



STEAM/HOT WATER UNIT HEATERS



MODEL HSB/HC



MODEL V/VN



MODEL PT/PTN



MODEL GLW

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Refer to page 9 for information regarding the
Breeze™ AccuSpec Sizing and Selection Program



Canadian
Registered
heat exchangers
CRN
OH 9234.5C
*Does not apply to
V/PT 952

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

Application, Design, Construction Overview - All Units

Wide Product Selection

- Ratings as low as 11,300 Btu/hr for hot water to as high as 952,000 Btu/hr for steam, based on standard conditions.
- Horizontal, Vertical, and Power-Throw™ (high velocity horizontal air delivery) models offer maximum application flexibility.
- Ratings are shown as Btu/hr (based on 2 PSI steam, 60°F entering air conditions), eliminating the need to convert from EDR. This simplifies the matching of unit ratings to building heat loss.

Application Flexibility

- Horizontal and Power-Throw™ units are furnished with louvers for directional control of heated air. Vertical units are available with various louver, truncone, and cone-jet deflector options to accommodate many different air distribution patterns. See page 22 for more information.
- Units are available as low outlet temperature (LOT) models. LOT models have coils with fewer fins per inch to reduce the output rating. This is a benefit for applications where the steam pressure exceeds 30 PSI and mounting height is critical; the lower output results in outlet air temperatures that approximate that of standard coils at standard steam pressure. LOT models are also well suited for dirty environments where the increased fin spacing decreases the build-up of foreign particles. Finally, LOT models offer lower airside resistance resulting in greater allowable mounting heights and greater heat throw.
- Vertical and Power-Throw™ units are available with 90/10 cupro-nickel coils for high pressure/temperature applications, up to 250 PSI or 400°F.
- Side piping connections on the HC horizontal air delivery model allow for low clearance installations.
- Explosion-proof motors are available for use in hazardous areas. See page 8 for additional details.
- Design assures the correct relationship between air temperature, velocity, and air volume for greater heat throw; air is delivered to the floor at maximum mounting height, increasing comfort and reducing fuel costs.

Ease of Installation/Maintenance = Reliability

- Units are compact and lightweight, requiring fewer contractor hours to install.
- All units include an electrical junction box, either integral to the motor or mounted on the unit casing, to allow for easy electrical connections.
- All motors are totally enclosed. All single phase and explosion-proof motors include internal overload protection to protect the motor from insulation damaging heat, resulting in longer motor life.
- Different suspension options are available for most units including threaded rod or pipe hanger adapters.
- All units are component tested for proper motor function and the coils are leak tested under pressure to ensure proper function when the unit arrives at the jobsite.
- Fins on all units are vertical to limit build-up of foreign particles, prolonging periods between cleanings. Fins on vertical and Power-Throw™ units are exposed for easy cleaning.

Blends with the Environment

- Quiet operation is assured through the use of carefully selected motors, fans, and scientifically designed venturi fan shrouds.
- HSB and HC models have squared off corners for a clean, defined appearance. Vertical and Power-Throw™ units have a pleasing circular symmetry.
- Casings are treated for corrosion resistance and finished with a neutral gray-green baked-on, electrostatically applied polyester powder coat paint finish.

Unit Features - Horizontal Delivery Unit Heaters

Horizontal delivery unit heaters are the most popular of all types. These units are ideal for heating buildings with large open areas and low ceilings. They are used to counter heat loss along outside building walls, especially where windows are present.

In addition to the features noted on page 2, features that enhance the popularity of the horizontal delivery unit heater are:

- HSB units have top and bottom supply and return connections. This permits the unit to be rotated 360° without piping changes.
- HC units have side supply and return connections. This permits the unit to be installed in low clearance areas.
- Units have a 2-piece casing for easy coil access.
- All models have tapped holes for suspension by threaded rod or optional pipe hanger adapter kit, except HSB 18 and HSB 24 which mount directly to and are supported by the supply and return piping.
- Serpentine copper tube coil design has high resistance to thermal shock, even under high steam pressures.
- Absence of coil headers eliminates potential leaks and increases coil face area without increasing overall size of unit.
- Coil designed for greater water carrying capacity with lower friction loss.

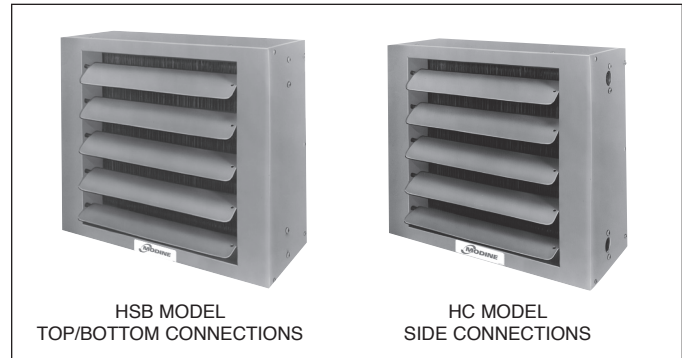
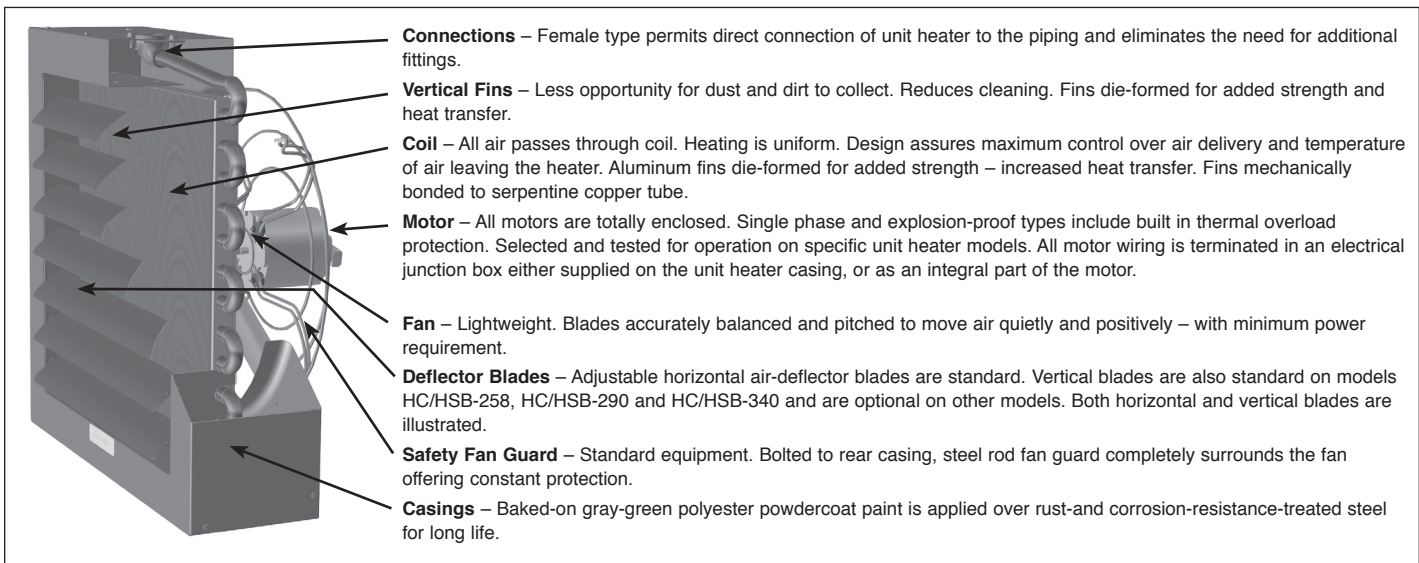


Figure 4.1 - Unit Features



Unit Features - Vertical Delivery Unit Heaters

Vertical delivery unit heaters are ideal for heating buildings with high ceilings or areas that require the heater to be mounted above obstructions such as craneways. Selection from a variety of heat throw patterns is made easy by choosing from four types of air deflectors. Heat throw patterns range from a high-velocity narrow jet to a gentle-velocity broad based cone of heated air.

In addition to the features noted on page 2, features that enhance the popularity of the vertical delivery unit heater are:

- Extended motor life with the use of the standard motor cooling cone. The cooling cone protects the motor from intense radiant and convection heat from the coil when the fan is not running. The cone also meters a controlled volume of ambient air over the motor to reduce motor temperature, when the motor is running.
- All models through V/VN 279 have tapped holes for threaded rod or optional pipe hanger adapter kit.
- All models V/VN 333 and larger have angle-iron mounting bracket with 5/8" diameter hanger holes.
- All vertical units are supplied with an outlet fan guard covering the opening in the bottom of the unit.



Figure 5.1 - Unit Features

| | | |
|--|--|---|
| <p>Motor-Cooling Cone – Shields motor from coil heat - prolongs life of insulation, windings, and lubricant. Prolongs motor life (V/VN models only).</p> | | <p>Junction Box – All motor wiring is terminated in an electrical junction box either supplied on the unit heater casing or as an integral part of the motor.</p> |
| <p>Coil – Aluminum fins firmly bonded to tubes for maximum heat transfer. Steam and water-carrying passages between extra-heavy steel pipe connections are copper for model V/PT and cupro-nickel for model VN/PTN.</p> | | <p>Motor Easily Removable – Modine design permits motor to be removed through opening below the unit especially important where heaters are installed close to ceiling (V/VN models only).</p> |
| <p>Motor – All motors are totally enclosed. Single phase and explosion-proof types include built in thermal overload protection. Selected and tested for operation on specific unit heater models.</p> | | <p>Vertical Fins – Less opportunity for dust and dirt to collect. Exposed for easy cleaning with air hose and brush.</p> |
| <p>Fan – Accurately balanced to operate quietly and at lowest possible power cost.</p> | | <p>Casings – Baked-on, gray-green polyester powder coat paint applied over rust- and corrosion-resistance treated steel lasts longer.</p> |

Unit Features - Power-Throw™ Horizontal Delivery Unit Heaters

Power-Throw™ horizontal delivery unit heaters are ideal for heating large buildings where a number of smaller units can be replaced by a few larger Power-Throw™ units. This results in a more economical installation. Their high velocity air delivery results in the greatest heat throw available.

Power-Throw™ units are also ideally suited for blanketing doors that frequently open.

Because of high velocity air delivery, care must be taken to avoid directing the air stream at building occupants.

In addition to the features noted on page 2, features that enhance the popularity of the Power-Throw™ horizontal delivery unit heater are:

- All models through PT/PTN 279 have hanger brackets with 5/8" diameter hanger holes for 3-point suspension.
- All models larger than PT/PTN 279 have hanger brackets with 5/8" diameter hanger holes for 2-point suspension and angle supports for 4-point suspension.
- Air distribution is controlled by a standard adjustable position horizontal louver assembly.
- The air stream can be concentrated into a high velocity jet or broadened to cover a greater area.
- Fan blades are properly balanced and pitched to move large volumes of high velocity air at relatively low sound levels.
- Refer to Figure 5.1 for features similar to the V/VN vertical models.



Unit Features - Low Water Temperature Greenhouse Heating Units

The Modine model GLW units are specifically designed to heat greenhouses with low-temperature water. They can be successfully used in applications where waste or reject heat from steam-electric power plants, refineries, pumping stations, distilleries, and other industrial or processing plants can be utilized for heating. With the ever-increasing cost of fossil fuel, utilizing reject heat as a heat source for greenhouses is a sensible solution with the model GLW.

Standard features include:

- Hot water coil with 1/2" O.D. copper tubes, aluminum fins, and 1-1/2" MPT copper connections.
- Maximum operating pressure is 300 PSI, maximum operating water temperature is 180°F
- Frame, enclosure panels, and 24" polytube transitions are galvanized steel for corrosion resistance in humid environments.
- 1/2 HP, totally enclosed motors (1 for GLW330S, 2 for GLW660S), available for single phase or three phase voltages.
- High airflow, 3850CFM for GLW330S and 7700CFM for GLW660S, based on 150 feet of polytube duct.



Unit Sizing

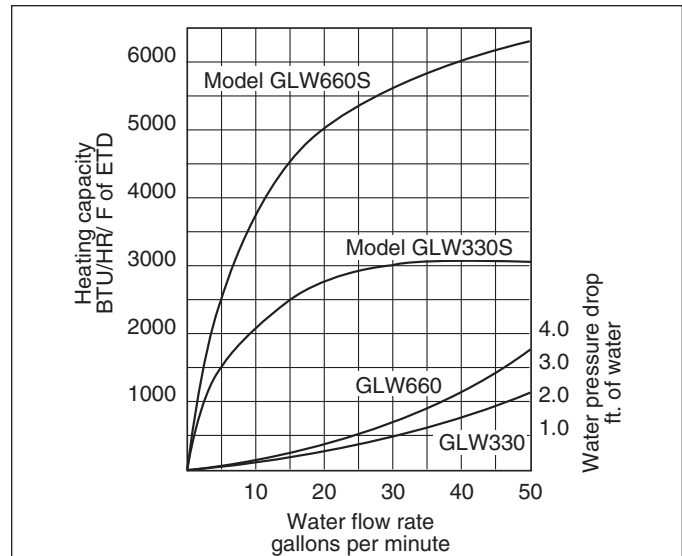
Unit performance is based on the flow rate and the temperature of the water relative to the ambient air temperature. Refer to Figure 6.1 and the following example for determining performance.

Example:

Determine heating capacity in BTU/hr for model GLW660S at 20GPM, 100°F entering water, and 70°F entering air.

