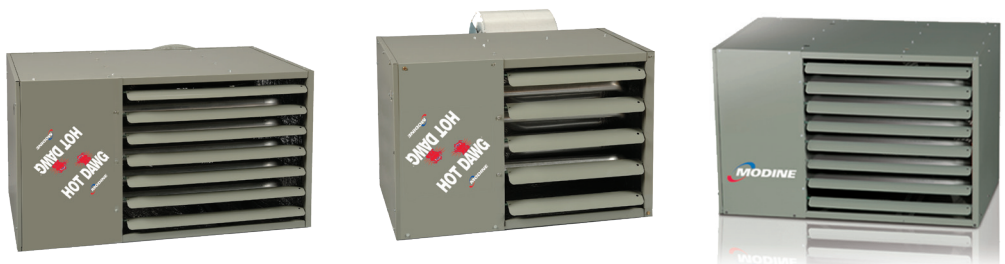




GAS-FIRED UNIT HEATERS RESIDENTIAL, COMMERCIAL & INDUSTRIAL



POWER VENTED
HD, HDB, PDP, BDP, PTP, BTP



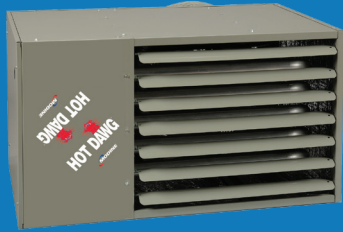
SEPARATED COMBUSTION
HDS, HDC, PTS, BTS



HIGH-EFFICIENCY SEPARATED COMBUSTION
PTC, BTC

GAS-FIRED, POWER-EXHAUSTED, PROPELLER

- 82% Thermal Efficiency (HD/PTP) • 83% Thermal Efficiency (PDP) • Horizontal or Vertical Venting • Field Convertible to Propane • 100% Shut-Off with Continuous Retry • Commercial or Residential Applications



MODEL HD



MODEL PDP



MODEL PTP

For applications requiring a low profile unit, Modine offers the Hot Dawg® unit heater. The Hot Dawg® may be installed in residential or commercial applications just one inch below the ceiling. The superior quality matched with the following features makes the Hot Dawg® unit heater an easy choice for a variety of applications:

- 82% thermal efficiency (HD/PTP), 83% thermal efficiency (PDP) for fuel savings.
- Uses natural or propane gas (field convertible from natural to propane gas).
- Certified for residential, commercial and industrial use.
- Lightweight, easily installs 1" from ceiling with only two angle brackets (standard on 30-75, accessory for 100-125).
- Install quickly and easily with knockouts for quick access to gas and electricity.
- The standard power exhauster allows the unit to be vented vertically or horizontally and is designed to use the smallest diameter vent pipe possible.
- Permanently-lubricated motor for trouble-free dependability.
- Full 10-year warranty on heat exchanger.
- Available in both propeller fan and centrifugal blower configurations.

The PDP propeller, power vented gas-fired unit heater is a product that is inexpensive to install, easy to use, and offers excellent in-service economy. The PDP model series expands on the size range of the HD model series providing product that is certified for commercial and industrial applications in sizes from 150 through 400MBH.

For blower model data, see page 6.

Table 2.1 - Propeller Unit Model HD and PDP General Performance Data

	Model HD Sizes						Model PDP Sizes						
	30	45	60	75	100	125	150	175	200	250	300	350	400
Btu/Hr Input ①	30,000	45,000	60,000	75,000	100,000	125,000	150,000	175,000	200,000	250,000	300,000	350,000	400,000
Btu/Hr Output ①	24,600	36,900	49,200	61,500	82,000	102,500	124,500	145,250	166,000	207,500	249,000	290,500	332,000
Entering Airflow (CFM) @ 70°F	505	720	990	1160	1490	1980	2180	2550	2870	3700	4460	4870	5440
Air Temp. Rise (°F)	44	46	45	48	50	47	51	51	52	50	50	53	54
Max. Mounting Height (Ft.) ②	10	10	12	14	12	16	16	17	15	19	21	20	19
Heat Throw (Ft.) @ Max Mtg Ht ③	25	27	36	38	42	56	55	59	51	67	74	70	69

The PTP features a stainless steel tubular heat exchanger as STANDARD on all units with a 10-year heat exchanger warranty, providing customers with a peace of mind. Users of the PTP will also benefit from a low profile design that allows quick and easy installations.

Table 2.2 - Propeller Unit Model PTP General Performance Data

	Model PTP Sizes						
	150	175	200	250	300	350	400
Btu/Hr Input ①	150,000	175,000	200,000	250,000	300,000	350,000	400,000
Btu/Hr Output ①	123,000	143,500	164,000	205,000	246,000	287,000	328,000
Entering Airflow (CFM) @ 70°F	2140	2725	2870	3995	4545	5280	5995
Air Temp. Rise (°F)	53	48	52	47	50	50	51
Max. Mounting Height (Ft.) ②	15	14	15	18	19	18	21
Heat Throw (Ft.) @ Max Mtg Ht	51	50	53	62	69	65	74

① 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 use of a high altitude kit.

② 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. For units equipped with deflector hoods.

DO NOT LOCATE ANY GAS-FIRED UNIT IN AREAS WITH CHLORINATED, HALOGENATED, OR ACIDIC VAPORS IN ATMOSPHERE.



Request Catalog 6-189 For Complete Technical Information and Specifications.

GAS-FIRED, SEPARATED COMBUSTION, PROPELLER

- 100% Outside Air for Combustion • Separated Compartment Protects Combination Gas Control, Ignition Control, Manifold and Burner • Horizontal or Vertical Concentric Venting • 82% Thermal Efficiency
- 100% Shut-Off with Continuous Retry • Certified for Commercial or Residential Applications



MODEL HDS



MODEL PTS

The separated combustion models HDS and PTS draw 100% of their combustion air from outside to ensure that the unit will always have plenty of fresh, clean air to breathe. This fresh-air supply reduces common concerns about maintenance, performance, and durability in dusty, dirty, or humid applications. In addition, by drawing the combustion air from the outside, the overall heating efficiency is increased. In short, the separated combustion units give you the added advantages of:

- 82% thermal efficiency for fuel savings.
- A separated compartment protects the combination gas valve, ignition control, manifold, and burner from the environment.
- External gas connections.
- Uses natural or propane gas (field convertible from natural to propane gas).
- Certified for residential (30-125MBH), commercial and industrial use (30-400MBH).
- Lightweight, easily installs 1" from ceiling with only two angle brackets (standard on 30-75, accessory for 100-125).
- Install quickly and easily with knockouts for quick access to gas and electricity.
- Standard power exhaust simplifies side-wall or roof venting with small-diameter vent pipe.
- Horizontal or vertical two-pipe or concentric venting options.
- Permanently-lubricated motor for trouble-free dependability.
- Full 10-year warranty on heat exchanger.
- Available in both propeller fan and centrifugal blower configurations.

For blower model data, see page 6.

Table 3.1 - Propeller Unit Model HDS and PTS General Performance Data

	Model HDS Sizes						Model PTS Sizes						
	30	45	60	75	100	125	150	175	200	250	300	350	400
Btu/Hr Input ①	30,000	45,000	60,000	75,000	100,000	125,000	150,000	175,000	200,000	250,000	300,000	350,000	400,000
Btu/Hr Output ①	24,600	36,900	49,200	61,500	82,000	102,500	123,000	143,500	164,000	205,000	246,000	287,000	328,000
Entering Airflow (CFM) @ 70°F	505	720	990	1160	1490	1980	2140	2725	2870	3995	4545	5280	5995
Air Temp. Rise (°F)	44	46	45	48	50	47	53	48	52	47	50	50	51
Max. Mounting Height (Ft.) ②	10	10	12	14	12	16	15	14	15	18	19	18	21
Heat Throw (Ft.) @ Max Mtg Ht ②	25	27	36	38	42	56	51	50	53	62	69	65	74

① 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 use of a high altitude kit.
 ② 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. For units equipped with deflector hoods.



DO NOT LOCATE ANY GAS-FIRED UNIT IN AREAS WITH CHLORINATED, HALOGENATED, OR ACIDIC VAPORS IN ATMOSPHERE.

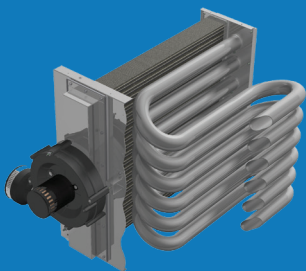
Request Catalog 6-175 For Complete Technical Information and Specifications.

GAS-FIRED, SEPARATED COMBUSTION, HIGH-EFFICIENCY CONDENSING

- 100% Outside Air for Combustion • Separated Compartment Protects Combination Gas Control, Ignition Control, Manifold and Burner • Conservicore® Secondary Heat Exchanger • Horizontal or Vertical Concentric Venting
- 93% Thermal Efficiency • Direct Spark Ignition • 100% Shut-Off with Continuous Retry



MODEL PTC



MODINE CONSERVICORE® HEAT EXCHANGER



Up to 97% thermal efficiency, Modine's Effinity⁹³ condensing unit heater features the highest efficiency available in North America for commercial and industrial, as well as residentially certified (sizes 110 and smaller) gas-fired unit heaters. This industry leading efficiency is a result of the coupling of our Conservicore® secondary heat exchanger technology with our robust tubular primary heat exchanger design. The Conservicore® technology features a secondary recuperative heat exchanger fabricated from AL29-4C® stainless steel. This material is superior to other lower grades of stainless steel and aluminum, resulting in outstanding ability to withstand the corrosive environment of condensing gas fired equipment.

Available in ten model sizes with input ranges from 55,000 to 310,000 Btu/Hr, Modine offers application flexibility unmatched in the industry. The separated combustion units draw combustion air from outside to ensure that the unit will always have plenty of fresh, clean air for combustion while increasing the overall heating efficiency. Venting material to be used is PVC, an extremely cost effective vent system.

- Up to 97% thermal efficiency for fuel savings.
- Factory installed Building Management Board provides an RS485 interface between the unit heater and existing building networks.
- A separated compartment protects the combination gas valve, ignition control, manifold, and burner from the environment.
- External gas connections.
- Uses natural or propane gas (field convertible from natural to propane gas).
- Certified for residential (55-110MBH), commercial, and industrial use.
- Standard Contractor Convenience Package with diagnostic LEDs, disconnect switch, and condensate pump outlet.
- Standard power exhaust simplifies side-wall or roof venting with small-diameter pipe.
- Horizontal or vertical two-pipe or concentric venting options.
- Permanently lubricated motor for trouble-free dependability.
- Full 10-year warranty on both heat exchangers.

Table 4.1 - Propeller Unit Heater Model PTC General Performance Data

	PTC Model Sizes									
	55	65	85 ③	110 ③	135	156	180	215	260	310
Btu/Hr Input ①	55,000	65,000	85,000	110,000	135,000	155,000	180,000	215,000	260,000	310,000
Btu/Hr Output ①	51,150	60,450	79,050	102,300	125,500	144,150	167,400	199,950	241,800	288,300
Condensate Production (Gal/Hr)	0.3	0.4	0.5	0.7	1.0	1.1	1.3	1.6	1.9	2.3
Entering Airflow (CFM) @ 70°F ②	1097	1141	1650	1750	2160	2600	3020	3865	4585	5400
Air Temp Rise (°F)	43	49	44	54	54	51	51	48	49	49
Max. Mounting Height (Ft.) ②	12	12	13	13	14	18	15	17	20	19
Heat Throw (Ft.) @ Max. Mtg. Ht.	43	43	48	46	51	62	53	60	70	67

① 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 use of a high altitude kit.

② Data taken at 65°F ambient and unit fired at full-rated input. Mounting height as measured from bottom of unit, and without deflector hoods.

③ Also certified for residential installations.

④ AL29-4C is a Registered Trademark of Allegheny Ludlum Corporation.

⑤ Effinity⁹³, Conservicore®, and any combination of these names either together or with other words is trademarked by Modine Manufacturing Co.

Heaters are designed for use in heating applications with ambient temperatures between 40°F and 80°F. Heaters should not be used in applications where the heated space temperature is below 40°F. The combination of low space and combustion air temperatures may result in condensate freezing in the secondary heat exchanger and/or condensate drain.

DO NOT LOCATE ANY GAS-FIRED UNIT IN AREAS WITH CHLORINATED, HALOGENATED, OR ACIDIC VAPORS IN ATMOSPHERE.

Request Catalog 6-170 For Complete Technical Information and Specifications.





Figure 5.1 - U.S. Average Heat Load Hours Map

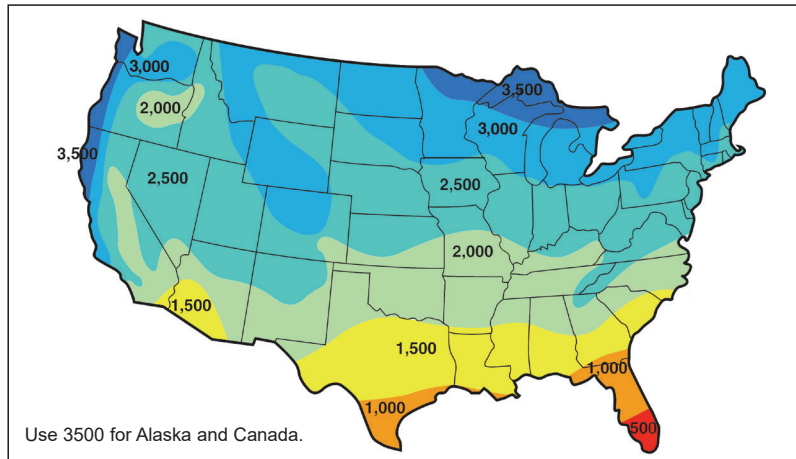


Table 5.1 - Estimated Annual Fuel Cost Savings Using the Effinity® Condensing Unit Heater

		Estimated Annual Savings Against Other Equipment ① ②			
		Gravity Vented		Power Vented	
Design Heat Load (Btu/Hr):		120,000	280,000	120,000	280,000
Annual Heat Load Hours (refer to Figure 5.1)	500	\$306	\$713	\$136	\$318
	1000	\$611	\$1,427	\$273	\$637
	1500	\$917	\$2,140	\$409	\$955
	2000	\$1,223	\$2,853	\$546	\$1,274
	2500	\$1,529	\$3,567	\$682	\$1,592
	3000	\$1,834	\$4,280	\$819	\$1,911
	3500	\$2,140	\$4,993	\$955	\$2,229

① Based on a natural gas rate of \$1.10/Therm. Actual realized savings can vary significantly based on a number of changing factors including, but not limited to, fuel prices, climate, building use or construction, etc.

② Compares 93% efficient against 65% seasonal efficient gravity vented and 78% seasonal efficient power vented.

Table 5.2 - Effinity® PTC260 (260,000 BTU/hr) vs. Comparable Power-Vented Unit Heater ①

Uses Less Natural Gas for Fewer CO ₂ Emissions			
City	Annual Gas Savings	Equivalent Urban Trees Planted	Pounds of CO ₂ Saved
Chicago, IL	\$914	154 trees	13,261
Las Vegas, NV	\$325	58 trees	4,945
Minneapolis, MN	\$903	187 trees	16,099
Nashville, TN	\$555	88 trees	7,350
Oklahoma City, OK	\$656	96 trees	8,278
Philadelphia, PA	\$916	118 trees	10,131
Portland, OR	\$671	109 trees	9,328

① Savings are realized by comparing the Effinity^{93%} BTU/hr output to a 78% seasonally efficient power-vented heater. Savings were determined by applying appropriate degree days at 65 degrees indoor design temperature under full year, 24/7 operation to each state's 2012 average price/therm of gas.

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Request Catalog 6-170 For Complete Technical Information and Specifications.



GAS-FIRED, BLOWER MODELS



MODEL HDB



MODEL BDP



MODEL BTS



MODEL BTC



MODEL BTP



Blower unit heaters are designed for both heating and ventilating. All Modine gas-fired unit heater types can be equipped with blowers, including our Hot Dawg® low-profile residential garage heaters and the Effinity^{93®}. In fact, the Effinity^{93®} is the only high efficiency gas-fired unit heater in North America with this option available.

These units can be used in a variety of ways:

- Ducting air in from adjacent spaces for ventilation.
- Protecting units from corrosive spaces by mounting them remotely and ducting in warm air.
- Where quietness is important, blower fans are lower-noise and can be ducted, unlike propeller units.
- Deflector hoods can be used in areas with higher mounting heights.

Table 6.1 - Power-Exhausted Blower Unit Model HDB and BDP General Performance Data

	Model HDB Sizes				Model BDP Sizes						Model BTP Sizes								
	60	75	100	125	150	175	200	250	300	350	400	150	175	200	250	300	350	400	
Btu/Hr Input ①	60,000	75,000	100,000	125,000	150,000	175,000	200,000	250,000	300,000	350,000	400,000	150,000	175,000	200,000	250,000	300,000	350,000	400,000	
Btu/Hr Output ①	49,200	61,500	82,000	102,500	123,000	143,500	164,000	205,000	246,000	287,000	328,000	123,000	143,500	164,000	205,000	246,000	287,000	328,000	
Entering Airflow Range (CFM)	635-1111	794-1389	1140-2116	1235-2058	1587-2778	1852-3241	2116-3704	2646-4630	3175-5556	3704-6481	4233-6584	1587-2778	1852-3241	2116-3704	2646-4630	3175-5556	3704-6481	4233-7407	
Outlet Velocity (FPM)	437-726	546-908	443-781	488-773	869	892	773	966	1026	1037	1008								
Air Temp. Rise (°F)	40-70	40-70	35-65	45-75	40-70	40-70	40-70	40-70	40-70	40-70	40-70	40-70	40-70	40-70	40-70	40-70	40-70	40-70	
Max. Mounting Height (Ft.) ②	7-13	7-16	8-19	8-17	14	15	13	16	18	19	19	14	8-18	9-21	10-22	11-26	11-26	13-29	
Heat Throw (Ft.) @ Max Mtg Ht ③	20-45	24-57	27-68	27-59	49	52	47	58	64	67	68	33-75	28-65	32-78	34-78	40-94	39-90	44-102	

Table 6.2 - Separated Combustion Blower Unit Model HDC and BTS General Performance Data

	Model HDC Sizes				Model BTS Sizes							
	60	75	100	125	150	175	200	250	300	350	400	
Btu/Hr Input ①	60,000	75,000	100,000	125,000	150,000	175,000	200,000	250,000	300,000	350,000	400,000	
Btu/Hr Output ①	49,200	61,500	82,000	102,500	123,000	143,500	164,000	205,000	246,000	287,000	328,000	
Entering Airflow Range (CFM)	635-1111	794-1389	1140-2116	1235-2058	1587-2778	1852-3241	2116-3704	2646-4630	3175-5556	3704-6481	4233-7407	
Air Temp. Rise (°F)	40-70	40-70	35-65	45-75	40-70	40-70	40-70	40-70	40-70	40-70	40-70	
Max. Mounting Height (Ft.) ②	7-13	7-16	8-19	8-17	9-21	8-18	9-21	10-22	11-26	11-26	13-29	
Heat Throw (Ft.) @ Max Mtg Ht ③	20-45	24-57	27-68	27-59	33-75	28-65	32-74	34-78	40-94	39-90	44-102	

Table 6.3 - Separated Combustion, High-Efficiency Condensing Blower Unit Heater Model BTC General Performance Data

	Model BTC Sizes		
	215	260	310
Btu/Hr Input ①	215,000	260,000	310,000
Btu/Hr Output ①	199,950	241,800	288,300
Condensate Production (Gal./Hr.)	1.6	1.9	2.3
Entering Airflow Range (CFM)	2645-4628	3198-5597	3813-6674
Air Temp. Rise (°F)	40-70	40-70	40-70
Max. Mounting Height (Ft.) ③	9-22	11-26	11-26
Heat Throw (Ft.) @ Max. Mtg Ht	33-77	40-94	39-91

① 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 use of a high altitude kit.

② 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.

③ Data taken at 65°F ambient and unit fired at full-rated input. Mounting height as measured from bottom of unit, and without deflector hoods.

DO NOT LOCATE ANY GAS-FIRED UNIT IN AREAS WITH CHLORINATED, HALOGENATED, OR ACIDIC VAPORS IN ATMOSPHERE.

Request Catalog 6-189 (HDB, BDP, BTP), 6-175 (BTS) and 6-170 (BTC) For Complete Technical Information and Specifications.

STANDARD FEATURES AND FACTORY OPTIONS

Table 7.1 - Standard Features and Factory Options

Feature	Model					Model					Model		
	HD	HDB	PDP	BDP	PTP	HDS	HDC	PTS	BTS	BTP	PTC	BTC	
Cabinet and Air Mover	Aluminized steel cabinet (gauge indicated)	22 ga.	22 ga.	20 ga.	20 ga.	20 ga.	22 ga.	22 ga.	20 ga.	20 ga.	20 ga.	20 ga.	20 ga.
	Low profile casing design	*	*				*	*					
	Baked-on polyester powder paint for durability and corrosion resistance	*	*	*	*	*	*	*	*	*	*	*	*
	Adjustable air-deflector blades	*	*	*	*	*	*	*	*	*	*	*	*
	Fans engineered for quiet operation	*	*	*	*	*	*	*	*	*	*	*	*
	Totally enclosed fan/blower motors (model sizes 100 and above)	*	*	*	*	*	*	*	*	*	*	*	*
	Fingerproof fan guard (standard on sizes 125 and below)	*	*	Opt		*	*	*	Opt			Opt	
	Two L-shaped mounting brackets (standard on 30-75, optional on 85-125)	*	*				*	*				*	
	Adjustable mounting brackets for level hanging			*	*								
	Hinged tool-less bottom pan entry			*	*								
Adjustable motor sheaves, certified to 0.7" W.C. external static pressure				*					*	*		*	
Heat Exchanger and Burner	efficiency %	82%	82%	83%	82%	82%	82%	82%	82%	82%	93%	93%	
	93% minimum thermal efficiency										*	*	
	Aluminized steel heat exchanger (409 stainless steel optional)	*	*	*	*	SS Std	*	*	*	*	SS Std	*	*
	Tubular heat exchanger	*	*			*	*	*	*	*	*	*	*
	In-shot burner on each heat exchanger tube for reliable performance, ease of serviceability, and low sound level on flame ignition/extinction	*	*			*	*	*	*	*	*	*	*
	Aluminized steel burner (409 stainless steel optional)			*	*								
	Modine Conservicore® Technology on secondary recuperative heat exchanger with AL29-4C® stainless steel material as standard											*	*
Controls	CSA or ETL certification for commercial and industrial use in the US and Canada	*	*	*	*	*	*	*	*	*	*	*	
	CSA or ETL certification for residential use in the US and Canada	*	*				*	*				55-110	
	Factory-installed power exhauster	*	*	*	*	*	*	*	*	*	*	*	
	Controls for natural gas (propane optional)	*	*	*	*	*	*	*	*	*	*	*	
	Single stage gas controls (two stage optional except for PTC/BTC)	*	*	*	*	*	*	*	*	*	*	*	
	Supply air high limit safety controls	*	*	*	*	*	*	*	*	*	*	*	
	Differential pressure switch for proof of venting	*	*	*	*	*	*	*	*	*	*	*	
	Flue gas high limit safety controls											*	
	Flame roll-out safety switch	*	*				*	*				55-110	
	Direct spark ignition with continuous retry control system	*	*			*	*	*	*	*	*	*	
	Intermittent pilot ignition with continuous retry control system			*	*								
	Control terminal board and low voltage terminal connections	*	*	*	*	*	*	*	*	*	*	*	
	Gas control step down transformer with 24V gas controls	*	*	*	*	*	*	*	*	*	*	*	
	Fan delay timer	*	*	*	*	*	*	*	*	*	*	*	
	Condensate drain overflow switch											*	
	Contractor convenience package featuring a condensate pump convenience outlet, unit on/off switch, heater function status indicator lights, and external terminals for thermostat wiring											*	
Factory install Building Management Control			Opt	Opt	Opt			Opt	Opt	Opt	*	*	



DO NOT LOCATE ANY GAS-FIRED UNIT IN AREAS WITH CHLORINATED, HALOGENATED, OR ACIDIC VAPORS IN ATMOSPHERE.

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

HVAC

- Unit Heaters:
 - Gas
 - Hydronic
 - Electric
 - Oil
- Ceiling Cassettes
- Duct Furnaces
- Hydronic Cabinet Unit Heaters, Fin Tube, Convectors
- Infrared Heaters
- Make-up Air Systems
- Unit Ventilators

Ventilation

- Packaged Rooftop Ventilation

School Products

- Vertical Packaged Classroom HVAC:
 - DX Cooling/Heat Pump
 - Water/Ground Source Heat Pump
 - Horizontal/Vertical Unit Ventilators

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



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GAS-FIRED HIGH AND LOW INTENSITY INFRARED HEATERS



MODEL IHR



MODEL OHP



MODEL IPT



This catalog describes the design and construction features and benefits, typical applications, dimensional data, and configurations available for the IHR and ITP Series.

Modine's IHR Series is a gas-fired, high intensity ceramic infrared heater. Ideal for spot heating, the IHR series offers simple gas and power connections, as well as inexpensive maintenance.

Modine's IPT Series sets the industry standard for low intensity infrared heating performance and installation versatility. The comfort and uniform heating provided by the IPT Series are second to none.

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 Specifications and Model Nomenclature - Model IPT 13

Infrared Heating Defined

Infrared heating systems rely upon the transfer of radiant energy from hot heat exchanger surfaces (up to 1850°F for high intensity heaters) through the air to cooler surfaces, without the use of an air mover. Since radiant energy always travels in a straight line from its source, people and objects within a direct line-of-sight of the heat exchanger become warmed immediately.

While capable of being used for total building heating or large area heating, they are ideally suited for spot heating applications. Spot heating involves small areas such as loading dock doors and single person work cells.

Advantages of Infrared Heating

- No air mover, reducing electricity and maintenance costs while increasing worker comfort from the absence of drafts and annoying fan noise.
- Quick temperature recovery, as only objects need to be heated, not large volumes of air.
- Significant energy savings through use of zone control and/or spot heating, which heats objects without the need to heat large air volumes.

Typical Applications

The following are examples of applications that can benefit from high-intensity infrared heating:

- Manufacturing facilities
- Vehicle repair centers
- Warehouses and loading docks
- Aircraft hangars
- Indoor tennis courts
- Indoor golf driving ranges
- Emergency vehicle garages
- Indoor stadium seating areas

The following are examples of applications that can benefit from low-intensity infrared heating:

- Manufacturing facilities
- Vehicle repair centers
- Warehouses and loading docks
- Aircraft hangars
- Tennis courts
- Car washes
- Golf driving ranges
- Covered walkways
- Emergency vehicle garages
- Stadium seating areas
- Vestibules

See Infrared Design and Engineering Guide 9-200 for additional application information.



Refer to page 3 for information regarding the Breeze® AccuSpec Sizing and Selection Program



! WARNING
 Do not locate ANY gas-fired unit in areas where chlorinated, halogenated or acid vapors are present in the atmosphere.

! WARNING
 Do not install in potentially explosive or flammable atmosphere laden with dust, sawdust, or similar airborne materials.

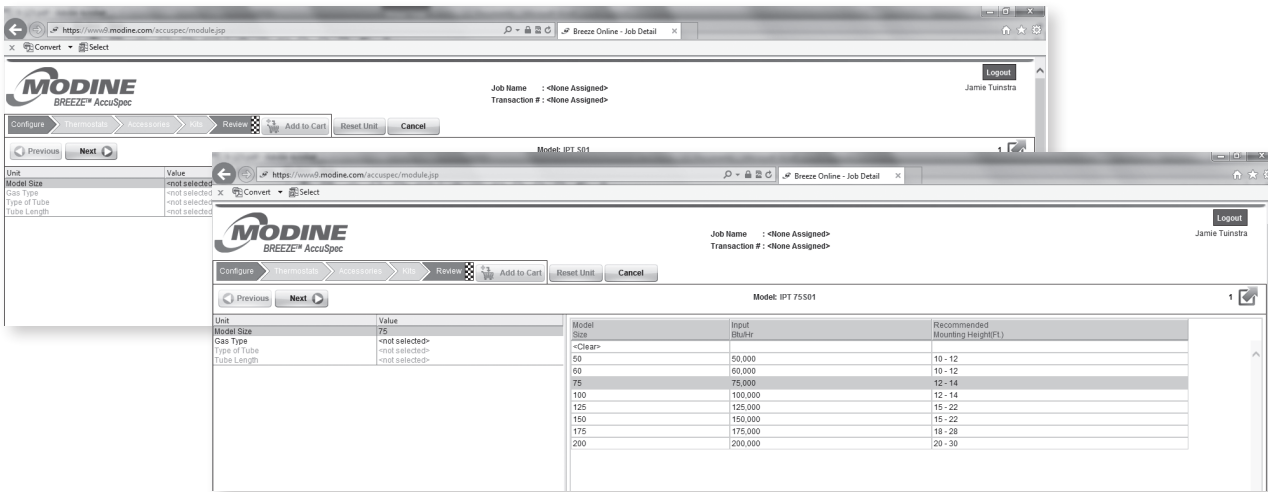
As Modine Manufacturing Company has a continuous product improvement program, it reserves the right to change design and specifications without notice.



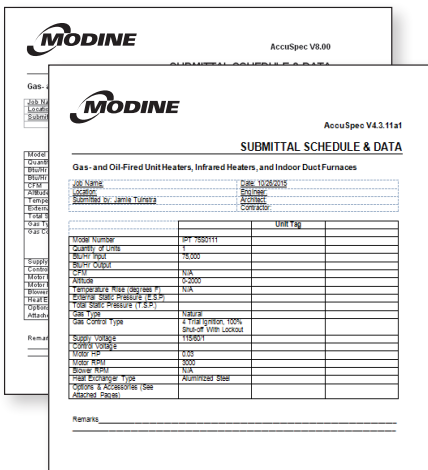
Modine Breeze® AccuSpec Sizing and Selection Program

The Modine Breeze® AccuSpec is the fastest way to generate performance data based on actual job conditions. The Breeze® AccuSpec program is a web-based sizing and selection program. The program provides a series of step-by-step questions that allow for the easy configuration of Modine products. After a model has been configured, the program can generate Submittal Schedules, Submittal Data (including performance and dimensional drawings), and Specifications.

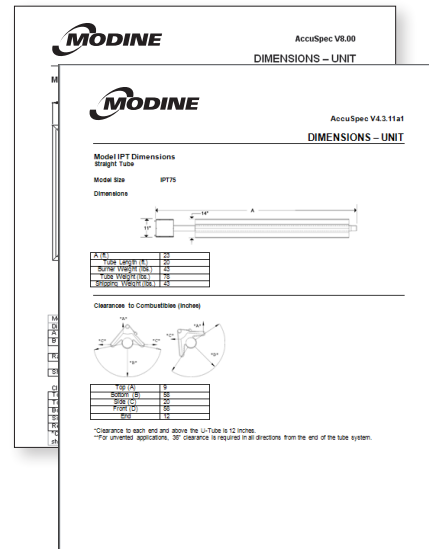
Fast and Simple Unit/Thermostat/Accessory Selection



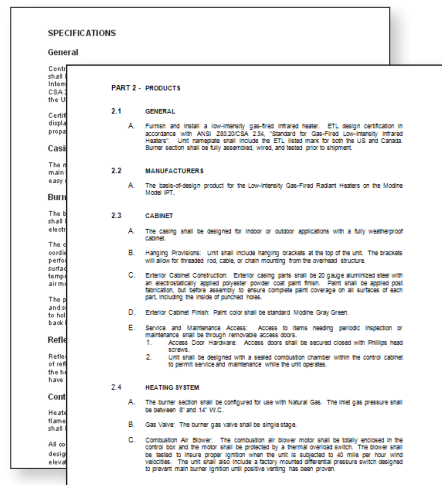
Submittal Schedules



Unit Specific Dimensional Drawings



Job Specific Specifications



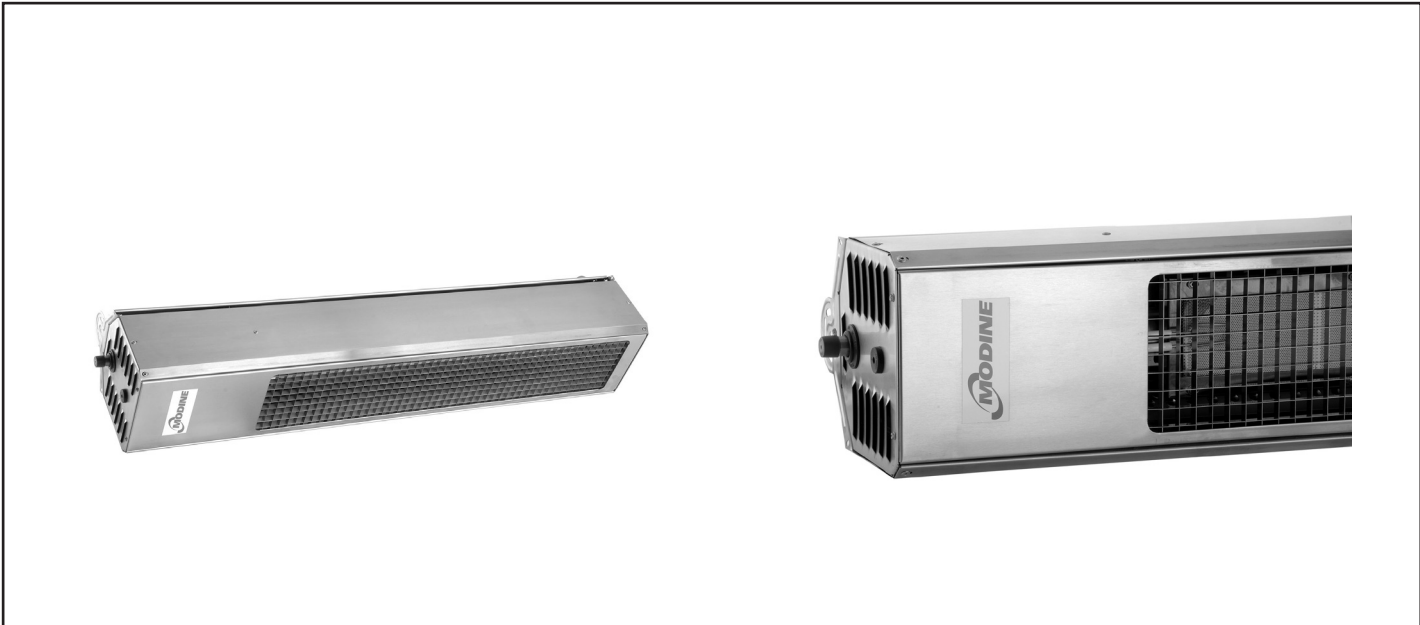
For access to the Breeze® AccuSpec program, contact your local Modine sales representative.

Figure 4.1 - Construction Features - Model IHR



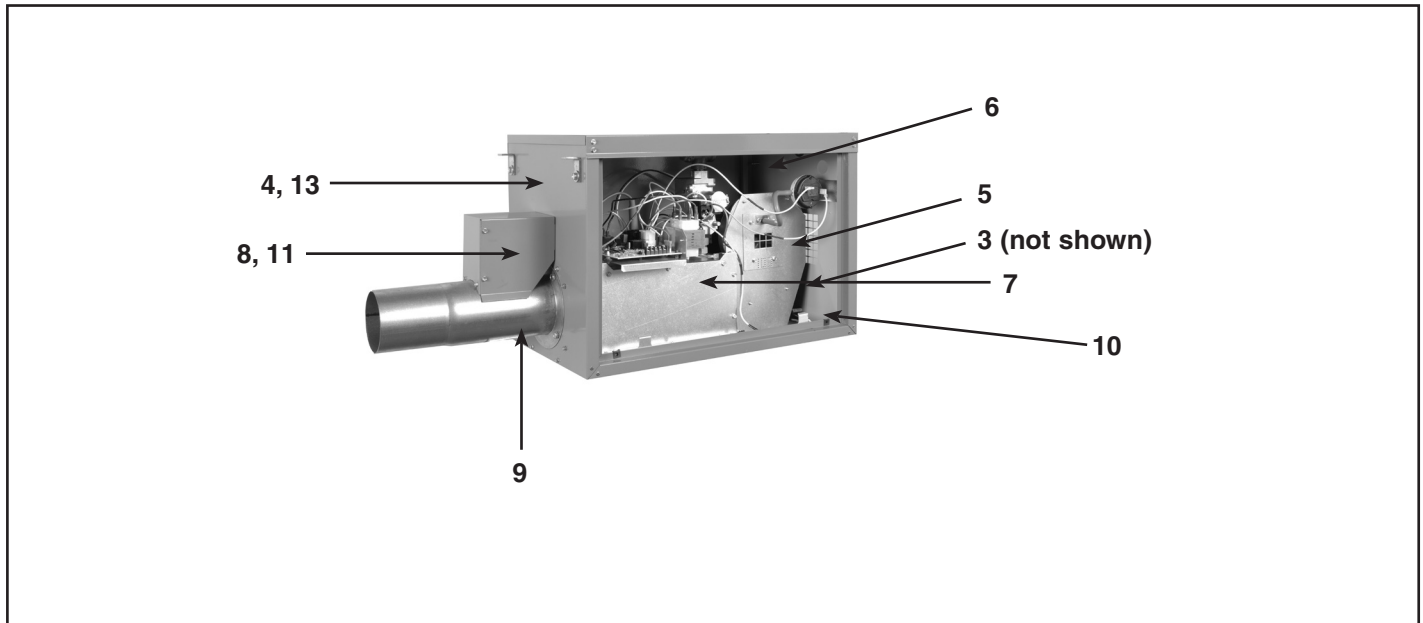
Features	Benefits
1. High temperature cordierite-based grooved ceramic tiles with perforations along both the top and bottom of the grooves	1. Increased temperature and surface area to provide maximum heat transfer while maintaining lower gas input ratings.
2. Polished aluminum reflectors	2. Efficiently direct radiant heat to the desired area, for increased comfort over wider areas.
3. 16 gauge aluminized steel frame	3. Provides support for simple chain mounting.
4. No air mover is utilized	4. Eliminates fan noise, drafts, maintenance and reduces electrical energy costs.
5. Input ranges from 30,000 Btu/hr through 160,000 Btu/hr in Natural or Propane gas	5. Wide input range to accommodate a variety of heating requirements
6. Direct spark or self-energizing standing pilot ignition	6. Maximize application flexibility.
7. 115V, 25V, or millivolt controls	7. Accommodate a wide range of electrical inputs.
8. Externally-mounted controls	8. Allow convenient access to gas valve, control system, transformer, and gas orifices, increasing ease of installation and service.
9. Burners are replaced by removing one fastener	9. Eliminates the removal of the unit from its mounted position for service.
10. CSA design certification for indoor, unvented operation in commercial and industrial installations	10. Assures that the unit conforms to national safety standards.

Figure 5.1 - Construction Features - Model OHP



Features	Benefits
1. ETL Design Certified to ANSI Z83.26 Standard	1. Assures that the unit conforms to national safety standards.
2. Decorative stainless steel windscreen eggcrate grille	2. Prevents wind disturbance.
3. Wind and rain protected design	3. Input range to accommodate a variety of heating requirements.
4. 31,000 and 34,000 BTU inputs.	4. Flexible fuel type offering.
5. No Fan Design.	5. Eliminates fan noise, drafts, maintenance and reduces electrical energy costs.
6. Externally-mounted controls	6. Allow convenient access to gas valve, control system, transformer, and gas orifices, increasing ease of installation and service.
7. Direct spark or self-energizing standing pilot ignition	7. Maximize application flexibility.
8. Brushed 430 Stainless Steel Housing	8. Provides maximum corrosion resistance.

Figure 6.1 - Construction Features



Features	Benefits
1. Heat-treated darkened aluminized steel tubes	1. Heat-treated darkening increases both radiant heat output for more heat near the end of the tube system and eliminates the scratching and flaking that can occur with painted tubes. Aluminized steel provides corrosion resistance for longer life.
2. Polished aluminum reflectors	2. Direct radiant heat from the tubes to the desired area, for increased comfort over wider areas.
3. Removable side-access panels on both sides of the burner box	3. Can be removed completely while accessing either side of the unit.
4. Durable polyester-powder paint	4. Maintains life-long new appearance.
5. Permanently-lubricated combustion blower motor	5. Reduces maintenance.
6. 180 degree-rotating gas valve	6. Allows convenient access from either side of the burner box.
7. Sealed burner compartment	7. Allows manifold pressure adjustments during unit operation, which increases ease of installation and service.
8. Flame sensor and ignitor mounted externally to the combustion chamber	8. Improve service access.
9. Flame observation window on underside of combustion chamber	9. Provides a convenient visual check of unit operation from ground level.
10. Gas valve operation light on back panel on the unit	10. Indicates that the combustion blower is operating.
11. Four-trial separate flame sensor	11. Provides reliable ignition.
12. System approval for vented and common vented installation	12. Maximizes installation flexibility.
13. Weatherproof, water-resistant casing	13. Maximizes application flexibility for both indoor and outdoor installation.
14. ETL design certification	14. Assures that the unit conforms to national safety standards.



Table 7.1 - Performance and Dimensional Data

Model	Gas Controls ③ ④	Input Rating (Btu/hr)		Recommended Mounting Height (ft.) ①		Dimensions (in) ②		Ship Wt. (lbs)	Radiating Area (sq. in.)
				Standard Reflector	Parabolic Reflector	A	B		
		Natural	Propane	30° Angle	30° Angle				
IHR 30	Single Stage or Millivolt	30,000		12 - 14	12 - 15	12 3/4	14 1/4	44	85
IHR 60	Single Stage or Millivolt	60,000		14 - 16	18 - 21	19 1/8	15 1/4	60	170
IHR 90	Single Stage or Millivolt	90,000		16 - 18	21 - 25	26 5/8	15 1/4	81	255
IHR 130	Single Stage or Millivolt	130,000		21 - 24	26 - 32	32	15 1/4	55	340
IHR 160	Single Stage or Millivolt	160,000		24 - 28	29 - 35	38 1/2	15 1/4	65	425

① See Table 8.1 for allowable mounting angles.

② See Figure 7.1.

③ Single stage controls are direct spark ignition with 100% safety shutoff and are available as either 115V or 24V

④ Millivolt thermostat and 35 feet of wire.

Figure 7.1 - Unit Dimensional Drawing

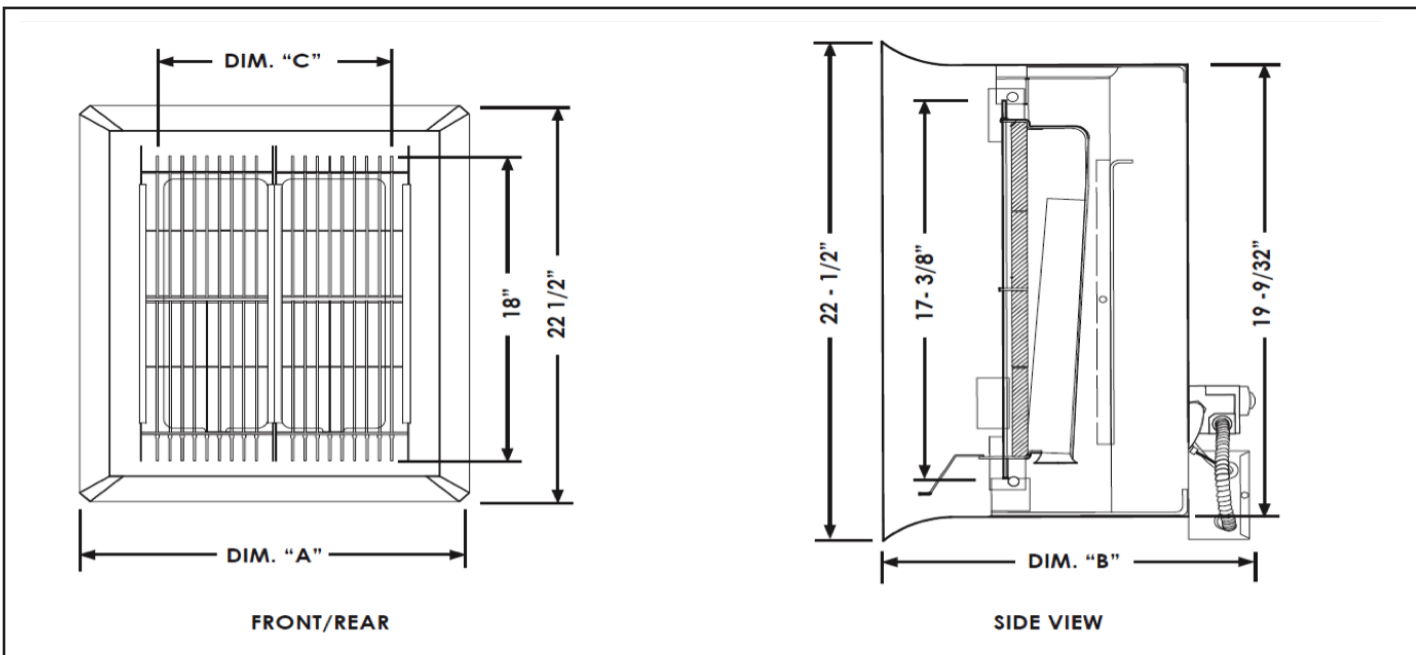


Table 8.1 - Allowable Mounting Angle Range

Model Size	Allowable Mounting Angle Range
30 – 160	20° – 35°

Table 8.2 - Clearances to Combustible Materials (See Figure 8.3)

Model Sizes	30	60	90	130	160
Side of Heater	30	32	48	48	50
Back of Heater	18	18	30	30	32
Top of Heater	28	40	42	52	60
Below Front	72	72 ^①	98	120	132

① Clearance is 80 in. when heater is fitted with a parabolic reflector.

Figure 8.3 - Clearances to Combustibles (See Table 8.2)

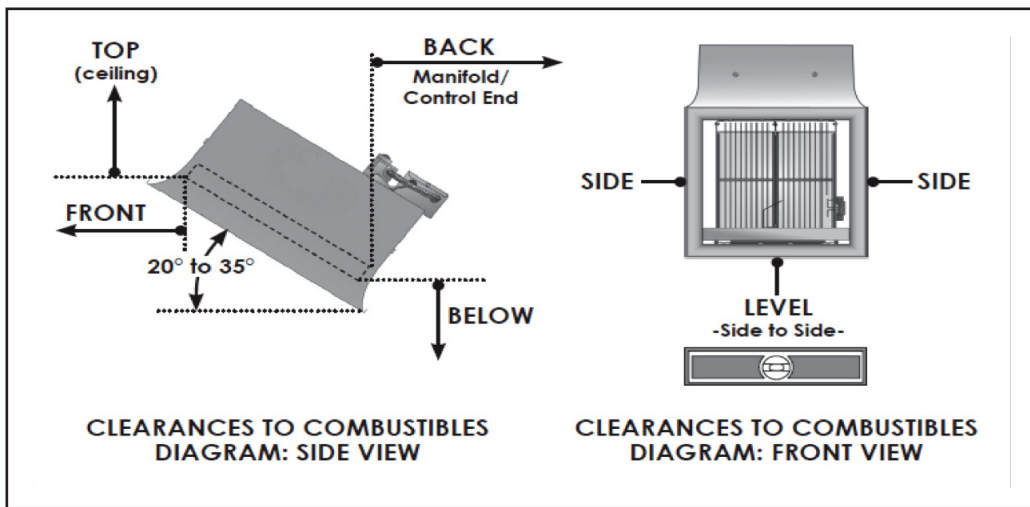




Table 9.1 - Performance and Dimensional Data

Model	Housing	BTU/Hr input	Ship Weight	Recommended Mounting Heights ①	Approx. Area Heated	Control Voltage
OHP 31	430 SS	31,000	59 lbs	8.0' to 12.0'	8' x 8'	24 vac
OHP 34	430 SS	34,000	59 lbs	8.5' to 13.0'	9' x 9'	24 vac

① Clearance is 80 in. when heater is fitted with a parabolic reflector.

Figure 9.1 - Unit Dimensional Drawing

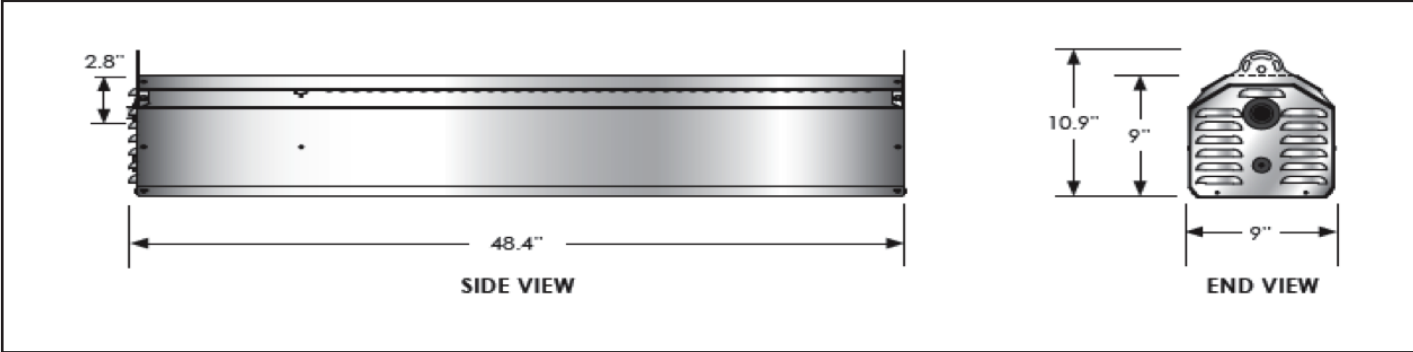


Table 9.2 - Clearances to Combustible Materials

Model Sizes	BTU'Hr	Voltage	Mounting Angle ①	Side	Back	Top	Below	End(s)	Front
31,000 (N,P)	31,000	24 vac	0°	18	N/A	13	48	12	N/A
			30°	N/A	18	18	40	12	36
34,000 (N)	34,000	24 vac	0°	18	N/A	13	48	12	N/A
			30°	N/A	18	18	40	12	36

① Heaters mounted on an angle between 1° to 30° must maintain clearances posted for 0° or 30°; whichever is greater.

Figure 9.2 - Clearance to Combustibles

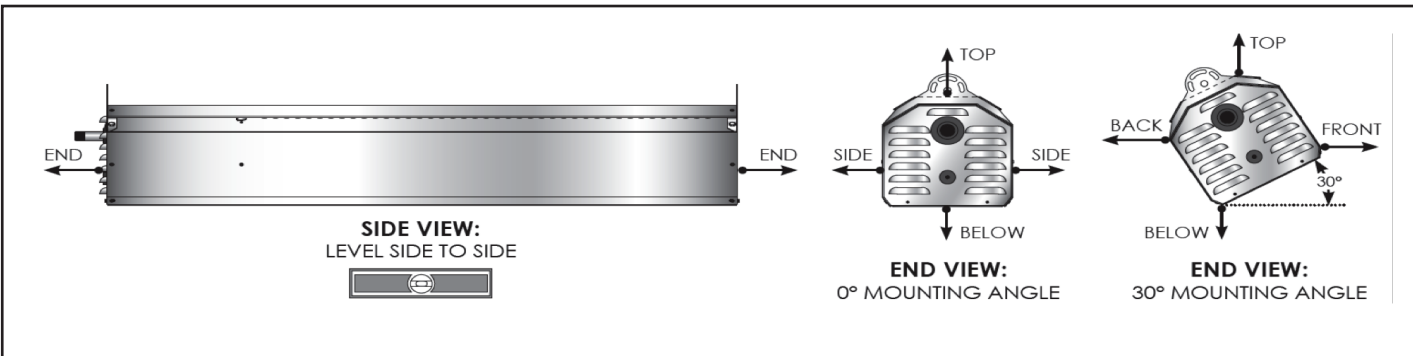


Table 10.1 - Performance

Input MBH	50	60	75	100	125	150	175	200
Certified Tube Lengths (ft.)	20, 30	20, 30, 40	20, 30, 40	30, 40, 50 ②	40, 50, 60	50, 60	50, 60, 70 ③	50, 60, 70 ③
Recommended Mounting Height (ft.) ①	10 – 12	10 – 12	12 – 14	12 – 14	15 – 22	15 – 22	18 – 28	20 - 30
Recommended Tube System Application ①	Spot or Area Heating	U-Tube						
	Total Building Heating	Straight Tube						

- ① Recommended Mounting Height and Tube System Applications are meant as a general guide and are adjusted to meet the requirements of the actual application. The applications are as follows:
 - Spot or Area Heating is an application where occupant comfort is the goal and occupant(s) are either relatively stationary (Spot - Example: small work cell or dispersed over a slightly wider range than with Spot Heating (Area - Example: assembly line). Mounting height is typically at the low end of the range shown above.
 - Total Building Heating is an application where average space temperature is to be maintained, however due to the significant temperature gradient differences on long straight tube systems, areas may exist where direct occupant comfort is not achieved.
- ② IPT 100 not available for Propane Gas operation at 50 ft. tube system length.
- ③ IPT 75 not available for Propane Gas operation at 40 ft. tube section length.

Table 10.2 - Utilities

Electrical Rating	Gas Connection (inch)	Minimum Gas Inlet Pressure (" W.C.)	Maximum Gas Inlet Pressure ("W.C.)	Manifold Gas Pressure (' W.C.)	Tube/Vent Diameter (inch)
60Hz/1Ph	1/2 NPT	7.0 (natural gas) 11.0 (propane gas)	14.0	3.5 (natural gas-single stage) 2.5 (natural gas-two stage) 10.0 (propane gas-single stage) 6.2 (propane gas-two stage)	4 (O.D.)

Table 10.3 - Combustible Material Clearances ① ② ③

IPT			
Combustible Material Clearances (inches)			
Input MBH	"A" ①	"B" ②	"C" ③
50/60	9	54	20
75/100/125	9	76	24
150/175/200	12	106	38

- ① Clearance to each end and above the U-Tube is 12 inches.
- ② In unvented applications, clearance from radiant tube end is 36" in all directions.
- ③ Refer to Figures 8.1 through 8.3.

Figure 10.2 - Stacking Height

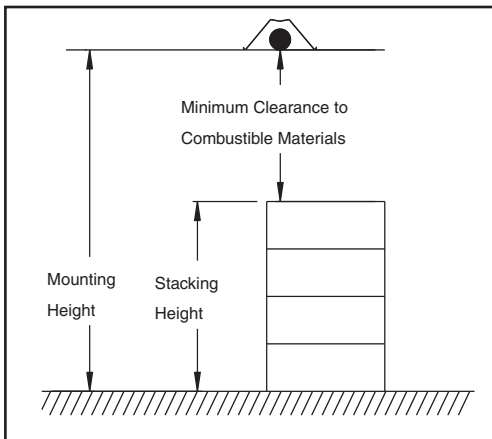


Figure 10.1 - Combustible Material Clearances - Straight Tube

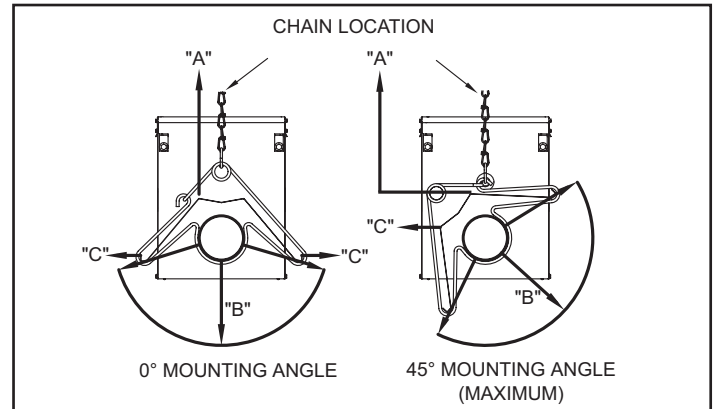


Figure 8.3 - Combustible Material Clearances - U-Tube

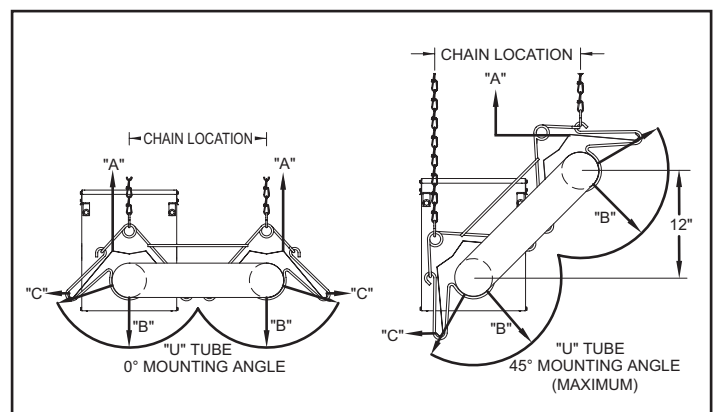


Figure 11.1 - Casing Dimensions

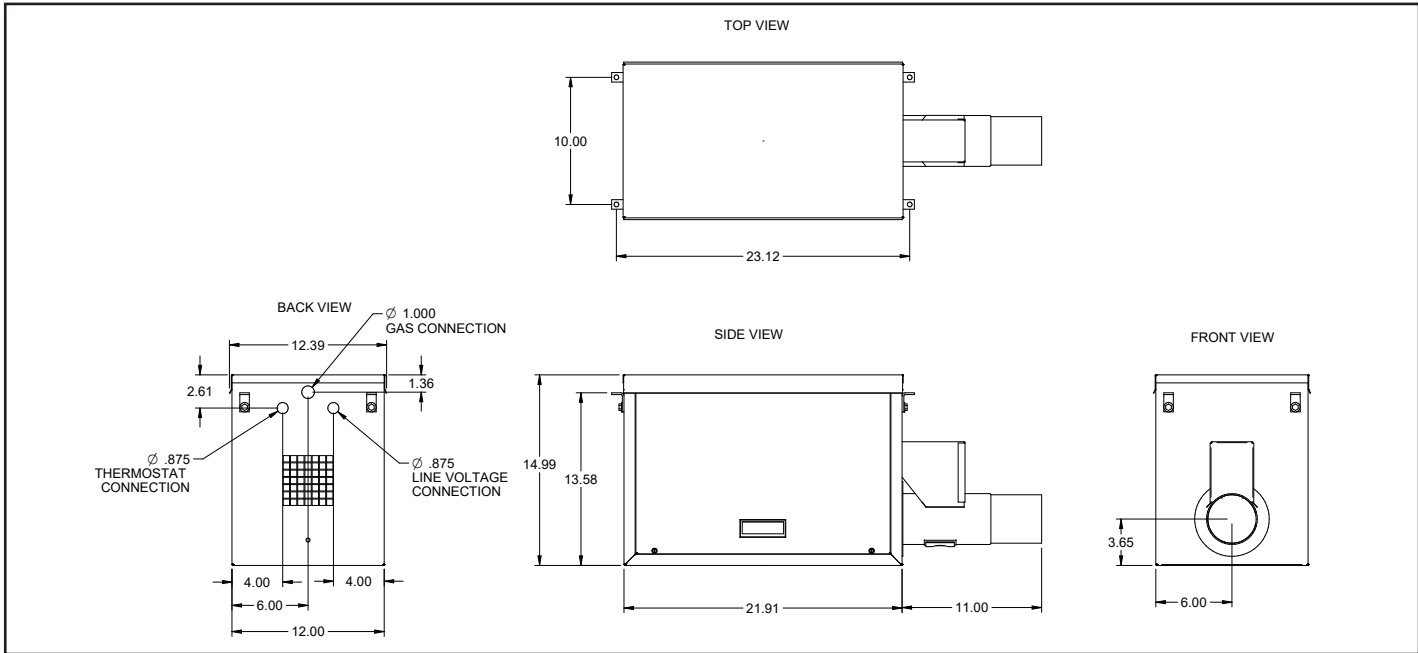


Figure 11.2 - Burner and Tube System Dimensions

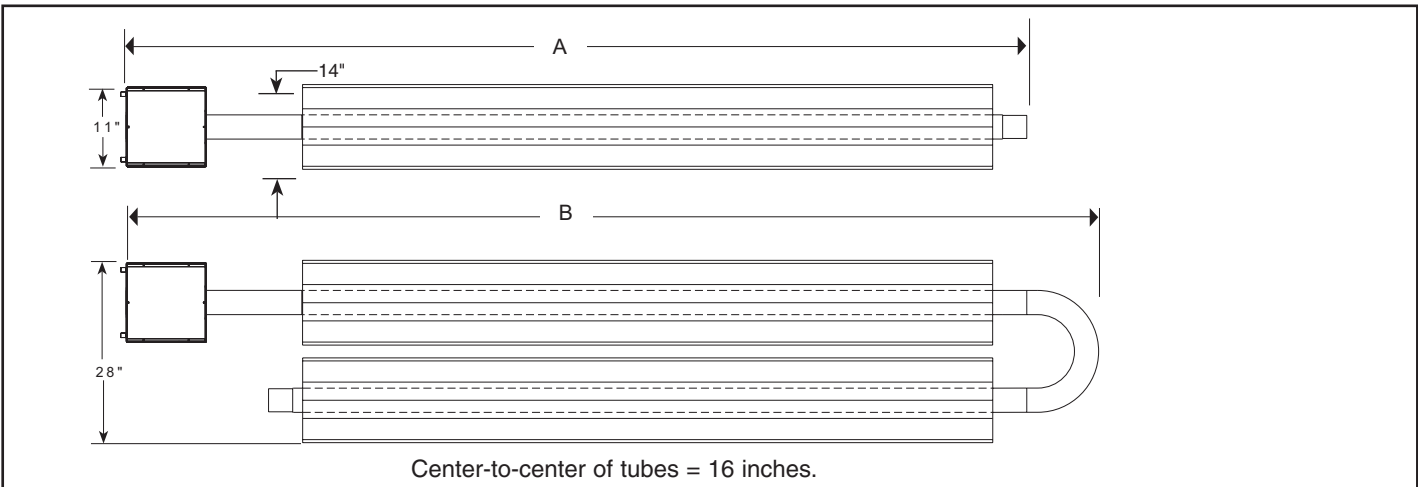


Table 11.1 - Tube Systems Data

Tube Length (ft.)	Straight Tube		U-Tube System	
	System Length "A" (ft.)	System Weight (lb.)	System Length "B" (ft.)	System Weight (lb.)
20	23	78	13	89
30	33	112	18	132
40	43	146	23	157
50	53	180	28	200
60	63	214	33	225
70	73	252	38	277

Table 11.2 - Burner Shipping Weights

Model	Shipping Wt. (lb.)
All Burners	43



General

The heater reflector housing shall be constructed of one-side bright polished aluminum. The emitter shall be composed of a perforated ceramic tile on which combustion takes place on the surface. The burner plenum shall be constructed of aluminized steel of one-piece drawn construction. The heater shall be of a modular design employing multiple burners to achieve the specified input.

- The venturi is constructed of stainless or aluminized steel.
- The secondary re-radiating rods shall be constructed of high temperature stainless steel alloy placed in close proximity of the ceramic burner face.
- Parabolic reflectors shall be used when units are installed in high mounting applications or when focusing of the infrared heating pattern is desirable.
- Protective screens shall be used in facilities where debris may damage the heater.

Burner

The ceramic burner face shall operate at a temperature range of 1660 degrees F to 1810 degrees F and shall incorporate a secondary re-radiating surface of stainless steel rods to obtain optimum operating temperature and radiant output.

Reflectors

The heater reflector housing shall be constructed of one-side bright polished aluminum. The emitter shall be composed of a perforated ceramic tile on which combustion takes place on the surface. The burner plenum shall be constructed of aluminized steel of one-piece drawn construction. The heater shall be of a modular design employing multiple burners to achieve the specified input.

- The venturi is constructed of stainless or aluminized steel.
- The secondary re-radiating rods shall be constructed of high temperature stainless steel alloy placed in close proximity of the ceramic burner face.
- Parabolic reflectors shall be used when units are installed in high mounting applications or when focusing of the infrared heating pattern is desirable.
- Protective screens shall be used in facilities where debris may damage the heater.

Controls

Heater(s) shall be equipped with (check one):

- Heaters shall be equipped with one of the following control systems:

Standing Manual Pilot System with 100% safety shut-off of pilot and main burner in case of pilot outage, operating with no external electrical connection but on milli-voltage generated by the pilot flame (NMV-2 or PMV-2).

Direct Spark Ignition System with direct spark ignition of the main burner through a solid state ignition module operating a spark electrode. Loss of power causes 100% safety shut-off of main burner(s). System operates on 120 or 24 volts (NFS-2 or PFS-2). 24V/60Hz/1ph with 6VA maximum power consumption.

Controls shall be exterior mounted for easy accessibility.

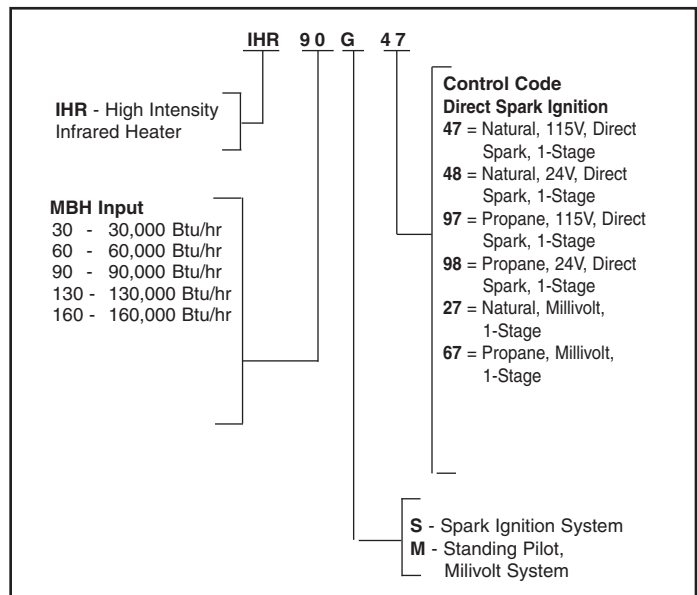
All controls shall be rated for a maximum inlet pressure of 1/2 PSI gas pressure. Controls shall be designed for Natural gas having a specific gravity of 0.60, a Btu content of 1050 Btu/ft³ (Alternate: Propane gas having a specific gravity of 1.53, a Btu content of 2500 Btu/ft³) at 0-2000 feet elevation.

Accessories

The following field installed accessories shall be included (check those that apply):

- Chain mounting set - 5' chain set with 4 "S" hooks. Preset mounting angle of 30°.
- Horizontal parabolic reflector - Directs rays directly downward. Can be used for matching horizontal mounting specifications.
- Full parabolic reflector - Directs rays in a more focused pattern. Typically used in high mounting applications.
- Full parabolic reflector with screen - Directs rays in a more focused pattern. Outer screen protects ceramic grids from objects striking the heater.
- DR heater screen - Screen slips on the outside of the reflectors and protects the ceramic grids.
- Warning plaque - Hung below heater, restates the clearance to combustible warning.

Figure 12.1 - Model Number Designations





General

Contractor shall furnish and install Modine model _____ low intensity infrared heater(s). The low intensity infrared system shall be straight tube _____, U-tube _____ configuration. Performance shall be as indicated on the equipment schedule in the plans. The infrared heater(s) shall be certified for indoor and outdoor installations. Infrared heater(s) shall have ETL design certification for use in both the US and Canada.

Casing

The controls, combustion air blower and burner shall be housed in a water-resistant casing, providing weatherproof protection. The burner and control box casing shall be constructed of not less than 20 gauge aluminized steel. After forming, the casing parts shall be cleaned of all oils and a phosphate coating applied prior to painting. The phosphated parts shall then be finished with an electrostatically applied, gray-green polyester powder paint finish. The applied polyester powder paint shall be baked on to provide an attractive finish on all of the exposed casing parts.

Heat Exchanger

The heat exchanger tubes and combustion chamber shall be constructed of 16 gauge, 4" O. D. aluminized steel, and the first combustion tube for gas inputs 150,000 Btuh and greater shall be 16 gauge 4" O. D. 409 Aluminized Stainless Steel. The last heat exchanger tube shall incorporate a turbulator baffle for maximum efficiency of heat transfer.

The heat exchanger tubes must be used in conjunction with reflectors. The reflector can be adjusted from 0° to 45° from the horizontal plane. Reflectors shall be of bright polished aluminum.

Controls

Input power to the infrared heater(s) shall be 115V/60Hz/1ph. Heater(s) shall be equipped with a direct four-trial (three re-trial), 100% shut-off electronic ignition control system with a separate flame sensor. Infrared heater(s) shall be equipped with a 115V/25V control transformer. Thermostat shall operate on 25V. Heater(s) will be equipped with a pre-purge mode, a differential pressure switch, and an indicator light to prove proper operation of the gas valve. All controls shall be rated for a maximum inlet pressure of 1/2 PSI gas pressure.

Controls shall be designed for natural _____, propane _____ gas having a specific gravity of _____, a Btu content of _____ Btu/ft³ at _____ feet elevation.

Motor

Each heater shall have a single motor. The combustion air blower motor shall be totally enclosed in the control box and the motor shall be protected by a thermal overload switch. The motor shall be .03 H.P., 115 volt, 60 Hz, single phase, with an operating speed of 3000 rpm.

Figure 13.1 - Model Number Designations

DIGIT SEQUENCE	1, 2, 3	4, 5, 6	7	8, 9	10, 11
MODEL NUMBER	IPT	200	S	01	11
MODEL PREFIX: IMPROVED PRESSURE TUBE: IPT	MODEL SIZE: MBH INPUT: 50, 60, 75, 100, 125, 150, 175, 200		IGNITION TYPE: S: DIRECT SPARK		CONTROL CODE: 11: SINGLE STAGE, NATURAL GAS 21: SINGLE STAGE, PROPANE GAS 12: TWO STAGE, NATURAL GAS 22: TWO STAGE, PROPANE GAS
				POWER CODE: 01: 115V/60HZ/1PH	

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

HVAC

- Unit Heaters:
 - Gas
 - Hydronic
 - Electric
 - Oil
- Ceiling Cassettes
- Duct Furnaces
- Hydronic Cabinet Unit Heaters, Fin Tube, Convectors
- Infrared Heaters
- Make-up Air Systems
- Unit Ventilators

Ventilation

- Packaged Rooftop Ventilation

School Products

- Vertical Packaged Classroom HVAC:
 - DX Cooling/Heat Pump
 - Water/Ground Source Heat Pump
 - Horizontal/Vertical Unit Ventilators

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



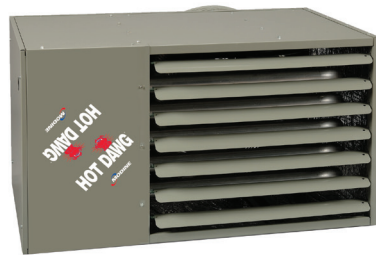
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GAS-FIRED POWER VENTED UNIT HEATERS PROPELLER & BLOWER MODELS



MODEL HD



MODEL HDB



MODEL PDP



MODEL BDP



MODEL PTP/BTP

Modine's power vented unit heaters are designed for the heating requirements of commercial and industrial buildings with select models available for residential garage heating as well.

For locations where negative pressure may be an issue or energy savings over older gravity vented units may be desired, Modine power vented gas fired unit heaters are your solution.

With 20 propeller and 11 blower model sizes available, the units cover a wide variety of applications with input ranges from 30,000 to 400,000 Btu/Hr in either natural or propane gas. This catalog describes the design benefits, construction features, performance data, unit selection procedure, and the optional and accessory devices available.

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 **WARNING**

Do not locate ANY gas-fired unit in areas where chlorinated, halogenated or acid vapors are present in the atmosphere.

 **DANGER**

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

As Modine Manufacturing Company has a continuous product improvement program, it reserves the right to change design and specifications without notice.



The Modine Breeze® AccuSpec is the fastest way to generate performance data based on actual job conditions. The Breeze® AccuSpec program is a web-based sizing and selection program. The program provides a series of step-by-step questions that allow for the easy configuration of Modine products. After a model has been configured, the program can generate Submittal Schedules, Submittal Data (including performance and dimensional drawings), and Specifications.

Tubular Heat Exchanger Power Vented Unit Heaters, 30-125MBH

For residential, commercial or industrial applications that require a low profile unit, Modine offers the Hot Dawg®. Capable of being installed just one inch below the ceiling, the superior quality of the Hot Dawg makes it a preferred choice for a variety of applications, including garages and workshops.

Figure 3.1 - Hot Dawg Propeller Unit Heater

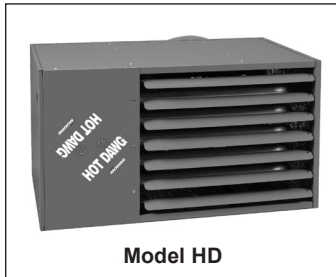
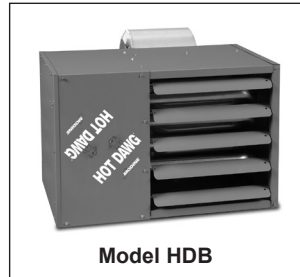


Figure 3.2 - Hot Dawg Blower Unit Heater



Power Vented Unit Heater, 150-400MBH

For commercial or industrial applications that require higher input ratings, the PDP/BDP and PTP are available in ratings that range from 150,000 to 400,000 Btu/Hr in either natural or propane gas.

Figure 3.3 - PDP/BDP Unit Heater

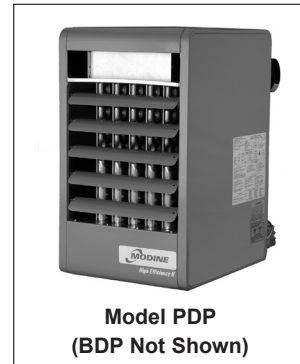


Figure 3.4 - PTP/BTP Unit Heater

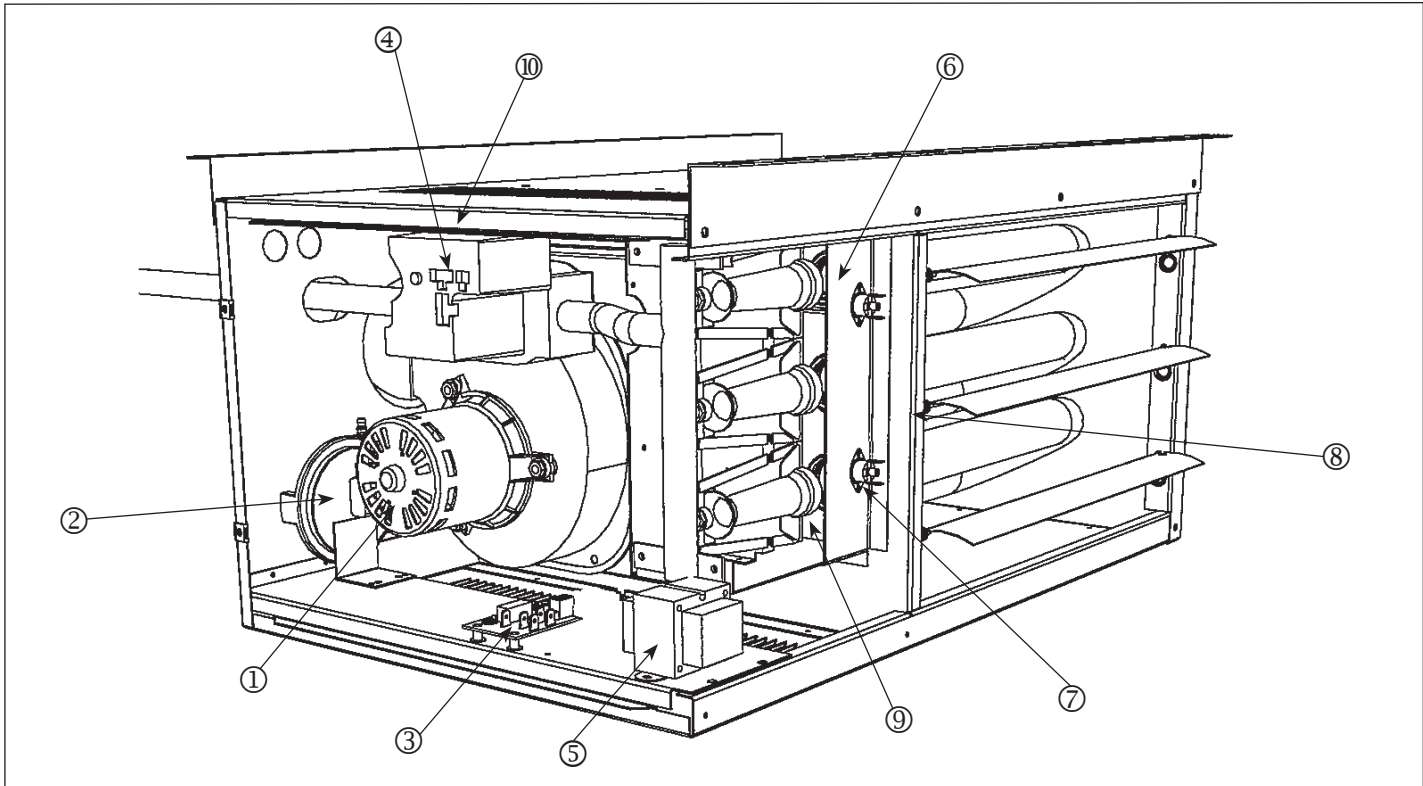


Table 3.1 - Standard Features and Factory Options ①

	Feature	Model					
		HD	HDB	PDP	BDP	PTP	BTP
Cabinet and Air Mover	Aluminized steel cabinet (gauge indicated)	22 ga.	22 ga.	20 ga.	20 ga.	20 ga.	20 ga.
	Low profile casing design	•	•				
	Baked-on polyester powder paint for durability and corrosion resistance	•	•	•	•	•	•
	Adjustable air-deflector blades	•	•	•	•	•	•
	Fans engineered for quiet operation	•	•	•	•	•	•
	Totally enclosed fan/blower motors (model sizes 100 and above)	•		•	•	•	•
	Fingerproof fan guard (optional on PDP and PTP units)	•	•	•		•	
	Two L-shaped mounting brackets (optional on sizes 100/125)	•	•				
	Adjustable mounting brackets for level hanging			•	•		
	Hinged tool-less bottom pan entry			•	•		
	Multi-tap 3-speed motors, certified to 0.8" W.C. external static pressure		•				
	Adjustable motor sheaves, certified to 0.5" W.C. external static pressure				•		•
Heat Exchanger and Burner	Efficiency %	82-83%	82%	83%	82%	82-83%	82%
	Aluminized steel heat exchanger (409 stainless steel optional)	•	•	•	•	409 SS	409 SS
	Tubular heat exchanger	•	•			•	•
	In-shot burner on each heat exchanger tube for reliable performance, ease of serviceability and low sound level on flame ignition/extinction	•	•			•	•
	Aluminized steel burner (409 stainless steel optional)			•	•		
Controls	ETL certification for commercial and industrial use in the US and Canada	•	•	•	•	•	•
	ETL certification for residential use in the US and Canada	•	•				
	Factory-installed power exhauster	•	•	•	•	•	•
	Contractor Convenience Box with Terminal Board, Unit On/Off Switch, and Indicator Light					•	•
	Single stage gas controls (two stage optional)	•	•	•	•	•	•
	High limit safety control	•	•	•	•	•	•
	Differential pressure switch for proof of venting	•	•	•	•	•	•
	Flame roll-out safety switch	•	•				
	Direct spark ignition with continuous retry control system	•	•			•	•
	Intermittent pilot ignition with continuous retry control system			•	•		
	Control terminal board and low voltage terminal connections	•	•	•	•	•	•
	Gas control step down transformer with 24V gas controls	•	•	•	•	•	•
	Fan delay timer	•	•	•	•	•	•
	Building Management System (BMS)		•	•	•	•	•

① See page 19 for Field Installed Accessories.

Figure 4.1 - Factory Mounted Standard and Optional Features (Models HD/HDB)



① **Power Exhauster (STD)**

All HD series (low profile) unit heaters are supplied with a round vent pipe connection.

② **Pressure Switch (STD)**

An automatic reset vent pressure switch is supplied on all HD series (low profile) unit heaters and is designed to prevent operation of the main burner in the event there is restricted venting of flue products. This restriction may occur due to an improper vent diameter, long vent runs, un-approved vent terminal, high winds, high negative pressure within space, etc. After the cause of the restriction has been corrected, the pressure switch will reset automatically. See the trouble shooting section of the installation and service manual for more information.

③ **Integrated Direct Spark Control Board (STD)**

The integrated direct spark ignition control combines all furnace control functions. The integrated board provides digital control of the air mover, inducer, ignition, gas valve and flame sense as well as monitoring the safety circuit at all times. The board includes LED diagnostics for trouble shooting and a fused power supply.

④ **Gas Valve - (See Table 18.2)**

a) **Single Stage Gas Valve - (STD)**

The main gas valve is factory installed on the unit heater gas train. The main gas valve provides regulator, main gas, and manual shutoff functions. The valve is redundant and provides 100% shut off.

b) **Two Stage Gas Valve - (OPT)**

The two-stage gas valve is factory installed on the unit heater gas train. The two stage gas valve provides the regulator, main gas (100% and 50% fire), and manual shutoff functions. The valve is redundant and provides 100% shut off.

⑤ **Control Step Down Transformer - (STD)**

The control step down transformer is located in the electrical junction box. The transformer is used to step down the supply power (115V, 208V, 230V, 460V, 575V) to 24V for the gas controls, fan delay relay, field supplied motor starter, etc. To determine the control transformer supplied as well as any accessory/field supplied transformers required, refer to Table 18.1

⑥ **Flame Sensor - (hidden, STD)**

Remote flame sensor verifies ignition of all burners, monitors the flame signal and communicates with the integrated circuit board.

⑦ **Flame Roll Out Switch - (STD)**

Flame roll out switches are mounted near the burners and will shut off the gas supply in the event of an unsafe flame roll out condition.

⑧ **Auto High Limit Switch - (hidden, STD)**

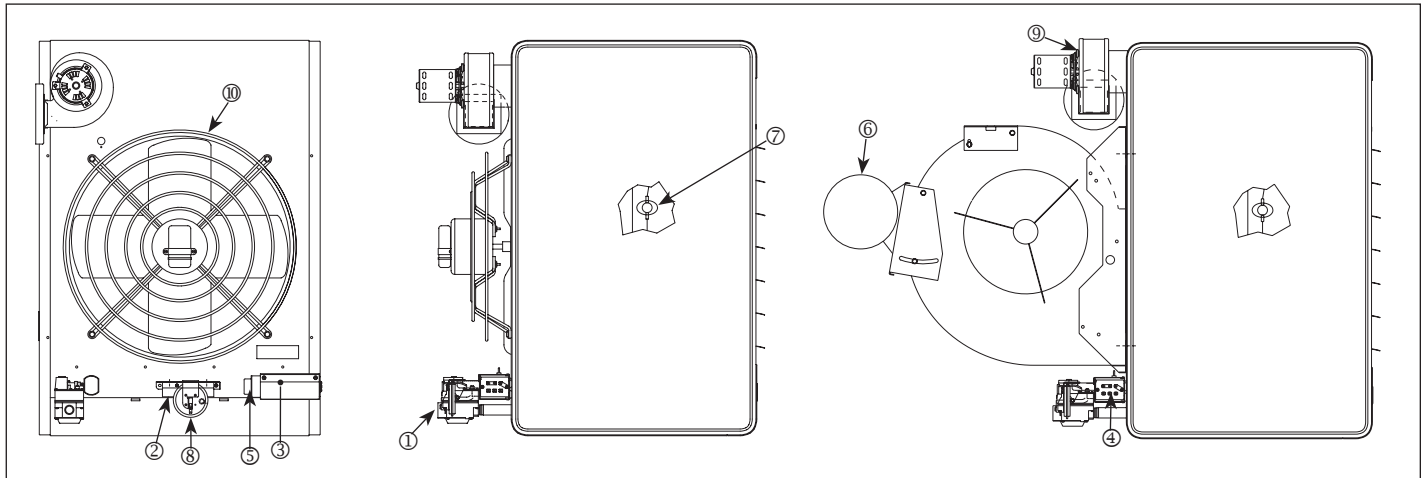
The limit control is mounted in the air stream and will shut off the gas supply in the event of overheating.

⑨ **Direct Spark Igniter - (hidden, STD)**

Provides spark for direct ignition of the burners.

⑩ **Manual Reset Control - (hidden, propeller 100-125 only)**

Figure 5.1 - Factory Mounted Standard and Optional Features (Models PDP/BDP)



All units include the standard (STD) features, and may include the optional (OPT) features shown.

① **Gas Valve (See Table 18.2)**

a) Single Stage Gas Valve - (STD)

The main gas valve is factory installed on the unit heater gas train. The main gas valve provides the pilot, regulator, main gas, and manual shutoff functions.

b) Two Stage Gas Valve - (OPT)

The two-stage gas valve is factory installed on the unit heater gas train. The two stage gas valve provides the pilot, regulator, main gas (100% and 50% fire), and manual shutoff functions. See the supplier literature included with the unit.

② **Ignition controller - (STD)**

The ignition controller is factory installed on the back of the unit heater with the spark igniter and sensor located on the burner. For both natural and propane gas units, the ignition controller is 100% shut-off with continuous retry. On a call for heat, the system will attempt to light the pilot for 70 seconds. If the pilot is not sensed for any reason, the ignition control will wait for approximately six minutes with the combination gas control closed and no spark. After six minutes, the cycle will begin again. After three cycles, some ignition controllers lockout for approximately one hour before the cycle begins again. This will continue indefinitely until the pilot flame is sensed or power is interrupted to the system.

③ **Time Delay Relay - (STD)**

The time delay relay is factory installed in electrical junction box. The time delay relay allows the gas controls to operate for approximately 30 to 90 seconds before the blower starts. This allows the heat exchanger a warm up period so that the initial delivered air is not cool. The time delay relay also keeps the motor running for approximately 30 - 90 seconds after the call for heat has been satisfied to remove the residual heat from the heat exchanger.

④ **Low Voltage Terminal Board - (STD)**

The low voltage terminal board is located in electrical junction box. The terminal board is labeled to match the electrical wiring diagram provided with the unit.

⑤ **Control Step Down Transformer - (STD)**

The control step down transformer is located in the electrical junction box. The transformer is used to step down the supply power (115V, 208V, 230V, 460V, 575V) to 24V for the gas controls, fan delay relay, field supplied motor starter, etc. To determine the control transformer supplied as well as any accessory/field supplied transformers required, refer to Table 18.1

⑥ **Blower Motor - (OPT)**

The blower motor is factory installed on the blower housing. The blower motor can be provided in a variety of supply voltages and motor horsepower. The blower motor is supplied with an adjustable sheave that can be used to increase/decrease the blower RPM.

⑦ **High Limit Switch - (STD)**

The automatic reset high limit switch is factory installed on the side of the unit heater. If the limit temperature is exceeded, the gas controls are de-energized until the switch is cooled.

⑧ **Pressure Switch (STD)**

A automatic reset vent pressure switch is supplied on all power vented unit heaters to prevent operation of the main burner in the event there is restricted venting of flue products. This restriction may occur due to an improper vent diameter, long vent runs, un-approved vent terminal, high winds, high negative pressure within space, etc. After the cause of the restriction has been corrected, the pressure switch will reset automatically.

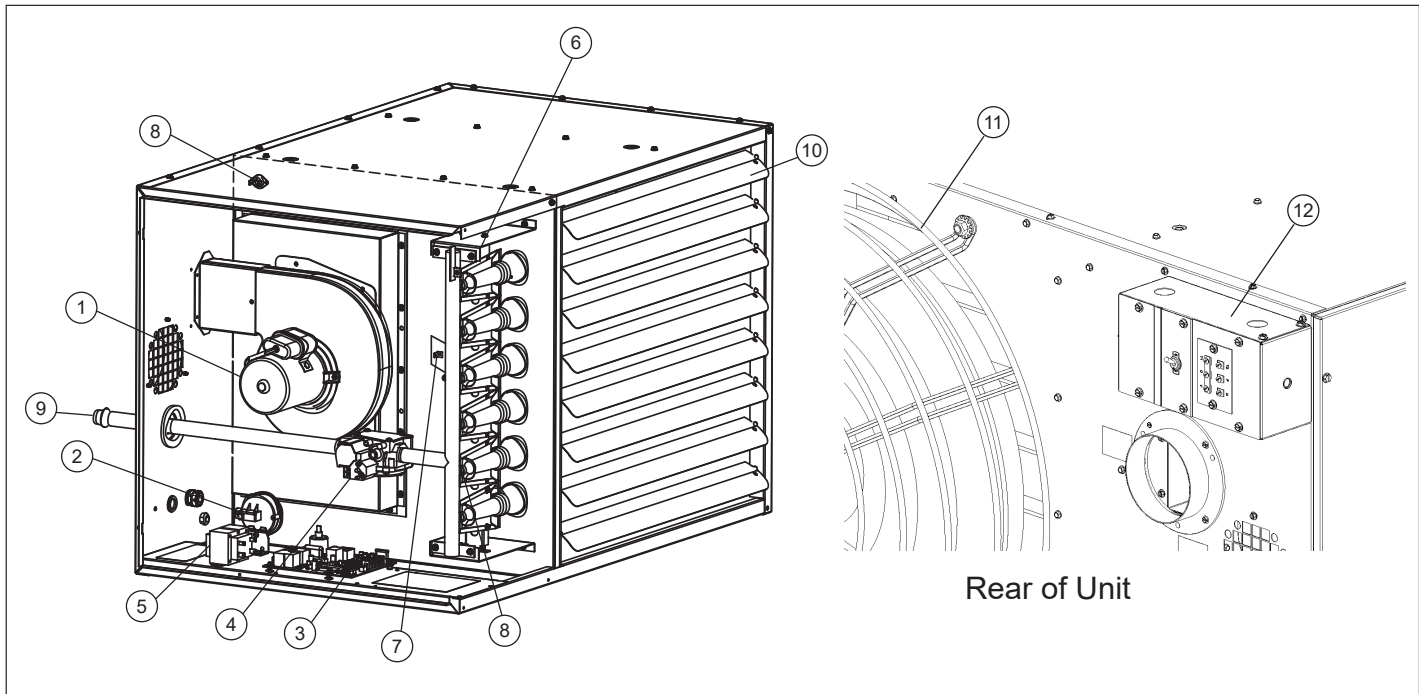
⑨ **Power Exhauster (STD)**

All power vented unit heaters are supplied with a round vent pipe connection. The power exhauster may be rotated 180° to allow for various venting directions.

⑩ **Finger Proof Fan Guard (OPT)**

Propeller units may be equipped with an optional finger proof fan guard for added protection. The finger proof fan guard is installed at the factory in place of the standard fan guard. Standard fan guard is shown.

Figure 6.1 - Factory Mounted Standard and Optional Features (Model PTP)



① **Power Exhauster (STD)**

All PTP series unit heaters are supplied with a round vent pipe connection.

② **Pressure Switch (STD)**

An automatic reset vent pressure switch is supplied on all PTP series unit heaters and is designed to prevent operation of the main burner in the event there is restricted venting of flue products. This restriction may occur due to an improper vent diameter, long vent runs, unapproved vent terminal, high winds, high negative pressure within space, etc. After the cause of the restriction has been corrected, the pressure switch will reset automatically. See the troubleshooting section of the installation and service manual for more information.

③ **Integrated Direct Spark Control Board (STD)**

The integrated direct spark ignition control combines all furnace control functions. The integrated board provides digital control of the air mover, inducer, ignition, gas valve and flame sense as well as monitoring the safety circuit at all times. The board includes LED diagnostics for troubleshooting and a fused power supply.

④ **Gas Valve - (See Table 18.2)**

a) **Single Stage Gas Valve - (STD)**

The main gas valve is factory installed on the unit heater gas train. The main gas valve provides regulator, main gas, and manual shutoff functions. The valve is redundant and provides 100% shut off.

b) **Two Stage Gas Valve - (OPT)**

The two-stage gas valve is factory installed on the unit heater gas train. The two stage gas valve provides the regulator, main gas (100% and 50% fire), and manual shutoff functions. The valve is redundant and provides 100% shut off.

⑤ **Control Step Down Transformer - (STD)**

The control step down transformer is located in the

electrical junction box. The transformer is used to step down the supply power (115V, 208V, 230V, 460V, 575V) to 24V for the gas controls, fan delay relay, field supplied motor starter, etc. To determine the control transformer supplied as well as any accessory/field supplied transformers required, refer to Table 18.1

⑥ **Flame Sensor - (hidden, STD)**

Remote flame sensor verifies ignition of all burners, monitors the flame signal and communicates with the integrated circuit board.

⑦ **Direct Spark Igniter - (hidden, STD)**

Provides spark for direct ignition of the burners.

⑧ **Auto High Limit Switch - (hidden, STD)**

The limit control is mounted in the air stream and will shut off the gas supply in the event of overheating.

⑨ **Gas Pipe Connection (STD)**

Easy access to factory installed gas pipe connection stubbed to outside of unit casing.

⑩ **Horizontal Air Deflector Blades**

Factory mounted on the discharge of the unit, the blades can be adjusted to provide horizontal (up and down) delivery control of the heated air. Vertical deflector blades are available as a field installed accessory.

⑪ **Finger Proof Fan Guard (OPT for PTP only)**

Propeller units may be equipped with an optional finger proof fan guard for added protection. The finger proof fan guard is installed at the factory in place of the standard fan guard.

⑫ **Contractor Convenience Package (STD)**

External junction box features simple connection of supply power wiring internally, thermostat wiring to terminals externally, an On/Off switch, and multi-color status indicator light to display the operational state of the unit.

GENERAL PERFORMANCE DATA - MODELS HD & PDP



Table 7.1 - Propeller Unit Model HD and PDP General Performance Data

	Model HD Sizes						Model PDP Sizes						
	30	45	60	75	100	125	150	175	200	250	300	350	400
Btu/Hr Input ①	30,000	45,000	60,000	75,000	100,000	125,000	150,000	175,000	200,000	250,000	300,000	350,000	400,000
Btu/Hr Output ①	24,900	36,900	49,200	62,250	83,000	102,500	124,500	145,250	166,000	207,500	249,000	290,500	332,000
Entering Airflow (CFM) @ 70°F	505	720	990	1160	1490	1980	2180	2550	2870	3700	4460	4870	5440
Outlet Velocity (FPM)	523	725	653	769	565	747	931	959	819	1053	1123	1068	1016
Air Temp. Rise (°F)	44	46	45	48	50	47	51	51	52	50	50	53	54
Max. Mounting Height (Ft.) ②	10	10	12	14	12	16	16	17	15	19	21	20	19
Heat Throw (Ft.) @ Max Mtg Ht ②	25	27	36	38	42	56	55	59	51	67	74	70	69
Motor Type ③	SP	SP	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC
Motor HP	1/15	1/15	1/12	1/12	1/6	1/8	1/8	1/6	1/6	1/3	1/2	3/4	3/4
Motor RPM	1550	1550	1625	1625	1050	1625	1625	1075	1075	1075	1075	1125	1125

Table 7.2 - Propeller Unit Model HD and PDP Operating Electrical Data

Supply Voltage	Power Code		Model HD Sizes						Model PDP Sizes						
			30	45	60	75	100	125	150	175	200	250	300	350	400
115V 1 Phase	01 (115V)	Motor Amps	2.40	2.40	1.95	1.95	2.50	2.20	2.30	2.80	2.80	5.40	7.00	7.20	7.20
		Total Amps	4.2	4.2	3.75	3.75	5.05	4.75	4.05	4.55	5.15	7.75	9.85	11.15	11.15
		Transformer kVA	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
208V 1 Phase	01 (115V) with Transformer	Transformer kVA	0.50	0.50	0.50	0.50	1.00	1.00	0.80	1.00	1.00	1.00	2.60	3.60	3.60
		208V Total Amps	2.05	2.05	2.07	2.07	2.79	2.63	2.24	2.52	2.85	4.28	5.45	6.16	6.16
230V 1 Phase	01 (115V) with Transformer	Transformer kVA	0.5	0.5	0.5	0.5	0.75	0.75	0.50	0.75	0.75	1.00	1.50	1.50	1.50
		230V Total Amps	1.85	1.85	1.88	1.88	2.53	2.38	2.03	2.28	2.58	3.88	4.93	5.58	5.58
208V 3 Phase	01 (115V) with Transformer	Transformer kVA	0.50	0.50	0.50	0.50	1.00	1.00	0.50	1.00	1.00	1.00	1.50	1.50	1.50
		208V Total Amps	2.05	2.05	2.07	2.07	2.79	2.63	2.24	2.52	2.85	4.28	5.45	6.16	6.16
230V 3 Phase	01 (115V) with Transformer	Transformer kVA	0.50	0.50	0.50	0.50	0.75	0.75	0.50	0.75	0.75	1.00	1.50	1.50	1.50
		230V Total Amps	1.85	1.85	1.88	1.88	2.53	2.38	2.03	2.28	2.58	3.88	4.93	5.58	5.58
460V 3 Phase	01 (115V) with Transformer	Transformer kVA	0.50	0.50	0.50	0.50	0.75	0.75	0.50	0.75	0.75	1.00	1.50	1.50	1.50
		460V Total Amps	0.93	0.93	0.94	0.94	1.26	1.19	1.01	1.14	1.29	1.94	2.46	2.79	2.79
575V 3 Phase	01 (115V) with Transformer	Transformer kVA	0.50	0.50	0.50	0.50	0.75	0.75	0.50	0.75	0.75	1.00	1.50	1.50	1.50
		575V Total Amps	0.74	0.74	0.75	0.75	1.01	0.95	0.81	0.91	1.03	1.55	1.97	2.23	2.23

① 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 use of a high altitude kit.

② 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.

③ 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. Motors on model sizes 100 and above are totally enclosed (model size 75 and below are open drip proof) and all single phase motors have built in thermal overload protection.

GENERAL PERFORMANCE DATA - MODEL PTP & BTP



Table 8.1 - Model PTP and BTP General Performance Data

	Model PTP Sizes							Model BTP Sizes						
	150	175	200	250	300	350	400	150	175	200	250	300	350	400
Btu/Hr Input	150,000	175,000	200,000	250,000	300,000	350,000	400,000	150,000	175,000	200,000	250,000	300,000	350,000	400,000
Btu/Hr Output	123,000	143,500	166,000	207,500	249,000	290,500	332,000	123,000	143,500	164,000	205,000	246,000	287,000	328,000
Entering Airflow (CFM) @ 70°F	2140	2725	2870	3995	4545	5280	5995	1587-2778	1852-3241	2116-3704	2646-4630	3175-5556	3704-6481	4233-7407
Outlet Velocity (FPM)	711	607	643	721	824	748	851	543-903	428-711	489-813	497-826	596-991	543-903	621-1032
Air Temp. Rise (°F)	53	48	52	47	50	50	51	40-70	40-70	40-70	40-70	40-70	40-70	40-70
Max. Mounting Height (Ft.)	15	14	15	18	19	18	21	9-21	8-18	9-21	10-22	11-26	11-26	13-29
Heat Throw (Ft.) (@ Max Mtg Ht)	51	50	53	62	69	65	74	33-75	28-65	32-74	34-78	40-94	39-90	44-102
Motor Type	PSC	PSC	PSC	PSC	PSC	PSC	PSC	T.E	T.E	T.E	T.E	T.E	T.E	T.E
Motor HP	1/6	1/6	1/3	1/3	1/2	1/2	3/4	See Table 10.1						
Motor RPM	1075	1075	1075	1075	1075	1125	1125	1725	1725	1725	1725	1725	1725	1725

Table 8.2 - Propeller Unit Model PTP Operating Electrical Data ①

Supply Voltage	Power Code		Model PTP Sizes							Model BTP Sizes
			150	175	200	250	300	350	400	All Sizes
115V 1 Phase	01 (115V)	Motor Amps	2.50	2.50	4.60	4.60	7.00	7.00	8.80	See Tables 9.1 through 9.3
		Total Amps	5.05	5.05	7.15	7.15	8.11	8.65	10.45	
		Transformer kVA	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
208V 1 Phase	01 (115V) with Transformer	Transformer kVA	1.00	1.00	1.00	1.00	1.00	1.00	1.50	
		208V Total Amps	2.79	2.79	3.95	3.95	4.48	4.78	5.78	
230V 1 Phase	01 (115V) with Transformer	Transformer kVA	0.75	0.75	1.00	1.00	1.00	1.00	1.50	
		230V Total Amps	2.53	2.53	3.58	3.58	4.06	4.33	5.23	
208V 3 Phase	01 (115V) with Transformer	Transformer kVA	1.00	1.00	1.00	1.00	1.00	1.00	1.50	
		208V Total Amps	2.79	2.79	3.95	3.95	4.48	4.78	5.78	
230V 3 Phase	01 (115V) with Transformer	Transformer kVA	0.75	0.75	1.00	1.00	1.00	1.00	1.50	
		230V Total Amps	2.53	2.53	3.58	3.58	4.06	4.33	5.23	
460V 3 Phase	01 (115V) with Transformer	Transformer kVA	0.75	0.75	1.00	1.00	1.00	1.00	1.50	
		460V Total Amps	1.26	1.26	1.79	1.79	2.03	2.16	2.61	
575V 3 Phase	01 (115V) with Transformer	Transformer kVA	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
		575V Total Amps	1.01	1.01	1.43	1.43	1.62	1.73	2.09	

① Amp draw data shown is operating amp draw at incoming power. For units that use a field installed accessory step-down transformer as noted, the amp draw shown is the primary side operating amp draw. For sizing of circuit protection for equipment with National Electric Code transformers, please refer to the Amp draw data shown is operating amp draw at incoming power. For units that use a field installed accessory step-down transformer as noted, the amp draw shown is the primary side operating amp draw. For sizing of circuit protection for equipment with transformers, please refer to the National Electric Code.

② For PTP units that are used on 230V/1ph, all models are equipped with 115V motors except the PTP400 which is equipped with motors that can operate on 230V. Since the transformer does not need to be sized to include the propeller motor, the rating of the Step Down Transformer Accessory is sized smaller for the power exhauster and gas control circuit only.



Table 9.1 - Blower Model BTP Motor Amp Draw ④ ⑤

Motor HP	Supply Voltage					
	115V/1ph	230V/1ph	208V/3ph	230V/3ph	460V/3ph	575V/3ph
1/4	3.70	-	-	-	-	-
1/3	5.00	2.50	1.60	1.40	.70	0.60
1/2	7.20	3.60	2.10	2.20	1.10	0.80
1	12.00	6.00	3.20	3.20	1.60	1.30
1-1/2	15.00	7.50	4.60	4.80	2.40	1.90
2	-	-	6.00	5.80	2.90	2.30
3	-	-	8.40	7.80	3.90	3.20
5	-	-	13.60	12.30	6.20	5.10

Table 9.2 - Blower Model BTP Control Circuit Amp Draw ④ ⑤

Model Size	Supply Voltage					
	115V/1ph	230V/1ph	208V/3ph	230V/3ph	460V/3ph	575V/3ph
150-250	2.55	1.28	1.41	1.28	0.64	0.51
300	1.11	0.56	0.61	0.56	0.28	0.22
350-400	1.65	0.83	0.91	0.83	0.41	0.33

Table 9.3 - Blower Model BTP Accessory Transformer Size (kVA) ⑥

Model Size	Supply Voltage			
	208V	230V	460V	575V
	3 ph	1 or 3 ph	3 ph	3 ph
150-250	0.50	0.50	0.50	0.50
300-400	0.50	0.25	0.25	0.25

- ① 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 use of a high altitude kit.
- ② 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.
- ③ 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. Model HDC motors are open drip proof, while model BTP motors are totally enclosed and all single phase motors have built-in thermal overload protection.
- ④ Amp draw data shown is operating amp draw at incoming power. For units that use a field installed accessory step-down transformer as noted, the amp draw shown is the primary side operating amp draw. For sizing of circuit protection for equipment with transformers, please refer to the National Electric Code.
- ⑤ For BTP models, add the Motor Amp Draw and Control Circuit Amp Draw to get the Total Unit Amp Draw.
- ⑥ Transformers for blower models are typically smaller than those used for propeller models, as the transformer is not needed for the blower motor. Size 300-400 use a PSC power exhaustor motor, further reducing the required transformer size.

BLOWER PERFORMANCE DATA - MODEL BTP

Table 10.1 - Power Code Description - Blower Model BTP ①

Power Code	Voltage	Phase	BTP150		BTP175		BTP250		BTP300		BTP350		BTP400	
			HP	Drive	HP	Drive	HP	Drive	HP	Drive	HP	Drive	HP	Drive
01	115	1	1/4	230	-	-	-	-	-	-	-	-	-	-
02	115/230	1	1/3	230	1/3	238	1/2	204	1	240	1 1/2	250	1 1/2	247
08	208-230/460	3	1/3	230	1/3	238	1/2	204	1	257	1 1/2	251	1 1/2	248
11	575	3	1/3	231	1/3	239	1/2	204	1	257	1 1/2	251	1 1/2	248
13	115/230	1	1/3	232	1/2	229	1	241	1	241	1 1/2	247	-	-
19	208-230/460	3	1/3	232	1/2	229	1	258	1	258	1 1/2	248	2	177
22	575	3	1/3	233	1/2	229	1	258	1	258	1 1/2	248	2	177
24	115/230	1	1/2	229	1	175	1.5	23	1 1/2	243	1 1/2	252	-	-
30	208-230/460	3	1/2	229	1	253	1.5	177	1 1/2	244	1 1/2	180	3	246
33	575	3	1/2	229	1	253	1.5	177	1 1/2	244	1 1/2	180	3	246
35	115/230	1	1	175	1 1/2	237	-	-	1 1/2	23	-	-	-	-
41	208-230/460	3	1	253	1 1/2	234	2	180	1 1/2	177	2	177	5	245
44	575	3	1	253	1 1/2	234	2	180	1 1/2	177	2	177	5	245
52	208-230/460	3	-	-	-	-	-	-	2	177	2	180	-	-
55	575	3	-	-	-	-	-	-	2	177	2	180	-	-
63	208-230/460	3	-	-	-	-	-	-	3	112	3	246	-	-
66	575	3	-	-	-	-	-	-	3	112	3	246	-	-
74	208-230/460	3	-	-	-	-	-	-	-	-	5	245	-	-
77	575	3	-	-	-	-	-	-	-	-	5	245	-	-

① For selection of correct Power Code, refer to the Tables on pages 11-12.

Table 10.2 - Filter Static Pressure Drop ②

	BTP150	BTP175	BTP200	BTP250	BTP300	BTP350	BTP400
Filter Static ("W.C.)	0.1	0.2	0.1	0.2	0.2	0.2	0.2

② For blower units with enclosure and filter, add the following static pressures to the static pressure determined by the system designer for total external static pressure.

BLOWER PERFORMANCE DATA - MODEL BTP



Table 11.1 - Blower Model BTP 150-250 (40-55°F temp rise for 250 size unit) ① ② ③

Model Size	ATR	CFM	HP	External Static Pressure ("W.C.)																																							
				0.0			0.1			0.2			0.3			0.4			0.5			0.6			0.7																		
				RPM	Drive	Turns	RPM	Drive	Turns	RPM	Drive	Turns	RPM	Drive	Turns	RPM	Drive	Turns	RPM	Drive	Turns	RPM	Drive	Turns	RPM	Drive	Turns																
150	40	2778	1	573	175	4.5	615	175	4.0	658	175	3.0	699	175	2.5	738	175	1.5	775	175	1.0	810	175	0.5	-	-	-	1															
	45	2469	1/2	510	229	4.0	558	229	3.0	606	-	-	650	-	-	692	-	-	731	-	-	769	-	-	806	-	-	-	1/2														
			1	-	-	-	175	4.5	-	-	-	175	4.0	-	-	175	3.0	-	-	175	2.5	-	-	175	2.0	-	-	175	1.0	-	0.5	1											
	50	2222	1/3	460	232	4.0	513	-	-	565	-	-	612	-	-	656	-	-	699	-	-	739	-	-	779	-	-	-	-	-	1/3												
			1/2		229	5.0		229	4.0		229	3.0		229	2.0		229	1.0		229	0.5		229	0.0		229	-0.5	229	-1.0	229	-1.5	229	-2.0	229	-2.5	229	-3.0	1/2					
			1		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1		
	55	2020	1/4	418	230	2.5	477	-	-	532	-	-	582	-	-	629	-	-	674	-	-	717	-	-	759	-	-	-	-	-	-	1/4											
			1/3		232	5.0		232	3.5		232	2.0		232	0.5		232	-0.5		232	-1.5		232	-2.5		232	-3.5	232	-4.5	232	-5.5	232	-6.5	232	-7.5	232	-8.5	1/3					
			1/2		230	2.5		229	5.0		229	3.5		229	2.0		229	0.5		229	-0.5		229	-1.5		229	-2.5	229	-3.5	229	-4.5	229	-5.5	229	-6.5	229	-7.5	229	-8.5	1/2			
			1		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1		
	60	1852	1/4	384	230	3.5	448	230	1.5	506	232	2.5	559	232	1.5	609	229	2.0	656	229	1.0	701	229	0.5	741	229	0.0	788	229	-0.5	834	229	-1.0	1/4									
			1/3		230	3.5		230	1.5		230	0.0		230	-0.5		230	-1.5		230	-2.5		230	-3.5		230	-4.5		230	-5.5		230	-6.5	230	-7.5	230	-8.5	230	-9.5	230	-10.5	1/3	
1/2			-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-	-	-	-	-	-	-	-	-	-	1/2
1			-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-	-	-	-	-	-	-	-	-	-	1
65	1709	1/4	354	230	4.0	423	230	2.0	485	230	0.5	540	232	2.0	592	232	1.0	642	229	1.5	690	229	0.5	735	229	0.0	788	229	-0.5	841	229	-1.0	1/4										
		1/3		230	4.0		232	4.5		232	3.0		232	1.5		232	0.0		232	-1.5		232	-3.0		232	-4.5		232	-6.0		232	-7.5	232	-9.0	232	-10.5	232	-12.0	1/3				
		1/2		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	1/2
		1		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	1
70	1587	1/4	329	230	5.0	403	230	3.0	467	230	1.0	525	232	2.5	580	232	1.0	635	229	1.5	680	229	0.5	722	229	0.0	779	229	-0.5	834	229	-1.0	1/4										
		1/3		230	5.0		232	5.0		232	3.5		232	2.0		232	0.5		232	-0.5		232	-1.5		232	-2.5		232	-3.5		232	-4.5	232	-5.5	232	-6.5	232	-7.5	232	-8.5	1/3		
		1/2		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	1/2
		1		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	1

Table 11.2 - Alternate Drives for 208-230/460V 3 Ph, 1 HP Motors

Model	1 HP Drive Listed	1 HP Drive for 208/460V
BTP150	175	= 253
BTP175	175	= 253
BTP200	175	= 253
BTP250	229	= 259
	241	= 258

Table 11.3 - Alternate Drives for 208-230/460V 3 Ph, 1-1/2 HP Motors

Model	1-1/2 HP Drive Listed	1-1/2 HP Drive for 230/460V
BTP150	-	= -
BTP175	237	= 234
BTP200	235	= 236
BTP250	23	= 177

Table 11.4 - Alternate Drives for 575V

Model	Drive for Under 575V	Drive for 575V
BTP150	175	= 253
	230	= 231
	232	= 233
BTP175	175	= 253
	238	= 239
BTP200	229	= 259
	235	= 236
BTP250	241	= 258

- ① Outputs shown are for elevations up to 2000'. For elevations over 2000', output needs to be reduced 4% for each 1000' above sea level. (Does not apply in Canada - see rating plate).
- ② Sheave turns open are approximate. For proper operation, check blower rpm.
- ③ For 208-230/460V (1 HP and 1-1/2 HP) or 575V selections, see Tables 11.2, 3, & 4 for the corrected Drive Number.

BLOWER PERFORMANCE DATA - MODEL BTP



Table 12.1 - Blower Model BTP 250-400 (60-70°F temp rise for 250 size unit) ① ② ③

Model Size	ATR	CFM	HP	External Static Pressure ("W.C.)																								HP
				0.0		0.1		0.2		0.3		0.4		0.5		0.6		0.7										
				RPM	Turns	RPM	Turns	RPM	Turns	RPM	Turns	RPM	Turns	RPM	Turns	RPM	Turns	RPM	Turns	RPM	Turns							
250	60	3086	1/2	204	4.0	204	3.0	204	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1/2				
			1	-	-	241	5.0	241	4.0	241	3.0	241	2.0	241	1.5	241	0.5	241	0.0	241	0.0	241	0.0	1				
			1-1/2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1-1/2			
		65	2849	1/2	204	4.5	204	3.5	204	2.0	204	1.0	-	-	-	-	-	-	-	-	-	-	-	-	1/2			
				1	-	-	241	4.5	241	3.5	241	2.5	241	1.5	241	1.0	241	0.5	241	0.0	241	0.0	241	0.0	1			
				1-1/2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1-1/2		
	70	2646	1/2	204	5.0	204	4.5	204	2.5	204	1.5	204	0.5	204	0.5	204	0.5	204	0.5	204	0.5	204	0.5	204	0.5	1/2		
			1	-	-	241	5.0	241	4.0	241	3.0	241	2.0	241	1.0	241	0.5	241	0.5	241	0.5	241	0.5	1				
			1-1/2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1-1/2			
	300	40	5556	3	112	3.0	112	2.5	112	2.0	112	1.0	112	0.5	112	0.0	112	0.0	112	0.0	112	0.0	112	0.0	3			
				2	177	1.5	177	0.5	177	0.0	177	0.0	177	0.0	177	0.0	177	0.0	177	0.0	177	0.0	177	0.0	2			
				1	177	3.5	177	3.0	177	2.0	177	1.0	177	0.0	177	0.0	177	0.0	177	0.0	177	0.0	177	0.0	1			
45			4938	3	112	5.0	112	3.5	112	3.0	112	3.0	112	2.0	112	1.5	112	1.5	112	0.5	112	0.5	112	0.0	3			
				2	23	5.0	23	4.5	23	3.5	23	2.5	23	1.5	23	0.5	23	0.5	23	0.0	23	0.0	23	0.0	2			
				1	23	5.0	23	4.5	23	3.5	23	2.5	23	1.5	23	0.5	23	0.5	23	0.0	23	0.0	23	0.0	1			
50		4444	1-1/2	243	2.5	243	1.5	243	0.0	243	0.0	243	0.0	243	0.0	243	0.0	243	0.0	243	0.0	243	0.0	243	0.0	1-1/2		
			3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3		
			1	241	3.5	241	3.0	241	2.0	241	1.0	241	0.0	241	0.0	241	0.0	241	0.0	241	0.0	241	0.0	241	0.0	1		
55		4040	1-1/2	240	2.0	240	1.5	240	0.5	240	0.5	240	0.5	240	0.5	240	0.5	240	0.5	240	0.5	240	0.5	240	0.5	1-1/2		
			3	243	4.0	243	3.0	243	1.5	243	0.5	243	0.5	243	0.0	243	0.0	243	0.0	243	0.0	243	0.0	243	0.0	3		
			1	241	3.5	241	3.0	241	2.0	241	1.0	241	0.0	241	0.0	241	0.0	241	0.0	241	0.0	241	0.0	241	0.0	1		
60	3704	1-1/2	240	3.0	240	2.5	240	1.5	240	1.5	240	1.0	240	1.0	240	1.0	240	1.0	240	1.0	240	1.0	240	1.0	1-1/2			
		3	243	5.0	243	4.5	243	3.0	243	1.5	243	0.5	243	0.5	243	0.5	243	0.5	243	0.5	243	0.5	243	0.5	3			
		1	241	4.5	241	3.5	241	3.0	241	2.0	241	1.0	241	0.0	241	0.0	241	0.0	241	0.0	241	0.0	241	0.0	1			
	65	3419	1-1/2	240	4.0	240	3.0	240	2.0	240	1.0	240	0.0	240	0.0	240	0.0	240	0.0	240	0.0	240	0.0	240	0.0	1-1/2		
			3	243	5.0	243	4.0	243	3.0	243	2.0	243	1.0	243	0.0	243	0.0	243	0.0	243	0.0	243	0.0	243	0.0	3		
			1	241	5.0	241	4.5	241	4.0	241	3.0	241	2.0	241	1.0	241	0.5	241	0.5	241	0.5	241	0.5	241	0.5	1		
70	3175	1-1/2	240	5.0	240	4.0	240	2.5	240	1.5	240	0.5	240	0.5	240	0.5	240	0.5	240	0.5	240	0.5	240	0.5	1-1/2			
		3	243	5.0	243	4.5	243	3.0	243	1.5	243	0.5	243	0.5	243	0.5	243	0.5	243	0.5	243	0.5	243	0.5	3			
		1	241	5.0	241	4.0	241	3.0	241	2.0	241	1.0	241	0.0	241	0.0	241	0.0	241	0.0	241	0.0	241	0.0	1			
350	40	6481	5	721	245	3.0	721	245	3.0	721	245	2.5	721	245	2.0	721	245	1.0	721	245	0.5	721	245	0.0	5			
			3	246	3.5	246	1.0	246	1.0	246	1.5	246	1.0	246	0.0	246	0.0	246	0.0	246	0.0	246	0.0	3				
			1	245	5.0	245	4.0	245	3.5	245	3.5	245	3.0	245	2.5	245	2.5	245	2.5	245	2.5	245	2.5	245	2.5	1		
		45	5761	5	180	5.0	180	4.5	180	4.0	180	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	5		
				3	177	3.5	177	3.0	177	2.0	177	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	3		
				1	177	5.0	177	4.5	177	4.0	177	3.5	177	3.0	177	2.5	177	2.5	177	2.5	177	2.5	177	2.5	177	2.5	1	
	50	5185	2	180	5.0	180	4.5	180	4.0	180	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	2			
			3	177	3.5	177	3.0	177	2.0	177	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	3			
			1	177	5.0	177	4.5	177	4.0	177	3.5	177	3.0	177	2.5	177	2.5	177	2.5	177	2.5	177	2.5	177	2.5	1		
	55	4714	1-1/2	247	3.5	247	3.0	247	2.0	247	2.0	247	2.0	247	1.0	247	1.0	247	1.0	247	1.0	247	1.0	247	1.0	1-1/2		
			2	250	0.5	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	2		
			5	177	5.0	177	4.5	177	3.5	177	2.5	177	1.5	177	1.0	177	1.0	177	1.0	177	1.0	177	1.0	177	1.0	5		
60	4321	1-1/2	247	5.0	247	4.0	247	3.0	247	2.0	247	2.0	247	1.0	247	1.0	247	1.0	247	1.0	247	1.0	247	1.0	1-1/2			
		2	250	2.5	250	1.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	2			
		5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5			
65	3989	1-1/2	250	4.0	250	2.5	250	1.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	250	0.0	1-1/2			
		2	-	-	247	5.0	247	4.0	247	3.0	247	2.0	247	2.0	247	1.5	247	1.5	247	1.5	247	1.5	247	1.5	2			
		5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5			
70	3704	1-1/2	250	5.0	250	4.0	250	2.5	250	1.0	250	1.0	250	1.0	250	1.0	250	1.0	250	1.0	250	1.0	250	1.0	1-1/2			
		2	-	-	247	5.0	247	4.0	247	3.0	247	2.0	247	2.0	247	1.5	247	1.5	247	1.5	247	1.5	247	1.5	2			
		5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5			
400	40	7407	5	823	245	0.5	823	245	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5			
			3	245	3.0	245	2.5	245	2.0	245	1.5	245	1.0	245	0.5	245	0.5	245	0.5	245	0.5	245	0.5	245	0.5	3		
			1	246	3.0	246	2.5	246	1.5	246	1.0	246	0.5	246	0.5	246	0.5	246	0.5	246	0.5	246	0.5	246	0.5	1		
		45	6584	5	733	245	3.0	733	245	2.5	733	245	2.0	733	245	1.5	733	245	1.0	733	245	0.5	733	245	0.0	5		
				3	246	3.0	246	2.5	246	1.5	246	1.0	246	0.5	246	0.5	246	0.5	246	0.5	246	0.5	246	0.5	246	0.5	3	
				1	245	5.0	245	4.5	245	3.5																		

GENERAL PERFORMANCE DATA - MODELS HDB & BDP



Table 13.1 - Blower Unit Model HDB and BDP General Performance Data

	Model HDB Sizes				Model BDP Sizes						
	60	75	100	125	150	175	200	250	300	350	400
Btu/Hr Input ①	60,000	75,000	100,000	125,000	150,000	175,000	200,000	250,000	300,000	350,000	400,000
Btu/Hr Output ①	49,200	61,500	82,000	102,500	123,000	143,500	164,000	205,000	246,000	287,000	328,000
Entering Airflow Range (CFM)	635-1111	794-1389	1140-2116	1235-2058	1587-2778	1852-3241	2116-3704	2646-4630	3175-5556	3704-6481	4233-6584
Outlet Velocity (FPM)	437-726	546-908	443-781	488-773	869	892	773	966	1026	1037	1008
Air Temp. Rise (°F)	40-70	40-70	35-65	45-75	40-70	40-70	40-70	40-70	40-70	40-70	40-70
Max. Mounting Height (Ft.) ②	7-13	7-16	8-19	8-17	14	15	13	16	18	19	19
Heat Throw (Ft.) @ Max Mtg Ht ②	20-45	24-57	27-68	27-59	49	52	47	58	64	67	68
Motor Type ③	P.S.C.	P.S.C.	P.S.C.	P.S.C.	T.E	T.E	T.E	T.E	T.E	T.E	T.E
Motor HP	1/4	1/3	1/2	1/2	See Table 11.1						
Motor RPM	Max 1100	Max 1100	Max 1100	Max 1100	1725	1725	1725	1725	1725	1725	1725

Table 13.2 - Blower Unit Model HDB and BDP Operating Electrical Data

Supply Voltage	Power Code		Model HDB Sizes				Model BDP Sizes						
			60	75	100	125	150	175	200	250	300	350	400
115V 1 Phase	01 (115V)	Motor Amps	5.70	7.10	9.50	9.50	See Tables 9.3 through 9.5						
		Total Amps	7.50	8.90	12.05	12.05							
		Transformer kVA	n/a	n/a	n/a	n/a							
208V 1 Phase	01 (115V) with Transformer	Transformer kVA	1.00	1.50	1.50	1.50							
		208V Total Amps	4.15	4.92	6.66	6.66							
230V 1 Phase	01 (115V) with Transformer	Transformer kVA	1.00	1.50	1.50	1.50							
		230V Total Amps	3.75	4.45	6.03	6.03							
208V 3 Phase	01 (115V) with Transformer	Transformer kVA	1.00	1.50	1.50	1.50							
		208V Total Amps	4.15	4.92	6.66	6.66							
230V 3 Phase	01 (115V) with Transformer	Transformer kVA	1.00	1.50	1.50	1.50							
		230V Total Amps	3.75	4.45	6.03	6.03							
460V 3 Phase	01 (115V) with Transformer	Transformer kVA	1.00	1.50	1.50	1.50							
		460V Total Amps	1.88	2.23	3.01	3.01							
575V 3 Phase	01 (115V) with Transformer	Transformer kVA	0.50	0.50	1.00	1.00							
		575V Total Amps	1.50	1.78	2.41	2.41							

Table 13.3 - Blower Model BDP Motor Amp Draw ④ ⑤

Motor HP	Supply Voltage					
	115V/1ph	230V/1ph	208V/3ph	230V/3ph	460V/3ph	575V/3ph
1/4	3.70	2.70	1.70	1.50	0.75	0.44
1/3	7.20	3.60	1.60	1.40	0.70	0.65
1/2	7.20	3.60	2.50	2.20	1.10	0.90
3/4	13.80	6.90	3.60	3.20	1.60	1.30
1	16.00	8.00	4.60	4.20	2.10	1.70
1-1/2	20.00	10.00	6.60	6.00	3.00	2.40
2	-	-	7.50	6.80	3.40	2.70
3	-	-	10.60	9.60	4.80	3.90
5	-	-	16.70	15.20	7.60	6.10

Table 13.4 - Blower Model BDP Control Circuit Amp Draw ④ ⑤

	Supply Voltage					
	115V/1ph	230V/1ph	208V/3ph	230V/3ph	460V/3ph	575V/3ph
150-175	1.75	0.84	0.86	0.84	0.42	0.44
200-400	2.35	1.28	1.10	1.28	0.72	0.62

Table 13.5 - Blower Model BDP Accessory Transformer Size (kVA) ⑥

Model Size	Supply Voltage			
	208V	230V	460V	575V
1 or 3 ph	1 or 3 ph	1 or 3 ph	3 ph	3 ph
150-175	n/a	n/a	0.25	0.25
200-400	n/a	n/a	0.50	0.50

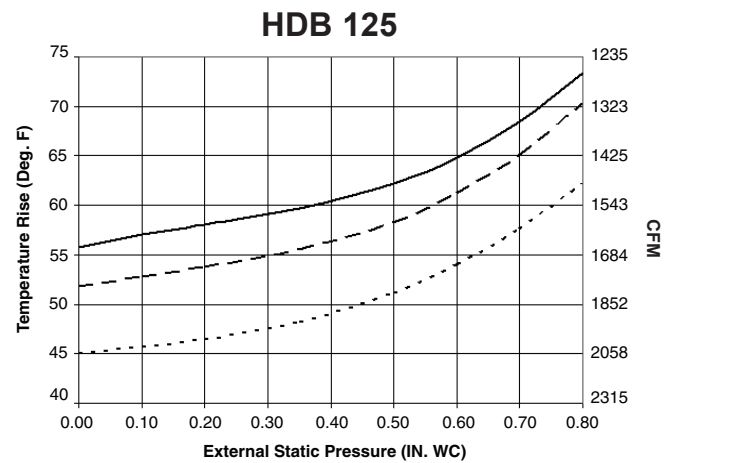
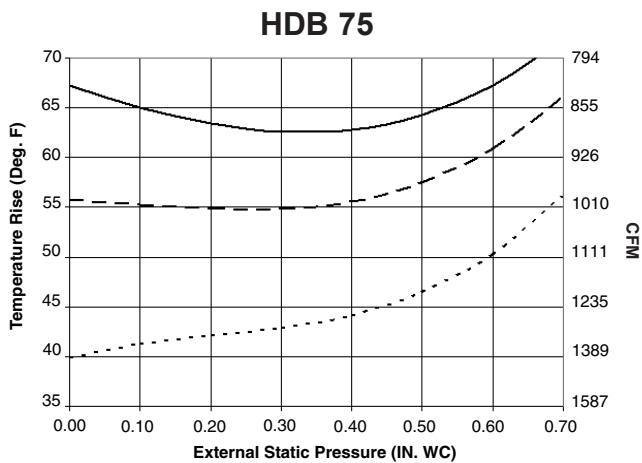
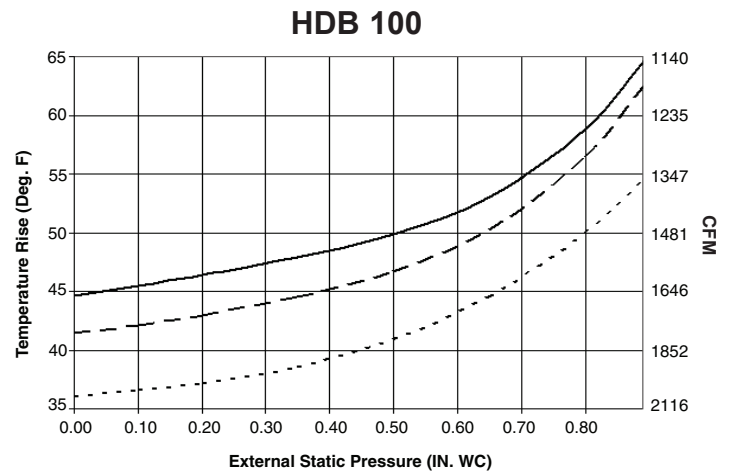
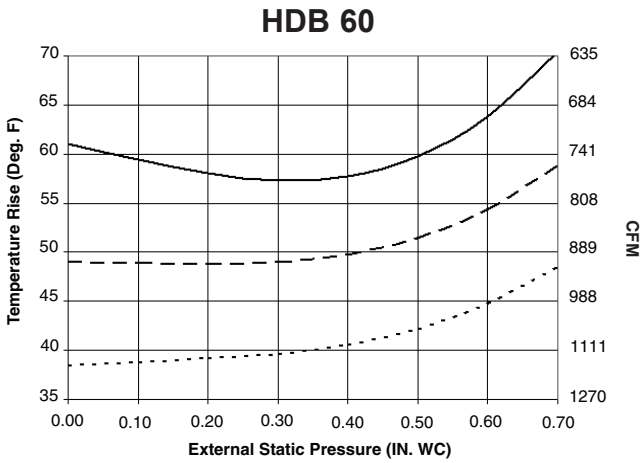
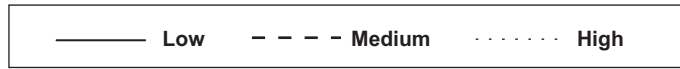
- ① Ratings shown are for elevations up to 2,000 ft. For elevations above 2,000 ft., ratings should be reduced at the rate of 4% for each 1,000 feet above sea level. (In Canada see rating plate.) Reduction of ratings requires use of a high altitude kit.
- ② Data taken at 55°F air temperature rise. At 65°F ambient and unit fired at full-rated input. Mounting height as measured from bottom of unit, and without deflector hoods.
- ③ 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. Model HDB motors are open drip proof, while model BDP motors are totally enclosed and all single phase motors have built-in thermal overload protection.
- ④ Amp draw data shown is operating amp draw at incoming power. For units that use a field installed accessory step-down transformer as noted, the amp draw shown is the primary side operating amp draw. For sizing of circuit protection for equipment with transformers, please refer to the National Electric Code.
- ⑤ For BDP models, add the Motor Amp Draw and Control Circuit Amp Draw to get the Total Unit Amp Draw.
- ⑥ Transformers for blower models are typically smaller than those used for propeller models, as the transformer is not needed for the blower motor.



Table 14.1 - Power Code Description - HDB Models

Power Code	Unit Voltage	HDB60	HDB75	HDB100	HDB125
01	115/60/1	1/4 HP	1/3 HP	1/2 HP	1/2 HP

Blower Speed Curves Models (HDB 60-125)



BLOWER PERFORMANCE DATA - MODEL BDP



Table 15.1 - Power Code Description — Blower Model BDP ①

Power Code	Voltage	Phase	150		175		200		250		300		350		400	
			HP	Drive	HP	Drive	HP	Drive	HP	Drive	HP	Drive	HP	Drive	HP	Drive
01	115	1	1/4	191	-	-	1/4	212	-	-	-	-	-	-	-	-
02	230	1	1/4	191	-	-	1/4	212	-	-	-	-	-	-	-	-
07	575	3	1/4	197	-	-	1/4	213	-	-	-	-	-	-	-	-
08	208-230/460	3	1/4	191	-	-	1/4	212	-	-	-	-	-	-	-	-
09	115	1	1/3	191	1/3	95	1/3	212	1/3	203	3/4	205	1	107	1-1/2	105
10	230	1	1/3	191	1/3	95	1/3	212	1/3	203	3/4	205	1	107	1-1/2	105
15	575	3	1/3	197	1/3	96	1/3	213	1/3	204	3/4	205	1	255	1-1/2	180
16	208-230/460	3	1/3	191	1/3	95	1/3	212	1/3	203	3/4	205	1	255	1-1/2	180
17	115	1	1/3	95	1/2	96	1/3	102	1/2	204	1	205	1-1/2	105	-	-
18	230	1	1/3	95	1/2	96	1/3	102	1/2	204	1	205	1-1/2	105	-	-
23	575	3	1/3	96	1/2	96	1/3	101	1/2	204	1	157	1-1/2	180	2	210
24	208-230/460	3	1/3	95	1/2	96	1/3	102	1/2	204	1	157	1-1/2	180	2	210
25	115	1	1/2	96	3/4	192	1/2	101	3/4	205	1-1/2	106	1-1/2	100	-	-
26	230	1	1/2	96	3/4	192	1/2	101	3/4	205	1-1/2	106	1-1/2	100	-	-
31	575	3	1/2	96	3/4	192	1/2	101	3/4	205	1-1/2	108	1-1/2	210	3	111
32	208-230/460	3	1/2	96	3/4	192	1/2	101	3/4	205	1-1/2	108	1-1/2	33	3	111
33	115	1	3/4	38	1	192	3/4	16	1	205	-	-	-	-	-	-
34	230	1	3/4	38	1	192	3/4	16	1	205	-	-	-	-	-	-
39	575	3	3/4	38	1	256	3/4	16	1	157	2	108	2	210	5	207
40	208-230/460	3	3/4	38	1	256	3/4	16	1	157	2	108	2	210	5	207
41	115	1	1	38	1-1/2	193	1	16	1-1/2	105	-	-	-	-	-	-
42	230	1	1	38	1-1/2	193	1	16	1-1/2	105	-	-	-	-	-	-
47	575	3	1	254	1-1/2	198	1	178	1-1/2	180	3	111	3	111	2	180
48	208-230/460	3	1	254	1-1/2	198	1	178	1-1/2	180	3	111	3	111	2	180
49	115	1	1/4	13	-	-	1-1/2	105	-	-	1-1/2	105	-	-	-	-
50	230	1	1/4	13	-	-	1-1/2	105	-	-	1-1/2	105	-	-	-	-
55	575	3	1/4	14	2	80	1-1/2	180	2	108	1-1/2	110	5	207	3	112
56	208-230/460	3	1/4	13	2	80	1-1/2	180	2	108	1-1/2	180	5	207	3	112
57	115	1	3/4	96	3/4	96	1/4	24	3/4	204	-	-	-	-	-	-
58	230	1	3/4	96	3/4	96	1/4	24	3/4	204	-	-	-	-	-	-
63	575	3	3/4	96	3/4	96	1/4	25	3/4	204	-	-	2	180	5	111
64	208-230/460	3	3/4	96	3/4	96	1/4	24	3/4	204	-	-	2	180	5	111
65	115	1	-	-	1-1/2	79	1/3	24	1-1/2	23	-	-	-	-	-	-
66	230	1	-	-	1-1/2	79	1/3	24	1-1/2	23	-	-	-	-	-	-
71	575	3	-	-	1-1/2	80	1/3	25	1-1/2	177	-	-	5	181	-	-
72	208-230/460	3	-	-	1-1/2	80	1/3	24	1-1/2	177	-	-	5	181	-	-
73	115	1	-	-	-	-	1/2	25	-	-	-	-	-	-	-	-
74	230	1	-	-	-	-	1/2	25	-	-	-	-	-	-	-	-
79	575	3	-	-	-	-	1/2	25	-	-	-	-	-	-	-	-
80	208-230/460	3	-	-	-	-	1/2	25	-	-	-	-	-	-	-	-
81	115	1	-	-	-	-	3/4	101	-	-	-	-	-	-	-	-
82	230	1	-	-	-	-	3/4	101	-	-	-	-	-	-	-	-
87	575	3	-	-	-	-	3/4	101	-	-	-	-	-	-	-	-
88	208-230/460	3	-	-	-	-	3/4	101	-	-	-	-	-	-	-	-
89	115	1	-	-	-	-	1-1/2	23	-	-	-	-	-	-	-	-
90	230	1	-	-	-	-	1-1/2	23	-	-	-	-	-	-	-	-
95	575	3	-	-	-	-	1-1/2	177	-	-	-	-	-	-	-	-
96	208-230/460	3	-	-	-	-	1-1/2	177	-	-	-	-	-	-	-	-

① For selection of correct Power Code, refer to the Tables on pages 16-17.

BLOWER PERFORMANCE DATA - MODEL BDP



Table 16.1 - Models With or Without Blower Enclosure - Blower Model BDP ① ②

Model Size	ATR	CFM	0.0" Static Press.				0.1" Static Press.				0.2" Static Press.				0.3" Static Press.				0.4" Static Press.				
			RPM	HP	Drive	Turns	RPM	HP	Drive	Turns	RPM	HP	Drive	Turns	RPM	HP	Drive	Turns	RPM	HP	Drive	Turns	
150	40	2778	515	1/2	96	4.0	565	3/4	38	4.5	615	3/4	38	4.0	665	3/4	38	3.0	705	1		2.0	
	45	2469	455	1/3		0.0	515	1/2	96	4.0	570	1/2	96	3.0	620			3.5	670	3/4	38	3.0	
	50	2222	410			1.5	475	1/3	95	5.0	535			3.5	590			2.5	640			3.5	
	55	2020	375			2.5	445			0.5	505			4.0	565	1/2	96	3.0	615			2.0	
	60	1852	345	1/4		3.5	420		1/4	191	1.0	485	1/3	95	4.5	545			3.5	600	1/2	96	2.5
	65	1709	315			4.0	400			2.0	470			5.0	530			4.0	585				
	70	1587	295			5.0	380			2.5	455	1/4	191	0.0	520	1/3	95	4.0	575	1/3	95	3.0	
175	40	3241	805	1-1/2	193	3.5	840	1-1/2	193	2.5	875	1-1/2	193	2.0	910	1-1/2	193	1.0	940	1-1/2	193	0.0	
	45	2881	715	1		4.0	755	1		3.5	795	1		3.0	830			3.0	865			2.0	
	50	2593	645	3/4	192	5.0	690	3/4	192	4.5	730	3/4	192	4.0	770	1		3.5	810	1		3.0	
	55	2357	585	1/2	96	2.5	635			1.5	680			4.5	720			4.0	765			3.5	
	60	2160	540			3.5	590	1/2	96	2.5	640	1/2	96	1.5	685	3/4	192	4.5	730	3/4		4.0	
	65	1994	495	1/3	95	4.5	550			3.5	605	1/2	96	2.5	655			1.5	700			0.5	
	70	1852	460			5.0	520	1/3	95	4.0	575	1/3	95	3.0	630	1/2	96	2.0	680	1/2	96	1.0	
200	40	3704	420	3/4	16	5.0	465	3/4	16	4.0	505	1	16	3.0	540	1		2.0	580	1		1.0	
	45	3292	375	1/2	101		420			3.5	465	3/4		3.5	510			2.5	550			2.0	
	50	2963	335	1/3		1.0	390	1/2	101	4.5	440			3.0	485	3/4	16	3.5	525	3/4	16	2.5	
	55	2694	305			2.0	365	1/3	102	5.0	415	1/2	101	3.5	465			2.5	510				
	60	2469	280	1/4	212	3.0	345			0.5	400			4.0	450	1/2	101	3.0	500			1.5	
	65	2279	260			4.0	325	1/4	212	1.5	385	1/3	102	4.5	440			4.0	490	1/2	101	2.0	
	70	2116	240			5.0	310			2.0	375			5.0	430	1/3	102	3.5	485				
250	40	4630	605	1-1/2	105	4.5	635	1-1/2	105	3.5	665	1-1/2	105	3.0	690	2	108	4.0	720	2	108	3.0	
	45	4115	535	1		3.5	570	1		3.0	605			4.5	635	1-1/2	105	3.5	665	1-1/2	105	2.5	
	50	3704	485	3/4	205	4.5	520	3/4	205	4.0	555	1		3.0	590	1		2.5	625			4.0	
	55	3367	440			2.0	480			5.0	520	3/4	205	4.0	555			3.0	595	1		2.5	
	60	3086	405	1/2	204	3.0	450	1/2	204	1.5	490	1/2	204	4.5	530	3/4	205	4.0	570			3.0	
	65	2849	370			4.0	420			2.5	465			1.0	510			4.0	550	3/4	205	3.5	
	70	2646	345	1/3	203	4.5	395	1/3	203	3.0	445	1/2	204	1.5	490	1/2	204	0.5	535				
300	40	5556	825	3	111	3.0	850	3	111	2.5	875	3	111	2.0	900	3	111	1.0	-	-	-	-	
	45	4938	735	2	108		760	2	108	2.0	790	2	108	1.5	815			3.0	840	3	111	2.5	
	50	4444	660	1-1/2	106	5.0	690	1-1/2	106	4.0	720	1-1/2	106	3.0	750	2	108	2.5	780	2	108	1.5	
	55	4040	600	1		2.5	635			5.0	665			4.5	700	1-1/2	106	4.0	730	1-1/2	106	3.0	
	60	3704	550			3.5	590	1		2.5	625	1		2.0	655			5.0	690			4.0	
	65	3419	510	3/4	205	4.0	550	3/4	205	3.5	585	3/4	205	2.5	620	1	205	2.0	655			1.0	
	70	3175	470			5.0	515			4.0	555			3.5	595	3/4	205	2.5	630	1	205	2.0	
350	40	6481	960	5	207	2.5	980	5	207	2.0	1005	5	207	1.5	1030	5	207	1.0	1050	5	207	0.5	
	45	5761	850	3	111		880	3	111	1.5	905	3	111	1.0	930			3.0	955			2.5	
	50	5185	765	2	210	4.5	795			3.5	825			3.0	850	3	111	2.5	880	3	111	1.5	
	55	4714	695			2.0	730	2	210	5.0	760	2	210	4.5	790	2	210	3.5	820			3.0	
	60	4321	640	1-1/2	105	3.5	675	1-1/2	105	2.5	710	1-1/2	105	1.5	740			0.5	770	2	210	4.0	
	65	3989	590			4.5	630			3.5	665			3.0	695	1-1/2	105	2.0	730			1.0	
	70	3704	550	1	107	5.0	590	1	107	4.5	625	1	107	3.5	660	1	107	3.0	695	1-1/2	105	2.0	
400	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	45	6584	885	5	207	4.0	915	5	207	3.5	940	5	207	3.0	965	5	207	2.5	985	5	207	2.0	
	50	5926	800	3	111	3.5	825			3.0	855			2.0	880			4.0	910			3.5	
	55	5387	725	2	210	5.0	760	3	111	4.5	790	3	111	4.0	815	3	111	3.0	845	3	111	2.5	
	60	4938	665			2.5	700	2	210	6.0	735	2	210	5.0	765			4.5	795			3.5	
	65	4558	615	1-1/2	105	4.0	650	1-1/2	105	3.0	685	1-1/2	105	2.0	720	2	210	5.0	750	2	210	4.5	
	70	4233	570			4.5	610			4.5	650			3.5	680	1-1/2	105	2.5	715	1-1/2	105	1.5	

For 230/460V or 575V selections and footnotes, please see page 17.

BLOWER PERFORMANCE DATA - MODEL BDP



Table 17.1 - Models With or Without Blower Enclosure - Blower Model BDP ① ②

Model Size	ATR	CFM	Data for use with filters only											
			0.5" Static Press.				0.6" Static Press.				0.7" Static Press.			
			RPM	HP	Drive	Turns	RPM	HP	Drive	Turns	RPM	HP	Drive	Turns
150	40	2778	750	1	38	1.5	-	-	-	-	-	-	-	
	45	2469	715			2.0	755	1	-	1.5	-	-	-	-
	50	2222	685			2.5	730	3/4	38	2.0	-	-	-	-
	55	2020	665	3.0	715	2.5	-			-	-	-		
	60	1852	650	1/2	96	1.5	-	-	-	-	-	-	-	
	65	1709	640			1.5	690	2.5	-	-	-	-		
	70	1587	630			2.0	680	1/2	96	1.0	-	-	-	
175	40	3241	970	2	80	2.5	1005	2	80	1.5	1035	2	80	
	45	2881	900	1-1/2	193	1.0	935	1-1/2	193	0.5	970	1	193	
	50	2593	845	1	192	2.5	885	3/4	192	1.5	920	1-1/2	193	
	55	2357	805			3.0	845			1	2.5	880	1	192
	60	2160	770			3.5	815	3/4	192	3.0	830	3/4	192	2.0
	65	1994	745	0.0	790	3.5	815			3/4	815	3/4	192	2.5
	70	1852	725	1/2	96	0.0	770			1/2	96	0.0	770	1/2	96
200	40	3704	615	1-1/2	105	4.0	650	1-1/2	105	3.0	-	-	-	
	45	3292	590	1	16	1.0	625	3/4	16	4.0	-	-	-	
	50	2963	570	1.5		610	1			0.5	-	-	-	
	55	2694	555	2.0		595	1	0.5	-	-	-			
	60	2469	545	3/4	16	2.0	590	3/4	16	1.0	-	-	-	
	65	2279	540			3.5	585			1.0	-	-	-	
	70	2116	535			1/2	101	0.5	580	1/2	101	0.5	580	1/2	101
250	40	4630	750	2	108	2.5	775	2	108	2.0	-	-	-	
	45	4115	695	1-1/2	105	2.0	725	3/4	105	3.0	755	2	108	
	50	3704	660			3.0	690			1-1/2	105	2.0	720	1-1/2	105
	55	3367	630			2.0	665	1-1/2	105	3.0	695	1-1/2	105	2.0
	60	3086	605	1	205	2.0	645	3/4	205	0.5	680	1	205	
	65	2849	590			2.5	630			1	205	2.0	665	1	205
	70	2646	575			3.0	615	3/4	205	2.0	655	1	205	1.0
300	40	5556	-	-	-	-	-	-	-	-	-	-	-	
	45	4938	865	3	111	2.0	890	3	111	1.5	915	3	111	
	50	4444	805	2	108	1.0	830	2	108	0.5	860	3	111	
	55	4040	760	1/2	106	2.5	785	3/4	106	1.5	815	2	108	
	60	3704	720			3.5	750			1-1/2	106	2.5	780	1-1/2	106
	65	3419	690			4.0	720	1-1/2	106	3.5	750	1-1/2	106	2.5
	70	3175	660	1	205	1.0	695	1	205	0.5	725	1	205	
350	40	6481	1070	5	207	0.5	1095	3/4	207	0.0	-	-	-	
	45	5761	975			2.0	1000			1.5	1025	5	207	1.5
	50	5185	905	3	111	1.0	930	3/4	111	0.5	955	3	111	
	55	4714	845			2.5	870			2.0	900	3	111	1.0
	60	4321	800			2	210	3.5	825	2	210	3.0	855	2	210
	65	3989	760	1-1/2	105	0.0	790	3/4	105	4.0	815	2	210	
	70	3704	725			1.0	755			1-1/2	105	0.0	785	1-1/2	105
400	40	-	-			-	-	-	-	-	-	-	-	-
	45	6584	1010	5	207	1.5	1035	3/4	207	1.0	1055	5	207	
	50	5926	935			3.0	955			2.5	980	5	207	2.0
	55	5387	870	3	111	2.0	895	3/4	111	1.0	920	3	111	
	60	4938	820			3.0	850			2.5	875	3	111	2.0
	65	4558	780			2	210	4.0	805	2	210	3.5	835	2	210
	70	4233	745	1-1/2	105	0.5	775	1-1/2	105	4.0	800	1-1/2	105	

Filters

For blower units with enclosure and filter, add the following static pressures to the static pressure determined by the system designer for total external static pressure.

BDP 150	0.1" W.C.
BDP 175	0.2" W.C.
BDP 200	0.1" W.C.
BDP 250	0.2" W.C.
BDP 300	0.2" W.C.
BDP 350	0.2" W.C.
BDP 400	0.2" W.C.

Alternate Drives for 208-230/460V^③

Model	HP & Drive Listed	HP & Drive Needed
150	1 - 38	= 1 - 254
175	1 - 192	= 1 - 256
	1-1/2 - 193	= 1-1/2 - 198
	1-1/2 - 79	= 1-1/2 - 80
200	1 - 16	= 1 - 178
	1-1/2 - 105	= 1-1/2 - 180
	1-1/2 - 23	= 1-1/2 - 177
250	1 - 205	= 1 - 157
	1-1/2 - 105	= 1-1/2 - 180
	1-1/2 - 23	= 1-1/2 - 177
300	1 - 205	= 1 - 157
	1-1/2 - 105	= 1-1/2 - 180
	1-1/2 - 23	= 1-1/2 - 177
350	1 - 205	= 1 - 157
	1-1/2 - 106	= 1-1/2 - 108
	1-1/2 - 105	= 1-1/2 - 180
400	1-1/2 - 105	= 1-1/2 - 180

Alternate Drives for 575V^③

Model	Drive for Under 575V	Drive for 575V
150	1/4 - 191	= 1/4 - 197
	1/3 - 191	= 1/3 - 197
	1/3 - 95	= 1/3 - 96
	1 - 38	= 1 - 254
175	1/3 - 95	= 1/3 - 96
	1 - 192	= 1 - 256
	1-1/2 - 193	= 1-1/2 - 198
200	1/4 - 212	= 1/4 - 213
	1/3 - 212	= 1/3 - 213
	1/3 - 102	= 1/3 - 101
	1 - 16	= 1 - 178
	1-1/2 - 105	= 1-1/2 - 180
250	1/3 - 203	= 1/3 - 204
	1 - 205	= 1 - 157
	1-1/2 - 105	= 1-1/2 - 180
	1-1/2 - 105	= 1-1/2 - 180
300	1 - 205	= 1 - 157
	1-1/2 - 106	= 1-1/2 - 108
	1-1/2 - 105	= 1-1/2 - 180
350	1 - 205	= 1 - 157
	1-1/2 - 105	= 1-1/2 - 180
	1-1/2 - 100	= 1-1/2 - 210
400	1-1/2 - 105	= 1-1/2 - 180

- ① Outputs shown are for elevations up to 2000'. For elevations over 2000', output needs to be reduced 4% for each 1000' above sea level. (Does not apply in Canada - see rating plate)
- ② Sheave turns open are approximate. For proper operation, check blower rpm
- ③ Models not shown use same HP and drive numbers as cataloged
- ④ Performance is the same; motor sheave accommodates larger shaft. When ordering 230/460V (1 & 1-1/2 HP) or 575V, specify the listed 230/460V (1 & 1-1/2 HP) or 575V drive.



Table 18.1 - Electrical/Control Code Selection Details - All Models

Model	Supply Voltage	Phase	Unit Voltage (Control & Mtr)	Accessory Transformer Required (Order Separate)	Control Codes Available	Factory Installed Transformer	Motor Starter Coil Voltage		
HD/HDB/PTP	115	1	115V/1ph	none	11,12,21,22	115V to 24V	none		
	208	1 or 3		208V to 115V					
	230			230V to 115V					
	460			460V to 115V					
	575			575V to 115V					
PDP/BDP	115	1	none	30,59,63,85,87	115V to 24V	none			
PDP	208	1 or 3	208V to 115V ②						
	230		230V to 115V ②						
	460		460V to 115V ②						
	575	3	575V to 115V ②						
PDP/BDP	208	1	208V/1ph	none	31,64,86,88	208V to 24V	none		
	230		230V/1ph			230V to 24V			
BDP	208	3	208V/3ph			460V to 230V ① ③	64,88	208V to 24V	208V
	230		230V/3ph					575V to 230V ① ③	230V to 24V	230V
BDP	460	3	230V/3ph			none	32,33,93,94	460V to 24V	230V
	575		460V/3ph	575V to 24V					
BTP	115	1	115V/1ph	115V/1ph	See Table 11.1	115V to 24V	none		
	208	1	208V/1ph						
	230		230V/1ph						
	208	3	208V/3ph						
	230		230V/3ph						
	460	3	460V/3ph						
	575		575V/3ph						

- ① Unit power code must match supply voltage, control voltage must match unit power.
- ② Certain 208V and 230V electrical distribution systems have connections available for supplying 115V service. This may eliminate the need for the additional field installed transformer. Please check with the job site electrician to determine applicability.
- ③ For CSA Canada certification, step down transformer may be required to be factory installed.

Table 18.2 - Gas Controls – All Models ①

Model	Model Size	Control System Description	Service Voltage	Gas Type	Control Code	Control Voltage	
HD/HDB/PTP/BTP	30-400	Single-Stage, Direct Spark Ignition Utilizes a single-stage combination gas control and an ignition control. Gas is automatically lit with the direct spark igniter on call for heat.	115V	Natural	11	24V	
				Propane	21		
	75-400	Two-Stage, Direct Spark Ignition Utilizes a two-stage combination gas control (fires at 50% or 100% of full rated input) and an ignition control. Gas is automatically lit with the direct spark igniter on call for heat.		Natural	12		
				Propane	22		
PDP/BDP	150-400	Single-Stage, Intermittent Pilot Ignition Utilizes a single-stage combination gas control and an ignition control. Pilot is automatically lit on call for heat.	115V	Natural	30	24V	
			208/230V		31		
			460V		32 ②		
			575V		33 ②		
			115V	Propane	85		
			208/230V		86		
			460V		93 ②		
			575V		94 ②		
			115V	Natural	63		
					208/230V		64
					115V		87
					208/230V		88

- ① All ignition controls are 100% Shut-Off with Continuous Retry.
- ② Available on BDP models only.

Table 19.1 - Field Installed Accessories

	Feature	Model					
		HD	HDB	PDP	BDP	PTP	BTP
Cabinet and Air Mover	Vertical Deflector Blades - Allows directional discharge air control in the left and right directions.	.	.	.	.	.	.
	Downward Air Deflector Hoods - Available in 30°, 60°, and 90° configurations these deflector hoods enable the unit to be mounted higher while still providing heat to the building occupants. Refer to page 16 for further details.	.	.	.	.	.	.
	Vibration Isolation Kit - Minimizes unit vibration transmission to the building structure.	.	.				
	Pipe Hanger Adapter Kits - Allows the unit to be suspended by 3/4" pipe from the standard 3/8" holes found in the top of the unit.			.	.	.	.
	Discharge Transition for Polytube - Allows for the connection of polytube (not included) to the discharge of the unit.		.		.		.
	Blower Enclosure with or without Filter Rack - Totally encases the motor and blower assembly. Optional filters provide filtering of the air prior to entering the heater.		.		.		.
	Discharge Velocity Generating Nozzle - Four varieties of velocity generating nozzles allow for increased application flexibility. These nozzles increase mounting height while also directing the airflow to the desired locations. Refer to pages 20-21 for further details.				.		.
	Belt Guard - Provides protection for building occupants as well as service people from the drive belt and sheaves.				.		.
Controls	Natural Gas to Propane Gas Conversion Kit - Provides all required parts as well as instructions to convert a natural gas unit to propane gas.	.	.	.	.	.	.
	Single or Two-Stage Room Thermostats - See Table 19.2 for details.	.	.	.	.	.	.
	Room Thermostat Guard - Clear plastic for room thermostats. Guard is locking type and comes with two keys.	.	.	.	.	.	.
	Summer/Winter Switch - Allows a choice of unit fan operation. In the summer position, the fan runs continuously for ventilation while allowing the gas controls to fire on a call for heat from the thermostat. In the winter position, the fan runs intermittently on a call for heat from the thermostat.	.	.	.	.	.	.
	Stepdown Transformers - Used to operate propeller units on 208/230/460/575V/3Ph supply voltage. Also may be required for control circuits for blower units. Refer to Table 18.1 for further selection details.	.	.	.	.	.	.
	Control Relays - This single pole single throw relay consists of a 24V coil with a maximum contact rating of 18 amps at 115V.	.	.	.	.	.	.
	Gas Pressure Regulator - Fisher Type S-100, 3/4 inch pressure regulator for 1/2 to 50 psi inlet pressure capacity, 30 MBH to 400 MBH.	.	.	.	.	.	.
	Energy Saver Kit - Used to lower total energy costs by reducing stratified air in high mounting height applications. This kit consists of a controller with a SPDT (16A @ 120V) switch and a temperature range of 30° - 100°F.	.	.	.	.	.	.
	Building Management System - The Modine Building Management System (BMS) Board installed in this unit provides an RS485 interface between the unit heater and existing building networks that employ a BACnet or Modbus protocol.		.	.	.	.	.

Table 19.2 - Field Installed Thermostats

	Type	Description
Single-Stage Thermostats	Room Thermostat	Thermostat, Modine Pro1 T-501M: 50-90°F, Non-programmable Thermostat includes 3 swap panels: 1.) Fan: On/Auto, System: Heat/Off/Cool, 2.) Fan: On/Auto, System: On/Off, 3.) System: On/Off
	Room - Digital	Thermostat, Modine Pro1 T-715M: 41-95°F, Heat/Auto/Off, Fan Auto/On, 7-day programmable
Two-Stage Thermostats	Room - WiFi	WiFi Thermostat, Modine Pro1 T855iSH: 41-95°F, 7-day prog, wifi, hardwire only
	Duct	Johnson Controls A350 Electronic Temp Control with Sensor and S350 Stage Adder (Blower units only)
Guard	Room	Thermostat Guard, Modine Pro1 T-150, Clear Plastic, Tumbler Lock with two keys

Table 20.1 - Downtown Hood General Performance Data for HD/PDP/PTP (feet)

		Model HD Sizes				Model PDP Sizes						Model PTP Sizes							
		60	75	100	125	150	175	200	250	300	350	400	150	175	200	250	300	350	400
Max. Mtg. Height (ft.)		9	11	11	12	18	18	18	22	24	24	24	16	16	15	20	22	21	23
30° Hood	X	4	5	5	6	6	9	6	8	8	8	8	6	6	7	7	8	7	11
	Y	11	14	14	16	20	26	18	24	26	24	24	20	17	20	22	25	23	31
	Z	16	21	20	23	29	37	26	35	38	36	35	29	26	29	32	37	34	44
60° Hood	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Y	8	12	12	14	13	23	12	16	19	16	16	17	14	17	18	21	18	26
	Z	12	17	17	19	19	32	17	23	28	24	23	24	21	24	26	30	26	37
90° Hood	S	10	14	13	15	23	25	22	29	32	20	29	17	16	16	20	22	21	24

Figure 20.1 - 30°, 60°, and 90° Downward Deflector Hoods

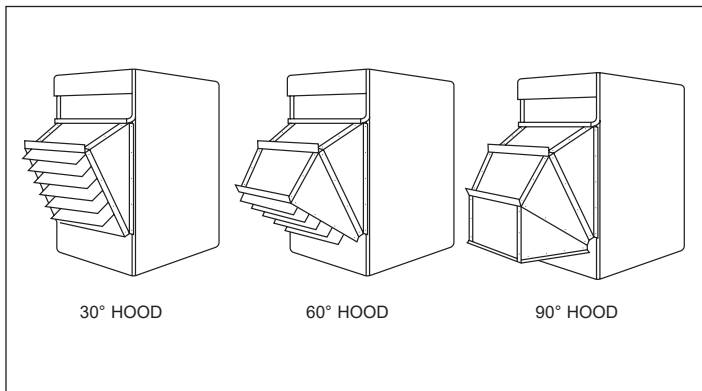


Figure 20.2 - 30° and 60° Throw/Floor Coverage

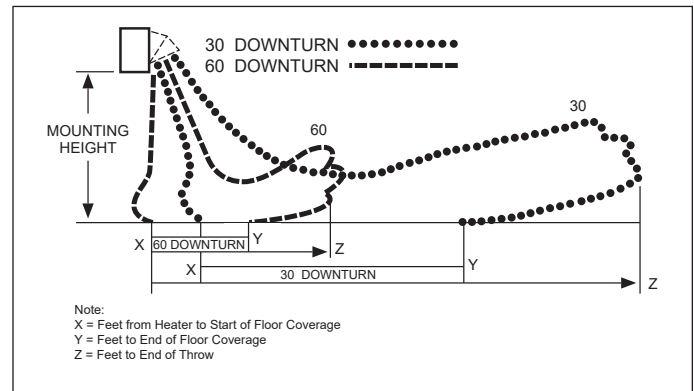
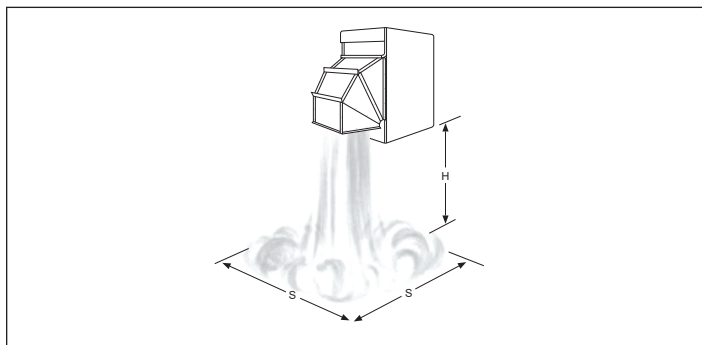


Figure 20.3 - 90° Hood Throw/Floor Coverage



PERFORMANCE DATA - HOODS FOR BTP/BTS BLOWER MODELS

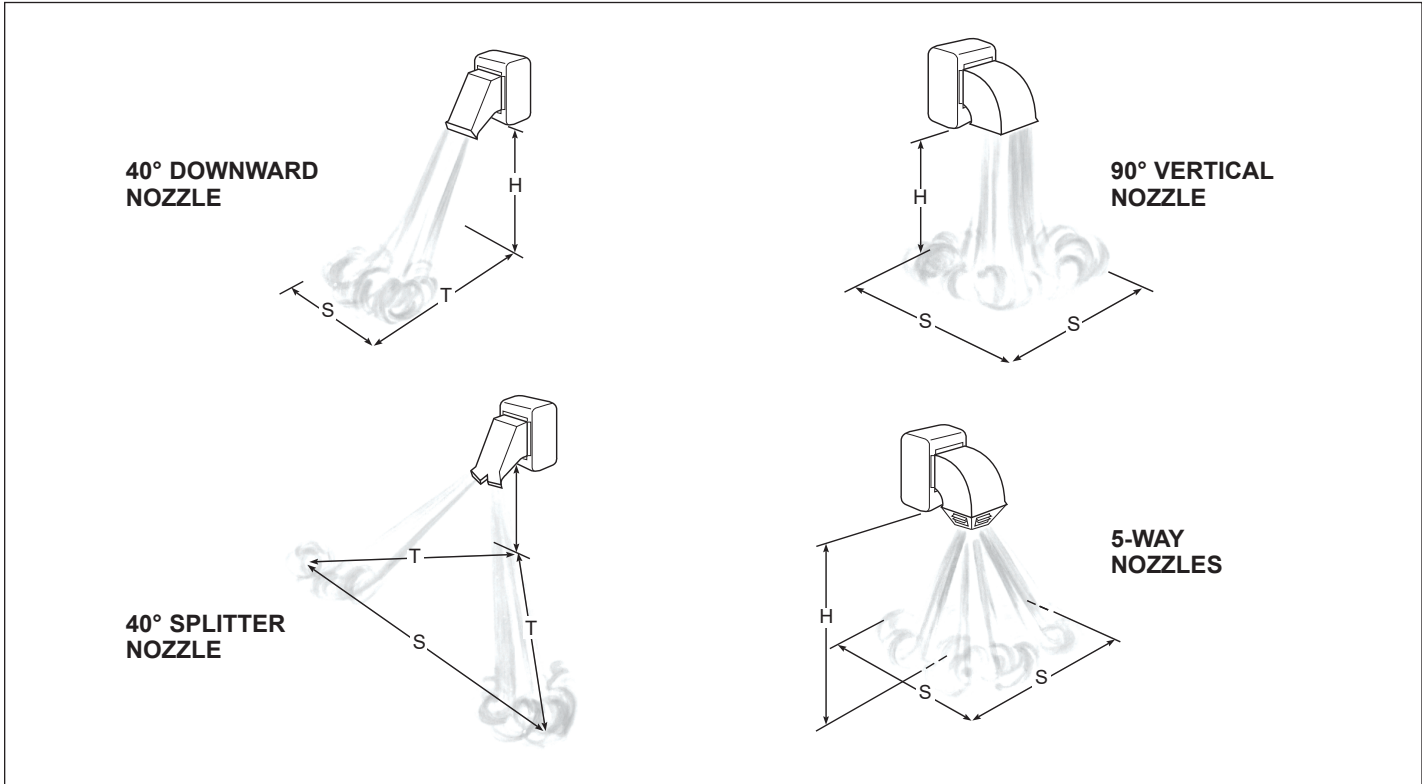


Table 21.1 - Deflector Hood General Performance Data - Model BTP/BTS

Model Size	Airflow (cfm)	Temp Rise (°F)	Mounting Height (ft)	Blade Angle (°)	30° Hood			60° Hood			90° Hood
					X (ft)	Y (ft)	Z (ft)	X (ft)	Y (ft)	Z (ft)	S (ft)
150	2020	55	8	57	13	29	40	0	31	42	21
			10	48	12	28	38	0	28	39	19
			12	37	10	25	35	0	25	34	17
			14	21	8	21	30	0	19	27	16
			15	10	7	19	27	0	12	18	15
175	2357	55	8	51	11	24	33	0	25	34	17
			10	39	9	22	31	0	22	30	15
			12	22	7	19	26	0	17	23	14
			13	2	5	14	21	0	10	14	13
200	2694	55	8	57	13	29	39	0	30	41	20
			10	47	12	27	37	0	28	38	18
			12	35	10	25	34	0	24	33	17
			14	18	7	20	29	0	18	25	15
			15	2	5	16	24	0	11	16	15
250	3367	55	8	59	14	31	42	0	32	44	22
			10	50	13	29	40	0	30	41	20
			12	39	11	27	37	0	27	37	18
			14	25	9	23	33	0	22	30	17
			15	15	7	20	29	0	18	25	16
300	4040	55	8	64	17	37	51	0	40	54	29
			10	57	16	36	50	0	38	52	26
			12	50	15	35	48	0	36	49	23
			14	41	13	33	45	0	33	45	22
			16	30	12	30	41	0	28	39	20
			18	14	9	24	35	0	21	29	19
350	4714	55	8	63	16	36	49	0	37	51	27
			10	55	15	34	47	0	36	49	24
			12	47	14	33	45	0	33	46	22
			14	37	12	30	42	0	30	41	20
			16	25	10	27	38	0	25	34	19
			18	2	6	20	29	0	13	19	18
400	5387	55	8	67	19	41	56	0	44	60	32
			10	60	18	40	55	0	42	58	29
			12	53	17	39	53	0	40	55	26
			14	46	15	37	51	0	37	51	25
			16	37	14	34	48	0	34	47	23
			18	26	12	31	43	0	29	40	22
			20	8	8	23	34	0	20	28	21

Note: Refer to Figures 20.1 through 20.3 on page 20.

Figure 22.1 - Velocity Generating Nozzles ①



① Velocity generating nozzles available for Blower Model BDP only.

Table 22.1 - Blower Unit Model BDP Velocity Generating Nozzle Performance Data (feet) ②

Nozzle Type		BDP Blower Model Size						
		150	175	200	250	300	350	400
40° Downward Nozzle	Max. Mounting Ht. (ft.) H	26	25	27	29	31	32	32
	Heat Throw (ft.) T	79	76	81	86	94	96	96
	Heat Spread (ft.) S	26	25	27	29	31	32	32
90° Vertical Nozzle	Max. Mounting Ht. (ft.) H	26	26	24	29	31	32	32
	Heat Spread (ft.) S	26	26	24	29	31	32	32
40° Splitter Nozzle	Max. Mounting Ht. (ft.) H	24	24	23	25	28	30	32
	Heat Throw (ft.) T	60	59	59	62	70	75	80
	Heat Spread (ft.) S	120	118	117	124	140	151	160
5-Way Nozzle	Max. Mounting Ht. (ft.) H	22	21	20	25	26	23	26
	Heat Spread (ft.) S	31	29	28	35	36	32	36

② The above table 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 16 and 17. Mounting height measured from bottom of unit.

Selection Procedure

In order to properly select a unit heater it is necessary to have the following basic information.

1. Heating output capacity

Model size output is to be matched against the heat loss to be replaced.

2. External static pressure (blower units only)

The external static pressure (E.S.P.) is determined using the ASHRAE Guide for duct losses or provided by the design engineer.

3. Accessory internal static pressure (Nozzles, transitions, filters, etc.) (blower units only)

The critical accessories are those that add internal static pressure (I.S.P.) to the unit. Once these items are determined, the total pressure drop can be determined (if applicable).

4. Heat exchanger material

The heat exchanger type is determined by the application. The standard heat exchanger material is aluminized steel. A 409 stainless steel heat exchanger and burner is recommended when the combined entering/return air to the unit is below 40°F or in high humidity applications.

5. Type of fuel

Either natural or propane gas determined by the design engineer.

6. Gas controls

Either single stage, two stage, or mechanical modulation as determined by the design engineer.

7. Main power supply voltage to unit

8. Altitude at which unit is to be installed

With this information a basic unit can be selected as shown in the following example.

Selection Example Conditions (Propeller Unit)

In the following example, select a unit heater to meet the following conditions:

1. Heating output capacity = 156,000 Btu/Hr per design engineer
2. External Static Pressure = 0.0
3. Internal Static Pressure = 0.0. No static producing accessories are required
4. Heat exchanger and burner = 409 Stainless Steel
5. Gas Type = Natural
6. Gas Controls = Single Stage Intermittent Pilot Ignition (IPI)
7. Supply Voltage: 460V/60Hz/3Ph
8. Altitude: 1,000 feet

Selection Example Solution (Propeller Unit)

With the information listed above, the basic model, using the information in this catalog and the Model Nomenclature shown on page 26, can be selected as shown in the following example:

1. Determine the Model and Input Rating (MBH):

Using the Heating output capacity, the Furnace Input Rating is determined from Table 7.1. The closest model to 156,000 Btu/Hr output has an Btu/Hr Input rating of 200,000 Btu/Hr so the Furnace Input Rating = 200. The corresponding model for a 200 size, propeller, power vented unit heater is PDP. The model and size are a PDP200.

2. Determination of Heat Exchanger/Burner/Drip Pan Material:

From item #4 in the example, the Heat Exchanger and Burner required are 409 Stainless Steel. Thus, the Heat Exchanger Material = S from the Model Nomenclature on page 32. The burner is an option placed on the order.

3. Determine the development sequence:

From item #6 in the example, the IPI results in the Development Sequence = E from the Model Nomenclature on page 32.

4. Determine Power Code Required:

Referring to Table 7.2, it can be seen that the supply voltage from the 7.2 example conditions is not available (460V). A transformer kit selected later in this example must be used. In this instance, from Table 7.2 select the 115V/60Hz/1Ph power code (PC) = 01 unit.

5. Determine the control type:

From items #5 and #6 in the example conditions, the gas type is Natural Gas and controls are single stage IPI. Given the supply voltage listed from the example conditions (460V) and by looking up the supply voltage of 460V/60Hz/3Ph in Table 18.2 for propeller units, it directs us use to a unit voltage of 115V. We then refer to Tables 18.1 and 18.2, locate the single-stage options and select the appropriate Control Code (CC) of 30. Remember a step-down transformer will be selected later in this example.

**At this point we have a full model number of:
PDP200SE0130SBAN**

6. Determination of transformer:

To operate a 115V/60Hz/1Ph unit on 460V/60Hz/3Ph supply power a unit step down transformer must be selected. By referring to Table 18.1 we see that a 460V to 115V step down transformer is required.

7. Altitude:

Since deration of gas fired unit heaters is only required for units to be installed at 2,000 ft or greater, no high altitude kit is required.

Selection Example Conditions (Blower Unit)

In the following example, select a unit heater to meet the following conditions:

1. Heating output capacity = 156,000 Btu/Hr per design engineer
2. External Static Pressure = 0.2.
3. Internal Static Pressure = 0.0. No static producing accessories are required
4. Heat exchanger and burner = Aluminized Steel
5. Gas Type = Propane
6. Gas Controls = Two stage Intermittent Pilot
7. Supply Voltage: 230V/60Hz/3Ph
8. Altitude: 1,000 feet
9. CFM = 2,400

Selection Example Solution (Blower Unit)

With the information listed above, the basic model, using the information in this catalog and the Model Nomenclature shown on page 32, can be selected as shown in the following example:

1. Determine the Model and Input Rating (MBH):

Using the Heating output capacity, the Furnace Input Rating is determined from Table 13.1 The closest model to 156,000 Btu/Hr output has an Btu/Hr Input rating of 200,000 Btu/Hr so the Furnace Input Rating = 200. The corresponding model for a 200 size, blower, power vented unit heater is BDP. The model and size are a BDP200.

2. Determination of Heat Exchanger/Burner/Drip Pan Material:

From item #4 in the example, the Heat Exchanger and Burner required are aluminized steel. Thus, the Heat Exchanger Material = A from the Model Nomenclature on page 32.

3. Determine the development sequence:

From item #6 in the example, the IPI results in the Development Sequence = E from the Model Nomenclature on page 32.

4. Determine Power Code Required:

From page 16 we see that a unit requiring a static of 0.2 and a cfm of 2400 requires a 1/3 horsepower motor with a -102 drive that is turned open 4.0 turns. Referring to Table 11.1 it can be determined that for a BDP200 with a 1/3 HP motor and a -102 drive operating on 230V/60Hz/3Ph that it will have a power code = 24.

5. Determine the control type:

From item #5 in the example, the gas type is Propane Gas and controls are Two Stage. Given the supply voltage listed in #7, we can refer to Tables 18.1 and 18.2 to determine what controls are needed. This results in a Control Code (CC) = 88.

At this point we have a full model number of:

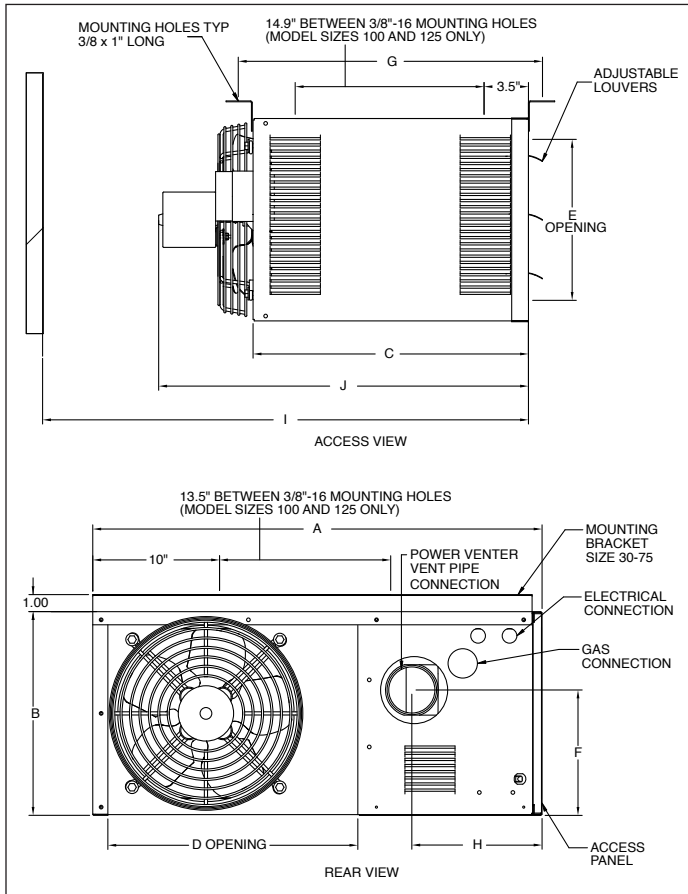
BDP200AE2488NBAN

6. Altitude:

Since deration of gas fired unit heaters is only required for units to be installed at 2,000 ft or greater, no high altitude kit is required.

Propeller Units - Model HD

Figure 25.1 - Dimensional Drawings - Model HD



Blower Units - Model HDB

Figure 25.2 - Dimensional Drawings - Model HDB

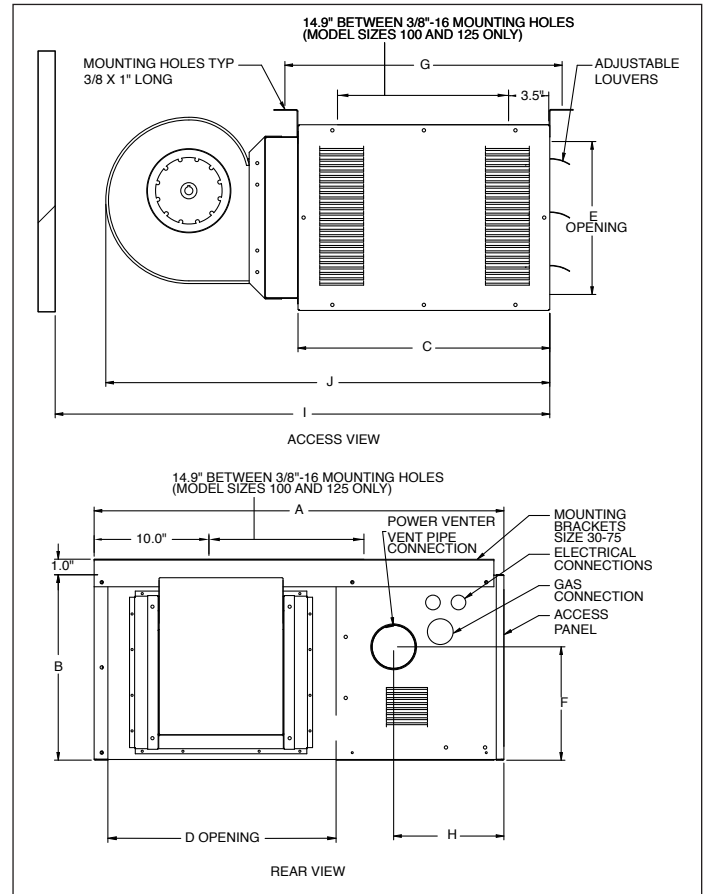


Table 25.1 - Dimensions (inches) - HD

Models	HD30	HD45	HD60	HD75	HD100/125
A	26.8	26.8	26.8	26.8	35.5
B	12.2	12.2	18.0	18.0	20.5
C	16.5	16.5	16.5	16.5	22.0
D	14.9	14.9	14.9	14.9	22.5
E	10.1	10.1	15.9	15.9	13.4
F	7.5	7.5	10.7	10.7	14.0
G	18.5	18.5	18.5	18.5	-
H	7.6	7.6	7.8	7.8	8.4
Gas Connection	1/2	1/2	1/2	1/2	1/2
I	34.5	34.5	34.5	34.5	43.0
J	22	22	25	25	31.0
Fan Diameter	10	10	14	14	18.0
Approx. Shipping Weight (lbs.)	67	72	92	97	143
Vent Pipe Connector Diameter (in)	3	3	3	3	4

Table 25.2 - Dimensions (inches) - HDB

Models	HDB 60	HDB 75	HDB100/125
A	26.8	26.8	35.5
B	18.0	18.0	20.5
C	16.5	16.5	22.0
D	14.9	14.9	22.5
E	15.9	15.9	18.4
F	10.7	10.7	14.0
G	18.5	18.5	-
H	7.8	7.8	8.4
Gas Connection	1/2	1/2	1/2
I	34.5	34.5	44.5
J	25.0	25.0	41.5
Blower	9 - 7	9 - 7	10 - 10
Approx. Shipping Weight (lbs.)	92	97	151
Vent Pipe Connector Diameter (in)	3	3	4

Table 25.3 - Clearance to Combustibles, Model HD/HDB

Unit Side	Clearance to Combustible Material		Recommended Service Clearance
	HD	HDB		HD/HDB
Top and Bottom	1"	6"	18"
Access Side	1"	6"	18"
Non-Access Side	1"	6"	18"
Rear	18"	18"	18"
Vent Connector	4"	4"	18"

Propeller Units - Model PDP

Figure 26.1 - Dimensional Drawings

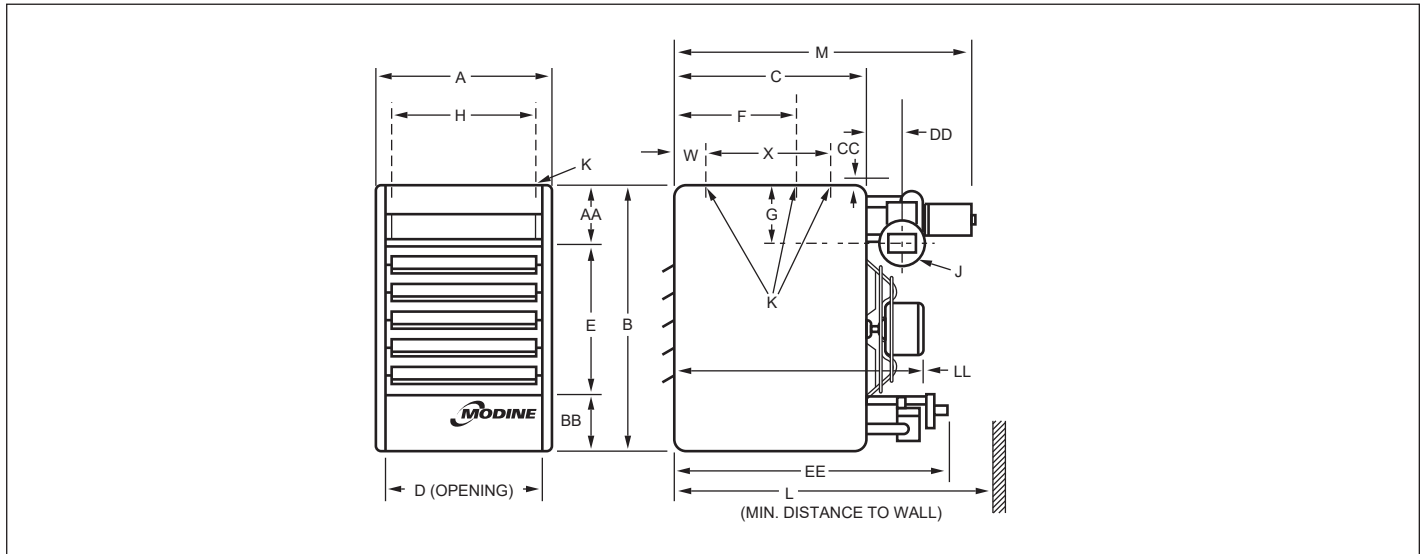


Table 26.1 - Dimensions (inches) - PDP ①

Dimension Symbol	Model Number						
	PDP 150	PDP 175	PDP 200	PDP 250	PDP 300	PDP 350	PDP 400
A	21	23-1/2	25-5/8	25-5/8	28-5/8	33-5/8	40
B	35-1/4	35-1/4	40-1/4	40-1/4	40-1/4	40-1/4	40-1/4
C	22	22	25	25	25	25	25
D	18-9/16	21-1/16	23-3/16	23-3/16	26-3/16	31-3/16	37-1/2
E	20	20	24	24	24	24	24
F	12	12	13-1/2	13-1/2	14	-	-
G	6-9/16	6-9/16	7-1/2	7-1/2	7-1/2	7-1/2	7-1/2
H	17-3/8	19-7/8	22	22	25	30	36-3/8
J ②	5	5	5	6	6	6	6
K (Mounting Holes) ③	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16
L ④	35-13/16	35-9/16	40-3/4	40-3/4	40-3/4	40-3/4	44-3/16
M	29-13/16	29-9/16	34-3/4	34-3/4	34-3/4	34-11/16	38-3/16
W	-	-	-	-	-	5	5
X	-	-	-	-	-	16	16
AA	8	8	9	9	9	9	9
BB	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4
CC	-	-	-	-	-	-	-
DD	2-3/4	2-3/4	3-3/8	3-3/8	3-3/8	3-3/8	6-13/16
EE	30-1/2	30-1/2	32-7/8	32-7/8	32-7/8	32-7/8	32-7/8
LL	31-1/8	31-1/8	34-7/8	34-7/8	36-1/4	35-1/2	40-1/2
Gas Connections ⑤	1/2	1/2	1/2	1/2	1/2	3/4	3/4
Fan Diameter	16	18	20	20	22	22	24
Approx. Weight	185	198	253	260	295	355	406

① Do not use propeller units with duct work.
 ② For some models, this is the dimension of the vent transition outlet supplied.
 ③ PDP 150 through PDP 300 — 2 holes (and the level hanging adjustment feature). PDP 350 through PDP 400 — 4 holes. (Listed is the hole diameter and threads per inch to accept threaded rod).
 ④ Dimension equals overall plus 6".
 ⑤ For natural gas; may vary depending on control availability.

Figure 26.2 - Combustible Material and Service Clearances

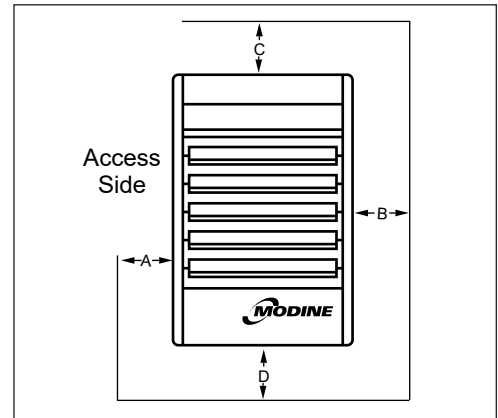


Table 26.2 - Combustible Material Clearances ①

Model Size	Access Side (A)	Non-Access Side (B)	Top (C)	Bottom (D)	Top of Power Exhauster (Not shown)
150-175	1	1	4	12	2
200-400	1	1	5	12	3

① Provide sufficient room around the heater to allow for proper combustion and operation of fan. Free area around the heater must not be less than 1-1/2 times the discharge area of the unit.

Blower Units - Model BDP

Figure 27.1 - Dimensional Drawings

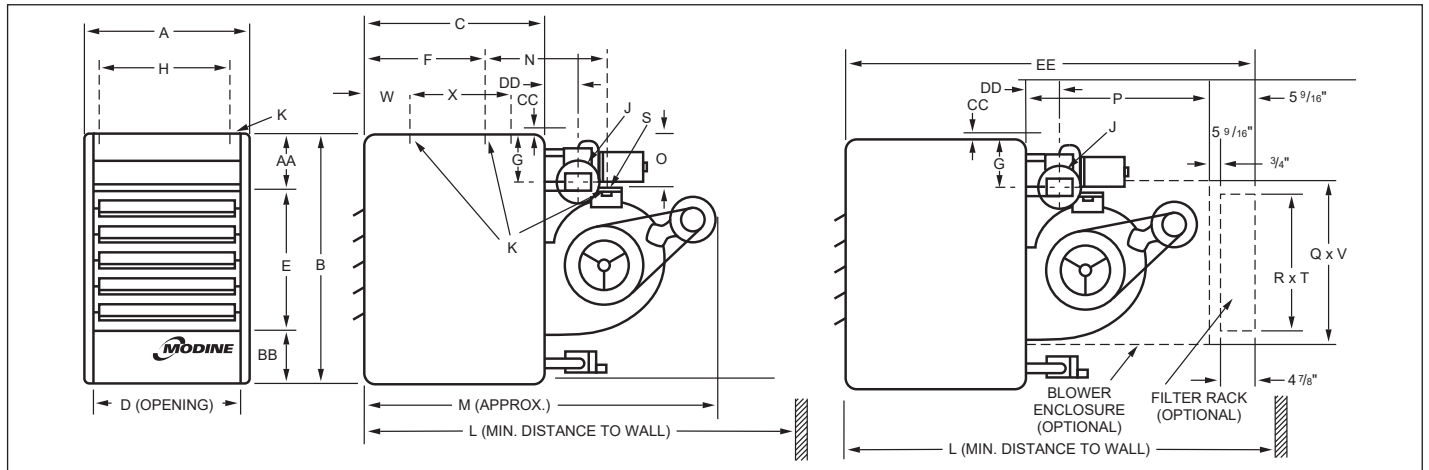


Table 27.1 - Dimensions (inches) - BDP

Dimension Symbol	Model Number						
	BDP 150	BDP 175	BDP 200	BDP 250	BDP 300	BDP 350	BDP 400
A	21	23-1/2	25-5/8	25-5/8	28-5/8	33-5/8	40
B	35-1/4	35-1/4	40-1/4	40-1/4	40-1/4	40-1/4	40-1/4
C	22	22	25	25	25	25	25
D	18-9/16	21-1/16	23-3/16	23-3/16	26-3/16	31-3/16	37-1/2
E	20	20	24	24	24	24	24
F	12	12	13-1/2	13-1/2	14	-	-
G	6-9/16	6-9/16	7-1/2	7-1/2	7-1/2	7-1/2	7-1/2
H	17-3/8	19-7/8	22	22	25	30	36-3/8
J ①	5	5	5	6	6	6	6
K Mounting Holes ②	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16
L w/ Blwr Encl & Filt Rk	62-5/8	62-5/8	69-5/8	69-5/8	69-5/8	69-5/8	69-5/8
L w/o Blwr Encl & Filt Rk	53-1/8	53-1/8	61	61	61	61	65
M ③	47-1/8	47-1/8	55	55	55	55	59
N ④	21-1/2	21-1/2	25-7/16	25-7/16	24-15/16	17-15/16	22
O	7-1/4	7-1/4	8-1/2	8-1/2	8-1/2	8-1/2	8-1/2
P	30	30	34	34	34	34	34
Q Blower Encl Ht	21-3/8	21-3/8	25-1/8	25-1/8	25-1/8	25-1/8	25-1/8
R Inlet Duct Height	20	20	23-3/4	23-3/4	23-3/4	23-3/4	23-3/4
S Center to Center Blower Mtg. Holes	17-5/16	17-3/8	20-3/8	20-3/8	20-3/8	20-3/8	20-3/8
T Inlet Duct Width	27-1/2	27-1/2	32-3/4	32-3/4	32-3/4	42-7/8	42-7/8
V Blower Encl Width	29	29	34-1/4	34-1/4	34-1/4	44-3/8	44-3/8
W	-	-	-	-	-	5	5
X	-	-	-	-	-	16	16
AA	8	8	9	9	9	9	9
BB	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4
CC	-	-	-	-	-	-	-
DD	2-3/4	2-3/4	2-3/4	3-3/8	3-3/8	3-3/8	6-13/16
EE	56-5/8	56-5/8	63-5/8	63-5/8	63-5/8	63-5/8	63-5/8
Gas Connections ⑤	1/2	1/2	1/2	1/2	1/2	3/4	3/4
Std. Mtr. Sheave Dia.	3	3	3	3	3	3	4-1/2
Std. Blower Sheave Dia.	11	7	14	10	7	6	10
Blower Wheel Diameter	13	13	15	15	15	15	15
Approx. Weight	221	237	315	315	339	498	498

Figure 27.2 - Combustible Material and Service Clearances

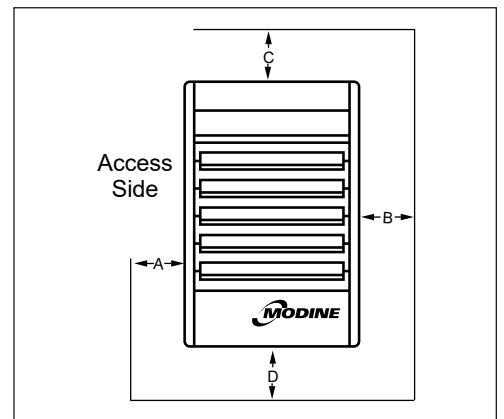


Table 27.2 - Combustible Material Clearances ①

Model Size	Access Side (A)	Non-Access Side (B)	Top (C)	Bottom (D)	Top of Power Exhauster (Not shown)
150-175	1	1	4	12	2
200-400	1	1	5	12	3

① Provide sufficient room around the heater to allow for proper combustion and operation of fan. Free area around the heater must not be less than 1-1/2 times the discharge area of the unit.

- ① For some models, this is the dimension of the vent transition outlet supplied.
- ② BDP 150 thru BDP 300 — 4 holes (2 on blower and 2 on unit). BDP 350 and BDP 400 — 6 holes (2 on blower and 4 on unit). (Listed is the hole diameter and threads per inch to accept threaded rod).
- ③ This is an approximate dimension for standard motors, allow 3" for sheave and optional motors.
- ④ Distance between mounting hole in unit casing and mounting hole on blower. On the BDP 350 and BDP 400, the distance is from rear mounting hole in casing to the mounting hole on blower.
- ⑤ For natural gas; may vary depending on control availability.

Propeller Units - Model PTP

Figure 28.1 - Dimensional Drawings

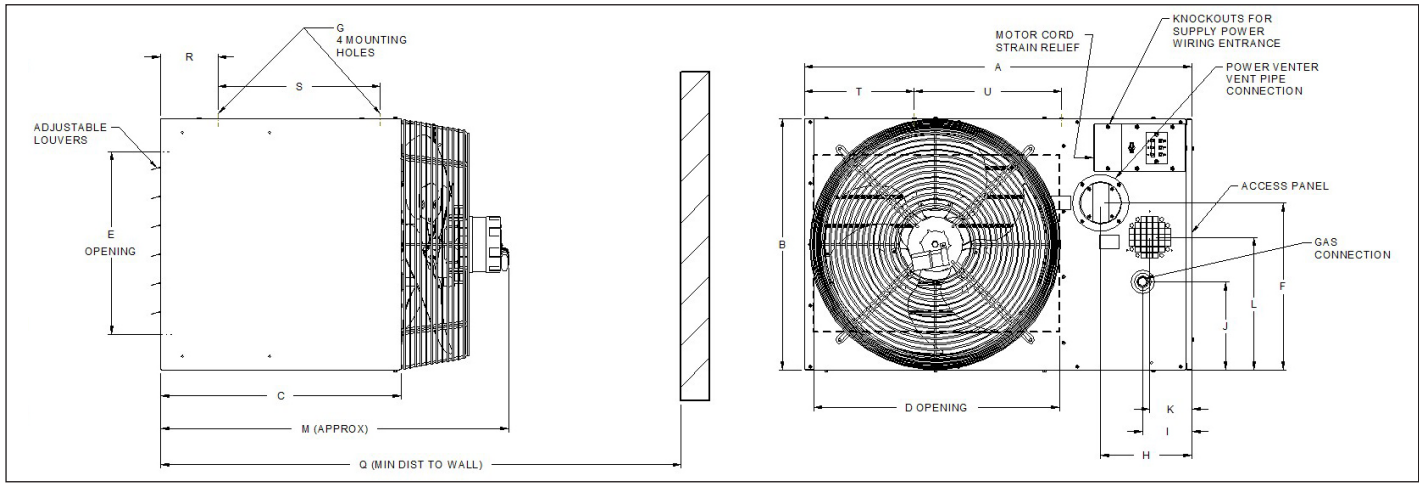


Table 28.1 - Dimensions (inches) - PTP ①

Models	PTP150	PTP175	PTP200	PTP250	PTP300	PTP350	PTP400
A	35.53	42.53	42.53	42.53	42.53	42.53	42.53
B	23.06	25.81	25.81	31.31	31.31	39.56	39.56
C	22.05	22.05	22.05	22.05	22.05	22.05	22.05
D	22.52	29.52	29.52	29.52	29.52	29.52	29.52
E	16.20	18.95	18.95	29.43	29.43	32.17	32.17
F	15.33	16.70	16.70	19.45	19.45	23.58	23.58
G (Mounting Hole) ②	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16
H	8.37	8.37	8.37	8.37	8.37	8.37	8.37
I	4.50	4.50	4.50	4.50	4.50	4.50	4.50
M	31.79	32.83	34.43	33.83	33.83	34.83	34.83
Q ③	43.79	44.83	46.43	45.83	45.83	46.83	46.83
R	3.56	3.56	3.56	3.56	3.56	3.56	3.56
S	14.90	14.90	14.90	14.90	14.90	14.90	14.90
T	10.00	10.00	10.00	10.00	10.00	10.00	10.00
U	13.54	20.53	20.53	20.53	20.53	20.53	20.53
Gas Connection	1/2	1/2	1/2	3/4	3/4	3/4	3/4
Vent Connector Size	4"	4"	4"	6"	6"	6"	6"
Fan Diameter	20.00	22.00	22.00	22.00	22.00	24.00	26.00
Approx. Shipping Weight (lbs.)	163	163	215	256	261	313	329

① Do not use propeller units with duct work.

② Listed is the hole diameter and threads per inch to accept threaded rod.

③ Dimension equals overall plus 12".

Figure 29.1 - Dimensional Drawings - Model BTP

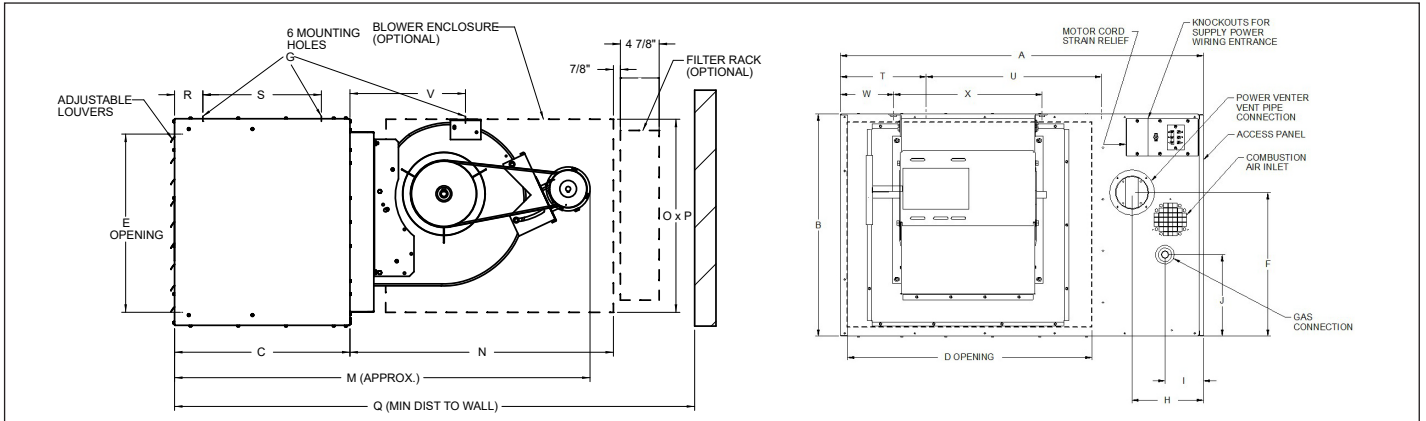


Table 29.1 - Dimensions (inches) — BTP

Models	BTP150	BTP175	BTP200	BTP250	BTP300	BTP350	BTP400
A	35.53	42.53	42.53	42.53	42.53	42.53	42.53
B	23.06	25.81	25.81	31.31	31.31	39.56	39.56
C	22.05	22.05	22.05	22.05	22.05	22.05	22.05
D	22.52	29.52	29.52	29.52	29.52	29.52	29.52
E	21.18	23.93	23.93	29.43	29.43	32.17	32.17
F	15.33	16.70	16.70	19.45	19.45	23.58	23.58
G (Mounting Hole) ①	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16
H	8.37	8.37	8.37	8.37	8.37	8.37	8.37
I	4.50	4.50	4.50	4.50	4.50	4.50	4.50
J	8.09	9.47	9.47	6.72	6.72	10.84	10.84
K	3.87	3.87	3.87	5.20	5.20	5.20	5.20
L	12.17	13.55	13.55	12.66	12.66	16.78	16.78
M ②	52.25	52.19	52.19	58.88	58.88	58.88	58.88
N	33.18	33.90	33.90	39.88	39.88	39.88	39.88
O	23.90	24.13	24.13	27.04	27.04	28.57	28.57
P	24.77	24.52	24.52	27.19	27.19	28.28	28.28
Q (w/Blower Encl & Filter Rack)	72.04	73.70	73.70	79.68	79.68	79.68	79.68
Q (w/o Blower Encl & Filter Rack)	64.24	64.19	64.19	70.88	70.88	70.88	70.88
R	3.56	3.56	3.56	3.56	3.56	3.56	3.56
S	14.90	14.90	14.90	14.90	14.90	14.90	14.90
T	10.00	10.00	10.00	10.00	10.00	10.00	10.00
U	13.54	20.53	20.53	20.53	20.53	20.53	20.53
V	14.52	14.52	14.52	18.04	18.04	18.00	18.00
W	3.27	7.15	7.15	4.77	4.77	5.24	5.24
X	17.38	17.38	17.38	20.38	20.38	20.38	20.38
Gas Connection	1/2	1/2	1/2	3/4	3/4	3/4	3/4
Vent Connector Size	4"	4"	4"	6"	6"	6"	6"
Blower	12-12	12-12	12-12	15-15	15-15	15-15	15-15
Approx. Shipping Weight (lbs.)	220	275	280	340	345	395	405

① Listed is the hole diameter and threads per inch to accept threaded rod.

② This is an approximate dimension for standard motors, allow 3" for sheave and optional motors.

Table 29.2 - Clearances to Combustible Materials

Unit Side	Clearance To Combustible Materials	Recommended Service Clearance
Top and Bottom	6"	6"
Access Side	6"	18"
Non-Access Side	6"	6"
Rear	18"	18"
Vent Connector	6"	6"

General

A. Standards

All unit(s) shall include:

- A.1. ETL Listed and ETL Verified design certification for use in both the US and Canada to the ANSI Z83.8 - latest revision, standard for "Gas Unit Heater and Gas-Fired Duct Furnaces" for safe operation, construction, and performance.

B. Mechanical Configuration

- B.1. Furnace(s) section with 82% minimum efficiency (BDP) and 83% minimum efficiency (PDP) provided by an indirect-fired heat exchanger with dimpled tube pattern for efficient heat transfer. (PDP/BDP models)
- B.2. Furnace(s) section with 82-83% minimum efficiency provided by an indirect-fired tubular heat exchanger with individually fired tubes for maximum heat transfer with minimal noise of flame ignition/extinction. (HD/HDB/PTP models)

C. Venting Arrangement

- C.2. The venting shall be a power exhausted arrangement. The unit shall be tested to insure proper ignition when the unit is subjected to 40 mile per hour wind velocities. The unit shall also include a factory mounted differential pressure switch designed to prevent main burner ignition until positive venting has been proven.

D. Unit Casing

- D.1. The unit heater(s) casing shall be constructed of not less than 20 gauge aluminized steel with minimization of exposed fasteners. (PDP/BDP/PTP models)
- D.1.a. The unit heater(s) casing shall be constructed of not less than 22 gauge aluminized steel with minimization of exposed fasteners. (HD/HDB models)
- D.2. All exterior casing parts shall be cleaned of all oils and a phosphate coating applied prior to painting. The exterior casing parts shall then be painted with an electrostatically applied baked-on gray-green polyester powder paint (7-mil thickness) for corrosion resistance.
- D.3. The unit shall be furnished with horizontal air deflectors. The deflectors are adjustable to provide for horizontal directional airflow control (up or down).

E. Furnace Section

- E.1. The heat exchanger(s) shall be made of 20 gauge aluminized steel tubes and headers (opt 409 stainless steel). (PDP/BDP models)
- The thermal efficiency of the unit(s) shall be a minimum of 82% (BDP) and 83% (PDP) efficient for all air flow ranges.
- Each heat exchanger tube shall be individually and directly flame-fired. The heat exchanger tube shall be contoured and dimpled to provide efficient heat transfer and crimped to allow for thermal expansion and contraction. The flue collector box shall be made of 20 gauge aluminized steel.
- E.1.a. The heat exchanger(s) shall be made of 18 gauge aluminized steel (opt 409 stainless steel). (HD/HDB/PTP models)
- The thermal efficiency of the unit(s) shall be a minimum of 82-83% for all air flow ranges.
- Each heat exchanger tube shall be individually and directly flame-fired. Each heat exchanger tube shall be individually and directly flame-fired. The heat exchanger tube shall be crimped to allow for thermal expansion and contraction. The flue collector box shall be made of 20 gauge aluminized steel.
- E.2. The heat exchanger(s) seams and duct connections shall be certified to withstand 0.9" W.C. external static pressure without burner flame disturbance. (HD/HDB/PTP models)

- E.2.a. The heat exchanger(s) seams and duct connections shall be certified to withstand 0.5" W.C. external static pressure without burner flame disturbance. (PDP/BDP models)
- E.3. The burner(s) shall be made of the same material as the heat exchanger with a thickness of not less than 28 gauge. Burner(s) shall have non-clogging, slotted ports with a stainless steel separator strip designed for good lighting characteristics without noise of extinction for both natural and propane gas. (PDP/BDP models)
- E.3.a. The burner(s) shall be in-shot type, directly firing each heat exchanger individually and is (are) designed for good lighting characteristics without noise of extinction for both natural and propane gas. (HD/HDB/PTP models)
- E.4. The orifices shall be provided on propane gas with adjustable air shutters for controlling the primary air mixture. (PDP/BDP models)
- E.5. The ignition controller(s) shall be 100% shut-off with continuous retry.
- E.6. The gas pressure shall be between 6-7" W.C for natural gas. (opt) The gas pressure shall be 11-14" W.C. for propane gas.
- E.7. The solid state ignition system shall intermittently light the pilot each time the system is energized. Once the pilot is proven, the main gas valve shall open and allow gas flow to the main burner. (PDP/BDP models)
- E.7.a. The solid state ignition system shall directly light the gas by means of a direct spark igniter each time the system is energized (HD/HDB/PTP models).
- E.8. The unit gas controls shall be provided with the following:
- E.8.d. (opt) Single-stage gas controls with a single-stage combination gas control, an ignition control, and a single-stage low voltage thermostat. The unit fires at 100% full fire based on a call for heat from a room thermostat.
- E.8.e. (opt) Two-stage gas controls with a two-stage combination gas control, an ignition control, and a two-stage low voltage thermostat. The unit fires at 50% fire on low stage or 100% fire on high stage of the unit based on the call for heat from either a room or duct thermostat.
- E.9. An automatic reset high limit switch mounted in the air stream to shut off the gas supply in the event of overheating.
- E.10. A time delay relay that delays the start of the air mover to allow the heat exchanger a warm-up period after a call for heat. The time delay relay shall also continue the air mover operation after the thermostat has been satisfied to remove any residual heat in the heat exchanger.
- E.11. The unit shall be orificed for up to 2000' elevation above sea level. (opt) The unit shall be orificed for _____ elevation above sea level.