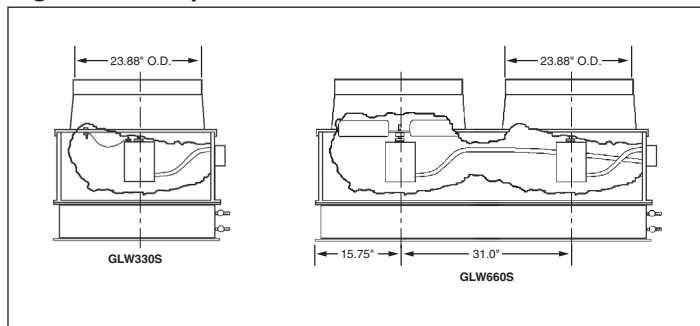
1. Figure 6.1 shows output in terms of BTU/hr per °F of ETD (Entering Temperature Difference). ETD is the difference between the entering water temperature and the entering air temperature. For this example, $ETD = 100°F - 70°F = 30°F$.
2. From Figure 6.1, at 20GPM, the BTU/hr per °F of ETD for the GLW660S is 5000.
3. The heating capacity = $5000 \times 30 = 150,000$ BTU/hr.
4. The water temperature drop = $(\text{heating capacity}) / (500 \times \text{GPM}) = 150,000 / (500 \times 20) = 15°F$.
5. The water pressure drop from the curve is 0.7 Ft. of water.

Figure 6.1 - Model GLW Performance Curves



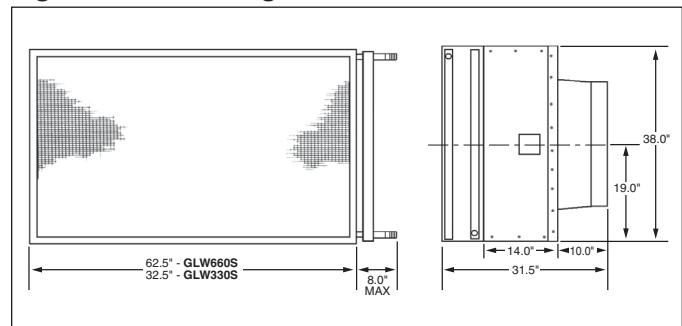
Dimensions and Specifications - Model GLW660S, GLW330S (All dimensions in inches)

Figure 6.2 - Top View



Weight: GLW330S=200 lbs., GLW660S=380 lbs.

Figure 6.3 - Discharge and Side Views



Note: Information on this page applies only to Model GLW units. Information contained in Catalog that is not on this page does not apply to Model GLW units.

Options and Accessories

Table 7.1
Factory Mounted Options

| Factory Mounted Option | Description |
|------------------------|--|
| Fingerproof Fan Guard | Standard fan guard may be factory replaced with fingerproof fan guard. For HSB/HC units only. Not available for units with explosion-proof motors. |

Table 7.2
Field Installed Accessories for Horizontal Models

| Field Installed Accessories | Description |
|-----------------------------|--|
| Vertical Deflector Blades | Blades used to deflect airflow in directions left or right of unit heater. Used in addition to standard horizontal deflector blades. Vertical deflector blades are standard on HSB/HC models 258 through 340. Not available for Power-Throw™ models. |
| Solid State Speed Control | Allows for remote control of airflow volume by controlling fan speed. Available only on HSB/HC models 18 through 108 with Power Code 01. |

Table 7.3
Field Installed Accessories for Vertical Models

| Field Installed Accessories | Description |
|-----------------------------|---|
| Cone-Jet | The cone-jet allows the discharge air stream to be adjusted from a concentrated high velocity jet to a broadened air stream to cover a larger area. See page 22 for additional information. |
| Truncone | The truncone causes a broad discharge air stream covering a larger area than possible with the cone-jet. See page 22 for additional information. |
| One Way Louver | The one-way louver allows the discharge air stream to be adjusted in one direction. See page 22 for additional information. |
| Two Way Louver | The two-way louver allows the discharge air stream to be adjusted in two directions. See page 22 for additional information. |

Table 7.4
Field Installed General Accessories

| Field Installed Accessories | Description |
|-----------------------------|--|
| Thermostat | Honeywell T4051A1003, 50-80°F range, 16A @ 115V, 8A @ 230V |
| Thermostat | Honeywell T451A3005, 44-86°F range, 9.8A @ 115V, 4.9A @ 230V |
| Thermostat | Johnson Controls T22BBC-1, 40-90°F range, Auto/Off/Fan switch, 10A @ 115V, 4.9A @ 230V |
| Explosion-proof Thermostat | Honeywell T6051B1006, 46-84° range, 10.2A @ 115V, 6.5A @ 230V |
| Aquastat | Aquastat, 10 amps @ 115V; 6 amps @ 230V; 100°-240°F range, SPDT, 10°F Diff. Fixed, Johnson A19DAC-1 |
| Thermostat Guard | Clear plastic locking guard with tumbler lock and two keys. Available only on thermostat Item Codes 23124, 23125 and 90348. |
| Pipe Hanger Adapter Kit | Allows unit heater to be suspended by threaded pipe instead of threaded rod. Two kits are required for V and VN models. Kits are not available for HSB-18 and HSB-24 models or Power-Throw™ models. |
| Manual Starter | Toggle switch starter with thermal overload protection for remote on/off control of unit fan operation. Available for power codes 01 and 02 only. |
| Step-Down Transformer | For supply voltages of 208V/60Hz/1ph and all non-explosion-proof 3 phase voltages of 208, 230, 460 and 575, certain Model Numbers require that a 115V/60Hz/1 phase Power Code 01 unit heater be used with a shipped loose accessory transformer. See page 23 for additional information. |

Power Code Descriptions & Control Sequence

**Table 8.1
Power Code Descriptions**

| Power Code | Supply Voltage | Motor Enclosure | Motor Type | Thermal Overload Protection | Motor Starter |
|------------|----------------|-------------------|---------------------|-----------------------------|--------------------------|
| 01 | 115/60/1 | Totally Enclosed | ① | Yes | N/A |
| 02 | 230/60/1 | Totally Enclosed | ① | Yes | N/A |
| 04 | 200-208/60/3 | Totally Enclosed | Polyphase Induction | No | Field Supplied/Installed |
| 05 | 230/460/60/3 | Totally Enclosed | Polyphase Induction | No | Field Supplied/Installed |
| 06 | 115/60/1 | Explosion-proof ② | Split Phase | Yes | N/A |
| 09 | 230/460/60/3 | Explosion-proof ② | Polyphase Induction | Yes | Field Supplied/Installed |
| 10 | 575/60/3 | Totally Enclosed | Polyphase Induction | No | Field Supplied/Installed |

① Motors are shaded pole for models HSB/HC 18-33 and V/VN 42-95. Models HSB/HC 47-340 and V/VN 139-333 are permanent split capacitor.
 ② Explosion-proof motors are suitable for Class I, Group D, Class II, Groups F and G, and Class III, Division 1 and 2 environments. Canadian Standard Association (CSA) requirements state that the explosion-proof units may not be used with a fluid temperature in excess of 329°F or pressures greater than 87 psig and still maintain their T3B temperature rating.
 Class I, Group D motors are for operations in areas containing gasoline, petroleum, naphtha, benzene, butane, propane, alcohol, acetone, lacquer solvent or natural gas.
 Class II, Group F motors are for operations in areas containing carbon black, coal or coke dust.
 Class II, Group G motors are for operations in areas containing flour, starch or grain dust.
 Class III motors are for operations in areas containing easily ignitable fibers and flyings.

Control Sequence

The following control sequence descriptions are typical for steam/hot water unit heaters:

Intermittent Fan Operation - Hot Coil

When a room thermostat calls for heat, the motor is energized. Hot water or steam is continuously supplied to the unit heater, even when the motor is not running. When the thermostat is satisfied, the motor is de-energized.

Continuous Fan Operation - Intermittent Hot/Cold Coil

When a room thermostat calls for heat, a valve is opened, allowing steam or hot water to enter the unit heater. When the thermostat is satisfied, the valve is closed. The fan runs continuously.

Intermittent Fan Operation - Intermittent Hot/Cold Coil

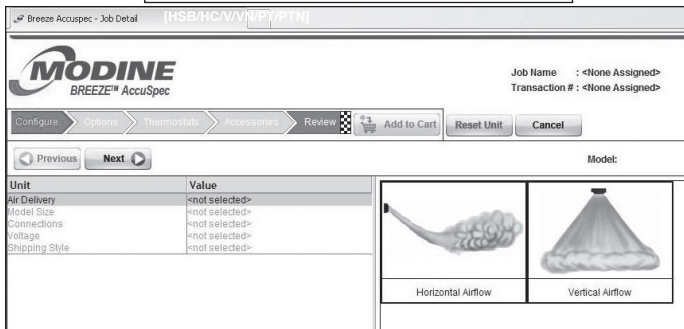
When a room thermostat calls for heat, the motor is energized. At the same time, a valve is opened allowing steam or hot water to enter the unit heater. An aquastat may be attached to the supply or return piping to prevent fan operation until the coil is adequately heated to avoid cold air delivery. When the thermostat is satisfied, the valve closes and the motor is de-energized.



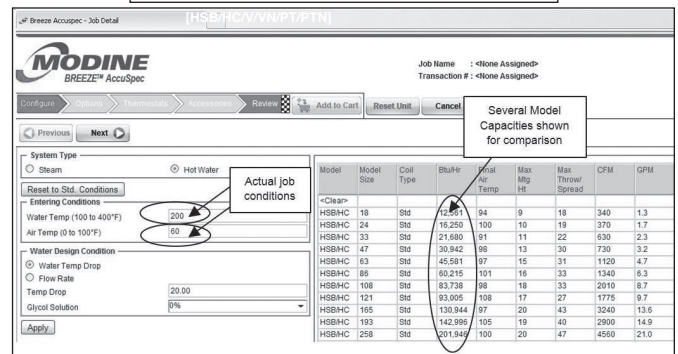
Modine Breeze™ AccuSpec Sizing and Selection Program

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 on 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.

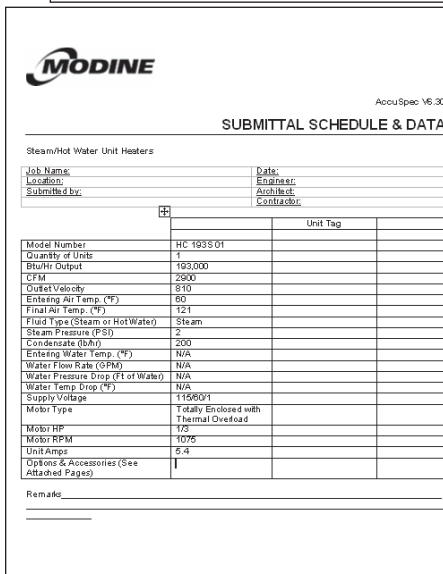
Pictures for Visual Selection



Capacities at Job Conditions

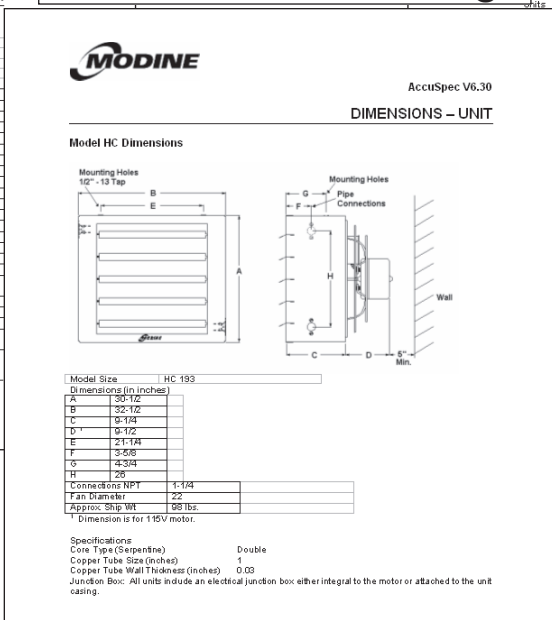


Submittal Schedules



Job Specific Specifications

Unit Specific Dimensional Drawings



Specifications

General: Manufacturer shall furnish and install Modine steam/hot water unit heater(s). Performance shall be as indicated on the equipment schedule in the plans. Unit heater(s) shall listed by CSA as certified.

Finish: Painted, factory assembled, pre-wired unit consisting of cabinet with air deflection louvers, supply air, and condenser.

Coating: Factory applied baked on grey-green corrosion resistant, high solids coating that meets the requirements of salt spray as defined in ASTM B117.

Construction: Tape tests as defined in ASTM D3359, Method B, Rating 5B. No cracking or peeling when test panel is bent around a 1/8 inch arc.

Coils: Coils are of the extended surface type of serpentine design, utilizing aluminum fins and DLP-Per tubes with cast bronze supply and return connections. Tubes are mechanically bonded to the fins. The condensers are warranted for operation at steam or hot water pressures up to 150 psi square inch gauge and/or temperatures up to 275°F. All coils are leak tested at 165 to 200 psi under water. Fins are continuous across the width and depth of the condenser and are vertically braced to minimize the collection of dirt and dust.

Design: of serpentine design with horizontal tubes, vertical fins and side supply and return. All tube ends are brazed. All tubes have individual expansion bends. Copper tubes are 1" O.D. with 0.03" wall thickness.

Motor: Motor with a supply voltage of and horsepower of 1/2 as indicated on the equipment schedule and listed for continuous fan duty type applications. Must be totally enclosed and single phase. It shall have built-in thermal overload protection. Motor will be mounted to the unit with rubber absorbing material. The entire length of the line voltage motor leads will be shielded and in a factory supplied junction box mounted on the unit or integral to the motor.

Guards: Guards are rated direct drive, aluminum blade; steel hub propeller will be statically and dynamically balanced. Unit shall be equipped with a safety fan guard.

Deflectors: Deflectors shall be furnished with horizontal air deflectors. The deflectors are adjustable to almost any position for downward, straight or upward airflow.

Field Installation: Field items are to be field installed in accordance with the manufacturer's instructions:

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



Steam Conversion Tables

Table 10.1 and the formulas below are used to determine the heating capacity (Btu/hr) of a unit heater at a steam pressure and/or entering air temperature other than standard conditions of 2 lb. steam, 60°F entering air temperature.