F. Electrical

- F.1. All electrical components shall carry UL, ETL, or CSA listing.
- F.2. A low voltage terminal board shall be provided for direct wiring connection to an external thermostat.
- F.3. A single step down transformer shall be provided for all unit controls.
- F.4. A contractor convenience junction box with unit on/off switch, terminal board for low voltage wiring, and system status indicator light (PTP/BTP models)

G. Air Mover

- G.1. The motor horsepower shall be ____.
- G.2. The motor wiring shall be in flexible metal BX conduit.
- G.3. (opt) The motor shall be controlled by a time delay relay (opt) and motor starter.
- G.4. Propeller models shall meet the following requirements.
- G.4.a. The motor type shall be Single-speed, Totally Enclosed (TE) (Open Drip Proof (ODP) on HD units 75MBH and smaller)
- G.4.b. The motor shall be rated for:
 - (a) 115V/60Hz/1Ph
 - (b) 208V/60Hz/1Ph (PDP model)
 - (c) 230V/60Hz/1Ph (PDP model)
- G.5. Blower models shall meet the following requirements.
- G.5.a. The motor type shall be Single-speed, totally enclosed (TE) (Open Drip Proof (ODP) on all HDB units)
- G.5.b. The motor shall be rated for:
 - (a) 115V/60Hz/1Ph
 - (b) 208V/60Hz/1Ph (BDP model)
 - (c) 230V/60Hz/1Ph (BDP model)
 - (d) 208V/60Hz/3Ph (BDP model)
 - (e) 230V/60Hz/3Ph (BDP model)
 - (f) 460V/60Hz/3Ph (BDP model)
 - (g) 575V/60Hz/3Ph (BDP model)
- G.5.c. The motor shall be provided with an adjustable motor sheave to allow for minor adjustment of the blower rpm at the job site. (BDP model)
- G.5.d. The blower shall be a double width, double inlet (DWDI), forward curved, belt driven, assembly with spider ball bearings.
- G.5.e. The motor shall be provided with three speed taps to allow for adjustment of the blower rpm at the job site. (HDB model)
- G.5.f. The blower shall be a double width, double inlet (DWDI), forward curved, direct motor drive assembly with spider ball bearings. (HDB model)
- G.5.g. 3 & 5 HP motors ship loose and require motor starter by others.

H. Mounting

- H.1. The unit shall be equipped with tapped holes to accept 3/8-16 threaded rod for suspension. (HD/HDB size 100/125 and PDP/BDP/PTP models)
- H.1.a. The unit shall be equipped with mounting brackets to allow for threaded rod suspension or to be bolted directly to the ceiling support structure allowing 1" of top clearance. (HD/HDB models - opt on sizes 100/125)
- H.2. Propeller Unit (Sizes 150 – 300) to have two point adjustable suspension points to allow for level hanging with a variety of accessories (PDP models).
- H.3. Propeller unit (all HD/PTP sizes and PDP350-400) and blower units (Sizes 60-300) to have 4 suspension points.
- H.4. Blower unit (Sizes 350, 400) to have 6 suspension points.

J. Accessories

The following field installed accessory control devices shall be provided with the unit:

- J.1. A 5-50 psi gas pressure regulator to reduce the inlet gas pressure for the operating controls.
- J.2. A clear plastic thermostat guard with two keys for room thermostats.
- J.3. A SPST summer winter switch for continuous fan in the summer position and intermittent fan and burner in the winter position.
- J.4. Pipe Hanger Adapter Kit to facilitate threaded pipe suspension. (HD/HDB size 100/125 and PDP/BDP/PTP models)

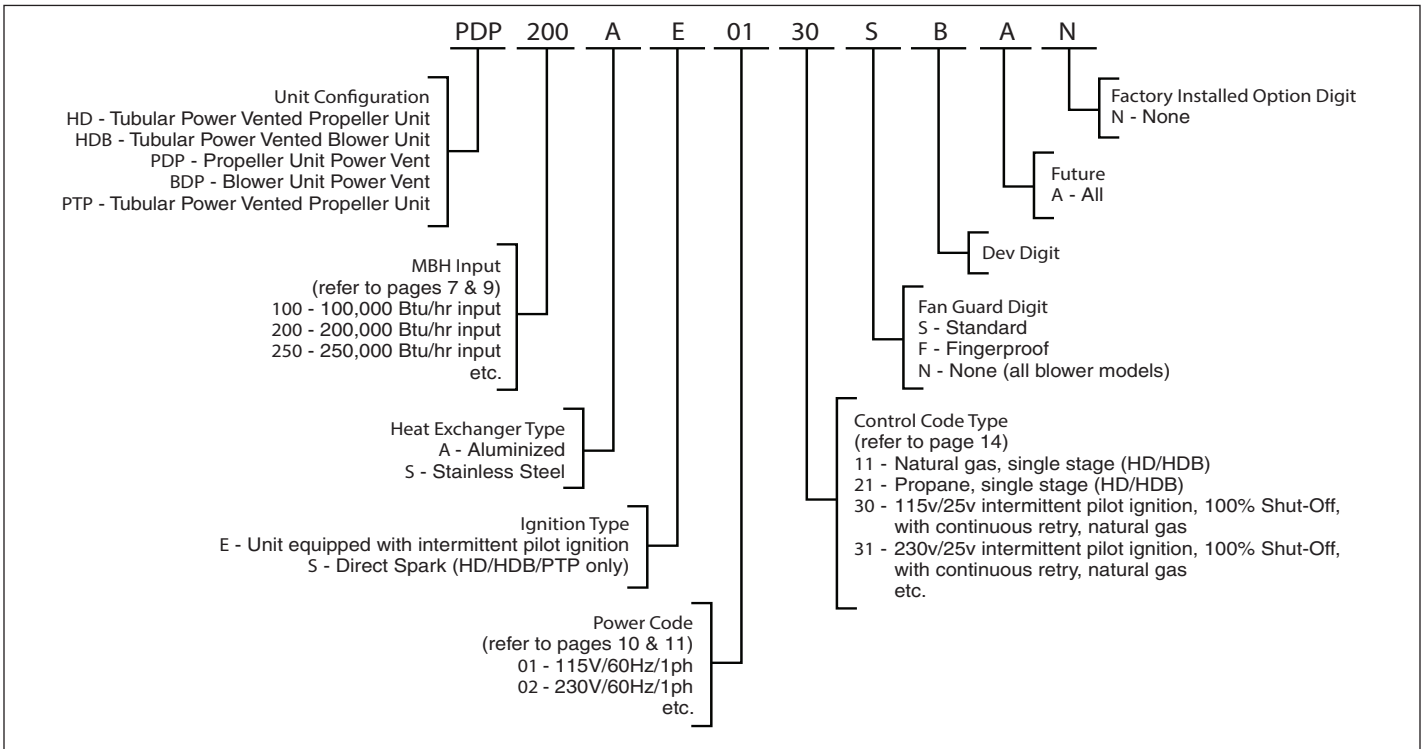
- J.5. An Energy Saver Kit used to reduce stratified air in high mounting height applications. (PDP/BDP models)
- J.7. Vertical Deflector Kit to enable side distribution of airflow.
- J.8. A blower enclosure fully encloses blower to enable the attachment of filter racks and/or duct.
- J.9. A combination filter rack/duct connector containing a 1" thick, cleanable filter.
- J.11. A belt guard enclosing the belts and sheaves (pulleys) on a blower type unit heater. (BDP model)
- J.12. Propane conversion kit for converting natural gas units to propane gas.
- J.13. 40° downward double deflection velocity generating discharge nozzle. (BDP model)
- J.14. 40° splitter double deflection velocity generating discharge nozzle. (BDP model)
- J.15. 90° vertical double deflection velocity generating discharge nozzle. (BDP model)
- J.16. 5-way downward velocity generating discharge nozzle. (BDP model)
- J.17. Discharge Transition from unit to polytube. (HDB/BDP models)
- J.18. 30° non-velocity generating downward air deflector hood constructed of 20 ga. cold rolled steel with baked-on gray-green polyester powder paint.
- J.19. 60° non-velocity generating downward air deflector hood constructed of 20 ga. cold rolled steel with baked-on gray-green polyester powder paint.
- J.20. 90° non-velocity generating downward air deflector hood constructed of 20 ga. cold rolled steel with baked-on gray-green polyester powder paint.
- J.21. (opt) A 208V to 115V step down shall be provided for operation of the propeller unit.
- J.22. (opt) A 230V to 115V step down shall be provided for operation of the propeller unit.
- J.23. (opt) A 460V to 115V step down shall be provided for operation of the propeller unit.
- J.24. (opt) A 575V to 115V step down shall be provided for operation of the propeller unit.

K. Thermostats

The unit shall be provided with the following thermostat:

- K.2. A single stage room thermostat with a 50°-90°F range.
- K.3. A single stage room thermostat with a 50°-90°F temperature set point range. The stat shall also include switching for Heat/Off and Fan On/Auto control.
- K.4. Modine Pro1 T-501M: 50-90°F, Non-programmable thermostat with 3 swap panels: 1.) Fan: On/Auto, System: Heat/Off/Cool, 2.) Fan: On/Auto, System: On/Off, 3.) System: On/Off.
- K.5. Modine Pro1 T-715M: 41-95°F, Heat/Auto/Off Thermostat with Fan Auto/On switching, 7-day programmable
- K.6. A two-stage electronic duct thermostat with field installed temperature sensor, temperature selector and one stage adder.

Figure 32.1 - Model Number Designations



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

HVAC

- Unit Heaters:
 - Gas
 - Hydronic
 - Electric
 - Oil
- Ceiling Cassettes
- Duct Furnaces
- Hydronic Cabinet Unit Heaters, Convectors
- Infrared Heaters
- Make-up Air Systems
- Unit Ventilators

School Products

- Vertical Packaged Classroom HVAC:
 - DX Cooling/Heat Pump
 - Water/Ground Source Heat Pump
 - Horizontal/Vertical Unit Ventilators

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



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9-512

December 2020

INSTALLATION AND SERVICE MANUAL

High Intensity Gas Fired Infrared Unit Heaters

Model IHR, Control Codes 47, 48, 97, 98, 27, and 67



INSTRUCTIONS APPLY TO:

- Installation
- Operation
- Maintenance

⚠ WARNING ⚠

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death. Read the installation, operating, and service/maintenance instructions thoroughly before installing or servicing this heater.

HAZARD INTENSITY LEVELS

- **DANGER:** Failure to comply will result in severe personal injury or death and property damage
- **WARNING:** Failure to comply could result in severe personal injury or death and/or property damage.
- **CAUTION:** Failure to comply could result in minor personal injury and/or property damage.

⚠ WARNING ⚠

Gas-fired heaters are not designed for use in hazardous atmospheres containing flammable vapors or combustible dust, or atmospheres containing chlorinated or halogenated hydrocarbons.

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2. Installation	9
3. Operation	19
4. Maintenance	20
5. Limited Warranty	24

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in the vicinity of this heater is hazardous.

These heaters must NOT be used in the following applications:

- Enclosed swimming pool areas
- Areas with contaminated atmospheres.
- Areas requiring explosion-proof equipment.
- Process heating applications.

FOR YOUR SAFETY

If you smell gas:

1. Open windows.
2. Do not touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.
5. If gas supplier cannot be reached, call fire department.

ATTENTION

Mount a copy of these instructions adjacent to the heater and retain a copy for future reference.

**FOR INDOOR INSTALLATION ONLY.
NOT FOR RESIDENTIAL USE.**

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WARNING

California Proposition 65

This product can expose you to chemicals including lead and carbon monoxide, which are known to the State of California to cause birth defects or other reproductive harm.

For more information, go to www.P65Warnings.ca.gov.

1.0 Safety

⚠ WARNING



Improper installation, adjustment, alteration, service, or maintenance can cause property damage, serious injury, or death. Read and understand the installation, operating, and maintenance instructions thoroughly before installing or servicing this heater. Only trained, qualified gas installation and service personnel may install or service this heater.

Safety Symbols

Safety is the most important consideration during installation, operation, and maintenance of the infrared heater. You will see the following symbols and signal words when there is a hazard related to safety or property damage.

⚠ WARNING

Warning indicates a potentially hazardous situation which, if not avoided, could result in death or injury.

⚠ CAUTION

Caution indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Notice indicates a potentially hazardous situation which, if not avoided, could result in property damage.

Applications

This is not an explosion proof heater. Consult your local fire marshal, insurance carrier, and other authorities for approval of the proposed installation.

Commercial / Industrial (Indoor Use Only)

Infrared heaters are designed and certified for use in industrial and commercial buildings such as warehouses, manufacturing plants, aircraft hangars, and vehicle maintenance shops. For maximum safety, the building must be evaluated for potential hazards before installing the heater system. A critical safety factor to consider before installation is the clearances to combustibles.

Residential

This heater is **NOT** approved for use in any residential application. This includes, but is not limited to, attached garages, living quarters, solariums, etcetera. Consult the local fire marshal and/or insurance provider if unsure of your application.

⚠ WARNING



Not For Residential Use.

Installation of an infrared heater system in residential indoor spaces, RVs, mobile homes, etc. may result in property damage, asphyxiation, fire, serious injury, or death.

Clearances to Combustibles

⚠ WARNING



Placement of explosive objects, flammable objects, liquids, and vapors close to the heater may result in explosion, fire, property damage, serious injury, or death. Do not store or use explosive objects, liquids, or vapors in the vicinity of the heater.

Failure to comply with the published clearances to combustibles could result in personal injury, death, and/or property damage.

⚠ CAUTION



Signs shall be posted specifying the maximum permissible stacking height in order to maintain clearances to combustibles.

Hazards Include:

For maximum safety the building must be evaluated for hazards before installing the heater system. Examples include, but are not limited to:

- Gas and electrical lines
- Combustible and explosive materials
- Chemical storage areas
- Areas of high chemical fume concentrations
- Provisions for accessibility to the heater
- Adequate clearances around air openings
- Combustion and ventilating air supply
- Vehicle parking areas
- Vehicles with lifts or cranes
- Storage areas with stacked materials
- Lights
- Sprinkler heads
- Overhead doors and tracks
- Dirty, contaminated environment

A critical safety factor to consider before installation is the clearances to combustibles. **Clearances to combustibles** is defined as *the minimum distance you must have between the infrared surface, or reflector, and the combustible item*. Considerations must also be made for moving objects around the infrared heater. The following is a partial list of items to maintain clearances from:

Combustible Items Include:

- Wood
- Paper
- Fabric
- Chemicals
- Wall or roof insulation

Moving Objects Include:

- Overhead doors
- Vehicles on lifts
- Cranes
- Hoists
- Car wash equipment

The stated clearances to combustibles represent a surface temperature of 90°F (50°C) above room temperature. Building materials with a low heat tolerance (such as plastic, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation.

When installing the infrared heater system, the minimum clearances to combustibles must be maintained. These distances are shown in Chart 1.1 and on the heater. If you are unsure of the potential hazards, consult your local fire marshal, fire insurance carrier, or other qualified authorities on the installation of gas fired infrared heaters for approval of the proposed installation.

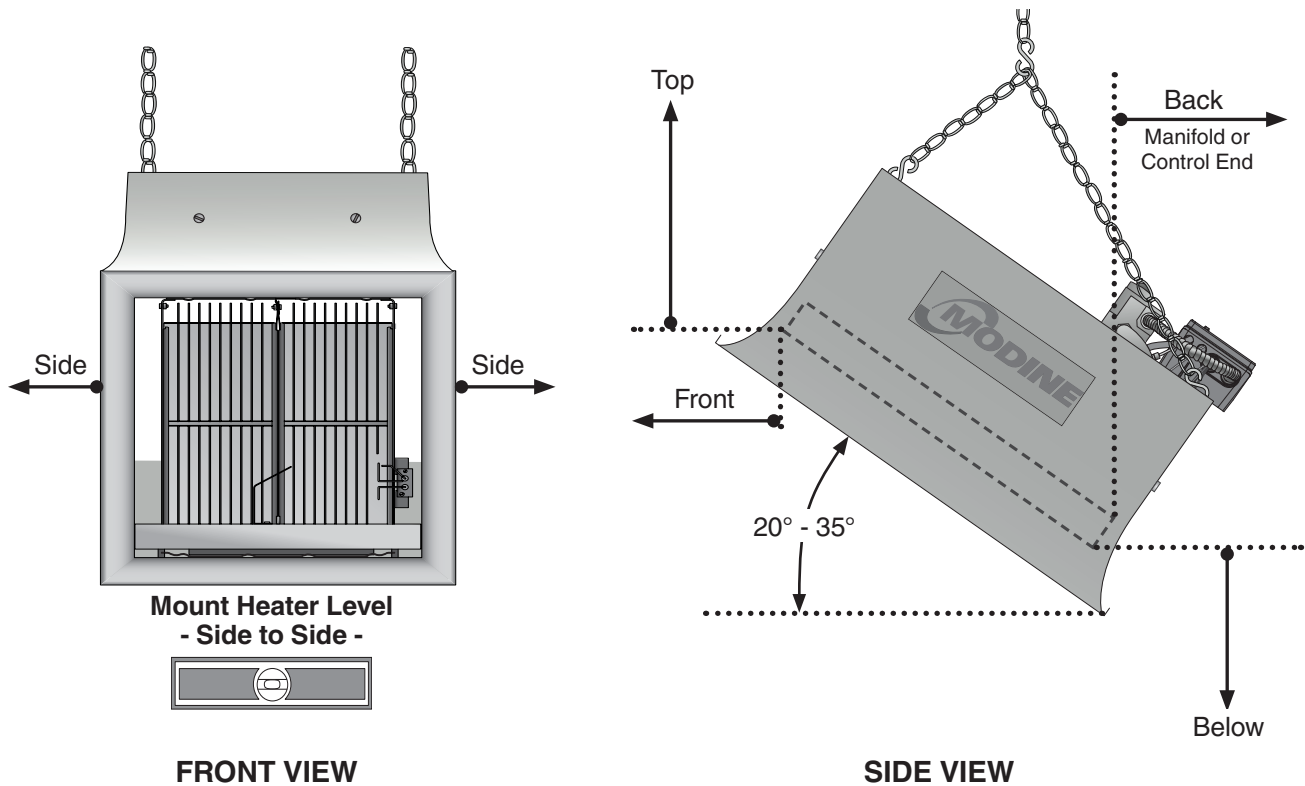
Chart 1.1 • Clearances to Combustibles in Inches (see Figure 1.1)

Model No.	Sides	Back	Top	Below/Front
IHR 30	30	18	28	72
IHR 60	32	18	40	72*
IHR 90	48	30	42	98
IHR 130	48	30	52	120
IHR 160	50	32	60	132

* This clearance is 80 in. when the heater is fitted with a parabolic reflector.

NOTE: If the heater is mounted beneath a non-combustible surface, a 24 in. minimum top clearance must be maintained from the top of the heater to prevent overheating the controls.

Figure 1.1 • Clearances to Combustibles



Gas Connection

⚠ WARNING



An approved connector, suitable for the environment of heater usage, is required. Visible or excessive swaying, flexing, and vibration of the gas connections **must** be avoided to prevent failure. Neither the gas pipe nor the connector shall be placed in the “flue discharge area.” In no case shall the gas supply support the weight of the heater.

To ensure your safety, and comply with the terms of the warranty, all units must be installed in accordance with these instructions.

Standards, Certifications, and Government Regulations

Installation of this infrared heater must comply with all applicable local, state, and national specifications, regulations, and building codes. Contact the local building inspector and/or fire marshal for guidance.

In the absence of local codes, the installation must conform to the latest edition of:

United States: National Fuel Gas Code, ANSI Z223.1 (NFPA 54).

Canada: CAN/CGA B149.1 and .2, Canadian Electrical Code C22.1

Copies of these standards can be viewed or purchased at www.nfpa.org or www.scc.ca.

Chart 1.2 • Standards and Code Installation Guidelines • Building Aspect

Building Aspect	Codes and Guidelines
Electrical	The heater must be electrically grounded in accordance with the following codes:
	<p>United States: Refer to National Electrical Code®, ANSI/NFPA 70 (latest edition). Wiring must conform to the latest edition of National Electrical Code®, local ordinances, and any special diagrams furnished.</p> <p>Canada: Refer to Canadian Electrical Code CSA C22.1 Part 1 (latest edition).</p>
Venting	Venting must comply with the requirements within this manual and the following codes:
	<p>United States: Refer to NFPA 54/ANSI Z223.1 (latest edition), the National Fuel Gas Code.</p> <p>Canada: Refer to CAN/CGA B149.1 Installation Codes for Gas Burning Appliances.</p>
High Altitude Installations	For high altitude applications:
	<p>Installation of this appliance at altitudes above 2,000 ft (610 m) shall be in accordance with local codes or, in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or National Standard of Canada, Natural Gas and Propane Installation Code, CSA B149.1.</p> <p>The heater’s standard orifice size is approved for installations up to 6,000 ft. (1829 m). For elevations above 6,000 ft., contact the factory for proper conversion kit.</p>

Chart 1.3 • Standards and Code Installation Guidelines • Building Type

Building Aspect	Codes and Guidelines
Public Garages	Installation of this infrared heater in public garages must conform to the following codes:
	<p>United States: Standard for Parking Structures NFPA 88A (latest edition) or the Code for Motor Fuel Dispensing Facilities and Repair Garages NFPA 30A (latest edition).</p> <p>Canada: Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances.</p>
	Guidelines:
	<ul style="list-style-type: none"> • Heaters must not be installed less than 8 ft. (2.4 m) above the floor. Minimum clearances to combustibles must be maintained from vehicles parked below the heater. • When installed over hoists, minimum clearances to combustibles must be maintained from the upper most point of objects on the hoist.
Aircraft Hangars	Installation of this infrared heater in aircraft hangars must be in accordance with the following codes:
	<p>United States: Refer to Standard for Aircraft Hangars, ANSI/NFPA 409 (latest edition).</p> <p>In Canada: Refer to Standard CAN/CGA B149.1 and B149.2.</p>
	Guidelines:
	<ul style="list-style-type: none"> • In aircraft storage and servicing areas, heaters shall be installed at least 10 ft. (3 m) from above the upper surface of wings or of the engine enclosures of the highest aircraft that may be housed in the hangar. The measurement shall be made from the wing or engine enclosure, whichever is higher from the floor, to the bottom of the heater. • In areas adjoining the aircraft storage area (e.g., shops, offices) the bottom of heaters shall be installed no less than 8 ft. (2.4 m) above the floor. • Suspended or elevated heaters shall be located in spaces where they shall not be subject to damage by aircraft, cranes, movable scaffolding, or other objects. <p>Provisions shall be made to assure accessibility to suspended infrared heaters for recurrent maintenance purposes.</p>

Applicable authorities governing the manufacturing or installation of this heater include (but are not limited to) the following organizations:

In the United States:

- NFPA 54/ANSI Z223.1 - National Fuel Gas Code.
- ANSI Z83.19/C2.35 - Gas-fired High Intensity Infrared Heaters.
- ANSI/NFPA 70 - National Electric Code.
- IRSC.

In Canada:

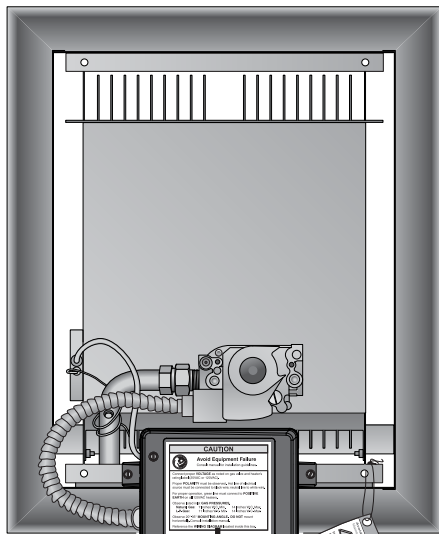
- CAN/CGA B149.1-10 - Natural Gas and Propane Installation Code.
- ANSI Z83.19/C2.35 - Gas-fired High Intensity Infrared Heaters.
- C22.1 Part 1 - Canadian Electrical Code.

Safety Labels and Their Locations

It is important to provide warnings to alert individuals to potential hazards and safety actions. ANSI Z83.19 and the National Fuel Gas Code require you to post a sign “specifying the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles” near the heater’s thermostat or, in absence of such thermostats, in a conspicuous location. Signs should state the hazards for the particular application and be legible to the building occupants. Consult the factory or a factory representative for additional information on signage compliance.

Safety warning labels must be maintained on the infrared heater. Illustrations of the safety labels, and their locations, are pictured below.

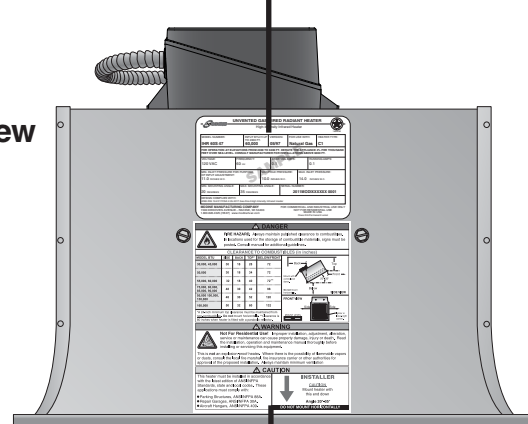
Back View



MODINE UNVENTED GAS-FIRED RADIANT HEATER				
High-Intensity Infrared Heater				
MODEL NUMBER: IHR 60S 47	INPUT BTU/H UP TO 2000 FT.:	VERSION:	FOR USE WITH:	HEATER TYPE:
	60,000	05/97	Natural Gas	C1
FOR OPERATION AT ELEVATIONS FROM 2000 TO 6000 FT. DERATE THE APPLIANCE 4% PER THOUSAND FEET OVER SEA LEVEL. CONSULT MANUFACTURER FOR INSTALLATIONS ABOVE 6000 FT.				
VOLTAGE: 120 VAC	FREQUENCY: 60 Hz	STARTING AMPS: 0.1	RUNNING AMPS: 0.1	
MIN. INLET PRESSURE FOR PURPOSE OF INPUT ADJUSTMENT: 11.0 INCHES W.C.	MANIFOLD PRESSURE: 10.0 INCHES W.C.	MAX. INLET PRESSURE: 14.0 INCHES W.C.		
MIN. MOUNTING ANGLE: 20 DEGREES	MAX. MOUNTING ANGLE: 35 DEGREES	SERIAL NUMBER: 2011MODIXXXXX 0001		
DESIGN COMPLIES WITH: ANSI Z83.19-2017/CSA 2.35-2017 Gas-Fired High Intensity Infrared Heater				
MODINE MANUFACTURING COMPANY 1500 DEKOVEN AVENUE - RACINE, WI 53403 1.800.828.4325 (HEAT) www.modinevac.com			FOR COMMERCIAL AND INDUSTRIAL USE ONLY NOT FOR RESIDENTIAL USE MADE IN USA Class IIIA Permanent Label	

Rating Plate

Bottom View



WARNING

Avoid Serious Injury, Death, or Property Damage. Maintain Clearances to Combustible to Prevent the Risk of Fire.

Clearances to combustibles must be maintained at all times in order to prevent the ignition of combustible materials. In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles. Signs must either be posted adjacent to the heater's thermostats or, in the absence of such thermostats, in a conspicuous location. Clearances are provided on the heater's safety label and in the heater's Installation, Operation, and Maintenance manual. Product installation and operation must comply with applicable standards, codes, and regulations. Post this tag adjacent to the heater's thermostat or controls before operating the heater.

California Proposition 65

This product can expose you to chemicals including lead and carbon monoxide, which are known to the State of California to cause birth defects or other reproductive harm.

For more information go to www.P65Warnings.ca.gov.

- INSTALLER: READ AND POST THIS NOTICE -

F/N: LL001 - Clearance Safety Tag (Affix adjacent to heater's thermostat)

CAUTION

Avoid Equipment Failure
Consult manual for installation guidelines.

Connect proper **VOLTAGE** as noted on gas valve and heater's rating label (25VAC or 120VAC).

Proper **POLARITY** must be observed. Hot line of electrical source must be connected to black wire; neutral line to white wire.

For proper operation, green line must connect to **POSITIVE EARTH** on all 120VAC heaters.

Observe listed inlet **GAS PRESSURES**.

Natural Gas: 7 Inches W.C. Min. 14 Inches W.C. Max.
L.P. Gas: 11 Inches W.C. Min. 14 Inches W.C. Max.

Observe **20°-35° MOUNTING ANGLE**. **DO NOT** mount horizontally. Consult installation manual.

Reference the **WIRING DIAGRAM** located inside this box.

F/N: LLD002

DANGER

FIRE HAZARD. Always maintain published clearance to combustibles. In locations used for the storage of combustible materials, signs must be posted. Consult manual for additional guidelines.

CLEARANCE TO COMBUSTIBLES (in inches)

MODEL BTU	SIDE	BACK	TOP*	BELOW/FRONT
30,000, 45,000	30	18	28	72
50,000	30	18	34	72
55,000, 60,000	32	18	40	72**
75,000, 80,000, 85,000, 90,000	48	30	42	98
95,000, 100,000, 130,000	48	30	52	120
160,000	50	32	60	132

*A 24-inch minimum top clearance must be maintained from non-combustibles. Do not mount horizontally. **Clearance is 80 inches when heater is fitted with a parabolic reflector.

Not For Residential Use! Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operation and maintenance manual thoroughly before installing or servicing this equipment.

This is **not** an explosion-proof heater. Where there is the possibility of flammable vapors or dusts, consult the local fire marshal, fire insurance carrier or other authorities for approval of the proposed installation. Always maintain minimum ventilation.

CAUTION

This heater must be installed in accordance with the latest edition of ANSI/NFPA Standards, state and local codes. These applications must comply with:

- Parking Structures, ANSI/NFPA 88A.
- Repair Garages, ANSI/NFPA 30A.
- Aircraft Hangars, ANSI/NFPA 409.

INSTALLER
CAUTION
Mount heater with this end down
Angle 20°-35°
DO NOT MOUNT HORIZONTALLY

F/N: LLDCL002

Clearances to Combustibles Label

2.0 Installation

⚠ WARNING



Read and understand the installation, operating, and maintenance instructions thoroughly before installing or servicing this heater.

Only trained, qualified gas installation and service personnel may install or service this heater.

⚠ CAUTION

This heater cannot be used in a building with an uninsulated roof or condensation problems can occur.

Design

To ensure a safe, properly designed heating system, a layout should be developed for the correct placement of the infrared heater(s). Aside from safety factors such as clearances to combustibles (see Chart 1.1 on page 5), consideration should also be given to factors such as the environment (e.g., cold/drafty, average, protected), heat coverage (sq. ft.) needed, heater centers, the distance behind a person or work station(s), and exhaust path. Also, the effective infrared surface temperature of a person or object may be diminished with wind above 5 mph. Wind barrier(s) may be required. Most importantly, clearances to combustibles **must** always be maintained! Refer to hazards on page 4.

This installation manual, along with national, state, provincial, and local codes, addresses these issues. It is critical that you read, understand, and follow all guidelines and instructions. Always inspect and evaluate the mounting conditions, space for exhaust, gas supply, and wiring.

Perimeter mounting of infrared heaters provides the most effective distribution of heat. The recommended spacing between the heaters is shown in Chart 2.1. Add additional heaters in the center of the space when heaters are spaced farther than the recommended distance (see Figure 2.1).

When heated, materials high in hydrocarbons (solvents, paint thinner, mineral spirits, formaldehydes, etc.) can evaporate. This may result in odors or fumes being emitted into the environment. To correct this problem, clean the area and/or introduce additional ventilation. Heaters installed and serviced in accordance with the installation manual do not emit foul odors into the environment.

IMPORTANT: Fire sprinkler heads must be located at an appropriate distance from the heater. This distance may exceed the published clearances to combustibles. Certain applications will require the use of high temperature sprinkler heads or relocation of the heaters.

Sprinkler systems containing propylene glycol or other flammable substances are not to be used in conjunction with this heater without careful consideration for, and avoidance of, potential fire or explosion hazards. For further information, consult NFPA 13. Always observe applicable state and local codes.

Chart 2.1 • Recommended Mounting Heights and Distances for “Total Area” Heating

Model No.	Mounting Heights Dim. A		Distance Between Heaters Dim. B (ft.)	Distance Between Heater Rows Dim. C (ft.)	Distance Between Heater and Wall (ft.)
	30° Angle Standard Reflector (ft.)	30° Angle Parabolic Reflector (ft.)			
IHR 30	12-14	12-15	8-24	15-40	4-8
IHR 60	14-16	18-21	12-36	15-55	6-12
IHR 90	16-18	21-25	16-48	20-70	6-12
IHR 130	21-24	26-32	20-60	25-85	8-14
IHR 160	24-28	29-35	24-65	30-100	8-14

Factory recommended mounting heights are listed as a guideline. If infrared heaters are mounted too low or too high, they may result in discomfort or lack of heat. Modine Manufacturing Company generally recommends observing the recommended mounting heights to optimize comfort conditions. However, certain applications such as spot heating, freeze protection, outdoor patio heating, or very high ceilings may result in the heaters being mounted outside of the recommended mounting heights.

Figure 2.1 • Total Area Heating Sample Layout

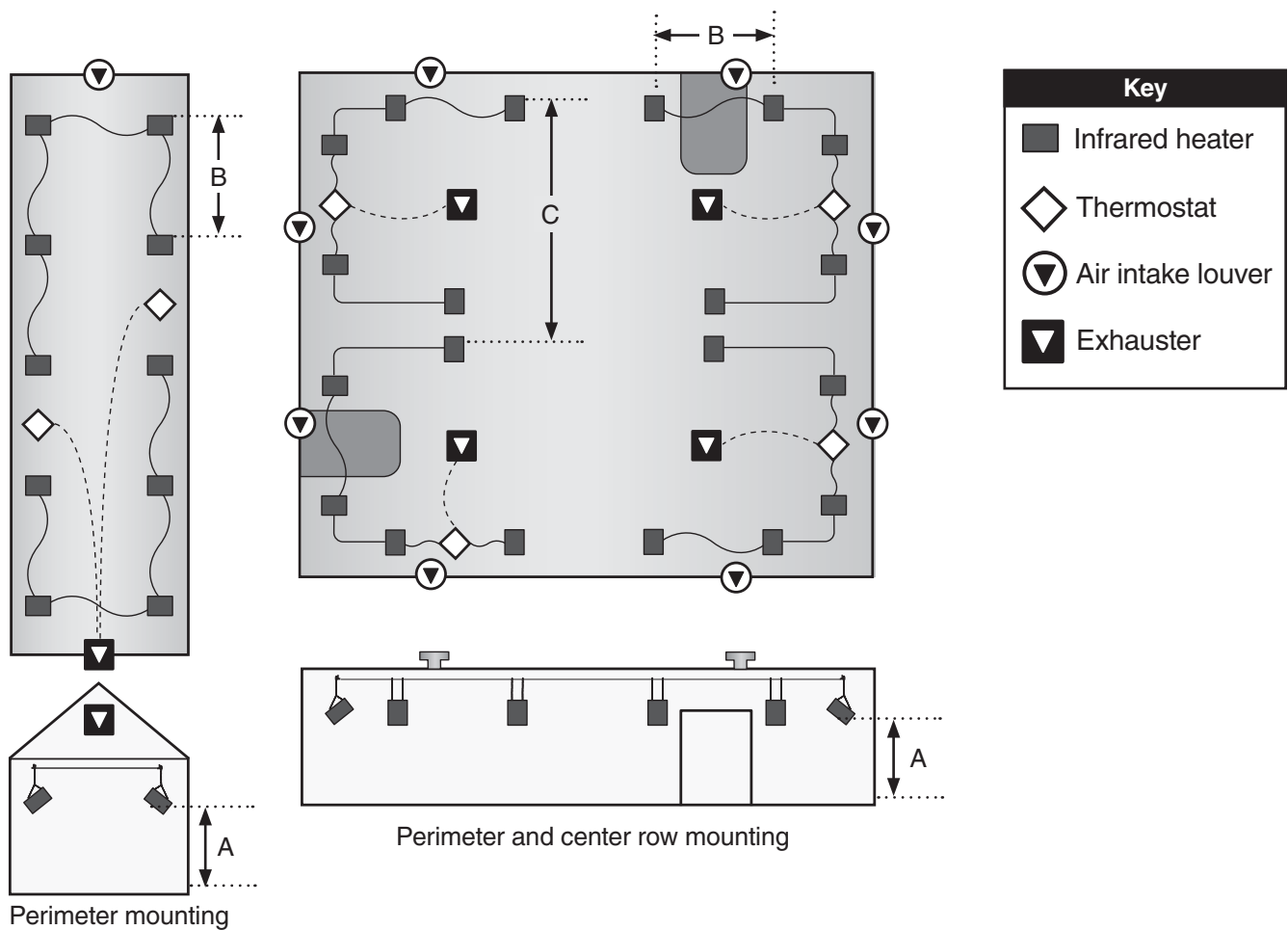
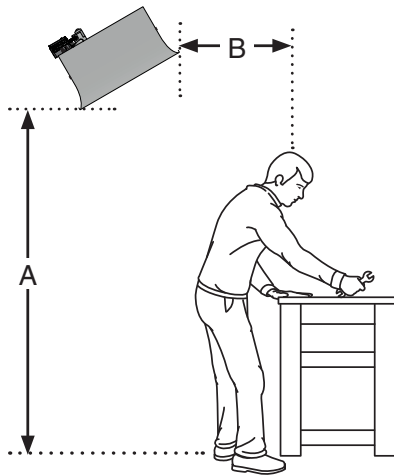


Chart 2.2 • Recommended Mounting Heights and Distances for “Spot” Heating

Model & Input	Type of Area (Surroundings)	Approx. Area Covered	Approx. Coverage (sq. ft.)	Recommended Mounting Height Std. Reflector (Dim. A)	Distance Behind Person or Work Station (Dim. B)	Centers for Full Coverage (Spot & Area) Htg. Only
IHR 30 30,000 BTU/h	Cold/Drafty	10' x 10'	100	9' to 10'	4'	10'
	Average	12' x 12'	144	10' to 12'	5'	12'
	Protected/Insulated	14' x 14'	196	12' to 14'	6'	14'
IHR 60 60,000 BTU/h	Cold/Drafty	16' x 16'	256	12' to 14'	6'	16'
	Average	18' x 18'	324	14' to 16'	7'	18'
	Protected/Insulated	20' x 20'	400	16' to 18'	8'	20'
IHR 90 90,000 BTU/h	Cold/Drafty	20' x 20'	400	16' to 18'	9'	20'
	Average	24' x 24'	576	18' to 20'	10'	24'
	Protected/Insulated	28' x 28'	784	20' to 22'	11'	26'
IHR 130 130,000 BTU/h	Cold/Drafty	26' x 26'	676	18' to 20'	11'	26'
	Average	30' x 30'	900	18' to 20'	12'	28'
	Protected/Insulated	35' x 35'	1225	20' to 22'	13'	32'
IHR 160 160,000 BTU/h	Cold/Drafty	28' x 28'	784	20' to 22'	12'	28'
	Average	35' x 35'	1225	24' to 26'	16'	32'
	Protected/Insulated	40' x 40'	1600	28' to 30'	20'	35'

Figure 2.2 • Spot Heater Heights



Heater Mounting



Improper suspension of the infrared heater may result in collapse and being crushed. Always suspend from a permanent part of the building structure that can support the total force and weight of the heater.



Failure to maintain minimum clearances to combustibles may result in fire and/or explosion, property damage, serious injury, or death. Always maintain minimum clearances and post signs or provided tags (F/N: LL001) where needed. Signs should state the hazards for the particular application and be legible to the building occupants. Consult the factory or a factory representative for additional information on signage compliance.

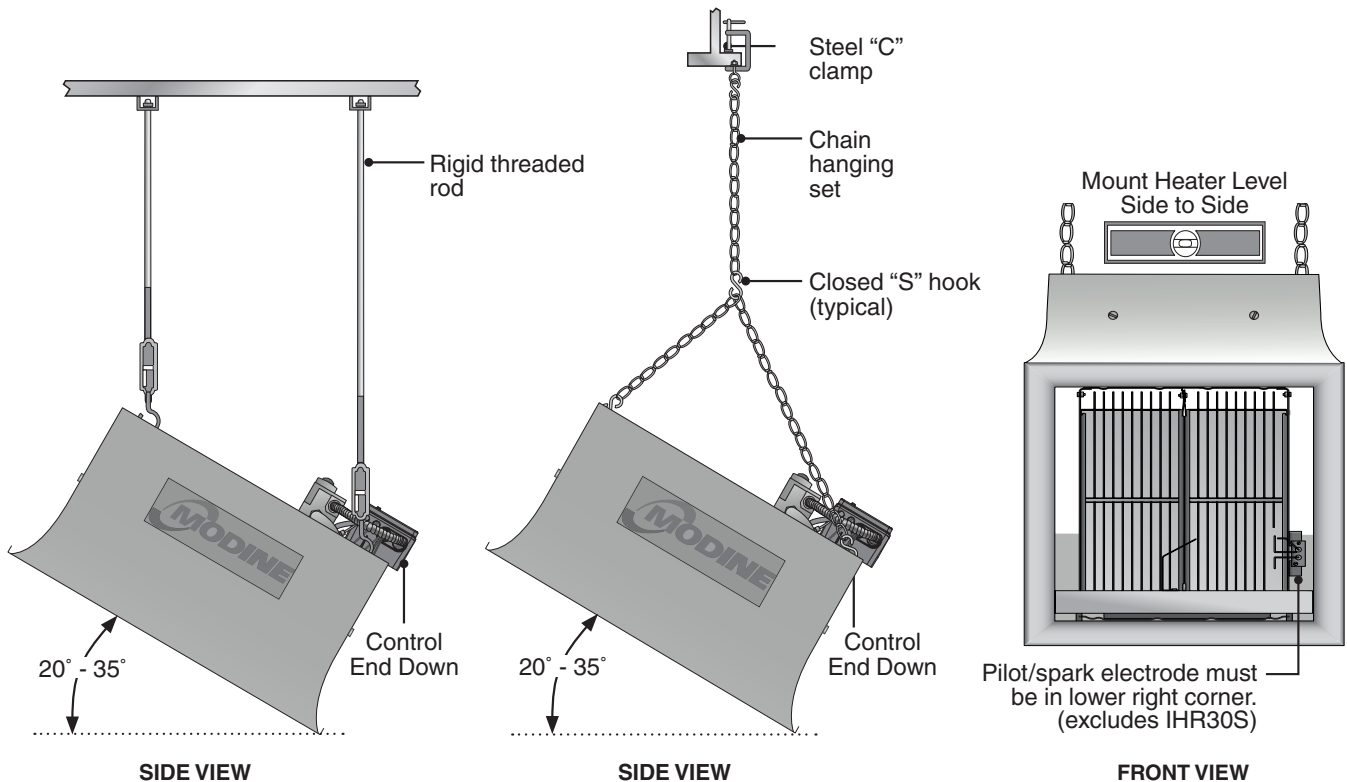


An approved connector, suitable for the environment of heater usage, is required. Visible or excessive swaying, flexing, and vibration of the gas connections **must** be avoided to prevent failure. Neither the gas pipe nor the connector shall be placed in the “flue discharge area.” In no case shall the gas supply support the weight of the heater.

The heater can be suspended with chains or rigid threaded rod. Local codes or conditions that would cause the unit to move (e.g., wind drafts, blowers, crane rails, etc.) may require rigid threaded rod. Consult all applicable codes before installation.

The heater must be level from side to side and between 20° and 35° from horizontal. The pilot burner or ignitor, manifold, and controls must be located on the lower end. Refer to Figure 2.3.

Figure 2.3 • Heater Mounting and Orientation



Ventilation

⚠ WARNING



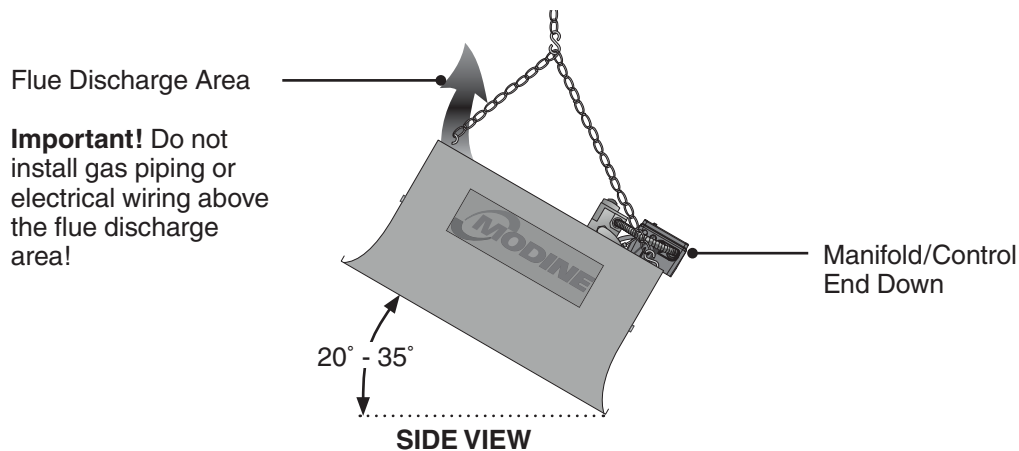
Insufficient ventilation may result in health problems, carbon monoxide poisoning, or death. Vent enclosed spaces and buildings according to national, state, provincial, and local codes.

Improper venting may result in asphyxiation, fire, explosion, injury, or death.

It is required that the levels where heaters are mounted be properly ventilated to supply combustion air to the heaters and to sufficiently dilute the products of combustion. It is also required that the flue discharge area is kept clear of gas piping and electrical wiring (see Figure 2.4).

This infrared heater must be vented in accordance with national, state, provincial, and local codes, and the guidelines in this manual. In the United States, refer to the latest edition of ANSI Z223.1 (NFPA 54) and in Canada, refer to the latest edition of the CAN/CGA B149.1 & B149.2 Standard.

Figure 2.4 • Hot Flue Discharge



Provisions must also be made to provide sufficient fresh air intake area and exhaust air outlet area. For proper ventilation, a positive air displacement of 4 CFM/1,000 BTU/h of gas consumed must be provided.

Where insufficient air movement exists, induced air displacement is required. A balanced system is essential to avoid negative building pressure which causes excessive infiltration, unfavorable drafts, and affects combustion efficiency.

Air displacement may be accomplished by either natural or mechanical means. Mechanical exhausters are preferred and typically mounted at high points on the roof where stagnant air accumulates inside the building. For a flat roof, considerations of prevailing winds, high and low pressure areas, and distribution of air movement must be taken into consideration when locating exhausters.

Best air distribution is accomplished by using a number of small exhausters versus one large exhauster. Provide a minimum of one square inch of inlet area per 1,000 BTU/h for combustion air supply. Inlet opening in the building should be well distributed (see Figure 2.1) high in the sidewalls and should direct incoming air upward to dilute products of combustion while preventing drafts at lower levels. Inlets are typically 1 to 3 sq. ft.

Local codes may require that mechanical exhaust systems be interlocked with heaters to enable both to function simultaneously (see page 17, Figure 2.6) or allow control of exhausters with a ceiling mounted humidistat.

Gas Supply

⚠ WARNING



Improperly connected gas lines may result in fire, explosion, poisonous fumes, toxic gases, asphyxiation, or death. Connect gas lines in accordance to national, state, provincial, and local codes.

The gas supply to the infrared heater must be connected and tested in accordance with national, state, provincial, and local codes along with the guidelines in this manual. In the United States, refer to the latest edition of the ANSI Z223.1 (NFPA 54) Standard and in Canada, refer to the latest edition of the CAN/CGA B149.2 Standard.

Important! Before connecting the gas supply to the infrared heater(s):

- Check that the gas piping and service has the capacity to handle the load of all heaters being installed, as well as any other gas appliances being connected to the supply line.
- Check that the main gas supply line is of proper diameter to supply the required fuel pressures.
- If utilizing used pipe, verify that its condition is clean and comparable to a new pipe. Test all gas supply lines in accordance with local codes.
- Test and confirm that inlet pressures are correct. Refer to the rating plate for required minimum and maximum pressures (see Chart 2.3). The gas supply pipe must be of sufficient size to provide the required capacity and inlet pressure to the heater (if necessary, consult the local gas company).

Chart 2.3 • Manifold Pressure

Type of Gas	Required Manifold Pressure	Minimum Inlet Pressure	Maximum Inlet Pressure
Natural	6.0 Inches W.C.	7.0 Inches W.C.	14.0 Inches W.C.
Propane	10.0 Inches W.C.	11.0 Inches W.C.	14.0 Inches W.C.

Note: Check manifold pressure at the tap located either at the outlet of the gas valve or on the gas manifold pipe. Readings will be above atmospheric pressure during operation.

Pressure Equivalents: 1 inch W.C. equals .058 oz/sq. in. equals 2.49 Mbar.

To connect the gas:**⚠ WARNING**

Failure to install, operate, or service this heater in the approved manner may result in property damage, injury, or death.

An approved connector, suitable for the environment of heater usage, is required. Visible or excessive swaying, flexing, and vibration of the gas connections **must** be avoided to prevent failure. Neither the gas pipe nor the connector shall be placed in the “flue discharge area.” In no case shall the gas supply support the weight of the heater.

This heater must be installed and serviced by trained gas installation and service personnel only.

The installation of this heater must conform with local building codes or, in the absence of such codes, the National Fuel Code (NFPA 54).

The gas outlet must be in the same room as the appliance and accessible. It may not be concealed within or run through any wall, floor, or partition.

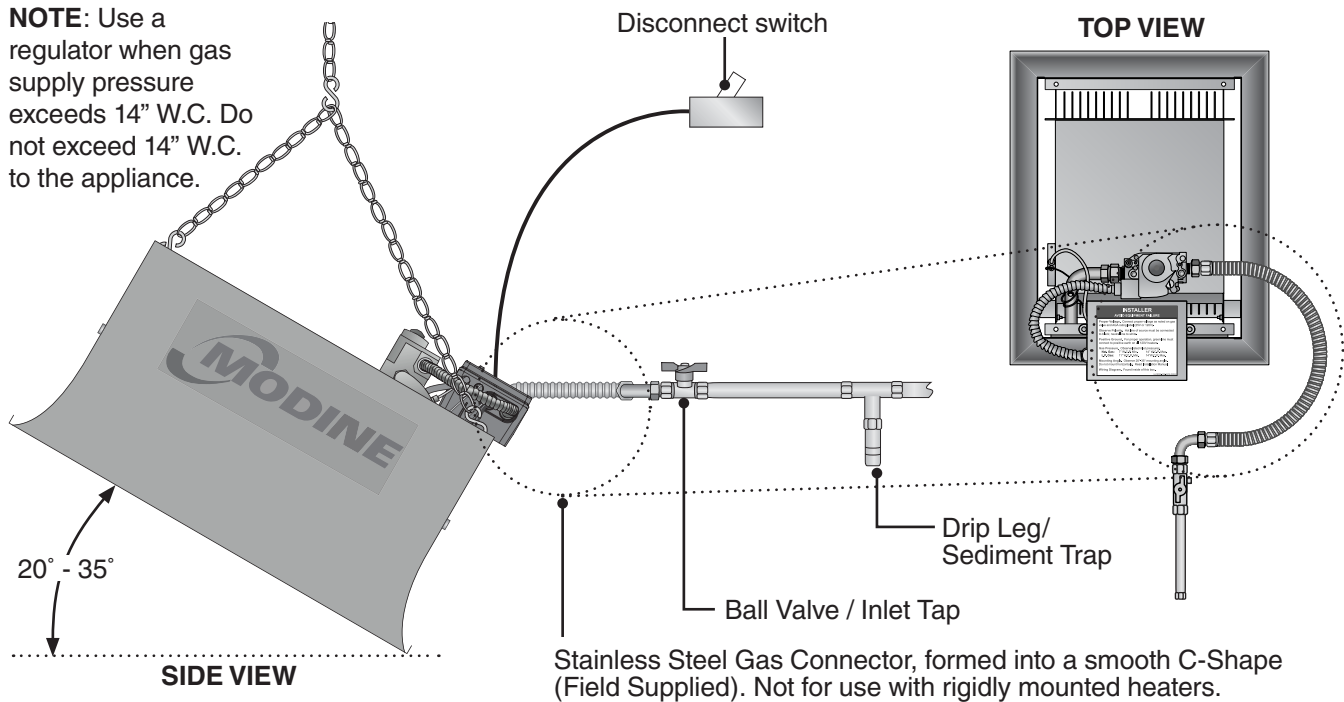
- ① The IHR series heater is equipped to receive a gas supply line nipple of 1/2” NPT Schedule 40 metallic pipe. All piping must be installed in accordance with the requirements outlined in the National Fuel Gas Code ANSI/Z223.1 (latest edition) or CSA B149.2. Support all gas supply with pipe hangers, metal strapping, or other suitable material. Do not rely on the heater to support the gas pipe.
- ② Form the stainless steel flexible connector (field supplied) into a smooth C-shape allowing 12 in. between the flexible connector’s end nuts. Figure 2.5 on page 16. **NOTE:** Not for use on rigidly mounted heaters.
- ③ Install a ground joint union with a brass seat and a manual shut off valve adjacent to the unit for emergency shut off and easy servicing of controls. A 1/8” NPT plugged tap that is accessible for a test gauge connection is also recommended.
- ④ A sediment trap must be installed in the supply line in the lowest spot prior to connecting to the heater. The trap length shall be at least three inches long. Ideally, the trap would be installed as close as possible to the shut off.
- ⑤ When connecting piping to the unit, the use of a thread joint compound is required. The thread compound (pipe dope) shall be resistant to the action of heater’s gas type or any other chemical constituents of the gas to be conducted through the piping. Use of Teflon[®] tape is not permitted.

⚠ WARNING

Always use two (2) opposing wrenches to tighten mating pipe connections to prevent excessive torque on the gas valve and manifold pipe. Excessive torque can damage the valve and/or misalign the orifice, resulting in fire, explosion, serious injury, or death.

Figure 2.5 • Gas Connection

NOTE: Use a regulator when gas supply pressure exceeds 14" W.C. Do not exceed 14" W.C. to the appliance.



Leak Testing

⚠ WARNING



Use a soap solution or equivalent for leak testing. Never test for leak with an open flame. Failure to comply could result in personal injury, property damage, or death.

Always leak test final gas assembly for gas leaks according to the procedures outlined in NFPA 54 and all local codes and/or standards.

For leak testing on pressures below ½” PSI

Before leak testing, close the field installed manual shut off valve shown on Figure 2.5 on the supply line to isolate the gas valve from the pressure.

NOTE: All factory installed gas connections have passed an approved leak test.

For leak testing on pressures above ½” PSI

When leak testing with pressures above ½” PSI (14 inches W.C.), the unit must be isolated from the supply pipe. Close the field installed manual shut off valve, disconnect the supply line to the unit, and temporarily cap the supply line for testing purposes.

⚠ WARNING



Gas pressures to the heater controls must never exceed 14 inches W.C. (1/2” PSI). Supply pressures greater than 14” W.C. can damage the controls, resulting in personal injury, property damage, or death.

Electrical Requirements and Wiring Diagrams

⚠ WARNING



Shock hazard. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage. Any original factory wiring that requires replacement must be replaced with wiring material having a rating of at least 600 V, 105°C.

All field installed wiring to the unit heater must be done in accordance with the national, state, provincial, local codes, and to the guidelines in this manual. In the United States, refer to the most current revisions to the Electrical Code ANSI/NFPA 70 and in Canada, refer to the most current revisions to the Canadian Electrical Code CSA C22.1 Part 1. The unit must be electrically grounded according to these codes. Line polarity must be observed when making field connections.

⚠ CAUTION

The power supply to the heater must be within +/- 5% of the voltage rating as indicated on the rating plate of the appliance. If input power does not meet these specifications, contact your utility company.

Before proceeding with electrical connections, ensure that the supply voltage, frequency, phase, and current capacity meet the requirements specified on the rating plate. A dedicated line voltage supply with properly sized wire should run directly from the main electrical panel to the heater. The power to the unit must be protected with a circuit breaker appropriate for the load. The unit must be electrically grounded in accordance with local codes or, in their absence, with the latest edition of the National Electrical Code, ANSI / NFPA 70 and/or the Canadian Electrical Code CSA C22.1, latest edition.

Control systems are initiated by either 120 VAC, 24 VAC, or millivolt energy. The 120 VAC systems can be used directly from a 120 VAC line. On 24 VAC systems, transformers **must** be used to supply power of sufficient VA rating for single or multiple connected installations.

Millivolt systems require NO external power, as energy needed to operate the valve is developed by the powerpile generator. Do not use multiple connections, as one thermostat may only control one heater.

For wiring of controls on the unit, see the Figure 2.6 below. It is recommended that the thermostat be installed on the hot side of a fused supply line and have sufficient ampere capacity rating for the heater(s) it will control. The ventilation system may not be controlled separately from the heating system (consult local codes) by the use of a humidistat that closes then the humidity rises. The humidistat control should be installed at roof level. For summer ventilation, a simple on/off switch can be installed at the occupant level.

Figure 2.6 • Typical Field Wiring

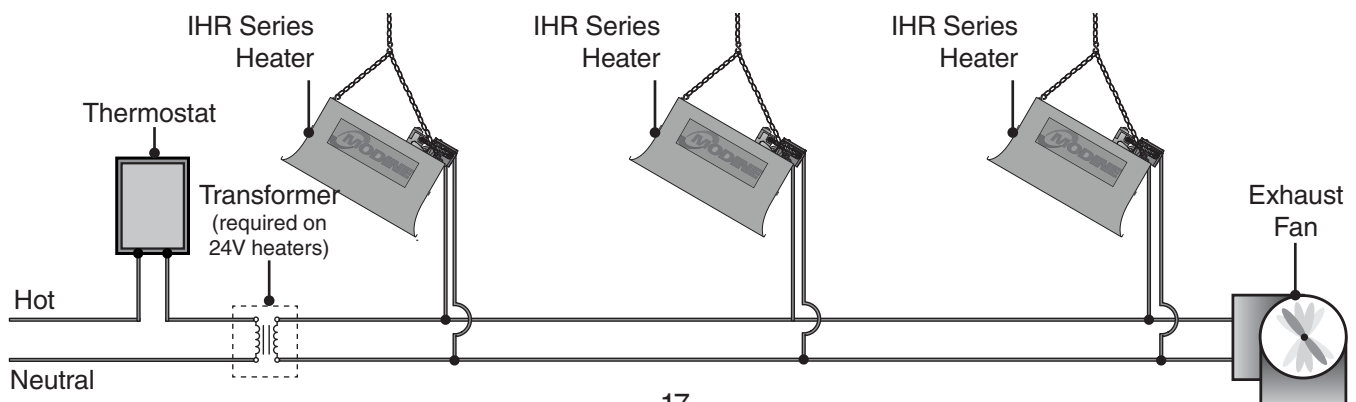


Figure 2.7 • Millivolt • 750 Schematic

- Millivolt Control

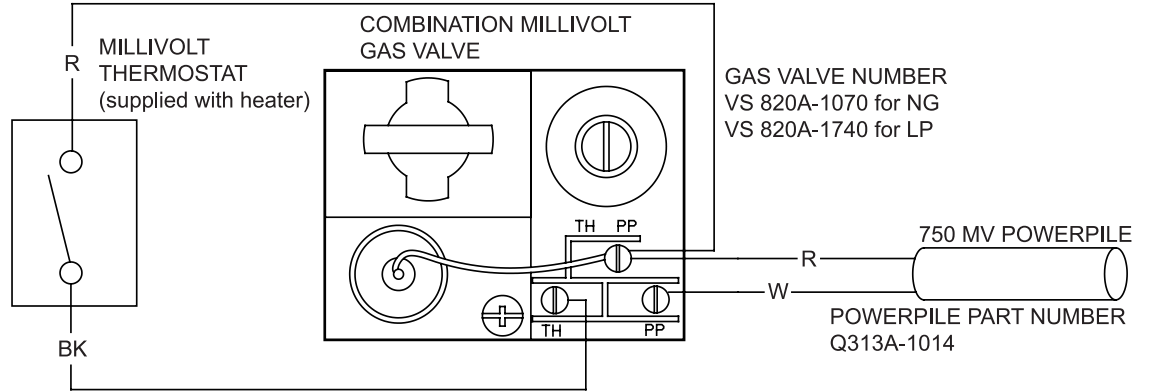


Figure 2.8 • 24 V Schematic

- Direct Spark Ignition
- VA Draw: 12
- Amps: .48
- Potted Circuit Board

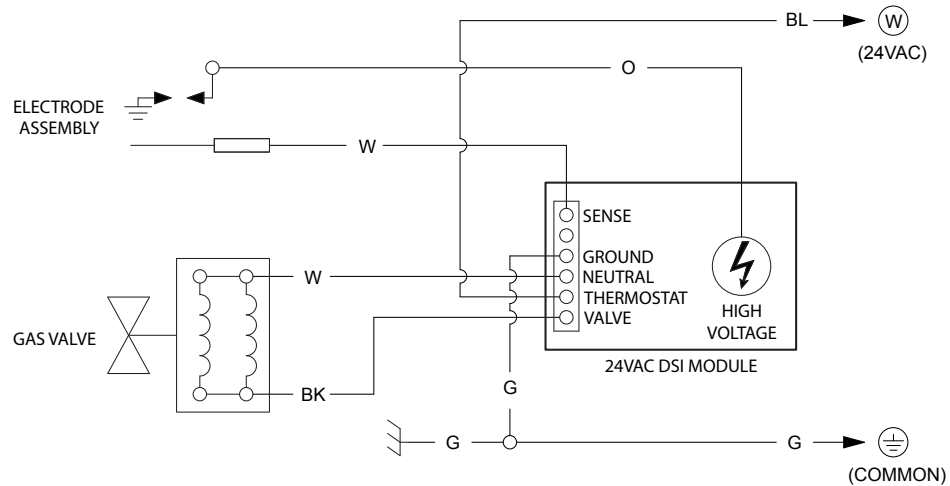
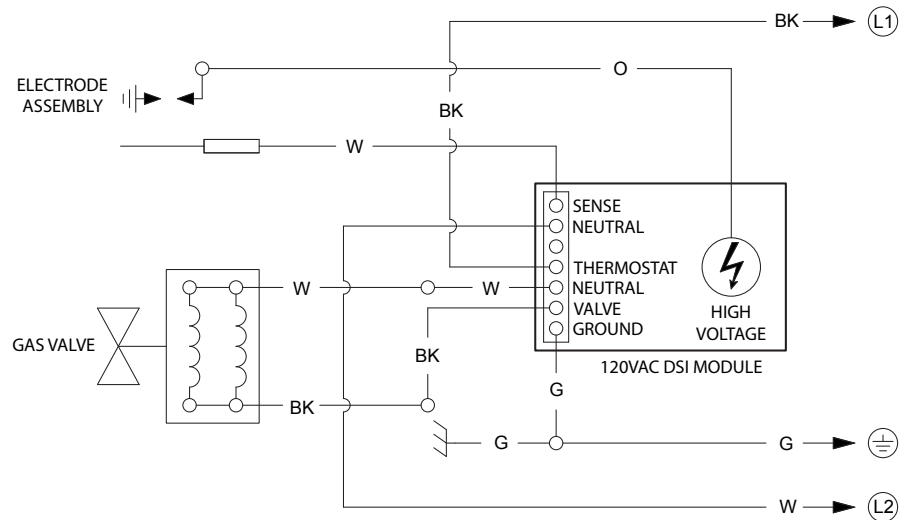


Figure 2.9 • 120 V Schematic

- Direct Spark Ignition
- VA Draw: 12
- Amps: .10
- Potted Circuit Board



3.0 Operation

⚠ WARNING



Do not attempt to ignite a direct spark ignition heater by hand. Failure to comply could result in personal injury, property damage, explosion, fire, or death.

Upon satisfactory completion of the electrical supply and purging of the gas supply line to the heater(s), follow the lighting instructions on the heater's rating label to put the heater into operation.

Direct Spark Ignition

Lighting Instructions

- 1 Rotate the heater's valve knob to the "ON" position.
- 2 Close electrical circuit (typically the thermostat).
- 3 If the heater fails to light, turn off gas, open electrical circuit, and wait 5 minutes before repeating the above steps.

Shutdown Instructions

- 1 Open electrical circuit.
- 2 Rotate the heater's valve knob to the "OFF" position.

Sequence of Operation

Starting Circuit: Upon a call for heat, voltage is applied to L1 and Neutral. After a pre-purge, the spark electrode is energized and the gas valve opens. The trial for ignition is 15 seconds. If flame is not sensed, the heater will attempt two more times to reignite.

Running Circuit: After ignition, the sensing electrode monitors the burner flame. If sense of flame is lost, the control immediately acts to reignite the gas-air mixture. If flame sense is not established within 15 seconds, the heater will attempt two additional ignition sequences before proceeding to hard lockout. The control can be reset by briefly interrupting the power source.

Millivolt

Lighting Instructions

- 1 Purge main gas supply line.
- 2 Slightly depress and rotate the heater's manual gas valve knob COUNTERCLOCKWISE from the "OFF" position to the "PILOT" position.
- 3 Fully depress the manual gas valve knob and light the pilot burner. Continue to depress for 30 seconds and then release.
- 4 Rotate the heater's valve knob to the "ON" position.
- 5 Close the control circuit. If the heater fails to light, turn off the gas, open control circuit and wait 5 minutes before repeating the above steps.

Shutdown Instructions

- 1 Open the control circuit.
- 2 Rotate the heater's valve knob to the "PILOT" position, depress slightly and rotate to the "OFF" position.

Sequence of Operation

Starting Circuit: After manually lighting the pilot (see lighting instructions), upon a call for heat, the main burner solenoid is energized. The gas valve opens and the pilot lights the main burner.

Running Circuit: After ignition, the powerpile monitors the pilot flame. If the pilot flame is lost, the powerpile cools and closes the valve within 180 seconds. See lighting instructions to relight the heater.

4.0 Maintenance

It is recommended that the following become a standard yearly procedure to obtain maximum operating efficiency and trouble free operation.

During long periods of non-usage, remove or cover heater with a polyethylene bag and shut off gas supply. If further service to the heater is desired, contact your representative or the factory.

Main Burner

- ① Gently use an air hose to blow any accumulated dust and/or dirt off the heater. Air hose pressure **must not exceed 30 psig**.
- ② Gently pass the air hose over the entire exposed area of the ceramic. A distance of 2' to 4' from the unit is recommended.
NOTE: Blowing out the gasket material will permanently damage the rayhead.
- ③ Gently place the air hose outlet into each venturi tube and allow the air to flow for approximately one minute.
- ④ See troubleshooting chart (page 21) if there are any signs of burner malfunction. Replace if necessary.

Pilot Burner

- ① Remove pilot access door.
- ② Use an air hose and gently blow the pilot burner free of dust or debris.

Gas Supply

- ① Periodically inspect the gas supply for signs of corrosion or failure. Replace if necessary.

⚠ WARNING



Use protective glasses when cleaning the heater.



Disconnect power to heater before servicing.



Do not operate unit if repairs are necessary. Do not operate unit showing any signs of burner malfunction. Call a professional for assistance.

⚠ CAUTION



Avoid Heater Failure.

Do not blow out heating elements with high pressure air.

Chart 4.1 • Troubleshooting Guide

Symptom	Code	Possible Cause	Corrective Action
Burning of gas-air mixture inside plenum (flashback).	A, B A, B A, B A, B A, B	<ul style="list-style-type: none"> • Heater mounted at incorrect angle. • Excessive drafts. • Gas leaking or blocked orifice/venturi. • Separation of ceramic grids. • Ceramic grids cracked. 	<ul style="list-style-type: none"> • Mounting angle 20°-35° from horizontal. • Relocate or shield from draft. • Do not operate. Check with leak detector solution. • Do not operate. Replace rayhead. • Do not operate. Replace rayhead.
Delayed ignition.	A A, B A, B A, B A, B	<ul style="list-style-type: none"> • Electrode out of specification. • Low gas pressure. • Partially blocked orifice. • Improper orifice size. • Incorrect gas. 	<ul style="list-style-type: none"> • See Figure 4.3. • See Gas Supply section. • Clean or replace. • Consult dealer. • Do not operate. See nameplate. Correct immediately.
Low ceramic surface temperature, excessive rollout or soot on rods.	A, B A, B A, B A, B A, B A, B A, B A, B	<ul style="list-style-type: none"> • Dirty or plugged rayhead ceramics. • Partially blocked orifice. • Low inlet gas pressure. • Low manifold gas pressure. <ul style="list-style-type: none"> • High manifold pressure. <ul style="list-style-type: none"> • Foreign matter in venturi tube. • Gas supply piping too small. • Incorrect gas. 	<ul style="list-style-type: none"> • See maintenance instructions. • Remove and clean. • See Gas Supply section. • Adjust main valve regulator for 6" W.C. natural gas, 10" W.C. propane. • Adjust main valve regulator for 6" W.C. natural gas, 10" W.C. propane. • See Maintenance Section. • Increase inlet pressure or replace. • Do not operate. See nameplate. Correct immediately.
Control system overheating.	A, B A, B	<ul style="list-style-type: none"> • Heater not mounted correctly. • Heater mounted too close to ceiling. 	<ul style="list-style-type: none"> • Mounting angle 20°-35° from horizontal. • Observe clearance to combustibles safety chart located on heater reflector. Do not operate.
Gas odor.	A, B B	<ul style="list-style-type: none"> • Loose pipe connection. <ul style="list-style-type: none"> • Pilot not lit. 	<ul style="list-style-type: none"> • Check all connections with leak-detector solution, tighten as necessary. • Cycle thermostat or manually light.
Heater cycles repeatedly.	A, B A A, B A, B B	<ul style="list-style-type: none"> • Heater located in drafty area. • Low gas pressure. • Thermostat located in drafty area. • Weak pilot flame. • Defective flame detector. 	<ul style="list-style-type: none"> • Relocate or shield from draft. • See Gas Supply section for propane. • Replace thermostat. • Clean or adjust pilot. • Replace.
Pilot on, no gas to main burner.	B	<ul style="list-style-type: none"> • Weak pilot flame. • No electrical power to unit. <ul style="list-style-type: none"> • Pilot sensor element not located in pilot flame. • Defective main valve solenoid. • Defective pilot generator or thermocouple. • Excessive thermostat wire length with millivolt system. • Manual valve off. 	<ul style="list-style-type: none"> • Clean or adjust pilot. • Check thermostat, manual switch or circuit breaker. • Locate upper 3/4 of element in pilot flame. • Isolate. Measure resistance, replace if "0". • Replace. • Wire not to exceed length provided by factory. <ul style="list-style-type: none"> • Turn to "ON" position.
No spark; no ignition.	A A A A A A A	<ul style="list-style-type: none"> • Lack of 120V or 24V incoming voltage. • Open high voltage wire. • Improper electrode gap. • Loose or open wire connection. • Poor or no equipment ground. <ul style="list-style-type: none"> • Unit in "safety lockout" mode. • Defective "gas lighter" control. 	<ul style="list-style-type: none"> • Proper voltage needed or repair wire. • Isolate and measure resistance, replace if "0". • See Figure 4.3. • Check all wires, tighten or replace. • Trace ground wire for complete circuit back to equipment ground from control. • Interrupt power source, repeat trial for ignition. • Verify proper voltage. Replace.
Heater lights, and "locks out" after approximately 10 seconds.	A A A A A	<ul style="list-style-type: none"> • Poor or no equipment ground. <ul style="list-style-type: none"> • Polarity is reversed. • Low gas pressure. • Electrode not sensing. • Heater mounted at incorrect angle. 	<ul style="list-style-type: none"> • Check all connections, provide positive earth ground. • 120V to black, neutral to white. • See Gas Supply section. • Relocate or replace if defective. • Mounting angle 20°-35° from horizontal.
Spark is present. No main gas operation. Unit "locks out".	A A A	<ul style="list-style-type: none"> • Gas valve in "Off" position. • Defective main valve solenoid. • Defective "Gas lighter" control. 	<ul style="list-style-type: none"> • Turn to "On" position. • Isolate and check for resistance. Replace if "0". • Verify proper voltage. Replace.
Heater will not shut off.	A, B A, B A, B	<ul style="list-style-type: none"> • Defective thermostat or wiring. • Gas valve stuck open. • High gas pressure. 	<ul style="list-style-type: none"> • Replace or repair. • Replace. • See Gas Supply section.

Code: **A** - Direct Spark Ignition (24V/120V) **B** - Standing Pilot (Millivolt)

Heater Assembly Components

NOTE: Replacement burners are called “rayheads” with rod inserts. Ceramic grids are not sold separately.

Figure 4.1 • Heater Assembly Components (side view)

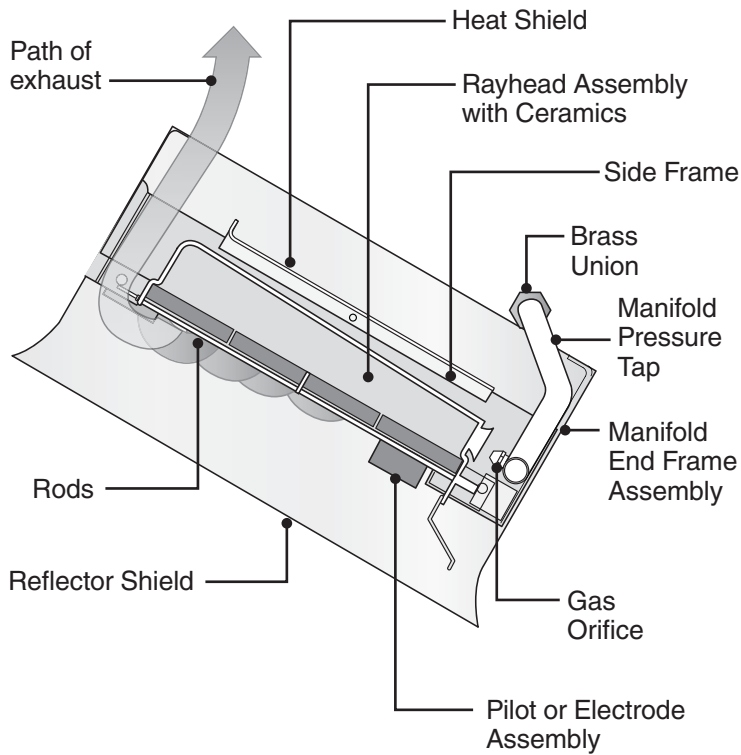


Figure 4.2 • Heater Assembly Components (rear view of Direct Spark)

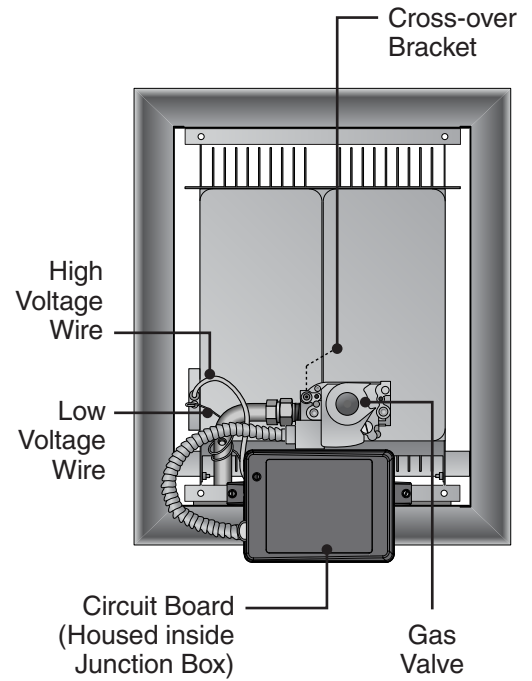


Figure 4.3 • Spark Electrode Side View (Direct Spark) Side View

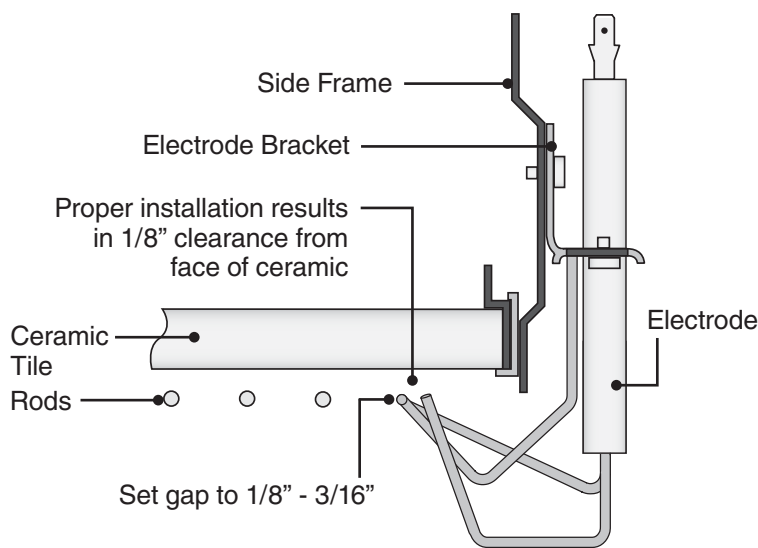
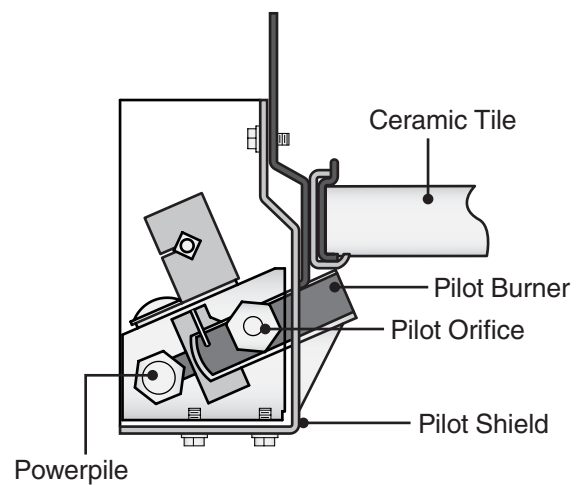


Figure 4.4 • Pilot Assembly Side View (Millivolt)



Parts Listing

IMPORTANT: Contact factory for conversion assistance. Note: Gas type conversions require gas valve and gas orifice(s) among other changes. Conversion may also require burner and crossover changes.

Chart 4.2 • Direct Spark Control Components

Part No.	Description	Voltage
78636	Combination gas valve, natural gas	25 V
78637	Combination gas valve, natural gas	120 V
78638	Combination gas valve, propane gas	25 V
78639	Combination gas valve, propane gas	120 V
78640	Main burner electrode	25 V, 120 V
78641	25 V circuit board	25 V
78642	Wiring harness for Mark 10DX-24 circuit board	25 V
78643	120 V circuit board	120 V
78644	Wiring harness for Mark 10DX-117 circuit board	120 V
78645	High voltage ignition wire	25 V, 120 V
78646	Low voltage ignition wire	25 V, 120 V

Chart 4.3 • Millivolt Control Components

Part No.	Description
78647	Combination gas valve, natural gas
78648	Combination gas valve, propane gas
78649	Pilot flame detector powerpile
78650	Pilot burner
78651	Pilot orifice, natural gas
78652	Pilot orifice, propane gas
78653	Pilot regulator, natural gas
78654	Pilot regulator, propane gas
78655	Millivolt Thermostat
78656	35' Thermostat Wire

Chart 4.4 • Miscellaneous Core Components

Part No.	Description	Part No.	Description
78657	Manifold	78675	Electrode mounting bracket (Direct Spark)
78658	Upper frame (*specify 1-5)	78676	Red Rubber Spark Boot (Direct Spark)
78659	Heat shield (*specify 1-5)	78677	Low volt black wire grommet (Direct Spark)
78660	Flash shield (*specify 1-5)	78678	High volt black wire heyco grommet (Direct Spark)
78661	Reflector End (*specify 1-5)	78679	JB-0514 metal junction box (Direct Spark)
78662	Full Reflector Assembly (*specify 1-5)	78680	#8 x 1/2" common sheet metal screw
78663	Side frame	78681	1/4 - 20 x 1/2" machine screw (IHR Bolt)
78664	Side frame insert	78682	1/4 - 20 hex nut (mates to IHR bolt)
78665	Embossed reflector sides	78683	1/4 - 20 x 1/2" self-tap IHR bolt
78666	Rayhead with center support	78684	1/4 - 10 short electrode mounting screw
78667	Rayhead no center support (IHR30 LP models only)	78685	#8 x 1/2" sheet metal self-tap screw
78668	Cross-over bracket	78686	Pilot access door with zip screw (Millivolt)
78669	Long rayhead rod	78687	Pilot shield for F10-1 pilot burner (Millivolt)
78670	Short rayhead rod	78688	Pilot line for IHR 30 (Millivolt)
78671	Union fitting, 3-piece	78689	Pilot line (Millivolt)
78672	Brass gas orifice (specify model #)	78690	Plastic junction box (Top)
78673	3/8" flex conduit (Direct Spark)	78691	Plastic Junction Box (Bottom)
78674	3/8" conduit attachment fitting (NFS-2/PFS-2)		

*Reference proper part number when ordering these parts: 1=IHR30; 2=IHR60; 3=IHR90; 4=IHR130, 5=IHR160

5.0 Limited Warranty

Seller warrants its products to be free from defects in material and workmanship, EXCLUSIVE, HOWEVER, of failures attributable to the use of materials substituted under emergency conditions for materials normally employed. This warranty covers replacement of any parts furnished from the factory of Seller, but does not cover labor of any kind and materials not furnished by Seller, or any charges for any such labor or materials, whether such labor, materials, or charges thereon are due to replacement of parts, adjustments, repairs, or any other work done. This warranty does not apply to any equipment which shall have been repaired or altered outside the factory of Seller in any way so as, in the judgement of Seller, to affect its stability, nor which has been subjected to misuse, negligence, or operating conditions in excess of those for which such equipment was designed. This warranty does not cover the effects of physical or chemical properties of water or steam or other liquids or gases used in the equipment.

BUYER AGREES THAT SELLER'S WARRANTY OF ITS PRODUCTS TO BE FREE FROM DEFECT IN MATERIAL AND WORKMANSHIP, AS LIMITED HEREIN, SHALL BE IN LIEU OF AN EXCLUSIVE OF ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, WHETHER ARISING FROM LAW, COURSE OF DEALING, USAGE OF TRADE, OR OTHERWISE, **THERE ARE NO OTHER WARRANTIES, INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE, WHICH EXTEND BEYOND THE PRODUCT DESCRIPTION CONFIRMED BY BUYER AND SELLER AS OF THE DATE OF FINAL AGREEMENT.**

This warranty is void if the input to the product exceeds the rated input as indicated on the product serial plate by more than 5% on gas-fired and oil-fired units, or if the product, in the judgement of the SELLER, has been installed in a corrosive atmosphere, or subjected to corrosive fluids or gases, been subjected to misuse, negligence, accident, excessive thermal shock, excessive humidity, physical damage, impact, abrasion, unauthorized alterations, or operation contrary to SELLER'S printed instructions, or if the serial number has been altered, defaced, or removed.

BUYER AGREES THAT IN NO EVENT WILL SELLER BE LIABLE FOR COSTS OF PROCESSING, LOST PROFITS, INJURY TO GOODWILL, OR ANY OTHER CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND RESULTING FROM THE ORDER OR USE OF ITS PRODUCT, WHETHER ARISING FROM BREACH OF WARRANTY, NONCONFORMITY TO ORDERED SPECIFICATIONS, DELAY IN DELIVERY, OR ANY LOSS SUSTAINED BY THE BUYER.

BUYER'S REMEDY FOR BREACH OR WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, IS LIMITED TO REPAIR OR REPLACEMENT AT THE FACTORY OF SELLER, ANY COMPONENT WHICH SHALL, WITHIN THE APPLICABLE WARRANTY PERIOD DEFINED HEREIN AND UPON PRIOR WRITTEN APPROVAL, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF SELLER DISCLOSE TO HAVE BEEN DEFECTIVE; EXCEPT THAT WHEN THE PRODUCT IS TO BE USED BY BUYER AS A COMPONENT PART OF EQUIPMENT MANUFACTURED BY BUYER, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO ONE YEAR FROM DATE OF SHIPMENT FROM SELLER, FOR GAS-FIRED PRODUCTS INSTALLED IN HIGH HUMIDITY APPLICATIONS AND UTILIZING STAINLESS STEEL HEAT EXCHANGERS, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO TEN YEARS FROM DATE OF SHIPMENT FROM SELLER.

These warranties are issued only to the original owner-user and cannot be transferred or assigned. No provision is made in these warranties for any labor allowance or field labor participation. Seller will not honor any expenses incurred in its behalf with regard to repairs to any of Seller's products. No credit shall be issued for any defective part returned without proper written authorization (including, but not limited to, model number, serial number, date of failure, etc.) and freight prepaid.

OPTIONAL SUPPLEMENTAL WARRANTY

Provided a supplemental warranty has been purchased, Seller extends the warranty herein for an additional four (4) years on certain compressors. Provided a supplemental warranty has been purchased, Seller extends the warranty herein for an additional four (4) years or nine (9) years on certain heat exchangers.

EXCLUSION OF CONSUMABLES & CONDITIONS BEYOND SELLER'S CONTROL

This warranty shall not be applicable to any of the following items: refrigerant, gas, belts, filters, fuses, and other items consumed or worn out by normal wear and tear or conditions beyond Seller's control, including (without limitation as to generality) polluted or contaminated or foreign matter contained in the air or water utilized for heat exchanger (condenser) cooling or if the failure of the part is caused by improper air or water supply, or improper or incorrect sizing of power supply.

Component	"APPLICABLE WARRANTY PERIOD"
Applicable Models	
Heat Exchangers Gas-Fired Units	TEN YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN ONE HUNDRED TWENTY-SIX MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST.
Heat Exchangers Low Intensity Infrared Units Compressors Condensing Units for Cassettes	FIVE YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN FIVE YEARS FROM DATE OF RESALE BY BUYER OR ANY OTHER USER, WITHIN FIVE YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN SIXTY-SIX MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST.
Burners Low Intensity Infrared Units Other Components excluding Heat Exchangers, Coils, Condensers, Burners, Sheet Metal	TWO YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TWO YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN THIRTY MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST.
Heat Exchangers/Coils Indoor and Outdoor Duct Furnaces and System Units, Steam/Hot Water Units, Oil-Fired Units, Electric Units, Cassettes, Vertical Unit Ventilators, Geothermal Units Compressors Vertical Unit Ventilators, Geothermal Units Burners High Intensity Infrared Units Sheet Metal Parts All Products	ONE YEAR FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN ONE YEAR FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN EIGHTEEN MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST.

As Modine Manufacturing Company has a continuous product improvement program, it reserves the right to change design and specifications without notice.



HEATING SOLUTIONS



HOT  DAWG™

GARAGE, WORKSPACE AND OUTBUILDING HEATERS

YEAR-ROUND COMFORT TO WORK, PLAY AND RELAX



HOT DAWG™ POWER-EXHAUSTED, GAS-FIRED UNIT HEATER (MODEL HD)

- Quiet operation allows your space to be warm without the distraction of a loud machine running in the background
- Unit can easily be rotated to allow for convenient right or left side control placement**
- Fuel type: Natural or propane gas
- Low-profile, lightweight design easily installs 1" from ceiling with only two angle brackets*
- Casing construction made of heavy gauge metal
- Full 10-year warranty on heat exchanger
- Permanently-lubricated motor for maintenance-free dependability
- Single- or two-stage controls available
- Direct spark ignition for reliable and consistent ignition
- 100% shut-off with continuous retry to allow for safe ignition in the event the unit doesn't light on the first try
- Factory installed finger proof fan guards
- Blower models (HDB) available

* Included on sizes 30-75, accessory for 100, 125

** For model sizes 30-75



HOT DAWG™ SEPARATED COMBUSTION GAS-FIRED UNIT HEATER (MODEL HDS)

Experience the same great features as the HD, with these added benefits:

- Blower models (HDB) available
- Draws fresh air from outside, ensuring dust, dirt or fumes do not affect durability or performance
- Factory assembled, certified separated combustion. No add-ons needed allow for an easier and quicker installation providing greater durability and reduced maintenance



HOT DAWG™ H₂O LOW PROFILE HOT WATER UNIT HEATER (MODEL HHD)

- Low-profile design with flexible mounting options (parallel, perpendicular or recessed between joists) allows for horizontal or vertical air delivery
- No external moving parts - twin centrifugal blowers keep all moving parts inside the cabinet
- Side panel air inlet opening have factory installed finger guards
- Constructed of heavy gauge steel for long lasting durability
- Includes two mounting brackets with vibration isolators to reduce noise and vibration
- Internal coil can handle water pressures up to 150 PSI and temperatures up to 200°F

Hot Dawg H₂O Applications*

Model Sizes	Airflow (CFM)	GPM	140° F BTU/hr	180° F BTU/hr	Application
HHD 30	405 405	2 4	20,600 24,200	30,900 36,300	1 to 2 car garage
HHD 45 (high speed)	710 710	2 4	29,900 35,100	44,800 52,700	2 to 3 car garage
HHD 45 (low speed)	425 425	2 4	20,700 24,400	31,100 36,600	2 to 3 car garage

* Sizing data for sample only. Consult a qualified installer for the actual requirements for your building.

Dimensions (inches) - Model HD/HDS

Model Size	30	45	60	75	100/125
A (length)	26.8	26.8	26.8	26.8	35.5
B (height)	12.2	12.2	18.0	18.0	20.5
C (depth)	22.0	22.0	25.0	25.0	31.0
Gas Connection	1/2	1/2	1/2	1/2	1/2
Vent Connection	3	3	3	3 7/4"	3 7/4"
Approx. Shipping Weight (lbs.)	55	60	80	85	125

* HD30, HD45, HD60, HD75
 ** HD100, D125

Performance Data - Model HD/HDS

Model Size	30	45	60	75	100	125
BTU/Hr Input*	30,000	45,000	60,000	75,000	100,000	125,000
BTU/Hr Output*	24,600	36,900	49,200	61,500	82,000	102,500
Entering Airflow (CFM)**	505	720	990	1,160	1,490	1,980
Outlet Velocity (FPM)**	523	725	653	769	565	747
Air Temp. Rise (°F)	44	46	45	48	50	47
Mounting Height (Max ft.)**	10	10	12	14	12	16
Heat Throw (ft.)	25	27	36	38	42	56

* Measured at distance from unit shown.
 ** Competitor published data.

Clearances for Residentially-Certified Unit Heaters

Unit Side	Clearance To Combustible Materials	Recommended Service Clearance
Top and Bottom	1"	18"
Access Side	1"	18"
Non-Access Side	1"	18"
Rear	18"	18"
Vent Connector	3" * / 4" **	—

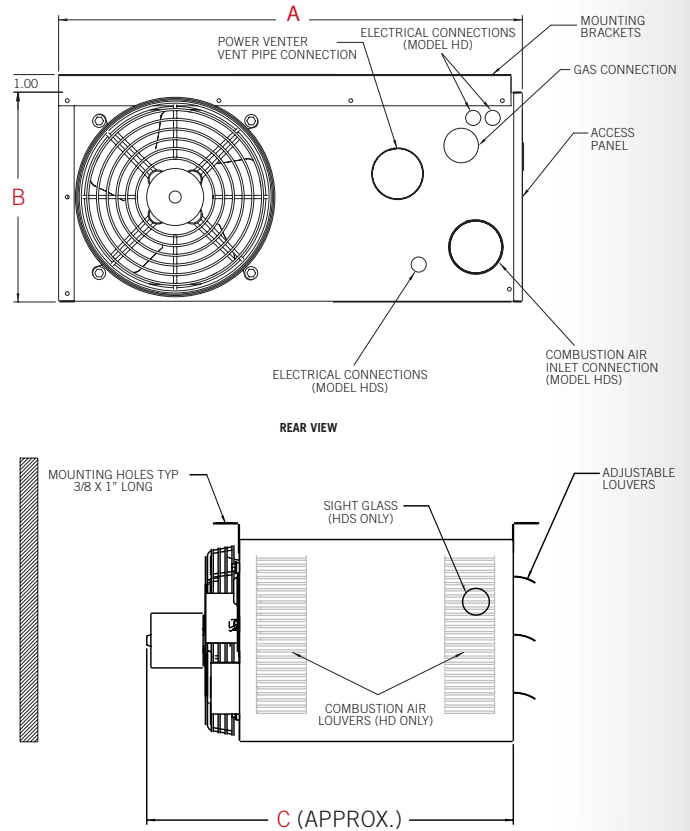
* HD30, HD45, HD60, HD75
 ** HD100, D125

Hot Dawg Applications*

Model	BTU/Hr Input	Typical Application
HD/HDS 30	30,000	1 to 1-1/2 Car Garage
HD/HDS 45	45,000	2 to 2-1/2 Car Garage
HD/HDS 60	60,000	3 to 3-1/2 Car Garage
HD/HDS 75, 100, 125	75,000-125,000	Large Garage

* Sizing data for sample only. Consult a qualified installer for the actual requirements for your building.

Hot Dawg H₂O Mounting Flexibility



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 rating requires use of a high altitude kit.

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.



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INSTALLATION AND SERVICE MANUAL

gas-fired unit heaters

model HD and HDB



All models approved for use in California by the CEC and in Massachusetts. Unit heater is certified for residential and commercial applications. These unit heaters are certified as Utility heaters and are intended for the heating of non-living spaces that are attached to, adjacent to, or part of a structure that contains space for family living quarters. They are not intended to be the primary source of heat in residential applications.

WARNING

1. Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death, and could cause exposure to substances which have been determined by various state agencies to cause cancer, birth defects, or other reproductive harm. Read the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment.
2. Do not locate ANY gas-fired units in areas where chlorinated, halogenated, or acid vapors are present in the atmosphere. These substances can cause premature heat exchanger failure due to corrosion, which can cause property damage, serious injury, or death.

IMPORTANT

The use of this manual is specifically intended for a qualified installation and service agency. All installation and service of these units must be performed by a qualified installation and service agency.

FOR YOUR SAFETY

WHAT TO DO IF YOU SMELL GAS:

1. Open windows.
2. Do not try to light any appliance.
3. Do not touch any electrical switch; do not use any phone in your building.
4. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you can not reach your gas supplier, call your fire department.

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

Inspection on Arrival

1. Inspect unit upon arrival. In case of damage, report it immediately to the transportation company and your local Modine sales representative.
2. Check rating plate on unit to verify that power supply meets available electric power at the point of installation.
3. Inspect unit upon arrival for conformance with description of product ordered (including specifications where applicable).

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SPECIAL PRECAUTIONS

SPECIAL PRECAUTIONS

THE INSTALLATION AND MAINTENANCE INSTRUCTIONS IN THIS MANUAL MUST BE FOLLOWED TO PROVIDE SAFE, EFFICIENT, AND TROUBLE-FREE OPERATION. IN ADDITION, PARTICULAR CARE MUST BE EXERCISED REGARDING THE SPECIAL PRECAUTIONS LISTED BELOW. FAILURE TO PROPERLY ADDRESS THESE CRITICAL AREAS COULD RESULT IN PROPERTY DAMAGE OR LOSS, PERSONAL INJURY, OR DEATH. THESE INSTRUCTIONS SUBJECT TO ANY MORE RESTRICTIVE LOCAL OR NATIONAL CODES.

HAZARD INTENSITY LEVELS

1. **DANGER:** Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.
2. **WARNING:** Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.
3. **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.
4. **IMPORTANT:** Indicates a situation which, if not avoided, MAY result in a potential safety concern.

DANGER

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

WARNING

1. Gas fired heating equipment must be vented - do not operate unvented.
2. A built-in power exhauster is provided - additional external power exhausters are not required or permitted.
3. If an existing heater is being replaced, it may be necessary to resize the venting systems. Improperly sized venting systems can result in vent gas leakage or the formation of condensate. Refer to the National Fuel Gas Code ANSI Z223.1 (NFPA 54) or CSA-B149.1 - latest edition. Failure to follow these instructions can result in injury or death.
4. Under no circumstances should two sections of double wall vent pipe be joined together within one horizontal vent system due to the inability to verify complete seal of inner pipes.
5. All field gas piping must be pressure/leak tested prior to operation. Never use an open flame. Use a soap solution or equivalent for testing.
6. Gas pressure to appliance controls must never exceed 14" W.C. (1/2 psi).
7. To reduce the opportunity for condensation, the minimum sea level input to the appliance, as indicated on the serial plate, must not be less than 5% below the rated input, or 5% below the minimum rated input of dual rated units.
8. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
9. All appliances must be wired strictly in accordance with wiring diagram furnished with the appliance. Any wiring different from the wiring diagram could result in a hazard to persons and property.
10. Any original factory wiring that requires replacement must be replaced with wiring material having a temperature rating of at least 105°C.
11. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% greater than the rated voltage.
12. When servicing or repairing this equipment, use only factory-approved service replacement parts. A complete replacements parts list may be obtained by contacting the factory. Refer to the rating plate on the appliance for complete appliance model number, serial number, and company address. Any substitution of parts or controls not approved by the factory will be at the owner's risk.

CAUTION

1. All literature shipped with this unit should be kept for future use for servicing or service diagnostics. Do not discard any literature shipped with this unit.
2. Consult piping, electrical, and venting instructions in this manual before final installation.
3. Do not attach ductwork, air filters, or polytubes to any propeller unit heater.
4. Clearances to combustible materials are critical. Be sure to follow all listed requirements.
5. Do not locate units in tightly sealed rooms or small compartments (commonly referred to as confined spaces) without provisions for adequate combustion air and venting. Combustion air must have access to the confined space through a minimum of two permanent openings in the enclosure, at least one near the bottom. They should provide a free area of one square inch per 1,000 BTU/Hr input rating of the unit with a minimum of 100 square inches for each opening, whichever is greater.
6. Low profile heaters are designed for use in heating applications with ambient startup temperatures between -40°F and 90°F, and ambient operating temperatures between 40°F and 90°F.
7. Do not install unit outdoors.
8. In garages or other sections of aircraft hangars, such as offices and shops that communicate with areas used for servicing or storage, keep the bottom of the unit at least 7' above the floor unless the unit is properly guarded to provide user protection from moving parts. In parking garages, the unit must be installed in accordance with the standard for parking structures ANSI/NFPA 88A latest edition, and in repair garages the standard for repair garages NFPA 30A - latest edition (Formerly NFPA 88B). In Canada, installation of heaters in airplane hangars must be in accordance with the requirements of the enforcing authority, and in public garages in accordance with the current CSA-B149 codes.
9. In aircraft hangars, keep the bottom of the unit at least 10' from the highest surface of the wings or engine enclosure of the highest aircraft housed in the hangars and in accordance with the requirements of the enforcing authority and/or NFPA 409 - latest edition.
10. Installation of units in high humidity or salt water atmospheres will cause accelerated corrosion, resulting in a reduction of the normal life of the units.
11. Do not install units below 7' measured from the bottom of the unit to the floor in commercial applications (unless unit is properly guarded to provide user protection from moving parts) and 5' measured from the bottom of the unit to the floor in residential applications.
12. Be sure no obstructions block air intake and discharge of unit heaters.
13. The minimum distance from combustible material is based on the combustible material surface not exceeding 160°F. Clearance from the top of the unit may be required to be greater than the minimum specified if heat damage, other than fire, may occur to materials above the unit heater at the temperature described.
14. Allow 18" of clearance at rear (or 6" beyond end of motor at rear of unit, whichever is greater) and access side to provide ample air for combustion and proper operation of fan.
15. Installation must conform with local building codes or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition. In Canada, installation must be in accordance with CSA-B149.1.
16. Purging of air from gas supply line should be performed as described in the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition. In Canada, installation must be in accordance with CSA-B149.1.

SPECIAL PRECAUTIONS / SI (METRIC) CONVERSION FACTORS

⚠ CAUTION

17. When leak testing the gas supply piping system, the appliance and its combination gas control must be isolated during any pressure testing in excess of 14" W.C. (1/2 psi).
18. The unit should be isolated from the gas supply piping system by closing its field installed manual shut-off valve. This manual shut-off valve should be located within 6' of the heater.
19. Turn off all gas before installing appliance.
20. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not less than 5% below the rated voltage.
21. Check the gas inlet pressure at the unit upstream of the combination gas control. The inlet pressure should be 6-7" W.C. on natural gas or 11-14" W.C. on propane. If inlet pressure is too high, install an additional pressure regulator upstream of the combination gas control.
22. Service or repair of this equipment must be performed by a qualified service agency.
23. Do not attempt to reuse any mechanical or electronic ignition controllers which has been wet. Replace defective controller.

IMPORTANT

1. To prevent premature heat exchanger failure, do not locate ANY gas-fired appliances in areas where corrosive vapors (i.e. chlorinated, halogenated, or acidic) are present in the atmosphere.
2. To prevent premature heat exchanger failure, the input to the appliance as indicated on the serial plate must not exceed the rated input by more than 5%.
3. To check most of the Possible Remedies in the troubleshooting guide listed in Table 19.1, refer to the applicable sections of the manual.

SI (METRIC) CONVERSION FACTORS

To Convert	Multiply By	To Obtain
"W.C.	0.249	kPa
°F	(°F-32) x 5/9	°C
Btu	1.06	kJ
Btu/ft ³	37.3	kJ/m ³
Btu/hr	0.000293	kW
CFH (ft ³ /hr)	0.000472	m ³ /min
CFH (ft ³ /hr)	0.00000787	m ³ /s
CFM (ft ³ /min)	0.0283	m ³ /min
CFM (ft ³ /min)	0.000472	m ³ /s

To Convert	Multiply By	To Obtain
feet	0.305	m
Gal/Hr.	0.00379	m ³ /hr
Gal/Hr.	3.79	l/hr
gallons	3.79	l
Horsepower	746	W
inches	25.4	mm
pound	0.454	kg
psig	6.89	kPa
psig	27.7	"W.C.

BEFORE YOU BEGIN

⚠ CAUTION

1. All literature shipped with this unit should be kept for future use for servicing or service diagnostics. Leave manual with the owner. Do not discard any literature shipped with this unit.
2. Consult piping, electrical, and venting instructions in this manual before final installation.
3. Do not attach ductwork, air filters, or polytubes to any propeller unit heater.

In the U.S., the installation of these units must comply with the National Fuel Gas Code, ANSI Z223.1 - latest edition (also known as NFPA 54) and other applicable local building codes. In Canada, the installation of these units must comply with local plumbing or waste water codes and other applicable codes and with the current code CSA-B149.1.

1. All installation and service of these units must be performed by a qualified installation and service agency only as defined in ANSI Z223.1 (NFPA 54) - latest edition, or in Canada by a licensed gas fitter.
2. This unit is certified with the controls furnished. For replacements parts, please order according to the replacement parts list on serial plate. Always know your model and serial numbers. Modine reserves the right to substitute other authorized controls as replacements.
3. Unit is balanced for correct performance. Do not alter fan or operate motors at reduced speed.
4. Information on controls is supplied separately.
5. The same burner is used for natural and propane gas.

UNIT LOCATION

UNIT LOCATION

DANGER

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

CAUTION

1. Clearances to combustible materials are critical. Be sure to follow all listed requirements.
2. Do not locate units in tightly sealed rooms or small compartments (commonly referred to as confined spaces) without provisions for adequate combustion air and venting. Combustion air must have access to the confined space through a minimum of two permanent openings in the enclosure, at least one near the bottom. They should provide a free area of one square inch per 1,000 BTU/Hr input rating of the unit with a minimum of 100 square inches for each opening, whichever is greater.
3. Low profile heaters are designed for use in heating applications with ambient startup temperatures between -40°F and 90°F, and ambient operating temperatures between 40°F and 90°F.
4. Do not install unit outdoors.
5. In garages or other sections of aircraft hangars such as offices and shops that communicate with areas used for servicing or storage, keep the bottom of the unit at least 7' above the floor unless the unit is properly guarded. In parking garages, the unit must be installed in accordance with the standard for parking structures ANSI/NFPA 88A-latest edition, and in repair garages the standard for repair garages NFPA 30A - latest edition (Formerly NFPA 88B). In Canada, installation of heaters in airplane hangars must be in accordance with the requirements of the enforcing authority, and in public garages in accordance with the current CSA-B149 codes.
6. In aircraft hangars, keep the bottom of the unit at least 10' from the highest surface of the wings or engine enclosure of the highest aircraft housed in the hangars and in accordance with the requirements of the enforcing authority and/or NFPA 409 - latest edition.
7. Installation of units in high humidity or salt water atmospheres will cause accelerated corrosion, resulting in a reduction of the normal life of the units.

IMPORTANT

To prevent premature heat exchanger failure, do not locate ANY gas-fired appliances in areas where corrosive vapors (i.e. chlorinated, halogenated or acid) are present in the atmosphere.

Location Recommendations

1. When locating the heater, consider general space and heating requirements, availability of gas and electrical supply, and proximity to vent locations.
2. When locating units, it is important to consider that the exhaust vent piping must be connected to the outside atmosphere.
3. Be sure the structural support at the unit location site is adequate to support the unit's weight. For proper operation the unit must be installed in a level horizontal position.
4. Do not install units in locations where the flue products can be drawn into the adjacent building openings such as windows, fresh air intakes, etc.

Table 4.1 Clearances

Unit Side	Clearance to Combustible Material		Recommended Service Clearance
	HD	HDB		HD/HDB
Top and Bottom	1"	6"	18"
Access Side	1"	6"	18"
Non-Access Side	1"	6"	18"
Rear	18"	18"	18"
Vent Connector	4"	4"	18"

5. Be sure that the minimum clearances to combustible materials and recommended service clearances are maintained. Units are designed for installation with the minimum clearances as shown in Table 4.1.
6. Do not install units in locations where the gas ignition system is exposed to water spray, rain, or dripping water.
7. Mounting height (measured from bottom of unit) at which unit heaters are installed is critical. Refer to mounting height and heat throw data on page 17 of this manual. The maximum mounting height for any unit is that height above which the unit will not deliver heated air to the floor.

Combustion Air Requirements

The National Fuel Gas Code defines an "unconfined space" as a space whose volume is greater than 50 cubic feet per 1,000 Btu/Hr input of the installed appliance(s). A confined space is 50 cubic feet or less per 1,000 Btu/Hr input of the installed appliance(s).

It is not recommended to install these unit heaters into residential confined spaces. This recommendation is due to the concern that at some point in time, the combustion air openings provided by the installer may become blocked or eliminated by the owner, either intentionally or unintentionally. Despite this recommendation, if these units are installed into a residential confined space, see National Fuel Gas Code ANSI Z223.1 (NFPA 54) or CSA-B149.1 Installation Code - latest edition, for detailed combustion air provisions. The installation must adhere to these requirements.

Units installed in confined spaces in industrial/commercial installations must be provided with two permanent openings - one near the top and one near the bottom of the confined space. Each opening should have a free area of not less than one square inch per 1,000 Btu/Hr of the total input rating of all units in the confined space, freely communicating with interior areas that have adequate infiltration from the outside.

For further details on supplying combustion air to a confined (tightly sealed) space or unconfined space, see the National Fuel Gas Code ANSI Z223.1 (NFPA 54) or CSA-B149.1 Installation Code - latest edition.

Turning The Unit 180° (Model Sizes 30-75 Only)

All units are produced at the factory with left-side controls (when looking at the unit). If the installation requires the controls to be on the right side, all heaters - with the exception of the HD/HDB 100 and 125 - can be turned over by following the instructions below.

- By turning the unit 180° from the way it was received from the factory, the sides become opposite, but the front and back remain in the same relative position. The bottom panel now becomes the top panel and vice-versa.
- Remove the access panel, turn it 180°, and re-attach it to the unit so that all the information labels can be read.
- Remove the spring loaded deflector blades, turn them over, replace, and adjust so they are open and in a position to direct the heated air down to the floor.

UNIT MOUNTING

CAUTION

1. Do not install units below 7' measured from the bottom of the unit to the floor in commercial applications (unless unit is properly guarded to provide user protection from moving parts) and 5' measured from the bottom of the unit to the floor in residential applications.
2. Be sure no obstructions block air intake and discharge of unit heaters.
3. The minimum distance from combustibile material is based on the combustibile material surface not exceeding 160°F. Clearance from the top of the unit may be required to be greater than the minimum specified if heat damage, other than fire, may occur to materials above the unit heater at the temperature described.
4. Allow 18" clearance at rear (or 6" beyond end of motor at rear of unit, whichever is greater) and access side to provide ample air for combustion and proper operation of fan.

1. Be sure the means of suspension is adequate to support the weight of the unit (see page 18 for unit weights).
2. For proper operation, the unit must be installed in a level horizontal position.
3. Clearances to combustibles as previously specified must be strictly maintained.
4. For model sizes 30-75, before lifting the heater for suspension, the mounting brackets must be installed as follows (for bracket accessory installation on model sizes 100-125, see the latest revision of literature 6-594):
 - For standard (left side) control access, remove the 3 screws and mounting bracket along the top edge of both the front and back of the unit. Install the front bracket as shown in Figure 5.1 by aligning the screw holes on the bracket with the screw holes on the top edge of the unit. Repeat for the bracket on the back of the unit.
 - For right side control access, remove the 3 screws and mounting bracket along the top edge of both the front and back of the unit. Turn the unit over and install the front bracket as shown in Figure 5.2 by aligning the screw holes on the bracket with the screw holes on the top edge of the unit (originally the bottom edge). Repeat for the bracket on the back of the unit.
- 5a. **Suspension by screws/lag bolts:** Secure the mounting brackets to the ceiling joists or truss, using 1/4" screws with 1/2" washers. These unit mounting brackets are slotted to accommodate joists on 16" or 24" centerlines.

Figure 5.1 - Unit Heater in Standard Mounting Configuration (30-75 Units Only)

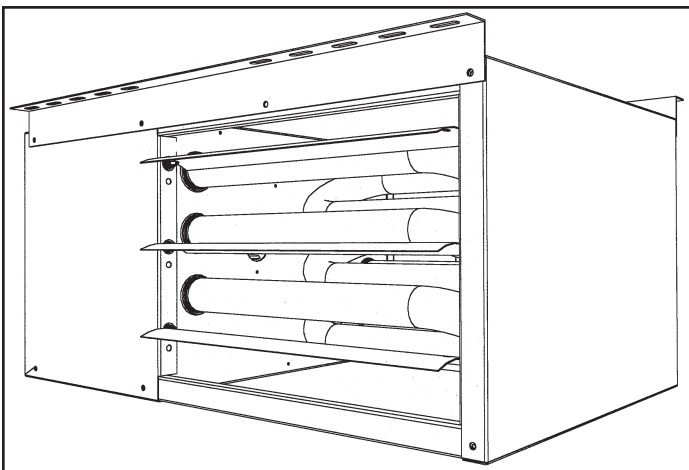
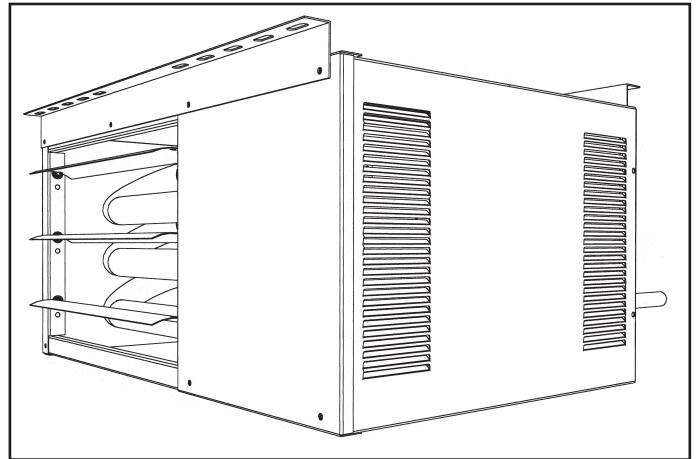
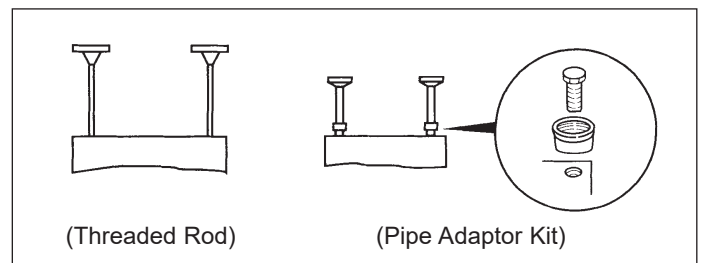


Figure 5.2 - Unit Heater Turned 180° (30-75 units only) (Access panel and heated air outlet change sides)



- 5b. **Suspension by threaded rod:** The unit can also be hung with threaded rod utilizing the same mounting brackets. Attach the threaded rod to the unit mounting brackets, securing with a top and bottom nut. For model sizes 100-125, the units are designed to be suspended by threaded rod without the use of brackets. On each piece of 3/8" threaded rod used, screw a nut a distance of about one inch onto the end of the threaded rods that will be screwed into the unit heater. Place a washer over the end of the threaded rod and screw the threaded rod into the unit heater weld nuts on the top of the heater at least 5 turns, and no more than 10 turns. Tighten the nut first installed onto the threaded rod to prevent the rod from turning.
Next, drill holes into a steel channel or angle iron at the same centerline dimensions as those chosen for the heater being installed. The steel channels or angle iron pieces need to span and be fastened to appropriate structural members. Cut the threaded rods to the preferred length, push them through the holes in the steel channel or angle iron and secure with washers and lock nuts, lock washers and nuts, or a washer with double nut arrangement.
NOTE: A pipe hanger adapter kit, shown in Figure 5.3, is available as an accessory. One kit consists of drilled 3/4" IPS pipe caps and 3/8" - 16 x 1-3/4" capscrews to facilitate threaded pipe suspension.
- 5c. **Shelf mounted units:** The unit heater can also be installed on a shelf. The mounting brackets will need to be attached to the heater the same manner as explained in note #4, however, to mount on a shelf the brackets must go on the bottom of the heater. The brackets must be affixed to the shelf using similar screws (1/4" screw with 1/2" washer) as overhead joist or truss mounting. Be sure all clearance to combustibile requirements are met.

Figure 5.3 - Unit Heater Suspension Methods



INSTALLATION - VENTING

⚠ WARNING

1. Gas fired heating equipment must be vented - do not operate unvented.
2. A built-in power exhauster is provided - additional external power exhausters are not required or permitted.
3. If an existing heater is being replaced, it may be necessary to resize the venting systems. Improperly sized venting systems can result in vent gas leakage or the formation of condensate. Refer to the National Fuel Gas Code ANSI Z223.1 (NFPA 54) or CSA-B149.1 Installation Code - latest edition. Failure to follow these instructions can result in serious injury or death.
4. Under no circumstances should two sections of double wall vent pipe be joined together within one horizontal vent system due to the inability to verify complete seal of inner pipes.

⚠ CAUTION

Installation must conform with local building codes or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition. In Canada, installation must be in accordance with CSA B149.1.

Model HD/HDB unit heaters must be vented with the proper passageway as described in these instructions to convey flue gases from the unit or the vent connector to the outside atmosphere.

The venting instructions are organized in sections, based on installation type. The sections are identified as follows:

Instructions Section	Applicable Installation Instructions by Vent System Type
A	General instructions for ALL installations
B	VERTICAL Category I vent systems ①
C	HORIZONTAL Category III vent systems ②

① The difference between Vertical Category I and Horizontal Category III will be identified in "Section A - General Instructions - All Units".

Section A – General Instructions – All Units

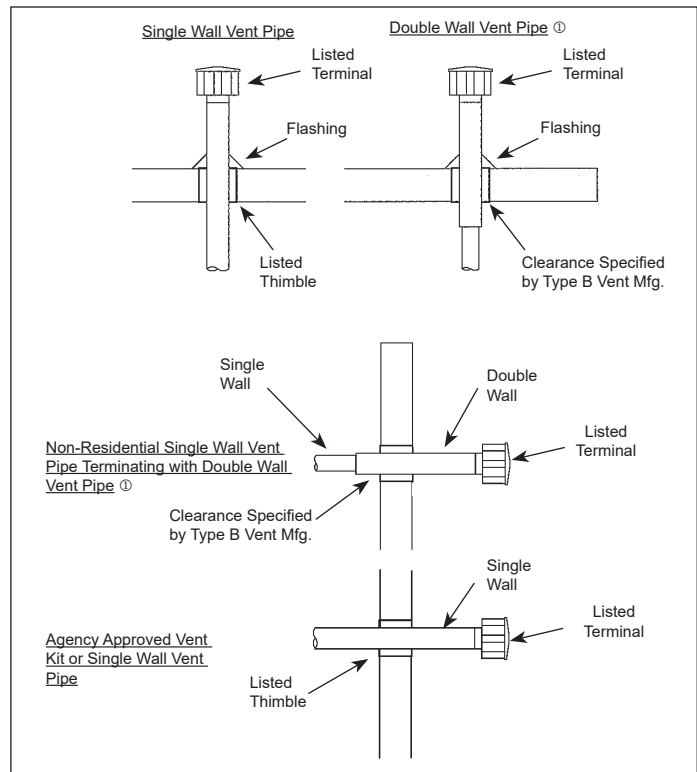
- A1. If the unit heater being installed is replacing existing equipment and using the existing vent system from that equipment, inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code ANSI Z223.1 (NFPA 54) or CSA-B149.1 Installation Code-latest edition and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
- A2. The vent pipe should be galvanized steel or other suitable corrosion resistant material (except for Horizontal Category III vent systems, which will be covered in "Section C – Horizontal, Category III Vent System Installation"). Follow the National Fuel Gas Code for minimum thickness of vent material. The minimum thickness for connectors varies depending on the pipe diameter. Do not vent unit with PVC or other forms of plastic venting material.
- A3. All heaters come with a factory installed vent adapter for attaching the vent pipe to the heater. Attach the vent pipe to the adapter with 3 non-corrosive screws. (Drill pilot holes through the vent pipe and adapter prior to screwing in place).
- A4. Refer to Table 6.1 for total equivalent vent pipe lengths, making the vent system as straight as possible. The equivalent length of a 3" elbow is 1' and for a 4" elbow is 5'.

Table 6.1 - Vent Pipe Diameters and Total Equivalent Vent Pipe Lengths For Horizontal Venting Systems

Model Size	Vent Pipe Diameter	Minimum Eqv. Length	Maximum Eqv. Length
30-75	3"	3'	30'
100-125	4"	3'	30'

- A5. A minimum of 12" straight pipe is recommended from the flue outlet before turns in the vent pipe.
- A6. Horizontal sections of vent pipe are to be installed with an upward or downward slope from the appliance of 1/4 inch per foot and suspended securely from overhead structures at points not greater than 3' apart.
- A7. Fasten individual lengths of vent together with at least 3 corrosion-resistant sheet metal screws.
- A8. Keep single wall vent pipe at least 6" from combustible materials. For double wall vent pipe, follow the vent pipe manufacturer's clearances to combustibles. The minimum distance from combustible materials is based on the combustible material surface not exceeding 160°F. Clearance from the vent pipe (or the top of the unit) may be required to be greater than 6" if heat damage other than fire could result (such as material distortion or discoloration).
- A9. Avoid venting through unheated space when possible. When venting does pass through an unheated space or if the unit is installed in an environment that promotes condensation, insulate runs greater than 5' to minimize condensation. Inspect for leakage prior to insulating and use insulation that is noncombustible with a rating of not less than 400°F. Install a tee fitting at the low point of the vent system and provide a drip leg with a clean out cap as shown in Figure 8.1.
- A10. When the vent passes through a combustible INTERIOR wall or floor, a metal thimble 4" greater than the vent

Figure 6.1 - Venting Through Combustible Roof or Wall



① See Instruction A10 for attaching single wall pipe to double wall pipe

INSTALLATION - VENTING

diameter is necessary. If there is 6' or more of vent pipe in the open space between the appliance and where the vent pipe passes through the wall or floor, the thimble need only be 2" greater than the diameter of the vent pipe. If a thimble is not used, all combustible material must be cut away to provide 6" of clearance. Where authorities have jurisdiction, type B vent may be used for the last section of vent pipe to maintain clearance to combustibles while passing through wall or floor (see Figure 6.1). Any material used to close the opening must be noncombustible.

A11. The following are general instructions for double wall (type B) terminal pipe installation:

How to attach a single wall vent terminal to double wall (type B) vent pipe:

1. Look for the "flow" arrow on the vent pipe.
2. Slide the vent terminal inside the exhaust end of the double wall vent pipe.
3. Drill 3 holes through the pipe and the vent terminal. Using 3/4" long sheet metal screws, attach the cap to the pipe. Do not over tighten.

How to connect a single wall vent system to double wall (type B) vent pipe:

1. Slide the single wall pipe inside the inner wall of the double wall pipe.
2. Drill 3 holes through both walls of the single and double wall vent pipes. Using 3/4" sheet metal screws, attach the two pieces of pipe. Do not over tighten.
3. The gap between the single and double wall pipe must be sealed, but it is not necessary to fill the full volume of the annular area. To seal, run a large bead of 400°F silastic around the gap.

A12. Vent termination clearances must be maintained:

Table 7.1 - Vent Termination Clearances

Structure	Minimum Clearances for Vent Terminal Location
Forced air inlet within 10 feet	3 feet above
Combustion air inlet of another appliance	6 feet all directions
Door, window, gravity air inlet, or any building opening	4 feet horizontal and below 1 foot above
Electric meter, gas meter, gas regulator, and relief equipment ①	4 feet horizontal (U.S.) 6 feet horizontal (Canada)
Gas regulator ①	3 feet horizontal (U.S.) 6 feet horizontal (Canada)
Adjoining building or parapet wall	6 feet all directions
Adjacent public walkways	7 feet all directions
Grade (ground level)	3 feet above

① Do not terminate the vent directly above a gas meter or regulator.

A13. Do NOT use dampers or other devices in the vent or combustion air pipes.

A14. Precautions must be taken to prevent degradation of building materials by flue products.

A15. Single wall vent pipe must not pass through any unoccupied attic, inside wall, concealed space, or floor.

A16. Uninsulated single wall vent pipe must not be used outdoors for venting appliances in regions where the 99% winter design temperature is below 32°F.

A17. The vent terminal must be:

Table 7.2 - Vent Terminals

Model Size	Modine PN
30-75	5H0722850005
100-125	5H0722850001

A18. In addition to following these general instructions, specific instructions for Vertical Category I or Horizontal Category III vent systems must also be followed. Table 7.3 outlines the differences:

Table 7.3 - ANSI Unit Heater Venting Requirements

Category	Description	Venting Requirements
I	Negative vent pressure Non-condensing	Follow standard venting requirements.
II	Negative vent pressure Condensing	Condensate must be drained.
III	Positive vent pressure Non-condensing	Vent must be gas tight.
IV	Positive vent pressure Condensing	Vent must be liquid and gastight. Condensate must be drained.

Note: Vent connectors serving Category I appliances shall not be connected into any portion of mechanical draft systems operating under positive pressure.

Vertical Category I Vent System Determination

- Vertical vent systems terminate vertically (up).
- The horizontal portion of the vent run cannot exceed 75% of the vertical rise (Example: If the vent height is 10', the horizontal portion of the vent system cannot exceed 7.5').
- The vent terminates a minimum of 5' above the vent connector on the unit.
- If the vent system to be installed meets ALL these criteria (an example is shown in Figure 9.1), proceed to "Section B – Vertical Vent System Installation". For all other cases, proceed to the next section for Horizontal Category III Vent System Determination:

Horizontal Category III Vent System Determination

- Horizontal vent systems terminate horizontally (sideways).
- A vent system that terminates vertically but has a horizontal run that exceeds 75% of the vertical rise is considered horizontal.
- Horizontal vent configurations are Category III. For residential installations, this requires the use of an agency approved (UL1738) Category III vent system. Additional requirements, including those for commercial and industrial installations are covered in "Section C – Horizontal, Category III Vent System Installation".

INSTALLATION - VENTING

Section B – Vertical Vent System Installation

- B1. This section applies to vertically vented Category I vent systems and is in addition to “Section A – General Instructions – All Units”.
- B2. Vertical vent systems terminate vertically, and must be sized in accordance with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition.
- B3. The horizontal portion of the vent run cannot exceed 75% of the vertical rise (Example: If the vent height is 10', the horizontal portion of the vent system cannot exceed 7.5').
- B4. It is recommended to install a tee with drip leg and clean out cap as shown in Figure 8.1.
- B5. The vent terminates a minimum of 5' above the vent connector on the unit.
- B6. All vertically vented heaters that are Category I must be connected to a chimney or vent complying with a recognized standard, or a lined masonry (or concrete) chimney with a material acceptable to the authority having jurisdiction. Venting into an unlined masonry chimney is not permitted. Refer to the National Fuel Gas Code for common venting and pages 11-12 of this manual.
- B7. Use a listed vent terminal to reduce down drafts and moisture in the vent.
- B8. Double wall vent pipe is recommended, although single wall can be used if the requirements of the National Fuel Gas Code are followed.
- B9. Vertical vents must terminate a minimum horizontal and vertical distance from roof lines and adjacent walls or obstructions. These minimum distances are outlined as follows (based on National Fuel Gas Code requirements for vents with diameters less than 12"):
- For **double wall** vent pipe and **8' or greater** horizontal distance to any vertical wall or similar obstruction, the vent must terminate above the roof in accordance with Figure 8.1 and Table 8.1.
 - For **double wall** vent pipe and **less than 8'** horizontal distance to any vertical wall or similar obstruction, the vent must terminate at least 2' above the highest point where it passes through a roof of a building and at least 2' higher than any portion of a building within a horizontal distance of 10' (see Figure 8.1).

Figure 8.1 - Vertical Vent Termination for Double Wall Vent Pipe and Greater Than or Less Than 8' Horizontally From a Vertical Wall or Obstruction

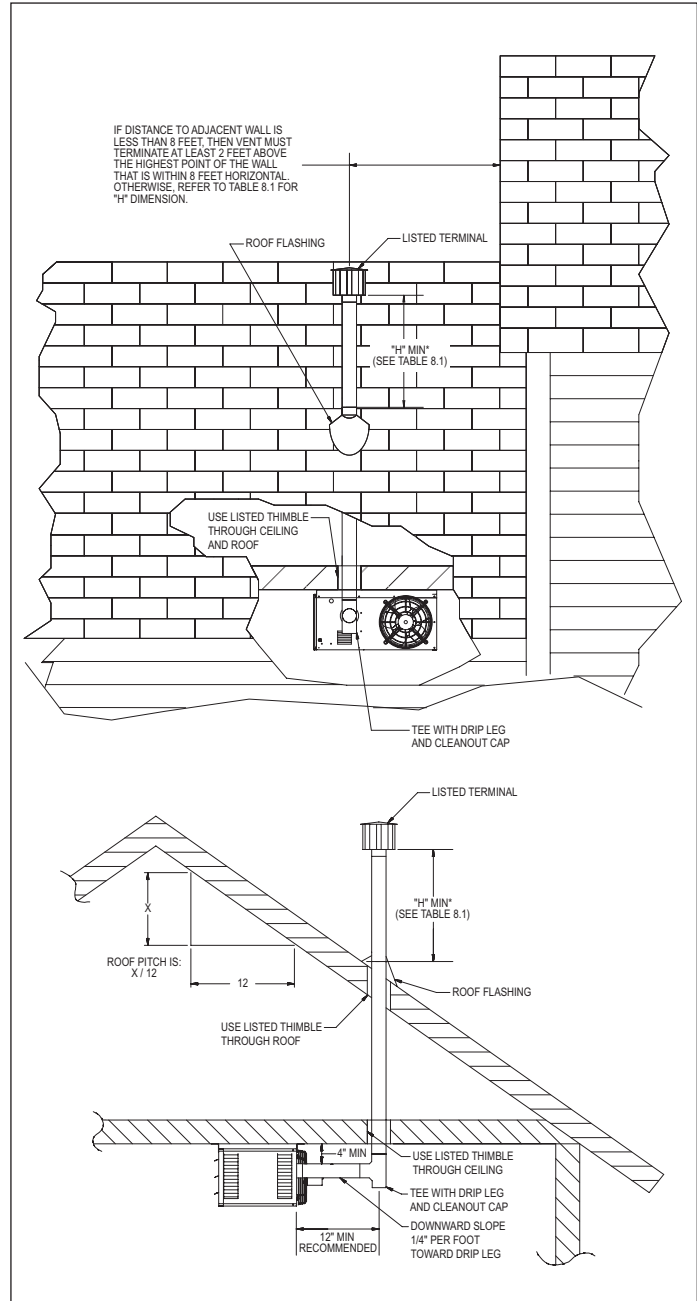


Table 8.1 - Minimum Height from Roof to Lowest Discharge Opening

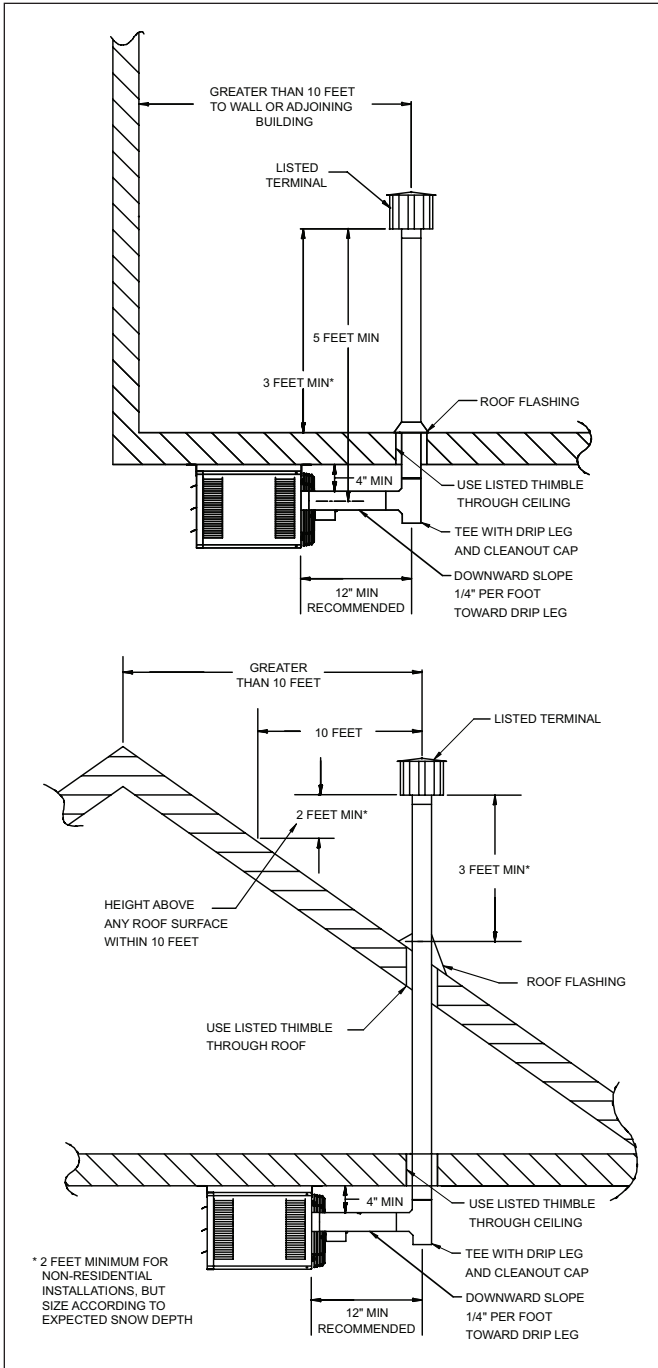
Rise X (in)	Roof Pitch	Min Height H (ft) ①
0-6	Flat to 6/12	1.00
6-7	6/12 to 7/12	1.25
7-8	7/12 to 8/12	1.50
8-9	8/12 to 9/12	2.00
9-10	9/12 to 10/12	2.50
10-11	10/12 to 11/12	3.25
11-12	11/12 to 12/12	4.00
12-14	12/12 to 14/12	5.00
14-16	14/12 to 16/12	6.00
16-18	16/12 to 18/12	7.00
18-20	18/12 to 20/12	7.50
20-21	20/12 to 21/12	8.00

① Size according to expected snow depth.

INSTALLATION - VENTING

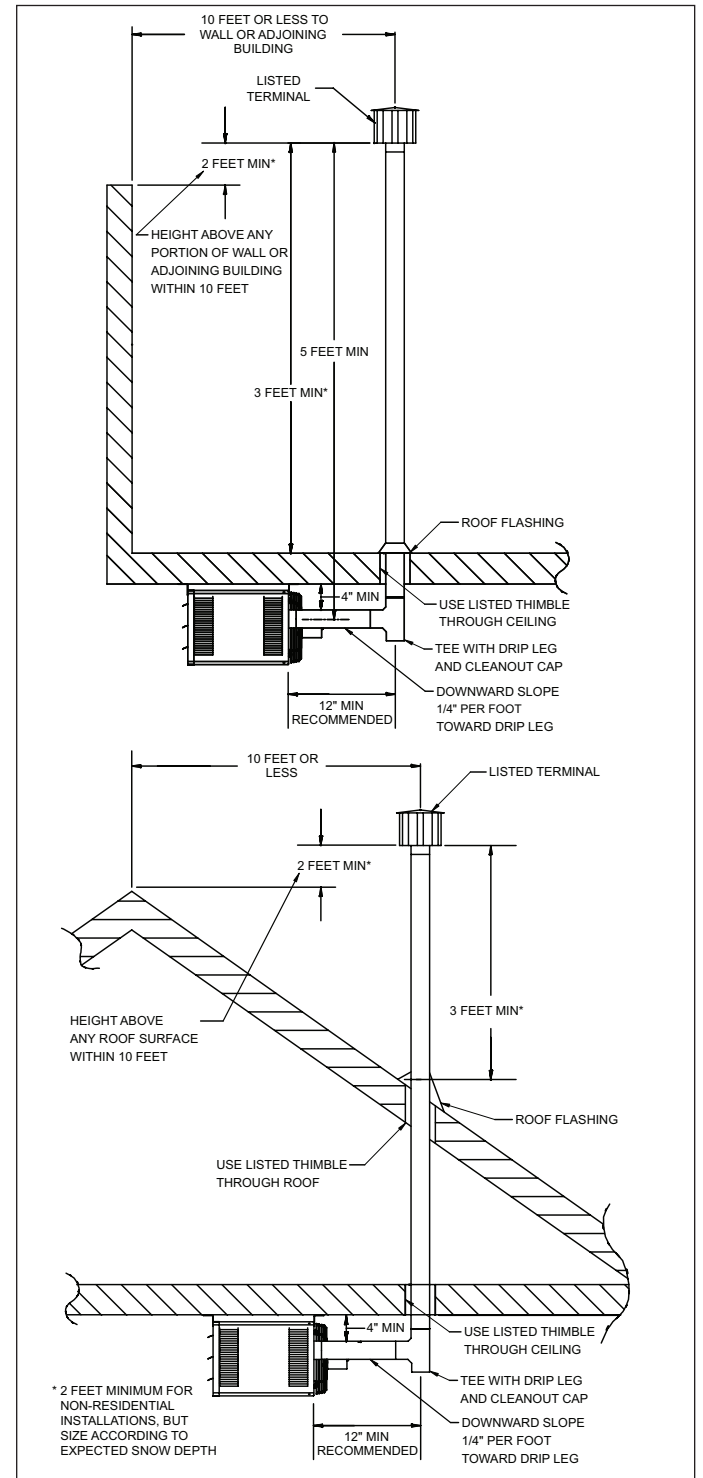
- For **single wall** vent pipe and **10' or greater** horizontal distance to any portion of a building, the vent must terminate at least 3' (2' for non-residential installations) above the highest point where it passes through a roof of a building and at least 2' higher than any portion of a building within a horizontal distance of 10' (see Figure 9.1).

Figure 9.1 - Vertical Vent Termination for Single Wall Vent Pipe and Greater Than 10' Horizontally From Adjacent Wall or Building



- For **single wall** vent pipe and **less than 10'** horizontal distance to any portion of a building, the vent must terminate 2' higher than any portion of that building (see Figure 9.2).

Figure 9.2 - Vertical Vent Termination for Single Wall Vent Pipe and 10' or Less Horizontally From Adjacent Building or Building



B10. Once venting is complete, proceed to the section titled "Installation – Gas Connections".

INSTALLATION - VENTING

Section C – Horizontal, Category III Vent System Installation

C1. This section applies to horizontally vented Category III vent systems and is in addition to “Section A – General Instructions – All Units”. Category III vent systems listed by a nationally recognized agency and matching the diameters specified may be used. Different brands of vent pipe materials may not be intermixed. Under no circumstances should two sections of double wall vent pipe be joined together within one horizontal vent system due to the inability to verify complete seal of inner pipes.

C2. All heaters that are horizontally vented perform as a Category III appliance. Category III venting has special venting requirements as follows.

- All **residential**, horizontally vented Category III heaters must be vented with an **agency certified (UL1738) Category III venting system**. Agency certified Category III venting systems are available from your local vent pipe distributor. Follow the agency certified Category III vent manufacturer’s instructions for installation.
- For **commercial and industrial** horizontally vented heaters you may use either agency certified Category III venting systems as noted above, or single wall galvanized or stainless steel vent pipe. For single wall vent systems, one continuous section of double wall vent pipe may be used within the vent system to pass through the wall to the listed terminal. Refer to instruction A10 in “Section A – General Instructions – All Units” for attaching double wall pipe to single wall pipe. If un-gasketed single wall vent pipe is used, all seams and joints must be sealed with metallic tape or silastic suitable for temperatures up to 400°F (3M aluminum foil tapes 433 or 363 are acceptable). Wrap tape two full turns around the vent pipe.

C3. All horizontal Category III vents must be terminated with a listed vent cap. The cap must terminate a minimum distance from the external wall, as summarized in Table 10.1.

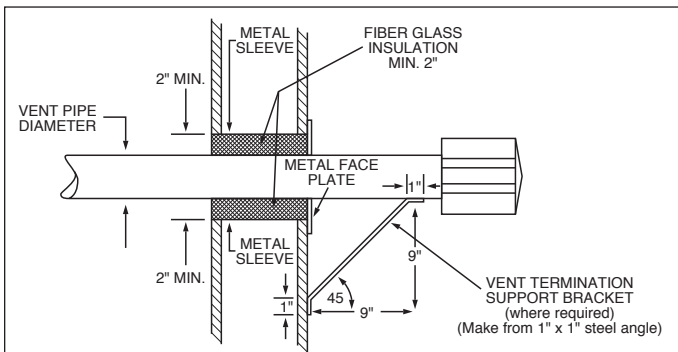
Table 10.1 - Minimum Length Between External Wall and Vent

Model Size	Application	Min. Length A ①
30-75	Residential & Commercial	11"
100, 125	Residential	12"
100, 125	Commercial	24"

① Refer to Figure 10.2 and 10.3.

C4. The vent must be supported as shown in Figure 10.1.

Figure 10.1 - Exhaust Vent Construction Through Combustible Walls and Support Bracket



C5. When condensation may be a problem, the vent system shall not terminate over public walkways or over an area where condensate or vapor could create a nuisance or hazard or could be detrimental to the operation of regulators, relief openings, or other equipment.

C6. The venting system must be exclusive to a single unit, and no other unit is allowed to be vented into it.

Figure 10.2 - Horizontal Category III Venting with Upward Pitch

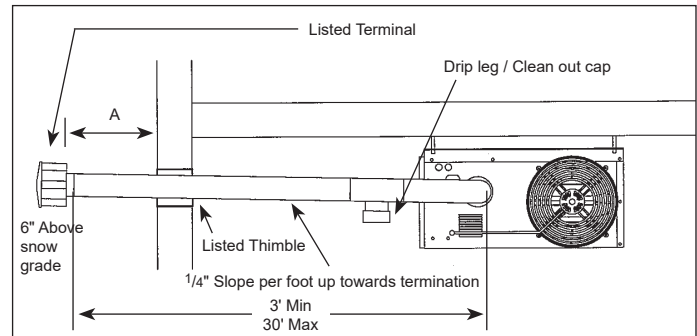
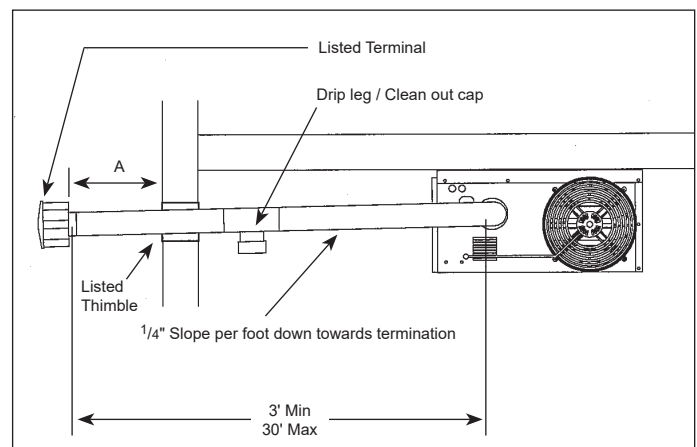


Figure 10.3 - Horizontal Category III Venting with Downward Pitch (with drip leg)



C7. When vented horizontally, maintain a 1/4" per foot rise away from the heater and place a drip leg with clean out near the unit as shown in Figure 10.2. Where local authorities have jurisdiction, a 1/4" per foot downward slope is acceptable with a drip leg and clean out near the exit of the vent as shown in Figure 10.3, or allow the condensate to drip out the end.

C8. For a vent termination located under an eave, the distance of the overhang must not exceed 24". The clearance to combustibles above the exterior vent must be maintained at a minimum of 12". Consult the National Fuel Gas Code for additional requirements for eaves that have ventilation openings.

C9. Once venting is complete, proceed to the section titled “Installation – Gas Connections”.

INSTALLATION - VENTING

Additional Requirements for Common Venting:

1. The common vent system and all attached appliances must be Category I.
2. The vent connector should be routed in the most direct route from the units to the common vent.
3. Where 2 or more vent connectors enter a common gas vent or chimney flue, the smaller connector shall enter at the highest level consistent with the available head room or clearance to combustible material.
4. Restrictions within the common vent such as elbows should be minimized. Each elbow installed within the common portion of the venting system reduces maximum common vent capacity by 10% (refer to Tables 11.2 and 11.3 for capacity).
5. The vent connector capacities included in these tables allow for the use of two 90° elbows (or turns). For each additional elbow, the vent connector capacity shall be reduced by 10%. Refer to NFPA54/ IFEC tables for capacity ratings.
6. The common vent cross sectional area must be equal to or greater than the largest vent connector cross-sectional area.
7. If all appliances are located on one level of the building, the vent height shall be measured from the highest draft hood or vent connector to be installed within the common vent system (refer to Figures 11.1 and 11.2).
8. All units must be vented in strict accordance of the common venting Tables 11.1 through 11.3.
9. All masonry chimneys must comply with all applicable local and national codes.
10. When combining multiple vent connectors into a manifold prior to the vertical portion of the common vent, the size of the common vent manifold and the common vent shall be determined by applying a 10% reduction (.90 x maximum vent capacity from Table 11.2 or 11.3) to the common vent capacity part of the common vent tables. The length of the common vent manifold (Lm) may not exceed 18 inches per inch of manifold diameter.
11. Refer to the National Fuel Gas Code for instructions on multi-level common venting and exterior masonry chimneys as well as additional installation of the listed applications.

Figure 11.1 - Common Venting into Double Wall B Vent

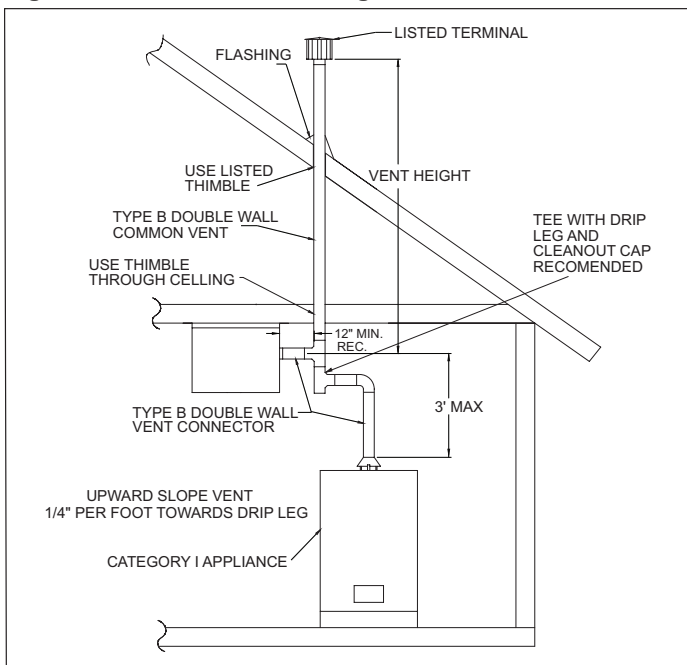


Table 11.1 - Maximum Vent Connector Horizontal Run (ft) - Type B Vent Connector

Connector Dia.	Model	Max Horiz. Run
3"	30,45,60,75	4.5
4"	100, 125	6

Based on ANSI Z223.1 (NFPA 54)-2009. For reference only.

Table 11.2 - Maximum Total Appliance Input Capacities (MBh) - Type B Vent Connector and Type B Common Vent

Vent Height (ft)	Diameter of Common Vent							
	4 in.		5 in.		6 in.		7 in.	
	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat
6	92	81	140	116	204	161	309	248
8	101	90	155	129	224	178	339	275
10	110	97	169	141	243	194	367	299
15	125	112	195	164	283	228	427	352
20	136	123	215	183	314	255	475	394
30	152	138	244	210	361	297	547	459

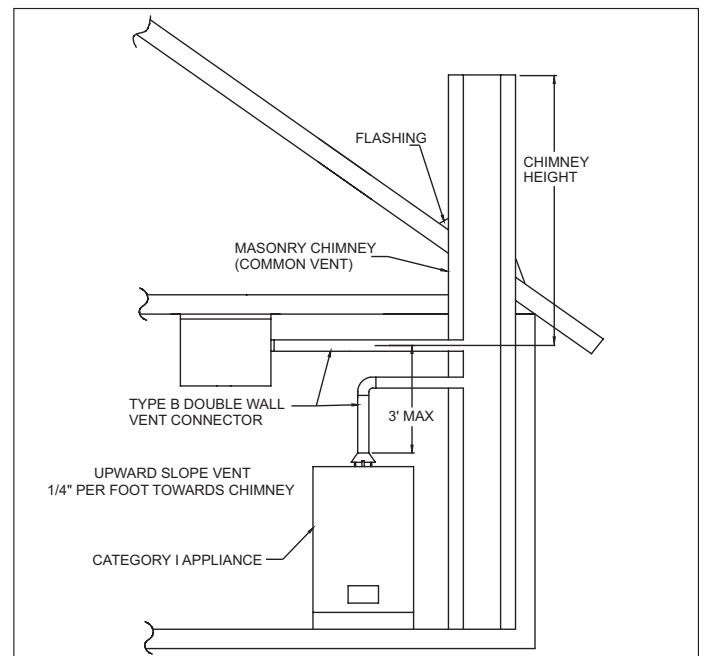
Based on ANSI Z223.1 (NFPA 54)-2009. For reference only.

Table 11.3 - Maximum Total Appliance Input Capacities (MBh) - Type B Vent Connector with Common Vent into Masonry Chimney

Vent Height (ft.)	Area of Common Vent							
	12 in ²		19 in ²		28 in ²		38 in ²	
	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat
6	NA	74	NA	119	NA	178	NA	257
8	NA	80	NA	130	NA	193	NA	279
10	NA	84	NA	138	NA	207	NA	299
15	NA	NA	NA	152	NA	233	NA	334
20	NA	NA	NA	NA	NA	250	NA	368
30	NA	NA	NA	NA	NA	270	NA	404

Based on ANSI Z223.1 (NFPA 54)-2009. For reference only.

Figure 11.2 - (Common) Venting into Masonry Chimney



INSTALLATION - GAS CONNECTIONS

⚠ WARNING

1. All field gas piping must be pressure/leak tested prior to operation. Never use an open flame. Use a soap solution or equivalent for testing.
2. Gas pressure to appliance controls must never exceed 14" W.C. (1/2 psi).
3. To reduce the opportunity for condensation, the minimum sea level input to the appliance, as indicated on the serial plate, must not be less than 5% below the rated input, or 5% below the minimum rated input of dual rated units.

⚠ CAUTION

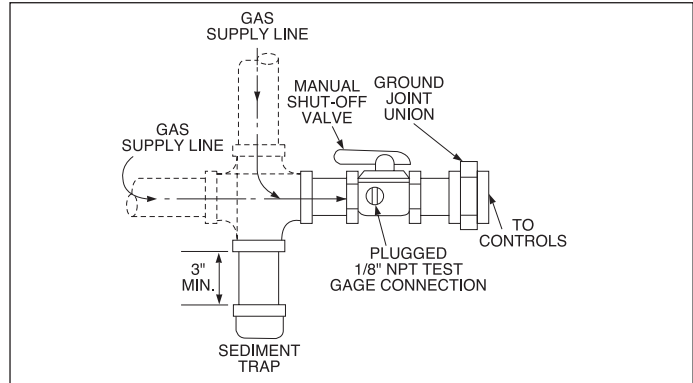
1. Purging of air from gas lines should be performed as described in the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition or in Canada CSA-B149 codes.
2. When leak testing the gas supply piping system, the appliance and its combination gas control must be isolated during any pressure testing in excess of 14" W.C. (1/2 psi).
3. The unit should be isolated from the gas supply piping system by closing its field installed manual shut-off valve. This manual shut-off valve should be located within 6' of the heater.
4. Turn off all gas before installing appliance.

IMPORTANT

To prevent premature heat exchanger failure, the input to the appliance, as indicated on the serial plate, must not exceed the rated input by more than 5%.

1. Installation of piping must conform with local building codes, or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition. In Canada, installation must be in accordance with CSA-B149.1.
2. Piping to units should conform with local and national requirements for type and volume of gas handled and pressure drop allowed in the line. Refer to Table 12.1 to determine the cubic feet per hour (CFH) for the type of gas and size of unit to be installed. Using this CFH value and the length of pipe necessary, determine the pipe diameter from Table 12.2. Where several units are served by the same main, the total capacity, CFH, and length of main must be considered. Avoid pipe sizes smaller than 1/2". Table 12.2 allows for a 0.3" W.C. pressure drop in the supply pressure from the building main to the unit. The inlet pressure to the unit must be 6-7" W.C. for natural gas and 11-14" W.C. for propane gas. When sizing the inlet gas pipe diameter, make sure that the unit supply pressure can be met after the 0.3" W.C. has been subtracted. If the 0.3" W.C. pressure drop is too high, refer to the Gas Engineer's Handbook for other gas pipe capacities.
3. Install a ground joint union with brass seat and a manual shut-off valve adjacent to the unit for emergency shut-off and easy servicing of controls, including a 1/8" NPT plugged tapping accessible for test gauge connection (see Figure 12.1).
4. Use 2 wrenches when connecting field piping to units.
5. Provide a sediment trap before each unit in the line where low spots cannot be avoided (see Figure 12.1).
6. When pressure/leak testing, pressures above 14" W.C. (1/2 psi), close the field installed shut-off valve, disconnect the appliance and its combination gas control from the gas supply line, and plug the supply line before testing. When testing pressures 14" W.C. (1/2 psi) or below, close the manual shut-off valve on the appliance before testing.

Figure 12.1 - Recommended Sediment Trap/Manual Shut-off Valve Installation - Side or Bottom Gas Connection ①



① Manual shut-off valve is in the "OFF" position when handle is perpendicular to pipe.

Table 12.1 - Sea Level Manifold Pressure & Gas Consumption

Model Size	BTU/Cu. Ft. Specific Gravity	Natural	Propane	No. of Orifices
		1050 0.60	2500 1.53	
Manifold Pressure In. W.C.		3.5	10.0	
30	CFH	28.6	12.0	2
	Gal/Hr. Propane		.33	
	Sec/cu. ft. Orifice Drill Size	126 49	300 56	
45	CFH	42.9	18.0	3
	Gal/Hr. Propane		.50	
	Sec/cu. ft. Orifice Drill Size	84 49	200 56	
60	CFH	57.1	24.0	4
	Gal/Hr. Propane		.66	
	Sec/cu. ft. Orifice Drill Size	63 49	150 56	
75	CFH	71.4	30.0	5
	Gal/Hr. Propane		.83	
	Sec/cu. ft. Orifice Drill Size	50 49	180 56	
100	CFH	95.2	40	5
	Gal/Hr. Propane		1.09	
	Sec/cu. ft. Orifice Drill Size	38 45	90 55	
125	CFH	119	50	5
	Gal/Hr. Propane		1.37	
	Sec/cu. ft. Orifice Drill Size	30 42	72 53	

Table 12.2 - Gas Pipe Capacities - Natural Gas ①②

Pipe Length (ft)	Natural Gas					
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
10	132	278	520	1050	1600	3050
20	92	190	350	730	1100	2100
30	73	152	285	590	890	1650
40	63	130	245	500	760	1450
50	56	115	215	440	670	1270
60	50	105	195	400	610	1150
70	46	96	180	370	560	1050
80	43	90	170	350	530	930
100	38	79	150	305	460	870
125	34	72	130	275	410	780
150	31	64	120	250	380	710

① Capacities in cubic feet per hour through Schedule 40 pipe with maximum 0.3"W.C. pressure drop with up to 14"W.C. gas pressure. Specific gravity is 0.60 for natural gas and 1.50 for propane gas.

② For pipe capacity with propane gas, divide natural gas capacity by 1.6. Example: What is the propane gas pipe capacity for 60 feet of 1-1/4" pipe? The natural gas capacity is 400 CFH. Divide by 1.6 to get 250 CFH for propane gas.

INSTALLATION - HIGH ALTITUDE ACCESSORY KIT

HIGH ALTITUDE ACCESSORY KIT

Modine's gas-fired equipment standard input ratings are certified by ETL. For elevations above 2,000', ANSI Z223.1 requires ratings be reduced 4 percent for each 1000'. above sea level. For units in Canada, CSA requires that ratings be reduced 10 percent at elevations above 2,000'. The high altitude adjustment instructions and pressure switch kits listed in this manual are for use with units that will be installed over 2,000'. These methods and kits comply with both ANSI Z223.1 and CSA requirements.

If a unit is to be installed at higher elevations AND converted from natural gas to propane gas operation, a propane conversion kit must be used in conjunction with the pressure adjustment methods and pressure switch kits listed herein. For the selection and installation instructions for propane conversion kits, please see the latest revision of Modine Manual 75-515.

Selection of the Proper Pressure and Kit

To determine the proper manifold pressure at altitude and if required, the proper combustion air pressure switch kit, the full model number of the heater, the fuel to be used, and the altitude the unit will be installed at must be known. Refer to the unit serial plate or carton label to obtain the necessary information about the unit.

After obtaining this information, refer to the gas pressure and selection charts shown in Tables 13.1 through 13.3. The pressure charts are differentiated by elevation, fuel type, and country the product is being installed in. The selection charts are differentiated by product type, altitude and fuel type. **If converting from natural gas to propane gas and operation at high altitude, both a propane conversion kit and a pressure switch kit must be used (if applicable).** Selection charts include the proper kit suffix, when required.

Table 13.1 - Natural Gas Heating Values at Altitude ①②④

Altitude (ft)	Gas Heating Values at Altitude (BTU/ft ³)	
	USA	Canada
0-2,000	1,050	1,050
2,001-3,000	929	945
3,001-4,000	892	
4,001-4,500	874	
4,501-5,000	856	856
5,001-6,000	822	822
6,001-7,000	789	789
7,001-8,000	757	757
8,001-9,000	727	727
9,001-10,000	698	698
10,001-11,000	670	670
11,001-12,000	643	643
12,001-13,000	618	618
13,001-14,000	593	593

Manifold Pressure Adjustment

The inlet pressure to the unit must be confirmed to be within acceptable limits (6-7" W.C. for natural gas and 11-14" W.C. for propane gas) before opening the shutoff valve or the combination gas valve may be damaged.

Heaters for use with **natural gas** have gas valves that need to be field set at 3.5" W.C. manifold pressure at 7.0" W.C. inlet pressure.

Units for use with **propane gas** need to be field set for 10.0" W.C. manifold pressure at 14.0" W.C. inlet pressure.

Installation above 2,000' elevation requires adjustment of the manifold pressure as described.

Derated BTU Content Gas and Manifold Pressure Calculation

Some utility companies may derate the BTU content (heating value) of the gas provided at altitude to a value other than 1,050 BTU/ft³ for natural gas or 2,500 BTU/ft³ for propane gas to allow certain heating appliances to be used with no manifold pressure adjustments. For this reason it is necessary that the supplying utility be contacted for detailed information about the gas type and BTU content (heating value) before operating any heater. Tables 13.1 and 13.2 show the standard derated heating values (4% per 1,000' of elevation in the USA and 10% between 2,001' and 4,500' elevation in Canada) of natural and propane gases at various altitudes. If the utility is supplying gas with heating values as shown in Tables 13.1 and 13.2, the manifold pressure should be set to 3.5" W.C. for natural gas and 10.0" W.C. for propane gas.

NOTE: Only the high fire gas pressure need be adjusted, low fire gas pressure should remain the same.

Table 13.2 - Propane Gas Heating Values at Altitude ②③④

Altitude (ft)	Gas Heating Values at Altitude (BTU/ft ³)	
	USA	Canada
0-2,000	2,500	2,500
2,001-3,000	2,212	2,250
3,001-4,000	2,123	
4,001-4,500	2,080	
4,501-5,000	2,038	2,038
5,001-6,000	1,957	1,957
6,001-7,000	1,879	1,879
7,001-8,000	1,803	1,803
8,001-9,000	1,731	1,731
9,001-10,000	1,662	1,662
10,001-11,000	1,596	1,596
11,001-12,000	1,532	1,532
12,001-13,000	1,471	1,471
13,001-14,000	1,412	1,412

- ① Values shown are for 3.5" W.C. manifold pressure, for other BTU content values (available from local utility) use Equation 14.1 to calculate manifold pressure.
- ② Values shown are for 10.0" W.C. manifold pressure, for other BTU content values (available from local utility) use Equation 14.1 to calculate manifold pressure.
- ③ When installed at altitudes above 2,000', a pressure switch may need to be changed. Refer to Table 13.3 to determine if a switch change is required.
- ④ Gas heating values are derated 4% per 1,000' of elevation in the USA and 10% between 2,000' and 4,500' elevation in Canada in accordance with ANSI Z223.1 and CSA-B149, respectively.

INSTALLATION - HIGH ALTITUDE ACCESSORY KIT

If the heating value of the gas being supplied is different than the values shown in Tables 13.1 and 13.2, use the following equation to determine the appropriate manifold pressure for the altitude and gas heating value being supplied.

Equation 14.1 - Manifold Pressure for Derated Gas

$$MP_{ACT} = \left(\frac{BTU_{TBL}}{BTU_{ACT}} \right)^2 \times MP_{SL}$$

WHERE:

MP_{ACT} = **Manifold Pressure (in. W.C.) at Altitude** –
Manifold pressure setting for the heater being installed

BTU_{TBL} = **BTU/ft³ Content of Gas** –
Obtained from Tables 13.1 or 13.2 (whichever is applicable)

BTU_{ACT} = **BTU/ft³ Content of Gas** –
Obtained from the local utility company

MP_{SL} = **Manifold Pressure (in. W.C.), at Sea Level** –
Use 3.5" W.C. for natural gas and 10.0" W.C. for propane gas

NOTE: Only the primary manifold pressure should be adjusted on units equipped with two-stage or modulating gas controls. No adjustments to the low fire manifold pressure are necessary on these units.

Table 13.3 - High Altitude Kits for HD/HDB ①

US and Canada Altitude (ft)	Model Size					
	30	45	60	75	100	125
	Item Code	Item Code	Item Code	Item Code	Item Code	Item Code
0-2,000	not required	not required	not required	not required	not required	not required
2,001-4,500	67248	67248	67248	67248	67248	67248
4,501-5,500	67248	67248	67248	67248	67248	67248
5,501-6,500	67248	67248	67248	67248	67248	67248
6,501-7,500	67248	67248	67248	67248	68408	68408
7,501-8,500	67248	67248	67248	67248	68408	68408
8,501-9,500	67248	67248	67248	68405	68408	68408
9,501-10,000	67248	67248	67248	68405	68408	68408
10,001-11,000	55945	55945	55945	55946	68409	68409
11,001-12,000	55945	N/A	N/A	55946	68409	68409
12,001-13,000	55945	N/A	N/A	55944	68411	68411
13,001-14,000	55945	N/A	N/A	55944	68411	68411

① For Label Only (67248) kits, Modine part number 5H0807146005 is required to be filled out and attached to the unit by the installer. Please contact the local Modine representative at 1.800.828.4328 (HEAT).

INSTALLATION - ELECTRICAL CONNECTIONS

ELECTRICAL CONNECTIONS

WARNING

1. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
2. All appliances must be wired strictly in accordance with wiring diagram furnished with the appliance. Any wiring different from the wiring diagram could result in a hazard to persons and property.
3. Any original factory wiring that requires replacement must be replaced with wiring material having a temperature rating of at least 105°C.
4. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% greater than rated voltage.

CAUTION

Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% less than the rated voltage.

1. Installation of wiring must conform with local building codes, or in the absence of local codes, with the National Electric Code ANSI/NFPA 70 - Latest Edition. Unit must be electrically grounded in conformance to this code. In Canada, wiring must comply with CSA C22.1, Part 1, Electrical Code.
2. Two copies of the unit wiring diagram are provided with each unit. One is located in the side access control compartment and the other is supplied in the literature packet. Refer to this diagram for all wiring connections.
3. Make sure all multi-voltage components (motors, transformers, etc.) are wired in accordance with the power supply voltage.
4. The power supply to the unit must be protected with a fused or circuit breaker switch.
5. The power supply must be within 5 percent of the voltage rating and each phase must be balanced within 2 percent of each other. If not, advise the utility company.
6. External electrical service connections that must be installed include:
 - a. Supply power connection (115, 208, 230, 460, or 575 volts).
 - b. Connection of thermostats, or any other accessory control devices that may be supplied (24 volts).

NOTE: All units with supply voltage 208V and greater must use a field installed step-down transformer, available as a separate accessory. Refer to Table 15.1 for additional information on the required transformer.

7. Refer to Figures 18.1 and 18.2 for the side access control compartment location.
8. All supply power electrical connections are made in the side access control compartment of the unit. The low voltage (thermostat and accessory control devices) can be wired to the terminals in the side access control compartment. Refer to the wiring diagram for the terminal location of all low voltage wiring.

INSTALLATION - ELECTRICAL CONNECTIONS

ELECTRICAL CONNECTIONS

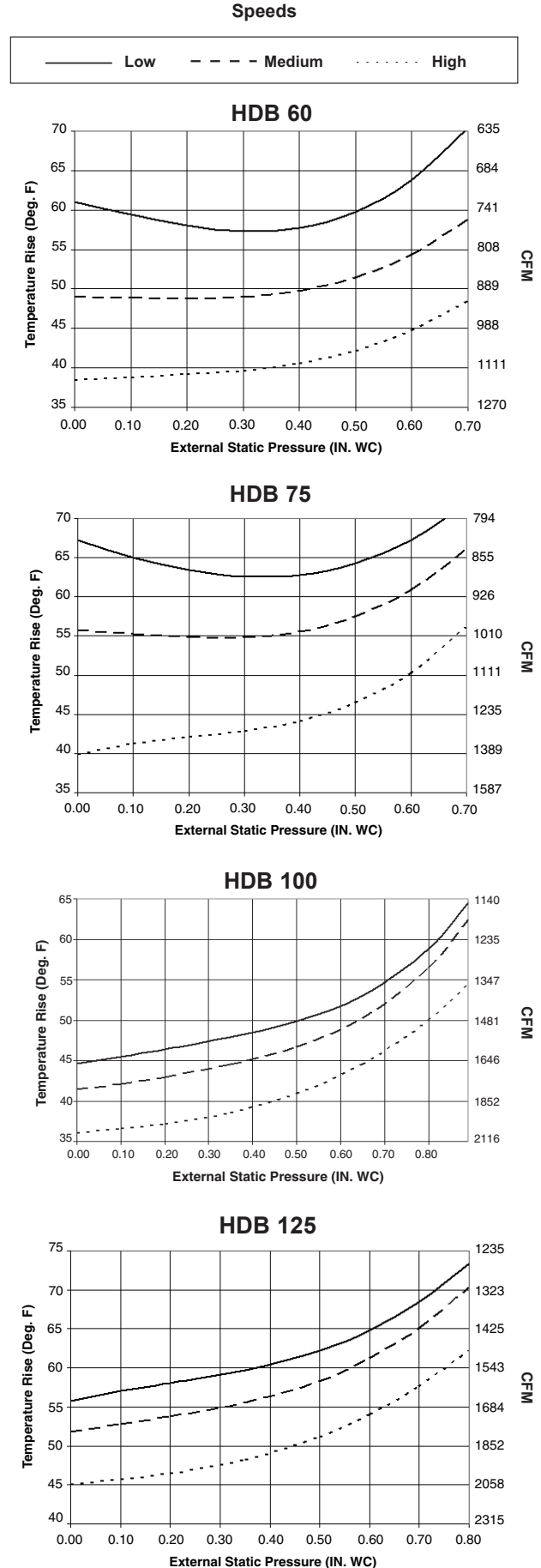
Location of thermostat should be determined by heating requirements and be mounted on an inside wall about 5' above floor level where it will not be affected by heat from the unit or other sources, or drafts from frequently opened doors. See instructions packed with thermostat.

Wiring Adjustments for Blower Motors

The blowers used on Modine HDB units are direct drive and equipped with three speed motors. Air temperature rise of the unit is determined by the speed setting and the amount of static pressure in the system. Units are normally shipped with motors set at high speed. Motor speed is changed by connecting the motor lead for the desired fan speed to the "EAC" or "BLO" terminal of the control board. Unused motor leads for other speeds are placed on the "PARK" terminals of the board (see the wiring diagram on page 21).

When applying a blower equipped unit to a duct system or other load, consult the performance curves on this page to determine the air temperature rise for a given motor speed range and static pressure. Verify that the static pressure on the outlet of the unit does not exceed the maximum specified for the unit. If static pressure is too high it must be reduced either by modifications to the system or using the medium or low motor speed. If the unit shuts down on high limit during normal operation, a higher motor speed should be used.

Blower Curve Models (HDB 60-125 Only)



INSTALLATION - OPERATION

OPERATION

Prior to Operation

IMPORTANT

1. To prevent premature heat exchanger failure, observe heat exchanger tubes. If the bottom of the tubes become red while blower and furnace are in operation, check to be sure the blower has been set to the proper RPM for the application. Refer to page 16 for wiring adjustments for blower motors.
2. Start-up and adjustment procedures must be performed by a qualified service agency.

Although this unit has been assembled and fire-tested at the factory, the following pre-operational procedures should be performed to assure proper on-site operation.

1. Turn off power to the unit at the disconnect switch. Check that fuses or circuit breakers are in place and sized correctly. Turn all hand gas valves to the "OFF" position.
2. Remove the side control access panel.
3. Check that the supply voltage matches the unit supply voltage listed on the Model Identification plate. Verify that all wiring is secure and properly protected. Trace circuits to insure that the unit has been wired according to the wiring diagram. If installed at altitudes above 2,000' and the high altitude kit includes a combustion air proving switch, replace the switch in the unit with the switch provided in the kit. Take care to ensure that the tubing and electrical connections are securely fastened.
4. Check to insure that the venting system is installed correctly and free from obstructions. Before you start use the following steps to verify that the venting system is adequately sized:
 - a. Seal any unused openings in the venting system.
 - b. Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) or CSA B149.1 Installation Code - latest edition and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies, which could cause an unsafe condition.
 - c. Insofar as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building. Turn on clothes dryers and any exhaust fans such as range hoods and bathroom exhausts, so they shall operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
 - d. Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so that the appliance will operate continuously.
 - e. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.
 - f. If improper venting is observed during any of the above tests, the venting system must be corrected.
5. Check to see that there are no obstructions to the intake and discharge of the unit.
6. Check fan clearance. Fan should not contact casing when spun by hand.
7. Check to make sure that all filters are in place and that they are installed properly according to direction of air flow (if applicable).
8. Perform a visual inspection of the unit to make sure no damage has occurred during installation. Check to ensure all fasteners are in place and the burner openings are properly aligned with the heat exchanger tubes and that the gas orifices are centered in the burner inspirator tube opening.
9. Check that all horizontal deflector blades are open a minimum of 30° as measured from vertical.
10. Turn on power to the unit at the disconnect switch.
11. Check the thermostat, ignition control, gas valve, and supply fan blower motor for electrical operation. If these do not function, check that the wiring is per the diagram.
12. Check the blower wheel for proper direction of rotation when compared to the air flow direction arrow on the blower housing (if applicable). Blower wheel rotation, not air movement, must be checked as some air will be delivered through the unit with the blower wheel running backwards.
13. For blower units, check the blower speed (RPM). Refer to "Blower Adjustments" for modification.
14. Check the motor speed (RPM).
15. Check the motor voltage.
16. Check the motor amp draw to make sure it does not exceed the motor nameplate rating.
17. Recheck the gas supply pressure at the field installed manual shut-off valve. The minimum inlet pressure should be 6" W.C. on natural gas and 11" W.C. on propane gas. The maximum inlet pressure for either gas is 14" W.C. If inlet pressure exceeds 14" W.C., a gas pressure regulator must be added upstream of the combination gas valve.
18. Open the field installed manual gas shut-off valve.
19. Place the manual main gas valve on the combination gas valve in the "ON" position. Call for heat with the thermostat.
20. Check to make sure that the main gas valve opens. Check the manifold gas pressure (See "Main Burner Adjustment") while the supply fan blower is operating.
21. Check to insure that gas controls sequence properly (see "Control Operating Sequence"). If you are not familiar with the unit's controls (i.e. combination gas control), refer to the control manufacturer's literature supplied with the unit.
22. Once proper operation of the unit has been verified, remove any jumper wires that were required for testing.
24. Replace the side control access panel.
25. If installed at altitudes above 2,000', affix label included with high altitude kit and fill in all fields with a permanent marker.

Main Burner Adjustment

The gas pressure regulator (integral to the combination gas control) is adjusted at the factory for average gas conditions. It is important that gas be supplied to the unit heater in accordance with the input rating on the serial plate. Actual input should be checked and necessary adjustments made after the unit heater is installed. Over-firing, a result of too high an input, reduces the life of the appliance and increases maintenance. Under no circumstances should the input exceed that shown on the serial plate. Measuring the manifold pressure is done at the outlet pressure tap of the gas valve.

To Adjust the Manifold Pressure

1. Move the field installed manual shut-off valve to the "OFF" position.
2. Remove the 1/8" pipe plug from the outlet pressure tap on the gas valve and attach a water manometer of "U" tube type which is at least 12" high.
3. Move the field installed manual gas shut-off valve to the "ON" position.
4. Create a high-fire call for heat from the thermostat.
5. Refer to Table 12.1 to determine the correct high fire manifold pressure for the gas type of the unit. Pressures at 0-2,000' elevation are 3.5" W.C. for natural gas, 10" W.C. for propane gas, for elevations above 2,000' refer to the instructions on page 13. Adjust the main gas pressure regulator spring to achieve the proper manifold pressure (for location, see the combination gas control literature supplied with unit).
6. After adjustment, move the field installed manual shut-off valve to the "OFF" position and replace the 1/8" pipe plug.
7. After the plug is in place, move the field installed manual shut-off valve to the "ON" position and recheck pipe plugs for gas leaks with soap solution.

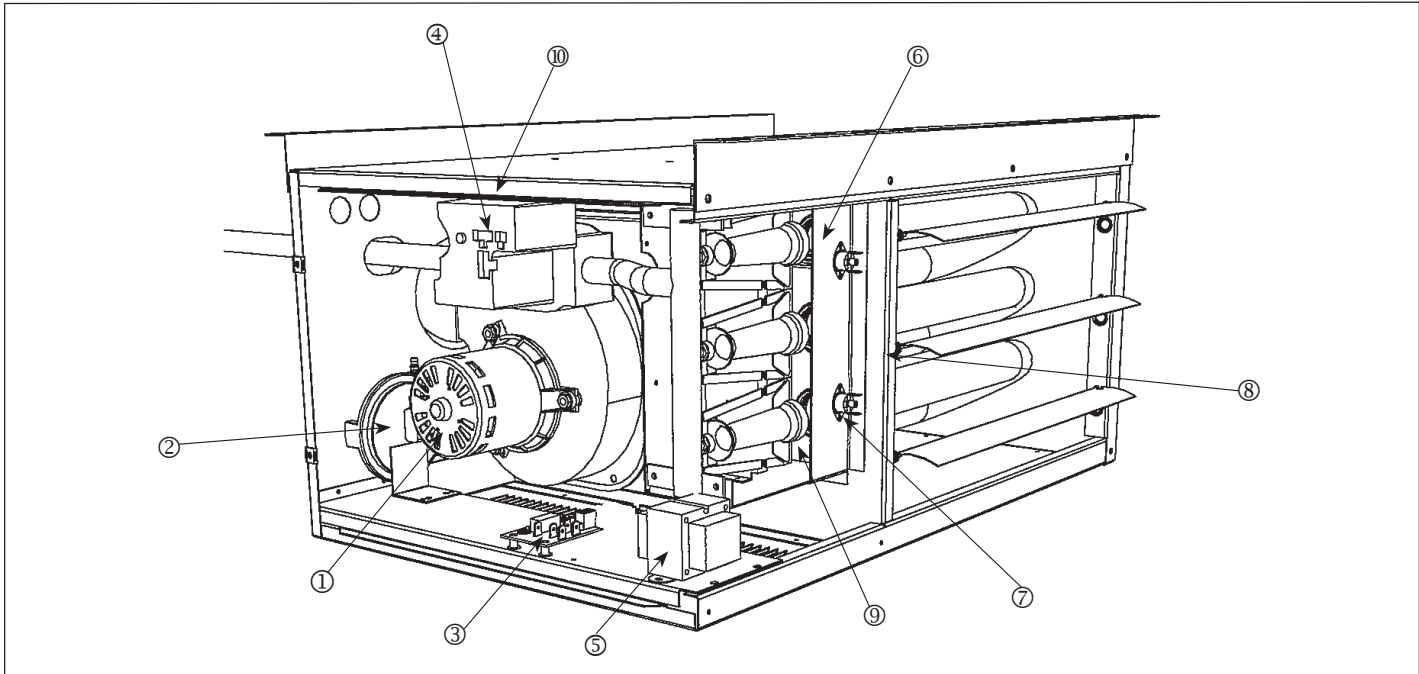
CONTROL OPERATING SEQUENCE / UNIT COMPONENTS

CONTROL OPERATING SEQUENCE

Upon a call for heat from the thermostat, power is supplied to the power exhauster motor. The unit will go through a purge period and then the direct spark igniter will be energized. At the same time, the main valve in the combination control valve will open to allow gas to flow to the burners. If the fan motor has not

all ready started it will start shortly. If a flame is not sensed for any reason the main valve will close and there will be a short purge period before ignition is tried again. If the flame is not sensed after 4 tries, there will be at least a 1 hour wait before ignition is tried again.

Figure 18.1 - Major Gas, Electrical Service, Safety and Other Components



- | | | |
|--|--------------------------------------|---|
| 1. Power Exhauster | 5. Control Transformer | 9. Direct Spark Igniter (hidden) |
| 2. Pressure Switch | 6. Flame Sensor (hidden) | 10. Manual Reset Control (hidden, propeller 100-125 only) |
| 3. Integrated Direct Spark Control Board | 7. Flame Rollout Switch | |
| 4. Combination Gas Control | 8. Auto Reset Limit Control (hidden) | |

Table 18.1 - Control Options

Control Description	Control Code No.	Service Voltage	Thermostat Voltage	Type of Gas	Model Size
Single-Stage, Direct Spark Ignition, 100% Shut-Off with Continuous Retry - Utilizes a single-stage combination gas control with ignition control. Gas is lit with a direct spark igniter on call for heat.	11	115V	24V	Natural	30-125
	21	115V	24V	Propane	30-125
Two-Stage, Direct Spark Ignition, 100% Shut-Off with Continuous Retry - Utilizes a two-stage combination gas control with built-in ignition control. Firing rate is 100% and 50% of full rated input. Gas is lit with a direct spark igniter on call for heat.	12	115V	24V	Natural	75-125
	22	115V	24V	Propane	75-125

Table 18.2 - Propeller Model HD Performance

	Model HD Sizes					
	30	45	60	75	100	125
Btu/Hr Input	30,000	45,000	60,000	75,000	100,000	125,000
Btu/Hr Output	24,900	36,900	49,200	62,250	82,000	102,500
Entering Airflow (CFM) @ 70°F	505	720	990	1160	1490	1980
Outlet Velocity (FPM)	523	725	653	769	565	747
Air Temp. Rise (°F)	44	46	45	48	50	47
Max. Mounting Height (Ft.)	10	10	12	14	12	16
Heat Throw (Ft.) (@ Max Mtg Ht.)	25	27	36	38	42	56
Motor Type	SP	SP	PSC	PSC	SP	PSC
Motor HP	1/15	1/15	1/12	1/12	1/6	1/8
Motor RPM	1550	1550	1625	1625	1050	1625

Table 18.3 - Blower Model HDB Performance

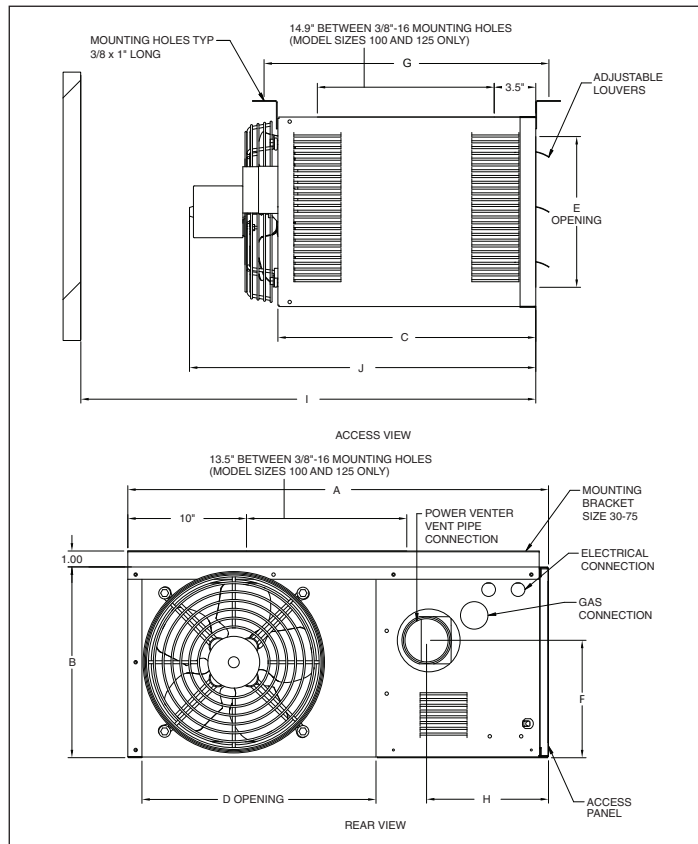
	Model HDB Sizes			
	60	75	100	125
Btu/Hr Input ①	60,000	75,000	100,000	125,000
Btu/Hr Output ①	49,200	61,500	82,000	102,500
Entering Airflow Range (CFM)	635-1111	794-1389	1140-2116	1235-2058
Outlet Velocity (FPM)	437-726	546-908	443-781	488-773
Air Temp. Rise (°F)	40-70	40-70	35-65	45-75
Max. Mounting Height (Ft.) ②	7-13	7-16	8-19	8-17
Heat Throw (Ft.) (@ Max Mtg Ht.) ②	20-45	24-57	27-68	27-59
Motor Type ③	P.S.C.	P.S.C.	P.S.C.	P.S.C.
Motor HP	1/4	1/3	1/2	1/2
Motor RPM	Max 1100	Max 1100	Max 1100	Max 1100

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. (In Canada see rating plate.) Reduction of ratings requires use of a high altitude kit.
 ② 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.

DIMENSIONAL DATA - MODEL HD/HDB

Propeller Units - Model HD

Figure 19.1 - Dimensional Drawings - Model HD



Blower Units - Model HDB

Figure 19.2 - Dimensional Drawings - Model HDB

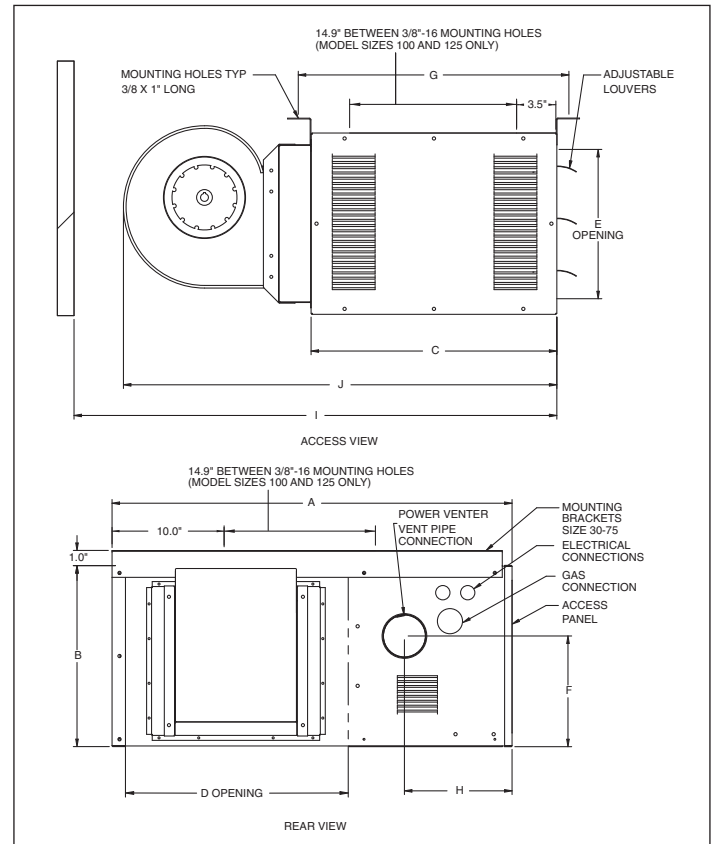


Table 19.1 - Dimensions (inches) - HD

Models	HD30	HD45	HD60	HD75	HD100/125
A	26.8	26.8	26.8	26.8	35.5
B	12.2	12.2	18.0	18.0	20.5
C	16.5	16.5	16.5	16.5	22.0
D	14.9	14.9	14.9	14.9	22.5
E	10.1	10.1	15.9	15.9	13.4
F	7.5	7.5	10.7	10.7	14.0
G	18.5	18.5	18.5	18.5	-
H	7.6	7.6	7.8	7.8	8.4
Gas Connection	1/2	1/2	1/2	1/2	1/2
I	34.5	34.5	34.5	34.5	43.0
J	22	22	25	25	31.0
Fan Diameter	10	10	14	14	18.0
Approx. Shipping Weight (lbs.)	67	72	92	97	143
Vent Connector Size (in)	3	3	3	3	4

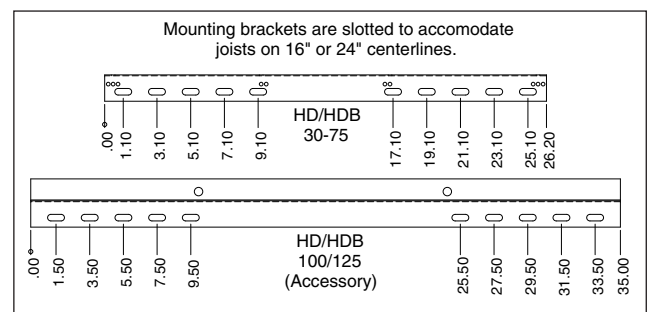
Table 19.2 - Dimensions (inches) - HDB

Models	HDB60	HDB75	HDB100/125
A	26.8	26.8	35.5
B	18.0	18.0	20.5
C	16.5	16.5	22.0
D	14.9	14.9	22.5
E	15.9	15.9	18.4
F	10.7	10.7	14.0
G	18.5	18.5	-
H	7.8	7.8	8.4
Gas Connection	1/2	1/2	1/2
I	34.5	34.5	44.5
J	25.0	25.0	41.5
Blower	9 - 7	9 - 7	10 - 10
Approx. Shipping Weight (lbs.)	92	97	151
Vent Connector Size (in)	3	3	4

Table 19.3 - Clearance to Combustibles, Model HD/HDB

Unit Side	Clearance to Combustible Material		Recommended Service Clearance
	HD	HDB	
Top and Bottom	1"	6"	18"
Access Side	1"	6"	18"
Non-Access Side	1"	6"	18"
Rear	18"	18"	18"
Vent Connector	4"	4"	18"

Figure 19.3 - Mounting



SERVICE / MAINTENANCE / TROUBLESHOOTING

WARNING

When servicing or repairing this equipment, use only factory-approved service replacement parts. A complete replacement parts list may be obtained by contacting the factory. Refer to the rating plate on the appliance for complete appliance model number, serial number, and company address. Any substitution of parts or controls not approved by the factory will be at the owner's risk.

CAUTION

1. Service or repair of this equipment must be performed by a qualified service agency.
2. Do not attempt to reuse any mechanical or electrical controllers which have been wet. Replace defective controller.

IMPORTANT

To check most of the Possible Remedies in the troubleshooting guide listed in Table 20.1, refer to the applicable sections of the manual.

General Maintenance

The unit and venting system must be checked once a year by a qualified service technician.

All installation and service of these units must be performed by a qualified installation and service agency.

Before any service, BE SURE TO TURN OFF GAS AT THE MANUAL SHUT-OFF VALVE AHEAD OF THE COMBINATION GAS CONTROL AND TURN OFF ALL ELECTRIC POWER TO THE HEATER.

1. Service air moving components annually.
 - a. Check fan for fit on motor shaft and for damage to blades.
2. Keep unit free from dust, dirt, grease, and foreign matter, paying particular attention to:
 - a. Combustion air inlets.
 - b. Burners and burner orifices. Turn off gas ahead of the combination gas control and shut off electric power to the heater. Remove the access panel, open the union on the gas line, and disconnect the igniter and sensor wires. Remove the screws that attach the burner tray to the header plate and remove the burner tray and manifold assembly from the heater. Carefully clean the burners with a wire brush or other suitable means. Replace any damaged or deteriorating burners or orifices. Install the burner assembly back on to the header making certain that all screws, pipes and electrical connections are tight.

CAUTION: Be careful when handling the igniter and flame sensor.

3. Inspect the flame sensor and igniter for deterioration and/or cracks.
4. Verify that the burners are touching each other at the carryover points. This will ensure flame carryover from burner to burner.
 - a. Clean exterior of heat exchanger tubes.
 - b. Fan blades.
5. Check wiring for possible loose connections.
6. Controls – The gas valves and piping should be checked annually for general cleanliness and tightness. The gas controls should be checked to insure that the unit is operating properly. See control instruction sheets furnished separately with the unit heater.
7. Power exhaust assembly/motor – The power exhaust motor bearings have been lubricated for long life and do not require additional lubrication. In dirty environments, it may be desirable to clean the motors and blower housing and blow out the cooling air passages of the motor with compressed air.
8. Perform periodic cleaning of inlet and vent terminal screens.

Table 20.1 - Troubleshooting

TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
Unit does nothing	<ol style="list-style-type: none"> 1. Power supply is off 2. No 24V power to thermostat 3. Thermostat malfunction 4. LED flashes 5. Blown fuse on control board 6. Defective control 	<ol style="list-style-type: none"> 1. Turn on main power 2 a. Check control transformer <ol style="list-style-type: none"> b. If failed transformer - check thermostat wire gage and length 3 a. Verify wire connections to R&W terminals only <ol style="list-style-type: none"> b. Check / replace thermostat 4. Check LED flash code 5. Replace fuse 6. Replace control
LED light off or flashing	<ol style="list-style-type: none"> 1. Blown fuse on control board 2. Multiple causes 	<ol style="list-style-type: none"> 1. Replace fuse 2. Control board LED flash codes vary with control type. A decal is installed in the unit giving a brief description of the applicable codes for your heater. For more detail, see the control board data sheet included with the unit.
Unit starts but does not ignite	<ol style="list-style-type: none"> 1. Main gas is off 2. Air in gas line 3. Main or manifold gas pressure 4. Check gas valve switch 	<ol style="list-style-type: none"> 1. Open manual gas valve 2. Purge gas line 3. Set gas pressures per manual instructions 4. Set gas valve switch to "ON" position
Unit goes through cycle but the burners go out in less than 10 seconds	<ol style="list-style-type: none"> 1. Reversed main power polarity 2. Unit not grounded 3. Flame not sensed 	<ol style="list-style-type: none"> 1. Black wire - HOT, White wire - NEUTRAL, Green wire - GROUND 2. Ground unit and verify quality of ground connection 3. Check flame sense probe and connection
Air circulating fan inoperable	<ol style="list-style-type: none"> 1. Loose connections 2. Defective control board 3. Defective fan motor 	<ol style="list-style-type: none"> 1. Check all connections 2. Check control board data sheet and function 3. Check fan motor

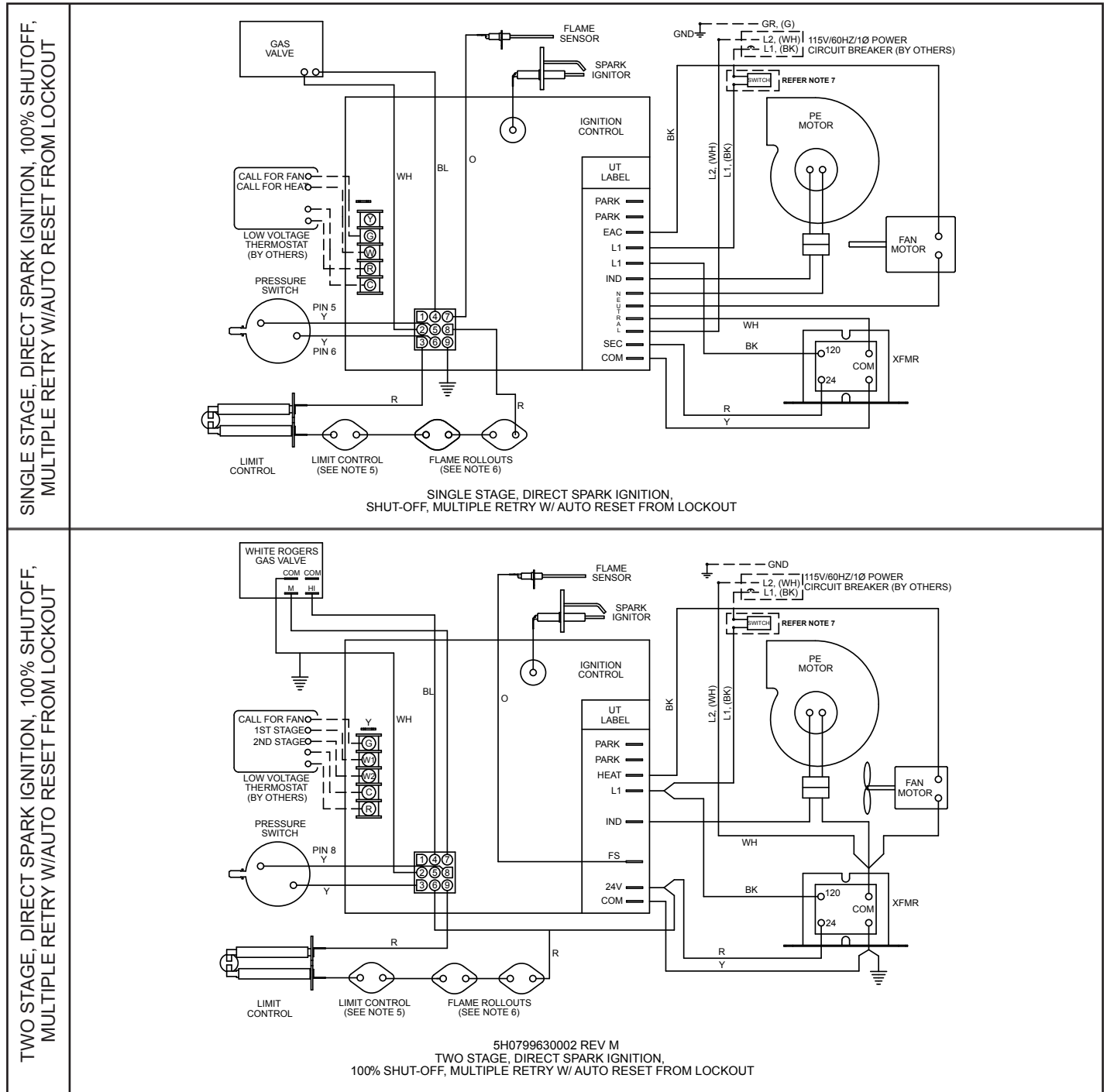
UNIT WIRING

Wiring Diagram Selection

Since internal or factory wiring may vary depending on the controls manufacturer, the wiring diagrams must be appropriately selected with the proper gas valve and ignition

type. The following wiring diagram represents a unit equipped with a single or two stage gas valve and direct spark ignition.

Figure 21.1 - Unit Heater Wiring Diagram (Single and Two Stage, Direct Spark Ignition)



NOTES TO INSTALLER:

1. ALL WIRING MUST COMPLY WITH NATIONAL ELECTRIC CODE AND ALL LOCAL CODES.
2. ALL COMPONENTS MUST AGREE WITH THEIR RESPECTIVE POWER SOURCE.
3. VERIFY THE POWER SOURCE AND THE UNIT POLARITY.
4. USE TYPE 105°C REPLACEMENT WIRE 300V OR GREATER.
5. USED ON PROPELLER MODELS 100 AND LARGER.
6. TWO SWITCHES: 30-75, ONE SWITCH: 100-125 NOT USED ON 150-400 UNITS.

CAUTION:

FAILURE TO WIRE THIS UNIT ACCORDING TO THIS WIRING DIAGRAM MAY RESULT IN INJURY TO THE INSTALLER OR USER. FOR DEVIATIONS CONTACT THE FACTORY.

MOTOR LEAD COLOR FOR DIRECT DRIVE BLOWER MOTORS

WH - NEUTRAL BL - MED
BK - HI RED - LO

ATTACH WIRES NOT USED TO "PARK" TERMINALS
UNITS ARE FACTORY WIRED FOR HIGH SPEED OPERATION.

WIRING LEGEND	
FACTORY WIRING	LINE
INTERNAL COMPONENT WIRING	24V
FIELD WIRING	
WIRE NUT	

◇ INDICATES TERMINAL BOARD CONNECTION

MODEL & SERIAL NUMBER / REPLACEMENT PARTS

Figure 22.1 - Model Number Designations (Remove access cover to locate)

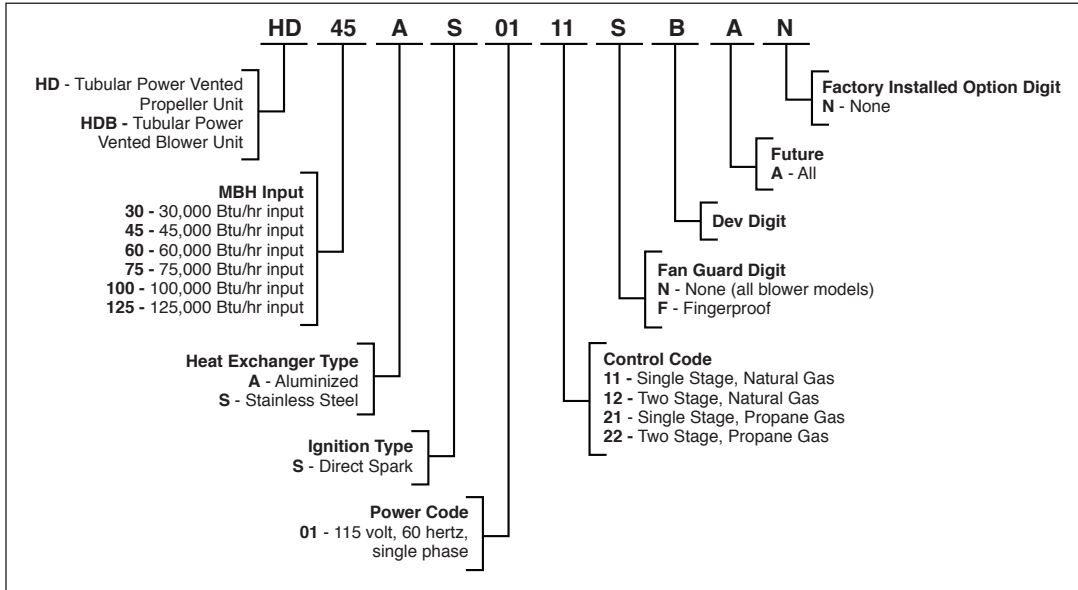
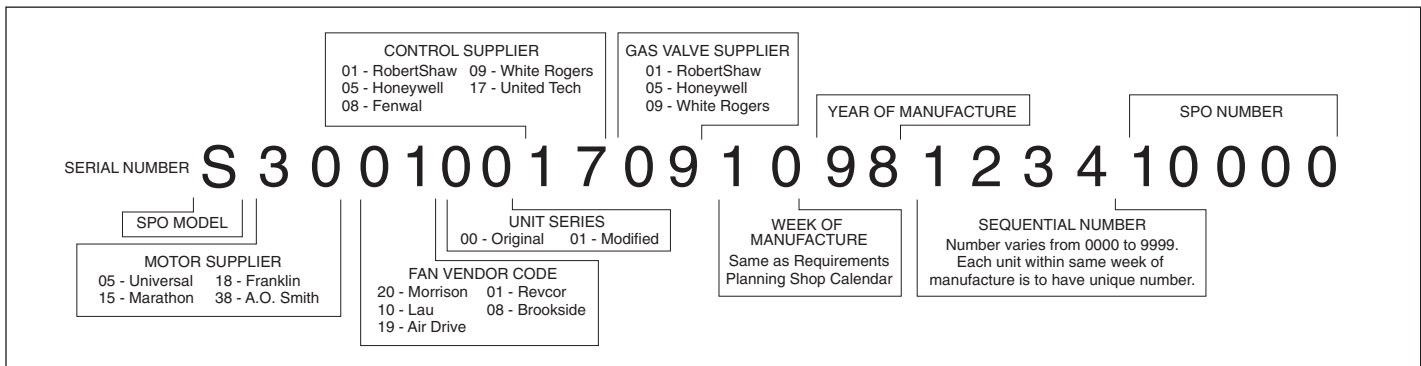


Figure 22.2 - Serial Number Designations (Remove access cover to locate)



Replacement Parts

When requesting parts please contact your local representative. Please have full model and serial number available. If you require assistance in locating your representative, please call the number located on the back page.

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COMMERCIAL WARRANTY

Seller warrants its products to be free from defects in material and workmanship, EXCLUSIVE, HOWEVER, of failures attributable to the use of materials substituted under emergency conditions for materials normally employed. This warranty covers replacement of any parts furnished from the factory of Seller, but does not cover labor of any kind and materials not furnished by Seller, or any charges for any such labor or materials, whether such labor, materials or charges thereon are due to replacement of parts, adjustments, repairs, or any other work done. This warranty does not apply to any equipment which shall have been repaired or altered outside the factory of Seller in any way so as, in the judgment of Seller, to affect its stability, nor which has been subjected to misuse, negligence, or operating conditions in excess of those for which such equipment was designed. This warranty does not cover the effects of physical or chemical properties of water or steam or other liquids or gases used in the equipment.

BUYER AGREES THAT SELLER'S WARRANTY OF ITS PRODUCTS TO BE FREE FROM DEFECT IN MATERIAL AND WORKMANSHIP, AS LIMITED HEREIN, SHALL BE IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, WHETHER ARISING FROM LAW, COURSE OF DEALING, USAGE OF TRADE, OR OTHERWISE, **THERE ARE NO OTHER WARRANTIES, INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE, WHICH EXTEND BEYOND THE PRODUCT DESCRIPTION CONFIRMED BY BUYER AND SELLER AS OF THE DATE OF FINAL AGREEMENT.**

This warranty is void if the input to the product exceeds the rated input as indicated on the product serial plate by more than 5% on gas-fired and oil-fired units, or if the product in the judgment of SELLER has been installed in a corrosive atmosphere, or subjected to corrosive fluids or gases, been subjected to misuse, negligence, accident, excessive thermal shock, excessive humidity, physical damage, impact, abrasion, unauthorized alterations, or operation contrary to SELLER'S printed instructions, or if the serial number has been altered, defaced or removed.

BUYER AGREES THAT IN NO EVENT WILL SELLER BE LIABLE FOR COSTS OF PROCESSING, LOST PROFITS, INJURY TO GOODWILL, OR ANY OTHER CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND RESULTING FROM THE ORDER OR USE OF ITS PRODUCT, WHETHER ARISING FROM BREACH OF WARRANTY, NONCONFORMITY TO ORDERED SPECIFICATIONS, DELAY IN DELIVERY, OR ANY LOSS SUSTAINED BY THE BUYER.

BUYER'S REMEDY FOR BREACH OF WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, IS LIMITED TO REPAIR OR REPLACEMENT AT THE FACTORY OF SELLER, ANY COMPONENT WHICH SHALL, WITHIN THE APPLICABLE WARRANTY PERIOD DEFINED HEREIN AND UPON PRIOR WRITTEN APPROVAL, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF SELLER SHALL DISCLOSE TO HAVE BEEN DEFECTIVE; EXCEPT THAT WHEN THE PRODUCT IS TO BE USED BY BUYER AS A COMPONENT PART OF EQUIPMENT MANUFACTURED BY BUYER, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO ONE YEAR FROM DATE OF SHIPMENT FROM SELLER. FOR GAS-FIRED PRODUCTS INSTALLED IN HIGH HUMIDITY APPLICATIONS AND UTILIZING STAINLESS STEEL HEAT EXCHANGERS, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO TEN YEARS FROM DATE OF SHIPMENT FROM SELLER.

These warranties are issued only to the original owner-user and cannot be transferred or assigned. No provision is made in these warranties for any labor allowance or field labor participation. Seller will not honor any expenses incurred in its behalf with regard to repairs to any of Seller's products. No credit shall be issued for any defective part returned without proper written authorization (including, but not limited to, model number, serial number, date of failure, etc.) and freight prepaid.

OPTIONAL SUPPLEMENTAL WARRANTY

Provided a supplemental warranty has been purchased, Seller extends the warranty herein for an additional four (4) years on certain compressors. Provided a supplemental warranty has been purchased, Seller extends the warranty herein for an additional four (4) years or nine (9) years on certain heat exchangers.

EXCLUSION OF CONSUMABLES & CONDITIONS BEYOND SELLER'S CONTROL

This warranty shall not be applicable to any of the following items: refrigerant gas, belts, filters, fuses and other items consumed or worn out by normal wear and tear or conditions beyond Seller's control, including (without limitation as to generality) polluted or contaminated or foreign matter contained in the air or water utilized for heat exchanger (condenser) cooling or if the failure of the part is caused by improper air or water supply, or improper or incorrect sizing of power supply.

Component Applicable Models	"APPLICABLE WARRANTY PERIOD"
Heat Exchangers Gas-Fired Units	TEN YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN ONE HUNDRED TWENTY-SIX MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST
Heat Exchangers Low Intensity Infrared Units Compressors Condensing Units for Cassettes	FIVE YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN FIVE YEARS FROM DATE OF RESALE BY BUYER OR ANY OTHER USER, WITHIN FIVE YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN SIXTY-SIX MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST
Burners Low Intensity Infrared Units Other Components excluding Heat Exchangers, Coils, Condensers, Burners, Sheet Metal	TWO YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TWO YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN THIRTY MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST
Heat Exchangers/Coils Indoor and Outdoor Duct Furnaces and System Units, Steam/Hot Water Units, Oil-Fired Units, Electric Units, Cassettes, Vertical Unit Ventilators, Ventilators, Geothermal Units Compressors Vertical Unit Ventilators, Ventilators, Geothermal Units Burners High Intensity Infrared Units Sheet Metal Parts All Products	ONE YEAR FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN ONE YEAR FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN EIGHTEEN MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST

As Modine Manufacturing Company has a continuous product improvement program, it reserves the right to change design and specifications without notice.



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Comme la Modine Manufacturing Company a un programme d'amélioration permanente de ses produits, elle se réserve le droit de modifier la conception et les caractéristiques techniques sans préavis.