Table 10.1
Steam Heating Capacity Conversion Factors

| Unit Heater Type | Steam Pressure (PSIG) | Entering Air Temperature (°F) | | | | | | | | | | | |
|-----------------------------------|-----------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| | | -10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Horizontal Delivery | 0 | 1.54 | 1.45 | 1.37 | 1.27 | 1.19 | 1.11 | 1.03 | 0.96 | 0.88 | 0.81 | 0.74 | 0.67 |
| | 2 | 1.59 | 1.50 | 1.41 | 1.32 | 1.24 | 1.16 | 1.08 | 1.00 | 0.93 | 0.85 | 0.78 | 0.71 |
| | 5 | 1.64 | 1.55 | 1.46 | 1.37 | 1.29 | 1.21 | 1.13 | 1.05 | 0.97 | 0.90 | 0.83 | 0.76 |
| | 10 | 1.73 | 1.64 | 1.55 | 1.46 | 1.38 | 1.29 | 1.21 | 1.13 | 1.06 | 0.98 | 0.91 | 0.84 |
| | 15 | 1.80 | 1.71 | 1.61 | 1.53 | 1.44 | 1.34 | 1.28 | 1.19 | 1.12 | 1.04 | 0.97 | 0.90 |
| | 20 | 1.86 | 1.77 | 1.68 | 1.58 | 1.50 | 1.42 | 1.33 | 1.25 | 1.17 | 1.10 | 1.02 | 0.95 |
| | 30 | 1.97 | 1.87 | 1.78 | 1.68 | 1.60 | 1.51 | 1.43 | 1.35 | 1.27 | 1.19 | 1.12 | 1.04 |
| | 40 | 2.06 | 1.96 | 1.86 | 1.77 | 1.68 | 1.60 | 1.51 | 1.43 | 1.35 | 1.27 | 1.19 | 1.12 |
| | 50 | 2.13 | 2.04 | 1.94 | 1.85 | 1.76 | 1.67 | 1.58 | 1.50 | 1.42 | 1.34 | 1.26 | 1.19 |
| | 60 | 2.20 | 2.09 | 2.00 | 1.90 | 1.81 | 1.73 | 1.64 | 1.56 | 1.47 | 1.39 | 1.31 | 1.24 |
| | 70 | 2.26 | 2.16 | 2.06 | 1.96 | 1.87 | 1.78 | 1.70 | 1.61 | 1.53 | 1.45 | 1.37 | 1.29 |
| | 75 | 2.28 | 2.18 | 2.09 | 1.99 | 1.90 | 1.81 | 1.72 | 1.64 | 1.55 | 1.47 | 1.40 | 1.32 |
| | 80 | 2.31 | 2.21 | 2.11 | 2.02 | 1.93 | 1.84 | 1.75 | 1.66 | 1.58 | 1.50 | 1.42 | 1.34 |
| | 90 | 2.36 | 2.26 | 2.16 | 2.06 | 1.97 | 1.88 | 1.79 | 1.71 | 1.62 | 1.54 | 1.46 | 1.38 |
| | 100 | 2.41 | 2.31 | 2.20 | 2.11 | 2.02 | 1.93 | 1.84 | 1.75 | 1.66 | 1.58 | 1.50 | 1.42 |
| 125 | 2.51 | 2.41 | 2.31 | 2.21 | 2.11 | 2.02 | 1.93 | 1.84 | 1.76 | 1.68 | 1.59 | 1.51 | |
| 150 | 2.60 | 2.50 | 2.40 | 2.30 | 2.20 | 2.11 | 2.02 | 1.93 | 1.84 | 1.76 | 1.67 | 1.59 | |
| Vertical Delivery and Power-Throw | 0 | 1.49 | 1.41 | 1.33 | 1.25 | 1.18 | 1.11 | 1.03 | 0.96 | 0.90 | 0.83 | 0.76 | 0.69 |
| | 2 | 1.52 | 1.45 | 1.37 | 1.29 | 1.22 | 1.15 | 1.07 | 1.00 | 0.93 | 0.86 | 0.80 | 0.73 |
| | 5 | 1.58 | 1.50 | 1.42 | 1.34 | 1.27 | 1.20 | 1.12 | 1.05 | 0.98 | 0.91 | 0.85 | 0.78 |
| | 10 | 1.64 | 1.57 | 1.49 | 1.41 | 1.34 | 1.27 | 1.19 | 1.12 | 1.05 | 0.98 | 0.91 | 0.85 |
| | 15 | 1.70 | 1.62 | 1.55 | 1.47 | 1.40 | 1.32 | 1.25 | 1.18 | 1.11 | 1.04 | 0.97 | 0.90 |
| | 20 | 1.75 | 1.67 | 1.60 | 1.52 | 1.45 | 1.37 | 1.30 | 1.23 | 1.16 | 1.09 | 1.02 | 0.96 |
| | 30 | 1.83 | 1.75 | 1.68 | 1.61 | 1.53 | 1.46 | 1.39 | 1.32 | 1.25 | 1.18 | 1.11 | 1.04 |
| | 40 | 1.90 | 1.82 | 1.75 | 1.68 | 1.61 | 1.53 | 1.46 | 1.39 | 1.32 | 1.25 | 1.18 | 1.11 |
| | 50 | 1.96 | 1.87 | 1.81 | 1.74 | 1.67 | 1.59 | 1.52 | 1.45 | 1.38 | 1.31 | 1.24 | 1.17 |
| | 60 | 2.02 | 1.94 | 1.87 | 1.79 | 1.72 | 1.64 | 1.57 | 1.50 | 1.43 | 1.36 | 1.29 | 1.22 |
| | 70 | 2.07 | 1.99 | 1.92 | 1.84 | 1.76 | 1.69 | 1.62 | 1.55 | 1.47 | 1.40 | 1.33 | 1.27 |
| | 75 | 2.10 | 2.02 | 1.94 | 1.86 | 1.79 | 1.71 | 1.64 | 1.57 | 1.49 | 1.42 | 1.36 | 1.29 |
| | 80 | 2.11 | 2.04 | 1.96 | 1.88 | 1.80 | 1.73 | 1.66 | 1.59 | 1.51 | 1.44 | 1.38 | 1.31 |
| | 90 | 2.15 | 2.08 | 2.00 | 1.92 | 1.84 | 1.77 | 1.69 | 1.62 | 1.55 | 1.48 | 1.41 | 1.34 |
| | 100 | 2.19 | 2.11 | 2.03 | 1.95 | 1.88 | 1.80 | 1.73 | 1.66 | 1.59 | 1.52 | 1.45 | 1.38 |
| | 125 | 2.27 | 2.19 | 2.11 | 1.99 | 1.91 | 1.88 | 1.81 | 1.74 | 1.67 | 1.60 | 1.53 | 1.46 |
| | 150 | 2.34 | 2.26 | 2.18 | 2.10 | 2.03 | 1.95 | 1.88 | 1.81 | 1.74 | 1.67 | 1.60 | 1.53 |
| 175 | 2.40 | 2.32 | 2.24 | 2.16 | 2.09 | 2.01 | 1.94 | 1.87 | 1.80 | 1.73 | 1.66 | 1.59 | |
| 200 | 2.45 | 2.37 | 2.29 | 2.22 | 2.14 | 2.07 | 1.99 | 1.92 | 1.85 | 1.78 | 1.71 | 1.64 | |
| 225 | 2.50 | 2.42 | 2.34 | 2.26 | 2.19 | 2.12 | 2.04 | 1.97 | 1.90 | 1.83 | 1.76 | 1.69 | |
| 250 | 2.54 | 2.46 | 2.38 | 2.31 | 2.23 | 2.16 | 2.09 | 2.01 | 1.94 | 1.87 | 1.80 | 1.73 | |

Applicable formulas (examples on page 15):

To find actual unit heater capacity when operated at non-standard (actual) conditions:

$$Btu_A = Btu_S \times \text{Heating Capacity Factor}$$

To select a heater capacity based on standard conditions to meet a heating capacity at non-standard (actual) conditions:

$$Btu_S = Btu_A \div \text{Heating Capacity Factor}$$

Where:

Btu_S = Capacity at standard conditions (2 lb. steam, 60°F entering air temperature) from Tables 13.1 through 14.2

Btu_A = Capacity at non-standard (actual) conditions



Steam Conversion Tables

Table 11.1 and the formulas below are used to determine the air temperature rise of a unit heater at a steam pressure and/or entering air temperature other than standard conditions of 2 lb. steam, 60°F entering air temperature.

Table 11.1
Air Temperature Rise Conversion Factors

| Unit Heater Type | Steam Pressure (PSIG) | Entering Air Temperature (°F) | | | | | | | | | | | |
|-----------------------------------|-----------------------|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| | | -10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| Horizontal Delivery | 0 | 1.33 | 1.28 | 1.24 | 1.17 | 1.12 | 1.07 | 1.01 | 0.96 | 0.90 | 0.84 | 0.78 | 0.72 |
| | 2 | 1.38 | 1.33 | 1.27 | 1.22 | 1.17 | 1.11 | 1.06 | 1.00 | 0.94 | 0.88 | 0.83 | 0.76 |
| | 5 | 1.43 | 1.38 | 1.33 | 1.27 | 1.21 | 1.16 | 1.11 | 1.05 | 1.00 | 0.93 | 0.88 | 0.82 |
| | 10 | 1.50 | 1.45 | 1.40 | 1.35 | 1.29 | 1.24 | 1.19 | 1.13 | 1.07 | 1.02 | 0.95 | 0.90 |
| | 15 | 1.56 | 1.51 | 1.46 | 1.42 | 1.36 | 1.31 | 1.24 | 1.19 | 1.14 | 1.08 | 1.02 | 0.97 |
| | 20 | 1.61 | 1.56 | 1.52 | 1.46 | 1.41 | 1.36 | 1.30 | 1.25 | 1.19 | 1.14 | 1.08 | 1.02 |
| | 30 | 1.70 | 1.65 | 1.61 | 1.55 | 1.51 | 1.46 | 1.40 | 1.35 | 1.29 | 1.24 | 1.18 | 1.12 |
| | 40 | 1.78 | 1.73 | 1.68 | 1.62 | 1.58 | 1.54 | 1.48 | 1.43 | 1.38 | 1.32 | 1.26 | 1.21 |
| | 50 | 1.84 | 1.79 | 1.74 | 1.69 | 1.65 | 1.60 | 1.55 | 1.50 | 1.45 | 1.39 | 1.33 | 1.28 |
| | 60 | 1.91 | 1.86 | 1.81 | 1.75 | 1.71 | 1.66 | 1.61 | 1.56 | 1.50 | 1.45 | 1.40 | 1.33 |
| | 70 | 1.95 | 1.91 | 1.86 | 1.81 | 1.76 | 1.71 | 1.66 | 1.61 | 1.56 | 1.51 | 1.45 | 1.39 |
| | 75 | 1.97 | 1.93 | 1.89 | 1.84 | 1.79 | 1.74 | 1.69 | 1.64 | 1.58 | 1.53 | 1.47 | 1.42 |
| | 80 | 2.00 | 1.95 | 1.91 | 1.86 | 1.82 | 1.76 | 1.72 | 1.66 | 1.61 | 1.56 | 1.49 | 1.44 |
| | 90 | 2.04 | 2.00 | 1.95 | 1.90 | 1.86 | 1.81 | 1.75 | 1.70 | 1.65 | 1.60 | 1.54 | 1.49 |
| | 100 | 2.08 | 2.04 | 1.99 | 1.95 | 1.89 | 1.85 | 1.79 | 1.75 | 1.69 | 1.64 | 1.59 | 1.53 |
| 125 | 2.17 | 2.13 | 2.09 | 2.04 | 1.99 | 1.94 | 1.89 | 1.84 | 1.79 | 1.74 | 1.68 | 1.63 | |
| 150 | 2.25 | 2.21 | 2.17 | 2.12 | 2.07 | 2.03 | 1.98 | 1.93 | 1.87 | 1.83 | 1.77 | 1.71 | |
| Vertical Delivery and Power-Throw | 0 | 1.36 | 1.31 | 1.25 | 1.19 | 1.13 | 1.08 | 1.02 | 0.96 | 0.90 | 0.84 | 0.78 | 0.72 |
| | 2 | 1.41 | 1.35 | 1.29 | 1.24 | 1.18 | 1.12 | 1.06 | 1.00 | 0.94 | 0.88 | 0.82 | 0.76 |
| | 5 | 1.46 | 1.40 | 1.35 | 1.29 | 1.23 | 1.17 | 1.12 | 1.06 | 1.00 | 0.94 | 0.88 | 0.82 |
| | 10 | 1.54 | 1.48 | 1.43 | 1.37 | 1.31 | 1.25 | 1.20 | 1.14 | 1.08 | 1.02 | 0.96 | 0.89 |
| | 15 | 1.61 | 1.55 | 1.49 | 1.44 | 1.38 | 1.32 | 1.26 | 1.20 | 1.14 | 1.09 | 1.02 | 0.97 |
| | 20 | 1.67 | 1.61 | 1.55 | 1.50 | 1.44 | 1.38 | 1.32 | 1.26 | 1.20 | 1.15 | 1.08 | 1.02 |
| | 30 | 1.77 | 1.71 | 1.65 | 1.60 | 1.54 | 1.48 | 1.42 | 1.36 | 1.30 | 1.25 | 1.18 | 1.12 |
| | 40 | 1.85 | 1.79 | 1.74 | 1.68 | 1.62 | 1.56 | 1.51 | 1.45 | 1.39 | 1.33 | 1.27 | 1.21 |
| | 50 | 1.92 | 1.86 | 1.81 | 1.75 | 1.69 | 1.64 | 1.58 | 1.52 | 1.46 | 1.40 | 1.34 | 1.28 |
| | 60 | 1.99 | 1.93 | 1.88 | 1.82 | 1.76 | 1.70 | 1.65 | 1.58 | 1.53 | 1.47 | 1.41 | 1.35 |
| | 70 | 2.05 | 1.99 | 1.94 | 1.88 | 1.82 | 1.76 | 1.70 | 1.65 | 1.59 | 1.53 | 1.47 | 1.41 |
| | 75 | 2.08 | 2.02 | 1.96 | 1.91 | 1.85 | 1.79 | 1.73 | 1.67 | 1.62 | 1.56 | 1.50 | 1.43 |
| | 80 | 2.10 | 2.04 | 1.99 | 1.93 | 1.87 | 1.81 | 1.75 | 1.70 | 1.64 | 1.58 | 1.52 | 1.46 |
| | 90 | 2.15 | 2.09 | 2.04 | 2.00 | 1.92 | 1.86 | 1.80 | 1.74 | 1.69 | 1.63 | 1.57 | 1.51 |
| | 100 | 2.19 | 2.14 | 2.08 | 2.02 | 1.97 | 1.91 | 1.85 | 1.79 | 1.73 | 1.67 | 1.61 | 1.55 |
| | 125 | 2.29 | 2.24 | 2.18 | 2.12 | 2.07 | 2.01 | 1.95 | 1.89 | 1.83 | 1.77 | 1.71 | 1.65 |
| | 150 | 2.39 | 2.33 | 2.27 | 2.22 | 2.16 | 2.10 | 2.04 | 1.99 | 1.93 | 1.87 | 1.81 | 1.75 |
| | 175 | 2.46 | 2.41 | 2.35 | 2.29 | 2.24 | 2.18 | 2.12 | 2.06 | 2.00 | 1.94 | 1.88 | 1.82 |
| 200 | 2.54 | 2.48 | 2.42 | 2.37 | 2.31 | 2.25 | 2.19 | 2.13 | 2.07 | 2.02 | 1.96 | 1.89 | |
| 225 | 2.60 | 2.54 | 2.49 | 2.43 | 2.37 | 2.32 | 2.26 | 2.20 | 2.14 | 2.08 | 2.02 | 1.96 | |
| 250 | 2.66 | 2.60 | 2.55 | 2.49 | 2.43 | 2.38 | 2.32 | 2.26 | 2.20 | 2.14 | 2.08 | 2.02 | |

Applicable formulas (examples on page 15):

To find actual air temperature rise of unit heater when operated at non-standard (actual) conditions:

$$ATR_A = (FAT_S - EAT_S) \times \text{Air Temperature Rise Factor}$$

To find actual final air temperature of unit heater when operated at non-standard (actual) conditions:

$$FAT_A = EAT_A + ATR_A$$

Where:

- EAT_S = Standard conditions entering air temperature (60°F)
- EAT_A = Non-standard (actual) entering air temperature
- FAT_S = Final air temperature at standard conditions from Tables 13.1 through 14.2
- FAT_A = Final air temperature at non-standard (actual) conditions
- ATR_A = Air temperature rise at non-standard (actual) conditions



Steam Conversion Tables

Table 12.1 is used to determine how steam pressures other than 2 lb. affect mounting height.

**Table 12.1
Steam Unit Heater Mounting Height Correction Factors ①②**

| Correction Factor | Steam Pressure, PSIG | | | | | | | | | | | | | | | | | | |
|-------------------|----------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 2 | 5 | 10 | 15 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 125 | 150 | 175 | 200 | 225 | 250 |
| Correction Factor | 1.00 | 0.97 | 0.94 | 0.92 | 0.89 | 0.86 | 0.84 | 0.82 | 0.80 | 0.79 | 0.77 | 0.76 | 0.76 | 0.74 | 0.72 | 0.71 | 0.70 | 0.69 | 0.68 |

① Factors are for use with entering air temperatures that range from 50° to 70°F.

② While all units are capable of operation on steam pressures greater than 30 lb., low outlet temperature models are ideally suited for steam pressures above 30 lb. when mounting height is critical.

Applicable formula (examples on page 15):

Max. Mounting Height_A = Max. Mounting Height_S x Correction Factor

Where:

Max. Mounting Height_A = Maximum mounting height at actual conditions

Max. Mounting Height_S = Maximum mounting height at standard conditions

Table 12.2 is used to determine the rate of condensate production at steam pressures other than 2 lb.

**Table 12.2
Properties of Steam**

| Gauge Pressure (PSIG) | Temp (°F) | Latent Heat (Btu/lb.) | Gauge Pressure (PSIG) | Temp (°F) | Latent Heat (Btu/lb.) | Gauge Pressure (PSIG) | Temp (°F) | Latent Heat (Btu/lb.) | Gauge Pressure (PSIG) | Temp (°F) | Latent Heat (Btu/lb.) |
|-----------------------|-----------|-----------------------|-----------------------|-----------|-----------------------|-----------------------|-----------|-----------------------|-----------------------|-----------|-----------------------|
| 0 | 212.0 | 970.3 | 34 | 279.4 | 924.7 | 70 | 316.0 | 897.3 | 109 | 343.6 | 875.4 |
| 2 | 218.5 | 966.2 | 36 | 281.9 | 922.9 | 72 | 317.7 | 896.0 | 112 | 345.4 | 873.9 |
| 4 | 224.4 | 962.4 | 38 | 284.3 | 921.1 | 74 | 319.3 | 894.8 | 115 | 347.2 | 872.5 |
| 5 | 227.2 | 960.6 | 40 | 286.7 | 919.3 | 76 | 320.9 | 893.5 | 118 | 348.9 | 871.0 |
| 6 | 229.8 | 958.8 | 42 | 289.0 | 917.6 | 78 | 322.4 | 892.3 | 121 | 350.7 | 869.6 |
| 8 | 234.8 | 955.6 | 44 | 291.3 | 915.9 | 80 | 323.9 | 891.1 | 124 | 352.4 | 868.2 |
| 10 | 239.4 | 952.5 | 46 | 293.5 | 914.3 | 82 | 325.4 | 889.9 | 125 | 352.9 | 867.8 |
| 12 | 243.7 | 949.6 | 48 | 295.6 | 912.7 | 84 | 326.9 | 888.8 | 127 | 354.0 | 866.9 |
| 14 | 247.8 | 946.8 | 50 | 297.7 | 911.2 | 86 | 328.4 | 887.6 | 130 | 355.7 | 865.5 |
| 16 | 251.6 | 944.2 | 52 | 299.7 | 909.7 | 88 | 329.8 | 886.5 | 133 | 357.3 | 864.1 |
| 18 | 255.3 | 941.7 | 54 | 301.7 | 908.2 | 90 | 331.2 | 885.4 | 136 | 358.9 | 862.9 |
| 20 | 258.8 | 939.3 | 56 | 303.6 | 906.7 | 92 | 332.5 | 884.3 | 139 | 360.4 | 861.5 |
| 22 | 262.1 | 936.9 | 58 | 305.5 | 905.3 | 94 | 333.9 | 883.2 | 142 | 362.0 | 860.3 |
| 24 | 265.3 | 934.7 | 60 | 307.3 | 903.9 | 96 | 335.2 | 882.1 | 145 | 363.5 | 859.0 |
| 26 | 268.3 | 932.5 | 62 | 309.1 | 902.5 | 98 | 336.6 | 881.1 | 150 | 365.9 | 856.9 |
| 28 | 271.3 | 930.5 | 64 | 310.9 | 901.2 | 100 | 337.9 | 880.0 | 175 | 377.4 | 846.8 |
| 30 | 274.1 | 928.5 | 66 | 312.6 | 899.9 | 103 | 339.8 | 878.5 | 200 | 387.9 | 837.2 |
| 32 | 276.8 | 926.6 | 68 | 314.4 | 898.6 | 106 | 341.7 | 876.9 | 225 | 397.3 | 828.5 |
| - | - | - | - | - | - | - | - | - | 250 | 406.1 | 820.0 |

Applicable formula (examples on page 15):

Condensate rate = Btu_A ÷ Latent Heat of Steam

Where:

Btu_A = Capacity at actual operating conditions

PERFORMANCE DATA



Steam Performance Data - Standard Models

Table 13.1 - Performance Data for Standard Units at Standard Conditions of 2 lb. Steam and 60°F Entering Air High Motor Speed

| Type | Model No. | Btu/hr | Sq. Ft. EDR | Air Data | | | | | | Motor Data | | | |
|------------------------|------------|---------|-------------|------------------------------------|---|----------|-----------------------|----------------------|------------------|------------|-------------|-------|-------|
| | | | | Maximum Mounting Height (ft.) ① | Heat Throw or Spread @ Max. Height ① | CFM ② | Outlet Velocity (Fpm) | Final Air Temp. (°F) | Condensate lb/hr | Hp | Approx. RPM | | |
| Horizontal Delivery | HSB/HC 18 | 18,000 | 75 | 8 | 17 | 340 | 625 | 107 | 19 | 1/60 | 1,550 | | |
| | HSB/HC 24 | 24,000 | 100 | 9 | 18 | 370 | 695 | 119 | 25 | 1/25 | 1,550 | | |
| | HSB/HC 33 | 33,000 | 138 | 10 | 21 | 630 | 690 | 108 | 34 | 1/25 | 1,550 | | |
| | HSB/HC 47 | 47,000 | 196 | 12 | 28 | 730 | 810 | 119 | 49 | 1/12 | 1,550 | | |
| | HSB/HC 63 | 63,000 | 263 | 14 | 29 | 1,120 | 690 | 111 | 65 | 1/12 | 1,550 | | |
| | HSB/HC 86 | 86,000 | 358 | 15 | 31 | 1,340 | 835 | 118 | 89 | 1/8 | 1,625 | | |
| | HSB/HC 108 | 108,000 | 450 | 17 | 31 | 2,010 | 790 | 109 | 112 | 1/8 | 1,625 | | |
| | HSB/HC 121 | 121,000 | 504 | 16 | 25 | 1,775 | 715 | 122 | 125 | 1/5 | 1,075 | | |
| | HSB/HC 165 | 165,000 | 688 | 19 | 40 | 3,240 | 880 | 106 | 171 | 1/3 | 1,075 | | |
| | HSB/HC 193 | 193,000 | 804 | 18 | 38 | 2,900 | 810 | 121 | 200 | 1/3 | 1,075 | | |
| | HSB/HC 258 | 258,000 | 1,075 | 19 | 44 | 4,560 | 750 | 111 | 267 | 1/2 | 1,075 | | |
| HSB/HC 290 | 290,000 | 1,208 | 20 | 46 | 4,590 | 765 | 117 | 300 | 1/2 | 1,075 | | | |
| HSB/HC 340 | 340,000 | 1,417 | 20 | 46 | 5,130 | 735 | 120 | 352 | 1/2 | 1,075 | | | |
| Power Throw™ ③ | PT/PTN 279 | 279,000 | 1,163 | 16 | 100 | 5,460 | 2,165 | 111 | 289 | 1/2 | 1,075 | | |
| | PT/PTN 333 | 333,000 | 1,388 | 17 | 110 | 5,980 | 2,165 | 116 | 345 | 3/4 | 1,140 | | |
| | PT/PTN 385 | 385,000 | 1,604 | 17 | 115 | 7,680 | 1,860 | 110 | 398 | 1 | 1,140 | | |
| | PT/PTN 500 | 500,000 | 2,083 | 18 | 130 | 10,390 | 2,520 | 108 | 517 | 1 1/2 | 1,140 | | |
| | PT/PTN 610 | 610,000 | 2,542 | 20 | 140 | 11,750 | 2,315 | 112 | 631 | 1 1/2 | 1,140 | | |
| | PT 952 | 952,000 | 3,967 | 21 | 145 | 12,170 | 2,321 | 139 | 985 | 2 | 1,140 | | |
| Vertical Delivery ③ | V/VN 42 | 42,000 | 175 | 11 | 15 | 17 | 11 | 950 | 825 | 103 | 43 | 1/30 | 1,050 |
| | V/VN 59 | 59,000 | 246 | 14 | 19 | 21 | 14 | 1,155 | 1,005 | 111 | 61 | 1/30 | 1,050 |
| | V/VN 78 | 78,000 | 325 | 15 | 20 | 23 | 15 | 1,590 | 1,065 | 109 | 81 | 1/15 | 1,050 |
| | V/VN 95 | 95,000 | 396 | 15 | 20 | 23 | 15 | 1,665 | 1,120 | 118 | 98 | 1/15 | 1,050 |
| | V/VN 139 | 139,000 | 579 | 18 | 24 | 27 | 18 | 2,660 | 1,285 | 112 | 144 | 1/6 | 1,075 |
| | V/VN 161 | 161,000 | 671 | 20 | 27 | 30 | 20 | 2,945 | 1,420 | 115 | 167 | 1/3 | 1,075 |
| | V/VN 193 | 193,000 | 804 | 22 | 30 | 33 | 22 | 3,500 | 1,690 | 116 | 200 | 1/3 | 1,075 |
| | V/VN 212 | 212,000 | 883 | 22 | 30 | 33 | 22 | 3,610 | 1,740 | 120 | 219 | 1/3 | 1,075 |
| | V/VN 247 | 247,000 | 1,029 | 26 | 34 | 39 | 26 | 4,820 | 1,910 | 111 | 256 | 1/2 | 1,075 |
| | V/VN 279 | 279,000 | 1,163 | 30 | 37 | 45 | 30 | 5,460 | 2,165 | 111 | 289 | 1/2 | 1,075 |
| | V/VN 333 | 333,000 | 1,388 | 30 | 37 | 45 | 30 | 5,980 | 2,165 | 116 | 345 | 3/4 | 1,140 |
| | V/VN 385 | 385,000 | 1,604 | 30 | 36 | 45 | 30 | 7,680 | 1,860 | 110 | 398 | 1 | 1,140 |
| | V/VN 500 | 500,000 | 2,083 | 37 | 44 | 56 | 37 | 10,390 | 2,520 | 108 | 517 | 1 1/2 | 1,140 |
| | V/VN 610 | 610,000 | 2,542 | 36 | 43 | 54 | 36 | 11,750 | 2,315 | 112 | 631 | 1 1/2 | 1,140 |
| V 952 | 952,000 | 3,967 | 37 | | 56 | | 12,170 | 2,321 | 139 | 985 | 2 | 1,140 | |

Table 13.2 - Performance Data for Standard Units at Standard Conditions of 2 lb. Steam and 60°F Entering Air Reduced Motor Speed ④

| Type | Model No. | Btu/hr | Sq. Ft. EDR | Air Data | | | | | | Motor Data | |
|---------------------|------------|--------|-------------|------------------------------------|---|----------|-----------------------|----------------------|------------------|------------|-------------|
| | | | | Maximum Mounting Height (ft.) ① | Heat Throw or Spread @ Max. Height ① | CFM ② | Outlet Velocity (Fpm) | Final Air Temp. (°F) | Condensate lb/hr | Hp | Approx. RPM |
| Horizontal Delivery | HSB/HC 18 | 14,000 | 58 | 8 | 10 | 220 | 415 | 118 | 14 | 1/60 | 1,000 |
| | HSB/HC 24 | 18,000 | 75 | 9 | 11 | 230 | 440 | 131 | 19 | 1/25 | 1,000 |
| | HSB/HC 33 | 25,000 | 104 | 10 | 13 | 395 | 440 | 118 | 26 | 1/25 | 1,000 |
| | HSB/HC 47 | 38,000 | 158 | 12 | 17 | 450 | 515 | 137 | 39 | 1/12 | 1,000 |
| | HSB/HC 63 | 47,000 | 195 | 14 | 17 | 685 | 430 | 122 | 49 | 1/12 | 1,000 |
| | HSB/HC 86 | 64,000 | 265 | 15 | 19 | 825 | 525 | 131 | 66 | 1/8 | 1,000 |
| | HSB/HC 108 | 81,000 | 340 | 17 | 19 | 1,255 | 500 | 119 | 84 | 1/8 | 1,000 |

① Horizontal units with horizontal louvers open 30° from vertical plane. Vertical types equipped with cone jet deflector, blades fully opened are shown in bold. Please see page 22 for additional outlet accessory performance data.