Modèles applicables	
Composant	Modèles applicables
Échangeurs de chaleur	DIX ANS À PARTIR DE LA DATE DE PREMIER USAGE BÉNÉFICIAIRE PAR L'ACHETEUR OU TOUT AUTRE UTILISATEUR, DIX ANS À PARTIR DE LA DATE DE REVENTE PAR L'ACHETEUR OU TOUT AUTRE UTILISATEUR, DIX ANS À PARTIR DE LA DATE D'EXPÉDITION DE L'USINE DU VENDEUR, SELON LA PREMIÈRE DE CES ÉCHÉANCES.
Échangeurs de chaleur	CINQ ANS À PARTIR DE LA DATE DE PREMIER USAGE BÉNÉFICIAIRE PAR L'ACHETEUR OU TOUT AUTRE UTILISATEUR, CINQ ANS À PARTIR DE LA DATE DE REVENTE PAR L'ACHETEUR OU TOUT AUTRE UTILISATEUR, CINQ ANS À PARTIR DE LA DATE D'EXPÉDITION DE L'USINE DU VENDEUR, SELON LA PREMIÈRE DE CES ÉCHÉANCES.
Compresseurs	Modèles infrarouges de faible intensité Condenseurs pour cassettes
Brûleurs	Modèles infrarouges de faible intensité
Autres	Composants sauf les échangeurs thermiques, serpents, condenseurs, brûleurs, tôle
Échangeurs thermiques/serpents	Systèmes et chaudières canalisés d'intérieur et d'extérieur, modèles à vapeur/eau chaude, modèles au mazout, appareils géothermiques
Compresseurs	Modèles infrarouges de haute intensité Ventilateurs verticaux, appareil géothermiques
Brûleurs	Modèles infrarouges de haute intensité
Pièces en tôle	Tous les produits

« PÉRIODE DE GARANTIE APPLICABLE »

Le vendeur garantit ses produits contre tout défaut de matériel ou de fabrication, SAUF si la défaillance est imputable à un remplacement de matériel en cas d'urgence causé par l'indisponibilité du matériel normalement utilisé. Cette garantie couvre le remplacement de toute pièce fournie par l'usine du Vendeur, mais ne couvre pas la main-d'œuvre et les matériaux, y compris cette main-d'œuvre, ces matériaux ou ces frais soient dus au remplacement de pièces, réglages, réparations ou tout autre travail effectué. Cette garantie ne s'applique à aucun équipement qui a été réparé ou altéré en dehors de l'usine du Vendeur de telle manière à compromettre sa stabilité, selon le Vendeur, ou a été soumis à une utilisation abusive, une dégradation ou des conditions d'utilisation non conformes à celles pour lesquelles cet équipement a été conçu. Cette garantie ne couvre pas les effets dus aux propriétés physiques ou chimiques de la vapeur, de l'eau ou d'autres liquides ou gaz utilisés dans l'équipement.

L'ACHETEUR RECONNAÎT QUE LA GARANTIE DU VENDEUR À L'ÉGARD DES DÉFAUTS DE FABRICATION OU DE MATIÈRES, AVEC LES LIMITATIONS ÉNONCÉES ICI, TIENENT LIEU ET EXCLUT TOUTE AUTRE FORME DE GARANTIE, TANT EXPRESSE QU'IMPLICITE, QUELLE DÉCOULE DE LA LOI, DE RAPPORTS D'AFFAIRES, DES PRATIQUES COMMERCIALES USUELLES OU AUTRES, ET QUELLE NE BÉNÉFICIE PAS D'AUTRES GARANTIES, NOTAMMENT DE QUALITÉ MARCHANDE OU D'APTITUDE À UN USAGE PARTICULIER, AU-DELÀ DE LA DESCRIPTION DU PRODUIT CONFIRMÉE PAR L'ACHETEUR ET LE VENDEUR À LA DATE DE L'ACCORD FINAL.

Cette garantie est nulle et non avenue si l'alimentation du produit dépasse l'alimentation nominale indiquée sur la plaque de série du produit de plus de 5 % pour les modèles au gaz et au mazout, ou si, selon le VENDEUR, le produit a été installé dans une atmosphère corrosive ou a été soumis à des fluides ou gaz corrosifs, soumis à des conditions telles que l'humidité excessive, l'acidité, choc thermique excessif, humidité excessive, utilisation abusive, impact, abrasion, altérations non autorisées ou utilisation contraire aux instructions imprimées du VENDEUR, ou si le numéro de série a été altéré, rendu invisible ou effacé.

L'ACHETEUR CONVIENT QU'EN AUCUN CAS LE VENDEUR NE SERA RESPONSABLE DES CÔÛTS DE TRAITEMENT, DES PERTES DE REVENU, DES PERTES D'ACHALANDE, OU AUTRES DOMMAGES INDIRECTS OU CONSÉCUTIFS, DÉCOULANT DE LA COMMANDE OU DE L'UTILISATION DE SES PRODUITS, QUELIS SOIENT LE RÉSULTAT DU NON-RESPECT DES CLAUSES DE GARANTIE, D'UNE NON-CONFORMITÉ AUX SPÉCIFICATIONS DE COMMANDE, DE RETARDS DE LIVRAISON OU DE TOUTE AUTRE SUBIE PAR L'ACHETEUR.

GARANTIE COMMERCIALE

LE RECOURS DE L'ACHETEUR EN CAS DE DÉFAILLANCE SOUS GARANTIE, À TOUT COMPOSANT QUI, AU COURS DE LA PÉRIODE DE GARANTIE APPLICABLE DÉFINIE EN CE CI ET AVEC AUTORISATION ÉCRITE PRÉALABLE, SERA RETOURNÉ EN PORT PAYÉ AU VENDEUR, DANS LA MESURE OU L'INSPECTION FAITE PAR LE VENDEUR PERMET DE CONCLURE QUE LE DIT PRODUIT EST DÉFECTUEUX, SAUF SI LE PRODUIT EST DESTINÉ À ÊTRE INCORPORÉ PAR L'ACHETEUR DANS UN COMPOSANT DE L'ÉQUIPEMENT FABRIQUÉ PAR LUI, AUQUEL CAS, LA DURÉE DE L'OBLIGATION DU VENDEUR, AVEC LES LIMITATIONS ÉNONCÉES CI-DESSUS, SERA LIMITÉE À UN AN À PARTIR DE LA DATE D'EXPÉDITION PAR LE VENDEUR. POUR LE PRODUIT AU GAZ INSTALLÉS DANS UNE FORTE HUMIDITÉ, LES APPLICATIONS ET UTILISANT DES ÉCHANGEURS THERMIQUES EN INOX, LE RECOURS DE L'ACHETEUR EN CAS DE VIOLATION DE GARANTIE, TEL QUE LIMITÉ EN CE CI, SERA LIMITÉ À DIX ANS À PARTIR DE LA DATE D'EXPÉDITION DE L'USINE DU VENDEUR. Ces garanties sont données uniquement au propriétaire-utilisateur initial et ne sont pas essentielles ou assignables. Aucune disposition n'est prévue dans ces garanties pour la main-d'œuvre ou la participation de main-d'œuvre sur site. Le Vendeur ne remboursera pas les frais encourus en son nom pour des réparations effectuées sur l'un de ses produits, quel qu'il soit. Aucun crédit ne sera fait pour toute pièce défectueuse retournée sans autorisation écrite (y compris, mais sans s'y limiter, numéro de modèle, numéro de série, date de la panne, etc.) et sans port payé.

GARANTIE SUPPLÉMENTAIRE EN OPTION

Sous réserve de l'achat d'une garantie supplémentaire, le vendeur prolonge la garantie fournie en ce ci de quatre (4) années supplémentaires pour certains compresseurs. Sous réserve de l'achat d'une garantie supplémentaire, le vendeur étend la garantie en ce ci à quatre (4) ou neuf (9) années supplémentaires sur certains échangeurs thermiques.

EXCLUSION DE CONSOMMABLES ET CONDITIONS AU-DELÀ DU CONTRÔLE DU VENDEUR

Cette garantie ne s'applique pas aux articles suivants : gaz frigorigènes, courroies, filtres, fusibles et autres articles consommés ou normalement usés ou conditions au-delà du contrôle du Vendeur, y compris (sans limitation quant à sa généralité) corps étranger, pollution ou contamination dans l'air ou l'eau utilisés pour le refroidissement de l'échangeur thermique (condensent) ou si la panne de la pièce est causée par une alimentation en air ou en eau inadéquate ou un tuyau d'alimentation de taille inadéquate ou incorrect.

PAGE VIERGE

NUMÉRO DE SÉRIE ET DE MODÈLE ET PIÈCES DE RECHANGE

Figure 22.1 - Composition du numéro de modèle (ouvrez le panneau d'accès)

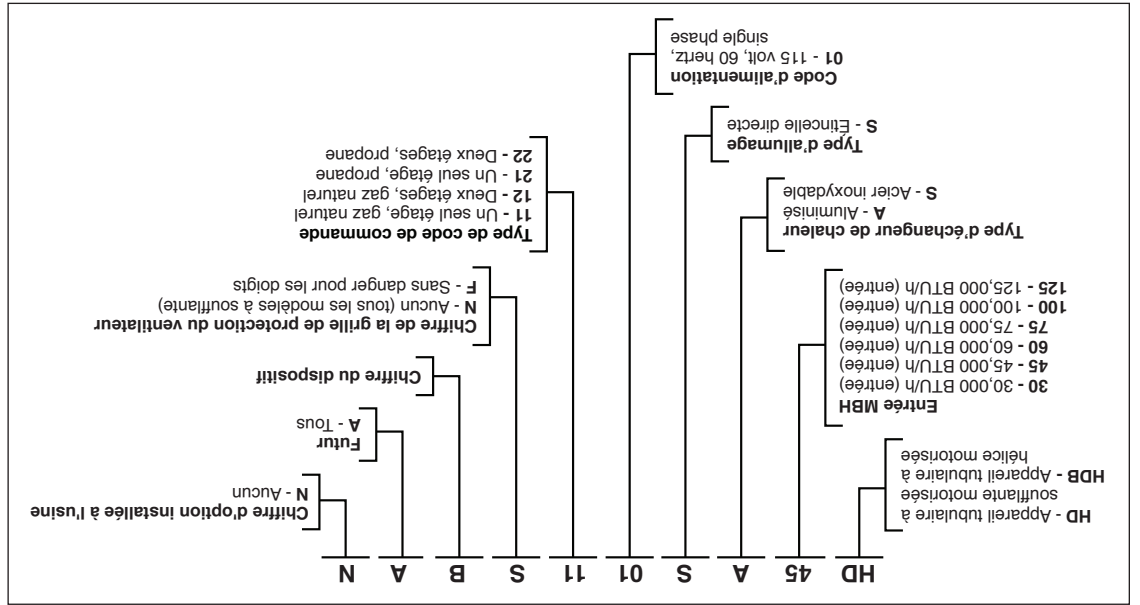
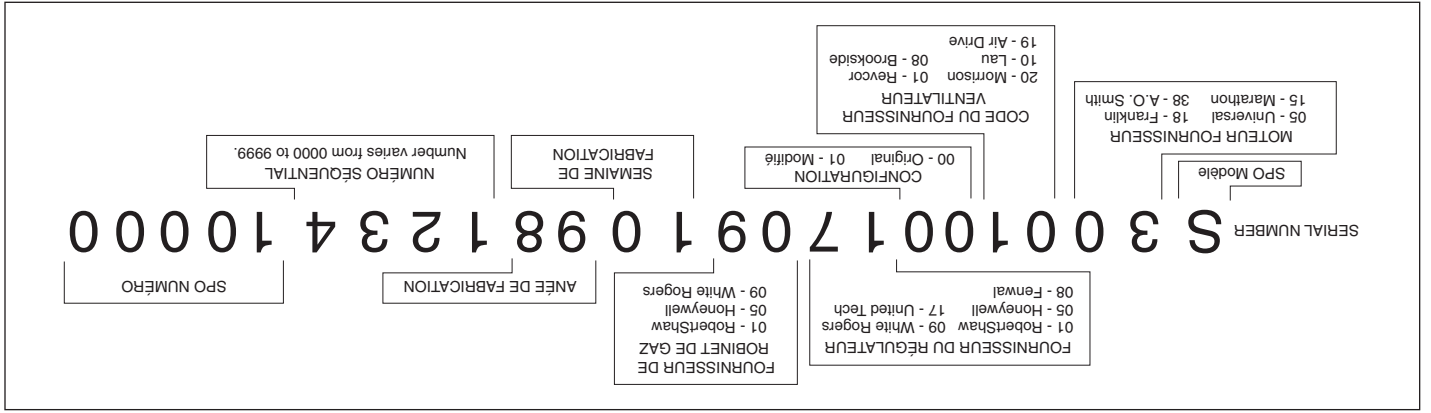


Figure 22.2 - Composition du numéro de série (retirez le panneau d'accès)



Pièces de rechange
 Pour commander des pièces, adressez-vous à votre représentant local. Vous aurez besoin du numéro de modèle complet et du numéro de série. Si vous avez besoin d'aide pour localiser votre représentant, appelez au numéro qui figure sur la dernière page du manuel.

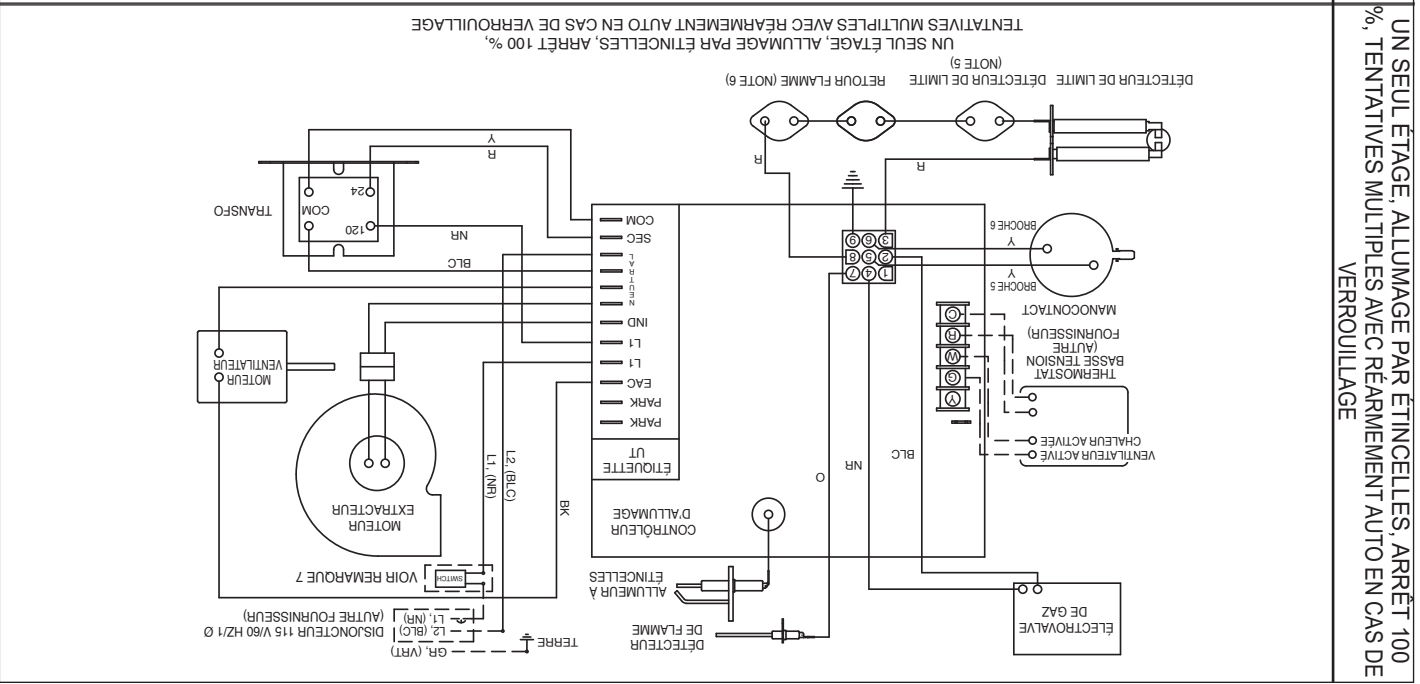
CÂBLAGE DE L'APPAREIL

Choix du schéma de câblage

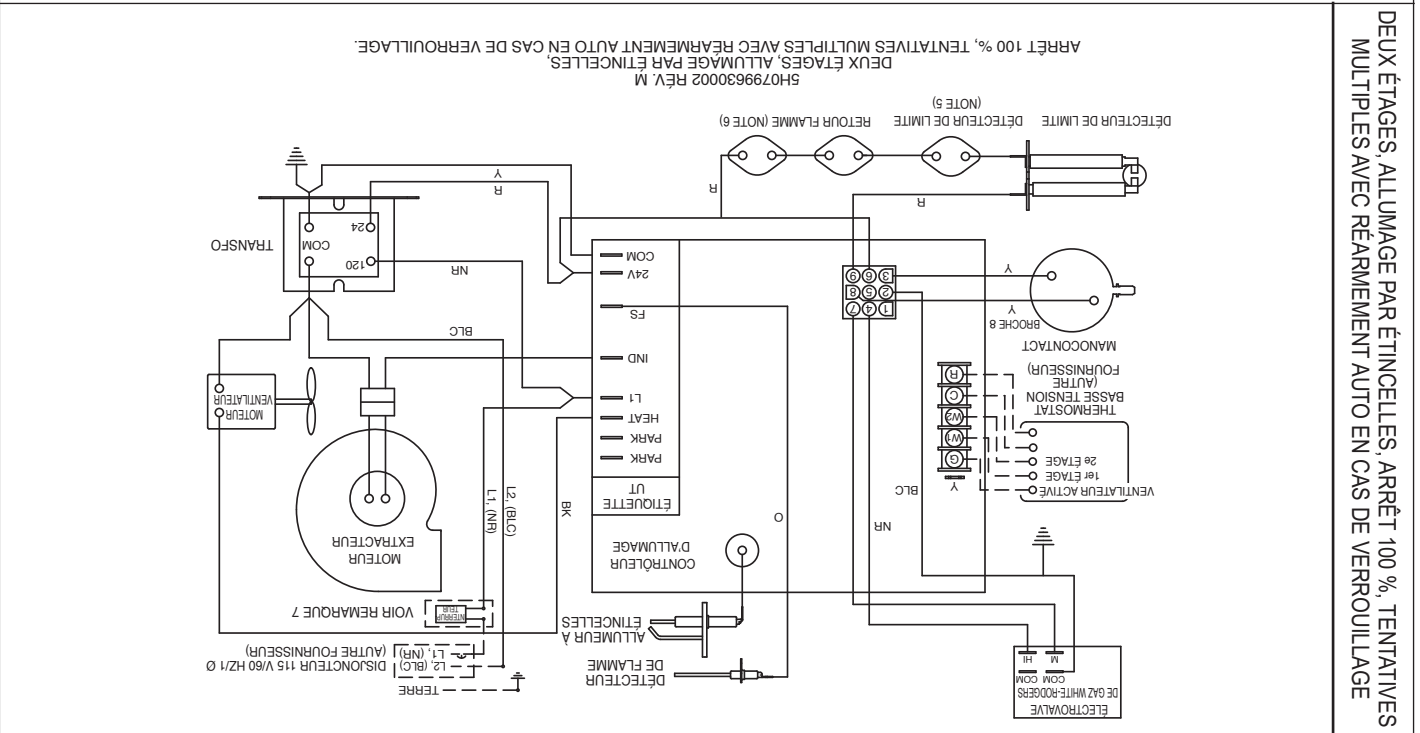
Le câblage interne ne posé en usine et le câblage dépend du modèle de contrôleur installé et il est important de choisir les schémas qui correspondent aux types de régulateur de gaz et d'allumeur de l'appareil.

Le schéma suivant est celui d'un appareil équipé d'un régulateur à un ou à deux étages, avec allumage direct à étincelles.

Figure 21.1 - Schéma de câblage de l'appareil (un ou deux étages, allumage direct à étincelles)



UN SEUL ÉTAGE; ALLUMAGE PAR ÉTINCELLES, ARRÊT 100 % TENTATIVES MULTIPLES AVEC RÉARMEMENT AUTO EN CAS DE VERROUILLAGE



DEUX ÉTAGES; ALLUMAGE PAR ÉTINCELLES, ARRÊT 100 % TENTATIVES MULTIPLES AVEC RÉARMEMENT AUTO EN CAS DE VERROUILLAGE

ATTENTION : UN CÂBLAGE NON CONFORME À CE SCHEMA PEUT CAUSER DES BLESSURES À L'INSTALLATEUR OU À L'UTILISATEUR. CONSULTER LE FABRICANT AVANT TOUTE MODIFICATION.

NOTES À L'INSTALLATEUR :

1. TOUS LES CÂBLAGES DOIVENT ÊTRE CONFORMES AU NATIONAL ELECTRIC CODE ET AUX CODES LOCAUX.
2. TOUS LES COMPOSANTS DOIVENT ÊTRE CONÇUS POUR LES CARACTÉRISTIQUES DU COURANT LOCAL.
3. VÉRIFIEZ LA TENSION DE LA SOURCE D'ALIMENTATION ET LA POLARITÉ DE L'APPAREIL.
4. POUR TOUT REMPLACEMENT, UTILISEZ DU FIL TYPE 105-C-300 V OU PLUS.

5. UTILISÉZ SUR LES MODÈLES À HÉLICE 100 ET PLUS GROS.
 6. DEUX INTERRUPTEURS : 30-75 UN INTERRUPTEUR : 100-125 INTUITÉ SUR LES APPAREILS 150-400.
 7. SECTIONNEUR EN OPTION.
- BLC - NEUTRE
NR - HI (FORT)
BU - MED (MOYEN)
RGE - LO (BAS)
- LES FILS NON UTILISÉS DOIVENT ÊTRE ATTACHÉS AUX BORNES PARK.
- APPAREILS CÂBLÉS POUR UN FONCTIONNEMENT À GRANDE VITESSE.

AVERTISSEMENT

Pour l'entretien et les réparations de cet appareil, n'utiliser que des pièces d'origine certifiées. Pour la liste complète des pièces de rechange, adressez-vous au fabricant. Le numéro de modèle complet, le numéro de série et l'adresse du fabricant figurent sur la plaque signalétique fixée à l'appareil. Toute substitution de pièce ou de commande non approuvée par le fabricant sera aux risques du propriétaire.

ATTENTION

1. L'entretien et les réparations de l'appareil doivent être confiés à un centre de SAV qualifié.
2. Ne tentez pas de réutiliser un contrôleur mécanique ou électronique qui a été mouillé. Remplacez tout contrôleur défectueux.

IMPORTANT

Pour essayer la plupart des Solutions possibles suggérées dans le tableau de dépannage 20.1, reportez-vous aux sections correspondantes du manuel.

Maintenance générale

L'appareil et le système d'évacuation des gaz doivent être vérifiés une fois par an par un technicien d'entretien qualifié. **Toutes les opérations d'installation et d'entretien doivent être confiées à une entreprise qualifiée.**

Avant toute intervention D'ENTRETIEN, ASSUREZ-VOUS DE FERMER LE ROBINET D'ARRÊT MANUEL, SITUÉ EN AMONT DU RÉGULATEUR DE GAZ COMBINÉ, ET COUPEZ L'ALIMENTATION ÉLECTRIQUE DE L'APPAREIL.

Tableau 20.1 - Dépannage

PROBLÈME	CAUSE POSSIBLE	SOLUTION POSSIBLE
L'appareil ne fait rien.	1. Pas d'alimentation électrique 2. Pas de courant 24 V au thermostat 3. Thermostat défectueux.	1. Mettez sous tension. 2 a. Vérifiez le transformateur de commande b. Si le transformateur ne fonctionne pas – vérifiez le calibre et la longueur des fils du thermostat. 3 a. Vérifiez les connexions des bornes R et W seulement b. Vérifiez/Remplacez le thermostat. 4. Vérifiez le code de clignotement DEL 5. Remplacez le fusible. 6. Remplacez l'ensemble de commande
Del éteinte ou clignotante	1. Fusible grillé sur la carte contrôleur 2. Causes multiples	1. Remplacez le fusible 2. Code de clignotement DEL du tableau de commande varie avec le type de commande. Un décalque est installé sur l'appareil avec la description des codes applicables pour l'appareil de chauffage. Pour plus de détails, consultez la fiche technique de la carte contrôleur, qui est fournie avec cet appareil.
L'appareil démarre mais le gaz ne s'allume pas.	1. Arrivée de gaz fermée 2. Le tuyau de gaz est rempli d'air. 3. Pression de la conduite principale ou du collecteur de gaz 4. Ouvrez le robinet d'arrêt de gaz.	1. Ouvrez le robinet de gaz manuel 2. Purgez le tuyau de gaz. 3. Réglez les pressions de gaz selon les instructions du manuel. 4. Vérifiez le robinet d'arrêt manuel.
Le cycle d'allumage se déroule normalement, mais les brûleurs s'éteignent en moins de 10 secondes. Le ventilateur de circulation d'air ne fonctionne pas	1. Branchement du secteur électrique inversé 2. L'appareil n'est pas à la terre. 3. Flamme non détectée	1. Fil noir = PHASE, fil blanc = NEUTRE, fil vert = TERRE 2. Rectifiez la mise à la terre et mesurez sa résistance. 3. Vérifiez la sonde et les connexions du détecteur.
d'air ne fonctionne pas	1. Connexions mal serrées 2. Tableau de commande défectueux 3. Moteur du ventilateur défectueux	1. Vérifiez toutes les connexions. 2. Vérifiez la feuille technique du tableau de commande et le fonctionnement. 3. Vérifiez le moteur du ventilateur.

- Entretien annuel des composants de transport de l'air.
a. Vérifiez que l'hélice du ventilateur est bien fixée sur l'arbre du moteur et que ses pales ne sont pas endommagées.
2. L'appareil doit être nettoyé de toute accumulation de poussière, saleté, graisse et matières étrangères, avec une attention particulière portée aux éléments suivants :
a. Entrées d'air de combustion.
b. Brûleurs et leurs orifices calibrés. Fermez le gaz en amont du régulateur combiné et coupez l'alimentation électrique de l'appareil. Retirez le panneau d'accès, ouvrez le raccord union de la conduite de gaz et déconnectez les fils de l'allumeur et du détecteur. Enlevez les vis qui retiennent le plateau des brûleurs sur la plaque de tête et sortez le plateau des brûleurs et l'ensemble collecteur. Nettoyez soigneusement les brûleurs avec une brosse métallique ou un moyen similaire.
Remplacez tout brûleur ou orifice calibré endommagé ou présentant des signes de détérioration. Réinstallez l'ensemble de brûleurs sur la plaque de tête en vous assurant de bien serrer les vis, les raccords et les connexions électriques.
ATTENTION : Manipulez l'allumeur et le détecteur de flamme avec précaution.
3. Inspectez le détecteur de flamme et l'allumeur en recherchant les détériorations et les fissures.
4. Vérifiez que les brûleurs se touchent aux points de transmission. Ces points assurent la transmission de la flamme d'un brûleur à l'autre.
a. Nettoyez l'extérieur des tubes de l'échangeur.
b. Pales du ventilateur.
5. Assurez-vous qu'il n'y a pas de connexions desserrées.
6. Commandes – Les robinets et les tuyauteries de gaz doivent être vérifiées chaque année afin de s'assurer qu'ils sont propres et étanches. Les commandes de gaz doivent être vérifiées afin de s'assurer que l'appareil fonctionne bien. Lisez les instructions d'entretien séparées, fournies avec l'appareil.
7. Moteur d'extraction – Les roulements du moteur d'extraction sont lubrifiés à vie et ne nécessitent aucun graissage supplémentaire. Dans les environnements sales, il faudra peut-être nettoyer l'intérieur des moteurs et les carters de soufflerie en dirigeant un jet d'air comprimé dans les passages de refroidissement du moteur. Les filtres à toile métallique d'entrée et de sortie doivent être périodiquement nettoyés.

INSTALLATION – FONCTIONNEMENT

FONCTIONNEMENT

Avant la mise en service

1. Pour éviter une défaillance prématurée de l'échangeur de chaleur, observez les tubes de l'échangeur. Si le bas des tubes devient rouge avec la soufflante et les brûleurs en marche, vérifiez que la vitesse de la soufflante est correcte pour l'application. Voir page 16, « Adaptation du câblage des moteurs de soufflante ».
2. Les procédures de démarrage et de réglage doivent être confiées à un centre de SAV qualifié.

Bien que l'appareil ait été assemblé et testé à chaud en usine, il est recommandé d'effectuer les vérifications préopératoires suivantes pour vous assurer que tout fonctionne normalement après l'installation.

1. Mettez l'appareil sous tension au niveau du sectionneur. Vérifiez que les disjoncteurs ou les fusibles sont en place et d'un calibre approprié. Fermez tous les robinets d'arrêt de gaz.

2. Ouvrez le panneau d'accès aux commandes sur le côté de l'appareil. Vérifiez que la tension du secteur correspond à la tension nominale de l'appareil inscrite sur la plaque signalétique. Assurez-vous que tous les câblages sont bien fixés et convenablement protégés. Suivez chaque circuit pour vous assurer qu'il est conforme au schéma de câblage. Si l'appareil est installé à plus de 2000 pieds et que l'ensemble pour haute altitude inclut un interrupteur de contrôle d'air de combustion, remplacez l'interrupteur de l'appareil par celui fourni dans l'ensemble. Assurez-vous que le tube et les branchements électriques sont solidement fixés. Vérifiez que le système d'évacuation des gaz est correctement installé et n'est pas obstrué. Avant de commencer, suivez les étapes suivantes afin de vous assurer que le système d'évacuation est correctement dimensionné :

a. Obtenez toutes les ouvertures inutilisées du système d'évacuation. Inspectez le système d'évacuation pour vérifier que les diamètres et la pente des tuyaux sont conformes aux normes ANSI Z223.1 (NFPA 54) ou au Code d'installation CSA B149.1, dernière édition, et aux présentes instructions. Déterminez s'il n'y a pas d'obstructions, de restriction, de fuite, de corrosion ou d'autres défauts pouvant créer un risque.

c. Dans la mesure du possible, fermez toutes les portes et fenêtres du bâtiment, ainsi que les portes de communication entre les espaces dans lesquels se trouvent le ou les appareils reliés au système d'évacuation, et les autres zones du bâtiment. Mettez en marche au régime maximum les sècheuses de linge et tous les ventilateurs, comme les hottes aspirantes, les ventilateurs de salle de bains, etc. Ne faites pas fonctionner la ventilation d'éte. Fermez les registres des foyers.

d. Suivez les instructions d'allumage. Faites fonctionner l'appareil à inspection. Réglez le thermostat de manière que l'appareil chauffe en continu.

e. Après avoir déterminé que chaque appareil relié au système d'évacuation fonctionne correctement dans les conditions décrites ci-dessus, remettez les portes et les fenêtres, les ventilateurs, les registres de cheminée et tout autre appareil au gaz dans leurs états antérieurs.

f. Si les essais révèlent un mauvais fonctionnement du système d'évacuation, il faut prendre les mesures correctives nécessaires. Vérifiez qu'il n'y a pas d'obstacles devant la prise d'air et la sortie d'air chaud.

6. Vérifiez que le ventilateur est libre. L'hélice doit tourner librement à la main.

7. Vérifiez que tous les filtres sont en place et correctement installés en respectant la direction de l'air (s'il y a lieu).

8. Effectuez une inspection visuelle de l'appareil et assurez-vous qu'il n'a pas été endommagé au cours de l'installation. Assurez-vous que toutes les attaches sont en place et que les orifices du brûleur sont correctement alignés sur les tubes de l'échangeur de chaleur et que les orifices à gaz sont centrés sur l'ouverture du tube inspirateur du brûleur. Assurez-vous que les lames des persiennes sont ouvertes d'au moins 30° mesurées par rapport à la verticale.

10. Mettez l'appareil sous tension au niveau du sectionneur.

Réglage du brûleur principal

11. Vérifiez le thermostat, l'allumeur, le robinet de gaz, puis mettez la soufflante sous tension. Si le fonctionnement n'est pas normal, vérifiez si le câblage est conforme au schéma.
12. Vérifiez que le moteur de la soufflante tourne dans le bon sens en comparant avec la flèche marquée sur le corps (s'il y a lieu). Vérifiez bien le sens de rotation, pas seulement le mouvement de l'air car, même à l'envers, l'hélice déplace de l'air.
13. Pour les appareils à circulation forcée, vérifiez la vitesse de la soufflante (tr/min). Voir les instructions de réglage de la soufflante pour toute modification.
14. Vérifiez le régime moteur (tr/min).
15. Vérifiez la tension du moteur.
16. Mesurez le courant d'appel du moteur et comparez-le à l'intensité nominale de la plaque signalétique.
17. Révérifiez la pression d'arrivée de gaz au niveau du robinet d'arrêt manuel installé sur site. La pression d'entrée de l'appareil doit être de 1,5 kPa (6 po d'eau) pour le gaz naturel ou de 2,75 kPa (11 po C.E.) pour le propane. La pression maximum d'arrivée pour l'un ou l'autre gaz est de 14 po C.E. Si la pression d'arrivée dépasse cette valeur, il faudra ajouter un détendeur en amont du robinet de gaz mixte.
18. Ouvrez le robinet d'arrêt de gaz manuel installé sur site.
19. Tournez le robinet manuel du régulateur combiné à la position « ON ».
20. Assurez-vous que la vane générale de gaz s'ouvre. Vérifiez la pression au collecteur de gaz (voir « Réglage du brûleur principal ») avec la soufflante en marche.
21. Assurez-vous que les commandes de gaz s'activent dans l'ordre (voir « Séquence de fonctionnement des commandes »). Si vous n'êtes pas familier avec ces commandes (régulateur de gaz combiné), lisez la documentation du fabricant du système de régulation, qui est livrée avec l'appareil.
22. Quand vous êtes assuré que l'appareil fonctionne normalement, retirez tous les fils volants utilisés pour les essais.
24. Remettez en place le panneau d'accès aux commandes sur le côté de l'appareil.
25. Si l'appareil est installé à plus de 2000 pieds, collez l'étiquette incluse dans l'ensemble pour haute altitude et remplissez tous les champs au feutre indélébile.

Pour régler la pression du collecteur de gaz

1. Fermez le robinet d'arrêt de gaz posé lors de l'installation.
2. Retirez le bouchon "du raccord 1/8 po pour bracher un manomètre à tube en U dont les braches ont une hauteur d'au moins 30 cm (12 po)".
3. Tournez le robinet d'arrêt de gaz manuel installé sur site sur position Marche.
4. Créez un appel thermique pour feu élevé à partir du thermostat.
5. Consultez le tableau 12.1 pour déterminer la pression nominale au collecteur principal pour le type d'appareil. Les pressions entre 0 et 2000 pieds d'altitude sont de 3,5 po C.E. pour le gaz naturel, 10 po C.E. pour le propane; à plus de 2000 pi, reportez-vous aux instructions à la page 13. Réglez le ressort du régulateur principal pour qu'il délivre le gaz à la pression correcte (pour savoir comme régler, consultez le manuel du régulateur fourni avec l'appareil).
6. Après ce réglage, fermez le robinet d'arrêt manuel et revissez le bouchon du raccord de 1/8" po.
7. Ensuite, ouvrez le robinet d'arrêt manuel installé sur site et assurez-vous à nouveau que les bouchons du tuyau ne fuient pas avec de l'eau savonneuse.

RACCORDEMENTS ÉLECTRIQUES

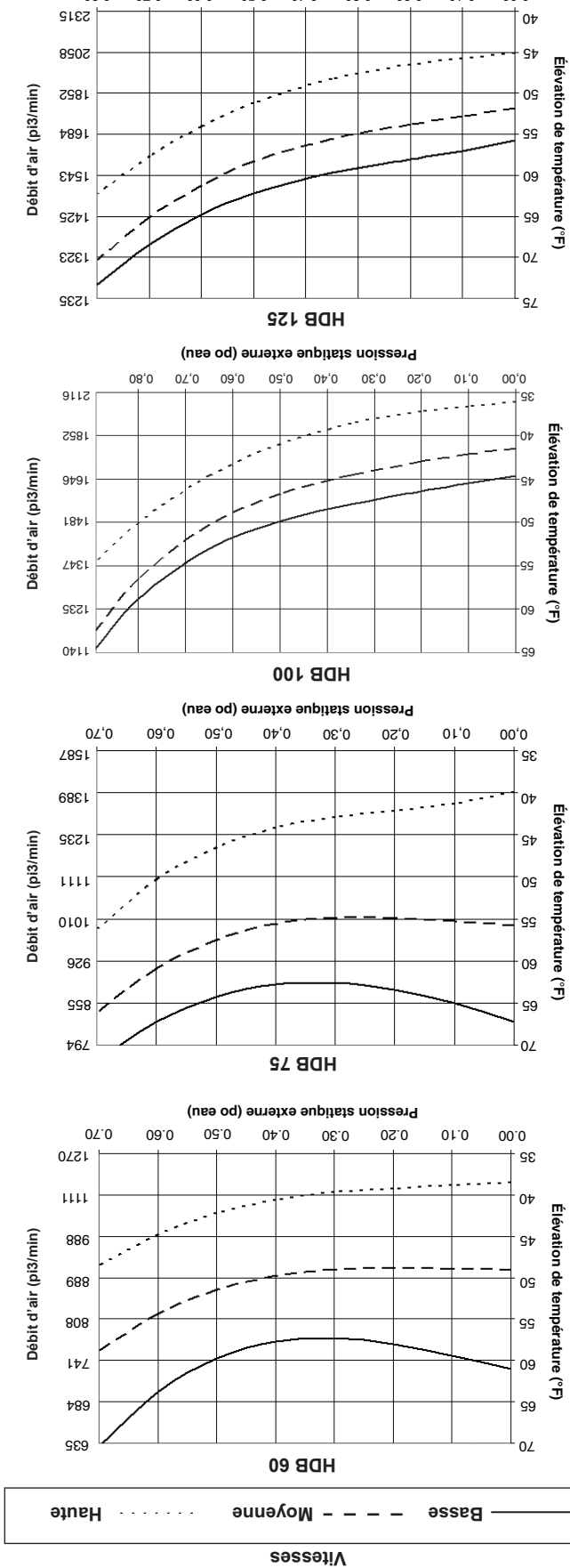
Le thermostat de commande sera installé en fonction des besoins de chauffage, sur une cloison intérieure à environ 1,5 m (5 pi) au-dessus du plancher et de façon à ne pas être exposé à la chaleur de l'appareil de chauffage ou d'une autre source, ni aux courants d'air des portes fréquemment ouvertes. Consultez les instructions fournies avec le thermostat.

Adaptation du câblage des moteurs de soufflante

Les soufflantes incorporées dans les appareils Modine HDB sont à entraînement direct et munies de moteurs à trois vitesses. L'élevation de la température de l'air de l'appareil est déterminée par la vitesse de la soufflante et la pression statique dans le système. Les appareils sont normalement expédiés avec le moteur de la soufflante réglé pour la plus grande vitesse. Pour sélectionner la vitesse de la soufflante, le fil du moteur doit être connecté à la borne voulue « EAS » ou « BLO » sur le panneau de commande. Les fils inutilisés du moteur pour les autres vitesses sont attachés aux bornes « PARK » du tableau. Voir le schéma de câblage à la page 21.

Si l'appareil à soufflante est raccordé à un système de gaines ou à une autre charge, consultez les courbes de performance sur cette page pour déterminer l'élevation de température en fonction de la vitesse du moteur et de la pression statique. Vérifiez que la pression statique de la sortie de l'appareil ne dépasse pas la pression maximale spécifiée pour l'appareil. Si la pression statique est trop élevée, elle doit être abaissée soit en modifiant le système, soit en utilisant une vitesse plus faible du moteur. Si l'appareil s'arrête en fonctionnement normal à cause d'un dépassement du seuil de température maximale, choisissez une vitesse plus élevée du moteur.

Modèles de courbes de soufflantes (HDB 60-125 seulement)



⚠️ AVERTISSEMENT

1. Débranchez l'alimentation avant d'effectuer des branchements pour éviter tout risque d'électrocution et d'endommagement de l'appareil.
2. Tous les branchements et câblages doivent être faits en stricte conformité avec le schéma fourni avec l'appareil. Tout câblage différent de celui du schéma peut créer des risques de dommages matériels ou de blessures.
3. Tout câblage usine d'origine exigeant un remplacement doit être remplacé par un câble d'indice thermique nominal de 105 °C.
4. Assurez-vous que la tension d'alimentation n'est pas supérieure de plus de 5 % à la tension nominale inscrite sur la plaque de l'appareil.

⚠️ ATTENTION

Vérifiez que la tension d'alimentation n'est pas inférieure de plus de 5 % à la tension nominale inscrite sur la plaque de l'appareil.

1. L'installation du câblage doit être conforme aux codes locaux du bâtiment ou, en l'absence de codes locaux, au Code électrique national ANS/NFPA 70, dernière édition. Conformément à ce code, l'appareil doit être mis à la terre. Au Canada, le câblage doit être conforme à CSA C22.1, Partie 1, Code électrique.
2. Deux exemplaires du diagramme de câblage de l'appareil sont fournis avec chaque appareil. L'un se situe dans le compartiment de commande accessible par le côté et l'autre est fourni dans le paquet de documentation. Reportez-vous à ce diagramme pour tous les branchements de câbles.
3. Assurez-vous que tous les composants multi-tension (noteurs, transformateurs, etc.) sont câblés conformément à la tension secteur.
4. L'alimentation de l'appareil doit être protégée par un interrupteur à fusible ou coupe-circuit.
5. L'alimentation doit se trouver à $\pm 5\%$ de la tension nominale et les phases doivent être équilibrées à $\pm 2\%$ les unes des autres. Sinon, prévenez le fournisseur d'électricité.
6. Les branchements électriques externes à installer incluent :
 - a. Branchement de l'alimentation secteur (115, 208, 230, 460 ou 575 volts)
 - b. Branchement des thermostats ou de tout autre appareil de commande d'accessoire pouvant être fourni (24 volts).
7. Pour l'emplacement du compartiment de commande accessible par le côté, reportez-vous à la figures 18.1 et 18.2.
8. Tous les branchements électriques secteur sont établis dans le compartiment de commande accessible par le côté. La basse tension (dispositifs de commande des thermostats et des accessoires) peut être câblée aux bornes des bornes de tous les câbles à basse tension, reportez-vous au diagramme de câblage.

INSTALLATION – ENSEMBLE D'ACCESSOIRES POUR HAUTE ALTITUDE

Table 13.3 - Ensembles haute altitude pour HD/HDB ①

Etats-Unis et Canada		Taille de modèle			
Altitude (pi)	Code d'article	Code d'article	Code d'article	Code d'article	Non requis
	30	45	60	75	
0 à 2000	requis	requis	requis	requis	Non requis
2001 à 4500	67248	67248	67248	67248	67248
4501 à 5500	67248	67248	67248	67248	67248
5501 à 6500	67248	67248	67248	67248	67248
6501 à 7500	67248	67248	67248	67248	67248
7501 à 8500	67248	67248	67248	67248	67248
8501 à 9500	67248	67248	67248	67248	67248
9501 à 10,000	67248	67248	67248	67248	67248
10001 à 11000	55945	55945	55945	55945	68409
11001 à 12000	55945	S/O	S/O	55946	68409
12001 à 13000	55945	S/O	S/O	55944	68411
13001 à 14000	55945	S/O	S/O	55944	68411

① Pour les ensembles Etiquette seulement, le numéro de référence Modine 5H0807146005 doit être inscrit et attaché à l'appareil par l'installateur.

Si la valeur de chauffage du gaz fourni est différente des valeurs des tableaux 13.1 et 13.2, utilisez l'équation suivante pour déterminer la pression appropriée au collecteur pour l'altitude et la valeur de chauffage du gaz fourni.

Equation 14.1 - Pression au collecteur pour valeur nominale de gaz réduite

$$MP_{ACT} = \left(\frac{BTU_{TBL}}{BTU_{ACT}} \right)^2 \times MP_{SL}$$

où :

MP_{ACT} = Pression au collecteur (po C.E.) en altitude – Réglage de pression de gaz pour l'appareil de chauffage installé

BTU_{TBL} = Teneur du gaz en BTU/pi³ – Tiré du tableau 11.1 ou 11.2 (selon le cas)

BTU_{ACT} = Teneur du gaz en BTU/pi³ – Obtenue auprès du fournisseur de gaz local

MP_{SL} = Pression au collecteur (po C.E.), au niveau de la mer – Utilisez 3,5 po C.E. pour le gaz naturel et 10 po C.E. pour le propane

REMARQUE : Seule la pression au collecteur primaire doit être réglée sur les appareils équipés de commandes de gaz à deux étages ou modulation. Aucun réglage de pression au collecteur à feu bas n'est nécessaire sur ces appareils.

INSTALLATION – ENSEMBLE D'ACCESSOIRES POUR HAUTE ALTITUDE

ENSEMBLE D'ACCESSOIRES POUR HAUTE ALTITUDE

Les valeurs nominales d'entrée standard des appareils au gaz de Modine sont certifiées par ETL. À plus de 2000 pieds, la norme ANSI Z223.1 exige la réduction des valeurs nominales de 4 % tous les 1000 pieds au-dessus du niveau de la mer. Au Canada, l'ACNOR exige la réduction des valeurs nominales de 10 % à plus de 2000 pieds d'altitude. Les instructions de réglage en haute altitude et les ensembles de pressostat listés dans ce manuel concernent les appareils qui seront installés à plus de 2000 pieds. Ces méthodes et ensembles sont conformes aux exigences ANSI Z223.1 et ACNOR.

Si un appareil doit être installé à plus haute altitude ET converti d'un service gaz naturel à gaz propane, un ensemble de conversion au propane doit être utilisé avec les méthodes de réglage de pression et les ensembles de pressostat listés dans ce manuel. Pour les instructions de sélection et d'installation pour les ensembles de conversion au propane, consultez la toute dernière version du manuel Modine 75-515.

Sélection de la pression et de l'ensemble corrects

Pour déterminer la pression de collecteur correcte en altitude et si nécessaire, l'ensemble de pressostat d'air de combustion correct, le numéro de modèle complet de l'appareil de chauffage, le combustible à utiliser et l'altitude à laquelle l'appareil sera installé doivent être connus. Pour obtenir les renseignements nécessaires sur l'appareil, consultez la plaque du numéro de série.

Une fois en possession de ces informations, consultez les tableaux de pressions de gaz et de sélection aux tableaux 13.1 à 13.3. Les tableaux de pression sont divisés par altitude, type de combustible et pays d'installation. L'altitude et le type de combustible. Dans le cas d'une conversion du gaz naturel au propane et d'une utilisation à haute altitude, un ensemble de conversion au propane et un ensemble de pressostat devra être utilisé (le cas échéant). Les tableaux de sélection incluent le suffixe d'ensemble adéquat, si nécessaire.

Tableau 13.1 - Valeurs de chauffage du gaz naturel selon l'altitude

Altitude (pi)	É.-U.	Canada
0 à 2000	1050	1050
2001 à 3000	929	945
3001 à 4000	892	945
4001 à 4500	874	945
4501 à 5000	856	856
5001 à 6000	822	822
6001 à 7000	789	789
7001 à 8000	757	757
8001 à 9000	727	727
9001 à 10000	698	698
10001 à 11000	670	670
11001 à 12000	643	643
12001 à 13000	618	618
13001 à 14000	593	593

① Les valeurs indiquées correspondent à une pression au collecteur de 10 po C.E.; pour les autres valeurs de teneur en BTU (disponibles auprès de votre fournisseur local), utilisez l'équation 14.1 pour calculer la pression au collecteur.
 ② Les valeurs indiquées correspondent à une pression au collecteur de 10 po C.E.; pour les autres valeurs de teneur en BTU (disponibles auprès de votre fournisseur local), utilisez l'équation 14.1 pour calculer la pression au collecteur.
 ③ Si l'appareil est installé à plus de 2000 pieds, vous devrez peut-être remplacer un pressostat. Reportez-vous au tableau 13.3 pour voir si un changement de pressostat est nécessaire.
 ④ Les valeurs nominales de chauffage du gaz sont réduites de 4 % tous les 1000 pieds d'altitude aux États-Unis et de 10 % entre 2000 et 4500 pieds d'altitude au Canada, conformément aux normes ANSI Z223.1 et CSA B149, respectivement.

Tableau 13.2 - Valeurs de chauffage du gaz propane selon l'altitude

Altitude (pi)	É.-U.	Canada
0 à 2000	2500	2500
2001 à 3000	2212	2250
3001 à 4000	2123	2250
4001 à 4500	2080	2250
4501 à 5000	2038	2038
5001 à 6000	1957	1957
6001 à 7000	1879	1879
7001 à 8000	1803	1803
8001 à 9000	1731	1731
9001 à 10000	1662	1662
10001 à 11000	1596	1596
11001 à 12000	1532	1532
12001 à 13000	1471	1471
13001 à 14000	1412	1412

① Les valeurs indiquées correspondent à une pression au collecteur de 10 po C.E.; pour les autres valeurs de teneur en BTU (disponibles auprès de votre fournisseur local), utilisez l'équation 14.1 pour calculer la pression au collecteur.
 ② Les valeurs indiquées correspondent à une pression au collecteur de 10 po C.E.; pour les autres valeurs de teneur en BTU (disponibles auprès de votre fournisseur local), utilisez l'équation 14.1 pour calculer la pression au collecteur.
 ③ Si l'appareil est installé à plus de 2000 pieds, vous devrez peut-être remplacer un pressostat. Reportez-vous au tableau 13.3 pour voir si un changement de pressostat est nécessaire.
 ④ Les valeurs nominales de chauffage du gaz sont réduites de 4 % tous les 1000 pieds d'altitude aux États-Unis et de 10 % entre 2000 et 4500 pieds d'altitude au Canada, conformément aux normes ANSI Z223.1 et CSA B149, respectivement.

Gaz à valeur de chauffage diminuée et calcul de pression au collecteur

Régler de pression au collecteur

La pression d'arrivée dans l'appareil doit être confirmée dans les limites acceptables (6 à 7 po C.E. pour le gaz naturel et 11 à 14 po C.E. pour le gaz propane) avant d'ouvrir le robinet d'arrêt, faute de quoi le robinet de gaz mixte risque d'être endommagé.

Les appareils de chauffage utilisant du gaz naturel ont des robinets de gaz réglés pour l'usine à une pression au collecteur de 3,5 po C.E. à une pression d'arrivée de 7 po C.E.

Les appareils qui utilisent du gaz propane sont réglés pour une pression au collecteur de 10 po C.E. à une pression d'arrivée de 14 po C.E.

Une installation à plus de 2000 pieds d'altitude exige le réglage de la pression au collecteur comme décrit.

REMARQUE : Seule la pression de gaz à feu fort doit être ajustée, la pression de gaz à feu bas doit rester la même.

Certains fournisseurs de gaz pourront réduire la teneur en BTU (valeur de chauffage) du gaz fournie en altitude à une autre valeur que 1050 BTU/pi³ pour le gaz naturel ou 2500 BTU/pi³ pour le propane pour permettre l'utilisation de certains appareils de chauffage sans régler la pression au collecteur. C'est pourquoi il est nécessaire de contacter le fournisseur de gaz pour en savoir plus sur le type de gaz et la teneur en BTU (valeur de chauffage) avant d'utiliser un appareil de chauffage. Les tableaux 13.1 et 13.2 indiquent les valeurs de chauffage diminuées standard (4 % pour 1000 pieds d'altitude aux États-Unis et 10 % entre 2001 et 4500 pieds d'altitude au Canada) des gaz naturel et propane à différentes altitudes. Si le fournisseur livre du gaz avec des valeurs de chauffage comme indiqué aux tableaux 13.1 et 13.2, la pression au collecteur doit être réglée à 3,5 po C.E. pour le gaz naturel et à 10 po C.E. pour le propane.

INSTALLATION – ÉVACUATION

Section C – Installation des systèmes d'évacuation horizontale de catégorie III.

- C1. Cette section s'applique aux systèmes d'évacuation horizontale de catégorie III et complète les prescriptions de la section A – Instructions générales – Tous modèles. Les systèmes de ventilation de catégorie III énumérés par une agence reconnue à l'échelle nationale et correspondant aux diamètres spécifiés peuvent être utilisés. Différentes marques de tuyau matériaux de ventilation peuvent ne pas être mélangées. Il est interdit d'accoupler deux longueurs de tuyau à double paroi dans une même installation d'évacuation horizontale à cause de l'impossibilité de vérifier l'étanchéité des raccords du tuyau intérieur.
- C2. Tous les appareils de chauffage qui sont évacués horizontalement font partie des appareils de catégorie III. La catégorie III impose les exigences particulières suivantes :
- Tous les appareils de chauffage résidentiels de catégorie III à évacuation horizontale doivent être munis d'un système d'évacuation homogène (UL-1738) de catégorie III par une agence officielle. Vous trouverez des systèmes d'évacuation officiellement homologués en catégorie III chez votre distributeur local de tuyaux d'évacuation. Suivez les instructions du fabricant du système d'évacuation certifié catégorie III pour l'installation.
 - Pour les appareils de chauffage commerciaux et industriels à évacuation horizontale, vous pouvez utiliser soit des conduits homologués en catégorie III, soit des conduits à simple paroi en acier inoxydable ou en acier galvanisé. Pour les systèmes d'évacuation à simple paroi, une section continue de tuyau d'évacuation à double paroi peut être utilisée dans le système d'évacuation pour la traversée du mur jusqu'au chapeau listé. Voir le point A10 de la section A – Instructions générales – Tous modèles pour les transitions entre double paroi et simple paroi. Sceller toutes les coutures et les joints des tuyaux à paroi simple non étanches avec du ruban métallique ou Silastic pour des températures allant jusqu'à 205 °C (400 °F). (Les bandes de feuille d'aluminium 3M 433 ou 363 sont acceptables). Le ruban doit être enroulé deux fois autour du tuyau.

- C3. Tous les systèmes d'évacuation horizontale de catégorie III doivent être terminés avec un chapeau de cheminée listé. Les distances minimales du chapeau au mur extérieur sont indiquées au tableau 10.1.
- C4. Tous les systèmes d'évacuation horizontale de catégorie III doivent être terminés avec un chapeau de cheminée listé. Les distances minimales du chapeau au mur extérieur sont indiquées au tableau 10.1.

Taille de modèle	Application	Longueur min. ①
30-75	Résidentielle et commerciale	11 po
100, 125	Résidentielle	12 po
100, 125	Commerciale	24 po

① Reportez-vous aux figures 10.2 et 10.3.

Tableau 10.1 - Longueur minimale entre le mur externe et l'évacuation

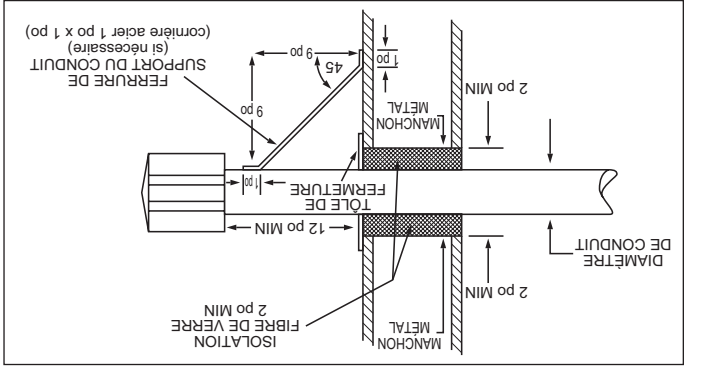


Figure 10.1 - Construction d'une traversée à travers une paroi combustible et support de cheminée

C4. Le tuyau doit être supporté comme illustré à la figure 10.1.

Figure 10.2 - Évacuation horizontale de catégorie III avec pente montante

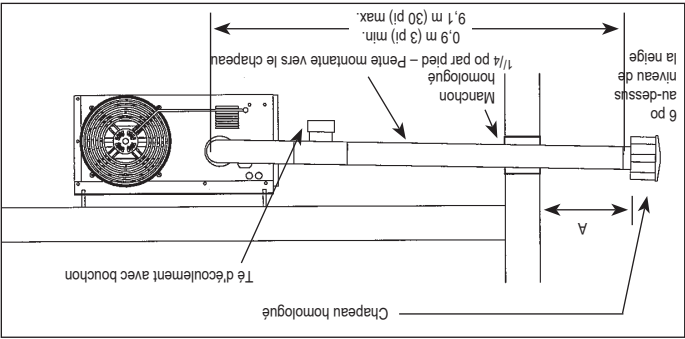
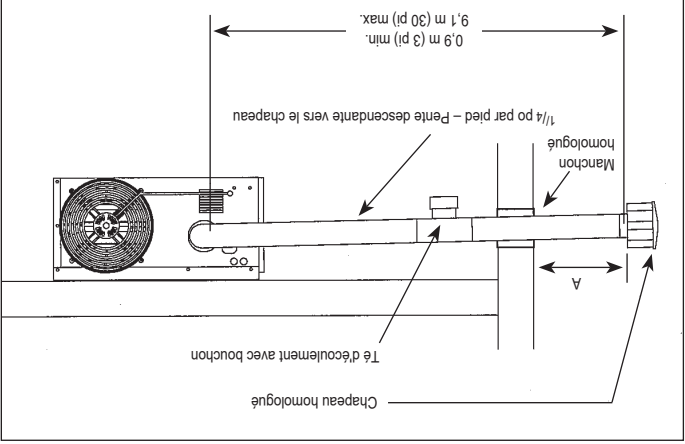


Figure 10.3 - Évacuation horizontale de catégorie III avec pente descendante (avec point de purge)



- C5. Si la condensation risque d'être un problème, le système d'évacuation ne doit pas déboucher au-dessus d'une voie publique ou d'une zone où le condensat ou la vapeur pourrait créer une nuisance ou un danger, ou pourrait affecter le fonctionnement de régulateurs ou d'évents, ou autres équipements.
- C6. Le système d'évacuation ne doit pas desservir plus d'un appareil de chauffage et ne doit pas servir à d'autres fins.
- C7. Pour une évacuation horizontale, il faut maintenir une pente montante de 21 mm par mètre (1/4 po par pied) vers l'aval et placer un té d'écoulement avec bouchon de nettoyage, comme illustré à la figure 10.2. Sous réserve de l'accord des autorités locales, une pente de 21 mm par mètre (1/4 po par pied) vers l'aval est acceptable avec un té d'écoulement avec bouchon de nettoyage près de la sortie, comme illustré à la figure 10.3, ou encore un écoulement direct du condensat au bout du tuyau.

- C8. Lorsqu'un chapeau de cheminée est situé sous un avant-toit, la distance du porte-à-faux ne doit pas dépasser 61 cm (24 po). Les dégagements par rapport aux surfaces combustibles d'un conduit d'évacuation extérieur doivent être de 30 cm (12 po) au minimum. Consultez le National Fuel Gas Code pour les exigences additionnelles relatives aux avant-toits ayant des ouvertures de ventilation.
- C9. Une fois l'installation du système d'évacuation terminée, passez à la section intitulée « Installation – Raccordements de gaz ».

INSTALLATION – EVACUATION

• Pour les conduits à simple paroi débouchant à une distance horizontale de 3 m (10 pi) ou plus d'une partie quelconque d'un bâtiment, le conduit doit se prolonger sur au moins 0,9 m (3 pi) – 0,60 m (3 pi) pour les installations non résidentielles – au-dessus du point le plus haut où le conduit sort du toit et à 0,60 m (2 pi) au-dessus de toute partie du bâtiment située dans un rayon horizontal de 3 m (10 pi) (voir la figure 9.1).

Figure 9.1 - Sortie verticale de conduit à simple paroi débouchant à plus de 3 m (10 pieds) horizontalement d'un mur ou d'un bâtiment adjacent

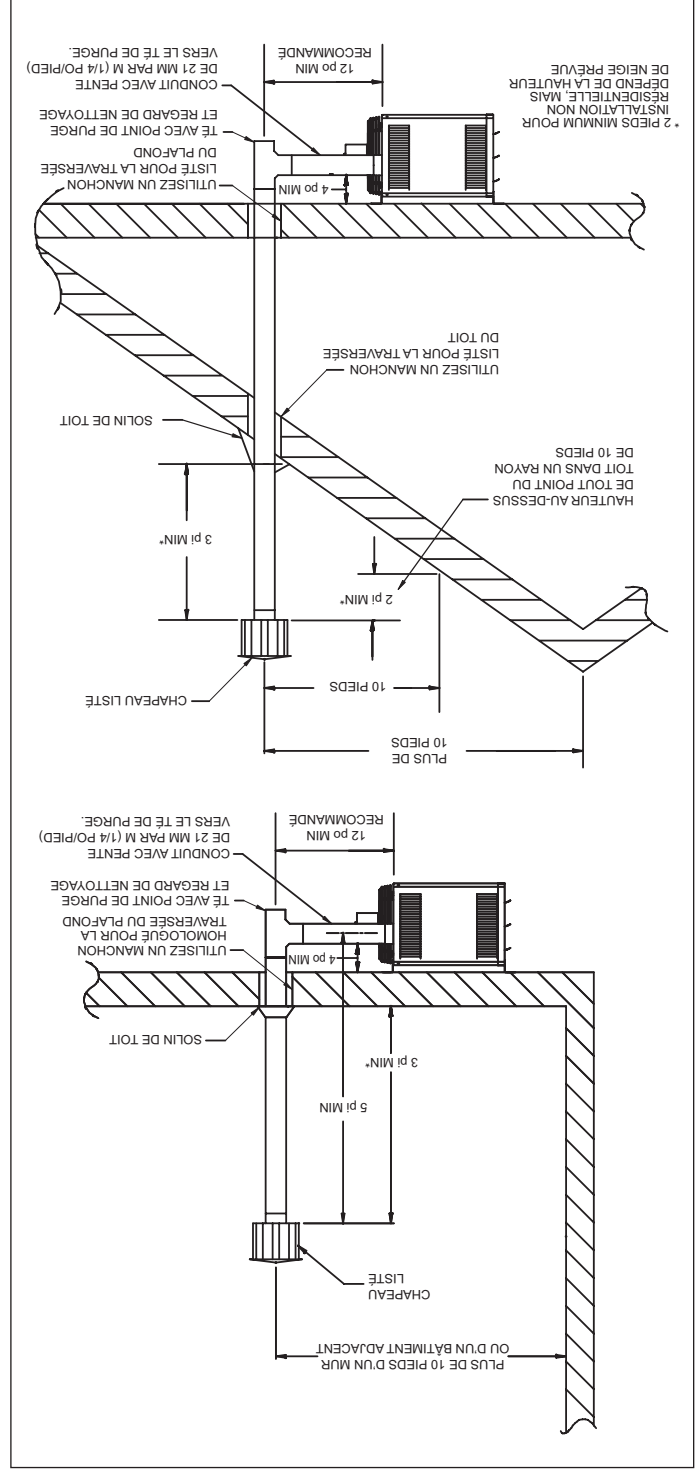
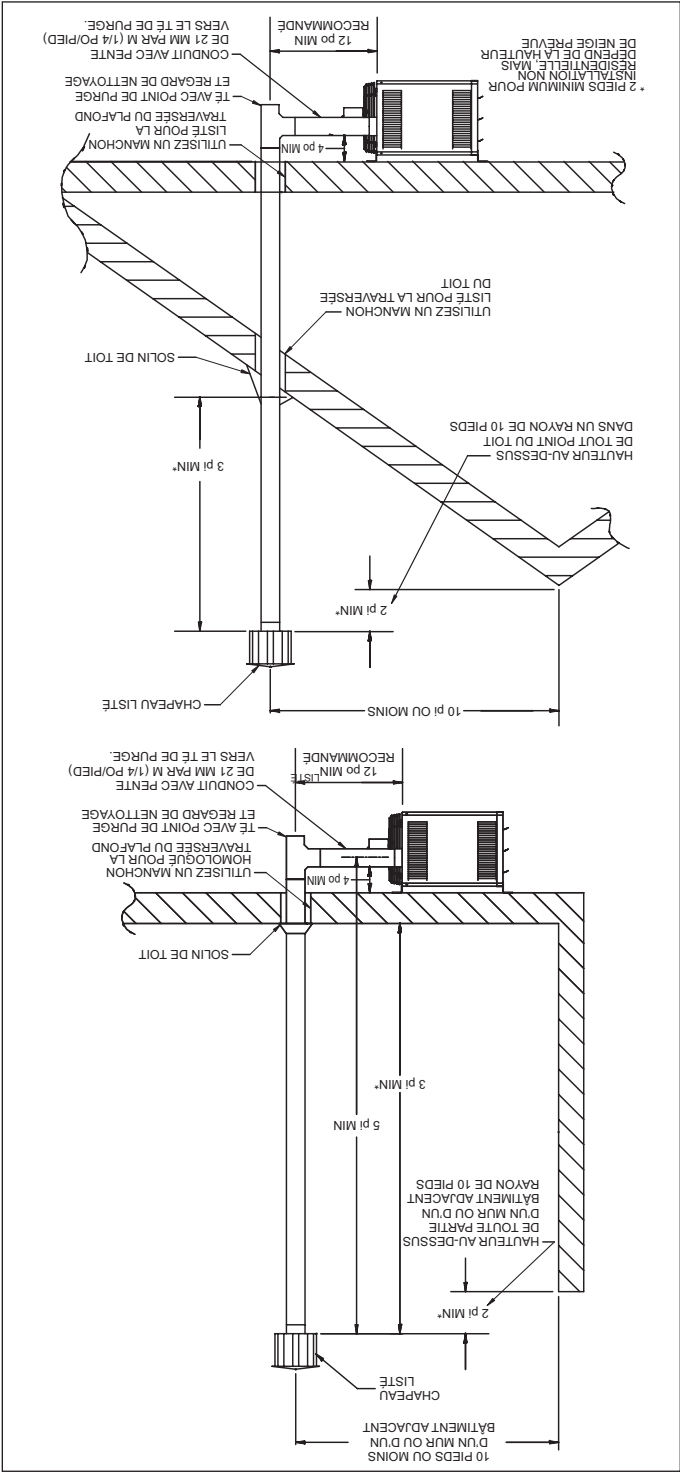


Figure 9.2 - Sortie verticale de conduit à simple paroi débouchant à 3 m (10 pieds) ou moins horizontalement d'un mur ou d'un bâtiment adjacent

• Pour des conduits d'évacuation à simple paroi débouchant à moins de 3 m (10 pi) horizontalement de toute partie du bâtiment, le conduit doit se terminer à 0,6 m (2 pi) au-dessus de ladite partie (voir la figure 9.2).

B10. Une fois l'installation du système d'évacuation terminée, passez à la section intitulée « Raccordements de gaz ».



INSTALLATION – ÉVACUATION

A11. Instructions générales pour l'installation du tuyau de chapeau à double paroi (type B) :

entre l'appareil et la traversée du mur ou du plancher à une longueur supérieure à 1,8 m (6 pi), le manchon peut avoir un diamètre de 5 cm (2 po) seulement de plus que le tuyau. S'il n'y a pas de manchon cm (2 po) seulement de plus que le tuyau. S'il n'y a pas de manchon de traversée, tous les matériaux combustibles doivent être découps pour assurer un dégagement d'au moins 15 cm (6 po) tout autour du tuyau. Sous réserve de l'accord des autorités compétentes locales, une évacuation de type B peut être utilisée comme dernier tronçon d'un conduit d'évacuation pour maintenir un dégagement par rapport aux combustibles lors du passage à travers le mur ou le plancher (voir la figure 6-1). Tout matériau utilisé pour boucher cette ouverture doit être incombustible.

Raccordement d'un chapeau de cheminée à paroi simple à un tuyau d'évacuation à double paroi (type B) :

1. Recherchez la flèche « de sens » sur le tuyau d'évacuation.
2. Fixez le chapeau de cheminée à l'extrémité du tuyau d'évacuation à double paroi.
3. Percez (3) avant-trous à travers le tuyau et le chapeau de cheminée. Utilisez des vis à tête de 3/4 po pour fixer le chapeau au tuyau. Ne serrez pas trop.

Comment fixer un tuyau d'évacuation à paroi double à un tuyau de cheminée à double paroi (type B) :

1. Entoncez le tuyau à simple paroi dans la paroi interne du tuyau à double paroi.
 2. Percez trois avant-trous à travers les deux épaisseurs des tuyaux. Utilisez des vis à tête de 3/4 po pour fixer les deux tuyaux. Ne serrez pas trop.
 3. L'écart entre les tuyaux à double et à simple paroi doit être scellé mais il n'est pas nécessaire de remplir le volume complet de la zone annulaire. Pour fermer l'ouverture annulaire, appliquez un large boudin de Silastic 400 F (205 °C).
- A12. Les dégagements doivent être maintenus jusqu'à la sortie du conduit d'évacuation :

Tableau 7.1 - Information concernant les dégagements des conduits d'évacuation

Structure	Dégagements minimums pour les conduits d'évacuation
Prise d'air forcé à moins de 3 m (10 pi)	150 cm (3 pi) au-dessus
Prise d'air de combustion d'un autre appareil	180 cm (6 pi) toutes directions
Porte, fenêtre, prise d'air libre dessous ou autre ouverture du bâtiment. Compteur électrique, compteur à gaz, régulateur de gaz et équipement de décharge	120 cm (4 pi) au-dessus 30 cm (1 pi) au-dessus 120 cm (4 pi) horizontalement (É.-U.) 6 pi horizontalement (Canada)
Régulateur de gaz	90 cm (3 pi) horizontalement (É.-U.) 180 cm (6 pi) horizontalement
Mur ou parapet de bâtiment adjaçant	180 cm (6 pi) toutes directions
Passage public adjaçant	210 cm (7 pi) toutes directions
Niveau du sol	90 cm (3 pi) au-dessus

① L'évent ne doit pas déboucher au-dessus d'un compteur ou d'un régulateur de gaz.

A13. Utilisez PAS de registre ni d'autre accessoire dans les conduits d'évacuation ou d'air de combustion.

A14. Des précautions doivent aussi être prises pour éviter la dégradation des matériaux de couverture par les produits de combustion.

A15. Un tuyau d'évacuation à simple paroi ne doit pas traverser un grenier inoccupé, une cloison, un vide de construction ou un plancher.

A16. Dans les régions où la température d'hiver utilisée pour le calcul à 99 % est inférieure à 0 °C (32 °F), il n'est pas permis d'utiliser des tuyaux simples pour l'évacuation à l'extérieur des gaz de combustion.

A17. Le chapeau de cheminée doit être :

Tableau 7.2 - Chapeaux de cheminée

Taille de modèle	Réf. Modèle
100-125	5H072285001
30-75	5H072285005

Tableau 7.3 - Exigences ANSI pour les conduits d'évacuation des appareils de chauffage

Catégorie	Description	Ventilation
I	Pression d'évacuation négative sans condensation	Suivez les exigences d'évacuation standard.
II	Pression d'évacuation négative avec condensation	Le condensat doit être égoutté.
III	Pression d'évacuation positive sans condensation	Le conduit d'évacuation doit être étanche aux gaz.
IV	Pression d'évacuation positive avec condensation	L'évacuation doit être étanche aux gaz et aux liquides. Le condensat doit pouvoir s'égoutter.

Remarque : Les tuyaux de raccordement desservant des appareils de catégorie I ne doivent pas être reliés à une partie d'un système d'évacuation à tirage mécanique fonctionnant avec une pression positive.

Détermination du système d'évacuation – Catégorie I verticale

- Conduit vertical débouchant verticalement (vers le haut).
- La partie horizontale du circuit ne doit pas dépasser 75 % de la hauteur verticale (Exemple : Si la hauteur est 3 m (10 pi), la partie horizontale ne doit pas dépasser 2,3 m (7,5 pi)).
- Le niveau de la sortie du système d'évacuation doit être à au moins 1,5 m (5 pi) au-dessus du raccord de l'appareil.
- Si le système d'évacuation respecte TOUTES ces exigences (voir l'exemple de la figure 9.1), passez à la section B – Installation des systèmes d'évacuation verticale. Dans tous les autres cas, passez à la section suivante « Détermination du système d'évacuation horizontal Catégorie III ».

Détermination d'un système d'évacuation horizontal de catégorie III

- Conduit horizontal débouchant horizontalement (sur le côté du bâtiment).
- Un système d'évacuation qui se termine verticalement mais comporte une partie horizontale de plus de 75 % de sa hauteur verticale est considéré comme horizontal.
- Les configurations d'évacuation horizontales appartiennent à la catégorie III. Pour les installations résidentielles, cela implique l'emploi de conduits d'évacuation homologués (UL 1738) de catégorie III. D'autres exigences, notamment celles qui s'appliquent aux installations commerciales et industrielles figurent dans la section C – Installations de systèmes d'évacuation horizontale de catégorie III.

AVERTISSEMENT

1. Un système d'évacuation est obligatoire pour les appareils de chauffage au gaz – ne les faites jamais fonctionner sans évacuation des gaz.

2. Un extracteur intégré assure la circulation des gaz – il est inutile ou interdit d'installer un dispositif d'extraction externe supplémentaire.

3. Si un appareil de chauffage existant est remplacé, vous devrez peut-être redimensionner les systèmes d'évacuation des gaz. Un système de ventilation de diamètre insuffisant peut causer des retournements de gaz brûlés ou la formation de condensat. Reportez-vous au National Fuel Gas Code ANSI Z223.1 (NFPA 54) ou à la dernière édition du code d'installation CSA B149.1. Le non-respect de ces instructions peut se solder par des blessures graves, voire mortelles.

4. Il est interdit d'accoupler deux longueurs de tuyau à double paroi dans une même installation d'évacuation horizontale à cause de l'impossibilité de vérifier l'étanchéité des raccords du tuyau intérieur.

L'installation doit se faire conformément aux codes locaux de la construction ou, à défaut de tels codes, conformément au National Fuel Gas Code, ANSI Z223.1 (NFPA 54), dernière édition. Au Canada, l'installation doit se faire selon le code CSA B149.1.

Les circuits d'évacuation des modèles HD/HD/DB doivent être conformes aux descriptions des présentes instructions pour conduire les gaz de combustion de l'appareil ou de son raccord de sortie vers l'atmosphère extérieure.

Les instructions d'évacuation sont organisées en sections, selon le type d'installation. Ces sections sont identifiées de la manière suivante :

Section	Instructions d'installation applicables par type de système d'évacuation
A	Instructions générales applicables à TOUTES les installations
B	Systèmes d'évacuation VERTICALE Catégorie I ①
C	Systèmes d'évacuation HORIZONTALE Catégorie III ①

① La différence entre les systèmes verticaux de catégorie I et les systèmes horizontaux de catégorie III sont indiquées dans la Section A – Instructions générales – Tous modèles.

Section A – Instructions générales – Tous modèles

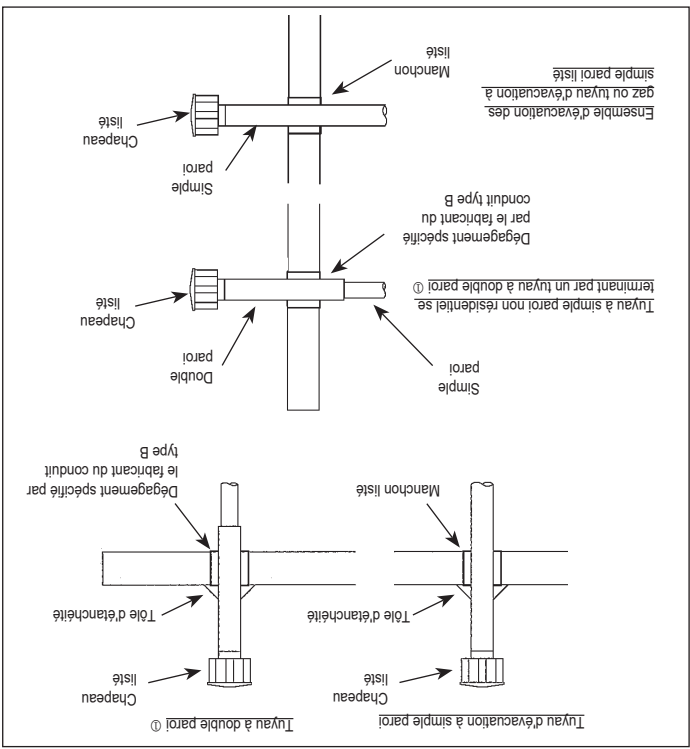
- A1. Si l'appareil que vous installez remplace un équipement existant et utilise le même système d'évacuation, inspectez le système d'évacuation pour vérifier que les diamètres et la pente des tuyaux sont conformes aux exigences du National Fuel Gas Code ANSI Z223.1 (NFPA 54) ou du code d'installation CSA B149.1, dernière édition, et aux présentes instructions. Déterminez s'il n'y a pas d'obstructions, de restriction, de fuite, de corrosion ou d'autres déficiences pouvant créer un risque.
- A2. Le conduit d'évacuation doit être en acier galvanisé ou autre matériau anticorrosion approprié (sauf pour les systèmes de type horizontal de catégorie III, qui seront couverts dans la section C). L'épaisseur minimale du conduit d'évacuation est spécifiée dans le National Fuel Gas Code. L'épaisseur minimale des raccords dépend du diamètre du tuyau. N'utilisez jamais des tuyaux de cheminée en PVC ou autres types de plastique.
- A3. Tous les appareils de chauffage sont fournis avec un adaptateur d'évacuation installé en usine permettant d'attacher le tuyau d'évacuation à l'appareil de chauffage. Fixez le tuyau d'évacuation à l'adaptateur avec 3 vis anticorrosion. (Percez des avant-trous à travers le tuyau d'évacuation et l'adaptateur avant de visser.)
- A4. Pour les longueurs totales de tuyau d'évacuation équivalentes, en créant le système d'évacuation le plus droit possible, voir le tableau 6.1. La longueur équivalente d'un coude de 3 pouces est 0,3 m (1 pi), celle d'un coude de 4 pouces est 1,5 m (5 pi).

Taille de modèle	Diamètre de conduit	Équiv. minimum Longueur	Équiv. maximum Longueur
100-125	4 po	3 pi	30 pi
30-75	3 po	3 pi	30 pi

Tableau 6.1 - Diamètres de tuyau d'évacuation et longueurs d'évacuation horizontaux

- A5. Il est recommandé de prévoir un raccord droit d'au moins 30 cm (12 po) entre la sortie de l'appareil et le conduit d'évacuation.
- A6. Les sections horizontales du tuyau d'évacuation doivent être installées avec une pente ascendante ou descendante de l'appareil de 1/4 de pouce par pied et doivent être suspendues de manière sécurisée à des structures suspendues à des points ne dépassant pas 3 pi.
- A7. Les tuyaux doivent être fixés les uns aux autres par au moins 3 vis à tête anticorrosion.
- A8. Les tuyaux à simple paroi doivent être éloignés d'au moins 15 cm (6 po) des surfaces combustibles. Pour des tuyaux à double paroi, suivez les instructions du fabricant en matière de dégagement. La distance minimum des matières combustibles dépend de la température de surface de la matière combustible ne devant pas dépasser 71 °C. Il est possible que la distance rapport au tuyau de ventilation (ou au haut de l'appareil) doive être augmentée à plus de 6 po si la chaleur risque de causer des dommages autre que le feu (comme des déformations ou une altération de couleur).
- A9. Évitez de faire passer le conduit à travers un espace non chauffé, dans la mesure du possible. Si le tuyau traverse un espace non chauffé ou si l'appareil est installé dans un environnement propice à la condensation, il faudra isoler toute longueur de tuyau de plus de 1,5 m (5 pi) afin de minimiser la condensation. Assurez-vous qu'il n'y a pas de fuites et utilisez un isolant non combustible avec un indice non inférieur à 204 °C (400 °F). Installez un raccord en té au point bas du système de ventilation et fournissez un collecteur de condensats avec un bouchon de nettoyage, comme illustré à la figure 8.1.
- A10. Si le tuyau traverse une cloison INTÉRIEURE ou un plancher combustible, la traversée doit être munie d'un manchon métallique d'un diamètre supérieur de 4 po à celui du tuyau. Si le tuyau situé

Figure 6.1 - Cheminée traversant un mur ou un toit combustible

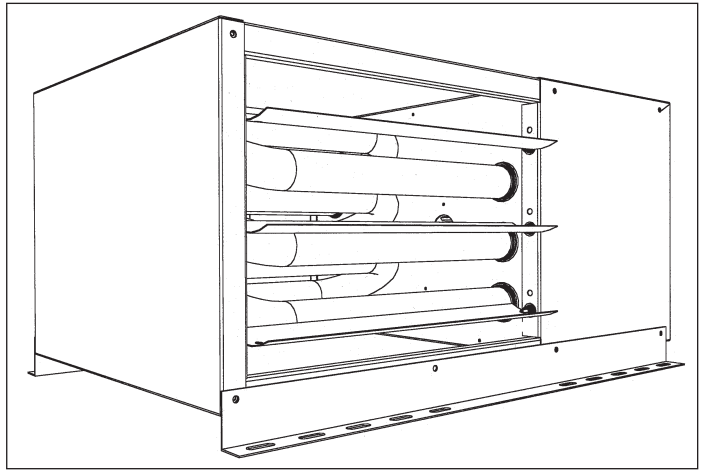


① Consultez les instructions A10 pour voir comment attacher un tuyau à simple paroi à un tuyau à double paroi.

ATTENTION

1. Dans le cas d'applications commerciales, les appareils ne doivent pas être installés à une hauteur de moins de 2,1 m (7 pi), mesurée entre le dessous et le plancher (à moins d'installer une protection appropriée des parties mobiles) et, dans le cas d'applications résidentielles, à une hauteur de moins de 1,5 m (5 pi) entre le dessous et le plancher.
2. Vérifiez qu'il n'y a pas d'obstacle devant la prise d'air et la sortie d'air chaud.
3. La distance minimum des matériaux combustibles dépend de la température de surface du matériau combustible ne dépassant pas 160 °F. Au-dessus de l'appareil, il faudra peut-être laisser un dégagement supérieur au minimum spécifié si des matériaux placés au-dessus de l'appareil à la température indiquée risquent de subir des dommages thermiques, autres que le feu.
4. Prévoyez un dégagement de 46 cm (18 po) à l'arrière ou de 15 cm (6 po) au-delà de l'extrémité du moteur, selon la plus grande des deux valeurs, et du côté de la porte d'accès pour assurer assez d'air pour le bon fonctionnement du ventilateur et pour la combustion.

1. Assurez-vous que les pièces de suspension peuvent supporter le poids de l'appareil (voir la page 18 pour les poids).
2. Pour bien fonctionner, l'appareil doit être installé à l'horizontale.
3. Les dégagements par rapport aux surfaces combustibles, telles que spécifiées précédemment, doivent être strictement maintenues.
4. Pour les tailles de modèle 30 à 75, installez comme suit les supports de fixation avant d'amener l'appareil à sa position de montage (pour l'installation des supports accessoires sur les tailles de modèle 100 à 125, consultez la dernière version de la documentation 6-594) :
 - Pour un montage normal (commandes à gauche), retirez les trois (3) vis et la ferrure de montage du bord supérieur, à l'avant et à l'arrière de l'appareil. Remontez la ferrure avant en alignant les trous de vis de la ferrure avec ceux du bord supérieur de l'appareil, comme illustré sur la figure 5.1. Procédez de la même façon pour la ferrure arrière.
 - Pour une installation avec les commandes à droite, retirez les trois (3) vis et la ferrure de montage du bord supérieur, à l'avant et à l'arrière de l'appareil. Installez la ferrure avant en alignant les trous de vis de la ferrure avec ceux du nouveau bord supérieur de l'appareil, comme illustré sur la figure 5.2. Procédez de la même façon pour la ferrure arrière.
- 5a. **Suspension par des vis ou des tirefonds** : Fixez les supports aux solives du plafond ou au raidisseur en utilisant des vis de 1/4 po et des rondelles de 1/2 po. Les ferrures de montage en cornière sont percées pour des solives espacées de 40 ou 61 cm (16 ou 24 po).



- 5b. Suspension par des tiges filetées : cet appareil de chauffage peut également être suspendu en utilisant les mêmes ferrures de montage et des tiges filetées. Fixez la tige filetée à la ferrure avec des écrous vissés de part et d'autre de la pièce. Pour les tailles de modèle 100-125, les appareils sont conçus pour être suspendus au moyen de tiges filetées, sans supports. Sur chaque section de tige filetée de 3/8 po utilisée, vissez un écrou sur une distance de 2,5 cm environ sur l'extrémité des tiges filetées qui seront vissées sur l'appareil de chauffage. Placez une rondelle sur l'extrémité de la tige filetée et vissez la tige filetée sur les écrous à souder de l'appareil de chauffage sur le dessus de l'appareil de chauffage en donnant 5 tours minimum, mais pas plus de 10. Serrez le premier écrou installé sur la tige filetée pour éviter la rotation de la tige.

Percez ensuite des trous dans un profilé en U ou une cornière au même espacement que les dimensions choisies sur l'appareil à installer. Les canaux en acier ou cornières devront être attachés aux éléments de structure appropriés. Coupez les tiges filetées à la longueur désirée et enfitez-les dans les trous du profilé ou de la cornière en les fixant avec des rondelles plates et des écrous freinés, contre-écrou.
- 5c. Montage sur étagère : L'appareil peut aussi être installé sur une étagère. Pour cela, montez les ferrures de fixation, comme expliqué dans la note 4, mais en bas plutôt qu'en haut de l'appareil. Les ferrures sont fixées à la console avec les mêmes vis (1/4 po et rondelles 1/2 po) que pour la suspension à des solives ou des poutrelles. Assurez-vous que toutes les distances aux surfaces combustibles sont respectées.

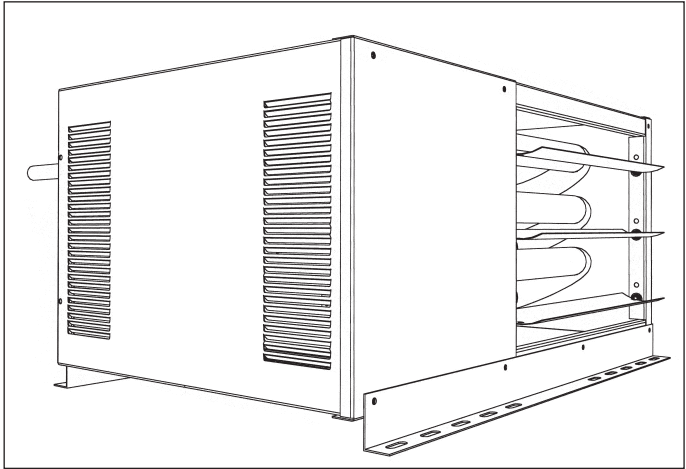
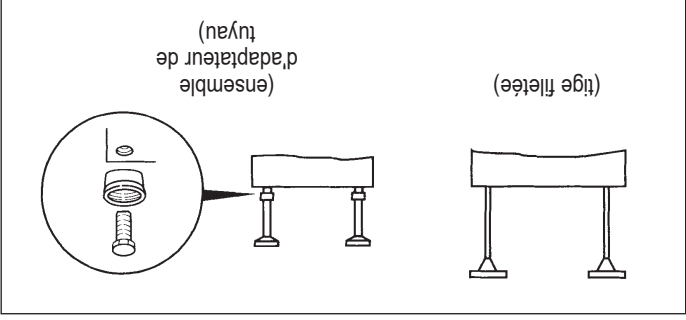


Figure 5.2 - Appareil tourné de 180° (modèles 30-75 seulement) (Panneau d'accès et sortie d'air réchauffé changent de côté)

Figure 5.3 - Méthodes de suspension des appareils de chauffage



Les appareils ne doivent pas être installés à un endroit où ils risquent d'être exposés à une atmosphère potentiellement explosive ou inflammable.



1. Les dégagements aux matériaux combustibles sont essentiels. Assurez-vous de respecter toutes les exigences mentionnées.

2. N'installez pas les appareils dans des pièces très hermétiques ou des petits compartiments (espaces clos) sans établir une bonne ventilation et une entrée d'air de combustion. L'air de combustion doit avoir accès à l'espace clos à travers deux ouvertures permanentes au moins dans l'enceinte, dont une au moins à proximité du fond. Ces ouvertures doivent fournir un espace libre de 6,45 cm² ou d'un pouce carré par tranche de 1000 BTU/h de puissance calorifique de l'appareil ou un minimum de 645 cm² ou 100 pouces carrés pour chaque ouverture, le plus élevé l'emportant.

3. Les appareils de chauffage à profil bas sont conçus pour être utilisés dans des applications où la température ambiante de départ est comprise entre -40 et 90 °F et la température ambiante de fonctionnement entre 40 et 90 °F.

4. L'appareil n'est pas conçu pour être installé à l'extérieur. Dans les stationsnements, l'appareil doit être installé conformément à la norme relative aux structures de stationnement ANSI/NFPA 88A (dernière édition), et dans les garages de réparation, conformément à la norme NFPA 30A (dernière édition) (ex-NFPA 88B). Au Canada, l'installation d'appareils de chauffage dans des hangars d'aviation doit être effectuée conformément aux exigences de l'autorité de réglementation B149.

5. Dans les garages ou dans certaines parties des hangars d'aviation, réservés à l'entretien ou à l'entreposage, le bas de l'appareil doit être placé à au moins 2,1 m du sol, sauf si des protections adéquates sont installées pour protéger convenablement l'appareil. Dans les stationsnements, l'appareil doit être installé conformément à la norme relative aux structures de stationnement ANSI/NFPA 88A (dernière édition), et dans les garages de réparation, conformément à la norme NFPA 30A (dernière édition) (ex-NFPA 88B). Au Canada, l'installation d'appareils de chauffage dans des hangars d'aviation doit être effectuée conformément aux exigences de l'autorité de réglementation B149.

6. Dans un hangar d'aviation, le bas de l'appareil doit être à au moins 3,05 m au-dessus de la plus haute surface des ailes ou d'un capot moteur, pour l'avion le plus haut que le hangar accueille et doit respecter les prescriptions de l'autorité de réglementation et/ou de la norme NFPA 409 – dernière édition.

7. Si l'appareil est installé dans un environnement très humide ou salin, il sera soumis à une corrosion accélérée qui réduira sa durée de vie normale.

IMPORTANT

Pour éviter la panne prématurée de l'échangeur thermique, ne placez AUCUN appareil à gaz à des endroits où les vapeurs corrosives (chlorées, halogénées ou acides) sont présentes dans l'atmosphère.

Recommandations pour le choix de l'emplacement

1. Les facteurs à considérer pour le choix de l'emplacement de l'appareil de chauffage sont les distances prescrites et les besoins de chauffage, l'endroit où se trouve l'arrivée du gaz et l'entrée électrique, ainsi que la proximité des conduits d'évacuation.

2. Lors du choix de l'emplacement d'installation, il est important de prendre en considération le raccourcissement de la tuyauterie d'évacuation vers l'atmosphère extérieure.

3. Assurez-vous que le support de l'appareil est assez solide pour porter son poids. Pour bien fonctionner, l'appareil doit être installé à l'horizontale.

4. N'installez pas l'appareil à un endroit où ses gaz brûlés pourraient être aspirés à l'intérieur d'un édifice voisin par une fenêtre, une prise d'air frais, etc.

Tableau 4.1 Dégagements

Dégagement recommandé pour la maintenance	Côté appareil		Raccord évacuation
	Distance minimum des matières combustibles	HD	
HD/HDB	HD	1 po	4 po
	HDB	6 po	4 po
HD/HDB	Haut et bas	1 po	18 po
	Côté porte d'accès	1 po	18 po
HD/HDB	Côté opposé à la porte	1 po	18 po
	Arrière	18 po	18 po
HD/HDB	Arrière	18 po	18 po
	Raccord évacuation	4 po	18 po

5. Vérifiez que les distances minimales aux surfaces combustibles et les dégagements recommandés pour l'entretien sont respectés. Les distances d'installation et les dégagements minimaux sont indiqués au tableau 4.1.

6. N'installez pas les appareils à un endroit où le système d'inflammation du gaz serait exposé à un brouillard d'eau, à la pluie ou à un goutte-à-goutte.

7. La hauteur de montage (mesurée du bas de l'appareil) est un aspect critique de l'installation. Pour les hauteurs de montage et les portées de chauffage, reportez-vous à la page 17 de ce manuel. La hauteur de montage maximale est le niveau pour lequel l'air chaud de l'appareil n'atteint plus le plancher.

Exigences en matière d'air de combustion

Le National Fuel Gas Code définit un « espace clos » comme un espace dont le volume est supérieur à 1,41 mètre cube (50 pieds cubes) par tranche de 1000 BTU/h de puissance calorifique installée est considéré comme un espace clos.

L'installation de ces appareils de chauffage dans des espaces clos résidentiels n'est pas recommandée. Cette recommandation est basée sur le fait qu'à un certain moment, les ouvertures d'air de combustion prévues par l'installateur pourraient être bloquées ou masquées, intentionnellement ou accidentellement. Si, malgré cette recommandation, vous décidez d'installer l'appareil dans un espace clos résidentiel, il faut consulter le National Fuel Gas Code ANSI Z223.1 (NFPA 54) ou le code d'installation CSA B149.1, dernière édition, pour connaître les dispositions détaillées relatives à l'air de combustion. L'installation doit respecter ces exigences. Les appareils installés dans des espaces clos d'installations industrielles ou commerciales doivent disposer d'ouvertures permanentes – l'une proche du haut et l'autre proche du bas de l'espace confiné. Chaque ouverture doit avoir un espace libre d'au moins 6,45 cm² (1 po²) par tranche de 1000 BTU/h de puissance calorifique totale de tous les appareils qui se trouvent dans un espace confiné, et doit communiquer librement avec les zones intérieures, lesquelles doivent avoir une infiltration adéquate de l'extérieur.

Pour des détails sur l'apport d'air de combustion dans un espace confiné (hermétiquement fermé) ou non confiné, consultez le National Fuel Gas Code ANSI Z223.1 (NFPA 54) ou le code d'installation CSA B149.1, dernière édition.

Inverser l'appareil en le tournant de 180° (modèles 30-75

seulement)

Tous les appareils sont livrés avec les commandes à gauche, lorsqu'on les regarde de l'avant. Si l'installation nécessite que les commandes soient sur le côté droit, tous les appareils, sauf les HD/HDB 100 et 125, peuvent être retournés en suivant les instructions ci-après.

- Le fait de retourner l'appareil de 180° par rapport à sa position d'origine, inverse ses côtés, mais l'avant et l'arrière conservent leurs positions relatives. Le panneau du bas devient le panneau du haut, et vice-versa.
- Le panneau d'accès doit être démonté, retourné de 180° et remis en place de manière que ses étiquettes d'information soient lisibles.
- Enlevez les persiennes à ressort, retournez-les et remontez-les. Ouvrez et réglez les persiennes pour que l'air chaud soit rabattu vers le plancher.

PRÉCAUTIONS PARTICULIÈRES / FACTEURS DE CONVERSION SI (SYSTÈME MÉTRIQUE) / EMPLACEMENT D'INSTALLATION

AVANT DE COMMENCER

ATTENTION

1. Toute la documentation livrée avec l'appareil doit être conservée pour référence lors des opérations d'entretien et de diagnostic des panes. Laissez le manuel au propriétaire. Ne jetez aucune documentation fournie avec cet appareil.
2. Étudiez les instructions en matière de tuyauterie, de câblage électrique et d'évacuation des gaz de ce manuel avant d'effectuer l'installation finale.
3. Ne raccordez pas les gaines, les filtres à air ou les faisceaux de tubes à un aérotherme.

Aux États-Unis, l'installation de ces appareils doit se faire conformément au code « National Fuel Gas Code », ANSI Z223.1, dernière édition (aussi connu sous le nom de NFPA 54) et aux autres codes du bâtiment locaux applicables. Au Canada, l'installation de ces appareils doit se faire conformément aux codes locaux de la plomberie et des eaux usées, et aux autres codes applicables, ainsi qu'à la version courante du code CSA B149.1.

1. Toutes les opérations d'installation et d'entretien de ces appareils doivent uniquement être confiées à une entreprise qualifiée, telle que définie dans la dernière édition de la norme ANSI Z223.1 (NFPA 54) ou, au Canada, par un installateur de gaz certifié.
2. Cet appareil est livré avec le système de commande fourni. Veuillez commander les pièces de rechange d'après la liste de pièces qui se trouve sur la plaque signalétique. Ayez toujours à portée de la main les numéros de modèle et de série. Modifiez la réserve le droit de substituer d'autres commandes listées comme pièces de rechange.
3. L'appareil est équilibré pour un fonctionnement correct. Ne modifiez pas le ventilateur ou ne faites pas fonctionner les moteurs à vitesse réduite.
4. La documentation sur les organes de régulation est fournie séparément.
5. Le même brûleur convient pour le gaz naturel et pour le propane.

ATTENTION

17. Pour l'essai d'étanchéité des tuyauteries d'alimentation en gaz, l'appareil et son régulateur de gaz combiné doivent être isolés pour tout essai fait à une pression dépassant 14 po C.E. ou (1/2 psi).
18. L'appareil doit pouvoir être isolé de la conduite d'alimentation en gaz par la fermeture d'un robinet d'arrêt manuel posé à l'installation. Ce robinet d'arrêt doit être à une distance d'au moins 1,8 m (6 pi) de l'appareil de chauffage.
19. Formez l'arrivée générale de gaz avant d'installer l'appareil.
20. Assurez-vous que la tension d'alimentation de l'appareil, comme indiqué sur la plaque signalétique, n'est pas inférieure à 5% sous la tension nominale.
21. Mesurez la pression d'entrée du gaz en amont du régulateur de gaz combiné. La pression d'entrée de l'appareil doit être de 6 à 7 po C.E. pour le gaz naturel ou de 11 à 14 po C.E. pour le propane. Si la pression d'entrée est trop élevée, installez un détendeur supplémentaire en amont du régulateur de gaz combiné.
22. L'entretien et les réparations de l'appareil doivent être confiés à un centre de SAV qualifié.
23. Ne tentez pas de réutiliser un contrôleur mécanique ou électronique d'allumage qui a été atteint par l'eau. Remplacez tout contrôleur défectueux.

IMPORTANT

1. Pour éviter la panne prématurée de l'échangeur de chaleur, ne placez AUCUN appareil à gaz à des endroits où des vapeurs corrosives (chlorées, halogénées ou acides) sont présentes dans l'atmosphère.
2. Pour éviter une défaillance prématurée de l'échangeur de chaleur, l'apport calorifique du gaz utilisé ne doit pas excéder de plus de 5% la valeur nominale inscrite sur la plaque signalétique de l'appareil.
3. Consultez l'essentiel des solutions possibles dans le guide de dépannage fourni au tableau 19.1 du manuel.

Pour convertir	Multipliez par	Pour obtenir
po C.E.	0,249	KPa
°F	(°F-32) x 5/9	°C
BTU	1,06	KJ
BTU/pi ³	37,3	KJ/m ³
BTU/h	0,000293	KW/h
CFH (pi ³ /h)	0,000472	m ³ /min
CFH (pi ³ /h)	0,00000787	m ³ /s
CFM (pi ³ /min)	0,0283	m ³ /min
CFM (pi ³ /min)	0,000472	m ³ /s
piéd	0,305	m
Gal/h	3,79	l/h
Gal/h	3,79	l
gallons	3,79	l
cheval-vapeur	746	W
pouces	25,4	mm
livre	0,454	kg
psi	6,89	KPa
psi	27,7	po C.E.

Facteurs de conversion SI (Système métrique)

PRÉCAUTIONS PARTICULIÈRES
LES INSTRUCTIONS D'INSTALLATION ET D'ENTRETIEN DE CE MANUEL
DOIVENT ÊTRE RESPECTÉES POUR ASSURER UN FONCTIONNEMENT
CORRECT ET SANS PROBLÈMES. IL CONVIENT ÉGALEMENT
DE RESPECTER RIGOREUSEMENT LES PRÉCAUTIONS PARTICULIÈRES
CI-APRÈS. LE FAIT DE NE PAS SE CONFORMER À CES PRÉCAUTIONS
CRITIQUES PEUT CAUSER DES DOMMAGES MATÉRIELS, DES BLESSURES
OU LA MORT. CES INSTRUCTIONS SONT DONNÉES SOUS RÉSERVE DE
HIÉRARCHIE DES NIVEAUX DE RISQUES

- DANGER** : Indique un danger imminent qui, s'il n'est pas évité, entraînera l'INÉVITABLEMENT des blessures graves, voire mortelles.
- AVERTISSEMENT** : Indique un danger potentiel qui, s'il n'est pas évité, POURRAIT engendrer des blessures graves, voire mortelles.
- ATTENTION** : Indique un danger potentiel qui, s'il n'est pas évité, PEUT engendrer des blessures mineures ou modérées.
- IMPORTANT** : Indique une situation qui, si elle n'est pas évitée, PEUT poser un problème de sécurité.

DANGER

Les appareils ne doivent pas être installés à un endroit où ils risquent d'être exposés à une atmosphère potentiellement explosive ou inflammable.

AVERTISSEMENT

- Un système d'évacuation est obligatoire pour les appareils de chauffage au gaz – ne les faites jamais fonctionner sans évacuation des gaz.
- Un extracteur intégré assure la circulation des gaz – il est inutile ou interdit d'installer un dispositif d'extraction externe supplémentaire.
- Si un appareil de chauffage existant est remplacé, vous devez peut-être redimensionner les systèmes d'évacuation des gaz. Un système de ventilation de diamètre insuffisant peut causer des refoulements de gaz brûlés ou la formation de condensat. Reportez-vous au National Fuel Gas Code ANSI Z223.1 (NFPA 54) ou à la dernière édition de la norme CSA B149.1. Le non-respect de ces instructions peut avoir des conséquences graves ou mortelles.
- Il est interdit d'accoupler deux longueurs de tuyau à double paroi dans une même installation d'évacuation horizontale à cause de l'impossibilité de vérifier l'étanchéité des raccords du tuyau intérieur.
- Toutes les tuyauteries de gaz existantes doivent être soumises à des essais de pression et d'étanchéité avant la mise en marche. Ne recherchez jamais les fuites avec une flamme nue. Utilisez plutôt de l'eau savonneuse ou un produit équivalent.
- La pression de gaz au régulateur de l'appareil ne doit jamais dépasser 14 po C.E. (1/2 psi).
- Pour réduire les risques de condensation, le pouvoir calorifique minimum du gaz (au niveau de la mer) ne doit pas être inférieur de plus de 5 % à la valeur minimale nominale figurant sur la plaque signalétique de l'appareil ou de 5 % à la valeur la plus basse des appareils à double alimentation.
- Débranchez l'alimentation électrique avant de faire les connexions pour éviter les chocs électriques et les dommages à l'équipement.
- Tous les branchements et câblages doivent être faits en stricte conformité avec le schéma fourni avec l'appareil. Tout câblage différentiel de celui du schéma peut créer des risques de dommages matériels ou de blessures.
- Tout câblage usiné d'origine exigeant un remplacement doit être remplacé par un câble d'indice thermique nominal de 105 °C.
- Vérifier que la tension d'alimentation n'est pas supérieure de plus de 5 % à la tension nominale inscrite sur la plaque de l'appareil.
- Pour l'entretien et les réparations de cet appareil, n'utiliser que des pièces d'origine certifiées. Pour la liste complète des pièces de rechange, adressez-vous au fabricant. Le numéro de modèle complet, le numéro de série et l'adresse du fabricant figurent sur la plaque signalétique fixée à l'appareil. Toute substitution de pièce ou de commande non approuvée par le fabricant sera aux risques du propriétaire.