② Cfm for horizontal types is entering Cfm. Cfm for vertical and Power-Throw™ types is leaving Cfm.

③ V and PT models have copper tubes, VN and PTN models have 90/10 cupro-nickel tubes.

④ Requires Solid State Motor Speed Controller.



Steam Performance Data - Low Outlet Temperature Models

Table 14.1 - Performance Data for Low Outlet Temperature Units at Standard Conditions of 2 lb. Steam and 60°F Entering Air High Motor Speed

| Type | Model No. | Btu/hr | Sq. Ft. EDR | Air Data | | | | | | | Motor Data | | |
|--------------------------------|-------------|---------|-------------|--|---|-----------|------------------|-----------------------|----------------------|------------------|------------|-------------|-------|
| | | | | Maximum Mounting Height (ft.) ^① | Heat Throw or Spread @ Max. Height ^① | | CFM ^② | Outlet Velocity (Fpm) | Final Air Temp. (°F) | Condensate lb/hr | Hp | Approx. RPM | |
| Horizontal Delivery | HSB/HC 18L | 15,900 | 66 | 9 | 20 | | 364 | 655 | 100 | 16 | 1/60 | 1,550 | |
| | HSB/HC 24L | 19,300 | 80 | 11 | 21 | | 435 | 795 | 100 | 20 | 1/25 | 1,550 | |
| | HSB/HC 33L | 29,500 | 123 | 12 | 24 | | 695 | 745 | 99 | 31 | 1/25 | 1,550 | |
| | HSB/HC 47L | 32,000 | 133 | 14 | 32 | | 855 | 910 | 94 | 33 | 1/12 | 1,550 | |
| | HSB/HC 63L | 52,500 | 219 | 16 | 33 | | 1,170 | 710 | 101 | 54 | 1/12 | 1,550 | |
| | HSB/HC 86L | 61,500 | 256 | 17 | 36 | | 1,510 | 910 | 97 | 64 | 1/8 | 1,625 | |
| | HSB/HC 108L | 86,500 | 360 | 19 | 36 | | 2,150 | 825 | 97 | 90 | 1/8 | 1,625 | |
| | HSB/HC 121L | 88,000 | 367 | 18 | 29 | | 2,070 | 800 | 98 | 91 | 1/5 | 1,075 | |
| | HSB/HC 165L | 143,000 | 596 | 21 | 45 | | 3,480 | 930 | 97 | 148 | 1/3 | 1,075 | |
| | HSB/HC 258L | 190,000 | 792 | 22 | 51 | | 4,655 | 750 | 98 | 197 | 1/2 | 1,075 | |
| HSB/HC 290L | 207,000 | 863 | 23 | 53 | | 5,040 | 805 | 94 | 214 | 1/2 | 1,075 | | |
| HSB/HC 340L | 255,000 | 1,063 | 23 | 53 | | 5,575 | 775 | 102 | 264 | 1/2 | 1,075 | | |
| Power Throw™ ^③ | PT/PTN 610L | 470,000 | 1,958 | 22 | 154 | | 2,400 | 2,445 | 97 | 486 | 1-1/2 | 1,140 | |
| Vertical Delivery ^③ | V 42L | 33,000 | 138 | 13 | 17 | 20 | 13 | 960 | 835 | 94 | 34 | 1/30 | 1,050 |
| | V 59L | 44,000 | 183 | 16 | 22 | 24 | 16 | 1,190 | 1,035 | 96 | 45 | 1/30 | 1,050 |
| | V 78L | 62,000 | 258 | 19 | 26 | 29 | 19 | 1,740 | 1,070 | 95 | 65 | 1/15 | 1,050 |
| | V 95L | 71,000 | 296 | 19 | 26 | 29 | 19 | 1,760 | 1,180 | 99 | 73 | 1/15 | 1,050 |
| | V/VN 139L | 103,000 | 429 | 23 | 31 | 35 | 23 | 2,860 | 1,380 | 95 | 106 | 1/6 | 1,075 |
| | V/VN 161L | 127,000 | 529 | 26 | 35 | 39 | 26 | 3,400 | 1,640 | 96 | 132 | 1/3 | 1,075 |
| | V/VN 193L | 149,000 | 621 | 27 | 36 | 41 | 27 | 3,710 | 1,790 | 99 | 154 | 1/3 | 1,075 |
| | V/VN 212L | 163,000 | 679 | 27 | 36 | 41 | 27 | 3,830 | 1,845 | 102 | 169 | 1/3 | 1,075 |
| | V/VN 247L | 190,000 | 792 | 32 | 42 | 48 | 32 | 5,110 | 2,030 | 96 | 197 | 1/2 | 1,075 |
| | V/VN 279L | 215,000 | 896 | 36 | 45 | 54 | 36 | 5,790 | 2,300 | 96 | 222 | 1/2 | 1,075 |
| | V/VN 333L | 256,000 | 1,067 | 36 | 45 | 54 | 36 | 6,340 | 2,300 | 100 | 265 | 3/4 | 1,140 |
| | V/VN 385L | 296,000 | 1,233 | 36 | 43 | 54 | 36 | 8,140 | 1,970 | 95 | 307 | 1 | 1,140 |
| | V/VN 500L | 385,000 | 1,604 | 45 | 54 | 68 | 45 | 11,000 | 2,670 | 94 | 400 | 1-1/2 | 1,140 |
| V/VN 610L | 470,000 | 1,958 | 44 | 52 | 66 | 44 | 12,400 | 2,445 | 97 | 485 | 1-1/2 | 1,140 | |
| V 952L | 733,000 | 3,055 | 45 | - | 68 | - | 12,940 | 2,450 | 115 | 759 | 2 | 1,140 | |

Table 14.2 - Performance Data for Low Outlet Temperature Units at Standard Conditions of 2 lb. Steam and 60°F Entering Air Reduced Motor Speed^④

| Type | Model No. | Btu/hr | Sq. Ft. EDR | Air Data | | | | | | | Motor Data | |
|---------------------|------------|--------|-------------|--|---|-------|------------------|-----------------------|----------------------|------------------|------------|-------------|
| | | | | Maximum Mounting Height (ft.) ^① | Heat Throw or Spread @ Max. Height ^① | | CFM ^② | Outlet Velocity (Fpm) | Final Air Temp. (°F) | Condensate lb/hr | Hp | Approx. RPM |
| Horizontal Delivery | HSB/HC 18L | 12,000 | 51 | 9 | 12 | | 230 | 425 | 108 | 12 | 1/60 | 1,000 |
| | HSB/HC 24L | 14,400 | 60 | 11 | 13 | | 265 | 490 | 109 | 15 | 1/25 | 1,000 |
| | HSB/HC 33L | 22,000 | 92 | 12 | 14 | | 430 | 470 | 107 | 23 | 1/25 | 1,000 |
| | HSB/HC 47L | 24,300 | 101 | 14 | 19 | | 540 | 580 | 101 | 25 | 1/12 | 1,000 |
| | HSB/HC 63L | 39,500 | 164 | 16 | 20 | | 725 | 445 | 109 | 41 | 1/12 | 1,000 |
| | HSB/HC 86L | 46,000 | 192 | 17 | 22 | | 925 | 565 | 105 | 48 | 1/8 | 1,000 |
| HSB/HC 108L | 65,000 | 270 | 19 | 22 | | 1,330 | 520 | 104 | 67 | 1/8 | 1,000 | |

① Horizontal units with horizontal louvers open 30° from vertical plane. Vertical types equipped with cone jet deflector, blades fully opened are shown in bold. Please see page 22 for additional outlet accessory performance data.

② Cfm for horizontal types is entering Cfm. Cfm for vertical and Power-Throw™ types is leaving Cfm.

③ V and PT models have copper tubes, VN and PTN models have 90/10 cupro-nickel tubes.

④ Requires Solid State Motor Speed Controller.

Steam Conversion Tables - Example Calculations

Conversion factor example #1:

For an HSB340S operating at 30 lb. steam and 50°F entering air temperature, determine the following:

- Capacity (Btu/hr)
- Final air temperature (°F)
- Condensate (lb./hr)
- Maximum mounting height

Solution:

The factors/data necessary to solve this problem are as follows:

- Steam heating capacity conversion factor for 30 lb. steam and 50°F entering air is 1.43, from Table 10.1.
- Air temperature rise conversion factor is 1.40, from Table 11.1.
- The latent heat of steam at 30 lb. is 928.5 Btu/lb., from Table 12.2.
- The mounting height correction factor is 0.86, from Table 12.1.
- The standard rated capacity of an HSB 340 is 340,000 Btu/hr, from Table 13.1.
- The final air temperature of an HSB 340 at standard conditions is 120°F, from Table 13.1.
- The maximum mounting height at standard conditions is 20 feet, from Table 13.1.

$$\text{Btu}_A = \text{Btu}_S \times \text{Heating Capacity Factor} = 340,000 \times 1.43 = \underline{486,200 \text{ Btu/hr}}$$

$$\text{ATR}_A = (\text{FAT}_S - \text{EAT}_S) \times \text{Air Temp Rise Factor} = (120^\circ\text{F} - 60^\circ\text{F}) \times 1.40 = 84^\circ\text{F}$$

$$\text{FAT}_A = \text{EAT}_A + \text{ATR}_A = 50^\circ\text{F} + 84^\circ\text{F} = \underline{134^\circ\text{F}}$$

$$\text{Condensate rate} = \text{Btu}_A \div \text{Latent Heat of Steam} = 486,200 \div 928.5 = \underline{523.6 \text{ lb./hr}}$$

$$\text{Max. Mounting Height}_A = \text{Max. Mounting Height}_S \times \text{Correction Factor} = 20 \text{ feet} \times 0.86 = \underline{17.2 \text{ feet}}$$

Conversion factor example #2:

Which vertical unit heater model is required to deliver 155,500 Btu/hr at 20 lb. steam and 60°F entering air temperature. What will be the actual capacity and rate of condensate production for the selected unit?

Solution:

The factors/data necessary to solve this problem are as follows:

- Steam heating capacity conversion factor for 20 lb. steam and 60°F entering air is 1.23, from Table 10.1.
- The latent heat of steam at 20 lb. is 939.3 Btu/lb. from Table 12.2.

$\text{Btu}_S = \text{Btu}_A \div \text{Heating Capacity Factor} = 155,500 \div 1.23 = 126,423 \text{ Btu/hr}$ (at standard conditions)
From Table 13.1, a V 139 model meets the requirement with a rated capacity of 139,000 Btu/hr at standard conditions.

The capacity of the V 139 at actual conditions will be $\text{Btu}_A = \text{Btu}_S \times \text{Heating Capacity Factor} = 139,000 \times 1.23 = \underline{170,970 \text{ Btu/hr}}$.

$$\text{Condensate rate} = \text{Btu}_A \div \text{Latent Heat of Steam} = 170,970 \div 939.3 = \underline{182.0 \text{ lb./hr}}$$

Alternate Solution:

Low Outlet Temperature models are normally recommended for steam pressures above 30 lb. However, the use of these models with steam pressure less than 30 lb. is acceptable.

Based on the example above, a V 161L model, from Table 14.1, meets the requirement with a rated capacity of 127,000 Btu/hr at standard conditions.

The capacity of the V 161L at actual conditions will be $\text{Btu}_A = \text{Btu}_S \times \text{Heating Capacity Factor} = 127,000 \times 1.23 = \underline{156,210 \text{ Btu/hr}}$.

$$\text{Condensate rate} = \text{Btu}_A \div \text{Latent Heat of Steam} = 156,210 \div 939.3 = \underline{166.3 \text{ lb./hr}}$$



Hot Water Conversion Tables

Table 16.1 and the formulas below are used to determine the heating capacity (Btu/hr) of a unit heater at a water temperature and/or entering air temperature other than standard conditions of 200° entering water temperature, 60° entering air temperature.