ATTENTION

- Toute la documentation livrée avec l'appareil doit être conservée pour référence lors des opérations d'entretien et de diagnostic des pannes. Ne jetez aucune documentation fournie avec cet appareil.
- Étudiez les instructions en matière de tuyauterie, de câblage électrique et d'évacuation des gaz de ce manuel avant d'effectuer l'installation finale.
- Ne raccordez pas les gaines, les filtres à air ou les faisceaux de tubes à un aérotherme.
- Les dégagements par rapport aux matériaux combustibles adjacents sont essentiels. Assurez-vous de respecter toutes les exigences mentionnées.
- N'installez pas les appareils dans des pièces très hermétiques ou des petits compartiments (espaces clos) sans établir une bonne ventilation réservée à l'entretien ou à l'entreposage, le bas de l'appareil doit être placé à au moins 2,13 m (7 pi) du sol, sauf si vous installez aussi des protections adéquates pour éviter les contacts avec des pièces mobiles. Dans les stationnements, l'appareil doit être installé conformément à la norme relative aux structures de stationnement ANSI/NFPA 88A (dernière édition), et dans les garages de réparation, conformément à la norme NFPA 30A (dernière édition) (ex-NFPA 88B), Au Canada, l'installation d'appareils de chauffage dans des hangars d'aviation doit être effectuée conformément aux exigences de l'autorité de réglementation et, dans les garages publics, conformément aux codes courants CSA B149.
- Dans un hangar d'aviation, le bas de l'appareil doit être à au moins 3 m (10 pi) au-dessus de la plus haute surface des ailes ou d'un capot moteur, pour l'avion le plus haut que le hangar est destiné à accueillir et être installés à une hauteur de moins de 2,1 m (7 pi), mesurée entre le dessous et le plancher (à moins d'installer une protection appropriée des parties mobiles) et, dans le cas d'applications résidentielles, à une hauteur de moins de 1,5 m (5 pi) entre le dessous et le plancher.
- Vérifiez qu'il n'y a pas d'obstacle devant la prise d'air et la sortie d'air chaud.
- La distance minimum des matériaux combustibles dépend de la température de surface du matériau combustible ne dépassant pas 160 °F. Au-dessus de l'appareil, il faudra peut-être laisser un dégagement supérieur au minimum spécifié si des matériaux placés au-dessus de l'appareil à la température indiquée risquent de subir des dommages thermiques, autres que le feu.
- Prévoyez un dégagement de 46 cm (18 po) à l'arrière ou de 15 cm (6 po) au-delà de l'extrémité du moteur, selon la plus grande des deux valeurs, et du côté de la porte d'accès pour assurer assez d'air pour le bon fonctionnement du ventilateur et pour la combustion.
- L'installation doit se faire conformément aux codes locaux de la construction ou, à défaut de tels codes, conformément au National Fuel Gas Code, ANSI Z223.1 (NFPA 54) – dernière édition. Au Canada, l'installation doit se faire selon le code CSA B149.1.
- La purge de l'air des tuyauteries de gaz doit se faire selon la procédure ANSI Z223.1 (NFPA 54) de la dernière édition du National Fuel Gas Code. Au Canada, l'installation doit se faire selon le code CSA B149.1.

Tous les modèles approuvés pour une utilisation en Californie par le

CFC et au Massachusetts. L'appareil de chauffage est certifié pour des applications résidentielles et commerciales. Ces aérothermes sont certifiés comme appareils de chauffage utilitaire et sont destinés au chauffage d'espaces non vivants reliés, adjacents ou faisant partie d'une structure contenant des espaces pour les logements de la famille. Ils ne sont pas destinés à être la principale source de chaleur dans les applications résidentielles.



IMPORTANT

Ce manuel est spécifiquement destiné au personnel d'une entreprise d'installation et d'entretien qualifiée. Toutes les opérations d'installation et d'entretien doivent être confiées à une entreprise qualifiée.

Inspection à la réception

1. Inspectez l'appareil à la livraison. Signalez immédiatement tout dommage au transporteur et avisez le représentant commercial local de Modine.
2. Vérifiez la plaque signalétique pour déterminer si les caractéristiques de l'appareil correspondent au secteur électrique disponible au point d'installation.
3. Inspectez l'appareil à la réception pour vous assurer qu'il est conforme à la description du produit commandé (y compris aux spécifications, s'il y a lieu).

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2	Précisions spéciales.
3	Facteurs de conversion métrique (SI).
4	Avant de commencer.
4	Emplacement d'installation.
4	Matériaux combustibles et dégagements.
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5	Installation de l'appareil.
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12	Raccordements au gaz.
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19	Dimensions.
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21	Schéma de câblage de l'appareil.
22	Numéro de série ou de modèle et pièces de rechange.
	Garantie commerciale.
	Couverture arrière.



AVERTISSEMENT

1. Une installation, des réglages, des modifications ou un entretien inappropriés peuvent causer des dommages matériels, des blessures ou la mort, ainsi que l'exposition à des substances reconnues par divers organismes officiels comme causant des cancers, des malformations congénitales ou des anomalies du système reproducteur. Lisez attentivement les instructions d'installation, d'utilisation et d'entretien avant d'installer ou d'entretenir cet appareil.
2. N'installez AUCUN appareil fonctionnant au gaz dans des lieux où l'atmosphère contient des vapeurs chlorées, halogénées ou acides. Ces substances peuvent causer une défaillance prématurée de l'échangeur de chaleur, en raison de la corrosion, laquelle peut provoquer des dommages matériels, des blessures graves ou même la mort.

POUR VOTRE SÉCURITÉ

SI VOUS SENTEZ UNE ODEUR DE GAZ :

1. Ouvrez les fenêtres.
2. Ne tentez d'allumer aucun autre appareil.
3. Ne touchez pas aux interrupteurs électriques et n'utilisez aucun téléphone dans votre édifice.
4. Appelez immédiatement votre compagnie de gaz depuis le téléphone d'un voisin. Suivez les instructions de la compagnie de gaz. Si vous ne pouvez pas contacter votre compagnie de gaz, appelez les pompiers.

POUR VOTRE SÉCURITÉ

L'utilisation et le stockage d'essence ou d'autres vapeurs et liquides inflammables dans des récipients ouverts à proximité de cet appareil sont dangereux.



Hot Dawg® Troubleshooting Guide



MODINE
Always Innovating. Always Improving.

Troubleshooting Hot Dawg® Direct Spark Units

IMPORTANT

The use of this manual is specifically intended for a qualified installation and service agency. All installation and service of these units must be performed by a qualified installation and service agency.

FOR YOUR SAFETY

What to do if you smell gas:

1. Open windows.
2. Do not try to light any appliance.
3. Do not touch any electrical switch; do not use any phone in your building.
4. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call your fire department.

WARNING

1. Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death and could cause exposure to substances which have been determined by various state agencies to cause cancer, birth defects, or other reproductive harm. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.
2. Do not locate ANY gas-fired units in areas where chlorinated, halogenated or acidic vapors are present in the atmosphere. These substances can cause premature heat exchanger failure due to corrosion, which can cause property damage, serious injury or death.

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Introduction

The purpose of this handbook is to help you troubleshoot through any problems that might come up when installing or servicing your Modine Hot Dawg® unit heater.

Definitions

Soft Lockout of Control: The control does not initiate a call for continuous fan while in lockout. The control will respond to an open limit and undesired flame. Lockout shall automatically reset after 1 hour. Lockout may be manually reset by removing power from the control for more than 1 second or removing the thermostat call for heat for more than 1 and less than 20 seconds.

Hard Lockout: If the control detects a fault on the control board, the status LED will be de-energized and the control will lockout as long as the fault remains. A hard lockout will automatically reset if the hardware fault clears.

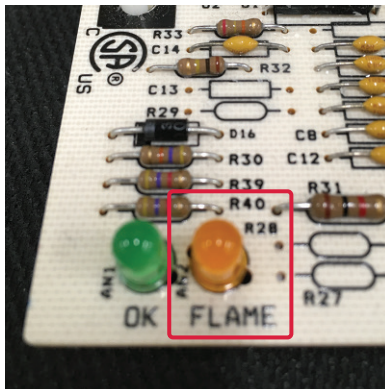
Flame Status – Yellow LED Labeled “Flame”

Flame status LED is lit when flame is sensed.

Flame LED flashes slowly when flame current is below 1.0uA (+/- 50%), to indicate a “weak” flame.

Flame LED flashes fast when flame is present with gas valve off.

- If flame is sensed longer than four seconds while the gas valve is de-energized, the control shall energize the power exhauster and indoor blower motor
- When flame is no longer sensed, the power exhauster will run through post-purge and the blower motor will run through fan off delay time
- The control will do a soft lockout, but will still respond to open limit and flame
- Flame LED shall flash rapidly when lockout is due to undesired flame



Heating Sequence of Operation

Listed below is the sequences of operation that occurs when there is a call for heat:

- The green LED will be on at all times. It only flashes during a fault.
- Thermostat contacts close board terminals R & W together
- The 24 VAC at terminal W goes through the limit string first
- Terminal IND sends 115 VAC to the power exhauster
- The air draft causes the pressure switch to close
- After a short delay, 24 VAC powers the gas valve open
- The igniter sparks when the gas valve opens
- Flame is detected when it carries electrical current from the flame rod
- The yellow LED is on, the igniter stops, and the gas valve stays open
- After 30 sec, terminal HEAT sends 115 VAC to power the fan motor
- When satisfied, thermostat contacts open between R & W
- The gas valve closes. The yellow LED is off. The power exhauster and fan purge for 60-90 sec, then shut off.

Thermostat Connections

Listed below are typical residential thermostat connections to the Hot Dawg® control board. Consult thermostat manufacturer's instructions for more details.

- T-stat terminal R (required) - Connects to board terminal R for a 24 VAC source
- T-stat terminal W (required) - Connects to board terminal W to call for heat
- T-stat terminal G (optional) - Connects to board terminal G to call for fan
- T-stat terminal C (optional) - Required for some digital t-stats
Connects to board terminal C for a ground/neutral

Call for Heat – Unit Does Nothing

The below troubleshooting steps refer to situations where the green light on the control board is ON:

Step 1: Verify that the thermostat is wired correctly and there is a call for heat.

Step 2: Verify that the thermostat is wired between the R & W terminals on the terminal strip.

Step 3: Once you've verified that the thermostat is wired correctly and the unit still does not operate, then:

- Turn power off
- Remove thermostat wires
- Carefully install a jumper wire between terminals R & W directly on the control board
- Turn power on (Be aware that the unit may start!)

Step 4: If the installation of a jumper wire resolved the issue, then proceed to the next step. If, however, the installation of a jumper wire did not solve the issue, please turn to page 8.

Step 5: If unit operates correctly when a jumper wire is installed between terminals R & W on the board, check the field wiring to the thermostat and verify the wiring, replacing the thermostat if needed.

Call for Heat – Unit Does Nothing

The below troubleshooting steps refer to situations where the green light on the control board is ON and the unit does NOT operate correctly when a jumper wire is installed between terminals R & W on the control board:

Step 1: Check for loose connections. Disconnect and reconnect all Molex plugs.

Step 2: Check to make sure there are no troubleshooting codes.

Step 3: Turn the switch to the gas valve off and on. Then leave valve on.

Step 4: If the unit still does not operate correctly, you may have a bad control board.

- If you suspect a bad control board, turn to page 23 and follow the additional troubleshooting steps before replacing the control board.

Call for Heat – Unit Does Nothing

The below troubleshooting steps refer to situations where the green light on the control board is OFF:

Step 1: If the green light on the control board is off, verify there is not a flash code.

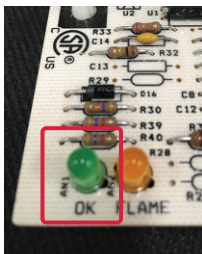
Step 2: Verify that there is 24 VAC between Sec & Com on the control board.

- If 24 VAC is not present between Sec & Com, turn to page 10 for further troubleshooting steps.

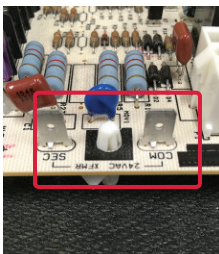
Step 3: Check the fuse for a blown element:

- Remove the fuse
- Check for continuity
- If fuse is blown, replace fuse
- If fuse is not blown, then the terminal board is not letting 24 VAC through the board. If this is the case, please refer to page 23 to see troubleshooting steps to take before replacing the control board.

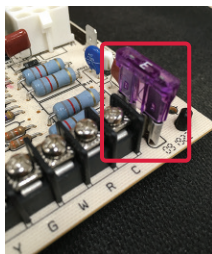
Step 4: Check for loose connections.



GREEN LIGHT



SEC & COM TERMINALS



FUSE

Call for Heat – Unit Does Nothing

The below troubleshooting steps refer to situations where the green light on the control board is OFF and 24 VAC is NOT present between Sec & Com on board:

Step 1: Check for loose connections.

Step 2: Check incoming power (115 VAC).

Step 3: If incoming power is correct, check for 24 VAC at the secondary of the transformer.

- If incoming voltage is correct and there is no voltage at the secondary, then replace transformer.
- For more information on how to replace transformer, please visit www.youtube.com/modineHVAC.

No Flashes – Troubleshooting Codes

The below troubleshooting information is related to situations where there are **NO** flashes:

- If there is no flash code, please refer to page 8, and follow the troubleshooting steps.

One Flash – No Power Exhauster

The below troubleshooting information is related to situations where the power exhauster does not cycle on:

- When there is a ONE flash troubleshooting code, the unit is indicating that the pressure switch is not closing within 30 seconds of the power exhauster being energized.
- To determine the cause of the issue, check to see if the power exhauster is cycling on. If the power exhauster is NOT cycling on, then continue to the possible causes listed below. If, however, the power exhauster IS cycling on, go to page 13.

Possible Causes:

- Defective exhauster motor
 - This occurs when the exhauster motor is receiving 115 volts from IND and NEUTRAL terminals on the board, but the exhauster will not run. To solve this issue, the exhauster needs to be replaced. Verify and replace if necessary.
- Defective control board
 - Not sending 115 volts from IND and NEUTRAL terminals to exhauster. To solve this issue, replace board.
 - Before replacing the board, review page 23 on control board troubleshooting steps.

One Flash – Pressure Switch Won't Close

The below troubleshooting information is related to situations where the power exhauster DOES cycle on:

Unit Sequence: Green light on, call for heat, 24 VAC at R & W, power exhauster cycles on after approximately 30 seconds, Green light will give one flash.

- When there is a one flash troubleshooting code, it is indicating that the pressure switch is not closing within 30 seconds of the power exhauster being energized.

Possible Causes:

Blockage in tubing to pressure or venting is not allowing for a proper vacuum to pull pressure switch contacts closed. To solve this issue, troubleshoot the units venting.

- Wire off pressure switch
- 24 VAC not coming from board
- Defective pressure switch
 - If this is the case, verify the switch is defective and replace.

For more information, visit www.youtube.com/ModineHVAC and watch the video on venting.

Two Flashes – Pressure Switch Closes Before Power Exhauster Energizes

When there is a TWO flash troubleshooting code, the unit is indicating that the pressure switch has closed before the power exhauster is energized.

Troubleshooting Steps:

1. Pull one of the yellow wires off the pressure switch. If the power exhauster turns on and the code goes away, replace the switch. If the code persists, go to step 2.
2. Check the yellow wires to see if they are shorted together. Make sure the connector for the safety harness is seated correctly on the board.
3. If there are no wiring faults, then there is a defective board (verify and replace if bad).

Three Flashes – Open in the Safety Switch Circuit

When there is a **THREE** flash troubleshooting code, the unit is indicating that the limit switch or flame roll out switch is open.

- **The limit switch is ignored unless a call for heat is present (R to W energized).**
- If the limit switch is open and a call for heat is present, then:
 - The control de-energizes the gas valve, runs the blower motor and runs the power exhauster.
 - The control will flash three times on the LED unit the limit switch closes.
 - When the switch re-closes or the call for heat is lost, the control runs the power exhauster through post-purge and runs the blower through the fan off delay.
 - The control will return to normal operation after the blower off delay is completed.

Possible Causes:

- Open or short in safety circuit (flame roll out switches some and some limit switches are manual reset):
 - Check for open contacts on switches in safety circuit. Reset flame roll out switches and manual reset limit switches.
 - Check wiring for loose connections.
 - Replace defective limits if they will not reset automatically or manually after the unit heater has cooled.
 - Defective board, not letting 24 VAC through limits.
 - For more information on fixing or replacing a defective board, reference page 23.

Four Flashes – Unit Sparks, Lights Flame and Shuts Down After 10 Seconds

The information below is related to situations where the unit **DOES SPARK** and then **SHUTS DOWN** within 10 seconds:

This usually occurs as a result if the safety switch circuit is open:

- Pressure switch is open

Unit Sequence:

- Green light on, call for heat
- Power exhauster cycles on, burner lights, no yellow flame light on board, burner shuts down after 10 seconds. Fan motor never cycles on.

Possible Causes:

- Reversed polarity:
 - To check for reversed polarity:
 1. Remove the call for heat
 2. Measure voltage across terminal L1 and case. It should be 115 VAC
 3. Measure voltage across terminal NEUTRAL and case.
It should be 0 VAC
 4. If the readings are backwards, shut off power, then reverse LI and neutral wires coming from the panel to the unit
- Loose flame sensor wire
- Dirty or defective flame sensor, not sending micro-amps to board:
 - Clean sensor with emery cloth
 - If issue is not resolved, verify and replace sensor
- Defective board
 - Getting correct micro-amps from sensor, but not allowing unit to ignite
 - For more information on fixing or replacing a defective board, reference page 23.

Four Flashes – Unit in Lockout From Failed Ignition/ Flame Loss – Unit Sparks but Doesn't Ignite

The information below is related to situations where the unit is in lockout from failed ignition or flame loss. The unit sparks but **DOES NOT IGNITE**:

Unit Sequence:

- Green light on, call for heat, 24 VAC at R & W terminals
- Power exhauster cycles on, start pre-purge, 24 VAC through pressure switch and limits
- Igniter sparks, no ignition, no yellow flame sensor light
- Unit will cycle five times in this manner, then the green light will flash four times. Power exhauster will cycle off and fan motor will never cycle on.

Possible Causes:

- Gas valve in “off” position
- No 24 VAC from board to gas valve
- Loose wires
 - Wire off gas valve
- Excessive inlet pressure
- Low or no gas pressure to inlet of valve (purge lines)
- Defective gas valve
 - Verify and replace if required
- Defective board
 - Now allowing ignition
 - For more information on fixing or replacing a defective board, reference page 23.

Four Flashes – Unit Doesn't Spark

The information below is related to situations where the unit is in lockout from failed ignition or flame loss and the unit **DOES NOT SPARK**:

Unit Sequence:

- Green light on, call for heat
- Power exhauster cycles on, starts pre-purge
- 24 VAC power present through pressure switch, limits and to valve
- No spark at igniter. RAW gas is going through orifices for approximately six seconds during this cycle. Unit then cycles off, and there is no yellow flame sense light.
- Will cycle FIVE times in this manner. Then, green light will flash four times, power exhauster will cycle off and the fan motor does not turn on.

Possible Causes:

- Loose wires
 - Wire off igniter
- Defective or damaged igniter
 - Examine, verify and replace if needed
- Defective board
 - Not sending voltage to the igniter
 - For more information on fixing or replacing a defective board, reference page 23.

Five Flashes – Twin Communication Fault

The information below is related to situations where the troubleshooting code flashes FIVE times:

Twin Communication Fault:

- Occurs if the 24 VAC supply to the twins are not in phase with each other or power is removed from one of the twins.
- While a twin fault exists, the control does not respond to thermostat commands, and the green light will flash five times.
 - Open limit and undesired flame response are still operational
 - The control continually tries to establish communication and automatically resumes normal operation when communication is re-established
 - If a twin fault occurs during a heat cycle, both furnaces will terminate the call immediately
 - The only chance for blower mis-synchronization is if the blower off delays are set differently on the twins
 - If a twin fault occurs during high speed fan or continuous fan operation, both controls will shut the blowers off immediately.
 - If a twin communication terminal is not in use and the unit is showing a troubleshooting code of five flashes, the board may be defective.

Six Flashes – Main Air Mover Doesn't Cycle On

The information below is related to situations where the main air mover **DOES NOT** cycle on:

This usually occurs as a result of an open in the safety switch circuit:

- Limit switch or flame roll out switch is open

Unit Sequence:

- Green light on, call for heat, power exhauster cycles on, pre-purge
- 24 VAC power present through pressure switch, limits and to valve
- Igniter sparks, burner cycles on, yellow flame light turns on, board is on
- After three to four minutes, unit goes out on a limit switch, yellow light turns off, green light then flash six times

Possible Causes:

- Loose wires
 - Check all wiring for a loose wire
- Defective motor
 - 115 VAC at EAC and neutral terminals on board, but motor does not turn on
- Defective board
 - 115 VAC not present at EAC and neutral terminals
 - For more information on fixing or replacing a defective board, reference page 23.

Six Flashes – Main Air Mover Does Cycle On

The information below is related to situations where the main air mover DOES cycle on:

Unit Sequence:

- Green light on, call for heat, power exhauster cycles on, fan motor cycles on, green light flashes six times

Possible Causes:

- Open contacts due to over-firing of unit (flame roll out switches and some limit switches are manual reset)
 - Check gas pressure
 - Check to make sure nothing is blocking the airflow of the unit
 - Wire off limit or flame rollout switch
 - Limit or flame rollout switch shorting to the unit
 - Defective limit or flame rollout switch
 - Verify and replace
- Defective board
 - Not letting 24 VAC through limits
 - For more information on fixing or replacing a defective board, reference page 23.

Seven Flashes – Five Flame Losses During One Heat Cycle

The information below is related to situations where there are five flame losses during one heat cycle. If this occurs, you will see a troubleshooting code for SEVEN flashes:

Ignition Re-cycle:

- The control will re-cycle up to five flame losses (4 re-cycles) within a single call for heat before the unit goes into lockout.

Before Replacing a Control Board

- Remove thermostat and use a temporary jumper wire to make a call for heat
- Check the supply power for correct polarity
- Re-check all wiring to the control board for loose connections:
 - Disconnect and reconnect all Molex plugs
- Re-check that the wiring to the control board matches the wiring diagram
- If the control board has a fuse, remove and test continuity of the fuse
Important: Do not just do a visual inspection of the fuse – check continuity
- Make sure the pressure switch is not opening during the call for heat cycle
- Check limits and rollout switches for an open circuit
- Turn the switch on the gas valve to off and then to on several times
- Make sure the power exhauster is running when there is a call for heat
- Check for a proper micro-amp signal from the flame sensor to the control board:
 - A proper signal is 1-5 micro-amps
- Check for proper supply gas pressure:
 - Excessive gas pressure can/will lock up the main valve
- Check for limit and/or flame sensor shorts:
 - Make sure they are not touching metal
- Check for any moisture on board that may have occurred if checking for gas leaks with a liquid solution
- Check in-line regulators for BTU sizing and lockup point not above a 14" WC
- Review troubleshooting codes
- Check to make sure external regulator is not right next to the unit so that the regulator “fights” the regulator inside the combination gas valve
- Check settings of heat anticipator of thermostat if applicable, making sure to also check wire size and run length

For Additional Help

For additional help, visit
www.ModineHVAC.com

To find installation & service manuals, visit
<http://www.modinehvac.com/resources/product-literature/>

In addition, Modine has live operators
That can be reached at:
(800)-828-4328

Scan the QR code for a mobile-
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6-549.1

INSTALLATION AND SERVICE MANUAL

power vented gas-fired unit heaters

models PDP and BDP



All models approved for use in California by the CEC and in Massachusetts. Unit heater is certified for non-residential applications.

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

⚠ WARNING

1. Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death, and could cause exposure to substances which have been determined by various state agencies to cause cancer, birth defects, or other reproductive harm. Read the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment.
2. Do not locate ANY gas-fired units in areas where chlorinated, halogenated, or acidic vapors are present in the atmosphere. These substances can cause premature heat exchanger failure due to corrosion, which can cause property damage, serious injury, or death.

IMPORTANT

The use of this manual is specifically intended for a qualified installation and service agency. All installation and service of these units must be performed by a qualified installation and service agency.

FOR YOUR SAFETY

WHAT TO DO IF YOU SMELL GAS:

1. Open windows.
2. Do not try to light any appliance.
3. Do not touch any electrical switch; do not use any phone in your building.
4. Extinguish any open flame.
5. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you can not reach your gas supplier, call your fire department.

Inspection on Arrival

1. Inspect unit upon arrival. In case of damage, report it immediately to transportation company and your local Modine sales representative.
2. Check rating plate on unit to verify that power supply meets available electric power at the point of installation.
3. Inspect unit upon arrival for conformance with description of product ordered (including specifications where applicable).

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SPECIAL PRECAUTIONS

SPECIAL PRECAUTIONS

THE INSTALLATION AND MAINTENANCE INSTRUCTIONS IN THIS MANUAL MUST BE FOLLOWED TO PROVIDE SAFE, EFFICIENT AND TROUBLE-FREE OPERATION. IN ADDITION, PARTICULAR CARE MUST BE EXERCISED REGARDING THE SPECIAL PRECAUTIONS LISTED BELOW. FAILURE TO PROPERLY ADDRESS THESE CRITICAL AREAS COULD RESULT IN PROPERTY DAMAGE OR LOSS, PERSONAL INJURY, OR DEATH. THESE INSTRUCTIONS ARE SUBJECT TO ANY MORE RESTRICTIVE LOCAL OR NATIONAL CODES.

HAZARD INTENSITY LEVELS

1. **DANGER:** Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.
2. **WARNING:** Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.
3. **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.
4. **IMPORTANT:** Indicates a situation which, if not avoided, MAY result in a potential safety concern.

DANGER

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

WARNING

1. Gas fired heating equipment must be vented - do not operate unvented.
2. A built-in power exhauster is provided - additional external power exhausters are not required or permitted.
3. If an existing heater is being replaced, it may be necessary to resize the venting systems. Improperly sized venting systems can result in vent gas leakage or the formation of condensate. Refer to the National Fuel Gas Code ANSI Z223.1 (NFPA 54) or CSA B149.1 – latest edition. Failure to follow these instructions can result in injury or death.
4. Under no circumstances should two sections of double wall vent pipe be joined together within one horizontal vent system due to the inability to verify complete seal of inner pipes.
5. All field gas piping must be pressure/leak tested prior to operation. Never use an open flame. Use a soap solution or equivalent for testing.
6. Gas pressure to appliance controls must never exceed 14" W.C. (1/2 psi).
7. To reduce the opportunity for condensation, the minimum sea level input to the appliance, as indicated on the serial plate, must not be less than 5% below the rated input, or 5% below the minimum rated input of dual rated units.
8. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
9. All appliances must be wired strictly in accordance with wiring diagram furnished with the appliance. Any wiring different from the wiring diagram could result in a hazard to persons and property.
10. Any original factory wiring that requires replacement must be replaced with wiring material having a temperature rating of at least 105°C.
11. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% greater than the rated voltage.

WARNING

12. When servicing or repairing this equipment, use only factory-approved service replacement parts. A complete replacements parts list may be obtained by contacting the factory. Refer to the rating plate on the appliance for complete appliance model number, serial number, and company address. Any substitution of parts or controls not approved by the factory will be at the owner's risk.

CAUTION

1. All literature shipped with this unit should be kept for future use for servicing or service diagnostics. Do not discard any literature shipped with this unit.
2. Consult piping, electrical, and venting instructions in this manual before final installation.
3. Do not attach ductwork, air filters, or polytubes to any propeller unit heater.
4. Clearances to combustible materials are critical. Be sure to follow all listed requirements.
5. Heaters are designed for use in heating applications with ambient startup temperatures between -40°F and 90°F and ambient operating temperatures between 40°F and 90°F.
6. Do not install unit outdoors.
7. In garages or other sections of aircraft hangars such as offices and shops that communicate with areas used for servicing or storage, keep the bottom of the unit at least 7' above the floor unless the unit is properly guarded to provide user protection from moving parts. In parking garages, the unit must be installed in accordance with the standard for parking structures ANSI/NFPA 88A - latest edition, and in repair garages the standard for repair garages NFPA 30A - latest edition (formerly NFPA 88B). In Canada, installation of heaters in airplane hangars must be in accordance with the requirements of the enforcing authority, and in public garages in accordance with the current CSA-B149 codes.
8. In aircraft hangars, keep the bottom of the unit at least 10' from the highest surface of the wings or engine enclosure of the highest aircraft housed in the hangars and in accordance with the requirements of the enforcing authority and/or NFPA 409 - latest edition.
9. Installation of units in high humidity or salt water atmospheres will cause accelerated corrosion, resulting in a reduction of the normal life of the units.
10. Do not install units below 7' measured from the bottom of the unit to the floor in commercial applications (unless unit is properly guarded to provide user protection from moving parts).
11. Be sure no obstructions block air intake and discharge of unit heaters.
12. The minimum distance from combustible material is based on the combustible material surface not exceeding 160°F. Clearance from the top of the unit may be required to be greater than the minimum specified if heat damage, other than fire, may occur to materials above the unit heater at the temperature described.
13. Allow 18" of clearance at rear (or 12" beyond end of motor at rear of unit, whichever is greater) and access side to provide ample air for proper operation of fan.
14. Installation must conform with local building codes or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition. In Canada installation must be in accordance with CSA-B149.1.

SPECIAL PRECAUTIONS / SI (METRIC) CONVERSION FACTORS

⚠ CAUTION

15. Purging of air from gas supply line should be performed as described in the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition. In Canada, installation must be in accordance with CSA-B149.1.
16. When leak testing the gas supply piping system, the appliance and its combination gas control must be isolated during any pressure testing in excess of 14" W.C. (1/2 psi).
17. The unit should be isolated from the gas supply piping system by closing its field installed manual shut-off valve. This manual shut-off valve should be located within 6' of the heater.
18. Turn off all gas before installing appliance.
19. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not less than 5% below the rated voltage.
20. Check the gas inlet pressure at the unit upstream of the combination gas control. The inlet pressure should be 6-7" W.C. on natural gas or 11-14" W.C. on propane. If inlet pressure is too high, install an additional pressure regulator upstream of the combination gas control.
21. Service or repair of this equipment must be performed by a qualified service agency.
22. Do not attempt to reuse any mechanical or electronic ignition controller which has been wet. Replace defective controller.

IMPORTANT

1. To prevent premature heat exchanger failure, do not locate ANY gas-fired appliances in areas where corrosive vapors (i.e. chlorinated, halogenated, or acidic) are present in the atmosphere.
2. To prevent premature heat exchanger failure, the input to the appliance as indicated on the serial plate, must not exceed the rated input by more than 5%.
3. Start-up and adjustment procedures must be performed by a qualified service agency.

BEFORE YOU BEGIN

⚠ CAUTION

1. All literature shipped with this unit should be kept for future use for servicing or service diagnostics. Leave manual with the owner. Do not discard any literature shipped with this unit.
2. Consult piping, electrical, and venting instructions in this manual before final installation.
3. Do not attach ductwork, air filters, or polytubes to any propeller unit heater.

In the U.S., the installation of these units must comply with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition and other applicable local building codes. In Canada, the installation of these units must comply with local plumbing or waste water codes and other applicable codes and with the current code CSA-B149.1.

1. All installation and service of these units must be performed by a qualified installation and service agency only as defined in ANSI Z223.1 (NFPA 54) - latest edition or in Canada by a licensed gas fitter.
2. This unit is certified with the controls furnished. For replacements parts, please order according to the replacement parts list on serial plate. Always know your model and serial numbers. Modine reserves the right to substitute other authorized controls as replacements.
3. Unit is balanced for correct performance. Do not alter fan or operate motors at speeds below what is shown in this manual.
4. Information on controls is supplied separately.
5. The same burner is used for natural and propane gas.

SI (Metric) Conversion Factors

To Convert	Multiply By	To Obtain
"W.C.	0.249	kPa
°F	(°F-32) x 5/9	°C
BTU	1.06	kJ
Btu/ft ³	37.3	kJ/m ³
Btu/hr	0.000293	kW
CFH (ft ³ /hr)	0.000472	m ³ /min
CFH (ft ³ /hr)	0.00000787	m ³ /s
CFM (ft ³ /min)	0.0283	m ³ /min
CFM (ft ³ /min)	0.000472	m ³ /s
feet	0.305	m
Gal/Hr.	0.00379	m ³ /hr
Gal/Hr.	3.79	l/hr
gallons	3.79	l
Horsepower	746	W
inches	25.4	mm
pound	0.454	kg
psig	6.89	kPa
psig	27.7	"W.C.

SI (METRIC) CONVERSION FACTORS / UNIT LOCATION

UNIT LOCATION

⚠ DANGER

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

⚠ CAUTION

- Clearances to combustible materials are critical. Be sure to follow all listed requirements.
- Heaters are designed for use in heating applications with ambient startup temperatures between -40°F and 90°F and ambient operating temperatures between 40°F and 90°F.
- Do not install unit outdoors.
- In garages or other sections of aircraft hangars such as offices and shops that communicate with areas used for servicing or storage, keep the bottom of the unit at least 7' above the floor unless the unit is properly guarded. In parking garages, the unit must be installed in accordance with the standard for parking structures ANSI/NFPA 88A - latest edition, and in repair garages the standard for repair garages NFPA 30A - latest edition (formerly NFPA 88B). In Canada, installation of heaters in airplane hangars must be in accordance with the requirements of the enforcing authority, and in public garages in accordance with the current CSA-B149 codes.
- In aircraft hangars, keep the bottom of the unit at least 10' from the highest surface of the wings or engine enclosure of the highest aircraft housed in the hangars and in accordance with the requirements of the enforcing authority and/or NFPA 409 – latest edition.
- Installation of units in high humidity or salt water atmospheres will cause accelerated corrosion resulting in a reduction of the normal life of the units.

IMPORTANT

To prevent premature heat exchanger failure, do not locate ANY gas-fired appliances in areas where corrosive vapors (i.e. chlorinated, halogenated or acidic) are present in the atmosphere.

Location Recommendations

- When locating the heater, consider general space and heating requirements, availability of gas and electrical supply, and proximity to vent locations.
- Avoid installing units in extremely drafty locations. Drafts can cause burner flames to impinge on heat exchangers which shortens life. Maintain separation between units so discharge from one unit will not be directed into the inlet of another.
- Be sure the structural support at the unit location site is adequate to support the unit's weight. For proper operation the unit must be installed in a level horizontal position.
- Do not install units in locations where the flue products can be drawn into the adjacent building openings such as windows, fresh air intakes, etc.
- Be sure that the minimum clearances to combustible materials and recommended service clearances are maintained. Units are designed for installation on non-combustible surfaces with the minimum clearances shown in Figure 4.1 and Tables 4.1 and 4.2.
- Units exposed to inlet air temperatures of 40°F or less, may experience condensation, therefore, provisions should be made for disposal of condensate.
- When locating units, it is important to consider that the exhaust vent piping must be connected to the outside atmosphere.
- Maximum equivalent vent lengths are listed in "Section A - General Instruction - All Units" of the Venting Instructions.

- Do not install units in locations where gas ignition system is exposed to water spray, rain, or dripping water.
- Do not install units below 7', measured from the bottom of the unit to the floor, unless properly guarded to provide protection from moving parts.

Figure 4.1 - Combustible Material and Service Clearances

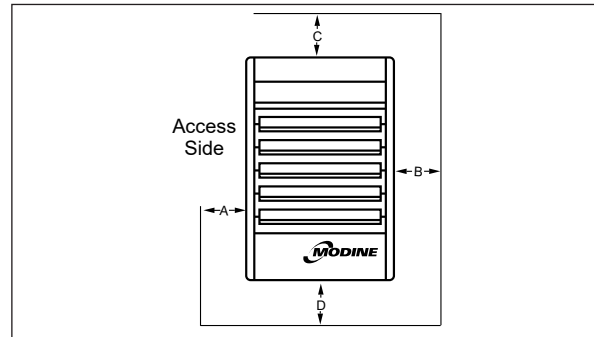


Table 4.1 - Combustible Material Clearances ①

Model Size	Access Side (A)	Non-Access Side (B)	Top (C)	Bottom (D)	Vent Connector (Not shown)
150-175	1"	1"	4"	12"	6"
200-400	1"	1"	5"	12"	7"

① Provide sufficient room around the heater to allow for proper combustion and operation of fan. Free area around the heater must not be less than 1-1/2 times the discharge area of the unit.

Table 4.2 - Recommended Service Clearances

Model Size	Access Side (A)	Non-Access Side (B)	Top (C)	Bottom (D)	Vent Connector (Not shown)
150-175	18"	18"	6"	22"	6"
200-400	18"	18"	6"	25"	7"

Combustion Air Requirements

The National Fuel Gas Code defines an "unconfined space" as a space whose volume is greater than 50 cubic feet per 1,000 Btu/Hr input of the installed appliance(s). A confined space is 50 cubic feet or less per 1,000 Btu/Hr input of the installed appliance(s).

Units installed in tightly sealed buildings or confined spaces must be provided with two permanent openings, one near the top of the confined space and one near the bottom. Each opening should have a free area of not less than one square inch per 1,000 BTU per hour of the total input rating off all units in the enclosure, freely communicating with interior areas having, in turn adequate infiltration from the outside.

For further details on supplying combustion air to a confined (tightly sealed) space or unconfined space, see the National Fuel Gas Code ANSI Z223.1 (NFPA 54) or CSA-B149.1 Installation Code - latest edition.

Sound and Vibration Levels

All standard mechanical equipment generates some sound and vibration that may require attenuation. Libraries, private offices and hospital facilities will require more attenuation, and in such cases, an acoustical consultant may be retained to assist in the application. Locating the equipment away from the critical area is desirable within ducting limitations. Generally, a unit should be located within 15' of a primary support beam. Smaller deflections typically result in reduced vibration and noise transmission.

INSTALLATION

UNIT MOUNTING

1. Be sure the means of suspension is adequate to support the weight of the unit (see pages 24 and 25 for unit weights).
2. For proper operation and to assure that flames are directed into the center of the heat exchanger tubes, the unit must be installed in a level horizontal position. Use a spirit level to ensure that the unit is suspended correctly.
3. Clearances to combustibles as specified in Figure 4.1 and Tables 4.1 and 4.2 must be strictly maintained.
4. All standard units are shipped fully boxed. Larger units are also supplied with skid supports on the bottom of the box. The larger units may be lifted from the bottom by means of a fork lift or other lifting device only if the shipping support skids are left in place and the forks support the whole depth of the unit. If the unit must be lifted from the bottom for final installation without the carton in place, be sure to properly support the unit over its entire length and width to prevent damage. When lifting units, make sure the load is balanced.
5. Propeller models up to size 350 have 2 mounting holes, size 350 and above have 4 mounting holes and blower models up to size 350 have 4 mounting holes, size 350 and above have 6 mounting holes. Units with two point suspension incorporate a level hanging feature. Depending on what options and accessories are being used, the heater may not hang level as received from the factory. Do not hang heaters with deflector hoods until referring to the "Installation Manual for Deflector Hoods" and making the recommended preliminary adjustments on the heater, while the heater is resting on the floor. The units can be mounted with 3/8"-16 threaded rod as follows:

- On each piece of threaded rod used, screw a nut a distance of about 1" onto the end of the threaded rods that will be screwed into the unit heater.
- Place a washer over the end of the threaded rod and screw the threaded rod into the unit heater weld nuts on the top of the heater at least 5 turns, and no more than 10 turns. Tighten the nut first installed onto the threaded rod to prevent the rod from turning.
- Drill holes into a steel channel or angle iron at the same center-line dimensions as the heater that is being installed. The steel channels or angle iron pieces need to span and be fastened to appropriate structural members.
- Cut the threaded rods to the preferred length, place them through the holes in the steel channel or angle iron and secure with washers and lock nuts or lock washers and nuts. A double nut arrangement can be used here instead of at the unit heater (a double nut can be used both places but is not necessary).
- Do not install standard unit heaters above the maximum mounting height shown in Table 19.1.

NOTE: A pipe hanger adapter kit, shown in Figure 5.3, is available as an accessory. One kit consists of drilled 3/4" IPS pipe caps and 3/8" - 16 x 1-3/4" capscrews to facilitate threaded pipe suspension.

Figure 5.1 - Adjustable Mounting Brackets - To Adjust:

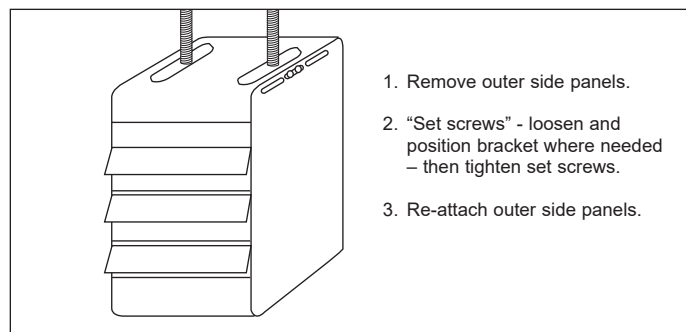
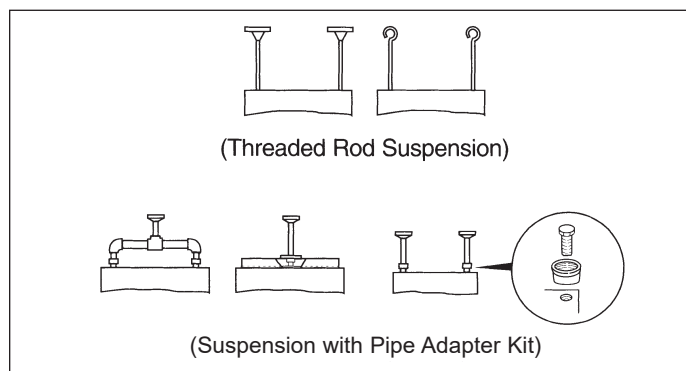


Figure 5.2 - Suspension Methods



INSTALLATION - VENTING

⚠ WARNING

1. Gas fired heating equipment must be vented - do not operate unvented.
2. A built-in power exhauster is provided - additional external power exhausters are not required or permitted.
3. If an existing heater is being replaced, it may be necessary to resize the venting systems. Improperly sized venting systems can result in vent gas leakage or the formation of condensate. Refer to the National Fuel Gas Code ANSI Z223.1 (NFPA 54) or CSA B149.1 - latest edition. Failure to follow these instructions can result in serious injury or death.
4. Under no circumstances should two sections of double wall vent pipe be joined together within one horizontal vent system due to the inability to verify complete seal of inner pipes.

⚠ CAUTION

Installation must conform with local building codes or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition. In Canada installation must be in accordance with CSA B149.1.

Model PDP and BDP unit heaters must be vented with the proper passageway as described in these instructions to convey flue gases from the unit or the vent connector to the outside atmosphere.

The venting instructions are organized in sections, based on installation type. The sections are identified as follows:

Instructions	Applicable Installation Instructions by Vent System Type
A	General Instructions for ALL Installations
B	VERTICAL CATEGORY I vent systems ①
C	HORIZONTAL CATEGORY III vent systems ②

① The differences between vertical and horizontal vent systems will be identified in "Section A - General Instructions - All Units".

Section A - General Instructions - All Units

- A1. If the unit heater being installed is replacing existing equipment and using the existing vent system from that equipment, inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) or CSA B149.1 Installation Code - latest edition and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies, which could cause an unsafe condition.
- A2. The vent pipe should be galvanized steel or other suitable corrosion resistant material. Follow the National Fuel Gas Code for minimum thickness of vent material. The minimum thickness for connectors varies depending on the pipe diameter. Do not vent unit with PVC or other forms of plastic venting material.
- A3. All heaters come with a vent adapter for attaching the vent pipe to the heater (see Table 6.1). Attach the vent pipe to the adapter with 3 corrosion resistant screws. (Drill pilot holes through the vent pipe and adapter prior to screwing in place). Vent pipe must not be smaller than the connector size.
- A4. Limit the total equivalent vent pipe length to fall between the minimum and maximum equivalent vent lengths given

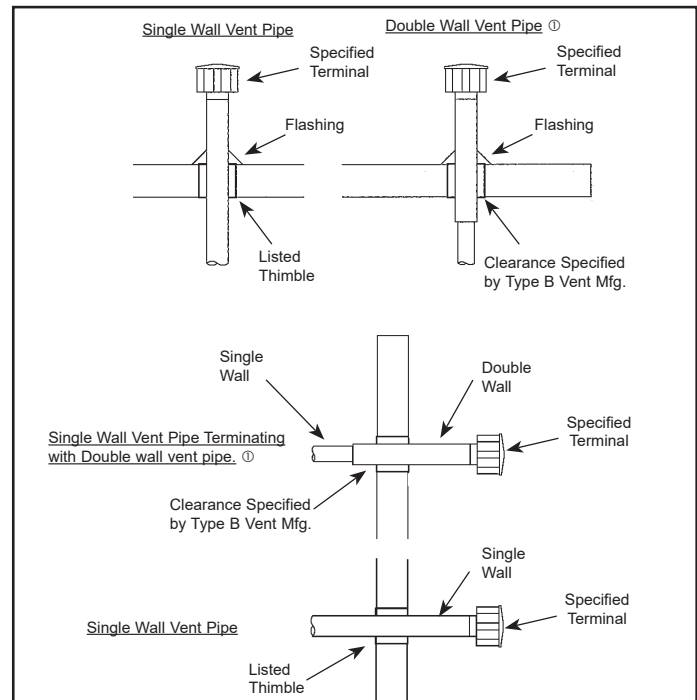
in Table 6.1, making the vent system as straight as possible. The equivalent length of a 5" elbow is 6' and for a 6" elbow is 7'.

- A5. A minimum of 12" straight pipe is recommended from the flue outlet before turns in the vent pipe.
- A6. Horizontal sections of vent pipe are to be installed with an upward or downward slope from the appliance of 1/4" per foot and suspended securely from overhead structures at points not greater than 3' apart.
- A7. Fasten individual lengths of vent together with at least 3 corrosion resistant sheet metal screws.
- A8. Keep single wall vent pipe at least 6" from combustible materials. For double wall vent pipe, follow the vent pipe manufacturer's clearances to combustibles. The minimum distance from combustible materials is based on the combustible material surface not exceeding 160°F. Clearance from the vent pipe (or the top of the unit) may be required to be greater than 6" if heat damage other than fire could result (such as material distortion or discoloration).
- A9. Avoid venting through unheated space when possible. When venting does pass through an unheated space or if the unit is installed in an environment that promotes condensation, insulate runs greater than 5' to minimize condensation. Inspect for leakage prior to insulating and use insulation that is noncombustible with a rating of not less than 400°F. Install a tee fitting at the low point of the vent system and provide a drip leg with a clean out cap as shown in Figure 8.1.

Table 6.1 - Vent Pipe Diameters, Transitions, and Total Equivalent Vent Pipe Lengths for Horizontal Vent Systems

Model Size	Vent Transition Included	Vent Pipe Diameter	Minimum Eqv Length	Maximum Eqv Length
150, 175	4" to 5"	5"	2'	60'
200	6" to 5"	5"	2'	60'
250-400	Not required	6"	2'	70'

Figure 6.1 - Venting Through Combustible Roof or Wall



① See Instruction A12 for attaching single wall pipe to double wall pipe.

INSTALLATION - VENTING

- A10. When the vent passes through a combustible INTERIOR wall or floor, a metal thimble 4" greater than the vent diameter is necessary. If there is 6' or more of vent pipe in the open space between the appliance and where the vent pipe passes through the wall or floor, the thimble need only be 2" greater than the diameter of the vent pipe. If a thimble is not used, all combustible material must be cut away to provide 6" of clearance. Where authorities have jurisdiction, Type B vent may be used for the last section of vent pipe to maintain clearance to combustibles while passing through wall or floor. See Figure 6.1. Any material used to close the opening must be noncombustible.
- A11. Seal all seams and joints of un-gasketed single wall pipe with metal tape or Silastic suitable for temperatures up to 400°F. Wrap the tape 2 full turns around the vent pipe. One continuous section of double wall vent pipe may be used within the vent system to pass through the wall to the listed vent cap. Refer to instruction A12 in "Section A – General Instructions – All Units" for attaching double wall pipe to single wall pipe.
- A12. The following are general instructions for double wall (Type B) terminal pipe installation.

How to attach a single wall vent terminal to double wall (Type B) vent pipe:

1. Look for the "flow" arrow on the vent pipe.
2. Slide the vent terminal inside the exhaust end of the double wall vent pipe.
3. Drill 3 holes through the pipe and the vent terminal. Using 3/4" long sheet metal screws, attach the cap to the pipe. Do not over tighten.

How to connect a single wall vent system to a double wall (Type B) vent pipe:

1. Slide the single wall pipe inside the inner wall of the double wall pipe.
2. Drill 3 holes through both walls of the single and double wall vent pipes. Using 3/4" sheet metal screws, attach the 2 pieces of pipe. Do not over tighten.
3. The gap between the single and double wall pipe must be sealed but it is not necessary to fill the full volume of the annular area. To seal, run a large bead of 400°F silastic around the gap.

- A13. Vent termination clearances must be maintained:

Table 7.1 - Vent Termination Clearances

Structure	Minimum Clearances for Vent Terminal Location
Forced air inlet within 10'	3' above
Combustion air inlet of another appliance	6' all directions
Door, window, gravity air inlet, or any building opening	4' horizontal and below 1' above
Electric meter, gas meter, gas regulator, and relief equipment ①	4' horizontal (U.S.) 6' horizontal (Canada)
Gas regulator ①	3' horizontal (U.S.) 6' horizontal (Canada)
Adjoining building or parapet wall	6' all directions
Adjacent public walkways	7' all directions
Grade (ground level)	3' above

① Do not terminate the vent directly above a gas meter or regulator.

- A14. Do NOT vent this appliance into a masonry chimney.
- A15. Do NOT use dampers or other devices in the vent or combustion air pipes.

- A16. The venting system must be exclusive to a single appliance and no other appliance is allowed to be vented into it.
- A17. Precautions must be taken to prevent degradation of building materials by flue products.
- A18. Single wall vent pipe must not pass through any unoccupied attic, inside wall, concealed space, or floor.
- A19. Uninsulated single wall vent pipe must not be used outdoors for venting appliances in regions where the 99% winter design temperature is below 32°F.
- A20. The vent terminal must be:

Table 7.2 - Vent Terminals

Model Size	Modine PN
150-200	5H0722850004
250-400	5H0722850002

- A21. If left hand (facing front of heater with air blowing in face) power exhauster discharge is desired, the power exhauster may be rotated 180°. To do this, remove the screws in the vent collar, rotate the power exhauster, then replace the screws.
- A22. In addition to following these general instructions, specific instructions for Vertical Category I or Horizontal Category III vent systems must also be followed. The following outlines the differences:

Table 7.3 - ANSI Unit Heater Venting Requirements

Category	Description	Venting Requirements
I	Negative vent pressure Non-condensing	Follow standard venting requirements.
II	Negative vent pressure Condensing	Condensate must be drained.
III	Positive vent pressure Non-condensing	Vent must be gas tight.
IV	Positive vent pressure Condensing	Vent must be liquid and gas tight. Condensate must be drained.

Note: Vent connectors serving Category I appliances shall not be connected into any portion of mechanical draft systems operating under positive pressure.

Vertical Category I Vent

- Vertical vent systems terminate vertically (up) (an example is shown in Figure 8.1).
- The horizontal portion of the vent run cannot exceed 75% of the vertical rise (Example: If the vent height is 10', the horizontal portion of the vent system cannot exceed 7.5').
- The vent terminates a minimum of 5' above the vent connector on the unit.
- If the vent system to be installed meets ALL these criteria (an example is shown in Figure 8.1), proceed to "Section B - Vertical Vent System Installation". For all other cases, proceed to the next section for Horizontal Category III Vent System Determination:

Horizontal Category III Vent

- Horizontal vent systems terminate horizontally (sideways) (an example is shown in Figure 9.2).
- A vent system that terminates vertically but has a horizontal run that exceeds 75% of the vertical rise is considered horizontal.
- Horizontal vent configurations are Category III. Additional requirements are covered in "Section C - Horizontal Category III Vent System Installation".

INSTALLATION - VENTING

Section B – Vertical Vent System Installation

- B1. This section applies to vertically vented Category I vent systems and is in addition to “Section A – General Instructions – All Units”.
- B2. Vertical vent systems terminate vertically and must be sized in accordance with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition.
- B3. The horizontal portion of the vent run cannot exceed 75% of the vertical rise (Example: If the vent height is 10', the horizontal portion of the vent system cannot exceed 7.5').
- B4. It is recommended to install a tee with drip leg and clean out cap as shown in Figure 8.1.
- B5. The vent terminates a minimum of 5' above the vent connector on the unit.
- B6. All vertically vented heaters that are Category I must be connected to a vent complying with a recognized standard, with a material acceptable to the authority having jurisdiction. Venting into a masonry chimney is not permitted. Refer to the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition for instructions on common venting.
- B7. Use a listed vent terminal to reduce down drafts and moisture in the vent.
- B8. Double wall vent pipe is recommended, although single wall can be used if the requirements of the National Fuel Gas Code are followed.
- B9. Vertical vents must terminate a minimum horizontal and vertical distance from roof lines and adjacent walls or obstructions. These minimum distances are outlined as follows (based on National Fuel Gas Code requirements for vents with diameters less than 12"):
- For **double wall** vent pipe and **8' or greater** horizontal distance to any vertical wall or similar obstruction, the vent must terminate above the roof in accordance with Figure 8.1 and Table 8.1.
 - For **double wall** vent pipe and **less than 8'** horizontal distance to any vertical wall or similar obstruction, the vent must terminate at least 2' above the highest point where it passes through a roof of a building and at least 2' higher than any portion of a building within a horizontal distance of 10' (see Figure 8.1).

Figure 8.1 - Vertical Category I Vent System

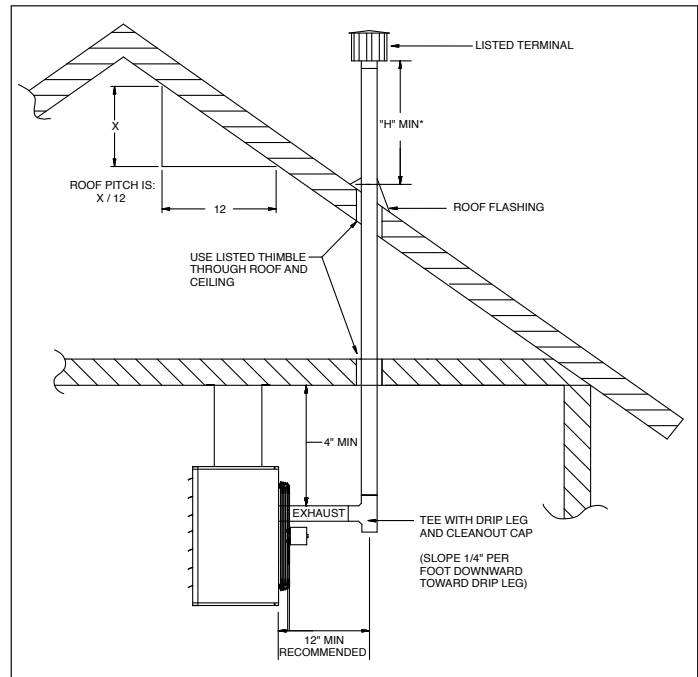


Table 8.1 - Minimum Height from Roof to Lowest Discharge Opening

Rise X (in)	Roof Pitch	Min Height H (ft) ①
0-6	Flat to 6/12	1.00
6-7	6/12 to 7/12	1.25
7-8	7/12 to 8/12	1.50
8-9	8/12 to 9/12	2.00
9-10	9/12 to 10/12	2.50
10-11	10/12 to 11/12	3.25
11-12	11/12 to 12/12	4.00
12-14	12/12 to 14/12	5.00
14-16	14/12 to 16/12	6.00
16-18	16/12 to 18/12	7.00
18-20	18/12 to 20/12	7.50
20-21	20/12 to 21/12	8.00

① Size according to expected snow depth.

- For **single wall** vent pipe and 10' or greater horizontal distance to any portion of a building, the vent must terminate at least 2' above the highest point where it passes through a roof of a building and at least 2' higher than any portion of a building within a horizontal distance of 10'.
- For **single wall** vent pipe and less than 10' horizontal distance to any portion of a building, the vent must terminate at least 2' higher than any portion of that building.

INSTALLATION - VENTING

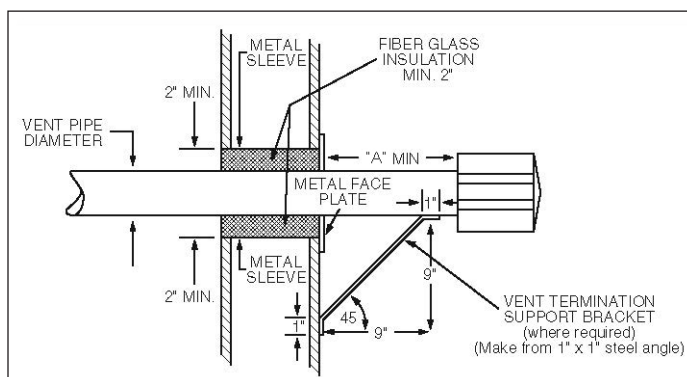
Section C – Horizontal, Category III Vent System Installation

- C1. This section applies to horizontally vented Category III vent systems and is in addition to "Section A – General Instructions – All Units".
- C2. Horizontal vent systems terminate horizontally (sideways).
- C3. Seal all seams and joints of un-gasketed single wall pipe with metal tape or Silastic suitable for temperatures up to 400°F. Wrap the tape 2 full turns around the vent pipe. For single wall vent systems, 1 continuous section of double wall vent pipe may be used within the vent system to pass through the wall to the listed vent cap. Under no circumstances should two sections of double wall vent pipe be joined together within one horizontal vent system due to the inability to verify complete seal of inner pipes. Category III vent systems listed by a nationally recognized agency and matching the diameters specified may be used. Different brands of vent pipe materials may not be intermixed. Refer to instruction A10 in "Section A – General Instructions – All Units" for attaching double wall pipe to single wall pipe.
- C4. Refer to Table 6.1 for total minimum and maximum vent lengths, making the system as straight as possible. The equivalent length of a 90° elbow is 6' for 5" diameter and 7' for 6" diameter.
- C5. All horizontal Category III vents must be terminated with a listed vent cap. The cap must terminate a minimum distance beyond the exterior wall surface as shown in Figure 9.2 and Table 9.1. The vent must be supported as shown in Figure 9.1. Precautions must be taken to prevent degradation of building materials by flue products.

Table 9.1 - Dimension Between Vent Cap and Exterior Wall

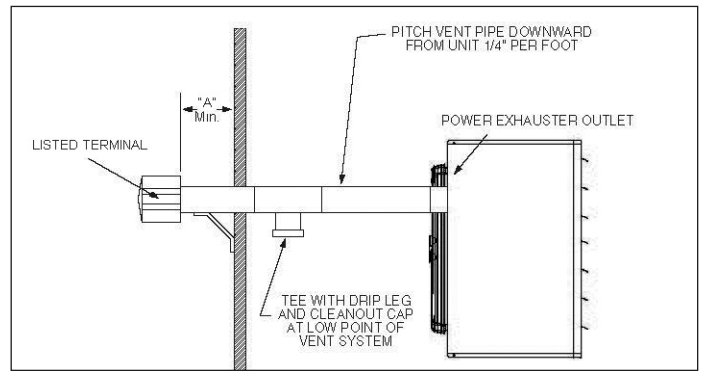
Vent Terminal	"A" Min.
Selkirk, Starkap, or Constant Air-Flo 2433	12"
Modine 5H072285	6"
Tjernlund VH1	0"

Figure 9.1 - Exhaust Vent Construction Through Combustible Walls and Support Bracket



- C6. When condensation may be a problem, the vent system shall not terminate over public walkways or over an area where condensate or vapor could create a nuisance or hazard or could be detrimental to the operation of regulators, relief openings, or other equipment.
- C7. The venting system must be exclusive to a single unit, and no other unit is allowed to be vented into it.
- C8. When vented horizontally, maintain a 1/4" per foot rise away from the heater and place a drip leg with clean out near the unit as shown in Figure 9.2. Where local authorities have jurisdiction, a 1/4" per foot downward slope is acceptable

Figure 9.2 - Horizontal Venting



- C9. For a vent termination located under an eave, the distance of the overhang must not exceed 24". The clearance to combustibles above the exterior vent must be maintained at a minimum of 12". Consult the National Fuel Gas Code for additional requirements for eaves that have ventilation openings.
- C10. Once venting is complete, proceed to the section titled "Installation – Gas Connections".

INSTALLATION

GAS CONNECTIONS

! WARNING

1. All field gas piping must be pressure/leak tested prior to operation. Never use an open flame. Use a soap solution or equivalent for testing.
2. Gas pressure to appliance controls must never exceed 14" W.C. (1/2 psi).
3. To reduce the opportunity for condensation, the minimum sea level input to the appliance, as indicated on the serial plate, must not be less than 5% below the rated input, or 5% below the minimum rated input of dual rated units.

! CAUTION

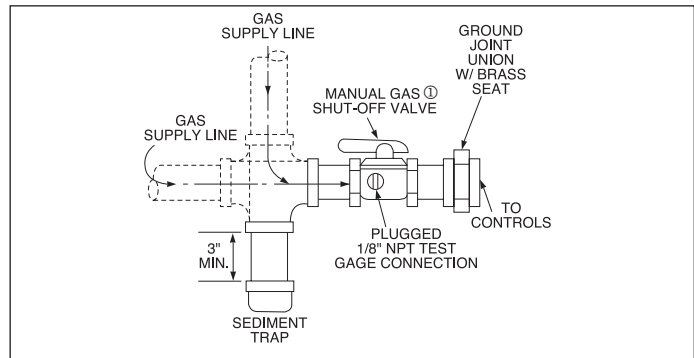
1. Purging of air from gas lines should be performed as described in the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition or in Canada CSA-B149 codes.
2. When leak testing the gas supply piping system, the appliance and its combination gas control must be isolated during any pressure testing in excess of 14" W.C. (1/2 psi).
3. The unit should be isolated from the gas supply piping system by closing its field installed manual shut-off valve. This manual shut-off valve should be located within 6' of the heater.
4. Turn off all gas before installing appliance.

IMPORTANT

To prevent premature heat exchanger failure, the input to the appliance, as indicated on the serial plate, must not exceed the rated input by more than 5%.

1. Installation of piping must conform with local building codes, or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - Latest Edition. In Canada, installation must be in accordance with CSA-B149.1.
2. Piping to units should conform with local and national requirements for type and volume of gas handled, and pressure drop allowed in the line. Refer to Table 10.1 to determine the cubic feet per hour (cfh) for the type of gas and size of unit to be installed. Using this cfh value and the length of pipe necessary, determine the pipe diameter from Table 10.2. Where several units are served by the same main, the total capacity, cfh and length of main must be considered. Avoid pipe sizes smaller than 1/2". Table 10.1 allows for a 0.3" W.C. pressure drop in the supply pressure from the building main to the unit. The inlet pressure to the unit must be 6-7" W.C. for natural gas and 11-14" W.C. for propane gas. When sizing the inlet gas pipe diameter, make sure that the unit supply pressure can be met after the 0.3" W.C. has been subtracted. If the 0.3" W.C. pressure drop is too high, refer to the Gas Engineer's Handbook for other gas pipe capacities.
3. Install a ground joint union with brass seat and a manual shut-off valve adjacent to the unit for emergency shut-off and easy servicing of controls, including a 1/8" NPT plugged tapping accessible for test gauge connection (see Figure 10.1).
4. Use 2 wrenches when connecting field piping to units.
5. Provide a sediment trap before each unit and in the line where low spots cannot be avoided (see Figure 10.1).
6. When pressure/leak testing, pressures above 14" W.C. (1/2 psi), close the field installed shut-off valve, disconnect the appliance and its combination gas control from the gas supply line, and plug the supply line before testing. When testing pressures 14" W.C. (1/2 psi) or below, close the manual shut-off valve on the appliance before testing.

Figure 10.1 - Recommended Sediment Trap/Manual Shut-off Valve Installation for Gas Connection



① Manual shut-off valve is in the "OFF" position when handle is perpendicular to pipe.

Table 10.1 - Sea Level Manifold Pressure & Gas Consumption ①

Model Size	Manifold Pressure ("W.C.)	Natural	Propane	# of Orifices
		3.5	10	
150	CFH	138.1	58.0	2
	Gal/Hr. Propane	-	1.64	
	Orifice Drill Size	21	39	
175	CFH	166.7	70.0	3
	Gal/Hr. Propane	-	1.86	
	Orifice Drill Size	28	43	
200	CFH	190.5	80.0	3
	Gal/Hr. Propane	-	2.19	
	Orifice Drill Size	25	42	
250	CFH	238.1	100.0	3
	Gal/Hr. Propane	-	2.74	
	Orifice Drill Size	18	36	
300	CFH	285.7	120.0	4
	Gal/Hr. Propane	-	3.29	
	Orifice Drill Size	21	39	
350	CFH	333.3	140.0	5
	Gal/Hr. Propane	-	3.84	
	Orifice Drill Size	23	41	
400	CFH	381.0	160.0	6
	Gal/Hr. Propane	-	4.38	
	Orifice Drill Size	25	42	

Table 10.2 - Gas Pipe Capacities - Natural Gas ①②

Pipe Length (ft)	Natural Gas					
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
10	132	278	520	1050	1600	3050
20	92	190	350	730	1100	2100
30	73	152	285	590	890	1650
40	63	130	245	500	760	1450
50	56	115	215	440	670	1270
60	50	105	195	400	610	1150
70	46	96	180	370	560	1050
80	43	90	170	350	530	930
100	38	79	150	305	460	870
125	34	72	130	275	410	780
150	31	64	120	250	380	710

① Capacities in cubic feet per hour through Schedule 40 pipe with maximum 0.3" W.C. pressure drop with up to 14" W.C. gas pressure. Specific gravity is 0.60 for natural gas and 1.50 for propane gas.

② For pipe capacity with propane gas, divide natural gas capacity by 1.6. Example: What is the propane gas pipe capacity for 60' of 1-1/4" pipe? The natural gas capacity is 400 CFH. Divide by 1.6 to get 250 CFH for propane gas.

INSTALLATION - HIGH ALTITUDE ACCESSORY KIT

HIGH ALTITUDE ACCESSORY KIT

Modine's gas-fired equipment standard input ratings are certified by ETL. For elevations above 2,000', ANSI Z223.1 requires ratings be reduced 4 percent for each 1000' above sea level. For units in Canada, CSA requires that ratings be reduced 10 percent at elevations above 2,000'. The high altitude adjustment instructions and pressure switch kits listed in this manual are for use with units that will be installed over 2,000'. These methods and kits comply with both ANSI Z223.1 and CSA requirements.

If a unit is to be installed at higher elevations AND converted from natural gas to propane gas operation, a propane conversion kit must be used in conjunction with the pressure adjustment methods and pressure switch kits listed herein. For the Selection and Installation Instructions for propane conversion kits, please see the latest revision of Modine Manual 75-511.

Selection of the Proper Pressure and Kit

To determine the proper manifold pressure at altitude and if required, the proper combustion air pressure switch kit, the full model number of the heater, the fuel to be used, and the altitude the unit will be installed at must be known. Refer to the unit serial plate or carton label to obtain the necessary information about the unit.

After obtaining this information, refer to the gas pressure and selection charts shown in Tables 11.1 through 11.3. The pressure charts are differentiated by elevation, fuel type, and country the product is being installed in. The selection charts are differentiated by product type, altitude and fuel type. **If converting from natural gas to propane gas and operation at high altitude, both a propane conversion kit and a pressure switch kit must be used (if applicable).** Selection charts include the proper kit suffix, when required.

Table 11.1 - Natural Gas Heating Values at Altitude ① ③ ④

Altitude (ft)	Gas Heating Values at Altitude (BTU/ft ³)	
	USA	Canada
0-2,000	1,050	1,050
2,001-3,000	929	945
3,001-4,000	892	
4,001-4,500	874	
4,501-5,000	856	856
5,001-6,000	822	822
6,001-7,000	789	789
7,001-8,000	757	757
8,001-9,000	727	727
9,001-10,000	698	698
10,001-11,000	670	670
11,001-12,000	643	643
12,001-13,000	618	618
13,001-14,000	593	593

- ① Values shown are for 3.5" W.C. manifold pressure, for other BTU content values (available from local utility) use Equation 12.1 to calculate manifold pressure.
 ② Values shown are for 10.0" W.C. manifold pressure, for other BTU content values (available from local utility) use Equation 12.1 to calculate manifold pressure.
 ③ When installed at altitudes above 2,000', a pressure switch may need to be changed. Refer to Table 11.3 to determine if a switch change is required.
 ④ Gas heating values are derated 4% per 1,000' of elevation in the USA and 10% between 2,000' and 4,500' elevation in Canada in accordance with ANSI Z223.1 and CSA-B149, respectively.

Manifold Pressure Adjustment

The inlet pressure to the unit must be confirmed to be within acceptable limits (6-7" W.C. for natural gas and 11-14" W.C. for propane gas) before opening the shutoff valve or the combination gas valve may be damaged.

Heaters for use with **natural gas** have gas valves that need to be feild set at 3.5" W.C. manifold pressure at 7.0" W.C. inlet pressure.

Units for use with **propane gas** need to be feild set for 10.0" W.C. manifold pressure at 14.0" W.C. inlet pressure.

Installation above 2,000'. elevation requires adjustment of the manifold pressure as described.

Derated BTU Content Gas and Manifold Pressure Calculation

Some utility companies may derate the BTU content (heating value) of the gas provided at altitude to a value other than 1,050 BTU/ft³ for natural gas or 2,500 BTU/ft³ for propane gas to allow certain heating appliances to be used with no manifold pressure adjustments. For this reason it is necessary that the supplying utility be contacted for detailed information about the gas type and BTU content (heating value) before operating any heater. Tables 11.1 and 11.2 show the standard derated heating values (4% per 1,000' of elevation in the USA and 10% between 2,001' and 4,500' elevation in Canada) of natural and propane gases at various altitudes. If the utility is supplying gas with heating values as shown in Tables 11.1 and 11.2, the manifold pressure should be set to 3.5" W.C for natural gas and 10.0" W.C. for propane gas.

NOTE: Only the high fire gas pressure need be adjusted, low fire gas pressure should remain the same.

Table 11.2 - Propane Gas Heating Values at Altitude ② ③ ④

Altitude (ft)	Gas Heating Values at Altitude (BTU/ft ³)	
	USA	Canada
0-2,000	2,500	2,500
2,001-3,000	2,212	2,250
3,001-4,000	2,123	
4,001-4,500	2,080	
4,501-5,000	2,038	2,038
5,001-6,000	1,957	1,957
6,001-7,000	1,879	1,879
7,001-8,000	1,803	1,803
8,001-9,000	1,731	1,731
9,001-10,000	1,662	1,662
10,001-11,000	1,596	1,596
11,001-12,000	1,532	1,532
12,001-13,000	1,471	1,471
13,001-14,000	1,412	1,412

INSTALLATION - HIGH ALTITUDE ACCESSORY KIT

If the heating value of the gas being supplied is different than the values shown in Tables 11.1 and 11.2, use the following equation to determine the appropriate manifold pressure for the altitude and gas heating value being supplied.

Equation 12.1 - Manifold Pressure for Derated Gas

$$MP_{ACT} = \left(\frac{BTU_{TBL}}{BTU_{ACT}} \right)^2 \times MP_{SL}$$

WHERE:

MP_{ACT} = **Manifold Pressure (in. W.C.) at Altitude** –
Manifold pressure setting for the heater being installed

BTU_{TBL} = **BTU/ft³ Content of Gas** –
Obtained from Tables 11.1 or 11.2 (whichever is applicable)

BTU_{ACT} = **BTU/ft³ Content of Gas** –
Obtained from the local utility company

MP_{SL} = **Manifold Pressure (in. W.C.), at Sea Level** –
Use 3.5" W.C. for natural gas and 10.0" W.C. for propane gas

NOTE: Only the primary manifold pressure should be adjusted on units equipped with 2-stage or modulating gas controls. No adjustments to the low fire manifold pressure are necessary on these units.

Table 11.3 - High Altitude Kits for PDP/BDP ①

US and Canada Altitude (ft)	Model Size						
	150 Item Code	175 Item Code	200 Item Code	250 Item Code	300 Item Code	350 Item Code	400 Item Code
0-2,000	not re- quired	not re- quired	not re- quired	not re- quired	not re- quired	not re- quired	not re- quired
2,001-7,500	67248	67248	67248	67248	67248	67248	67248
7,501-8,500	68408	55941	67248	55942	67248	68406	68407
8,501-9,500	68408	55941	67248	55942	67248	68406	68407
9,501-10,000	68408	55941	67248	55942	68408	68406	68407
10,001-11,000	55948	55941	67248	77785	68408	68406	68407
11,001-12,000	55948	55941	67248	77785	68408	68406	55941
12,001-13,000	55948	55941	67248	77785	68408	68406	55941
13,001-14,000	55948	55941	55941	77785	68406	68406	55941

① For Label Only (67248) kits, Modine part number 5H0807146005 is required to be filled out and attached to the unit by the installer. Please contact the local Modine representative at 1.800.828.4328 (HEAT).

INSTALLATION

ELECTRICAL CONNECTIONS

! WARNING

1. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
2. All appliances must be wired strictly in accordance with wiring diagram furnished with the appliance. Any wiring different from the wiring diagram could result in a hazard to persons and property.
3. Any original factory wiring that requires replacement must be replaced with wiring material having a temperature rating of at least 105°C.
4. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% greater than rated voltage.

! CAUTION

Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% less than the rated voltage.

1. Installation of wiring must conform with local building codes, or in the absence of local codes, with the National Electric Code ANSI/NFPA 70 - Latest Edition. Unit must be electrically grounded in conformance to this code. In Canada, wiring must comply with CSA C22.1, Part 1, Electrical Code.
 2. Two copies of the unit wiring diagram are provided with each unit. One is located in the electrical junction box and the other is supplied in the literature packet. Refer to this diagram for all wiring connections.
 3. Make sure all multi-voltage components (motors, transformers, etc.) are wired in accordance with the power supply voltage.
 4. The power supply to the unit must be protected with a fused or circuit breaker switch.
 5. The power supply must be within 10 percent of the voltage rating and each phase must be balanced within 2 percent of each other. If not, advise the utility company.
 6. External electrical service connections that must be installed include:
 - a. Supply power connection (120, 208, 240, 480, or 575 volts).
 - b. Thermostats, summer/winter switches, or other accessory control devices that may be supplied (24 volts).
- NOTE:** Certain units will require the use of a field step-down transformer. Refer to the serial plate to determine the unit supply voltage required. Additional information may be found in Tables 19.2 and 19.3 and in the step down transformer installation instructions.
7. Refer to Figure 18.1 for the electrical junction box locations.
 8. All supply power electrical connections are made in the electrical junction box of the unit. The low voltage (thermostat and accessory control devices) can be wired to the terminals on the electrical junction box. Refer to the wiring diagram for the terminal location of all low voltage wiring.

DUCT INSTALLATION

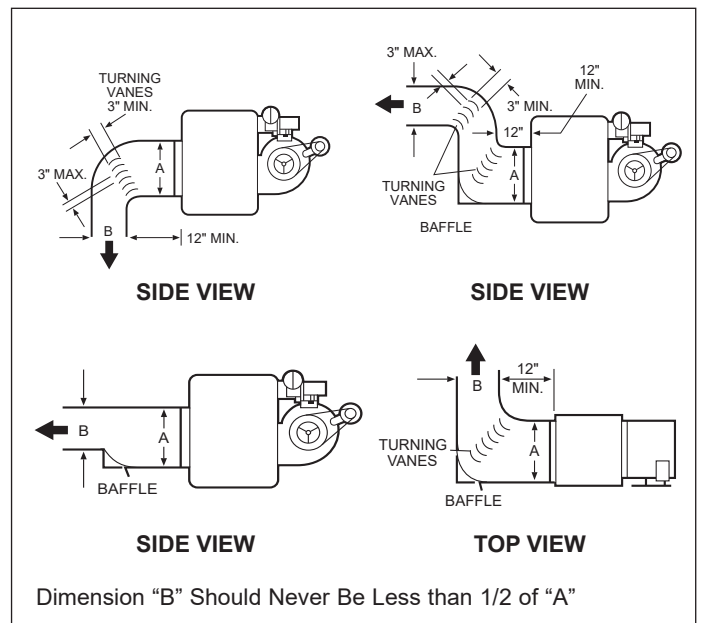
IMPORTANT

Do not attempt to attach ductwork of any kind to propeller models.

When installing the heater, always follow good duct design practices for even distribution of the air across the heat exchanger. Recommended layouts are shown in Figure 13.1. When installing blower units with ductwork the following must be done.

1. **Provide uniform air distribution over the heat exchanger.** Use turning vanes where required (see Figure 13.1).
2. Provide removable access panels in the ductwork on the downstream side of the unit heater. These openings should be large enough to view smoke or reflect light inside the casing to indicate leaks in the heat exchanger and to check for hot spots on exchanger due to poor air distribution or lack of sufficient air.
3. If ductwork is connected to the rear of the unit use a Modine blower enclosure kit or if using a field designed enclosure maintain dimensions of the blower enclosure as shown on page 25.

Figure 13.1 - Recommended Ductwork Installations



Additional Requirements for Blower Model BDP

Determining Blower Speed

The drive assembly and motor on all blower units are factory assembled and adjusted for operation under average conditions of air flow and without any external static pressure. The motor sheave should be adjusted as required when the unit is to be operated at other than average air flows and/or with external static pressures. Adjustment must always be within the performance range shown on page 20 and the temperature rise range shown on the unit's rating plate.

To determine the proper blower speed and motor sheave turns open, the operating conditions must be known. For example, a model BDP350 unit, operating with no external static pressure, (e.g. no ductwork, nozzles, etc.) is to deliver an air volume of 6481 cfm (cfm = cubic feet per minute). This requires the unit be supplied with a 5 hp motor, a -207 drive, and the drive sheave set at 2.5 turns open to achieve a blower speed of 960

INSTALLATION

rpm (see performance table for units with or without blower enclosure, page 20). See "Blower Adjustments" for setting of drive pulley turns open.

If a blower unit is to be used with ductwork or nozzles, etc., the total external static pressure under which the unit is to operate, and the required air flow must be known before the unit can be properly adjusted. Any device added externally to the unit, and which the air must pass through, causes a resistance to air flow called pressure loss.

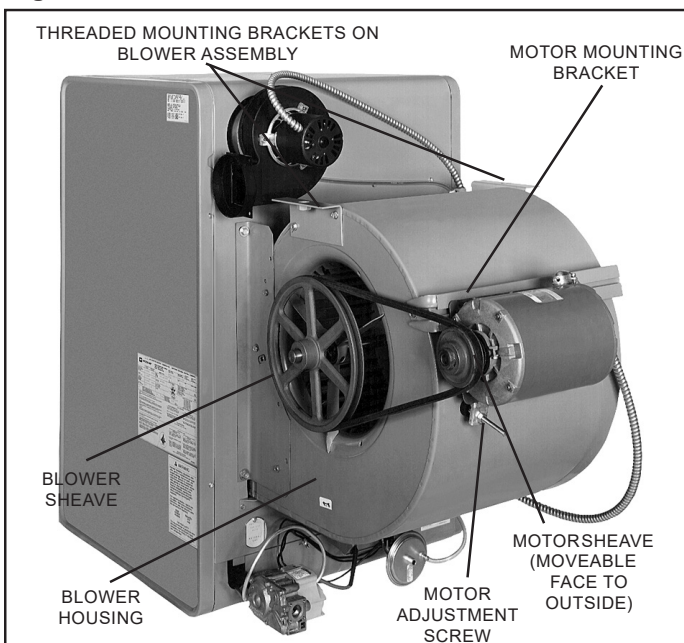
If Modine filters are used, the pressure loss through the filters is included in the performance data on page 20. If Modine supplied discharge nozzles are used, the pressure drop of the nozzles can be found footnoted at the bottom of page 23. If filters, nozzles or ductwork are to be used with the unit, and they are not supplied by Modine, the design engineer or installing contractor must determine the pressure loss for the externally added devices or ductwork to arrive at the total external static pressure under which the unit is to operate.

Once the total static pressure and the required air flow are known, the operating speed of the blower can be determined and the correct motor sheave adjustments made. As an example, a model BDP350 is to be used with a Modine supplied blower enclosure and filters attached to ductwork by others. The unit is to move 6481 cfm of air flow against an external static pressure of 0.2" W.C, which must be added for the filter pressure drop for a total of 0.4" W.C. total pressure drop. The performance table on page 20 for a BDP350, at 6481 cfm and 0.4" W.C. static pressure, shows that the unit will require a 5 hp motor using a -207 drive, and the motor sheave should be set at .5 turns open to achieve a blower speed of 1050 rpm.

To Install

1. Remove and discard the motor tie down strap and the shipping block beneath the belt tension adjusting screw (Not used on all models.)
2. For 3 and 5 HP motors, affix sheave to the motor shaft and install motor on the motor mounting bracket. Install belt on blower and motor sheaves.

Figure 14.1 - Blower Model



3. Adjust motor adjusting screw for a belt deflection of approximately 3/4" with five pounds of force applied midway between the sheaves (see Figure 14.3). Since the belt tension will decrease dramatically after an initial run-in period, it is necessary to periodically re-check the tension. Excessive tension will cause bearing wear and noise.
4. The blower bearings are lubricated for life; however, before initial unit operation the blower shaft should be lubricated at the bearings with SAE 20 oil. This will reduce initial friction and start the plastic lubricant flowing.
5. Make electrical connections as outlined in the section "Electrical Connections" on page 13.

Blower Adjustments

Following electrical connections, check blower rotation to assure blow-through heating. If necessary interchange wiring to reverse blower rotation. Start fan motor and check blower sheave RPM with a hand-held or strobe-type tachometer. RPM should check out with the speeds listed in "Performance Data" shown on page 20. A single-speed motor with an adjustable motor sheave is supplied with these units. If blower fan speed changes are required, adjust motor sheave as follows:

NOTE: Do not fire unit until blower adjustment has been made or unit may cycle on limit (overheat) control.

1. **Shut-off power before making blower speed adjustments.** Refer to "Determining Blower Speed" on page 13 and to "Performance Data" on page 20 to determine proper blower RPM.
2. Loosen belt and remove from motor sheave.
3. Loosen set screw on outer side of adjustable motor sheave (see Figure 14.2).
4. To reduce the speed of the blower, turn outer side of motor sheave counterclockwise.
5. To increase the speed of the blower, turn outer side of motor sheave clockwise.
6. Retighten motor sheave set screw, replace belt and retighten motor base. Adjust motor adjusting screw such that there is 3/4" belt deflection when pressed with 5 pounds of force midway between the blower and motor sheaves (see Figure 14.3). Since the belt tension will decrease dramatically after an initial run-in period, it is necessary to periodically re-check the tension to assure proper belt adjustment.
7. Check to make certain motor sheave and blower sheave are aligned. Re-align if necessary.
8. Re-check blower speed after adjustment.
9. Check motor amps. Do not exceed amps shown on motor nameplate. Slow blower if necessary.
10. Check air temperature rise across unit. Check temperature rise against values shown in Performance Tables on page 20 to assure actual desired air flow is being achieved.
11. If adjustments are required, recheck motor amps after final blower speed adjustment.

Figure 14.2 - Motor Sheave Adjustment

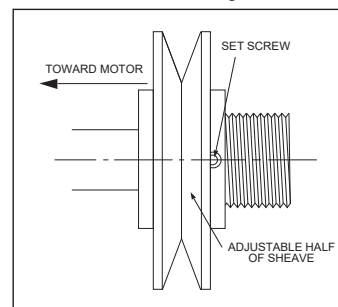
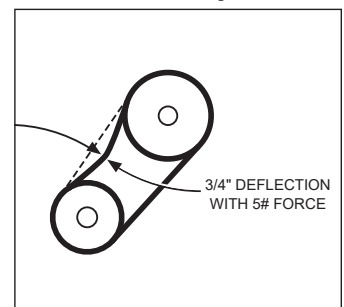


Figure 14.3 - Belt Tension Adjustment



START-UP PROCEDURE

IMPORTANT

1. To prevent premature heat exchanger failure, observe heat exchanger tubes. If the bottom of the tubes become red while blower and furnace are in operation, check to be sure the blower has been set to the proper rpm for the application. Refer to page 14 for blower adjustments.
 2. Start-up and adjustment procedures must be performed by a qualified service agency.
1. Turn off power to the unit at the disconnect switch. Check that fuses or circuit breakers are in place and sized correctly. Turn all hand gas valves to the "OFF" position.
 2. Remove electrical junction box cover.
 3. Check that the supply voltage matches the unit supply voltage listed on the Model Identification Plate. Verify that all wiring is secure and properly protected. Trace circuits to insure that the unit has been wired according to the wiring diagram. If installed at altitudes above 2,000' and the high altitude kit includes a combustion air proving switch, replace the switch in the unit with the switch provided in the kit. Take care to ensure that the tubing and electrical connections are securely fastened.
 4. Check to insure that the venting system is installed correctly and free from obstructions.
 5. Check to see that there are no obstructions to the intake and discharge of the unit.
 6. For blower units, check the belt tension and sheave alignment. Refer to "Blower Adjustments" for proper belt tension.
 7. Check bearings for proper lubrication (if applicable).
 8. Check to make sure that all filters are in place and that they are installed properly according to direction of air flow (if applicable).
 9. Perform a visual inspection of the unit to make sure no damage has occurred during installation. Lower bottom pan and visually inspect all components in the burner compartment. Check to ensure all fasteners are in place and the burner openings are properly aligned with the heat exchanger tubes and that the gas orifices are centered in the burner inspirator tube opening, as shown in Figure 16.2.
 10. Check that all horizontal deflector blades are open a minimum of 30° as measured from vertical.
 11. Turn on power to the unit at the disconnect switch. Check to insure that the voltage between electrical junction box terminals T1 and G is 24V.
 12. Check the thermostat, ignition control, gas valve, and supply fan blower motor for electrical operation. If these do not function, recheck the wiring diagram. Check to insure that none of the Control Options have tripped.
 13. Check the blower wheel for proper direction of rotation when compared to the air flow direction arrow on the blower housing (if applicable). Blower wheel rotation, not air movement, must be checked as some air will be delivered through the unit with the blower wheel running backwards.
 14. For blower units, check the blower speed (rpm). Refer to "Blower Adjustments" for modification.
 15. Check the motor speed (rpm).
 16. Check the motor voltage. On three phase systems, check to make sure all legs are in balance.
 17. Check the motor amp draw to make sure it does not exceed the motor nameplate rating. On three phase systems, check all legs to insure system is balanced.
 18. Recheck the gas supply pressure at the field installed manual shut-off valve. The minimum inlet pressure should be 6" W.C. on natural gas and 11" W.C. on propane gas. The maximum inlet pressure for either gas is 14" W.C. If inlet pressure exceeds 14" W.C., a gas pressure regulator must be added upstream of the combination gas valve.
 19. Open the field installed manual gas shut-off valve.
 20. Open the manual main gas valve on the combination gas valve. Call for heat with the thermostat and allow the pilot to light for intermittent pilot ignition. If the pilot does not light, purge the pilot line. If air purging is required, disconnect the pilot line at outlet of pilot valve. In no case should line be purged into heat exchanger. Check the pilot flame length (See "Pilot Flame Adjustment").
 21. Once the pilot has been established, check to make sure that the main gas valve opens. Check the manifold gas pressure (see "Main Gas Adjustment") and flame length (see "Air Shutter Adjustment") while the supply fan blower is operating. Inspect the condition of the main flame and if necessary, resolve flame appearance problems (see "Burner Flame Adjustment" and Figures 28.1 through 28.4).
 22. Check to insure that gas controls sequence properly (see "Control Operating Sequence"). Verify if the unit has any additional control devices and set according to the instructions in the "Control Options".
 23. Once proper operation of the unit has been verified, remove any jumper wires that were required for testing.
 24. Replace the electrical junction box cover.
 25. If installed at altitudes above 2,000', affix label included with high altitude kit and fill in all fields with a permanent marker.

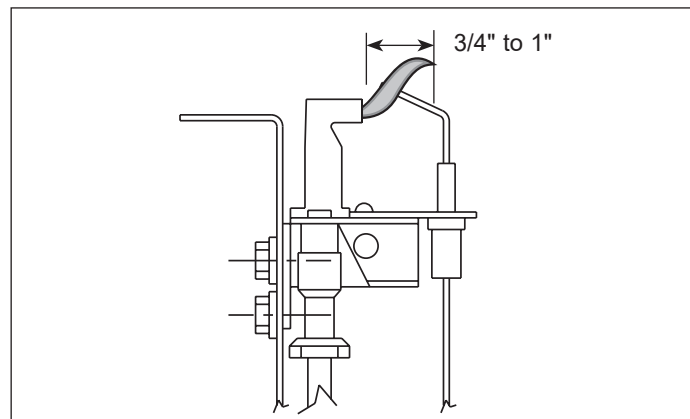
Pilot Burner Adjustment

The pilot burner is orificed to burn properly with an inlet pressure of 6-7" W.C. on natural gas and 11-14" W.C. on propane gas, but final adjustment must be made after installation. If the pilot flame is too long or large, it is possible that it may cause soot and/or impinge on the heat exchanger, causing failure. If the pilot flame is shorter than shown, it may cause poor ignition and result in the controls not opening the combination gas control. A short flame can be caused by a dirty pilot orifice. Pilot flame condition should be observed periodically to assure trouble-free operation.

To Adjust the Pilot Flame

1. Create a call for heat from the thermostat.
2. Remove the cap from the pilot adjustment screw. For location, see the combination gas control literature supplied with unit.
3. Adjust the pilot length by turning the screw in or out to achieve a soft steady flame 3/4" to 1" long and encompassing 3/8"-1/2" of the tip of the thermocouple or flame sensing rod (see Figure 15.1).
4. Replace the cap from the pilot adjustment screw.

Figure 15.1 - Correct Pilot Flame



START-UP PROCEDURE

Main Burner Adjustment

The gas pressure regulator (integral to the combination gas control) is adjusted at the factory for average gas conditions. It is important that gas be supplied to the unit heater in accordance with the input rating on the serial plate. Actual input should be checked and necessary adjustments made after the unit heater is installed. Over-firing, a result of too high an input, reduces the life of the appliance and increases maintenance. Under no circumstances should the input exceed that shown on the serial plate.

Measuring the manifold pressure is done at the outlet pressure tap of the gas valve (see Figure 16.1).

To Adjust the Manifold Pressure

1. Move the field installed manual shut-off valve to the "OFF" position.
2. Remove the 1/8" pipe plug in the pipe tee or gas valve and attach a water manometer of "U" tube type which is at least 12" high.
3. Move the field installed manual gas shut-off valve to the "ON" position.
4. Create a high fire call for heat from the thermostat.
5. Determine the correct high fire manifold pressure (3.5" W.C. for natural gas, 10" W.C. for propane gas). (Pressures at 0-2,000' elevation are 3.5" W.C. for natural gas, 10" W.C. for propane gas, for elevations above 2,000' refer to the instructions in "Gas Connections - High Altitude Accessory Kit" on page 11). Adjust the main gas pressure regulator spring to achieve the proper manifold pressure (for location, see the combination gas control literature supplied with unit).
6. After adjustment, move the field installed manual shut-off valve to the "OFF" position and replace the 1/8" pipe plug.
7. After the plug is in place, move the field installed manual shut-off valve to the "ON" position and recheck pipe plugs for gas leaks with soap solution.

Burner Flame Adjustment

Proper operation provides a soft blue flame with a well-defined inner core. A lack of primary air will reveal soft yellow-tipped flames. Excess primary air produces short, well-defined flames with a tendency to lift off the burner ports. For both natural and propane gas, the flame may be adjusted by sliding the manifold. Also, for units with the air shutters, they can be adjusted to control the burner flame height. The air shutters can be accessed by lowering the bottom pan of the unit heater.

Natural Gas Flame Control

Control of burner flames on unit heaters utilizing natural gas is achieved by resetting the manifold position to either increase or decrease primary combustion air. Prior to flame adjustment, operate unit heater for about fifteen minutes. The main burner flame can be viewed after loosening and pushing aside the flame observation disc on the back of the unit.

To increase primary air, loosen the manifold mounting screws and move the manifold away from the burner until the yellow-tipped flames disappear (see Figure 16.2). To decrease primary air, move manifold closer to the burner until flames no longer lift from burner ports, but being careful not to cause yellow tipping. Retighten manifold mounting screws after adjustment.

Propane Gas Flame Control

An optimum flame will show a slight yellow tip. Prior to flame adjustment, operate heater for at least 15 minutes. Loosen air shutter set screws and move the air shutters away from the manifold to reduce the primary air until the yellow flame tips appear (see Figure 16.3). Then increase the primary air until yellow tips diminish and a clean blue flame with a well-defined inner cone appears.

It may also be necessary to adjust the manifold position in addition to adjusting air shutters to obtain proper flame. Follow the instructions under "Natural Gas Flame Control" for adjusting the manifold.

Figure 16.1 - Typical Combination Gas Control

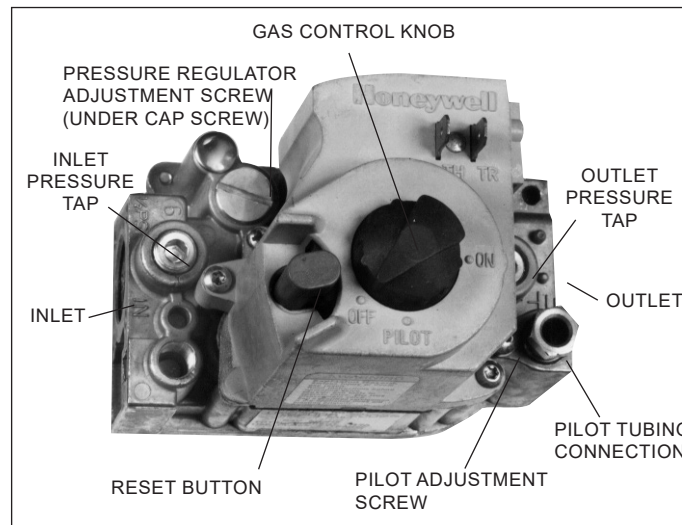


Figure 16.2 - Manifold Adjustment, Natural Gas

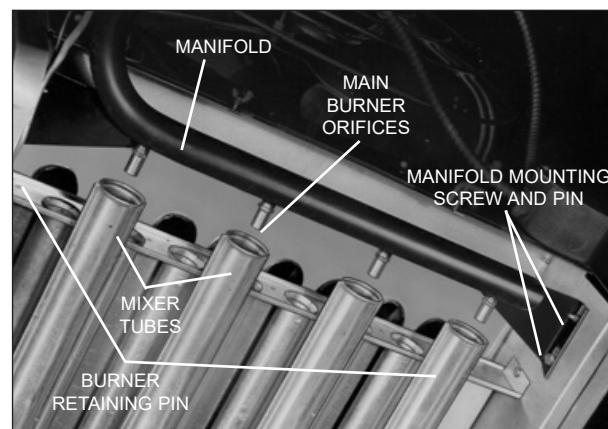
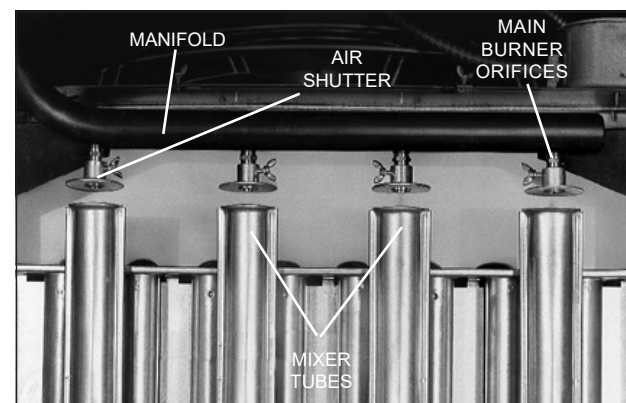


Figure 16.3 - Air Shutter Adjustment, Propane Gas



START-UP PROCEDURE

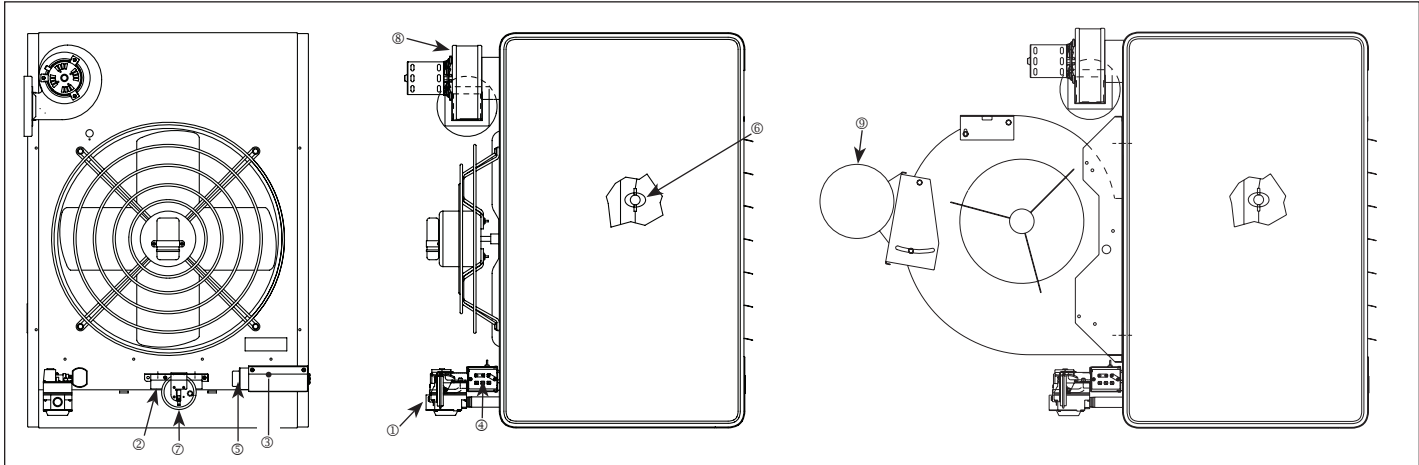
Control Operating Sequence

All units are supplied with intermittent pilot systems with continuous retry control as standard. For intermittent pilot systems, both the main burner and pilot are turned off 100% when the thermostat is satisfied. For all units, the system will attempt to light the pilot for 70 seconds. If the pilot is not sensed, the ignition control will wait approximately 6 minutes with the combination gas control closed and no spark. After 6 minutes, the cycle will begin again. After 3 cycles, some ignition controllers lockout for approximately 1 hour before the cycle begins again. This will continue indefinitely until the pilot flame is sensed or power is interrupted to the system. Refer to Table 18.1 for control code descriptions. Specific descriptions of the control sequence for different control codes are listed below.

1. The thermostat calls for heat.
2. The power exhauster relay is energized, starting the power exhauster motor. Once the motor has reached full speed, the differential pressure switch closes.
3. The pilot valve opens and the ignitor sparks for 70 seconds in an attempt to light the pilot.
4. Once the pilot is lit, the flame sensor proves the pilot and stops the ignitor from sparking.
5. On single stage units, the main gas valve is opened and the main burner is lit to 100% full fire. On two stage units, the gas valve may open at either 50% or 100%, depending on what the two stage thermostat is calling for.
6. The air mover starts after 30 to 90 seconds to allow the heat exchanger to warm up.
7. The unit continues to operate until the thermostat is satisfied, at which time both the main and pilot valves close 100%.
8. The air mover stops after 30 to 90 seconds to remove residual heat from the heat exchanger.

UNIT AND CONTROL OPTIONS

Figure 18.1 - Factory Mounted Option Location



All units include the standard (STD) features. The unit must be reviewed to determine the optional (OPT) features that may have been supplied with the unit.

① Gas Valve

a) Single Stage Gas Valve - (STD)

The main gas valve provides the pilot, regulator, main gas, and manual shutoff functions. For additional information, see the supplier literature included with the unit.

b) Two Stage Gas Valve - (OPT)

The two stage gas valve provides the pilot, regulator, main gas (100% and 50% fire), and manual shutoff functions. For additional information, see the supplier literature included with the unit.

② Ignition controller - (STD)

The ignition controller is factory installed on the back of the unit heater with the spark igniter and sensor located on the burner. For additional information, refer to “Control Operating Sequence” on page 16 and the supplier literature included with the unit.

③ Time Delay Relay - (STD)

The time delay relay is factory installed in electrical junction box and controls propeller/blower motor function. For single-phase units below 2 Hp, the time delay relay controls the motor directly. For single-phase units 2 Hp and greater and all three phase units, the time delay relay controls the motor starter. For additional information, refer to “Control Operating Sequence” on page 17.

④ Low Voltage Terminal Board - (STD)

The low voltage terminal board is located in the electrical junction box. The terminal board is labeled to match the electrical wiring diagram provided with the unit. All low voltage field wiring connections should be made to the exposed side of the terminal board (exterior of electrical junction box) to prevent miswiring by modifying the factory wiring, which is inside the electrical junction box.

⑤ Control Step Down Transformer - (STD)

The control step down transformer is located in the electrical junction box. The transformer is used to step down the supply power (115V, 208V, 230V, 460V, 575V) to 24V. This transformer is used to control the gas controls, fan delay relay, field supplied motor starter, etc. All unit heaters are supplied with a 40VA control step down transformer. To determine the control transformer supplied as well as any accessory/field supplied transformers required, reference the supply voltage listed on the serial plate and reference Tables 19.2 and 19.3.

⑥ High Limit Switch - (STD)

The automatic reset high limit switch is factory installed on the left side (air blowing at you) of the unit heater. If the limit temperature is exceeded, the gas controls are de-energized until the switch is cooled.

⑦ Pressure Switch (STD)

An automatic reset vent pressure switch is designed to prevent operation of the main burner if there is restricted venting of flue products. This restriction may occur due to an improper vent diameter, long vent runs, unapproved vent terminal, high winds, high negative pressure within space, etc. After the cause of the restriction has been corrected, the pressure switch will reset automatically. See the troubleshooting section for more information.

⑧ Power Exhauster (STD)

All power vented unit heaters are supplied with a round vent pipe connection. Some models may require the use of a vent transition from the power exhauster outlet to the vent pipe (see Table 6.1). The power exhauster may be rotated 180° to allow for various venting directions.

⑨ Blower Motor - (STD on BDP models only)

The blower motor can be provided in a variety of supply voltages and motor horsepowers. Refer to the model nomenclature to determine the motor provided. The blower motor is supplied with an adjustable sheave that can be used to increase/decrease the blower RPM. For instructions on changing the blower RPM, refer to “Blower Adjustments.”