Table 16.1
Hot Water Heating Capacity Conversion Factors

| Entering Water Temp. (°F) | Entering Air Temperature (°F) | | | | | | | | | | |
|------------------------------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 60 | 0.462 | 0.380 | 0.300 | 0.222 | 0.146 | 0.072 | 0 | 0 | 0 | 0 | 0 |
| 70 | 0.539 | 0.456 | 0.375 | 0.296 | 0.219 | 0.145 | 0.071 | 0 | 0 | 0 | 0 |
| 80 | 0.615 | 0.531 | 0.450 | 0.370 | 0.293 | 0.217 | 0.143 | 0.071 | 0 | 0 | 0 |
| 90 | 0.692 | 0.607 | 0.524 | 0.444 | 0.366 | 0.289 | 0.214 | 0.141 | 0.070 | 0 | 0 |
| 100 | 0.769 | 0.683 | 0.599 | 0.518 | 0.439 | 0.361 | 0.286 | 0.212 | 0.140 | 0.069 | 0 |
| 110 | 0.846 | 0.759 | 0.674 | 0.592 | 0.512 | 0.434 | 0.357 | 0.283 | 0.210 | 0.138 | 0.068 |
| 120 | 0.923 | 0.835 | 0.749 | 0.666 | 0.585 | 0.506 | 0.429 | 0.353 | 0.279 | 0.207 | 0.137 |
| 130 | 1.000 | 0.911 | 0.824 | 0.740 | 0.658 | 0.578 | 0.500 | 0.424 | 0.349 | 0.276 | 0.205 |
| 140 | 1.077 | 0.987 | 0.899 | 0.814 | 0.731 | 0.651 | 0.571 | 0.494 | 0.419 | 0.345 | 0.273 |
| 150 | 1.154 | 1.063 | 0.974 | 0.888 | 0.805 | 0.723 | 0.643 | 0.565 | 0.489 | 0.414 | 0.342 |
| 160 | 1.231 | 1.139 | 1.049 | 0.962 | 0.878 | 0.795 | 0.714 | 0.636 | 0.559 | 0.483 | 0.410 |
| 170 | 1.308 | 1.215 | 1.124 | 1.036 | 0.950 | 0.867 | 0.786 | 0.706 | 0.629 | 0.552 | 0.478 |
| 180 | 1.385 | 1.291 | 1.199 | 1.110 | 1.024 | 0.940 | 0.857 | 0.777 | 0.699 | 0.621 | 0.547 |
| 190 | 1.462 | 1.367 | 1.274 | 1.184 | 1.097 | 1.012 | 0.929 | 0.848 | 0.768 | 0.690 | 0.615 |
| 200 | 1.539 | 1.443 | 1.349 | 1.258 | 1.170 | 1.084 | 1.000 | 0.918 | 0.838 | 0.759 | 0.684 |
| 210 | 1.615 | 1.519 | 1.424 | 1.332 | 1.243 | 1.157 | 1.071 | 0.989 | 0.908 | 0.828 | 0.752 |
| 220 | 1.692 | 1.594 | 1.499 | 1.406 | 1.312 | 1.229 | 1.143 | 1.060 | 0.978 | 0.897 | 0.820 |
| 230 | 1.769 | 1.670 | 1.573 | 1.480 | 1.390 | 1.301 | 1.214 | 1.130 | 1.048 | 0.966 | 0.889 |
| 240 | 1.846 | 1.746 | 1.649 | 1.554 | 1.463 | 1.373 | 1.286 | 1.201 | 1.118 | 1.035 | 0.957 |
| 250 | 1.923 | 1.822 | 1.723 | 1.628 | 1.536 | 1.446 | 1.357 | 1.272 | 1.188 | 1.104 | 1.025 |
| 260 | 2.000 | 1.898 | 1.798 | 1.702 | 1.609 | 1.518 | 1.429 | 1.342 | 1.257 | 1.173 | 1.094 |
| 270 | 2.077 | 1.974 | 1.873 | 1.776 | 1.682 | 1.590 | 1.500 | 1.413 | 1.327 | 1.242 | 1.162 |
| 280 | 2.154 | 2.050 | 1.948 | 1.850 | 1.755 | 1.663 | 1.571 | 1.483 | 1.397 | 1.311 | 1.230 |
| 290 | 2.231 | 2.126 | 2.023 | 1.924 | 1.829 | 1.734 | 1.643 | 1.554 | 1.467 | 1.380 | 1.300 |
| 300 | 2.308 | 2.202 | 2.098 | 1.998 | 1.902 | 1.807 | 1.714 | 1.625 | 1.537 | 1.449 | 1.367 |
| 310 | 2.385 | 2.278 | 2.173 | 2.072 | 1.974 | 1.879 | 1.786 | 1.695 | 1.607 | 1.518 | 1.436 |
| 320 | 2.462 | 2.354 | 2.248 | 2.146 | 2.048 | 1.952 | 1.857 | 1.766 | 1.677 | 1.587 | 1.504 |
| 330 | 2.539 | 2.430 | 2.323 | 2.220 | 2.121 | 2.024 | 1.929 | 1.837 | 1.746 | 1.656 | 1.572 |
| 340 | 2.615 | 2.506 | 2.398 | 2.294 | 2.194 | 2.096 | 2.000 | 1.907 | 1.816 | 1.725 | 1.641 |
| 350 | 2.692 | 2.581 | 2.473 | 2.368 | 2.267 | 2.168 | 2.071 | 1.978 | 1.886 | 1.794 | 1.709 |
| 360 | 2.769 | 2.657 | 2.548 | 2.442 | 2.340 | 2.241 | 2.143 | 2.049 | 1.956 | 1.863 | 1.778 |
| 370 | 2.846 | 2.733 | 2.622 | 2.516 | 2.413 | 2.313 | 2.214 | 2.119 | 2.026 | 1.932 | 1.846 |
| 380 | 2.923 | 2.809 | 2.697 | 2.590 | 2.486 | 2.385 | 2.286 | 2.190 | 2.096 | 2.001 | 1.914 |
| 390 | 3.000 | 2.885 | 2.772 | 2.664 | 2.560 | 2.458 | 2.357 | 2.261 | 2.165 | 2.070 | 1.983 |
| 400 | 3.077 | 2.961 | 2.847 | 2.738 | 2.633 | 2.530 | 2.429 | 2.331 | 2.235 | 2.139 | 2.051 |

Applicable formulas (examples on page 21):

To find actual unit heater capacity when operated at non-standard (actual) conditions:

$$Btu_A = Btu_S \times \text{Heating Capacity Factor}$$

To select a heater capacity based on standard conditions to meet a heating capacity at non-standard (actual) conditions:

$$Btu_S = Btu_A \div \text{Heating Capacity Factor}$$

Where:

Btu_S = Capacity at standard conditions (200°F entering water temperature, 60°F entering air temperature) from Tables 19.1 through 20.2

Btu_A = Capacity at non-standard (actual) conditions



Hot Water Conversion Tables

Table 17.1 - Minimum Water Flow and Water Volume (gallons) ①

| Type | Model | Min. GPM | Max. GPM | Coil Volume (gals) | Type | Model | Min. GPM | Max. GPM | Coil Volume (gals) | Type | Model | Min. GPM | Max. GPM | Coil Volume (gals) |
|----------------------------|-------|----------|----------|--------------------|---------------------|-------|----------|----------|--------------------|------------------------|-------|----------|----------|--------------------|
| HORIZONTAL DELIVERY HSB/HC | 18 | 0.25 | 5 | 0.13 | POWER-THROW™ PT/PTN | 279 | 4.50 | 60 | 0.97 | VERTICAL DELIVERY V/VN | 42 | 0.50 | 10 | 0.15 |
| | 24 | 0.25 | 5 | 0.13 | | 333 | 4.50 | 100 | 1.24 | | 59 | 0.75 | 15 | 0.23 |
| | 33 | 0.40 | 10 | 0.41 | | 385 | 4.50 | 100 | 1.24 | | 78 | 1.00 | 20 | 0.31 |
| | 47 | 0.40 | 10 | 0.41 | | 500 | 6.00 | 100 | 1.66 | | 95 | 1.25 | 25 | 0.38 |
| | 63 | 0.50 | 20 | 0.66 | | 610 | 6.00 | 100 | 1.98 | | 139 | 1.00 | 30 | 0.43 |
| | 86 | 0.50 | 20 | 0.66 | | 952 | 14.00 | 200 | 6.50 | | 161 | 1.25 | 40 | 0.54 |
| | 108 | 0.50 | 30 | 0.98 | | | | | | | 193 | 1.50 | 50 | 0.65 |
| | 121 | 0.50 | 30 | 0.98 | | | | | | | 212 | 2.00 | 60 | 0.86 |
| | 165 | 2.00 | 30 | 1.35 | | | | | | | 247 | 2.00 | 60 | 0.86 |
| | 193 | 2.00 | 50 | 1.45 | | | | | | | 279 | 2.25 | 75 | 0.97 |
| | 258 | 2.50 | 70 | 2.20 | | | | | | | 333 | 2.25 | 75 | 1.24 |
| | 290 | 2.50 | 70 | 2.20 | | | | | | | 385 | 2.25 | 75 | 1.24 |
| | 340 | 2.50 | 70 | 2.50 | | | | | | | 500 | 3.00 | 100 | 1.66 |
| | | | | | | | | 610 | 6.00 | 100 | 1.98 | | | |
| | | | | | | | | 952 | 14.00 | 200 | 6.50 | | | |

① Water flow and water volume is the same for standard coils and low-outlet temperature coils

Table 17.2 - Ethylene Glycol Correction Factors ②

Table 17.2 is used to determine how glycol solutions affect heater capacity. These factors should be applied to the heater capacity at actual entering water and air temperature conditions.

| Solution Temperature (°F) | Ethylene Glycol Solution % | | | | | | |
|---------------------------|----------------------------|------|------|------|------|------|------|
| | 20% | 30% | 40% | 50% | 60% | 70% | 80% |
| 60 | 0.99 | 0.96 | 0.93 | 0.89 | 0.85 | 0.81 | 0.76 |
| 100 | 0.99 | 0.96 | 0.93 | 0.89 | 0.85 | 0.81 | 0.76 |
| 150 | 0.99 | 0.96 | 0.94 | 0.90 | 0.87 | 0.83 | 0.78 |
| 200 | 0.99 | 0.96 | 0.94 | 0.92 | 0.88 | 0.85 | 0.81 |
| 250 | 0.98 | 0.96 | 0.94 | 0.92 | 0.89 | 0.86 | 0.82 |
| 300 | 0.98 | 0.95 | 0.95 | 0.92 | 0.90 | 0.87 | 0.83 |
| 350 | 0.98 | 0.95 | 0.95 | 0.93 | 0.91 | 0.88 | 0.84 |
| 400 | 0.97 | 0.95 | 0.95 | 0.93 | 0.92 | 0.89 | 0.85 |

② For Propylene Glycol solution correction factor, multiply Ethylene Glycol correction factor by 0.95.

Applicable formulas (examples on page 21):

To find actual unit heater capacity when operated with glycol solution:

$$Btu_{AG} = Btu_S \text{ (or } Btu_A) \times \text{Glycol Correction Factor}$$

To select a heater capacity based on standard conditions to meet a heating capacity with a glycol solution:

$$Btu_S \text{ (or } Btu_A) = Btu_{AG} \div \text{Glycol Correction Factor}$$

Where:

Btu_S = Capacity at standard conditions (200°F entering water temperature, 60°F entering air temperature) from Tables 19.1 through 20.2

Btu_A = Capacity at non-standard (actual) conditions

Btu_{AG} = Capacity with glycol solution

Table 17.3 - Hot Water Unit Heater Mounting Height Correction Factors ③

Table 17.3 is used to determine how hot water temperatures other than 200°F affect mounting height.

| Entering Water Temperature, °F | Correction Factor | Entering Water Temperature, °F | Correction Factor | Entering Water Temperature, °F | Correction Factor |
|--------------------------------|-------------------|--------------------------------|-------------------|--------------------------------|-------------------|
| 140 | 1.33 | 230 | 0.91 | 320 | 0.74 |
| 150 | 1.25 | 240 | 0.89 | 330 | 0.72 |
| 160 | 1.19 | 250 | 0.86 | 340 | 0.71 |
| 170 | 1.13 | 260 | 0.84 | 350 | 0.70 |
| 180 | 1.08 | 270 | 0.82 | 360 | 0.69 |
| 190 | 1.04 | 280 | 0.80 | 370 | 0.67 |
| 200 | 1.00 | 290 | 0.78 | 380 | 0.66 |
| 210 | 0.97 | 300 | 0.77 | 390 | 0.65 |
| 220 | 0.94 | 310 | 0.75 | 400 | 0.64 |

③ Factors are for use with entering air temperatures that range from 50° to 70°F

Applicable formula (examples on page 21):

$$\text{Max. Mounting Height}_A = \text{Max. Mounting Height}_S \times \text{Correction Factor}$$

Where:

Max. Mounting Height_A = Maximum mounting height at actual conditions

Max. Mounting Height_S = Maximum mounting height at standard conditions

Hot Water Conversion Tables - Miscellaneous Formulas

Table 18.1 is used to determine how water temperature drop affects heater capacity in Btu, water flow rate in GPM and pressure drop in feet of water. These factors should be applied to the values at actual entering water and air temperature conditions.

Table 18.1
Correction Factors for Varying Water Temperature Drop ①

| | Water Temperature Drop, °F | | | | | | | | | | | |
|------------------------------|----------------------------|------|------|------|------|------|------|------|------|------|------|------|
| | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
| Btu Correction Factor | 1.23 | 1.13 | 1.06 | 1.00 | 0.95 | 0.90 | 0.86 | 0.82 | 0.78 | 0.72 | 0.69 | 0.67 |
| GPM Correction Factor | 4.64 | 2.21 | 1.40 | 1.00 | 0.76 | 0.61 | 0.50 | 0.42 | 0.36 | 0.30 | 0.26 | 0.23 |
| WPD Correction Factor | 17.24 | 4.32 | 1.85 | 1.00 | 0.61 | 0.41 | 0.30 | 0.22 | 0.18 | 0.14 | 0.12 | 0.11 |

① Water temperature drop correction factors valid only for standard 200°F entering water and 60°F air temperature conditions.