Table 18.1 - Control Descriptions - Models PDP & BDP

Control System Description	Control Code		Service Voltage	Thermostat Voltage
	Natural Gas	Propane Gas		
Single-Stage ①	30	85	115V	25V
	31	86	208/230V	25V
	32	93	460V ②	25V
	33	94	575V ②	25V
Two-Stage ①	63	87	115V	25V
	64	88	208/230V	25V

① All controls are intermittent pilot ignition, 100% shut-off with continuous retry.

② Factory wired 460/575 available on blower models. Field installed step down transformer may be used for 460/575 propeller applications.

GENERAL PERFORMANCE DATA

Table 19.1 - Performance - Propeller (PDP) ① ② ③

	Model Number						
	PDP 150	PDP 175	PDP200	PDP 250	PDP 300	PDP 350	PDP 400
Btu/Hr. Input ①	150,000	175,000	200,000	250,000	300,000	350,000	400,000
Btu/Hr. Output ①	124,500	145,250	166,000	207,500	249,000	290,500	332,000
Entering Airflow (CFM)	2180	2550	2870	3700	4460	4870	5440
CFM Range	-	-	-	-	-	-	-
Air Temp. Rise (F)	51	51	52	50	50	53	54
Max. Mounting Hgt. (Ft.)②	16	17	15	19	21	20	19
Heat Throw (Ft.)② @ Maximum Mgt. Height	55	59	51	67	74	70	69
Motor Type ③	PSC	PSC	PSC	PSC	PSC	PSC	PSC
HP	115/60/1 (PC01)	1/8	1/6	1/6	1/3	1/2	3/4

- ① Ratings shown are for elevations up to 2,000'. For elevations above 2,000', ratings should be reduced at the rate of 4% for each 1,000' above sea level (in Canada see rating plate.) Reduction of ratings requires use of a high altitude kit.
- ② 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. For units equipped with deflector hoods, see page 23.
- ③ 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.

Blower (BDP) Models

Model Number	BDP150			BDP175			BDP200			BDP250			BDP300			BDP350			BDP400		
Btu/Hr. Input	150,000			175,000			200,000			250,000			300,000			350,000			400,000		
Btu/Hr. Output	123,000			143,500			164,000			205,000			246,000			287,000			328,000		
Entering Airflow (CFM)	Low	Mid	High	Low	Mid	High	Low	Mid	High	Low	Mid	High	Low	Mid	High	Low	Mid	High	Low	Mid	High
	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM
	1587	2020	2778	1852	2357	3241	2116	2694	3704	2646	3367	4630	3175	4040	5556	3704	4714	6481	4233	5387	6584
Max Mounting Height. (Ft.)	10	14	23	10	15	24	9	12	22	12	17	27	13	18	30	13	19	30	13	19	25
Air Temp. Rise (F)	70	55	40	70	55	40	70	55	40	70	55	40	70	55	40	70	55	40	70	55	45
Heat Throw (Ft.) @ Max Mounting Height.	34	49	80	37	52	85	33	48	77	41	59	96	45	65	105	46	67	107	46	66	89
Heat Throw (Ft.) @ 7' Minimum Mounting Height.	45	71	120	49	76	128	43	68	115	57	87	145	64	97	160	66	99	164	66	99	136

* See pages 20 and 21 for motor information

GENERAL PERFORMANCE DATA

Table 21.1 - Power Code Description - Blower Model BDP ①

Power Code	Voltage	Phase	150		175		200		250		300		350		400	
			HP	Drive	HP	Drive	HP	Drive	HP	Drive	HP	Drive	HP	Drive	HP	Drive
01	115	1	1/4	191	-	-	1/4	212	-	-	-	-	-	-	-	-
02	230	1	1/4	191	-	-	1/4	212	-	-	-	-	-	-	-	-
07	575	3	1/4	197	-	-	1/4	213	-	-	-	-	-	-	-	-
08	208-230/460	3	1/4	191	-	-	1/4	212	-	-	-	-	-	-	-	-
09	115	1	1/3	191	1/3	95	1/3	212	1/3	203	3/4	205	1	107	1-1/2	105
10	230	1	1/3	191	1/3	95	1/3	212	1/3	203	3/4	205	1	107	1-1/2	105
15	575	3	1/3	197	1/3	96	1/3	213	1/3	204	3/4	205	1	255	1-1/2	180
16	208-230/460	3	1/3	191	1/3	95	1/3	212	1/3	203	3/4	205	1	255	1-1/2	180
17	115	1	1/3	95	1/2	96	1/3	102	1/2	204	1	205	1-1/2	105	-	-
18	230	1	1/3	95	1/2	96	1/3	102	1/2	204	1	205	1-1/2	105	-	-
23	575	3	1/3	96	1/2	96	1/3	101	1/2	204	1	157	1-1/2	180	2	210
24	208-230/460	3	1/3	95	1/2	96	1/3	102	1/2	204	1	157	1-1/2	180	2	210
25	115	1	1/2	96	3/4	192	1/2	101	3/4	205	1-1/2	106	1-1/2	100	-	-
26	230	1	1/2	96	3/4	192	1/2	101	3/4	205	1-1/2	106	1-1/2	100	-	-
31	575	3	1/2	96	3/4	192	1/2	101	3/4	205	1-1/2	108	1-1/2	210	3	111
32	208-230/460	3	1/2	96	3/4	192	1/2	101	3/4	205	1-1/2	108	1-1/2	33	3	111
33	115	1	3/4	38	1	192	3/4	16	1	205	-	-	-	-	-	-
34	230	1	3/4	38	1	192	3/4	16	1	205	-	-	-	-	-	-
39	575	3	3/4	38	1	256	3/4	16	1	157	2	108	2	210	5	207
40	208-230/460	3	3/4	38	1	256	3/4	16	1	157	2	108	2	210	5	207
41	115	1	1	38	1-1/2	193	1	16	1-1/2	105	-	-	-	-	-	-
42	230	1	1	38	1-1/2	193	1	16	1-1/2	105	-	-	-	-	-	-
47	575	3	1	254	1-1/2	198	1	178	1-1/2	180	3	111	3	111	2	180
48	208-230/460	3	1	254	1-1/2	198	1	178	1-1/2	180	3	111	3	111	2	180
49	115	1	1/4	13	-	-	1-1/2	105	-	-	1-1/2	105	-	-	-	-
50	230	1	1/4	13	-	-	1-1/2	105	-	-	1-1/2	105	-	-	-	-
55	575	3	1/4	14	2	80	1-1/2	180	2	108	1-1/2	110	5	207	3	112
56	208-230/460	3	1/4	13	2	80	1-1/2	180	2	108	1-1/2	180	5	207	3	112
57	115	1	3/4	96	3/4	96	1/4	24	3/4	204	-	-	-	-	-	-
58	230	1	3/4	96	3/4	96	1/4	24	3/4	204	-	-	-	-	-	-
63	575	3	3/4	96	3/4	96	1/4	25	3/4	204	-	-	2	180	5	111
64	208-230/460	3	3/4	96	3/4	96	1/4	24	3/4	204	-	-	2	180	5	111
65	115	1	-	-	1-1/2	79	1/3	24	1-1/2	23	-	-	-	-	-	-
66	230	1	-	-	1-1/2	79	1/3	24	1-1/2	23	-	-	-	-	-	-
71	575	3	-	-	1-1/2	80	1/3	25	1-1/2	177	-	-	5	181	-	-
72	208-230/460	3	-	-	1-1/2	80	1/3	24	1-1/2	177	-	-	5	181	-	-
73	115	1	-	-	-	-	1/2	25	-	-	-	-	-	-	-	-
74	230	1	-	-	-	-	1/2	25	-	-	-	-	-	-	-	-
79	575	3	-	-	-	-	1/2	25	-	-	-	-	-	-	-	-
80	208-230/460	3	-	-	-	-	1/2	25	-	-	-	-	-	-	-	-
81	115	1	-	-	-	-	3/4	101	-	-	-	-	-	-	-	-
82	230	1	-	-	-	-	3/4	101	-	-	-	-	-	-	-	-
87	575	3	-	-	-	-	3/4	101	-	-	-	-	-	-	-	-
88	208-230/460	3	-	-	-	-	3/4	101	-	-	-	-	-	-	-	-
89	115	1	-	-	-	-	1-1/2	23	-	-	-	-	-	-	-	-
90	230	1	-	-	-	-	1-1/2	23	-	-	-	-	-	-	-	-
95	575	3	-	-	-	-	1-1/2	177	-	-	-	-	-	-	-	-
96	208-230/460	3	-	-	-	-	1-1/2	177	-	-	-	-	-	-	-	-

① For selection of correct Power Code, refer to the tables on page 20.

PERFORMANCE DATA - HOODS

Table 22.1 - Performance Data - 30°, 60° and 90° Downward Deflector Hoods

Mounting Height to Bottom of Heater	30° Downward Hood For Propeller Units													
	PDP ①							BDP ②						
	PDP 150 X Y Z	PDP 175 X Y Z	PDP 200 X Y Z	PDP 250 X Y Z	PDP 300 X Y Z	PDP 350 X Y Z	PDP 400 X Y Z	BDP 150 X Y Z	BDP 175 X Y Z	BDP 200 X Y Z	BDP 250 X Y Z	BDP 300 X Y Z	BDP 350 X Y Z	BDP 400 X Y Z
8'	16 36 49	18 38 52	15 33 45	21 44 60	24 49 67	22 46 63	22 45 62	26 53 72	28 56 76	24 50 68	31 63 86	35 69 94	37 73 99	30 61 84
10'	15 34 47	17 37 51	14 31 43	20 43 59	23 48 66	21 45 62	21 44 61	25 52 71	26 55 75	23 49 67	30 62 85	34 69 94	36 72 98	29 61 83
12'	14 33 45	15 35 49	12 30 41	19 42 58	21 47 65	20 44 61	19 43 59	23 51 70	25 54 74	22 48 66	29 62 84	33 68 93	34 71 97	28 60 82
14'	12 30 42	14 33 46	11 27 37	17 40 56	20 46 63	19 43 59	18 42 57	22 50 68	24 53 73	21 47 64	28 61 83	31 67 92	33 71 96	27 59 80
16'	10 27 38	12 31 43	8 22 31	16 38 53	19 44 61	17 41 56	16 40 55	21 48 66	23 52 71	19 45 62	27 59 81	30 66 90	32 69 95	26 57 79
18'	6 20 29	9 26 37	6 18 26	14 36 50	17 42 58	15 38 53	15 37 52	19 46 64	21 50 69	18 43 59	25 58 80	29 65 89	31 68 93	24 56 77
20'				12 32 45	15 39 54	13 35 49	13 33 47	18 44 61	20 48 66	16 40 56	24 56 77	28 63 87	30 67 92	23 54 75
22'				8 24 35	13 35 49	10 29 42	8 25 37	16 41 57	18 45 63	14 36 51	22 54 75	26 62 85	28 65 90	21 52 72
24'					8 26 38	8 24 36	8 24 35	13 36 51	16 42 59	10 29 42	21 52 72	25 59 82	27 63 87	20 49 69
26'											19 48 68	23 57 79	25 61 85	18 46 64
28'											16 44 62	21 54 75	23 58 81	15 41 58
30'											12 36 52	19 50 70	21 55 77	10 32 47

Mounting Height to Bottom of Heater	60° Downward Hood For Propeller Units													
	PDP ①							BDP ②						
	PDP 150 X Y Z	PDP 175 X Y Z	PDP 200 X Y Z	PDP 250 X Y Z	PDP 300 X Y Z	PDP 350 X Y Z	PDP 400 X Y Z	BDP 150 X Y Z	BDP 175 X Y Z	BDP 200 X Y Z	BDP 250 X Y Z	BDP 300 X Y Z	BDP 350 X Y Z	BDP 400 X Y Z
8'	0 38 52	0 40 55	0 35 47	0 47 65	0 52 72	0 49 68	0 48 66	0 56 77	0 60 82	0 53 73	0 68 93	0 74 102	0 78 107	0 66 90
10'	0 36 49	0 39 53	0 33 45	0 46 63	0 51 70	0 48 66	0 47 64	0 55 76	0 59 81	0 52 71	0 67 91	0 74 101	0 77 106	0 65 88
12'	0 33 46	0 36 50	0 30 41	0 44 60	0 50 68	0 46 64	0 45 62	0 54 74	0 57 79	0 50 69	0 65 90	0 72 99	0 76 104	0 63 87
14'	0 30 41	0 33 46	0 26 36	0 41 57	0 48 65	0 44 61	0 43 59	0 52 71	0 56 76	0 48 67	0 64 88	0 71 97	0 75 102	0 62 85
16'	0 25 35	0 29 41	0 19 27	0 38 53	0 45 62	0 41 57	0 40 55	0 50 68	0 54 74	0 46 63	0 62 85	0 69 95	0 73 100	0 60 82
18'	0 13 19	0 23 32	0 12 17	0 35 48	0 42 58	0 38 52	0 36 50	0 47 64	0 51 70	0 43 59	0 60 82	0 68 93	0 72 98	0 58 79
20'				0 29 40	0 38 52	0 33 46	0 31 43	0 43 60	0 48 66	0 39 54	0 58 79	0 65 90	0 70 95	0 55 76
22'				0 16 23	0 32 45	0 25 35	0 21 30	0 39 54	0 44 61	0 34 47	0 55 75	0 63 86	0 67 92	0 52 72
24'					0 19 28	0 16 24	0 16 23	0 33 45	0 39 54	0 24 34	0 51 70	0 60 82	0 64 89	0 48 66
26'											0 46 64	0 56 78	0 61 84	0 43 60
28'											0 40 56	0 52 72	0 57 79	0 36 50
30'											0 30 43	0 46 65	0 53 73	0 22 31

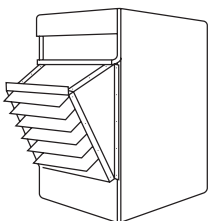
Mounting Height to Bottom of Heater	90° Downward Hood For Propeller Units													
	PDP ①							BDP ②						
	PDP 150 S	PDP 175 S	PDP 200 S	PDP 250 S	PDP 300 S	PDP 350 S	PDP 400 S	BDP 150 S	BDP 175 S	BDP 200 S	BDP 250 S	BDP 300 S	BDP 350 S	BDP 400 S
8'	38	42	36	54	62	58	56	72	79	70	98	113	121	94
10'	34	37	32	48	56	52	50	65	70	63	88	101	108	84
12'	31	34	29	44	51	47	46	59	64	58	80	92	99	77
14'	29	32	27	41	47	44	42	55	60	53	74	85	91	71
16'	27	29	25	38	44	41	39	51	56	50	70	80	85	67
18'	25	28	24	36	42	38	37	48	53	47	66	75	81	63
20'	24	26	23	34	40	36	35	46	50	45	62	71	76	60
22'	23	25	22	33	38	35	34	44	48	42	59	68	73	57
24'				31	36	33	32	42	45	41	57	65	70	55
26'				30	35	32	31	40	44	39	55	63	67	52
28'				29	33	31	30	39	42	38	53	60	65	50
30'					32	30	29	37	41	36	51	58	62	49
32'								36	39	35	49	56	60	47
34'								35	38	34	48	55	59	46
36'											46	53	57	45
38'											45	52	55	43
40'											44	50	54	42
42'											43	49	53	41

① Data based on units fired at full rated input with an entering air temperature of 60°-80°F.

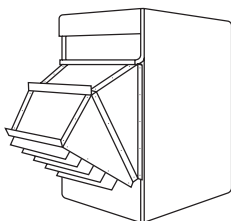
Maximum mounting heights higher versus units without outlet devices.

② Data based on unit fired at full rated input, 60°-80°F entering air temperature, and a 40°F temperature rise through unit.

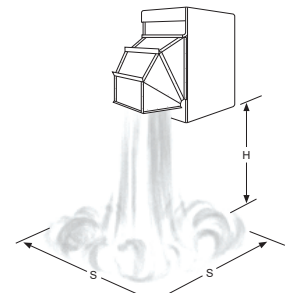
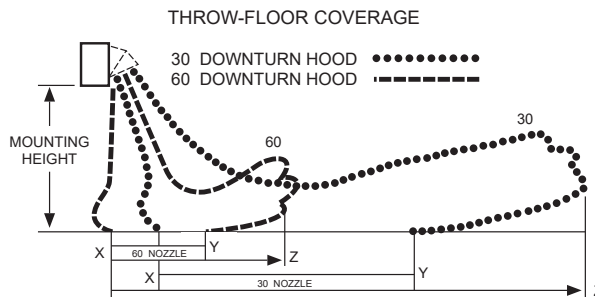
Maximum mounting heights higher versus units without outlet devices.



30° HOOD



60° HOOD



90° HOOD

PERFORMANCE DATA – NOZZLES

Figure 23.1 - Mounting Height, Heat Throw, Heat Spread (in feet)

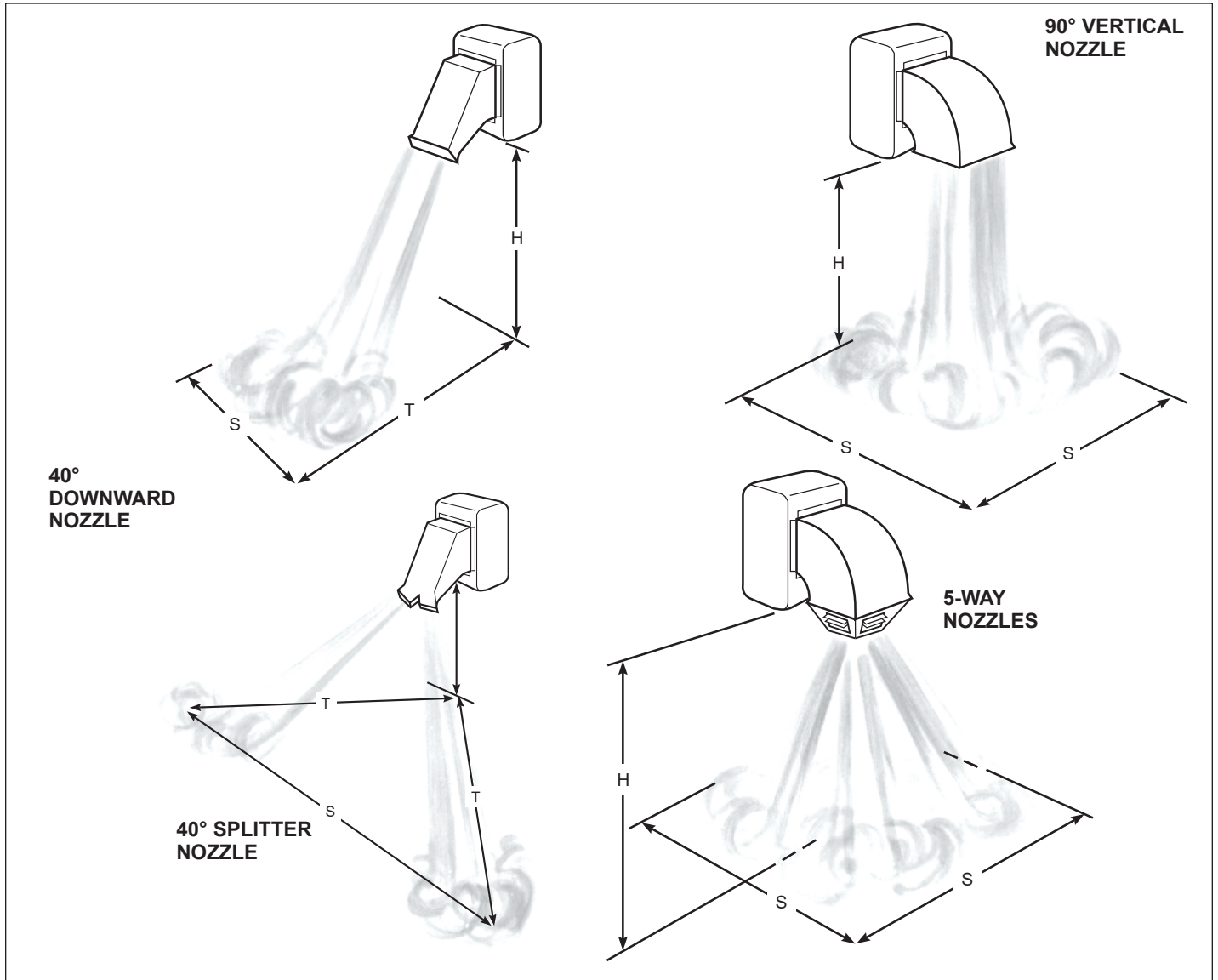


Table 23.1 - Mounting Height, Heat Throw, Heat Spread (in feet)

Nozzle Type		Model Number						
		BDP 150	BDP 175	BDP 200	BDP 250	BDP 300	BDP 350	BDP 400
40° Downward Nozzle	Max. Mounting Ht. (ft.) H	26	25	27	29	31	32	32
	Heat Throw (ft.) T	79	76	81	86	94	96	96
	Heat Spread (ft.) S	26	25	27	29	31	32	32
90° Vertical Nozzle	Max. Mounting Ht. (ft.) H	26	26	24	29	31	32	32
	Heat Spread (ft.) S	26	26	24	29	31	32	32
40° Splitter Nozzle	Max. Mounting Ht. (ft.) H	24	24	23	25	28	30	32
	Heat Throw (ft.) T	60	59	59	62	70	75	80
	Heat Spread (ft.) S	120	118	117	124	140	151	160
5-Way Nozzle	Max. Mounting Ht. (ft.) H	22	21	20	25	26	23	26
	Heat Spread (ft.) S	31	29	28	35	36	32	36

The above table 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 1,750 FPM for the 40° nozzles, 1,000 FPM for the 90° nozzle and 1,300 FPM for 5-way. For motor size, drive and blower rpm refer to page 20. Mounting height measured from bottom of unit.

DIMENSIONAL DATA

Figure 24.1 - Dimensional Drawings - Propeller Units (Model PDP)

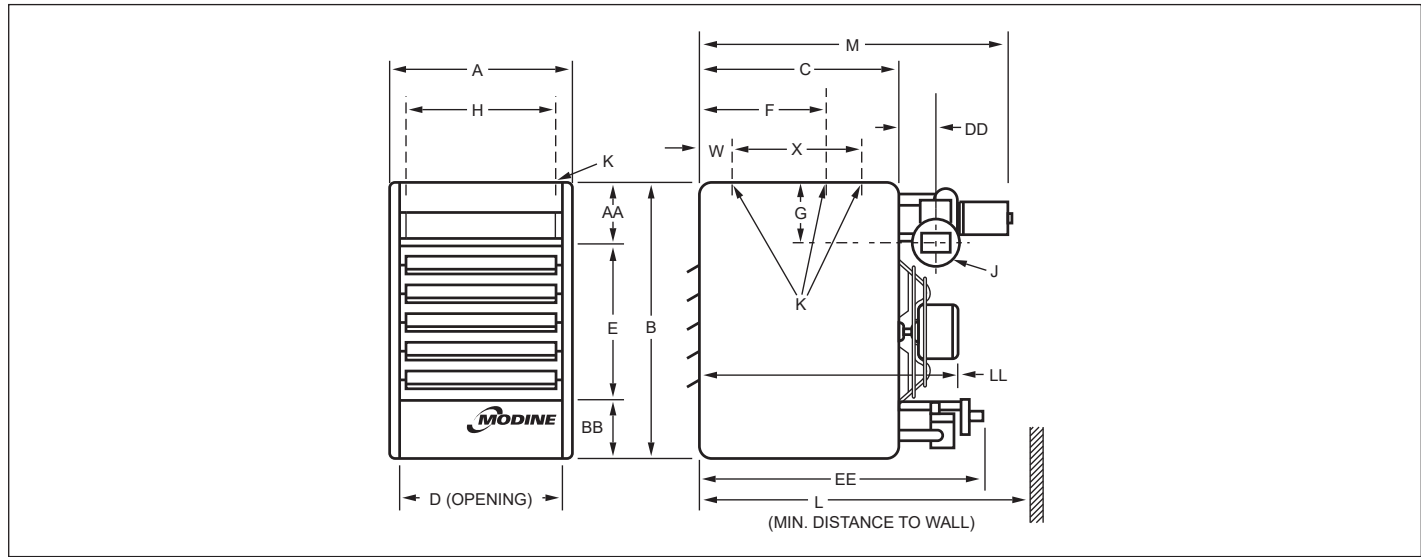


Table 24.1 - Dimensions (inches) - PDP ①

Dimension Symbol	Model Number						
	PDP 150	PDP 175	PDP 200	PDP 250	PDP 300	PDP 350	PDP 400
A	21	23-1/2	25-5/8	25-5/8	28-5/8	33-5/8	40
B	35-1/4	35-1/4	40-1/4	40-1/4	40-1/4	40-1/4	40-1/4
C	22	22	25	25	25	25	25
D	18-9/16	21-1/16	23-3/16	23-3/16	26-3/16	31-3/16	37-1/2
E	20	20	24	24	24	24	24
F	13.00	12.75	14.38	14.38	14.75	—	—
G	6-9/16	6-9/16	7-1/2	7-1/2	7-1/2	7-1/2	7-1/2
H	17-3/8	19-7/8	22	22	25	30	36-3/8
J	5 ②	5 ②	5 ②	6	6	6	6
K (Mounting Holes) ③	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16
L ④	35-13/16	35-9/16	40-3/4	40-3/4	40-3/4	40-3/4	44-3/16
M	29-13/16	29-9/16	34-3/4	34-3/4	34-3/4	34-11/16	38-3/16
W	—	—	—	—	—	5	5
X	—	—	—	—	—	16	16
AA	8	8	9	9	9	9	9
BB	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4
DD	2-3/4	2-3/4	3-3/8	3-3/8	3-3/8	3-3/8	6-13/16
EE	30-1/2	30-1/2	32-7/8	32-7/8	32-7/8	32-7/8	32-7/8
LL	31-1/8	31-1/8	34-7/8	34-7/8	36-1/4	35-1/2	40-1/2
Gas Connections ⑤	1/2	1/2	1/2	3/4	3/4	3/4	3/4
Fan Diameter	16	18	20	20	22	22	24
Approx. Weight	168	175	239	239	269	338	418

① Do not use propeller units with duct work.

② Vent connection is 5", connected to a factory supplied vent transition. For model sizes 150 and 175, the factory supplied transition is 4" (to the power exhauster outlet) to 5" (to the vent system). For model size 200, the factory supplied transition is 6" (to the power exhauster outlet) to 5" (to the vent system).

③ PDP 150 through PDP 300 - 2 holes (and the level hanging adjustment feature). PDP 350 through PDP 400 - 4 holes. (Listed is the hole diameter and threads per inch to accept threaded rod).

④ Dimension equals overall plus 6".

⑤ For natural gas; may vary depending on control availability.

DIMENSIONAL DATA

Figure 25.1 - Dimensional Drawings - Blower Units (Model BDP)

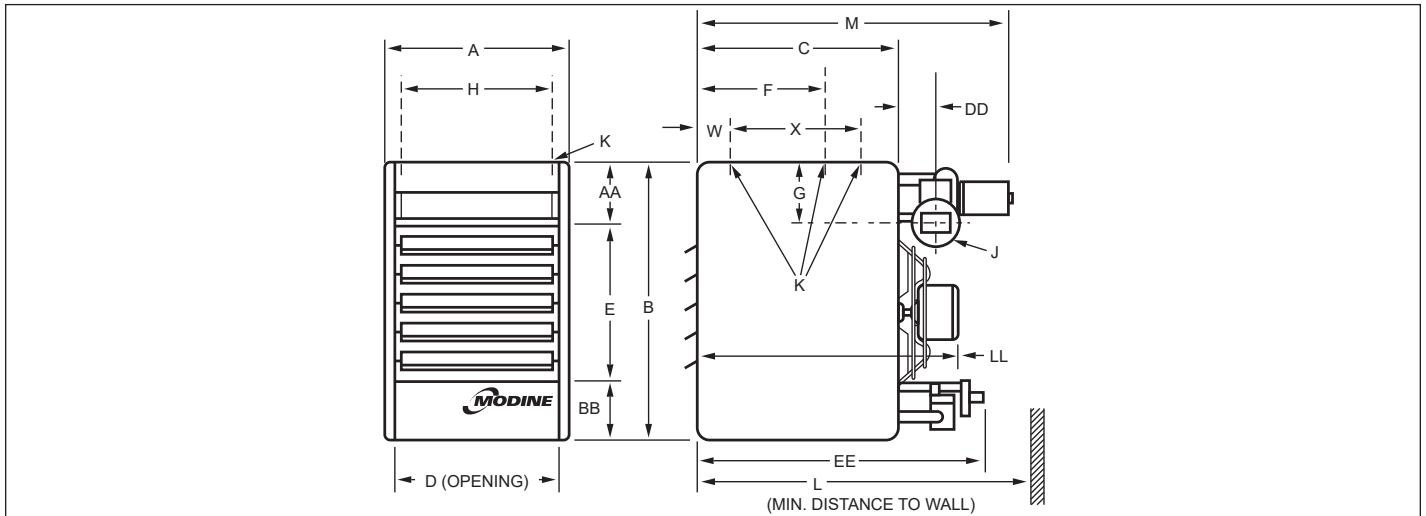


Table 25.1 - Dimensions (inches) - BDP

Dimension Symbol	Model Number						
	BDP 150	BDP 175	BDP 200	BDP 250	BDP 300	BDP 350	BDP 400
A	21	23-1/2	25-5/8	25-5/8	28-5/8	33-5/8	40
B	35-1/4	35-1/4	40-1/4	40-1/4	40-1/4	40-1/4	40-1/4
C	22	22	25	25	25	25	25
D	18-9/16	21-1/16	23-3/16	23-3/16	26-3/16	31-3/16	37-1/2
E	20	20	24	24	24	24	24
F	12	12	13-1/2	13-1/2	14	—	—
G	6-9/16	6-9/16	7-1/2	7-1/2	7-1/2	7-1/2	7-1/2
H	17-3/8	19-7/8	22	22	25	30	36-3/8
J	5 ①	5 ①	5 ①	6	6	6	6
K Mounting Holes ②	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16
L w/ Blwr Encl & Filt Rk	62-5/8	62-5/8	69-5/8	69-5/8	69-5/8	69-5/8	69-5/8
L w/o Blwr Encl & Filt Rk	53-1/8	53-1/8	61	61	61	61	65
M ③	47-1/8	47-1/8	55	55	55	55	59
N ④	21-1/2	21-1/2	25-7/16	25-7/16	24-15/16	17-15/16	22
O	7-1/4	7-1/4	8-1/2	8-1/2	8-1/2	8-1/2	8-1/2
P	30	30	34	34	34	34	34
Q Blower Encl Ht	21-3/8	21-3/8	25-1/8	25-1/8	25-1/8	25-1/8	25-1/8
R Inlet Duct Height	20	20	23-3/4	23-3/4	23-3/4	23-3/4	23-3/4
S Center to Center Blower Mtg. Holes	17-5/16	17-3/8	20-3/8	20-3/8	20-3/8	20-3/8	20-3/8
T Inlet Duct Width	27-1/2	27-1/2	32-3/4	32-3/4	32-3/4	42-7/8	42-7/8
V Blower Encl Width	29	29	34-1/4	34-1/4	34-1/4	44-3/8	44-3/8
W	—	—	—	—	—	5	5
X	—	—	—	—	—	16	16
AA	8	8	9	9	9	9	9
BB	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4
DD	2-3/4	2-3/4	2-3/4	3-3/8	3-3/8	3-3/8	6-13/16
EE	56-5/8	56-5/8	63-5/8	63-5/8	63-5/8	63-5/8	63-5/8
Gas Connections ⑤	1/2	1/2	1/2	3/4	3/4	3/4	3/4
Blower Wheel Diameter	13	13	15	15	15	15	15
Approx. Weight	152	152	315	315	339	428	498

① Vent connection is 5", connected to a factory supplied vent transition. For model sizes 150 and 175, the factory supplied transition is 4" (to the power exhauster outlet) to 5" (to the vent system). For model size 200, the factory supplied transition is 6" (to the power exhauster outlet) to 5" (to the vent system).

② BDP 150 thru BDP 300 — 4 holes (2 on blower and 2 on unit). BDP 350 and BDP 400 — 6 holes (2 on blower and 4 on unit). (Listed is the hole diameter and threads per inch to accept threaded rod).

③ This is an approximate dimension for standard motors, allow 3" for sheave and optional motors.

④ Distance between mounting hole in unit casing and mounting hole on blower. On the BDP 350 and BDP 400, the distance is from rear mounting hole in casing to the mounting hole on blower.

⑤ For natural gas; may vary depending on control availability.

MAINTENANCE

WARNING

When servicing or repairing this equipment, use only factory-approved service replacement parts. A complete replacement parts list may be obtained by contacting the factory. Refer to the rating plate on the appliance for complete appliance model number, serial number, and company address. Any substitution of parts or controls not approved by the factory will be at the owner's risk.

CAUTION

1. Service or repair of this equipment must be performed by a qualified service agency.
2. Do not attempt to reuse any mechanical or electrical controllers which have been wet. Replace defective controller.

NOTE: To check most of the possible remedies in the troubleshooting guide listed in Table 27.1, refer to the applicable sections of the manual.

General Maintenance

The unit and venting system must be checked once a year by a qualified service technician.

All installation and service of these units must be performed by a qualified installation and service agency.

Before any service, BE SURE TO TURN OFF GAS AT THE MANUAL SHUT-OFF VALVE AHEAD OF THE COMBINATION GAS CONTROL AND TURN OFF ALL ELECTRIC POWER TO THE HEATER.

General Unit

When providing annual maintenance for the unit heater, keep the unit free from dust, dirt, grease and foreign matter. Pay particular attention to:

1. The combustion air and exhaust vent piping.
2. The burner ports and pilot burner orifices (avoid the use of hard, sharp instruments capable of damaging surfaces for cleaning these ports). To check the burner port and pilot burner orifice, see "Burner and Pilot Assembly Removal".
3. The air shutters and main burner orifices (avoid the use of hard, sharp instruments capable of damaging surfaces for cleaning these orifices). To check the air shutters and main burner orifices, see for "Manifold Assembly Removal."
4. The heat exchanger. Clean tubes from the bottom with a stiff non-wire brush.
5. The heat exchanger should be checked annually for cracks and discoloration of the tubes. If a crack is detected, the heat exchanger should be replaced before the unit is put back into service. If the tubes are dark gray, airflow across the heat exchanger should be checked to insure that a blockage has not occurred or the blower is operating properly.

Electrical Wiring

The electrical wiring should be checked annually for loose connections or deteriorated insulation.

Gas Piping & Controls

The gas valves and piping should be checked annually for general cleanliness and tightness.

The gas controls should be checked to ensure that the unit is operating properly.

Propeller Assembly

Check the motor for lubrication if the motor is not permanently lubricated. Inspect the fan for damage and fit on motor shaft. Clean any dust, dirt or foreign matter from the fan blades.

Blower Assembly

The blower assembly includes the bearings, drive sheaves and belts. Blower bearings should be checked and lubricated based on the blower manufacturer's recommendations. Bearings should also be checked for any unusual wear and replaced if needed.

Drive sheaves should be checked at the same time the bearings are inspected. Check to make sure the sheaves are in alignment and are securely fastened to the blower and motor shafts.

Belt tension should be rechecked shortly after the unit has been installed to check for belt stretching. After the initial start-up, monthly checks are recommended.

Manifold Assembly Removal

To remove the manifold:

1. Shut off gas and electric supply.
2. Lower bottom pan to expose burner and manifold (see Figure 16.2).
3. Disconnect pilot tubing and thermocouple lead (or ignition cable) at the combination gas control (and ignition control).
4. Disconnect control wires for the combination gas control.
5. Disconnect gas manifold at ground union joint.
6. Remove the 2 screws holding the manifold to the heat exchanger support.
7. Clean the orifices and adjust the air shutters as necessary.
8. Follow steps 2-6 in reverse order to install the manifold assembly.
9. Turn on the electric and gas supply.
10. Check the ground union joint for leaks with a soap solution. Tighten if necessary.

Burner and Pilot Assembly Removal

To remove the burner:

1. Shut off gas and electric supply.
2. Lower bottom pan to expose burner and manifold (see Figure 16.2).
3. Disconnect pilot tubing and thermocouple lead (or ignition cable) at the combination gas control (and ignition control).
4. Remove the 2 burner retaining pins holding the burner in place. The burner can then be easily lowered from the unit.
5. Examine the burner and pilot assembly for cleanliness and/or obstructions as necessary (see "General Unit" for cleaning instructions).
6. Replace the burner assembly in reverse order. In replacing the burner, be certain that the slots at the front of the burner are located properly on their shoulder rivets and that the burner retaining pins are put back into their proper locations.
7. Reconnect the ignition cable and pilot gas supply line.
8. Turn on the electric and gas supply.

SERVICE & TROUBLESHOOTING

Table 27.1 - Troubleshooting

Trouble	Possible Cause	Possible Remedy
Pilot does not light	<ol style="list-style-type: none"> 1. Main gas is off. 2. Power supply is off. 3. Air in gas line. 4. Dirt in pilot orifice. 5. Gas pressure out of proper range. 6. Pilot valve does not open. <ol style="list-style-type: none"> a. Defective ignition controller. b. Blown fuse on control board c. Defective gas valve. 7. No spark at ignitor. <ol style="list-style-type: none"> a. Loose wire connections. b. Pilot sensor is grounded. c. Blown fuse on control board d. Defective ignition controller. 8. Safety device has cut power. 9. Pilot valve is off. 10. Dirty thermocouple contact. 11. Excessive drafts. 12. Pilot orifice Fitting leak. 	<ol style="list-style-type: none"> 1. Open manual gas valve. 2. Turn on main power. 3. Purge gas line. 4. Check for plugged pilot orifice and clean with compressed air if necessary. 5. Adjust to a maximum of 14" W.C. Minimum for natural gas - 6" W.C. Minimum for propane gas - 11" W.C. 6. Check wiring for 24 volts to valve. <ol style="list-style-type: none"> a. Replace ignition controller. b. Replace Fuse c. Replace gas valve. 7. <ol style="list-style-type: none"> a. Check all ignition controller wiring. b. Replace sensor if cracked or worn c. Replace fuse d. Replace ignition controller. 8. Check all safety devices (High limit, pressure switch, blocked vent safety switch, etc.) Determine and correct problem. Reset if necessary. 9. Turn gas control knob or lever on combination gas control to pilot position. 10. Be sure thermocouple contact is clean. If problem persists replace thermocouple. 11. Find source and re-direct airflow away from unit. 12. Tighten pilot orifice. Flame impingement on thermocouple may cause thermocouple to become inoperative.
Main burners do not light (Pilot is lit)	<ol style="list-style-type: none"> 1. Defective valve. 2. Loose wiring. 3. Defective pilot sensor 4. Defective ignition controller. 5. Improper thermostat wiring. 	<ol style="list-style-type: none"> 1. Replace valve. 2. Check wiring to gas valve. 3. Replace pilot sensor. 4. Replace ignition controller. 5. Verify wiring compared to wiring diagram.
Lifting Flames (See Figure 28.2)	<ol style="list-style-type: none"> 1. Too much primary air. 2. Main pressure set too high. 3. Orifice too large. 	<ol style="list-style-type: none"> 1. Reduce primary air. 2. Adjust to a maximum of 14" W.C. 3. Check orifice size with those listed on the serial plate.
Yellow Tipping (With propane gas, some yellow tipping is always present.)	<ol style="list-style-type: none"> 1. Insufficient primary air. 2. Dirty orifice. 3. Misaligned orifice. 	<ol style="list-style-type: none"> 1. Increase primary air. 2. Check orifices and clean with compressed air if necessary. 3. Check manifold, replace if necessary.
Wavering Flames (See Figure 28.1)	<ol style="list-style-type: none"> 1. Drafts across burner 2. Misalignment of burner 3. Cracked heat exchanger 	<ol style="list-style-type: none"> 1. Eliminate drafts 2. Align burner on locator pins 3. Replace heat exchanger
Flashback	<ol style="list-style-type: none"> 1. Too much primary air 2. Main pressure set too high. 3. Orifice too large. 	<ol style="list-style-type: none"> 1. Reduce primary air. 2. Adjust to maximum of 14" W.C. 3. Check orifice size with those listed on the serial plate.
Floating Flames (see Figure 28.3)	<ol style="list-style-type: none"> 1. Insufficient primary air. 2. Main pressure set too high. 3. Orifice too large. 4. Blocked vent. 	<ol style="list-style-type: none"> 1. Increase primary air. 2. Adjust to a maximum of 14" W.C. 3. Check orifice size with those listed on the serial plate. 4. Clean/correct venting system.
Flame Rollout (see Figure 28.4)	<ol style="list-style-type: none"> 1. Main pressure set too high. 2. Orifice too large. 3. Blocked vent. 	<ol style="list-style-type: none"> 1. Adjust to a maximum of 14" W.C. 2. Check orifice size with those listed on the serial plate. 3. Clean/correct venting system.

SERVICE & TROUBLESHOOTING

Trouble	Possible Cause	Possible Remedy
Not Enough Heat	<ol style="list-style-type: none"> Unit cycling on high limit. ① <ol style="list-style-type: none"> Obstructions/leaks in duct system. Main pressure set too high. Blower motor not energized. Loose belt Blower speed too low. Blocked/damaged venting system. Air distribution baffle removed (high temperature rise units only). Defective high limit switch. <ol style="list-style-type: none"> Main pressure set too low. <ol style="list-style-type: none"> Too much outside air. <ol style="list-style-type: none"> Thermostat malfunction. Gas controls wired incorrectly. <ol style="list-style-type: none"> Unit undersized. 	<ol style="list-style-type: none"> <ol style="list-style-type: none"> Clean/correct duct system. Adjust to a maximum of 14" W.C. Check/correct to insure blower motor operates within 45 seconds of when gas controls are energized. Adjust belt tension. Check/correct blower drive settings for proper rpm. Check/correct venting system. Replace air distribution baffle. Replace high limit switch. Adjust main gas pressure. Minimum for natural gas — 6" W.C. Minimum for propane gas — 11" W.C. Adjust outside air damper to decrease outside air percentage (if possible). Check/replace thermostat. Check unit wiring against the wiring diagram. Check design conditions. If unit is undersized, an additional unit(s) or other heat source must be added.
Too Much Heat	<ol style="list-style-type: none"> Thermostat malfunction. Gas controls do not shut-off. <ol style="list-style-type: none"> Gas controls wired incorrectly. Short circuit. Main gas pressure set too high. Defective gas valve. 	<ol style="list-style-type: none"> Check/replace thermostat. <ol style="list-style-type: none"> Check unit wiring against the wiring diagram. Check for loose or worn wires. Adjust to a maximum of 14" W.C. Replace gas valve.

① Automatic Reset High Limit

The unit heater comes standard with an automatic reset high limit switch that will shut off the gas should the discharge air temperature become excessive. See Figure 18.1, indicator ⑦ for the location of either the standard automatic high limit switch. The switch should operate only when something is seriously wrong with the unit operation. Anytime the switch operates, correct the difficulty immediately or serious damage may result. If the switch cuts off the gas supply during normal operation, refer to the "Not Enough Heat" section of Service & Troubleshooting.

Figure 28.1 - Wavering Flame or Misalignment

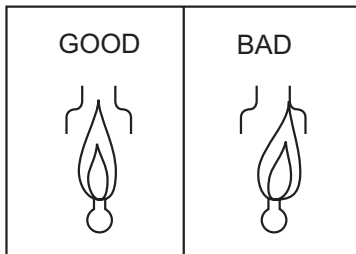


Figure 28.2 - Lifting Flame Condition

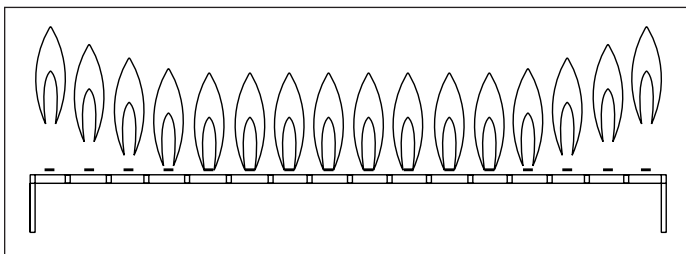


Figure 28.3 - Floating Flame Condition

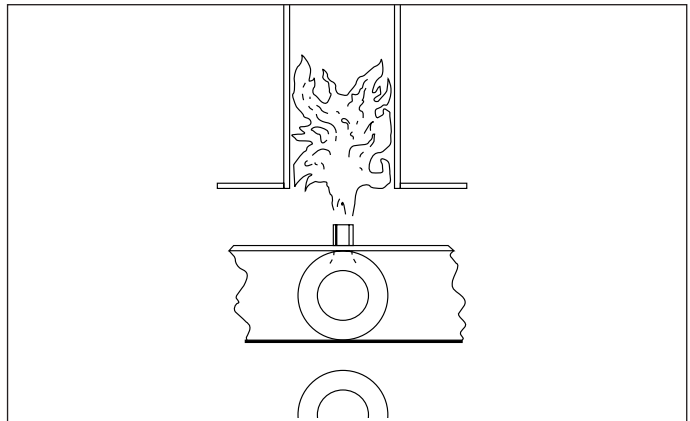
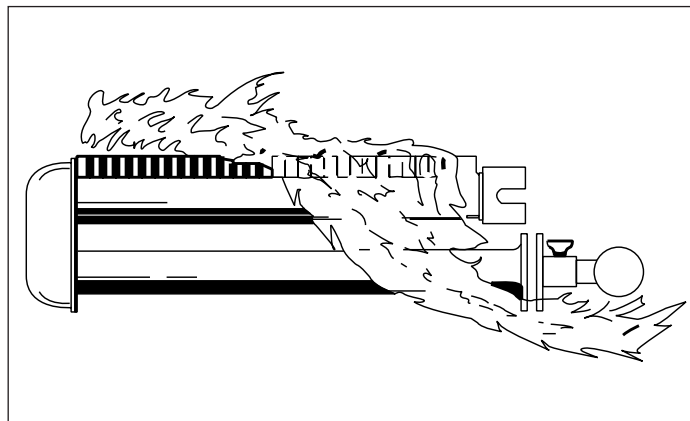


Figure 28.4 - Flame Rollout Appearance



MODEL NUMBER / RATING PLATE IDENTIFICATION

Figure 29.1 - Serial Number Designations

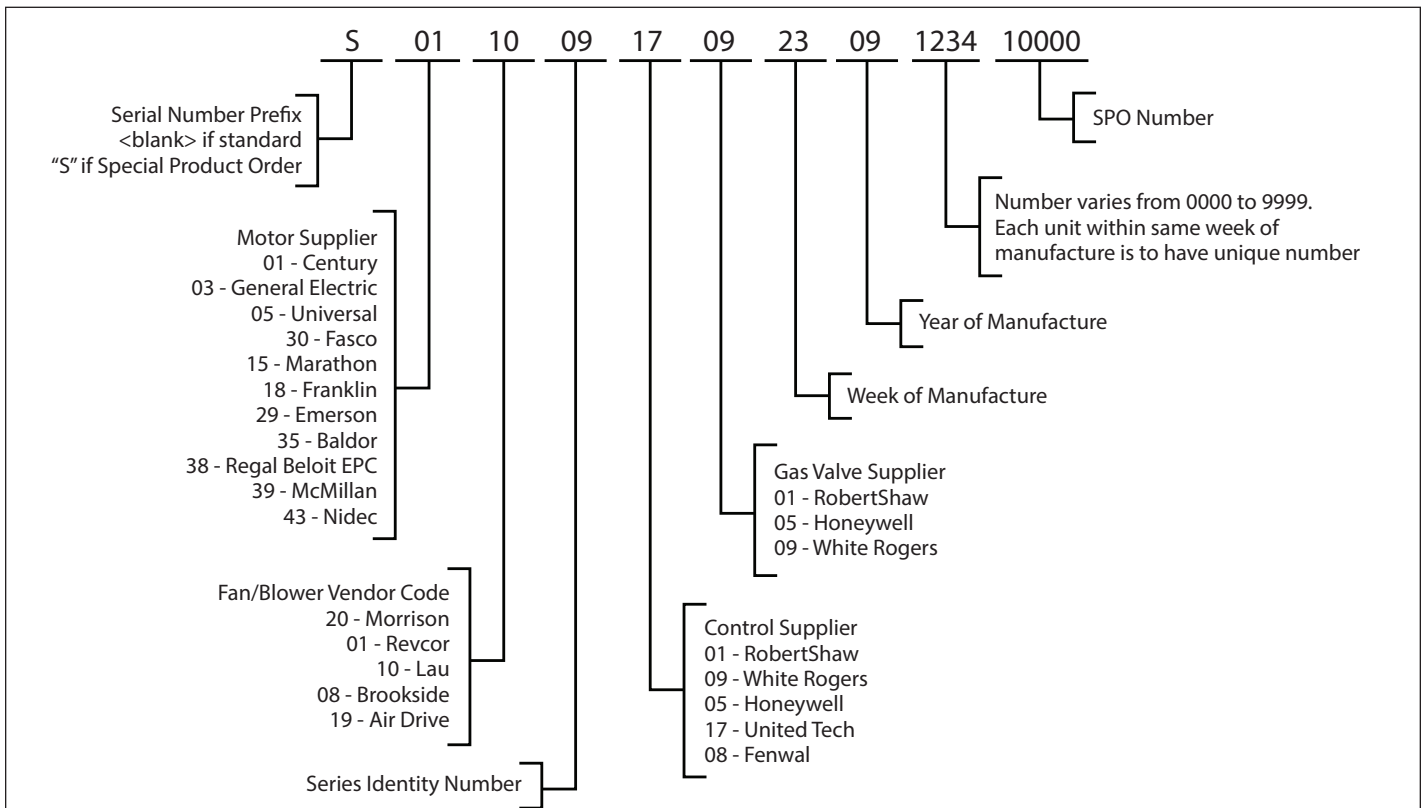
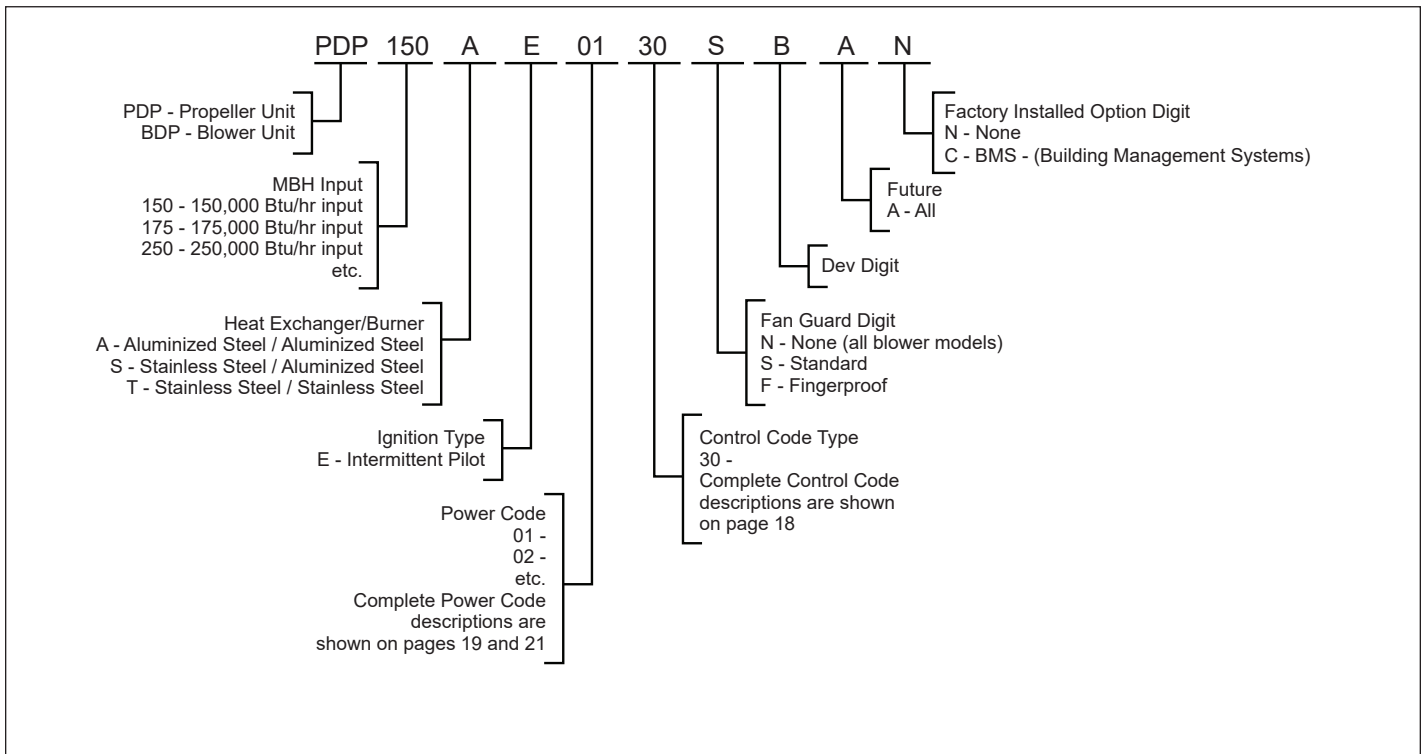


Figure 29.2 - Model Number Designations



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COMMERCIAL WARRANTY

Seller warrants its products to be free from defects in material and workmanship, EXCLUSIVE, HOWEVER, of failures attributable to the use of materials substituted under emergency conditions for materials normally employed. This warranty covers replacement of any parts furnished from the factory of Seller, but does not cover labor of any kind and materials not furnished by Seller, or any charges for any such labor or materials, whether such labor, materials or charges thereon are due to replacement of parts, adjustments, repairs, or any other work done. This warranty does not apply to any equipment which shall have been repaired or altered outside the factory of Seller in any way so as, in the judgment of Seller, to affect its stability, nor which has been subjected to misuse, negligence, or operating conditions in excess of those for which such equipment was designed. This warranty does not cover the effects of physical or chemical properties of water or steam or other liquids or gases used in the equipment.

BUYER AGREES THAT SELLER'S WARRANTY OF ITS PRODUCTS TO BE FREE FROM DEFECT IN MATERIAL AND WORKMANSHIP, AS LIMITED HEREIN, SHALL BE IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, WHETHER ARISING FROM LAW, COURSE OF DEALING, USAGE OF TRADE, OR OTHERWISE, THERE ARE NO OTHER WARRANTIES, INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE, WHICH EXTEND BEYOND THE PRODUCT DESCRIPTION CONFIRMED BY BUYER AND SELLER AS OF THE DATE OF FINAL AGREEMENT.

This warranty is void if the input to the product exceeds the rated input as indicated on the product serial plate by more than 5% on gas-fired and oil-fired units, or if the product in the judgment of SELLER has been installed in a corrosive atmosphere, or subjected to corrosive fluids or gases, been subjected to misuse, negligence, accident, excessive thermal shock, excessive humidity, physical damage, impact, abrasion, unauthorized alterations, or operation contrary to SELLER'S printed instructions, or if the serial number has been altered, defaced or removed.

BUYER AGREES THAT IN NO EVENT WILL SELLER BE LIABLE FOR COSTS OF PROCESSING, LOST PROFITS, INJURY TO GOODWILL, OR ANY OTHER CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND RESULTING FROM THE ORDER OR USE OF ITS PRODUCT, WHETHER ARISING FROM BREACH OF WARRANTY, NONCONFORMITY TO ORDERED SPECIFICATIONS, DELAY IN DELIVERY, OR ANY LOSS SUSTAINED BY THE BUYER.

BUYER'S REMEDY FOR BREACH OF WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, IS LIMITED TO REPAIR OR REPLACEMENT AT THE FACTORY OF SELLER, ANY COMPONENT WHICH SHALL, WITHIN THE APPLICABLE WARRANTY PERIOD DEFINED HEREIN AND UPON PRIOR WRITTEN APPROVAL, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF SELLER SHALL DISCLOSE TO HAVE BEEN DEFECTIVE; EXCEPT THAT WHEN THE PRODUCT IS TO BE USED BY BUYER AS A COMPONENT PART OF EQUIPMENT MANUFACTURED BY BUYER, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO ONE YEAR FROM DATE OF SHIPMENT FROM SELLER. FOR GAS-FIRED PRODUCTS INSTALLED IN HIGH HUMIDITY APPLICATIONS AND UTILIZING STAINLESS STEEL HEAT EXCHANGERS, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO TEN YEARS FROM DATE OF SHIPMENT FROM SELLER.

These warranties are issued only to the original owner-user and cannot be transferred or assigned. No provision is made in these warranties for any labor allowance or field labor participation. Seller will not honor any expenses incurred in its behalf with regard to repairs to any of Seller's products. No credit shall be issued for any defective part returned without proper written authorization (including, but not limited to, model number, serial number, date of failure, etc.) and freight prepaid.

OPTIONAL SUPPLEMENTAL WARRANTY

Provided a supplemental warranty has been purchased, Seller extends the warranty herein for an additional four (4) years on certain compressors. Provided a supplemental warranty has been purchased, Seller extends the warranty herein for an additional four (4) years or nine (9) years on certain heat exchangers.

EXCLUSION OF CONSUMABLES & CONDITIONS BEYOND SELLER'S CONTROL

This warranty shall not be applicable to any of the following items: refrigerant gas, belts, filters, fuses and other items consumed or worn out by normal wear and tear or conditions beyond Seller's control, including (without limitation as to generality) polluted or contaminated or foreign matter contained in the air or water utilized for heat exchanger (condenser) cooling or if the failure of the part is caused by improper air or water supply, or improper or incorrect sizing of power supply.

Component Applicable Models	"APPLICABLE WARRANTY PERIOD"
Heat Exchangers Gas-Fired Units	TEN YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN ONE HUNDRED TWENTY-SIX MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST
Heat Exchangers Low Intensity Infrared Units Compressors Condensing Units for Cassettes	FIVE YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN FIVE YEARS FROM DATE OF RESALE BY BUYER OR ANY OTHER USER, WITHIN FIVE YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN SIXTY-SIX MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST
Burners Low Intensity Infrared Units Other Components excluding Heat Exchangers, Coils, Condensers, Burners, Sheet Metal	TWO YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TWO YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN THIRTY MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST
Heat Exchangers/Coils Indoor and Outdoor Duct Furnaces and System Units, Steam/Hot Water Units, Oil-Fired Units, Electric Units, Cassettes, Vertical Unit Ventilators, Geothermal Units Compressors Vertical Unit Ventilators, Geothermal Units Burners High Intensity Infrared Units Sheet Metal Parts All Products	ONE YEAR FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN ONE YEAR FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN EIGHTEEN MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST

As Modine Manufacturing Company has a continuous product improvement program, it reserves the right to change design and specifications without notice.



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 www.modinehvac.com



Comme la Modine Manufacturing Company a un programme d'amélioration permanente de ses produits, elle se réserve le droit de modifier la conception et les caractéristiques techniques sans préavis.

<p>Composant</p> <p>Modèles applicables</p>	<p>Échangeurs de chaleur</p> <p>Appareils de chauffage au gaz</p> <p>DIX ANS À PARTIR DE LA DATE DE PREMIER USAGE BÉNÉFICIAIRE PAR L'ACHETEUR OU TOUT AUTRE UTILISATEUR, DIX ANS À PARTIR DE LA DATE DE REVENTE PAR L'ACHETEUR OU TOUT AUTRE UTILISATEUR, DIX ANS À PARTIR DE LA DATE D'EXPÉDITION DE L'USINE DU VENDEUR, SELON LA PREMIÈRE DE CES ÉCHÉANCES.</p> <p>Échangeurs de chaleur</p> <p>Modèles infrarouges de faible intensité</p> <p>Condenseurs pour cassettes</p> <p>Compresseurs</p> <p>Modèles infrarouges de faible intensité</p> <p>CINQ ANS À PARTIR DE LA DATE DE PREMIER USAGE BÉNÉFICIAIRE PAR L'ACHETEUR OU TOUT AUTRE UTILISATEUR, CINQ ANS À PARTIR DE LA DATE DE REVENTE PAR L'ACHETEUR OU TOUT AUTRE UTILISATEUR, CINQ ANS À PARTIR DE LA DATE D'EXPÉDITION DE L'USINE DU VENDEUR, SELON LA PREMIÈRE DE CES ÉCHÉANCES.</p> <p>Brûleurs</p> <p>Modèles infrarouges de faible intensité</p> <p>Autres</p> <p>Composants sauf les échangeurs thermiques, serpents, condensateurs, brûleurs, tôle</p> <p>Échangeurs thermiques/serpents</p> <p>Systèmes et chaudières canalisés d'intérieur et d'extérieur, modèles à vapeur/eau chaude, modèles au mazout, appareils géothermiques</p> <p>Compresseurs</p> <p>Ventilateurs verticaux, appareil géothermiques</p> <p>Brûleurs</p> <p>Modèles infrarouges de haute intensité</p> <p>Pièces en tôle</p> <p>Tous les produits</p>
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« PÉRIODE DE GARANTIE APPLICABLE »

Le vendeur garantit ses produits contre tout défaut de matériel ou de fabrication, SAUF si la défaillance est imputable à un remplacement de matériel en cas d'urgence causé par l'indisponibilité du matériel normalement utilisé. Cette garantie couvre le remplacement de tout pièce fournie par l'usine du Vendeur, mais ne couvre pas la main-d'œuvre et les matériaux, y compris cette main-d'œuvre, ces matériaux ou ces frais soient dus au remplacement de pièces, réglages, réparations ou tout autre travail effectué. Cette garantie ne s'applique à aucun équipement qui a été réparé ou altéré en dehors de l'usine du Vendeur de telle manière à compromettre sa stabilité, selon le Vendeur, ou a été soumis à une utilisation abusive, une négligence ou de des conditions d'utilisation non conformes à celles pour lesquelles ce cet équipement a été conçu. Cette garantie ne couvre pas les effets sur d'autres propriétés physiques ou chimiques de la vapeur, de l'eau ou d'autres liquides ou gaz utilisés dans l'équipement. L'ACHETEUR RECONNAÎT QUE LA GARANTIE DU VENDEUR À L'ÉGARD DES DÉFAUTS DE FABRICATION OU DE MATIÈRES, AVEC LES LIMITATIONS ÉNONCÉES ICI, TIENENT ICI ET EXCLUT TOUTE AUTRE FORME DE GARANTIE, TANT EXPRESSE QU'IMPLICITE, QUELLE DÉCOULE DE LA LOI, DE RAPPORTS D'AFFAIRES, DES PRATIQUES COMMERCIALES USUELLES OU AUTRES, ET QU'IL NE BÉNÉFICIE PAS D'AUTRES GARANTIES, NOTAMMENT DE QUALITÉ MARCHANDE OU D'APTITUDE À UN USAGE PARTICULIER, AU-DELÀ DE LA DESCRIPTION DU PRODUIT CONFIRMÉE PAR L'ACHETEUR ET LE VENDEUR À LA DATE DE L'ACCORD FINAL.

Cette garantie est nulle et non avenue si l'alimentation du produit dépasse l'alimentation nominale indiquée sur la plaque de série du produit de plus de 5 % pour les modèles au gaz et au mazout, ou si, selon le VENDEUR, le produit a été installé dans une atmosphère corrosive ou a été soumis à des fluides ou gaz corrosifs, soumis à des conditions telles que utilisation abusive, négligence, accident, choc thermique excessif, humidité excessive, dégâts physiques, impact, abrasion, altérations non autorisées ou utilisation contraire aux instructions imprimées du VENDEUR, ou si le numéro de série a été altéré, rendu invisible ou retiré. L'ACHETEUR CONVIENT QU'EN AUCUN CAS LE VENDEUR NE SERA RESPONSABLE DES COÛTS DE TRAITEMENT, DES PERTES DE REVENUS, DES PÉRIS D'ACHAT/ANAGAGE, OU AUTRES DOMMAGES INDIRECTS OU CONSÉQUENTS, DÉCOULANT DE LA COMMANDE OU DE L'UTILISATION DE SES PRODUITS, QU'ILS SOIENT LE RÉSULTAT DU NON-RESPECT DES CLAUSES DE GARANTIE, D'UNE NON-CONFORMITÉ AUX SPÉCIFICATIONS DE COMMANDE, DE RETARDS DE LIVRAISON OU DE TOUTE AUTRE SUBIE PAR L'ACHETEUR.

GARANTIE COMMERCIALE

LE RECOURS DE L'ACHETEUR EN CAS DE DÉFAILLANCE SOUS GARANTIE, À TOUT COMPOSANT QUI, AU COURS DE LA PÉRIODE DE GARANTIE APPLICABLE DÉFINIE EN CECI ET AVEC AUTORISATION ÉCRITE PRÉALABLE, SERA RETOURNÉ EN PORT PAYÉ AU VENDEUR, DANS LA MESURE OU L'INSPECTION FAITE PAR LE VENDEUR PERMET DE CONCLURE QUE LEDIT PRODUIT EST DÉFECTUEUX, SAUF SI LE PRODUIT EST DESTINÉ À ÊTRE INCORPORÉ PAR L'ACHETEUR DANS UN COMPOSANT DE L'ÉQUIPEMENT FABRIQUÉ PAR LUI, AUQUEL CAS, LA DURÉE DE L'OBLIGATION DU VENDEUR, AVEC LES LIMITATIONS ÉNONCÉES CI-DESSUS, SERA LIMITÉE À UN AN À PARTIR DE LA DATE D'EXPÉDITION PAR LE VENDEUR, POUR LE PRODUIT AU GAZ INSTALLÉS DANS UNE FORTE HUMIDITÉ, LES APPLICATIONS ET UTILISANT DES ÉCHANGEURS THERMIQUES EN INOX, LE RECOURS DE L'ACHETEUR EN CAS DE VIOLATION DE GARANTIE, TEL QUE LIMITÉ EN CECI, SERA LIMITÉ À DIX ANS À PARTIR DE LA DATE D'EXPÉDITION DE L'USINE DU VENDEUR. Ces garanties sont données uniquement au propriétaire-utilisateur initial et ne sont pas cessibles ou assignables. Aucune disposition n'est prévue dans ces garanties pour la main-d'œuvre ou la participation de main-d'œuvre sur site. Le Vendeur ne remboursera pas les frais encourus en son nom pour des réparations effectuées sur l'un de ses produits, quel qu'il soit. Aucun crédit ne sera fait pour toute pièce défectueuse retournée sans autorisation écrite (y compris, mais sans s'y limiter, numéro de modèle, numéro de série, date de la panne, etc.) et sans port payé.

GARANTIE SUPPLÉMENTAIRE EN OPTION

Sous réserve de l'achat d'une garantie supplémentaire, le vendeur prolonge la garantie fournie en ceci de quatre (4) années supplémentaires pour certains compresseurs. Sous réserve de l'achat d'une garantie supplémentaire, le vendeur étend la garantie en ceci à quatre (4) ou neuf (9) années supplémentaires sur certains échangeurs thermiques. EXCLUSION DE CONSOMMABLES ET CONDITIONS AU-DELÀ DU CONTRÔLE DU VENDEUR

Cette garantie ne s'applique pas aux articles suivants : gaz frigorigènes, courroies, filtres, fusibles et autres articles consommés ou normalement usés ou conditions au-delà du contrôle du Vendeur, y compris (sans limitation quant à sa généralité) corps étranger, pertes d'achat/anage, ou autres dommages indirects ou consécutifs, DÉCOULANT DE LA COMMANDE OU DE L'UTILISATION DE SES PRODUITS, QU'ILS SOIENT LE RÉSULTAT DU NON-RESPECT DES CLAUSES DE GARANTIE, D'UNE NON-CONFORMITÉ AUX SPÉCIFICATIONS DE COMMANDE, DE RETARDS DE LIVRAISON OU DE TOUTE AUTRE SUBIE PAR L'ACHETEUR.

en eau inadéquate ou un tuyau d'alimentation de taille inadéquate ou incorrect.

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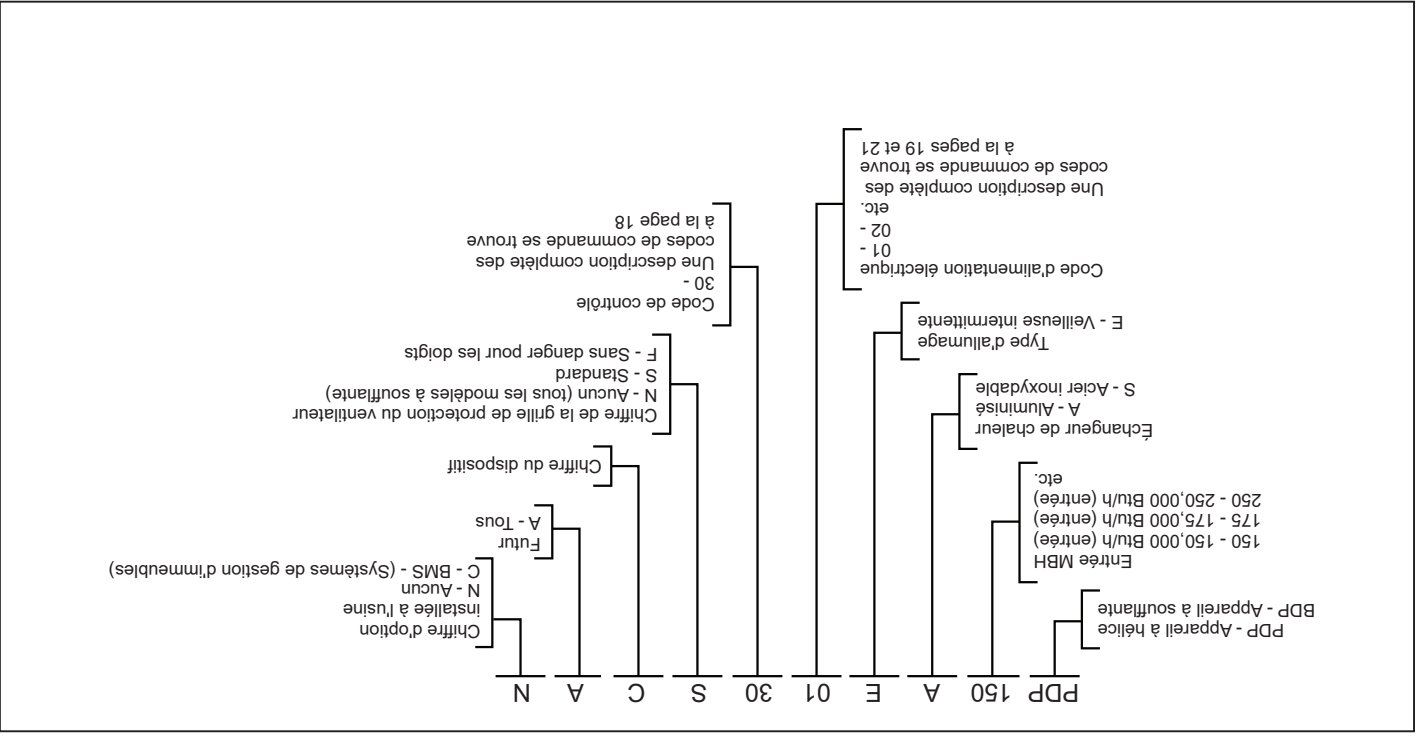


Figure 29.1 - Désignation des numéros de série

NUMÉRO DE MODÈLE/IDENTIFICATION DE LA PLAQUE SIGNALÉTIQUE

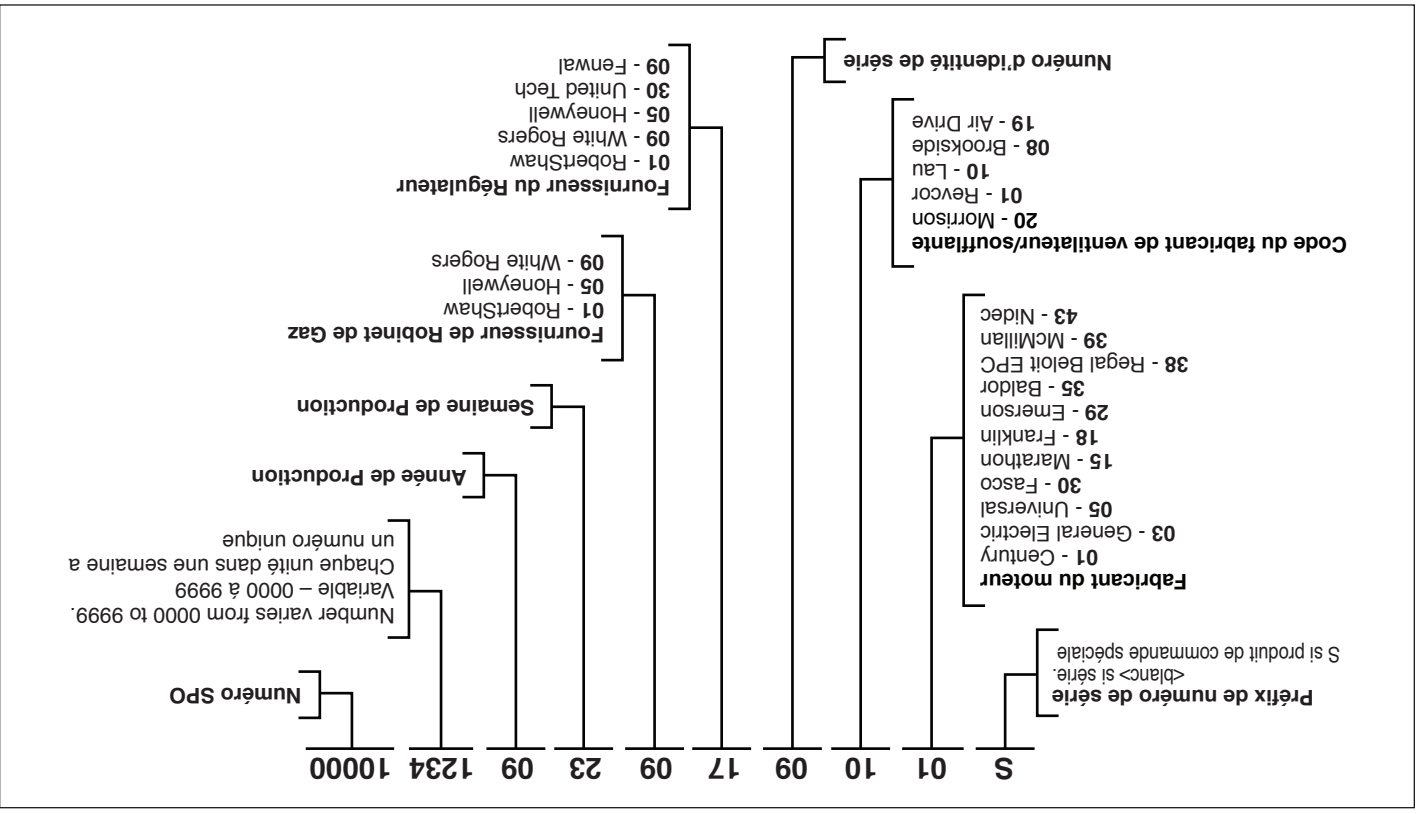


Figure 29.2 - Désignation des numéros de modèle

Problème	Cause possible	Solution possible
<p>Chaleur insuffisante</p> <ol style="list-style-type: none"> L'appareil commence un nouveau cycle dès l'atteinte de la limite haute. <ul style="list-style-type: none"> a. Obstructions/fuites dans les canalisations. b. Pression principale trop élevée. c. Moteur de la soufflante hors tension. d. Courroie détendue e. Vitesse de la soufflante trop basse Système de ventilation bouché/endommagé. <ul style="list-style-type: none"> f. Cloison de distribution d'air retirée (appareils à haute montée de température seulement). g. Pression principale trop basse Trop d'air extérieur. <ul style="list-style-type: none"> 4. Thermostat défectueux. 5. Commandes de gaz mal câblées. 6. Capacité de l'appareil insuffisante 	<ol style="list-style-type: none"> Thermostat défectueux. Les commandes de gaz ne se ferment pas. <ul style="list-style-type: none"> a. Commandes de gaz mal câblées. b. Court-circuit. 3. Pression de gaz réseau trop élevée. 4. Robinet de gaz défectueux. 	<ol style="list-style-type: none"> Vérifiez/remplacez le thermostat. <ul style="list-style-type: none"> a. Comparez le câblage de l'appareil au diagramme de câblage. b. Vérifiez s'il n'y a pas de fils débranchés ou usés. 3. Réglez à 14 po C.E. maximum. 4. Remplacez le robinet de gaz.
<p>Chaleur excessive</p> <ol style="list-style-type: none"> Thermostat défectueux. Les commandes de gaz ne se ferment pas. <ul style="list-style-type: none"> a. Commandes de gaz mal câblées. 	<ol style="list-style-type: none"> Nettoyez/corrigez les canalisations. <ul style="list-style-type: none"> b. Réglez à 35,5 cm (14 po) C.E. maximum. c. Vérifiez/corrigez pour être sûr que le moteur de la soufflante s'active dans les 45 secondes qui suivent l'activation des commandes de gaz. d. Ajustez la tension de la courroie. e. Vérifiez/corrigez les réglages d'entraînement de la soufflante pour obtenir le régime (tr/min) correct. f. Vérifiez/corrigez le système de ventilation. g. Remplacez la cloison de distribution d'air. h. Remplacez le thermorupteur. Réglez la pression de gaz réseau. <ul style="list-style-type: none"> 2. Minimum pour le gaz naturel — 6 po C.E. 3. Minimum pour le propane — 11 po C.E. 3. Réglez le registre d'air extérieur pour diminuer le pourcentage d'air extérieur (si possible). 4. Vérifiez/remplacez le thermostat. 5. Comparez le câblage de l'appareil au diagramme de câblage. 6. Vérifiez la conception. Si l'appareil n'est pas de capacité suffisante, ajoutez-en un autre ou une autre source de chaleur. 	<ol style="list-style-type: none"> 1. Vérifiez/remplacez le thermostat. <ul style="list-style-type: none"> a. Comparez le câblage de l'appareil au diagramme de câblage. b. Vérifiez s'il n'y a pas de fils débranchés ou usés. 3. Réglez à 14 po C.E. maximum. 4. Remplacez le robinet de gaz.

① **Thermorupteur à réarmement automatique**
 L'appareil de chauffage est fourni en série avec un thermorupteur à réarmement automatique qui coupe le gaz si la température de l'air ventilé devient excessive. Pour l'emplacement du thermorupteur à réarmement automatique de série, voir Figure 18.1, indicateur ⑦. Le commutateur devrait s'activer uniquement lorsque quelque chose entrave gravement le fonctionnement de l'appareil. Chaque fois que le commutateur s'active, le fonctionnement de l'appareil coupe le gaz en cours de fonctionnement normal, survient. Si le commutateur coupe le gaz en cours de fonctionnement normal, consultez la section « Chaleur insuffisante » de Service et dépannage.

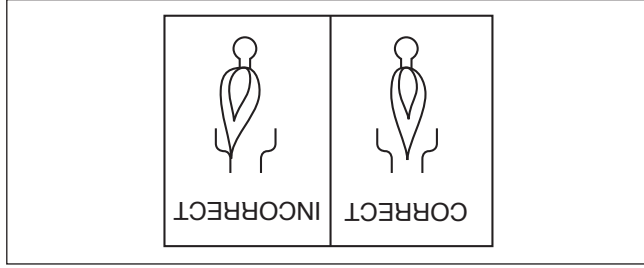


Figure 28.1 - Flamme vacillante ou mauvais alignement

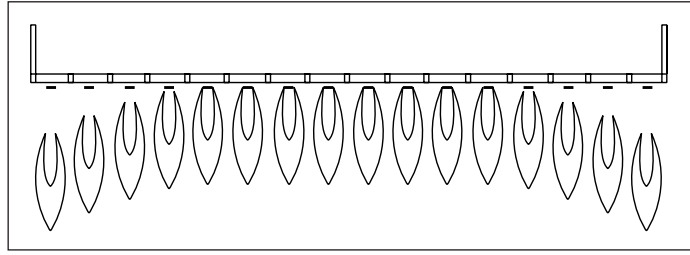


Figure 28.2 - Soulevement des flammes

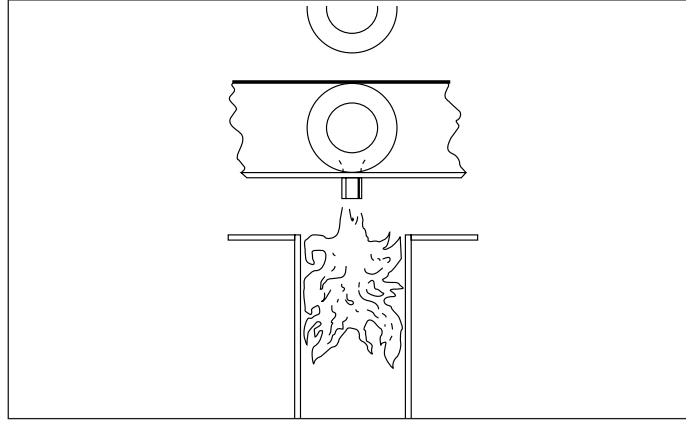


Figure 28.3 - Flottement des flammes

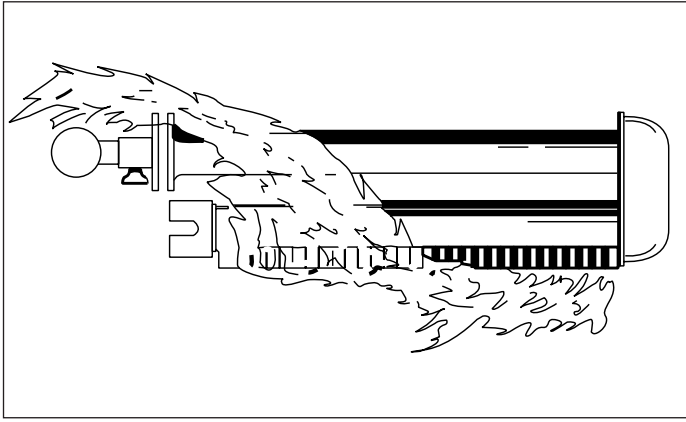


Figure 28.4 - Flamme rouillante

Tableau 27.1 – Dépannage

Solution possible	Cause possible	Problème
<ol style="list-style-type: none"> 1. Ouvrez le robinet de gaz manuel. 2. Mettez sous tension. 3. Purgez le tuyau de gaz. 4. Vérifiez si l'orifice de la veilleuse n'est pas bouché et nettoyez à l'air comprimé au besoin. 5. Réglez à 35,5 cm (14 po) C.E. maximum. Minimum pour le gaz naturel – 6 po C.E. Minimum pour le propane – 11 po C.E. 6. Vérifiez si la tension est de 24 V sur le câble menant au robinet. a. Remplacez le contrôleur d'allumage. b. Remplacez le fusible. c. Remplacez le robinet de gaz. 7. a. Vérifiez tout le câblage du contrôleur d'allumage. b. Remplacez le capteur s'il est fissuré ou usé. c. Remplacez le fusible. d. Remplacez le contrôleur d'allumage. 8. Vérifiez tous les dispositifs de sécurité (thermomètre, pressostat, commutateur de sécurité d'évacuation bloqué, etc.). Déterminez et corrigez le problème. Réarmez au besoin. 9. Ouvrez le robinet ou la manette de gaz de la commande de gaz mixte sur position veilleuse. Assurez-vous que le contact du thermocouple est propre. Si le problème persiste remplacez le thermocouple. 11. Trouvez la source et éloignez le débit d'air de l'appareil. 12. Serrez l'orifice de la veilleuse. Les flammes qui lèchent le thermocouple risquent de le rendre inopérant. 	<ol style="list-style-type: none"> 1. Arrivée de gaz fermée. 2. Pas d'alimentation électrique. 3. Le tuyau de gaz est rempli d'air. 4. Saletés dans l'orifice de la veilleuse. 5. Pression de gaz hors norme. 6. Le robinet de gaz de la veilleuse ne s'ouvre pas. <ol style="list-style-type: none"> a. Contrôleur d'allumage défectueux. b. Fusible grillé sur la carte contrôleur c. Robinet de gaz défectueux. 7. Pas d'étincelle à l'allumeur. <ol style="list-style-type: none"> a. Branchements électriques desserrés. b. Capteur de la veilleuse mis à la terre. c. Fusible grillé sur la carte contrôleur d. Contrôleur d'allumage défectueux. 8. Le dispositif de sécurité a coupé l'alimentation électrique. <ol style="list-style-type: none"> a. Capteur de veilleuse défectueux. b. Contrôleur d'allumage défectueux. c. Capteur de gaz défectueux. d. Contrôleur d'allumage défectueux. e. Thermostat mal câblé. 9. Robinet de la veilleuse fermé 10. Contact de thermocouple sale 11. Courants d'air excessifs. 12. Fuite de raccord à l'orifice de la veilleuse 	<p>La veilleuse ne s'allume pas.</p>
<ol style="list-style-type: none"> 1. Remplacez le robinet. 2. Vérifiez le câblage du robinet de gaz. 3. Remplacez le capteur de la veilleuse. 4. Remplacez le contrôleur d'allumage. 5. Vérifiez le câblage en vous référant au diagramme de câblage. 	<ol style="list-style-type: none"> 1. Robinet défectueux 2. Câble desserré. 3. Capteur de veilleuse défectueux. 4. Contrôleur d'allumage défectueux. 5. Thermostat mal câblé. 	<p>Les brûleurs principaux ne s'allument pas (veilleuse allumée).</p>
<ol style="list-style-type: none"> 1. Réduisez le débit d'air primaire. 2. Réglez à 14 po C.E. maximum. 3. Comparez la taille de l'orifice à celle qui est indiquée sur la plaque de série. 	<ol style="list-style-type: none"> 1. Trop d'air primaire 2. Pression principale trop élevée. 3. Orifice trop large. 	<p>Souèvement des flammes (Figure 28.2)</p>
<ol style="list-style-type: none"> 1. Augmentez le débit d'air primaire. 2. Contrôlez les orifices et nettoyez à l'air comprimé au besoin. 3. Vérifiez le collecteur, remplacez au besoin. 	<ol style="list-style-type: none"> 1. Pas assez d'air primaire. 2. Orifice sale. 3. Orifice mal aligné. 	<p>Pointes jaunes (Avec le propane, des pointes jaunes sont toujours présentes sur les flammes.)</p>
<ol style="list-style-type: none"> 1. Éliminez les courants d'air. 2. Alignez le brûleur sur les broches de référence. 3. Remplacez l'échangeur de chaleur. 	<ol style="list-style-type: none"> 1. Courants d'air à travers le brûleur. 2. Mauvais alignement du brûleur. 3. Échangeur de chaleur fissuré. 	<p>Flammes vacillantes (Figure 28.1)</p>
<ol style="list-style-type: none"> 1. Réduisez le débit d'air primaire. 2. Réglez à 14 po C.E. maximum. 3. Comparez la taille de l'orifice à celle qui est indiquée sur la plaque signalétique. 	<ol style="list-style-type: none"> 1. Trop d'air primaire. 2. Pression principale trop élevée. 3. Orifice trop large. 	<p>Retour de flamme</p>
<ol style="list-style-type: none"> 1. Augmentez le débit d'air primaire. 2. Réglez à 14 po C.E. maximum. 3. Comparez la taille de l'orifice à celle qui est indiquée sur la plaque de série. 4. Nettoyez/corrigez le système de ventilation. 	<ol style="list-style-type: none"> 1. Pas assez d'air primaire. 2. Pression principale trop élevée. 3. Orifice trop large. 4. Ventilation bouchée. 	<p>Flammes flottantes (Figure 28.3)</p>
<ol style="list-style-type: none"> 1. Réglez à 14 po C.E. maximum. 2. Comparez la taille de l'orifice à celle qui est indiquée sur la plaque de série. 3. Nettoyez/corrigez le système de ventilation. 	<ol style="list-style-type: none"> 1. Pression principale trop élevée. 2. Orifice trop large. 3. Ventilation bouchée. 	<p>Flamme roulante (voir Figure 28.4)</p>

- Tuyauterie et commandes de gaz**
La propreté générale et l'étanchéité des robinets et des tuyauteries de gaz doivent être vérifiées chaque année.
- Les commandes de gaz doivent être vérifiées afin de s'assurer que l'appareil fonctionne bien.
- Hélice**
Vérifiez la lubrification du moteur si le moteur n'est pas à lubrification permanente. Inspectez l'état du ventilateur et ajustez sur l'arbre moteur. Nettoyez la poussière, les saletés ou les particules étrangères des pales du ventilateur.
- Soufflerie**
La soufflerie inclut les roulements, les roues à gorge d'entraînement et les courroies. Les roulements de la soufflerie devront être vérifiés et lubrifiés selon les recommandations du fabricant de la soufflerie. L'usure inhabituelle des roulements devra également être vérifiée; remplacer au besoin.
- Les roues à gorge d'entraînement doivent être vérifiées durant l'inspection des roulements. Assurez-vous que les roues à gorge sont alignées et solidement fixées à l'arbre de la soufflerie et à l'arbre moteur.
- Révérifiez la courroie pour vous assurer qu'elle ne s'est pas distendue. Après le démarrage initial, des contrôles mensuels sont recommandés.
- Dépôt de collecteur**
Pour déposer le collecteur :
1. Coupez le gaz et l'électricité.
 2. Abaissez le bac inférieur pour exposer le brûleur et le collecteur (Figure 16.2).
 3. Déconnectez le tube de la veilleuse et le fil du thermocouple (ou le câble d'allumage) à la commande de gaz mixtes (et commande d'allumage).
 4. Déconnectez les fils de commande pour la commande de gaz mixtes.
 5. Déconnectez le collecteur de gaz au raccord union.
 6. Retirez les deux vis qui fixent le collecteur au support de l'échangeur thermique.
 7. Nettoyez les orifices et ajustez les volets d'air au besoin.
 8. Reprenez les étapes 2 à 6 dans l'ordre inverse pour installer le collecteur.
 9. Ouvrez le gaz et allumez l'électricité.
 10. Avec une solution de savon, assurez-vous que le raccord union ne fuit pas. Serrez-le au besoin.
- Démontage du brûleur et de la veilleuse**
Pour déposer le brûleur :
1. Coupez le gaz et l'électricité.
 2. Abaissez le bac inférieur pour exposer le brûleur et le collecteur (Figure 16.2).
 3. Déconnectez le tube de la veilleuse et le fil du thermocouple (ou le câble d'allumage) à la commande de gaz mixtes (et commande d'allumage).
 4. Enlevez les deux goupilles qui fixent le brûleur en place. Le brûleur peut ensuite être facilement abaissé de l'appareil.
 5. Examinez la propreté et/ou les obstructions du brûleur et de la veilleuse au besoin (pour les instructions de nettoyage, voir l'entretien générale de l'appareil).
 6. Remettez le brûleur en place en procédant dans l'ordre inverse. En remettant le brûleur en place, assurez-vous que les fentes à l'avant du brûleur sont correctement situées sur leurs rivets et que les goupilles de retenue du brûleur sont remises dans leur emplacement initial.
 7. Rebranchez le câble d'allumage et la conduite d'arrivée de gaz de la veilleuse.
 8. Ouvrez le gaz et allumez l'électricité.

Le câblage électrique doit être vérifié une fois par année (branchements desserrés ou gaine isolante abîmée).

Câblage électrique

1. La prise d'air de combustion et la tuyauterie du chapeau.
2. Les orifices du brûleur principal et du brûleur de la veilleuse (pour nettoyer ces orifices, évitez d'utiliser des instruments pointus durs, capables de les endommager). Pour vérifier les volets d'air et les orifices du brûleur principal, voir Démontage du collecteur.
3. Les volets d'air et les orifices du brûleur principal (pour nettoyer ces orifices, évitez d'utiliser des instruments pointus durs, capables de les endommager). Pour vérifier les orifices du brûleur principal et du brûleur de la veilleuse, voir Démontage du brûleur et de la veilleuse.
4. L'échangeur de chaleur. Nettoyez les tubes à partir du bas avec une brosse non métallique à soies raides.
5. L'échangeur thermique doit être vérifié une fois par année (fissures et décoloration des tubes). Si une fissure est détectée, l'échangeur thermique doit être remplacé avant la remise en service de l'appareil. Si les tubes sont gris foncé, la circulation d'air à travers l'échangeur thermique devra être vérifiée pour confirmer l'absence d'obstruction et le fonctionnement correct de la soufflerie.

Lorsque vous

- effectuez la maintenance annuelle de l'appareil de chauffage, évitez de le salir (poussière, saletés, graisse et matières étrangères). Faites particulièrement attention aux points suivants :
- AVANT TOUTE INTERVENTION D'ENTRETIEN, ASSUREZ-VOUS DE FERMER LE ROBINET D'ARRÊT MANUEL, SITUÉ EN AMONT DU RÉGULATEUR DE GAZ COMBINÉ, ET COUPEZ L'ALIMENTATION ÉLECTRIQUE DE L'APPAREIL.**

L'appareil et le système d'évacuation des gaz doivent être vérifiés une fois par an par un technicien d'entretien qualifié. **Toutes les opérations d'installation et d'entretien doivent être confiées à une entreprise qualifiée.**

Maintenance générale

REMARQUE : Pour essayer la plupart des Solutions possibles suggérées dans le tableau de dépannage 27.1, reportez-vous aux sections correspondantes du manuel.

1. L'entretien et les réparations de l'appareil doivent être confiés à un centre de SAV qualifié.
2. Ne tentez pas de réutiliser un contrôleur mécanique ou électronique qui a été mouillé. Remplacez tout contrôleur défectueux.

ATTENTION

Pour l'entretien et les réparations de cet appareil, n'utiliser que des pièces d'origine certifiées. Pour la liste complète des pièces de rechange, adressez-vous au fabricant. Le numéro de modèle complet, le numéro de série et l'adresse du fabricant figurent sur la plaque signalétique fixée à l'appareil. Toute substitution de pièce ou commande non approuvée par le fabricant sera aux risques du propriétaire.

AVERTISSEMENT

DIMENSIONS

Figure 24.1 - Plans cotés – Modèles à hélice (PDP)

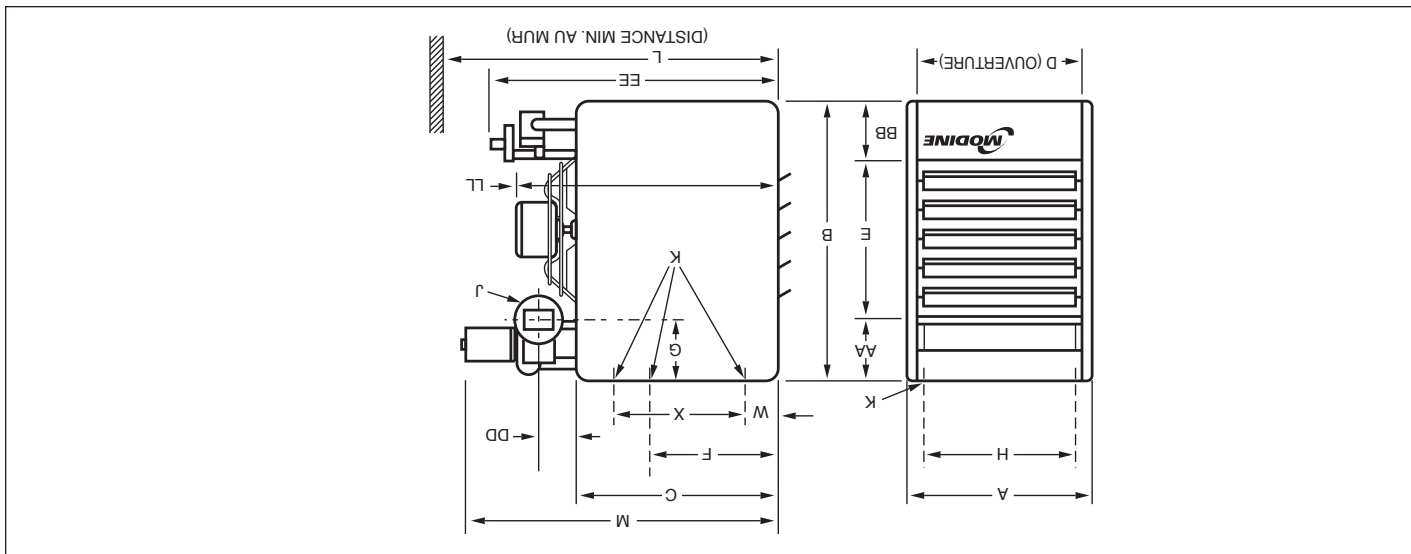


Tableau 24.1 - Dimensions (pouces) – PDP ①

Symbole de dimension	Numéro de modèle												
	PDP 150	PDP 175	PDP 200	PDP 250	PDP 300	PDP 350	PDP 400	A	B	C	D	E	
K (trous de montage) ③	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16
J	5 ②	5 ②	5 ②	6	6	6	6	6	6	6	6	6	6
H	17-3/8	19-7/8	22	22	25	30	36-3/8	17-3/8	19-7/8	22	22	25	30
G	6-9/16	6-9/16	7-1/2	7-1/2	7-1/2	7-1/2	7-1/2	6-9/16	6-9/16	7-1/2	7-1/2	7-1/2	7-1/2
F	13.00	12.75	14.38	14.38	14.75	14.75	14.75	13.00	12.75	14.38	14.38	14.75	14.75
E	20	20	24	24	24	24	24	20	20	24	24	24	24
D	18-9/16	21-1/16	23-3/16	23-3/16	23-3/16	26-3/16	31-3/16	18-9/16	21-1/16	23-3/16	23-3/16	26-3/16	31-3/16
C	22	22	25	25	25	25	25	22	22	25	25	25	25
B	35-1/4	35-1/4	40-1/4	40-1/4	40-1/4	40-1/4	40-1/4	35-1/4	35-1/4	40-1/4	40-1/4	40-1/4	40-1/4
A	21	23-1/2	25-5/8	25-5/8	25-5/8	28-5/8	33-5/8	21	23-1/2	25-5/8	25-5/8	28-5/8	33-5/8
de montage ③	35-13/16	35-9/16	40-3/4	40-3/4	40-3/4	40-3/4	44-3/16	35-13/16	35-9/16	40-3/4	40-3/4	40-3/4	44-3/16
L ④	29-13/16	29-9/16	34-3/4	34-3/4	34-3/4	34-3/4	38-3/16	29-13/16	29-9/16	34-3/4	34-3/4	34-3/4	38-3/16
M	29-13/16	29-9/16	34-3/4	34-3/4	34-3/4	34-3/4	38-3/16	29-13/16	29-9/16	34-3/4	34-3/4	34-3/4	38-3/16
W	—	—	—	—	—	—	5	—	—	—	—	—	5
X	—	—	—	—	—	—	16	—	—	—	—	—	16
AA	8	8	9	9	9	9	9	8	8	9	9	9	9
BB	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4	7-1/4
DD	2-3/4	2-3/4	3-3/8	3-3/8	3-3/8	3-3/8	6-13/16	2-3/4	2-3/4	3-3/8	3-3/8	3-3/8	6-13/16
EE	30-1/2	30-1/2	32-7/8	32-7/8	32-7/8	32-7/8	32-7/8	30-1/2	30-1/2	32-7/8	32-7/8	32-7/8	32-7/8
LL	31-1/8	31-1/8	34-7/8	34-7/8	34-7/8	36-1/4	40-1/2	31-1/8	31-1/8	34-7/8	34-7/8	36-1/4	40-1/2
Raccordements au gaz ⑤	1/2	1/2	1/2	3/4	3/4	3/4	3/4	1/2	1/2	1/2	3/4	3/4	3/4
Diamètre du ventilateur	16	18	20	20	20	22	24	16	18	20	20	22	24
Poids approx.	168	175	239	239	239	269	338	168	175	239	239	269	338

① N'utilisez pas les modèles à hélice avec des gaines.

② Le raccord d'évacuation est de 5 po, raccordée à une transition d'évacuation fournie par l'usine. Pour les tailles de modèle 150 et 175, la transition fournie par l'usine est de 4 po (jusqu'à la sortie de l'extracteur) à 5 po (jusqu'au système d'évacuation). Pour la taille de modèle 200, la transition fournie par l'usine est de 6 po (jusqu'à la sortie de l'extracteur) à 5 po (jusqu'au système d'évacuation).

③ DDP 150 à PDP 300 — 2 trous (et dispositif d'ajustement de suspension à l'horizontale), PDP 350 à PDP 400 — 4 trous. (Le diamètre de trou et les filets par pouce pour accepter la tige fileté sont indiqués.)

④ Dimension égale hors-tout plus 30,5 cm.

⑤ Pour le gaz naturel; peut varier selon les commandes disponibles.

Le tableau ci-dessus est basé sur une température d'arrivée d'air de 70 °F et une augmentation de la température de l'air de 55 °F. Les déflecteurs d'air sur les buses de retour sont d'environ 1750 p/m/min pour les buses à 40°, de 1000 p/m/min pour la buse à 90° et de 1300 p/m/min pour la buse à 5 voies. Pour la taille du moteur, l'entraînement et le régime de la soufflante, voir page 20. Hauteur de montage mesurée du bas de l'appareil.

Type de buse	Numéro de modèle						
	BDP 150	BDP 175	BDP 200	BDP 250	BDP 300	BDP 350	BDP 400
40° vers le bas	Haut. max. de montage (pi) H	26	25	27	29	31	32
	Portée de chauffage (pi) T	79	76	81	86	94	96
90° verticale	Couverture de chauffage (pi) S	26	26	24	29	31	32
	Haut. montage max. (pi) H	26	26	24	29	31	32
Séparation à 40°	Portée de chauffage (pi) T	60	59	59	62	70	75
	Couverture de chauffage (pi) S	120	118	117	124	140	151
5 voies	Haut. montage max. (pi) H	22	21	20	25	26	23
	Couverture de chauffage (pi) S	31	29	28	35	36	32

Tableau 23.1 - Hauteur de montage, portée et couverture de chauffage (pi)

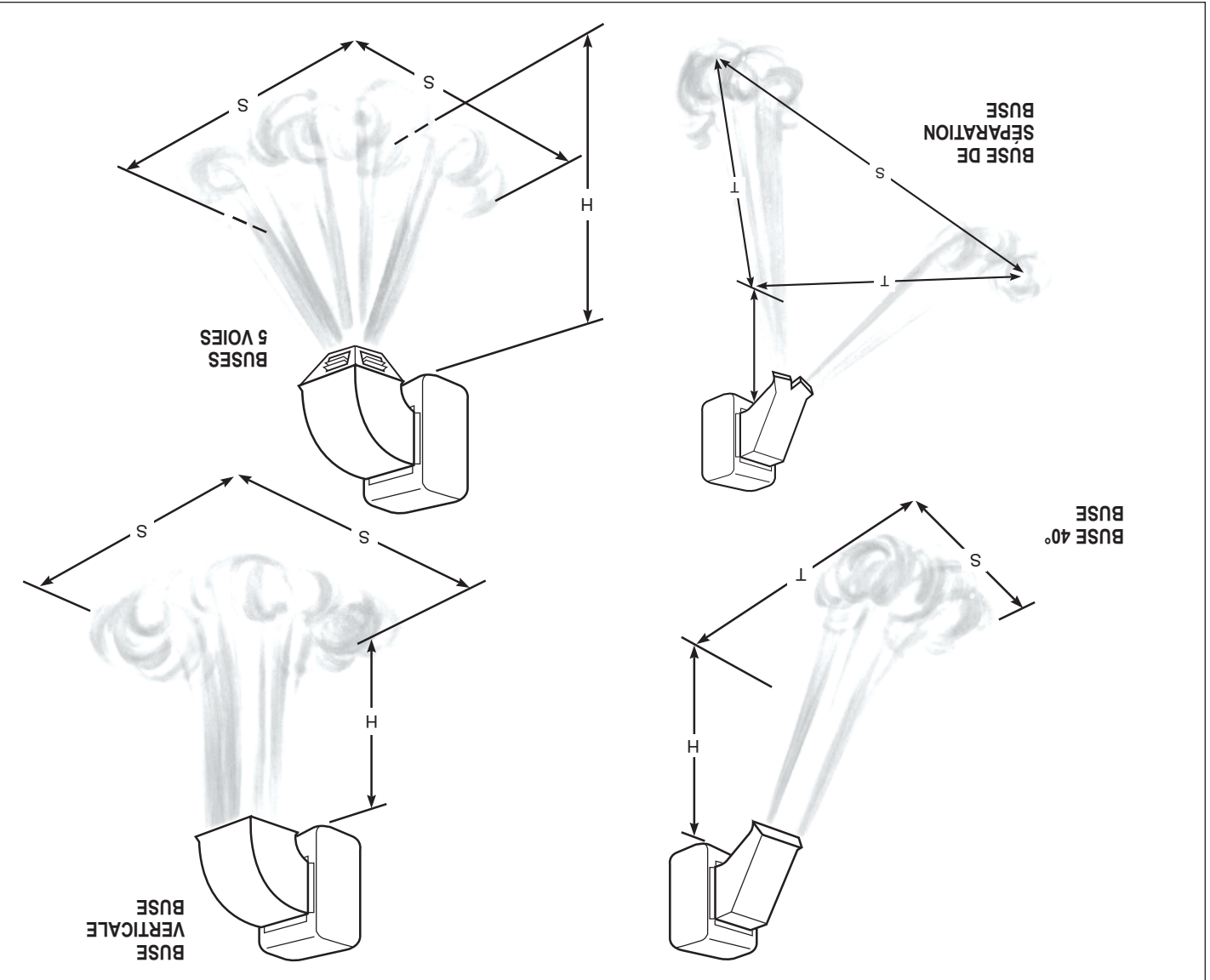


Figure 23.1 - Hauteur de montage, portée et couverture de chauffage (pi)

DONNÉES DE PERFORMANCE – BUSES

DONNÉES DE PERFORMANCE - HOTTES

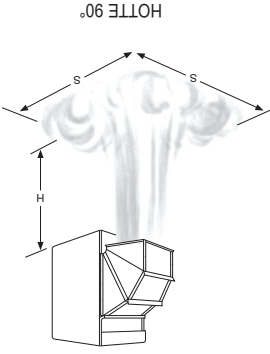
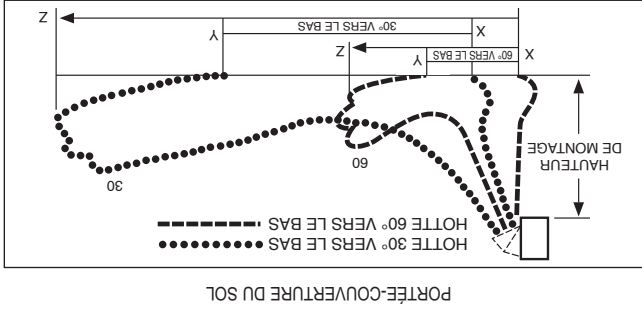
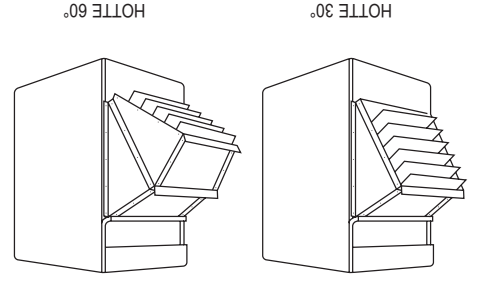
Tableau 22.1 - Données de performance – hottes de déflexion vers le bas à 30°, 60° et 90°

Hauteur de montage jusqu'au chaudière	Hotte à 30° vers le bas pour modèles à hélice											
	PDP 150	PDP 175	PDP 200	PDP 250	BDP 200	BDP 250	BDP 300	BDP 350	BDP 400	PDP 300	PDP 350	PDP 400
8 pi	16 36 49	18 38 52	15 33 45	21 44 60	24 49 67	31 63 86	35 69 94	37 73 99	30 61 84	X Y Z	X Y Z	X Y Z
10 pi	15 34 47	17 37 51	14 31 43	20 43 59	23 49 67	30 62 85	34 69 94	36 72 98	29 61 83	X Y Z	X Y Z	X Y Z
12 pi	14 33 45	15 35 49	12 30 41	19 42 58	22 48 66	29 62 84	33 68 93	34 71 97	28 60 82	X Y Z	X Y Z	X Y Z
14 pi	12 30 42	14 33 46	11 27 37	17 40 56	20 46 63	28 61 83	31 67 92	33 71 96	27 59 80	X Y Z	X Y Z	X Y Z
16 pi	10 27 38	12 31 43	8 22 31	16 38 53	19 44 61	27 59 81	30 66 90	32 69 95	26 57 79	X Y Z	X Y Z	X Y Z
18 pi	6 20 29	9 26 37	6 18 26	14 36 50	17 42 58	25 58 80	29 65 89	31 68 93	24 56 77	X Y Z	X Y Z	X Y Z
20 pi				12 32 45	15 35 49	24 56 77	28 63 87	30 67 92	23 54 75	X Y Z	X Y Z	X Y Z
22 pi				8 24 35	13 35 49	22 54 75	26 62 85	28 66 90	21 52 72	X Y Z	X Y Z	X Y Z
24 pi				8 26 38	10 29 42	16 41 57	25 65 82	27 63 87	20 49 69	X Y Z	X Y Z	X Y Z
26 pi					8 24 36	18 44 61	26 66 91	28 64 92	18 46 64	X Y Z	X Y Z	X Y Z
28 pi					8 25 37	16 41 57	24 53 73	27 63 87	15 41 58	X Y Z	X Y Z	X Y Z
30 pi						16 42 59	24 53 73	27 63 87	10 29 42	X Y Z	X Y Z	X Y Z

Hauteur de montage jusqu'au chaudière	Hotte à 60° vers le bas pour modèles à hélice											
	PDP 150	PDP 175	PDP 200	PDP 250	BDP 200	BDP 250	BDP 300	BDP 350	BDP 400	PDP 300	PDP 350	PDP 400
8 pi	0 38 52	0 40 55	0 35 47	0 47 65	0 52 72	0 49 68	0 53 73	0 58 93	0 66 90	X Y Z	X Y Z	X Y Z
10 pi	0 36 49	0 39 53	0 33 45	0 46 63	0 51 70	0 48 63	0 52 71	0 57 91	0 65 88	X Y Z	X Y Z	X Y Z
12 pi	0 33 46	0 36 50	0 30 41	0 44 60	0 49 69	0 46 67	0 50 79	0 56 90	0 63 85	X Y Z	X Y Z	X Y Z
14 pi	0 30 41	0 33 46	0 26 36	0 41 57	0 48 65	0 45 62	0 49 71	0 55 85	0 62 85	X Y Z	X Y Z	X Y Z
16 pi	0 25 35	0 29 41	0 19 27	0 38 53	0 45 62	0 42 57	0 46 64	0 52 76	0 60 82	X Y Z	X Y Z	X Y Z
18 pi	0 13 19	0 23 32	0 12 17	0 35 48	0 42 58	0 39 54	0 43 59	0 49 69	0 56 85	X Y Z	X Y Z	X Y Z
20 pi				0 29 40	0 38 52	0 31 43	0 43 60	0 48 66	0 55 76	X Y Z	X Y Z	X Y Z
22 pi				0 16 23	0 25 35	0 21 30	0 33 45	0 39 54	0 46 64	X Y Z	X Y Z	X Y Z
24 pi				0 19 28	0 32 45	0 28 35	0 39 54	0 44 61	0 51 70	X Y Z	X Y Z	X Y Z
26 pi					0 16 24	0 23 30	0 33 45	0 39 54	0 46 64	X Y Z	X Y Z	X Y Z
28 pi						0 21 30	0 33 45	0 39 54	0 46 64	X Y Z	X Y Z	X Y Z
30 pi							0 33 45	0 39 54	0 46 64	X Y Z	X Y Z	X Y Z

Hauteur de montage jusqu'au chaudière	Hotte à 90° vers le bas pour modèles à hélice											
	PDP 150	PDP 175	PDP 200	PDP 250	BDP 200	BDP 250	BDP 300	BDP 350	BDP 400	PDP 300	PDP 350	PDP 400
8 pi	38	42	36	54	62	58	72	79	70	S	S	S
10 pi	34	37	32	48	56	52	65	70	63	S	S	S
12 pi	31	34	29	44	51	47	60	64	58	S	S	S
14 pi	29	32	27	41	47	42	55	59	54	S	S	S
16 pi	27	29	25	38	44	41	51	56	50	S	S	S
18 pi	25	28	24	36	42	38	48	53	47	S	S	S
20 pi	24	26	23	34	40	36	46	50	45	S	S	S
22 pi	23	25	22	33	39	35	44	48	42	S	S	S
24 pi				31	36	32	42	45	41	S	S	S
26 pi				30	35	31	40	44	40	S	S	S
28 pi				29	33	30	39	42	38	S	S	S
30 pi						29	37	41	36	S	S	S
32 pi							35	39	35	S	S	S
34 pi							38	41	34	S	S	S
36 pi										S	S	S
38 pi										S	S	S
40 pi										S	S	S
42 pi										S	S	S

① Données basées sur des appareils allumés à l'entrée nominale maximum avec une température d'arrivée d'air de 60 à 80 °F. Hauteurs de montage maximums supérieures à celles d'appareils sans dispositifs de sortie.
 ② Données basées sur des appareils allumés à l'entrée nominale maximum avec une température d'arrivée d'air de 60 à 80 °F et une augmentation de température de 40 °F à travers l'appareil. Hauteurs de montage maximums supérieures à celles d'appareils sans dispositifs de sortie.



DONNÉES DE PERFORMANCE GÉNÉRALES

Tableau 21.1 - Description des codes de puissance - Modèle soufflante BDP ①

Code d'alimentation	Tension	Phase	150			175			200			250			300			350			400			
			HP	Entraînement	HP	Entraînement	HP	Entraînement	HP	Entraînement	HP	Entraînement	HP	Entraînement	HP	Entraînement	HP	Entraînement	HP	Entraînement	HP	Entraînement		
01	115	1/4	1	191	1/4	1	191	1/4	1	212	1/4	1	212	1/4	1	212	1/4	1	212	1/4	1	212	1/4	1
02	230	1/4	1	191	1/4	3	197	1/4	3	212	1/4	3	212	1/4	3	212	1/4	3	212	1/4	3	212	1/4	3
07	575	1/4	3	197	1/4	3	197	1/4	3	213	1/4	3	213	1/4	3	213	1/4	3	213	1/4	3	213	1/4	3
08	208-230/460	1/4	3	191	1/2	3	191	1/2	3	212	1/2	3	212	1/2	3	212	1/2	3	212	1/2	3	212	1/2	3
09	115	1/3	1	191	1/3	1	191	1/3	1	212	1/3	1	212	1/3	1	212	1/3	1	212	1/3	1	212	1/3	1
10	230	1/3	1	191	1/3	1	191	1/3	1	212	1/3	1	212	1/3	1	212	1/3	1	212	1/3	1	212	1/3	1
15	575	1/3	3	197	1/3	3	197	1/3	3	213	1/3	3	213	1/3	3	213	1/3	3	213	1/3	3	213	1/3	3
16	208-230/460	1/3	3	191	1/3	3	191	1/3	3	212	1/3	3	212	1/3	3	212	1/3	3	212	1/3	3	212	1/3	3
17	115	1/3	1	195	1/2	1	195	1/2	1	204	1/2	1	204	1/2	1	204	1/2	1	204	1/2	1	204	1/2	1
18	230	1/3	1	195	1/2	1	195	1/2	1	204	1/2	1	204	1/2	1	204	1/2	1	204	1/2	1	204	1/2	1
23	575	1/3	3	195	1/2	3	195	1/2	3	204	1/2	3	204	1/2	3	204	1/2	3	204	1/2	3	204	1/2	3
24	208-230/460	1/3	3	195	1/2	3	195	1/2	3	204	1/2	3	204	1/2	3	204	1/2	3	204	1/2	3	204	1/2	3
25	115	1/2	1	196	1/2	1	196	1/2	1	205	1/2	1	205	1/2	1	205	1/2	1	205	1/2	1	205	1/2	1
26	230	1/2	1	196	1/2	1	196	1/2	1	205	1/2	1	205	1/2	1	205	1/2	1	205	1/2	1	205	1/2	1
31	575	1/2	3	196	1/2	3	196	1/2	3	205	1/2	3	205	1/2	3	205	1/2	3	205	1/2	3	205	1/2	3
32	208-230/460	1/2	3	196	1/2	3	196	1/2	3	205	1/2	3	205	1/2	3	205	1/2	3	205	1/2	3	205	1/2	3
33	115	3/4	1	192	3/4	1	192	3/4	1	205	3/4	1	205	3/4	1	205	3/4	1	205	3/4	1	205	3/4	1
34	230	3/4	1	192	3/4	1	192	3/4	1	205	3/4	1	205	3/4	1	205	3/4	1	205	3/4	1	205	3/4	1
39	575	3/4	3	192	3/4	3	192	3/4	3	205	3/4	3	205	3/4	3	205	3/4	3	205	3/4	3	205	3/4	3
40	208-230/460	3/4	3	192	3/4	3	192	3/4	3	205	3/4	3	205	3/4	3	205	3/4	3	205	3/4	3	205	3/4	3
41	115	1	1	193	1-1/2	1	193	1-1/2	1	16	1-1/2	1	16	1-1/2	1	16	1-1/2	1	16	1-1/2	1	16	1-1/2	1
42	230	1	1	193	1-1/2	1	193	1-1/2	1	16	1-1/2	1	16	1-1/2	1	16	1-1/2	1	16	1-1/2	1	16	1-1/2	1
47	575	3	1	198	1-1/2	3	198	1-1/2	3	178	1-1/2	3	178	1-1/2	3	178	1-1/2	3	178	1-1/2	3	178	1-1/2	3
48	208-230/460	3	1	198	1-1/2	3	198	1-1/2	3	178	1-1/2	3	178	1-1/2	3	178	1-1/2	3	178	1-1/2	3	178	1-1/2	3
49	115	1/4	1	13	1-1/2	1	13	1-1/2	1	105	1-1/2	1	105	1-1/2	1	105	1-1/2	1	105	1-1/2	1	105	1-1/2	1
49	115	1/4	1	13	1-1/2	1	13	1-1/2	1	105	1-1/2	1	105	1-1/2	1	105	1-1/2	1	105	1-1/2	1	105	1-1/2	1
50	230	1/4	1	13	1-1/2	1	13	1-1/2	1	105	1-1/2	1	105	1-1/2	1	105	1-1/2	1	105	1-1/2	1	105	1-1/2	1
55	575	1/4	3	14	1-1/2	3	80	1-1/2	3	180	1-1/2	3	180	1-1/2	3	180	1-1/2	3	180	1-1/2	3	180	1-1/2	3
56	208-230/460	1/4	3	13	1-1/2	3	80	1-1/2	3	180	1-1/2	3	180	1-1/2	3	180	1-1/2	3	180	1-1/2	3	180	1-1/2	3
57	115	3/4	1	96	3/4	1	96	3/4	1	204	3/4	1	204	3/4	1	204	3/4	1	204	3/4	1	204	3/4	1
58	230	3/4	1	96	3/4	1	96	3/4	1	204	3/4	1	204	3/4	1	204	3/4	1	204	3/4	1	204	3/4	1
63	575	3/4	3	96	3/4	3	96	3/4	3	25	3/4	3	25	3/4	3	25	3/4	3	25	3/4	3	25	3/4	3
64	208-230/460	3/4	3	96	3/4	3	96	3/4	3	25	3/4	3	25	3/4	3	25	3/4	3	25	3/4	3	25	3/4	3
65	115	1	1	79	1-1/2	1	79	1-1/2	1	24	1-1/2	1	24	1-1/2	1	24	1-1/2	1	24	1-1/2	1	24	1-1/2	1
66	230	1	1	79	1-1/2	1	79	1-1/2	1	24	1-1/2	1	24	1-1/2	1	24	1-1/2	1	24	1-1/2	1	24	1-1/2	1
71	575	3	3	80	1-1/2	3	80	1-1/2	3	25	1-1/2	3	25	1-1/2	3	25	1-1/2	3	25	1-1/2	3	25	1-1/2	3
72	208-230/460	3	3	80	1-1/2	3	80	1-1/2	3	25	1-1/2	3	25	1-1/2	3	25	1-1/2	3	25	1-1/2	3	25	1-1/2	3
73	115	1	1	25	1/2	1	25	1/2	1	25	1/2	1	25	1/2	1	25	1/2	1	25	1/2	1	25	1/2	1
74	230	1	1	25	1/2	1	25	1/2	1	25	1/2	1	25	1/2	1	25	1/2	1	25	1/2	1	25	1/2	1
79	575	3	3	25	1/2	3	25	1/2	3	25	1/2	3	25	1/2	3	25	1/2	3	25	1/2	3	25	1/2	3
80	208-230/460	3	3	25	1/2	3	25	1/2	3	25	1/2	3	25	1/2	3	25	1/2	3	25	1/2	3	25	1/2	3
81	115	1	1	101	3/4	1	101	3/4	1	101	3/4	1	101	3/4	1	101	3/4	1	101	3/4	1	101	3/4	1
82	230	1	1	101	3/4	1	101	3/4	1	101	3/4	1	101	3/4	1	101	3/4	1	101	3/4	1	101	3/4	1
87	575	3	3	101	3/4	3	101	3/4	3	101	3/4	3	101	3/4	3	101	3/4	3	101	3/4	3	101	3/4	3
88	208-230/460	3	3	101	3/4	3	101	3/4	3	101	3/4	3	101	3/4	3	101	3/4	3	101	3/4	3	101	3/4	3
89	115	1	1	23	1-1/2	1	23	1-1/2	1	23	1-1/2	1	23	1-1/2	1	23	1-1/2	1	23	1-1/2	1	23	1-1/2	1
90	230	1	1	23	1-1/2	1	23	1-1/2	1	23	1-1/2	1	23	1-1/2	1	23	1-1/2	1	23	1-1/2	1	23	1-1/2	1
95	575	3	3	177	1-1/2	3	177	1-1/2	3	177	1-1/2	3	177	1-1/2	3	177	1-1/2	3	177	1-1/2	3	177	1-1/2	3
96	208-230/460	3	3	177	1-1/2	3	177	1-1/2	3	177	1-1/2	3	177	1-1/2	3	177	1-1/2	3	177	1-1/2	3	177	1-1/2	3

① Pour sélectionner le code d'alimentation correct, reportez-vous aux tableaux de la page 20.

DONNÉES DE PERFORMANCE GÉNÉRALES

Tableau 19.1 - Performance (PDP) – à hélice (PDP) ①②③

Numéro de modèle	Performance (PDP) – à hélice (PDP) ①②③						
	PDP 150	PDP 175	PDP 200	PDP 250	PDP 300	PDP 350	PDP 400
BTU/h Entrée 150,000 ①	150,000	175,000	200,000	250,000	300,000	350,000	400,000
BTU/h Sortie 120,000 ①	124,500	145,250	166,000	207,500	249,000	290,500	332,000
Débit d'air – entrée (CFM)	2180	2550	2870	3700	4460	4870	5440
Plage CFM	-	-	-	-	-	-	-
Augmentation temp. air (°F) ②	51	51	52	50	50	53	54
Haut. montage max. (pi) ②	16	17	15	19	21	20	19
Portée de chauffage (pi) ③ @ Haut. mont. max.	55	59	51	67	74	70	69
Type de moteur	PSC	PSC	PSC	PSC	PSC	PSC	PSC
HP	1/8	1/6	1/6	1/3	1/2	3/4	3/4

① Les valeurs nominales indiquées correspondent à une altitude de 609 m maximum. Au-delà, elles doivent être réduites de 4 % tous les 300 m au-dessus du niveau de la mer. (Au Canada, consultez la plaque signalétique.) La réduction des valeurs nominales exige l'utilisation d'un ensemble pour haute altitude.

② Données relevées à une hausse de température de l'air de 12 °C. À une température ambiante de 18 °C, avec l'appareil à entrée nominale maximum. Hauteur de montage mesurée du bas de l'appareil et sans hottes de déflexion.

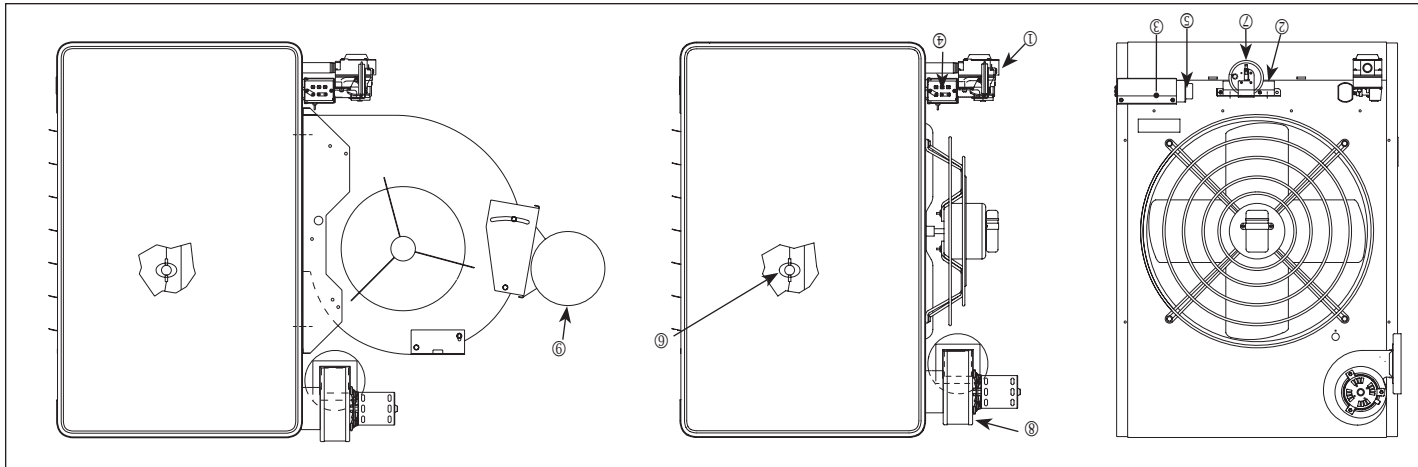
③ Tous les moteurs utilisés sont produits, mesurés et testés par des fabricants renommés, conformément aux normes NEMA et ils sont assortis de la garantie standard du fabricant du moteur et de Modine. Les moteurs du modèle BDP sont des moteurs monophasés totalement enfermés avec protection anti-surchauffe intégrée.

soufflante (BDP)

Numéro de modèle	BTU/h Entrée		BTU/h Sortie		Débit d'air – entrée (CFM)		Haut. montage max. (pi)	Augmentation temp. air (°F)	Portée de chauffage (pi) @ Haut. mont. max	Portée de chauffage (pi) @ 7' Hauteur de montage minimale.
BDP150	150,000	175,000	143,500	123,000	Faible CFM	Milieu CFM	10	40	34	45
BDP175	200,000	250,000	164,000	205,000	Faible CFM	Milieu CFM	9	40	33	43
BDP200	300,000	350,000	246,000	287,000	Faible CFM	Milieu CFM	12	40	27	34
BDP250	400,000	450,000	370,000	404,000	Faible CFM	Milieu CFM	12	40	22	28
BDP300	400,000	450,000	370,000	404,000	Faible CFM	Milieu CFM	13	40	17	23
BDP350	400,000	450,000	370,000	404,000	Faible CFM	Milieu CFM	13	40	12	18
BDP400	400,000	450,000	370,000	404,000	Faible CFM	Milieu CFM	13	40	9	13

*Voir les pages 20 et 21 pour les informations sur les moteurs

Figure 18.1 - Emplacement des options montées en usine



Tous les appareils incluent les fonctions de série (STD). L'appareil doit être examiné pour déterminer les options (OPT) qui ont pu être fournies avec l'appareil.

(1) Robinet de gaz

a) Robinet de gaz à un étage – (STD)

Le robinet de gaz assure l'arrêt de la veilleuse, du régulateur, de la conduite principale de gaz et l'arrêt manuel. Pour plus d'informations, consultez la documentation du fabricant fournie avec l'appareil.

b) Robinet de gaz à deux étages – (OPT)

Le robinet de gaz à deux étages assure l'arrêt de la veilleuse, du régulateur, de la conduite principale de gaz (feu à 100 % et à 50 %) et l'arrêt manuel. Pour plus d'informations, consultez la documentation fournie avec l'appareil.

(2) Contrôle d'allumage – (STD)

Le contrôleur d'allumage est installé en usine à l'arrière de l'appareil de chauffage, l'allumeur et le capteur étant situés sur le brûleur. Pour plus d'informations, voir « Séquence de fonctionnement des commandes », page 16, et la documentation du fabricant fournie avec l'appareil.

(3) Relais de temporisation – (STD)

Le relais temporisé est installé en usine dans une boîte de dérivation électrique et commande le fonctionnement du moteur de l'hélice/la soufflante. Pour les appareils monophasés de moins de 2 HP, le relais de temporisation commande directement le moteur. Pour les appareils monophasés de 2 HP et plus et tous les modèles triphasés, le relais de temporisation commande le démarrage du moteur. Pour plus d'informations, voir « Séquence de fonctionnement des commandes », page 17.

(4) Bornier basse tension – (STD)

Le bornier basse tension se situe dans la boîte de dérivation électrique. Le bornier est étiqueté pour correspondre au diagramme des câbles électriques fourni avec l'appareil. Tous les branchements de câble basse tension sur site doivent être établis côté exposé du bornier (extérieur de la boîte de dérivation électrique) pour éviter les erreurs de câblage en modifiant les câblages usine à l'intérieur de la boîte de dérivation électrique.

(5) Transformateur abaisseur de commande – (STD)

Le transformateur abaisseur de commande est localisé dans la boîte de distribution électrique. Le transformateur permet d'abaisser la tension d'alimentation (115 V, 208 V, 230 V, 460 V, 575 V) à 24 V. Ce transformateur permet de commander les commandes de gaz, le relais de temporisation du ventilateur, le démarreur de moteur fourni sur site, etc. Tous les appareils de chauffage sont fournis avec un transformateur abaisseur de 40 VA. Pour déterminer le transformateur fourni de même que tout accessoire/transformateur fourni sur site requis, reportez-vous à la tension d'alimentation indiquée sur la plaque signalétique et aux tableaux 19.2 et 19.3.

Tableau 18.1 - Description des commandes –
Modèles PDP et BDP

Description du système de commande	Code contrôleur		Tension de service	Thermostat
	Gaz naturel	Propane		
Un étage ①	30	85	115 V	25 V
	31	86	208/230 V	25 V
	32	93	460 V	25 V
	33	94	575 V	25 V
Deux étages ①	63	87	115 V	25 V
	64	88	208/230 V	25 V

① Toutes les commandes sont à allumage de veilleuse intermittent, arrêt à 100 % avec nouvelles tentatives de rallumage continues. □ Câblage usine 460/575 disponible sur les modèles à soufflante. Un transformateur abaisseur installé sur site peut être utilisé pour les applications à hélice 460/575.

PROCÉDURE DE MISE EN ROUTE

Séquence d'utilisation des commandes

Tous les appareils sont fournis avec un système de veilleuse intermittente avec commande de nouvelle tentative d'allumage continue de série. Pour les systèmes à veilleuse intermittente, le brûleur principal et la veilleuse s'éteignent tous deux complètement lorsque la température de consigne du thermostat est atteinte. Pour tous les appareils, le système essaie d'allumer la veilleuse pendant 70 secondes. Si la veilleuse n'est pas détectée, la commande d'allumage attend six minutes environ avec la commande de gaz mixte fermée et pas d'étincelle. Au bout de 6 minutes, le cycle recommence. Après 3 cycles, certains contrôleurs d'allumage se verrouillent pendant 1 heure environ avant le début d'un autre cycle. Ceci continue indéfiniment jusqu'à ce que la flamme de la veilleuse soit détectée ou que l'alimentation du système soit coupée. Pour une description des codes de commande, reportez-vous au tableau 18.1. Des codes figurent ci-dessous.

1. Le thermostat émet un appel thermique.
2. Le relais de l'extracteur est activé et démarre le moteur d'extraction. Une fois le moteur à plein régime, le pressostat de pression différentielle se ferme.
3. Le robinet de la veilleuse s'ouvre et l'allumeur émet une étincelle pendant 70 secondes en essayant d'allumer la veilleuse.
4. Une fois la veilleuse allumée, le détecteur de flamme vérifie la veilleuse et arrête l'allumeur.
5. Sur les modèles à un étage, le robinet de gaz principal s'ouvre et le brûleur principal s'allume à fond. Sur les modèles à deux étages, le robinet de gaz peut s'ouvrir à 50 ou 100 %, selon la température de consigne demandée par le thermostat des deux étages.
6. L'appareil de ventilation démarre 30 à 90 secondes après pour permettre le préchauffage de l'échangeur de chaleur.
7. L'appareil continue à fonctionner jusqu'à ce que le thermostat soit satisfait, après quoi le robinet principal et le robinet du brûleur se ferment complètement.
8. L'appareil de ventilation s'arrête 30 à 90 secondes après enlever la chaleur résiduelle de l'échangeur de chaleur.

Réglage du brûleur principal

Le régulateur de pression du gaz (à l'intérieur du régulateur combiné) a été réglé en usine pour des caractéristiques moyennes de gaz. Il est essentiel

que l'alimentation du brûleur soit conforme aux conditions indiquées sur la plaque signalétique. Ces conditions doivent être vérifiées, et les réglages nécessaires effectués après l'installation de l'appareil. Une puissance calorifique excessive se traduira par une surchauffe permanente réduisant la durée de vie de l'appareil et entraînant des besoins d'entretien accrus. L'entrée ne doit en aucun cas dépasser celle indiquée sur la plaque de série.

La pression du collecteur de gaz doit être mesurée au raccord installé à côté du robinet d'arrêt (Figure 16.1).

Pour régler la pression au collecteur de gaz

1. Tournez le robinet d'arrêt manuel installé sur site sur Arrêt.

2. Retirez le bouchon de tuyau de 1/8 po du raccord en T ou du robinet de gaz et attachez un manomètre d'eau du type tube en U qui mesure au moins 12 po de hauteur.

3. Tournez le robinet d'arrêt de gaz manuel installé sur site sur position Marche.

4. Créez un appel thermique pour feu élevé à partir du thermostat.

5. Déterminez la pression correcte du collecteur à feu fort (3,5 po de C.E. pour le gaz naturel, 10 po de C.E. pour le propane). (Les pressions haute altitude à la page 11). Réglez le ressort du régulateur principal

pour qu'il délivre le gaz à la pression correcte (pour savoir comment régler, consultez le manuel du régulateur fourni avec l'appareil).

6. Après ce réglage, fermez le robinet d'arrêt manuel et revissez le bouchon du raccord de 1/8 po.

7. Ensuite, rouvrez le robinet d'arrêt manuel installé sur site et assurez-vous à nouveau que les bouchons du tuyau ne fûtent pas avec de l'eau savonneuse.

Réglage de la flamme du brûleur

Un fonctionnement correct de l'appareil produit une flamme bleu douce

avec un cône bien défini au centre. Un manque d'air primaire se traduit par des flammes à bout jaune. Un excès d'air primaire produit des flammes courtes bien définies ayant tendance à se soulever des orifices du brûleur. Pour le gaz naturel et le propane, la flamme peut être ajustée en glissant le collecteur de brûleur, pour le propane, les volets d'air réglables permettent de contrôler la hauteur de flamme du brûleur. Les volets d'air sont accessibles en abaissant le bac inférieur de l'appareil de chauffage.

Commande de réglage de la flamme de gaz naturel

La régulation des flammes du brûleur sur les appareils de chauffage utilisant le gaz naturel s'effectue en réajustant la position du collecteur pour augmenter ou diminuer l'air de combustion primaire. Avant de régler la flamme, laissez l'appareil de chauffage fonctionner pendant environ 15 minutes. Pour voir la flamme du brûleur principal, desserrez et poussez le disque d'observation des flammes situé à l'arrière de l'appareil.

Pour augmenter l'air primaire, desserrez les vis de montage du collecteur et éloignez le collecteur du brûleur jusqu'à ce que les flammes à pointe jaune disparaissent (Figure 16.2). Pour diminuer l'air primaire, rapprochez le collecteur du brûleur jusqu'à ce que les flammes ne se soulèvent plus des orifices du brûleur, mais en veillant à ne pas causer de pointes jaunes. Resserrez les vis de montage du collecteur une fois le réglage terminé.

Réglage de la flamme de propane

Une flamme optimum a une pointe légèrement jaune. Avant de régler la flamme, faites fonctionner l'appareil de chauffage une quinzaine de minutes. Desserrez les vis de calage des volets d'air et éloignez les volets d'air du collecteur pour réduire l'air primaire jusqu'à ce que les pointes jaunes des flammes apparaissent (Figure 16.3). Ensuite, augmentez l'air primaire jusqu'à ce que les pointes jaunes diminuent et qu'une flamme bleue nette contenant un cône bien défini apparaisse.

Pour obtenir une flamme correcte, outre le réglage des volets d'air, vous devrez peut-être ajuster la position du collecteur. Pour régler le collecteur, suivez les instructions « Commande de réglage de la flamme de gaz naturel ».

Figure 16.1 - Commande de gaz mixte typique

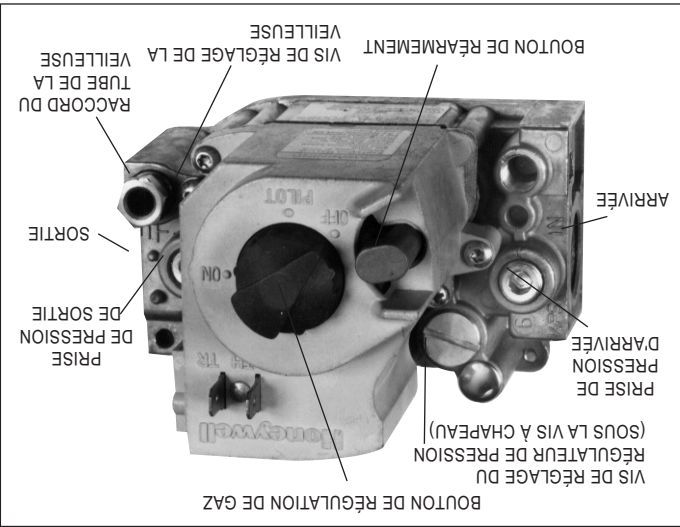


Figure 16.2 - Réglage du collecteur, gaz naturel

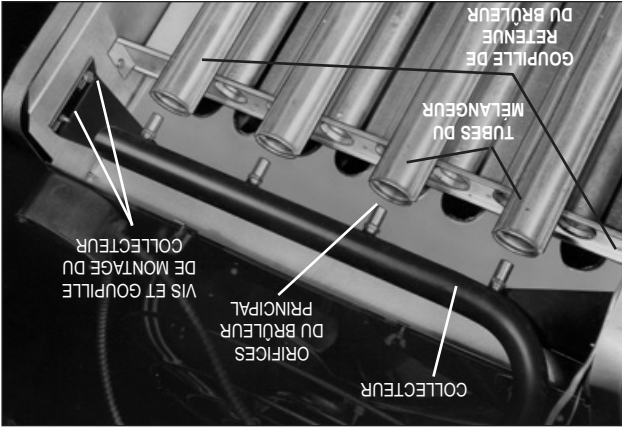
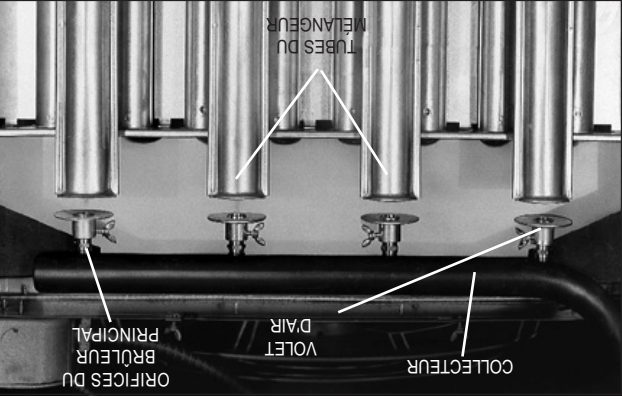


Figure 16.3 - Réglage du volet d'air, propane



IMPORTANT

1. Pour éviter une défaillance prématurée de l'échangeur de chaleur, observez les tubes de l'échangeur. Si le bas des tubes devient rouge avec la soufflante et les brûleurs en marche, vérifiez que la vitesse de la soufflante est correcte pour l'application. Pour le réglage de la soufflante, reportez-vous à la page 14.
2. Les procédures de démarrage et de réglage doivent être confiées à un centre de SAV qualifié.

1. Mettez l'appareil hors tension au niveau du sectionneur. Vérifiez que les disjoncteurs ou les fusibles sont en place et d'un calibre approprié.
2. Fermez tous les robinets d'arrêt de gaz.
3. Enlevez le couvercle de la boîte de dérivation électrique.
4. Vérifiez que la tension du secteur correspond à la tension nominale de l'appareil inscrite sur la plaque signalétique. Assurez-vous que tous les câblages sont bien fixés et convenablement protégés. Suivez chaque circuit pour vous assurer qu'il est conforme au schéma de câblage.
5. Si l'appareil est installé à plus de 2000 pieds et que l'ensemble pour haute altitude inclut un interrupteur de contrôle d'air de combustion, remplacez l'interrupteur de l'appareil par celui fourni dans l'ensemble. Assurez-vous que le tube et les branchements électriques sont solidement fixés.
6. Vérifiez que le système d'évacuation des gaz est correctement installé et n'est pas obstrué.
7. Vérifiez qu'il n'y a pas d'obstacles devant la prise d'air et la sortie d'air chaud.
8. Pour les modèles à soufflante, vérifiez la tension de la courroie et l'alignement de la roue à gorge. Pour la tension correcte de la courroie, reportez-vous à « Réglage de la soufflante ».
9. Vérifiez que tous les filtres sont en place et correctement installés en respectant la direction de l'air (s'il y a lieu).
10. Effectuez une inspection visuelle de l'appareil et assurez-vous qu'il n'a pas été endommagé au cours de l'installation. Abaissez le bac inférieur et inspectez tous les composants dans le compartiment du brûleur. Assurez-vous que toutes les attaches sont en place et que les orifices du brûleur sont correctement alignés sur les tubes de l'échangeur de chaleur et que les orifices à gaz sont centrés sur l'ouverture du tube inspirateur du brûleur, comme indiqué à la figure 16.2.
11. Assurez-vous que les lames des persiennes sont ouvertes d'au moins 30° mesurées par rapport à la verticale.
12. Mettez l'appareil sous tension au niveau du sectionneur. Assurez-vous que la tension entre les bornes de la boîte de dérivation électrique T1 et G est de 24 V.
13. Vérifiez le thermostat, l'allumeur, le robinet de gaz, puis mettez la soufflante sous tension. Si le fonctionnement n'est pas normal, réverifiez avec le schéma de câblage. Assurez-vous qu'aucune option de régulation n'a disjoncté.
14. Vérifiez que le moteur de la soufflante tourne dans le bon sens en comparant avec la flèche marquée sur le corps (s'il y a lieu). Vérifiez bien le sens de rotation, pas seulement le mouvement de l'air car, même à l'envers, l'hélice déplace de l'air.
15. Pour les appareils à circulation forcée, vérifiez la vitesse de la soufflante (tr/min). Voir les instructions de réglage de la soufflante pour toute modification.
16. Vérifiez le régime moteur (tr/min).
17. Vérifiez la tension du moteur. Sur les systèmes triphasés, assurez-vous que toutes les colonnes sont équilibrées.
18. Vérifiez le courant d'appel du moteur et comparez-le à l'intensité nominale de la plaque signalétique. Sur les systèmes triphasés, vérifiez toutes les colonnes afin de vous assurer que le système est équilibré.
19. Réverifiez la pression d'arrivée de gaz au niveau du robinet d'arrêt pour le propane. La pression maximum d'arrivée pour l'un ou l'autre (1,5 kPa (6 po pd'eau) pour le gaz naturel ou de 2,75 kPa (11 po pd'eau) pour le gaz C.E. Si la pression d'arrivée dépasse cette valeur, il faudra ajouter un détendeur en amont du robinet de gaz mixte.

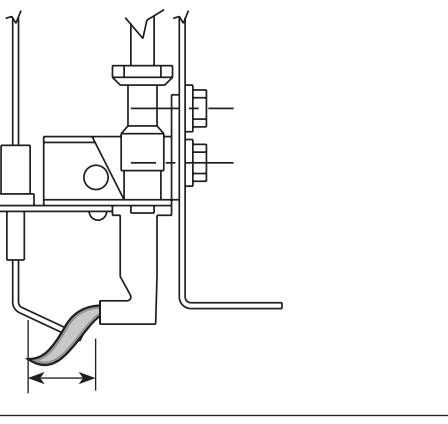


Figure 15.1 - Flamme de veilleuse correcte

1. Créez un appel thermique à partir du thermostat.
2. Retirez le capuchon de la vis de réglage de la veilleuse. Pour l'implacement, voir la documentation de commande de gaz mixte fournie avec l'appareil.
3. Réglez la longueur de la veilleuse en tournant la vis dans un sens ou dans l'autre pour obtenir une flamme constante de 3/4 à 1 po de longueur et empilant sur l'extrémité du thermocouple ou de la tige de détection de la flamme de 3/8 à 1/2 po (voir figure 15.1).
4. Remettez le capuchon sur la vis de réglage de la veilleuse.

Pour régler la flamme de la veilleuse

Le brûleur de la veilleuse a été conçu pour brûler correctement à une pression d'admission de 15 à 18 cm C.E. (gaz naturel) et 28 à 35,5 cm C.E. (propane), mais le réglage final doit avoir lieu après l'installation. Si la flamme de la veilleuse est trop longue ou grosse, il est possible qu'elle cause de la suie et/ou touche l'échangeur thermique, causant sa panne. Si la flamme de la veilleuse est plus courte que sur l'illustration, elle risque de causer un mauvais allumage et d'engendrer la non-ouverture de la commande de gaz mixte. Une flamme courte peut être causée par un orifice de veilleuse sale. L'état de la flamme de la veilleuse devra être périodiquement observé pour garantir un fonctionnement sans problème.

Réglage du brûleur de la veilleuse

19. Ouvrez le robinet d'arrêt de gaz manuel installé sur le robinet de gaz mixte. Réglez le thermostat pour créer une demande de chauffage et attendez l'allumage de la veilleuse (allumage intermittent). Si la veilleuse ne s'allume pas, purgez sa conduite. Si une purge d'air est requise, déconnectez la conduite de la veilleuse à la sortie du robinet de la veilleuse. La conduite ne doit en aucun cas être purgée dans l'échangeur thermique. Contrôlez la longueur de la flamme de la veilleuse (voir « Réglage de la flamme de la veilleuse »).
20. Une fois la veilleuse allumée, assurez-vous que le robinet de gaz réseau s'ouvre. Contrôlez la pression de gaz au collecteur (voir « Réglage principal du gaz ») et la longueur de la flamme (voir « Réglage du volet d'air ») pendant que la soufflante fonctionne.
21. Inspectez l'état de la flamme principale et, si nécessaire, résolvez les problèmes d'apparence de la flamme (voir « Réglage de la flamme du brûleur » et les figures 28.1 à 28.4).
22. Vérifiez que la séquence de fonctionnement des commandes de gaz est correcte (voir « Séquence de fonctionnement des commandes »).
23. Vérifiez si l'appareil a des dispositifs de commande supplémentaires et réglez-les en suivant les instructions de régulation du gaz.
24. Quand vous vous êtes assurés que l'appareil fonctionne normalement, retirez tous les fils volants utilisés pour les essais.
25. Remettez le couvercle de la boîte de dérivation électrique.
26. Si l'appareil est installé à plus de 2000 pieds, collez l'étiquette incluse dans l'ensemble pour haute altitude et remplissez tous les champs au feutre indélébile.

⚠ AVERTISSEMENT

1. Débranchez l'alimentation avant d'effectuer des branchements pour éviter tout risque d'électrocution et d'endommagement de l'appareil.
2. Tous les branchements et câblages doivent être faits en stricte conformité avec le schéma fourni avec l'appareil. Tout câblage différent de celui du schéma peut créer des risques de dommages matériels ou de blessures.
3. Tout câblage usiné d'origine exigeant un remplacement doit être remplacé par un câble d'indice thermique nominal de 105 °C.
4. Assurez-vous que la tension d'alimentation n'est pas supérieure de plus de 5 % à la tension nominale inscrite sur la plaque de l'appareil.

⚠ ATTENTION

Vérifiez que la tension d'alimentation n'est pas inférieure de plus de 5 % à la tension nominale inscrite sur la plaque de l'appareil.

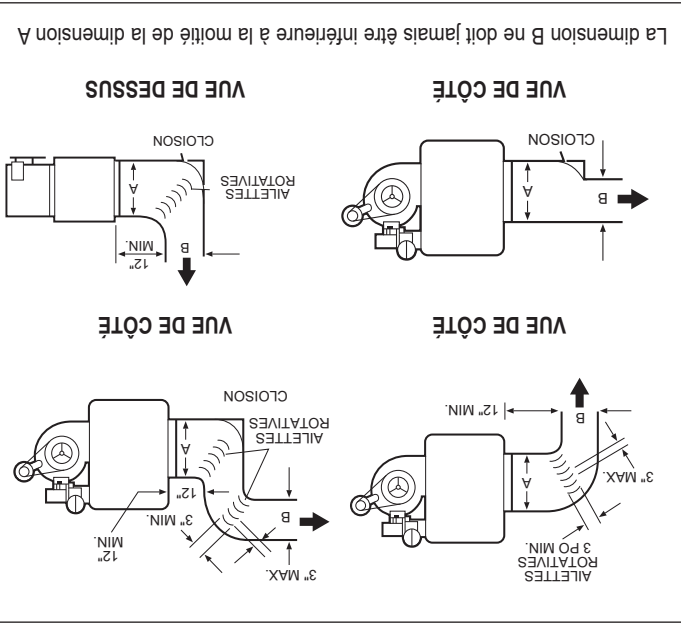
1. L'installation doit se faire conformément aux codes locaux de la construction ou, à défaut de tels codes, conformément au National Electric Code ANSI/NFPA 70 – dernière édition. Conformément à ce code, l'appareil doit être mis à la terre. Au Canada, le câblage doit être conforme à CSA C22.1, Partie 1, Code électrique.
 2. Deux exemplaires du diagramme de câblage de l'appareil sont fournis avec chaque appareil. Un exemplaire se trouve dans la poche de dérivation électrique, et l'autre se trouve dans la poche de documentation. Reportez-vous à ce diagramme pour tous les branchements de câbles.
 3. Assurez-vous que tous les composants multi-tension (moteurs, transformateurs, etc.) sont câblés conformément à la tension secteur.
 4. L'alimentation de l'appareil doit être protégée par un interrupteur à fusible ou coupe-circuit.
 5. L'alimentation doit se trouver à $\pm 10\%$ de la tension nominale et les phases doivent être équilibrées à $\pm 2\%$ les unes des autres. Sinon, prévenez le fournisseur d'électricité.
 6. Les branchements électriques externes à installer incluent :
 - a. Branchement de l'alimentation secteur (120, 208, 240, 480 ou 575 volts).
 - b. Thermostats, commutateurs été/hiver ou autre commande accessoire pouvant être fournie (24 volts).
- REMARQUE :** Certains modèles exigent l'utilisation d'un transformateur abaisseur installé sur site. Pour déterminer la tension d'alimentation requise, consultez la plaque signalétique. Des informations supplémentaires se trouvent aux tableaux 19.2 et 19.3 et dans les instructions d'installation du transformateur.
7. Pour l'emplacement de la boîte de dérivation électrique, reportez-vous à la figure 18.1.
 8. Tous les branchements électriques d'alimentation sont établis dans la boîte de dérivation électrique de l'appareil. La basse tension (thermostat et accessoires) peuvent être câblés aux bornes de la boîte de dérivation électrique. Pour l'emplacement des bornes de tous les câbles à basse tension, reportez-vous au diagramme de câblage.

IMPORTANT

N'essayez pas d'attacher des gaines quelconques aux modèles à hélice.

- Lors de l'installation de l'appareil de chauffage, suivez toujours les bonnes pratiques de conception de réseau de gaine pour obtenir la distribution uniforme de l'air à travers l'échangeur de chaleur. Les configurations recommandées apparaissent à la figure 13.1. Lorsque vous installez des appareils à soufflante avec des gaines, vous devez procéder comme suit.
1. Assurez une distribution d'air uniforme sur l'échangeur thermique. Utilisez les ailettes rotatives en cas de besoin. (Voir la figure 13.1.)
 2. Fournissez des panneaux d'accès amovibles dans les gaines côté aval de l'appareil de chauffage. Ces ouvertures doivent être assez grandes pour permettre de voir de la fumée ou de réfléchir la lumière à l'intérieur afin d'indiquer des fuites dans l'échangeur de chaleur et de vérifier les points chauds sur l'échangeur causés par une mauvaise répartition de l'air ou un manque d'air.
 3. Si les gaines sont connectées à l'arrière de l'appareil, utilisez l'ensemble du boîtier de soufflante Modine ou, si vous utilisez un boîtier conçu sur site, maintenez les dimensions du boîtier de la soufflante aux dimensions indiquées à la page 25.

Figure 13.1 - Recommandations pour l'installation de gaines



Exigences supplémentaires pour le modèle à soufflante BDP

Détermination du régime de la soufflante

L'entraînement et le moteur de tous les appareils de chauffage à soufflante sont assemblés à l'usine et ajustés pour un fonctionnement dans des conditions moyennes de débit d'air et sans pression statique extérieure. La roue à gorge du moteur doit être réglée au besoin quand l'appareil doit fonctionner avec des débits d'air et/ou des pressions statiques externes non moyens. Le réglage doit toujours se situer dans la plage de performance indiquée à la page 20 et la plage de montée de température indiquée sur la plaque signalétique de l'appareil.

Pour déterminer le régime de la soufflante et les tours d'ouverture de la roue à gorge corrects, les conditions de fonctionnement doivent être connues. Par exemple, un modèle BDP350 fonctionnant sans pression statique externe (à savoir, pas de gaines, buses, etc.) doit fournir un volume d'air de 6 481 pi³/min. Pour cela, l'appareil doit être muni d'un moteur de 5 HP, un entraînement -207 et la roue à gorge de l'entraînement doit être réglée à 2,5 tours pour atteindre un régime de soufflante de 960 tr/min (pour les modèles avec ou sans soufflante, voir le

INSTALLATION – ENSEMBLE D'ACCESSOIRES POUR HAUTE ALTITUDE

Tableau 11.3 - Ensemble haute altitude pour PDP/BDP ①

Etats-Unis et Canada		Taille de modèle			
Altitude (pi)	Code d'article	Code d'article	Code d'article	Code d'article	Code d'article
150	175	200	250	300	350
2001 à 7500	67248	67248	67248	67248	67248
7501 à 8500	68408	55941	67248	55942	68406
8501 à 9500	68408	55941	67248	55942	68406
9501 à 10,000	68408	55941	67248	55942	68406
10001 à 11000	55948	55941	67248	77785	68406
11001 à 12000	55948	55941	67248	77785	68406
12001 à 13000	55948	55941	67248	77785	68406
13001 à 14000	55948	55941	77785	68406	55941

① Pour les ensembles Etiquette seulement(67248), le numéro de référence Modine 5H0807146005 doit être inscrit et attaché à l'appareil par l'installateur.

Si la valeur de chauffage du gaz fourni est différente des valeurs des tableaux 11.1 et 11.2, utilisez l'équation suivante pour déterminer la pression appropriée au collecteur pour l'altitude et la valeur de chauffage du gaz fourni:

Equation 12.1 - Pression au collecteur pour valeur nominale de gaz réduite

$$MP_{ALT} = \left(\frac{BTU_{TBL}}{BTU_{ACT}} \right)^2 \times MP_{SL}$$

où :

MP_{ACT} = Pression au collecteur (po C.E.) en altitude – Réglage de pression de gaz pour l'appareil de chauffage installé

BTU_{TBL} = Teneur du gaz en BTU/pi³ – Tiré du tableau 11.1 ou 11.2 (selon le cas)

BTU_{ACT} = Teneur du gaz en BTU/pi³ – Obtenue auprès du fournisseur de gaz local

MP_{SL} = Pression au collecteur (po C.E.), au niveau de la mer – Utilisez 3,5 po C.E. pour le gaz naturel et 10 po C.E. pour le propane

REMARQUE : Seule la pression au collecteur primaire doit être réglée sur les appareils équipés de commandes de gaz à deux étages ou modulation. Aucun réglage de pression au collecteur à feu bas n'est nécessaire sur ces appareils.

INSTALLATION – ENSEMBLE D'ACCESSOIRES POUR HAUTE ALTITUDE

ENSEMBLE D'ACCESSOIRES POUR HAUTE ALTITUDE Régler de pression au collecteur

La pression d'arrivée dans l'appareil doit être confirmée dans les limites acceptables (6 à 7 po C.E. pour le gaz naturel et 11 à 14 po C.E. pour le gaz propane) avant d'ouvrir le robinet d'arrêt, faute de quoi le robinet de gaz mixte risque d'être endommagé.

Les appareils de chauffage utilisant du **gaz naturel** ont des robinets de gaz réglés pour l'usage à une pression au collecteur de 3,5 po C.E. à une pression d'arrivée de 7 po C.E.

Les appareils qui utilisent du **gaz propane** sont réglés pour une pression au collecteur de 10 po C.E. à une pression d'arrivée de 14 po C.E.

Une installation à plus de 2000 pieds d'altitude exige le réglage de la pression au collecteur comme décrit.

Gaz à valeur de chauffage diminuée et calcul de pression au collecteur

Certains fournisseurs de gaz pourront réduire la teneur en BTU (valeur de chauffage) du gaz fourni en altitude à une autre valeur que 1050 BTU/pi³ pour le gaz naturel ou 2500 BTU/pi³ pour le propane pour permettre l'utilisation de certains appareils de chauffage sans régler la pression au collecteur. C'est pourquoi il est nécessaire de contacter le fournisseur de gaz pour en savoir plus sur le type de gaz et la teneur en BTU (valeur de chauffage) avant d'utiliser un appareil de chauffage. Les tableaux 11.1 et 11.2 indiquent les valeurs de chauffage diminuées standard (4 % pour 1000 pieds d'altitude aux États-Unis et 10 % entre 2001 et 4500 pieds d'altitude au Canada) des gaz naturel et propane à différentes altitudes. Si le fournisseur livre du gaz avec des valeurs de chauffage comme indiqué aux tableaux 11.1 et 11.2, la pression au collecteur doit être réglée à 3,5 po C.E. pour le gaz naturel et à 10 po C.E. pour le propane.

REMARQUE : Seule la pression de gaz à feu fort doit être ajustée, la pression de gaz à feu bas doit rester la même.

Tableau 11.2 - Valeurs de chauffage du gaz propane selon l'altitude ④ ③ ② ①

Altitude (pi)	E.-U.	Canada
0 à 2000	2500	2500
2001 à 3000	2212	2250
3001 à 4000	2123	
4001 à 4500	2080	
4501 à 5000	2038	2038
5001 à 6000	1957	1957
6001 à 7000	1879	1879
7001 à 8000	1803	1803
8001 à 9000	1731	1731
9001 à 10000	1662	1662
10001 à 11000	1596	1596
11001 à 12000	1532	1532
12001 à 13000	1471	1471
13001 à 14000	1412	1412

Les valeurs nominales d'entrée standard des appareils au gaz de Modine sont certifiées par ETL. À plus de 2 000 pieds, la norme ANSI Z223.1 exige la réduction des valeurs nominales de 4% tous les 1 000 pieds au-dessus du niveau de la mer. Au Canada, l'ACNOR exige la réduction des valeurs nominales de 10 % à plus de 2 000 pieds d'altitude. Les instructions de réglage en haute altitude et les ensembles de pressostat listés dans ce manuel concernent les appareils qui seront installés à plus de 2 000 pieds. Ces méthodes et ensembles sont conformes aux exigences ANSI Z223.1 et ACNOR.

Si un appareil doit être installé à plus haute altitude ET converti d'un service gaz naturel à gaz propane, un ensemble de conversion au propane doit être utilisé avec les méthodes de réglage de pression et les ensembles de pressostat listés dans ce manuel. Pour les instructions de sélection et d'installation pour les kits de conversion au propane, consultez la toute dernière version du manuel Modine 75-511.

Sélection de la pression et de l'ensemble corrects

Pour déterminer la pression de collecteur correcte en altitude et si nécessaire, l'ensemble de pressostat d'air de combustion correct, le numéro de modèle complet de l'appareil de chauffage, le combustible à utiliser et l'altitude à laquelle l'appareil sera installé doivent être connus. Pour obtenir les renseignements nécessaires sur l'appareil, consultez la plaque du numéro de série.

Une fois en possession de ces informations, consultez les tableaux de pressions de gaz et de sélection aux tableaux 11.1 à 11.3. Les tableaux de pression sont divisés par altitude, type de combustible et pays d'installation du produit. Les tableaux de sélection sont divisés par type de produit, altitude et type de combustible. **Dans le cas d'une conversion du gaz naturel au propane à haute altitude, un ensemble de conversion au propane et un ensemble de pressostat devra être utilisé (le cas échéant).** Les tableaux de sélection incluent le suffixe d'ensemble adéquat, si nécessaire.

Tableau 11.1 - Valeurs de chauffage du gaz naturel selon l'altitude ④ ③ ② ①

Altitude (pi)	E.-U.	Canada
0 à 2000	1050	1050
2001 à 3000	929	945
3001 à 4000	892	
4001 à 4500	874	
4501 à 5000	856	856
5001 à 6000	822	822
6001 à 7000	789	789
7001 à 8000	757	757
8001 à 9000	727	727
9001 à 10000	698	698
10001 à 11000	670	670
11001 à 12000	643	643
12001 à 13000	618	618
13001 à 14000	593	593

- ① Les valeurs indiquées correspondent à une pression au collecteur de 3,5 po C.E.; pour les autres valeurs de teneur en BTU (disponibles auprès de votre fournisseur local), utilisez l'équation 12.1 pour calculer la pression au collecteur.
- ② Les valeurs indiquées correspondent à une pression au collecteur de 10 po C.E.; pour les autres valeurs de teneur en BTU (disponibles auprès de votre fournisseur local), utilisez l'équation 12.1 pour calculer la pression au collecteur.
- ③ Si l'appareil est installé à plus de 2000 pieds, vous devrez peut-être remplacer un pressostat. Reportez-vous au tableau 11.3 pour voir si un changement de pressostat est nécessaire.
- ④ Les valeurs nominales de chauffage du gaz sont réduites de 4 % tous les 1000 pieds d'altitude aux États-Unis et de 10 % entre 2000 et 4500 pieds d'altitude au Canada, conformément aux normes ANSI Z223.1 et ACNOR-B-149, respectivement.

INSTALLATION – EVACUATION

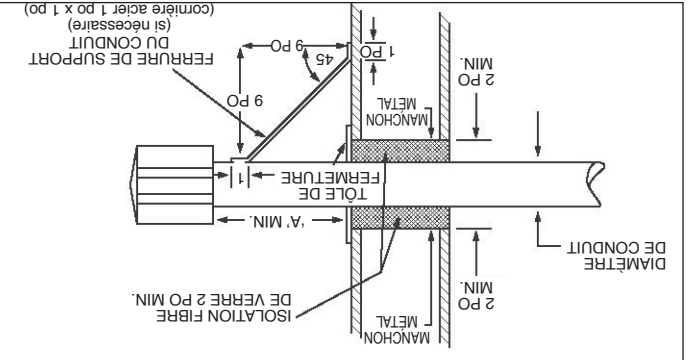
Section C – Installation des systèmes d'évacuation horizontale de catégorie III.

- C1. Cette section s'applique aux systèmes d'évacuation horizontale de catégorie III et complète les prescriptions de la section A – Instructions générales – Tous modèles.
- C2. Conduit horizontal débouchant horizontalement (sur le côté du bâtiment).
- C3. Sceller toutes les coupures et les joints des tuyaux à paroi simple non étanches avec du ruban métallique ou Silastic pour des températures allant jusqu'à 205 °C (400 °F). Le ruban doit être enroulé deux fois autour du tuyau. Pour les systèmes d'évacuation à simple paroi, une section continue de tuyau d'évacuation à double paroi peut être utilisée dans le système d'évacuation pour la traversée du mur jusqu'au chapeau d'évacuation listé. Il est interdit d'accomplir de ceux longueurs de tuyau à double paroi dans une même installation d'évacuation horizontale à cause de l'impossibilité de vérifier l'étanchéité des raccords du tuyau intérieur. Les systèmes de ventilation de catégorie III énumérés par une agence reconnue à l'échelle nationale et correspondant aux diamètres spécifiés peuvent être utilisés. Différents marques de tuyau matériaux de ventilation peuvent ne pas être mélangées. Voir le point A10 de la section A – Instructions générales – Tous modèles pour les transitions entre double paroi et simple paroi.
- C4. Pour les longueurs totales minimales et maximales des tuyaux afin de rendre le système le plus rectiligne possible, consultez le tableau 6.1. La longueur équivalente d'un coude de 90° est de 6 pi pour 5 po de diamètre et de 7 pi pour 6 po de diamètre.
- C5. Tous les systèmes d'évacuation horizontale de catégorie III doivent être terminés avec un chapeau de cheminée listé. Le chapeau doit se terminer à une distance minimum au-delà de la surface du mur extérieur, comme illustré à la figure 9.2 et au tableau 9.1. La cheminée doit être soutenue, comme illustré à la figure 9.1. Des précautions doivent être prises pour éviter la dégradation des matériaux de couverture par les produits de combustion.

Tableau 9.1 - Dimension entre le chapeau de cheminée et le mur extérieur

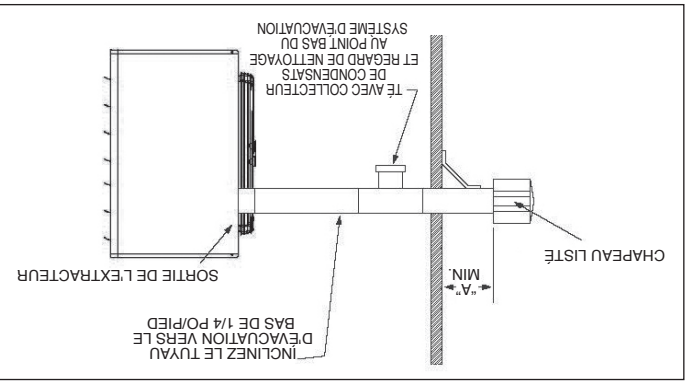
Chapeau de cheminée	"A" min.
Selkirk, Starkap ou Constant Air-Flo 2433	12 po
Modine 5H072285	6 po
Tjernlund VH1	0 po

Figure 9.1 - Construction d'une traversée à travers une paroi combustible et support de cheminée



- C6. Si la condensation risque d'être un problème, le système d'évacuation ne doit pas déboucher au-dessus d'une voie publique ou d'une zone où le condensat ou la vapeur pourrait créer une nuisance ou un danger, ou pourrait affecter le fonctionnement du régulateur ou des ouvertures de régulation de pression, ou bien d'autres équipements.
- C7. Le système d'évacuation ne doit pas desservir plus d'un appareil de chauffage et ne doit pas servir à d'autres fins.
- C8. Pour une évacuation horizontale, il faut maintenir une pente montante de 21 mm par pied (1/4 po par pied) vers l'aval et placer un té d'égouttement avec bouchon de nettoyage, comme illustré à la figure 9.2. Sous réserve de l'accord des autorités locales, une pente de 21 mm par mètre (1/4 po par pied) vers l'aval est acceptable avec un té d'égouttement avec bouchon de nettoyage près de la sortie, comme illustré à la figure 9.2, ou encore un écoulement direct du condensat au bout du tuyau.

Figure 9.2 - Ventilation horizontale



- C9. Dans le cas d'un chapeau de cheminée situé sous un avant-toit, la distance du porte-à-faux ne doit pas dépasser 61 cm (24 po). Les dégagements par rapport aux surfaces combustibles d'un conduit d'évacuation extérieur doivent être de 24 cm (12 po) au minimum. Consultez le National Fuel Gas Code pour les exigences additionnelles relatives aux avant-toits ayant des ouvertures de ventilation.
- C10. Une fois l'installation du système d'évacuation terminée, passez à la section intitulée « Installation – Raccordements de gaz ».

INSTALLATION – ÉVACUATION

A10. Si le tuyau traverse une cloison ou un plancher INTÉRIEUR combustible, la traversée doit être munie d'un manchon métallique ayant un diamètre de 10 cm (4 po) de plus que le tuyau. Si le tuyau est situé entre l'appareil et la traversée du mur ou du plancher à une longueur supérieure à 1,8 m (6 pi), le manchon peut avoir un diamètre de 5 cm (2 po) seulement de plus que le tuyau. S'il n'y a pas de manchon de traversée, tous les matériaux combustibles doivent être découpés pour assurer un dégagement d'au moins 15 cm (6 po) tout autour du tuyau. Sous réserve de l'accord des autorités compétentes locales, une évacuation de type B peut être utilisée comme dernier tronçon du conduit d'évacuation pour maintenir une distance par rapport aux combustibles lors du passage à travers le mur ou le plancher. Voir la figure 6.1 Tout matériau utilisé pour boucher cette ouverture doit être incombustible.

A11. Toutes les rivures et tous les joints des tuyaux à simple paroi doivent être scellés avec du ruban métallique ou Silastic certifié pour 400 °F. Le ruban doit être enroulé deux fois autour du tuyau. Une section continue de tuyau d'évacuation à double paroi peut être utilisée dans le système d'évacuation pour la traversée du mur jusqu'au chapeau d'évacuation listé. Voir le point A12 de la section A – Instructions générales – Tous modèles pour les transitions entre double paroi et simple paroi.

A12. Instructions générales pour l'installation du tuyau de chapeau à double paroi (Type B) :

Raccordement d'un chapeau de cheminée à paroi simple à un tuyau d'évacuation à double paroi (type B) :

1. Recherchez la flèche « de sens » sur le tuyau d'évacuation.
2. Fixez le chapeau de cheminée à l'extrémité du tuyau d'évacuation à double paroi.
3. Percez (3) avant-trous à travers le tuyau et le chapeau de cheminée. Utilisez des vis à tête de 3/4 po pour fixer le chapeau au tuyau. Ne serrez pas trop.

Comment fixer un tuyau d'évacuation à paroi simple à un tuyau de cheminée à double paroi (type B) :

1. Enfoncez le tuyau à simple paroi dans la paroi interne du tuyau à double paroi.
2. Percez trois avant-trous à travers les deux épaisseurs des tuyaux. Utilisez des vis à tête de 3/4 po pour fixer les deux tuyaux. Ne serrez pas trop.
3. L'espace annulaire entre les tuyaux à double et à simple paroi doit être scellé, mais il n'est pas nécessaire de remplir tout le volume. Pour fermer l'ouverture annulaire, appliquez un large boudin de Silastic 400°F (205°C).

A13. Les dégagements doivent être maintenus jusqu'à la sortie du conduit d'évacuation :

Tableau 7.1 - Information concernant les dégagements des conduits d'évacuation

Structure	Dégagements minimums pour les conduits d'évacuation
Prise d'air forcée à moins de 10 pi	3 pi au-dessus
Prise d'air de combustion d'un autre appareil	6 pi dans toutes les directions
Porte, fenêtre, prise d'air libre, ou autre ouverture du bâtiment	4 pi horizontalement ou en dessous 1 pi au-dessus
Compteur électrique, compteur à gaz, régulateur de gaz ou équipement ①	4 pi horizontalement (É.-U.) 6 pi horizontalement (Canada)
Régulateur de gaz	3 pi horizontalement (É.-U.) 6 pi horizontalement (Canada)
Mur ou parapet de bâtiment adjacent	6 pi toutes directions
Passage public adjacent	7 pi toutes directions
Niveau du sol	3 pi au-dessus

① L'évent ne doit pas déboucher au-dessus d'un compteur ou d'un régulateur de gaz. A14. Cet appareil ne doit PAS être relié à une cheminée en maçonnerie. A15. N'utilisez PAS de registres ni d'autres accessoires dans les conduits d'évacuation ou d'air de combustion.

Taille de modèle	Réf. Modèle
150-200	5H07222850004
250-400	5H07222850002

Tableau 7.2 - Chapeaux de cheminée

A16. Le système d'évacuation doit être exclusif à un seul appareil et aucun autre appareil ne doit être ventilé par son biais.

A17. Des précautions doivent être prises pour éviter la dégradation des matériaux de couverture par les produits de combustion.

A18. Un tuyau d'évacuation à simple paroi ne doit pas traverser un grenier inoccupé, une cloison, un vide de construction ou un plancher.

A19. Dans les régions où la température d'hiver utilisée pour le calcul à 99 % est inférieure à 0 °C (32 °F), il n'est pas permis d'utiliser des tuyaux simples pour l'évacuation à l'extérieur des gaz de combustion.

A20. Le chapeau de cheminée doit être :

Tableau 7.3 - Exigences ANSI pour les conduits d'évacuation des appareils de chauffage

Catégorie	Description	Exigences d'évacuation
I	Pression d'évacuation négative sans condensation	Suivre les exigences d'évacuation standard
II	Pression d'évacuation négative avec condensation	Le condensat doit pouvoir s'égoutter.
III	Pression d'évacuation positive sans condensation	Le conduit d'évacuation doit être étanche aux gaz
IV	Pression d'évacuation positive avec condensation	Le tuyau d'évacuation doit être étanche aux liquides et aux gaz. Le condensat doit pouvoir s'égoutter.

Remarque : Les tuyaux de raccordement desservant des appareils de catégorie I ne doivent pas être reliés à une partie d'un système d'évacuation à tirage mécanique fonctionnant avec une pression positive.

Évacuation verticale catégorie I

- Conduit vertical débouchant verticalement (vers le haut) (exemple à la figure 8.1).
- La partie horizontale du circuit ne doit dépasser 75% de la hauteur verticale (Exemple : Si la hauteur est 3 m (10 pi), la partie horizontale ne doit pas dépasser 2,3 m (7,5 pi)).
- Le niveau de la sortie du système d'évacuation doit être à au moins 1,5 m (5 pi) au-dessus du raccord de l'appareil.
- Si le système d'évacuation respecte TOUTES ces exigences (voir l'exemple de la figure 8.1), passez à la section B – Installation des systèmes d'évacuation verticale. Dans tous les autres cas, passez à la section suivante « Détermination du système d'évacuation horizontal Catégorie III ».

Évacuation horizontale de catégorie III

- Conduit horizontal débouchant horizontalement (sur le côté du bâtiment) (exemple à la figure 9.2).
- Un système d'évacuation qui se termine verticalement, mais comporte une partie horizontale de plus de 75 % de sa hauteur verticale est considéré comme horizontal.
- Les configurations d'évacuation horizontales appartenant à la catégorie III. Des exigences supplémentaires sont traitées à la Section C - Installation de système d'évacuation horizontale de catégorie III.

⚠ Avertissement

1. Un système d'évacuation est obligatoire pour les appareils de chauffage au gaz – ne les faites jamais fonctionner sans évacuation des gaz.
2. Un extracteur intégré assure la circulation des gaz – il est inutile ou interdit d'installer un dispositif d'extraction externe supplémentaire.
3. Si un appareil de chauffage existant est remplacé, vous devrez peut-être redimensionner les systèmes d'évacuation des gaz. Un système de ventilation de diamètre insuffisant peut causer des refoulements de gaz brûlés ou la formation de condensat. Reportez-vous au National Fuel Gas Code ANSI Z223.1 (NFPA 54) ou à la dernière édition de la norme CSA B149.1. Le non-respect de ces instructions peut se solder par des blessures graves, voire mortelles.
4. Il est interdit d'accoupler deux longueurs de tuyau à double paroi dans une même installation d'évacuation horizontale à cause de l'impossibilité de vérifier l'étanchéité des raccords du tuyau intérieur.

⚠ Attention

L'installation doit se faire conformément aux codes locaux de la construction ou, à défaut de tels codes, conformément au National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - dernière édition. Au Canada, l'installation doit se faire conformément à la norme CSA B149.1.

Les circuits d'évacuation des modèles PDP/BDP doivent être conformes aux descriptions des présentes instructions pour conduire les gaz de combustion de l'appareil ou de son raccord de sortie vers l'atmosphère extérieure.

Les instructions d'évacuation sont organisées en sections, selon le type d'installation. Ces sections sont identifiées de la manière suivante :

Instructions d'installation par type de système d'évacuation	A	Instructions générales applicables à TOUTES les installations
Systèmes d'évacuation VERTICALE CATÉGORIE I ①	B	Systèmes d'évacuation HORIZONTALE CATÉGORIE III ②
Les différences entre les systèmes verticaux et horizontaux seront identifiées à la « Section A – Instructions générales – tous modèles ».		

Section A – Instructions générales – Tous modèles

A1. Si l'appareil que vous installez remplace un équipement existant et utilise le même système d'évacuation, inspectez le système d'évacuation pour vérifier que les diamètres et la pente des tuyaux sont conformes aux exigences du National Fuel Gas Code ANSI Z223.1 (NFPA 54) ou du code d'installation CSA B149.1, dernière édition, et aux présentes instructions. Déterminez s'il n'y a pas d'obstructions, de restriction, de fuite, de corrosion ou d'autres déficiences pouvant créer un risque.

A2. Le tuyau d'évacuation des gaz doit être un tuyau en acier galvanisé ou autre matière résistant bien à la corrosion. L'épaisseur minimale du conduit d'évacuation est spécifiée dans le National Fuel Gas Code. N'utilisez jamais des tuyaux de cheminée en PVC ou autres types de plastique.

A3. Tous les appareils de chauffage sont fournis avec un adaptateur permettant d'attacher le tuyau d'évacuation à l'appareil de chauffage (Tableau 6.1). Attachez le tuyau d'évacuation des gaz à l'adaptateur à l'aide de 3 vis résistant à la corrosion. (Percez des avant-trous à travers le tuyau d'évacuation et l'adaptateur avant de visser.) Le tuyau d'évacuation des gaz ne doit pas être d'un diamètre inférieur à celui du connecteur.

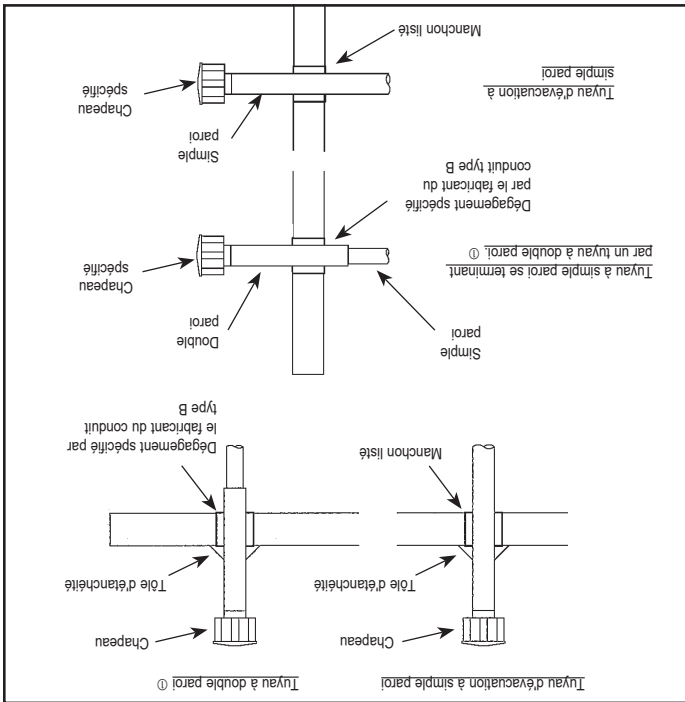
A4. Limitez la longueur totale équivalente du tuyau d'évacuation au minimum et maximum fournis au tableau 6.1, en créant un système

- d'évacuation le plus droit possible. La longueur équivalente d'un coude de 5 po est de 6 pi, celle d'un coude de 6 po est de 7 pi. A5. Il est recommandé de prévoir un raccord droit d'au moins 30 cm (12 po) entre la sortie de l'appareil et le conduit d'évacuation.
- A6. Les sections horizontales du tuyau d'évacuation doivent être installées avec une pente ascendante ou descendante de l'appareil de 1/4 de pouce par pied et doivent être suspendues de manière sécurisée à des structures suspendues à des points ne dépassant pas 3 pi.
- A7. Les tuyaux doivent être fixés les uns aux autres par au moins 3 vis à tôle anticorrosion.
- A8. Les tuyaux à simple paroi doivent être éloignés d'au moins 15 cm (6 po) des surfaces combustibles. Pour des tuyaux à double paroi, suivez les instructions du fabricant en matière de dégagement. La distance minimum des matières combustibles dépend de la température de surface de la matière combustible ne devant pas dépasser 71 °C. Il est possible que la distance par rapport au tuyau de ventilation (ou au haut de l'appareil) doit être augmentée à plus de 6 po si la chaleur risque de causer des dommages autre que le feu (comme des déformations ou une altération de couleur).
- A9. Évitez de faire passer le conduit à travers un espace non chauffé, dans la mesure du possible. Si le tuyau traverse un espace non chauffé ou si l'appareil est installé dans un environnement propice à la condensation, il faudra isoler toute longueur de tuyau de plus de 5 pi afin de minimiser la condensation. Assurez-vous qu'il n'y a pas de fuites et utilisez un isolant non combustible avec un indice non inférieur à 204 °C (400 °F). Installez un raccord en té au point bas du système de ventilation et fournissez un collecteur de condensats avec un bouchon de nettoyage, comme illustré à la figure 8.1.

Tableau 6.1 - Diamètres de tuyau d'évacuation, transitions et longueurs de tuyau d'évacuation équivalentes totales pour les systèmes d'évacuation horizontaux

Format du modèle	Transition de conduit incluse	Diamètre de tuyau d'évacuation	Long. équiv. minimum	Long. équiv. maximum
150, 175	4 à 5 po	5 po	2 pi	60 pi
200	6 à 5 po	5 po	2 pi	60 pi
250-400	Non requis	6 po	2 pi	70 pi

Figure 6.1 - Cheminée traversant un mur ou un toit combustible



① Consultez les instructions A12 pour savoir comment attacher un tuyau à simple paroi à un tuyau à double paroi.

MONTAGE DE L'APPAREIL

1. Assurez-vous que les pièces de suspension peuvent supporter le poids de l'appareil (voir les pages 24 et 25 pour les poids).

2. Pour un fonctionnement correct et pour s'assurer que les flammes sont dirigées dans le centre des tubes de l'échangeur de chaleur, l'appareil doit être installé à l'horizontale. Utilisez un niveau à bulle d'air pour vous assurer que l'appareil est correctement suspendu.

3. Les distances aux matériaux combustibles comme spécifié à la figure 4.1 et aux tableaux 4.1 et 4.2 doivent être strictement maintenues.

4. Tous les modèles de série sont expédiés en boîte. Les modèles de taille supérieure sont également fournis avec une plate-forme de soutien au fond de la boîte. Les plus grands modèles pourront être soulevés par en dessous à l'aide d'un chariot élévateur à fourches ou d'un autre appareil de levage, uniquement si la plate-forme de soutien reste en place et que les fourches soutiennent l'appareil sur toute sa profondeur. Si l'appareil doit être soulevé par en dessous pour l'installation finale sans le carton en place, veillez à soutenir l'appareil correctement sur toute sa longueur et sa largeur pour éviter de l'endommager. Lorsque vous soulevez les appareils, assurez-vous que la charge est équilibrée.

5. Les modèles à hélice jusqu'à la taille 350 ont deux trous de fixation; la taille 350 et au-dessus en ont quatre; les modèles à soufflante jusqu'à la taille 350 ont quatre trous de fixation; la taille 350 et au-dessus en ont six. Les appareils à deux points de suspension sont dotés d'un système de suspension à l'horizontale. Selon les options et les accessoires de suspension à l'horizontale, l'appareil de chauffage à sa sortie d'usine risque de ne pas être de niveau une fois suspendu. Ne suspendez pas les appareils ajustements préliminaires recommandés sur l'appareil chauffant, avec l'appareil au sol. Les modèles peuvent être montés avec une tige filetée de 3/8 po-16 comme suit :

• Sur chaque section de tige filetée utilisée, vissez un écrou sur une distance de 1 po environ sur l'extrémité des tiges filetées qui seront vissées sur l'appareil de chauffage.

• Placez une rondelle sur l'extrémité de la tige filetée et vissez la tige filetée sur les écrous à souder de l'appareil de chauffage sur le dessus de l'appareil de chauffage en donnant 5 tours minimum, mais pas plus de 10. Serrez le premier écrou installé sur la tige filetée pour éviter la rotation de la tige.

• Percez des trous dans un canal en acier ou une cornière aux mêmes dimensions de ligne centrale que l'appareil de chauffage en cours d'installation. Les canaux en acier ou cornières devront être attachés aux éléments de structure appropriés.

• Coupez les tiges filetées à la longueur voulue, enfillez-les dans les trous du canal en acier ou de la cornière, puis fixez par des rondelles et des contre-écrous ou des rondelles d'arrêt et des écrous. Une configuration à double écrou peut être utilisée ici plutôt qu'au niveau de l'appareil de chauffage (un double écrou peut être utilisé aux deux endroits, mais ce n'est pas une obligation).

• N'installez pas les appareils de chauffage de série au-dessus de la hauteur d'installation maximum indiquée au tableau 19.1.

REMARQUE : Un kit d'adaptateur pour suspension de tuyau, illustré à la figure 5.3, est fourni, disponible en accessoire. Un kit comprend des trous de 3/4 " Bouchons de tuyaux IPS et vis à tête 3/8 " - 16 x 1-3 / 4" pour la facilité tube de suspension fileté.

- N'installez pas les appareils de chauffage de série au-dessus de la hauteur d'installation maximum indiquée au tableau 19.1.
- Percez des trous dans un canal en acier ou une cornière aux mêmes dimensions de ligne centrale que l'appareil de chauffage en cours d'installation. Les canaux en acier ou cornières devront être attachés aux éléments de structure appropriés.
- Coupez les tiges filetées à la longueur voulue, enfillez-les dans les trous du canal en acier ou de la cornière, puis fixez par des rondelles et des contre-écrous ou des rondelles d'arrêt et des écrous. Une configuration à double écrou peut être utilisée ici plutôt qu'au niveau de l'appareil de chauffage (un double écrou peut être utilisé aux deux endroits, mais ce n'est pas une obligation).
- N'installez pas les appareils de chauffage de série au-dessus de la hauteur d'installation maximum indiquée au tableau 19.1.

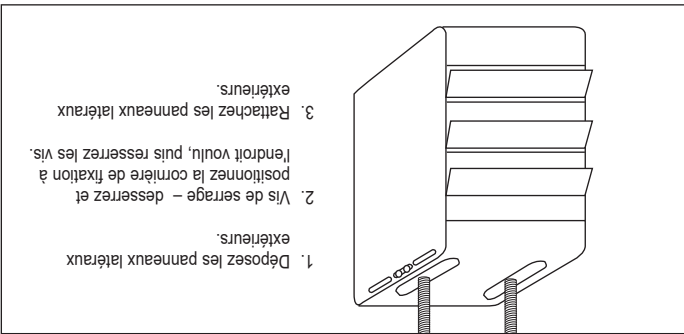


Figure 5.1 - Cornières de fixation réglables - Pour ajuster :

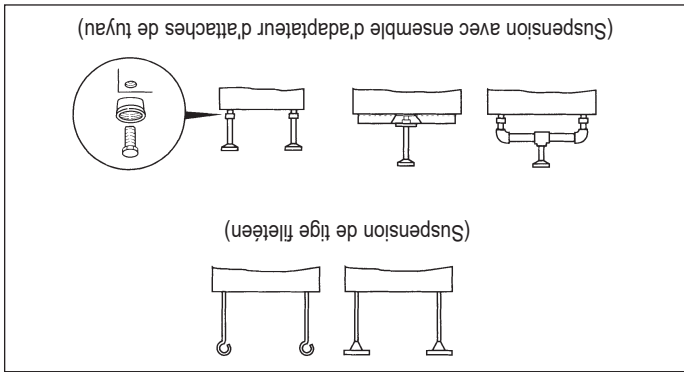


Figure 5.2 - Méthodes de suspension

EMPLACEMENT DE L'APPAREIL

EMPLACEMENT DE L'APPAREIL

Les appareils ne doivent pas être installés à un endroit où ils risquent d'être exposés à une atmosphère potentiellement explosive ou inflammable.

! DANGER

! ATTENTION

1. Les dégagements aux matériaux combustibles sont essentiels.

2. Assurez-vous de respecter toutes les exigences mentionnées.

3. Les appareils de chauffage sont conçus pour être utilisés dans des applications où la température ambiante de départ est comprise entre -40 et 90 ° F.

4. L'appareil n'est pas conçu pour être installé à l'extérieur.

5. Dans les garages ou dans certaines parties des hangars d'aviation, comme les bureaux et les ateliers qui communiquent avec des endroits réservés à l'entretien ou à l'entreposage, le bas de l'appareil doit être placé à au moins 7 pi du sol, sauf si des protections adéquates sont installées pour protéger convenablement l'appareil.

6. Dans les stationnements, l'appareil doit être installé conformément à la norme relative aux structures de stationnement ANSI/NFPA 88A (dernière édition), et dans les garages de réparation, conformément à la norme NFPA 30A (dernière édition) (ex-NFPA 88B). Au Canada, l'installation d'appareils de chauffage dans des hangars d'aviation doit être effectuée conformément aux exigences de l'autorité de réglementation et, dans les garages publics, conformément aux codes courants CSA B149.

7. Dans un hangar d'aviation, le bas de l'appareil doit être à au moins 10 pi au-dessus de la plus haute surface des ailes ou d'un capot moteur, pour l'avion le plus haut que le hangar accueillera et doit respecter les prescriptions de l'autorité de réglementation et/ou de la norme NFPA 409 – dernière édition.

8. Si l'appareil est installé dans un environnement très humide ou salin, il sera soumis à une corrosion accélérée qui réduira sa durée de vie normale.

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8. Si l'appareil est installé dans un environnement très humide ou salin, il sera soumis à une corrosion accélérée qui réduira sa durée de vie normale.

IMPORTANT

Pour éviter la panne prématurée de l'échangeur de chaleur, ne placez AUCUN appareil à gaz à des endroits où des vapeurs corrosives (chlorées, halogénées ou acides) sont présentes.

Recommandations pour le choix de l'emplacement

1. Les facteurs à considérer pour le choix de l'emplacement de l'appareil de chauffage sont les distances prescrites et les besoins de chauffage, l'endroit où se trouve l'arrivée du gaz et l'entrée électrique, ainsi que la proximité des conduits d'évacuation.
2. Évitez d'installer les appareils dans les lieux à courant d'air. En présence de courants d'air, les flammes risquent de lécher les échangeurs de chaleur et d'en raccourcir la durée de vie. Maintenez une certaine distance entre les appareils pour que le retournement d'un appareil ne soit dirigé jusqu'à l'aspiration d'un autre.
3. Assurez-vous que le support de l'appareil est assez solide pour porter son poids. Pour bien fonctionner, l'appareil doit être installé à l'horizontale.
4. N'installez pas l'appareil à un endroit où ses gaz brûlés pourraient être aspirés à l'intérieur d'un édifice voisin par une fenêtre, une prise d'air frais, etc.
5. Veillez à respecter les distances minimums des matériaux combustibles et les dégagements recommandés pour maintenance. Les appareils sont conçus pour une installation sur des surfaces non combustibles avec les dégagements minimums de la figure 4.1 et des tableaux 4.1 et 4.2.
6. Les appareils exposés à des températures d'air de 40 ° F ou moins pourront présenter de la condensation; par conséquent, prenez des dispositions pour l'évacuation du condensat.
7. Lors du choix de l'emplacement d'installation, il est important de prendre en considération le raccordement de la tuyauterie d'évacuation vers l'atmosphère extérieure.

Exigences en matière d'air de combustion

Le National Fuel Gas Code définit un "espace clos" comme un espace dont le volume est supérieur à 1,41 mètre cube (50 pieds cubes) par débit calorifique de 1000 Btu/h de l'appareil ou des appareils installés. Un espace offrant un volume de moins de 1,41 mètre cube (50 pieds cubes) par tranche de 1000 Btu/h de puissance calorifique installée est considéré comme un espace clos.

Pour les appareils installés dans des bâtiments hermétiquement fermés ou des espaces confinés, deux ouvertures permanentes doivent être prévues – une près du haut de l'espace confiné, l'autre près du bas. La surface de chaque ouverture doit être au minimum de 6,4 cm² pour 1 000 BTU par heure de la valeur nominale d'entrée totale de tous les appareils dans l'enceinte, et les ouvertures devront communiquer librement avec les zones intérieures auxquelles auront une infiltration adéquate de l'extérieur.

Pour des détails sur l'apport d'air de combustion dans un espace confiné (hermétiquement fermé) ou non confiné, consultez le National Fuel Gas Code ANSI Z223.1 de CAN-B149.1 Installation Code, dernière édition.

Niveaux sonores et de vibrations

Tout équipement mécanique standard génère bruit et vibrations pouvant exiger une atténuation. Les bibliothèques, les bureaux privés et les hôpitaux exigent une atténuation acoustique supplémentaire, et dans ce cas, un consultant en acoustique devra être engagé pour vous faciliter la tâche. L'éloignement de l'équipement de la zone critique est souhaitable dans les limites imposées par les gaines. Généralement, un appareil doit être placé à 15 pi d'une poutre de soutènement principale. De légères déviations diminueront généralement la transmission de vibrations et de bruit.

Tableau 4.1 - Distances des matières combustibles

Modèle	Côté accès	Côté opposé à l'accès	Haut	Bas	Évacuer
150-175	1 po	1 po	4 po	12 po	6 po
200-400	1 po	1 po	5 po	12 po	7 po

① Prévoyez un espace suffisant autour de l'appareil de chauffage pour permettre une combustion correcte et le bon fonctionnement du ventilateur. La zone de dégagement autour de l'appareil de chauffage ne doit pas être inférieure à 1,5 fois la zone de retournement de l'appareil.

Tableau 4.2 - Dégagements recommandés pour la maintenance

Modèle	Côté accès	Côté opposé à l'accès	Haut	Bas	Évacuer
150-175	18 po	18 po	6 po	22 po	6 po
200-400	18 po	18 po	6 po	22 po	7 po

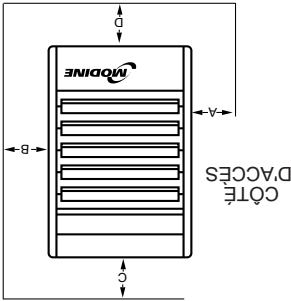


Figure 4.1 - Matières combustibles et dégagements

8. Les longueurs de tuyauterie d'évacuation équivalentes maximums apparaissent à « Section A – Instructions générales – tous modèles » des instructions d'évacuation des gaz.
9. N'installez pas les appareils à un endroit où le système d'allumage au gaz serait exposé à un brouillard d'eau, à la pluie ou à un goutte-à-goutte.
10. N'installez pas les appareils à moins de 7 pi (distance mesurée entre le bas de l'appareil et le sol), sauf s'il est équipé des barrières adéquates pour protéger l'utilisateur des composants en mouvement.

PRÉCAUTIONS PARTICULIÈRES

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LES INSTRUCTIONS D'INSTALLATION ET D'ENTRETIEN DE CE MANUEL DOIVENT ÊTRE RESPECTÉES POUR ASSURER UN FONCTIONNEMENT SÉCURITAIRE, EFFICACE ET SANS PROBLÈMES. IL CONVIENT ÉGALEMENT DE RESPECTER RIGOREUSEMENT LES PRÉCAUTIONS PARTICULIÈRES INDICÉES CI-APRÈS. LA NON-CONFORMITÉ À CES PRÉCAUTIONS PRIMORDIALES PEUT CAUSER DES DOMMAGES MATÉRIELS OU DES PERTES, DES BLESSURES OU LA MORT. CES INSTRUCTIONS SONT DONNÉES SOUS RÉSERVE DE DISPOSITIONS PLUS RESTRICTIVES DANS LES CODES LOCAUX OU NATIONAUX.

HIÉRARCHIE DES NIVEAUX DE RISQUES

- DANGER** : Indique un danger imminent qui, s'il n'est pas évité, entraînera INÉVITABLEMENT des blessures graves, voire mortelles.
- AVERTISSEMENT** : Indique un danger potentiel qui, s'il n'est pas évité, POURRAIT engendrer des blessures graves, voire mortelles.
- ATTENTION** : Indique un danger potentiel qui, s'il n'est pas évité, PEUT engendrer des blessures mineures ou modérées.
- IMPORTANT** : Indique une situation qui, si elle n'est pas évitée, PEUT poser un problème de sécurité.

! DANGER

Les appareils ne doivent pas être installés à un endroit où ils risquent d'être exposés à une atmosphère potentiellement explosive ou inflammable.

! AVERTISSEMENT

- Un système d'évacuation est obligatoire pour les appareils de chauffage au gaz – ne les faites jamais fonctionner sans évacuation des gaz.
- Un extracteur intégré assure la circulation des gaz – il est inutile ou interdit d'installer un dispositif d'extraction externe supplémentaire.
- Si un appareil de chauffage existant est remplacé, vous devrez peut-être redimensionner les systèmes d'évacuation des gaz. Un système de ventilation de diamètre insuffisant peut causer des retoulements de gaz brûlés ou la formation de condensat. Reportez-vous au National Fuel Gas Code ANSI Z223.1 ou à la dernière édition de la norme CSA B149.1. Le non-respect de ces instructions peut avoir des conséquences graves ou mortelles.
- Il est interdit d'accoupler deux longueurs de tuyau à double paroi dans une même installation d'évacuation horizontale à cause de l'impossibilité de vérifier l'étanchéité des raccords du tuyau intérieur.
- Toutes les tuyauteries de gaz extérieures doivent être soumises à des essais de pression et d'étanchéité avant la mise en marche. Ne recherchez jamais les fuites avec une flamme nue. Utilisez plutôt de l'eau savonneuse ou un produit équivalent.
- La pression de gaz au régulateur de l'appareil ne doit jamais dépasser 14 po c.e. (1/2 psi).
- Pour réduire les risques de condensation, le pouvoir calorifique minimum du gaz (au niveau de la mer) ne doit pas être inférieur de plus de 5 % à la valeur minimale nominale figurant sur la plaque signalétique de l'appareil ou de 5 % à la valeur la plus basse des appareils à double alimentation.
- Débranchez l'alimentation électrique avant de faire les connexions pour éviter les chocs électriques et les dommages à l'équipement.
- Tous les branchements et câblages doivent être faits en stricte conformité avec le schéma fourni avec l'appareil. Tout câblage différent de celui du schéma peut créer des risques de dommages matériels ou de blessures.
- Tout câblage usiné d'origine exigeant un remplacement doit être remplacé par un câble d'indice thermique nominal de 105 °C.
- Assurez-vous que la tension d'alimentation n'est pas supérieure de plus de 5 % à la tension nominale inscrite sur la plaque de l'appareil.

! AVERTISSEMENT

- Pour l'entretien et les réparations de cet appareil, n'utilisez que des pièces approuvées par le fabricant. Pour la liste complète des pièces de rechange, adressez-vous au fabricant. Le numéro de modèle complet, le numéro de série et l'adresse du fabricant figurent sur la plaque signalétique fixée à l'appareil. Toute substitution de pièce ou de commande non approuvée par le fabricant sera aux risques du propriétaire.

! ATTENTION

- Toute la documentation livrée avec l'appareil doit être conservée pour référence lors des opérations d'entretien et de diagnostic des pannes. Ne jetez aucune documentation fournie avec cet appareil.
- Étudiez les instructions en matière de tuyauterie, de câblage électrique et d'évacuation des gaz de ce manuel avant d'effectuer l'installation finale.
- Ne raccordez pas les gaines, les filtres à air ou les faisceaux de tubes à un aérotherme.
- Les dégagements par rapport aux matériaux combustibles adjacents sont essentiels. Assurez-vous de respecter toutes les exigences mentionnées.
- Les appareils de chauffage sont conçus pour être utilisés dans des applications où la température ambiante de départ est comprise entre -40 et 90 °F et la température ambiante de fonctionnement entre 40 et 90 °F.
- L'appareil n'est pas conçu pour être installé à l'extérieur.
- Dans les garages ou dans d'autres sections des hangars d'aéronefs, comme les bureaux et les ateliers qui communiquent avec des endroits réservés à l'entretien ou à l'entreposage, le bas de l'appareil doit être placé à au moins 2,13 m (7 pi) du sol, sauf si vous installez aussi des protections adéquates pour éviter les contacts avec des pièces mobiles. Dans les stationnements, l'appareil doit être installé conformément à la norme relative aux structures de stationnement ANSI/NFPA 88A (dernière édition), et dans les garages de réparation, conformément à la norme NFPA 30A (dernière édition) (ex-NFPA 88B). Au Canada, l'installation d'appareils de chauffage dans des hangars d'aviation doit être effectuée conformément aux exigences de l'autorité de réglementation et, dans les garages publics, conformément aux codes courants CSA B149.
- Dans un hangar d'aviation, le bas de l'appareil doit être à au moins 10 pi au-dessus de la plus haute surface des ailes ou d'un capot moteur, pour l'avion le plus haut que le hangar accueille et doit respecter les prescriptions de l'autorité de réglementation et/ou de la norme NFPA 409, dernière édition.
- Si l'appareil est installé dans un environnement très humide ou salin, il sera soumis à une corrosion accélérée qui réduira sa durée de vie normale.
- N'installez pas les appareils à moins de 7 pi (distance mesurée entre le bas de l'appareil et le sol dans les applications commerciales), sauf s'ils sont équipés de barrières adéquates pour protéger l'utilisateur des composants en mouvement.
- Vérifiez qu'il n'y a pas d'obstacle devant la prise d'air et la sortie d'air chaud.
- La distance minimum des matières combustibles dépend de la température de surface de la matière combustible ne devant pas dépasser 71 °C. Au-dessus de l'appareil, il faudra peut-être laisser un dégagement supérieur au minimum spécifié si des matériaux placés au-dessus de l'appareil à la température indiquée risquent de subir des dommages thermiques, autres que le feu.
- Prévoyez un dégagement de 18 po à l'arrière (ou de 12 po au-delà de l'extrémité du moteur, à l'arrière de l'appareil, selon la plus grande des deux valeurs), et du côté de la porte d'accès pour assurer assez d'air au bon fonctionnement du ventilateur.

MANUEL D'INSTALLATION ET DE MAINTENANCE appareils de chauffage alimentés au gaz à ventilation électrique modèles PDP et BDP



Tous les modèles sont approuvés pour une utilisation en Californie par le CEC et au Massachusetts. L'appareil de chauffage est certifié pour les applications non résidentielles.

POUR VOTRE SÉCURITÉ

L'utilisation et le stockage d'essence ou d'autres vapeurs et liquides inflammables dans des récipients ouverts à proximité de cet appareil sont dangereux.

IMPORTANT

Ce manuel est spécifiquement destiné au personnel d'une entreprise d'installation et d'entretien qualifiée. Toutes les opérations d'installation et d'entretien doivent être confiées à une entreprise qualifiée.

Inspection à la réception

1. Inspectez l'appareil à la livraison. Signalez immédiatement tout dommage au transporteur et avisez le représentant commercial local de votre région.
2. Vérifiez la plaque signalétique pour déterminer si les caractéristiques de l'appareil correspondent au secteur électrique disponible au point d'installation.
3. Inspectez l'appareil à la réception pour vous assurer qu'il est conforme à la description du produit commandé (y compris aux spécifications, s'il y a lieu).

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4	Emplacement d'installation
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4	Montage de l'appareil
5	Installation
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CE MANUEL DOIT ÊTRE REMIS AU PROPRIÉTAIRE DE L'INSTALLATION.
N'OUBLIEZ PAS DE LE LAISSER AU PROPRIÉTAIRE EN QUITTANT LE CHANTIER.

SI VOUS SENTEZ UNE ODEUR DE GAZ :

POUR VOTRE SÉCURITÉ

1. Ouvrez les fenêtres.
2. Ne tentez d'allumer aucun autre appareil.
3. Ne touchez pas aux interrupteurs électriques et n'utilisez aucun téléphone dans votre édifice.
4. Éteignez toute flamme nue.
5. Appelez immédiatement votre compagnie de gaz depuis le téléphone d'un voisin. Suivez les instructions de la compagnie de gaz. Si vous ne pouvez pas contacter votre compagnie de gaz, appelez les pompiers.

AVERTISSEMENT

1. Une installation, des réglages, des modifications ou un entretien inappropriés peuvent causer des dommages matériels, des blessures ou la mort, ainsi que l'exposition à des substances reconnues par divers organismes officiels comme causant des cancers, des malformations congénitales ou des anomalies du système reproducteur. Lisez attentivement les instructions d'installation, d'utilisation et d'entretien avant d'installer ou d'entretenir cet appareil.
2. AUCUN appareil fonctionnant au gaz ne devrait être installé dans des locaux dont l'atmosphère contient des vapeurs chlorées, halogénées ou acides. Ces substances peuvent causer une défaillance prématurée de l'échangeur de chaleur, en raison de la corrosion, laquelle peut provoquer des dommages matériels, des blessures graves ou même la mort.