Applicable formulas (examples on page 21):

To find actual unit heater capacity or flow rate or water pressure drop when operated at non-standard (actual) conditions:

$Btu_A = Btu_S \times Btu \text{ Correction Factor}$

$GPM_A = GPM_S \times GPM \text{ Correction Factor}$

$WPD_A = WPD_S \times WPD \text{ Correction Factor}$

To select a heater capacity based on standard conditions to meet a heating capacity at non-standard (actual) conditions:

$Btu_S = Btu_A \div Btu \text{ Correction Factor}$

- Where:
- Btu_S = Capacity at standard conditions (200°F entering water temperature, 60°F entering air temperature) from Tables 19.1 through 20.2
 - Btu_A = Capacity at non-standard (actual) conditions
 - GPM_S = Flow rate at standard conditions (200°F entering water temperature, 60°F entering air temperature) from Tables 19.1 through 20.2
 - GPM_A = Flow rate at non-standard (actual) conditions
 - WPD_S = Water pressure drop at standard conditions (200°F entering water temperature, 60°F entering air temperature) from Tables 19.1 through 20.2
 - WPD_A = Water pressure drop at non-standard (actual) conditions

Other miscellaneous useful formulas:

$FAT_A = EAT_A + [(460 + EAT_A) \times (Btu_A) \div (573 \times Cfm_S)]$ **for HSB and HC units only**

$FAT_A = EAT_A + [(460 + EAT_A) \div ((573 \times Cfm_S \div Btu_A) - 1)]$ **for V/VN and PT/PTN units only**

$WTD_A = Btu_A \div (480 \times GPM_A)$

- Where:
- EAT_A = Entering air temperature at actual conditions
 - FAT_A = Final air temperature at actual conditions
 - Btu_A = Capacity at actual conditions
 - Cfm_S = Unit airflow as found in Tables 19.1 through 20.2
 - GPM_A = Water flow rate at actual conditions in GPM
 - WTD_A = Water temperature drop at actual conditions

PERFORMANCE DATA



Hot Water Performance Data - Standard Models

Table 19.1 - Performance Data for Standard Units at Standard Conditions of 200°F Entering Water and 60°F Entering Air High Motor Speed

| Type | Model No. | Btu/hr | Water Data | | | Air Data | | | | | Motor Data | | | |
|--------------------------------|------------|---------|------------|------------------------------|--------------|--|---|------------------|-----------------------|----------------------|------------|-------------|-------|-------|
| | | | GPM | Pressure Drop (Ft. of Water) | Min/Max GPM | Maximum Mounting Height (ft.) ^① | Heat Throw or Spread @ Max. Height ^① | CFM ^② | Outlet Velocity (Fpm) | Final Air Temp. (°F) | Hp | Approx. RPM | | |
| Horizontal Delivery | HSB/HC 18 | 12,600 | 1.3 | 0.5 | 0.3 / 5.0 | 9 | 18 | 340 | 615 | 93 | 1/60 | 1,550 | | |
| | HSB/HC 24 | 16,200 | 1.7 | 0.8 | 0.3 / 5.0 | 10 | 19 | 370 | 675 | 100 | 1/25 | 1,550 | | |
| | HSB/HC 33 | 21,700 | 2.3 | 0.2 | 0.4 / 10.0 | 11 | 23 | 630 | 675 | 91 | 1/25 | 1,550 | | |
| | HSB/HC 47 | 30,900 | 3.2 | 0.4 | 0.4 / 10.0 | 13 | 30 | 730 | 785 | 98 | 1/12 | 1,550 | | |
| | HSB/HC 63 | 45,600 | 4.7 | 0.6 | 0.5 / 20.0 | 15 | 31 | 1,120 | 680 | 97 | 1/12 | 1,550 | | |
| | HSB/HC 86 | 60,200 | 6.3 | 1.0 | 0.5 / 20.0 | 16 | 33 | 1,340 | 820 | 101 | 1/8 | 1,625 | | |
| | HSB/HC 108 | 83,700 | 8.7 | 2.8 | 0.5 / 30.0 | 18 | 33 | 2,010 | 775 | 98 | 1/8 | 1,625 | | |
| | HSB/HC 121 | 93,000 | 9.7 | 3.3 | 0.7 / 30.0 | 17 | 27 | 1,775 | 700 | 107 | 1/5 | 1,075 | | |
| | HSB/HC 165 | 130,900 | 13.6 | 8.6 | 2.0 / 30.0 | 20 | 43 | 3,240 | 870 | 96 | 1/3 | 1,075 | | |
| | HSB/HC 193 | 143,000 | 14.9 | 1.4 | 2.0 / 50.0 | 19 | 41 | 2,900 | 790 | 105 | 1/3 | 1,075 | | |
| | HSB/HC 258 | 201,900 | 21.0 | 5.7 | 2.5 / 70.0 | 20 | 47 | 4,560 | 740 | 100 | 1/2 | 1,075 | | |
| HSB/HC 290 | 228,600 | 23.8 | 7.1 | 2.5 / 70.0 | 22 | 50 | 4,590 | 750 | 105 | 1/2 | 1,075 | | | |
| HSB/HC 340 | 271,100 | 28.2 | 11.3 | 2.8 / 70.0 | 22 | 50 | 5,130 | 720 | 108 | 1/2 | 1,075 | | | |
| Power Throw™ ^③ | PT/PTN 279 | 192,300 | 20.0 | 0.2 | 4.5 / 60.0 | 17 | 108 | 5,460 | 2,165 | 94 | 1/2 | 1,075 | | |
| | PT/PTN 333 | 238,500 | 24.8 | 0.4 | 4.5 / 100.0 | 18 | 117 | 5,980 | 2,165 | 99 | 3/4 | 1,140 | | |
| | PT/PTN 385 | 276,100 | 28.8 | 0.6 | 4.5 / 100.0 | 18 | 124 | 7,680 | 1,860 | 95 | 1 | 1,140 | | |
| | PT/PTN 500 | 358,000 | 37.3 | 0.5 | 6.0 / 100.0 | 19 | 138 | 10,390 | 2,520 | 93 | 1-1/2 | 1,140 | | |
| | PT/PTN 610 | 450,400 | 46.9 | 1.0 | 6.0 / 100.0 | 22 | 151 | 11,750 | 2,315 | 97 | 1-1/2 | 1,140 | | |
| | PT 952 | 721,600 | 75.2 | 1.1 | 14.0 / 200.0 | 23 | 150 | 12,166 | 2,321 | 120 | 2 | 1,140 | | |
| Vertical Delivery ^③ | V/VN 42 | 30,100 | 3.1 | 0.6 | 0.5 / 10.0 | 12 | 16 | 18 | 12 | 950 | 825 | 90 | 1/30 | 1,050 |
| | V/VN 59 | 42,600 | 4.4 | 0.5 | 0.8 / 15.0 | 15 | 20 | 22 | 15 | 1,155 | 1,005 | 96 | 1/30 | 1,050 |
| | V/VN 78 | 57,000 | 5.9 | 0.5 | 1.0 / 20.0 | 16 | 22 | 24 | 16 | 1,590 | 1,065 | 95 | 1/15 | 1,050 |
| | V/VN 95 | 69,300 | 7.2 | 0.5 | 1.3 / 25.0 | 16 | 22 | 24 | 16 | 1,665 | 1,120 | 101 | 1/15 | 1,050 |
| | V/VN 139 | 106,600 | 11.1 | 2.6 | 1.0 / 30.0 | 19 | 26 | 29 | 19 | 2,660 | 1,285 | 99 | 1/6 | 1,075 |
| | V/VN 161 | 123,200 | 12.8 | 2.2 | 1.3 / 40.0 | 21 | 29 | 32 | 22 | 2,945 | 1,420 | 101 | 1/3 | 1,075 |
| | V/VN 193 | 147,200 | 15.3 | 2.2 | 1.5 / 50.0 | 23 | 32 | 35 | 24 | 3,500 | 1,690 | 101 | 1/3 | 1,075 |
| | V/VN 212 | 161,700 | 16.8 | 1.5 | 2.0 / 60.0 | 23 | 32 | 35 | 24 | 3,610 | 1,740 | 104 | 1/3 | 1,075 |
| | V/VN 247 | 188,700 | 19.7 | 2.1 | 2.0 / 60.0 | 28 | 37 | 41 | 28 | 4,820 | 1,910 | 98 | 1/2 | 1,075 |
| | V/VN 279 | 212,600 | 22.2 | 2.1 | 2.3 / 75.0 | 32 | 40 | 48 | 32 | 5,460 | 2,165 | 98 | 1/2 | 1,075 |
| | V/VN 333 | 260,100 | 27.1 | 3.8 | 2.8 / 75.0 | 32 | 40 | 48 | 32 | 5,980 | 2,165 | 102 | 3/4 | 1,140 |
| | V/VN 385 | 302,100 | 31.5 | 5.0 | 3.3 / 75.0 | 32 | 39 | 48 | 32 | 7,680 | 1,860 | 98 | 1 | 1,140 |
| | V/VN 500 | 391,700 | 40.8 | 4.8 | 3.0 / 100.0 | 39 | 47 | 59 | 40 | 10,390 | 2,520 | 96 | 1-1/2 | 1,140 |
| V/VN 610 | 450,400 | 46.9 | 1.0 | 6.0 / 100.0 | 38 | 46 | 57 | 39 | 11,750 | 2,315 | 97 | 1-1/2 | 1,140 | |
| V 952 | 721,600 | 75.2 | 1.1 | 14.0 / 200.0 | 39 | - | 59 | - | 12,166 | 2,321 | 120 | 2 | 1,140 | |

Table 19.2 - Performance Data for Standard Units at Standard Conditions of 200°F Entering Water and 60°F Entering Air Reduced Motor Speeds^④

| Type | Model No. | Btu/hr | Water Data | | | Air Data | | | | Motor Data | |
|---------------------|------------|--------|------------|------------------------------|--|---|------------------|-----------------------|----------------------|------------|-------------|
| | | | GPM | Pressure Drop (Ft. of Water) | Maximum Mounting Height (ft.) ^① | Heat Throw or Spread @ Max. Height ^① | CFM ^② | Outlet Velocity (Fpm) | Final Air Temp. (°F) | Hp | Approx. RPM |
| Horizontal Delivery | HSB/HC 18 | 9,900 | 1.3 | 0.5 | 9 | 11 | 220 | 400 | 101 | 1/60 | 1,000 |
| | HSB/HC 24 | 12,400 | 1.7 | 0.8 | 10 | 12 | 230 | 425 | 109 | 1/25 | 1,000 |
| | HSB/HC 33 | 16,700 | 2.3 | 0.2 | 11 | 14 | 395 | 430 | 98 | 1/25 | 1,000 |
| | HSB/HC 47 | 23,600 | 3.2 | 0.4 | 13 | 18 | 450 | 490 | 107 | 1/12 | 1,000 |
| | HSB/HC 63 | 34,600 | 4.7 | 0.6 | 15 | 18 | 685 | 420 | 106 | 1/12 | 1,000 |
| | HSB/HC 86 | 45,900 | 6.3 | 1.0 | 16 | 20 | 825 | 515 | 110 | 1/8 | 1,000 |
| | HSB/HC 108 | 64,300 | 8.7 | 2.8 | 18 | 20 | 1,255 | 490 | 106 | 1/8 | 1,000 |

① Horizontal units with horizontal louvers open 30° from vertical plane. Vertical types equipped with cone jet deflector, blades fully opened are shown in bold. Please see page 22 for additional outlet accessory performance data.

② Cfm for horizontal types is entering Cfm. Cfm for vertical and Power-Throw™ types is leaving Cfm.

③ V and PT models have copper tubes, VN and PTN models have 90/10 cupro-nickel tubes.

④ Requires Solid State Motor Speed Controller.

PERFORMANCE DATA



Hot Water Performance Data - Low Outlet Temperature Models

Table 20.1 - Performance Data for Low Outlet Temperature Units at Standard Conditions of 200°F Entering Water and 60°F Entering Air – High Motor Speed

| Type | Model No. | Btu/hr | Water Data | | | Air Data | | | | | Motor Data | | | |
|--------------------------------|-------------|---------|------------|------------------------------|-------------|--|---|------------------|-----------------------|----------------------|------------|-------------|-------|-------|
| | | | GPM | Pressure Drop (Ft. of Water) | Min/Max GPM | Maximum Mounting Height (ft.) ^① | Heat Throw or Spread @ Max. Height ^① | CFM ^② | Outlet Velocity (Fpm) | Final Air Temp. (°F) | Hp | Approx. RPM | | |
| Horizontal Delivery | HSB/HC 18L | 11,300 | 1.2 | 0.4 | 0.3 / 5.0 | 10 | 21 | 364 | 650 | 88 | 1/60 | 1,550 | | |
| | HSB/HC 24L | 13,700 | 1.4 | 0.6 | 0.3 / 5.0 | 12 | 22 | 435 | 775 | 88 | 1/25 | 1,550 | | |
| | HSB/HC 33L | 19,300 | 2.0 | 0.2 | 0.4 / 10.0 | 13 | 26 | 695 | 730 | 85 | 1/25 | 1,550 | | |
| | HSB/HC 47L | 21,100 | 2.2 | 0.2 | 0.4 / 10.0 | 15 | 34 | 855 | 890 | 82 | 1/12 | 1,550 | | |
| | HSB/HC 63L | 37,900 | 4.0 | 0.4 | 0.5 / 20.0 | 17 | 35 | 1,170 | 695 | 89 | 1/12 | 1,550 | | |
| | HSB/HC 86L | 44,600 | 4.6 | 0.6 | 0.5 / 20.0 | 18 | 38 | 1,510 | 890 | 87 | 1/8 | 1,625 | | |
| | HSB/HC 108L | 66,100 | 6.9 | 1.8 | 0.8 / 30.0 | 20 | 38 | 2,150 | 815 | 88 | 1/8 | 1,625 | | |
| | HSB/HC 121L | 66,700 | 6.9 | 1.9 | 0.8 / 30.0 | 19 | 31 | 2,070 | 785 | 89 | 1/5 | 1,075 | | |
| | HSB/HC 165L | 113,200 | 11.8 | 6.6 | 2.0 / 30.0 | 23 | 48 | 3,480 | 920 | 89 | 1/3 | 1,075 | | |
| | HSB/HC 258L | 147,400 | 15.4 | 3.2 | 2.5 / 70.0 | 23 | 54 | 4,655 | 735 | 89 | 1/2 | 1,075 | | |
| | HSB/HC 290L | 161,100 | 16.8 | 3.7 | 2.5 / 70.0 | 25 | 57 | 5,040 | 800 | 89 | 1/2 | 1,075 | | |
| HSB/HC 340L | 200,900 | 20.9 | 6.6 | 2.5 / 70.0 | 25 | 57 | 5,575 | 760 | 93 | 1/2 | 1,075 | | | |
| Power Throw™ ^③ | PT/PTN 610L | 344,900 | 35.9 | 0.6 | 6.0 / 100.0 | 24 | 158 | 12,400 | 2,445 | 86 | 1 1/2 | 1,140 | | |
| Vertical Delivery ^③ | V 42L | 23,000 | 2.4 | 0.4 | 0.5 / 10.0 | 14 | 18 | 21 | 14 | 960 | 835 | 83 | 1/30 | 1,050 |
| | V 59L | 32,600 | 3.4 | 0.3 | 0.8 / 15.0 | 17 | 23 | 25 | 17 | 1,190 | 1,035 | 86 | 1/30 | 1,050 |
| | V 78L | 43,600 | 4.5 | 0.3 | 1.0 / 20.0 | 20 | 28 | 31 | 21 | 1,740 | 1,170 | 84 | 1/15 | 1,050 |
| | V 95L | 53,100 | 5.5 | 0.3 | 1.3 / 25.0 | 20 | 28 | 31 | 21 | 1,760 | 1,180 | 89 | 1/15 | 1,050 |
| | V/VN 139L | 81,200 | 8.5 | 1.6 | 1.0 / 30.0 | 24 | 33 | 37 | 25 | 2,860 | 1,380 | 87 | 1/6 | 1,075 |
| | V/VN 161L | 93,900 | 9.8 | 1.3 | 1.3 / 40.0 | 28 | 37 | 41 | 28 | 3,400 | 1,640 | 86 | 1/3 | 1,075 |
| | V/VN 193L | 112,500 | 11.7 | 1.3 | 1.5 / 50.0 | 29 | 38 | 43 | 29 | 3,710 | 1,790 | 89 | 1/3 | 1,075 |
| | V/VN 212L | 123,400 | 12.9 | 0.9 | 2.0 / 60.0 | 29 | 38 | 43 | 29 | 3,830 | 1,845 | 91 | 1/3 | 1,075 |
| | V/VN 247L | 143,600 | 15.0 | 1.2 | 2.0 / 60.0 | 34 | 45 | 51 | 35 | 5,110 | 2,030 | 87 | 1/2 | 1,075 |
| | V/VN 279L | 162,200 | 16.9 | 1.2 | 2.3 / 75.0 | 38 | 48 | 57 | 39 | 5,790 | 2,300 | 87 | 1/2 | 1,075 |
| | V/VN 333L | 198,300 | 20.7 | 2.3 | 2.3 / 75.0 | 38 | 48 | 57 | 39 | 6,340 | 2,300 | 90 | 3/4 | 1,140 |
| | V/VN 385L | 229,100 | 23.9 | 3.0 | 2.3 / 75.0 | 38 | 46 | 57 | 49 | 8,140 | 1,970 | 87 | 1 | 1,140 |
| | V/VN 500L | 295,000 | 30.7 | 2.8 | 3.0 / 100.0 | 48 | 57 | 72 | 49 | 11,000 | 2,670 | 85 | 1 1/2 | 1,140 |
| V/VN 610L | 344,900 | 35.9 | 0.6 | 6.0 / 100.0 | 47 | 55 | 70 | 48 | 12,400 | 2,445 | 86 | 1 1/2 | 1,140 | |
| V 952L | 546,700 | 56.9 | 0.7 | 14.0 / 100.0 | 48 | | 72 | | 12,800 | 2,440 | 102 | 2 | 1,140 | |

Table 20.2 - Performance Data for Low Outlet Temperature Units at Standard Conditions of 200°F Entering Water and 60°F Entering Air – Reduced Motor Speeds^④

| Type | Model No. | Btu/hr | Water Data | | | Air Data | | | | | Motor Data | |
|---------------------|-------------|--------|------------|------------------------------|--|---|------------------|-----------------------|----------------------|------|-------------|--|
| | | | GPM | Pressure Drop (Ft. of Water) | Maximum Mounting Height (ft.) ^① | Heat Throw or Spread @ Max. Height ^① | CFM ^② | Outlet Velocity (Fpm) | Final Air Temp. (°F) | Hp | Approx. RPM | |
| Horizontal Delivery | HSB/HC 18L | 8,700 | 1.2 | 0.4 | 10 | 13 | 230 | 410 | 94 | 1/60 | 1,000 | |
| | HSB/HC 24L | 10,400 | 1.4 | 0.6 | 12 | 14 | 265 | 475 | 95 | 1/25 | 1,000 | |
| | HSB/HC 33L | 14,700 | 2.0 | 0.2 | 13 | 16 | 430 | 455 | 91 | 1/25 | 1,000 | |
| | HSB/HC 47L | 16,300 | 2.2 | 0.2 | 15 | 21 | 540 | 570 | 87 | 1/12 | 1,000 | |
| | HSB/HC 63L | 29,000 | 4.0 | 0.4 | 17 | 21 | 725 | 435 | 96 | 1/12 | 1,000 | |
| | HSB/HC 86L | 33,900 | 4.6 | 0.6 | 18 | 23 | 925 | 550 | 93 | 1/8 | 1,000 | |
| | HSB/HC 108L | 50,500 | 6.9 | 1.8 | 20 | 23 | 1,330 | 510 | 94 | 1/8 | 1,000 | |

① Horizontal units with horizontal louvers open 30° from vertical plane. Vertical types equipped with cone jet deflector, blades fully opened are shown in bold. Please see page 22 for additional outlet accessory performance data.

② Cfm for horizontal types is entering Cfm. Cfm for vertical and Power-Throw™ types is leaving Cfm.

③ V and PT models have copper tubes, VN and PTN models have 90/10 cupro-nickel tubes.

④ Requires Solid State Motor Speed Controller.

Hot Water Conversion Tables - Example Calculations

Conversion factor example #1:

What is the capacity (Btu/hr), water flow rate (GPM), water temperature drop (°F) and final air temperature (°F) for an HSB 86 at 240°F entering water temperature (EWT) and 70°F entering air temperature (EAT)? What is the maximum mounting height?

Solution:

The factors/data necessary to solve this problem are as follows:

- Hot water heating capacity conversion factor for 240°F EWT and 70°F entering air is 1.201, from Table 16.1.
- The standard rated capacity of an HSB 86 is 60,200 Btu/hr, from Table 19.1.
- The standard rated capacity of an HSB 86 is based on water flow rate of 6.3 GPM, from Table 19.1.
- The standard high motor speed airflow of an HSB 86 is 1340 CFM, from Table 19.1.
- The maximum mounting height, at standard conditions for an HSB 86 is 16 feet, from Table 19.1.
- The mounting height correction factor for 240°F EWT is 0.89 from Table 17.2.

$$Btu_A = Btu_S \times \text{Heating Capacity Factor} = 60,200 \times 1.201 = \underline{72,300 \text{ Btu/hr}}$$

For water flow rate, since only the entering water and air temperature conditions have changed, the water flow rate will remain 6.3 GPM.

$$WTD_A = Btu_A \div (480 \times G_A) = 72,300 \text{ Btu/hr} \div (480 \times 6.3 \text{ GPM}) = \underline{23.9^\circ\text{F}}$$

$$FAT_A = EAT_A + [(460 + EAT_A) \times (Btu_A) \div (576 \times Cfm_S)] = 70^\circ\text{F} + [(460 + 70^\circ\text{F}) \times (72,300) \div (576 \times 1340)] = \underline{120^\circ\text{F}}$$

$$\text{Max. Mounting Height}_A = \text{Max. Mounting Height}_S \times \text{Correction Factor} = 16 \text{ ft.} \times 0.89 = \underline{14.2 \text{ feet}}$$

Conversion factor example #2:

Select a vertical unit heater model that can deliver at least 150,000 Btu/hr with 160°F EWT and 60°F EAT. What will be the required water flow rate, water temperature drop, final air temperature and maximum mounting height?

Solution:

The factors/data necessary to solve this problem are as follows:

- Hot water heating capacity conversion factor for 160°F EWT and 60°F entering air is 0.714, from Table 16.1.
- The mounting height correction factor for 160°F EWT is 1.19, from Table 17.2.

$Btu_S = Btu_A \div \text{Heating Capacity Factor} = 150,000 \div 0.714 = 210,084 \text{ Btu/hr}$ (at standard conditions)
From Table 19.1, a V 279 model will meet the requirement with a rated capacity of 212,600 Btu/hr at standard conditions.

The capacity of the V 279 at actual conditions will be $Btu_A = Btu_S \times \text{Heating Capacity Factor} = 212,600 \times 0.714 = \underline{151,796 \text{ Btu/hr}}$.

Since the capacity was calculated based off standard conditions with factors for changes in entering water and air temperature conditions, the water flow rate will remain 22.2 GPM.

$$WTD_A = Btu_A \div (480 \times GPM_A) = 151,796 \text{ Btu/hr} \div (480 \times 22.2 \text{ GPM}) = \underline{14.2^\circ\text{F}}$$

$$FAT_A = EAT_A + [(460 + EAT_A) \div ((576 \times Cfm_S \div Btu_A) - 1)] = 60^\circ\text{F} + [(460 + 60^\circ\text{F}) \div ((576 \times 5,460 \div 151,796) - 1)] = \underline{86.4^\circ\text{F}}$$

$$\text{Max. Mounting Height}_A = \text{Max. Mounting Height}_S \times \text{Correction Factor} = 40 \text{ ft. (with cone-jet deflector)} \times 1.19 = \underline{47.6 \text{ feet}}$$

Maximum Mounting Heights for Vertical Outlet Accessories, Dimensions

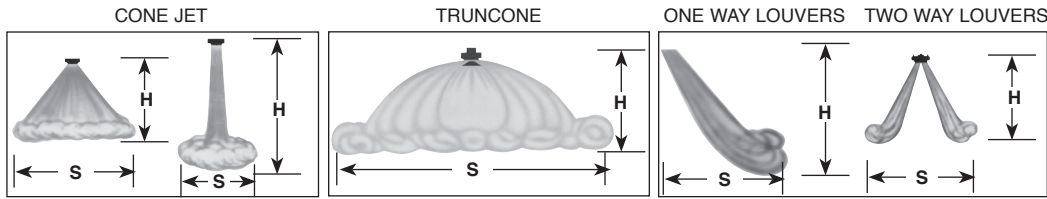


Table 22.1
Mounting Height/Spread for Vertical Unit Air Outlet Accessories ①②③④

| Model | Cone-Jet | | | | Truncone | | | | One Way Louvers | | | | Two Way Louvers | | | |
|----------|----------|----|--------|----|----------|----|--------|----|-----------------|----|--------|----|-----------------|----|--------|----|
| | Standard | | L.O.T. | | Standard | | L.O.T. | | Standard | | L.O.T. | | Standard | | L.O.T. | |
| | H | S | H | S | H | S | H | S | H | S | H | S | H | S | H | S |
| V/VN 42 | 15 | 11 | 17 | 13 | 8 | 19 | 9 | 23 | 13 | 11 | 15 | 13 | 8 | 22 | 9 | 26 |
| V/VN 59 | 19 | 14 | 22 | 16 | 9 | 25 | 11 | 28 | 16 | 14 | 18 | 16 | 10 | 28 | 11 | 32 |
| V/VN 78 | 20 | 15 | 26 | 19 | 11 | 26 | 14 | 33 | 17 | 15 | 22 | 19 | 11 | 30 | 13 | 38 |
| V/VN 95 | 20 | 15 | 26 | 19 | 11 | 26 | 14 | 33 | 17 | 15 | 22 | 19 | 11 | 30 | 13 | 38 |
| V/VN 139 | 24 | 18 | 31 | 23 | 13 | 32 | 17 | 40 | 21 | 18 | 26 | 23 | 13 | 36 | 16 | 46 |
| V/VN 161 | 27 | 20 | 35 | 26 | 14 | 35 | 18 | 46 | 23 | 20 | 30 | 26 | 14 | 40 | 18 | 52 |
| V/VN 193 | 30 | 22 | 36 | 27 | 16 | 39 | 19 | 47 | 25 | 22 | 31 | 27 | 15 | 44 | 19 | 54 |
| V/VN 212 | 30 | 22 | 36 | 27 | 16 | 39 | 19 | 47 | 25 | 22 | 31 | 27 | 15 | 44 | 19 | 54 |
| V/VN 247 | 34 | 26 | 42 | 32 | 17 | 46 | 21 | 56 | 30 | 26 | 37 | 32 | 18 | 52 | 22 | 64 |
| V/VN 279 | 37 | 30 | 45 | 36 | 18 | 53 | 22 | 63 | 35 | 30 | 41 | 36 | 21 | 60 | 25 | 72 |
| V/VN 333 | 37 | 30 | 45 | 36 | 17 | 53 | 20 | 63 | 35 | 30 | 41 | 36 | 21 | 60 | 25 | 72 |
| V/VN 385 | 36 | 30 | 43 | 36 | 17 | 53 | 20 | 63 | 35 | 30 | 41 | 36 | 21 | 60 | 25 | 72 |
| V/VN 500 | 44 | 37 | 54 | 45 | 19 | 65 | 24 | 79 | 42 | 37 | 51 | 45 | 26 | 74 | 31 | 90 |
| V/VN 610 | 43 | 36 | 52 | 44 | 19 | 63 | 24 | 77 | 41 | 41 | 50 | 44 | 25 | 72 | 30 | 88 |
| V 952 | - | - | - | - | - | - | - | - | 45 | 56 | 54 | 65 | 26 | 66 | 31 | 82 |

- ① Data shown for standard 2 lb. steam, 60°F entering air temperature conditions. For louvers or cone-jet, data shown for deflectors in fully-opened position. For mounting height/spread at steam pressures other than 2 lb., multiply the value by the correction factor in Table 11.1.
- ② For mounting height and spread for hot water, multiply the values above by 1.06 to approximate the mounting height and spread at 200°F entering water temperature. For entering water temperature other than 200°F, multiply the values above by 1.06 and then multiply the correction factor in Table 16.2
- ③ All dimensions in feet.
- ④ V models have copper tubes and VN models have 90/10 cupro-nickel tubes.

Figure 22.2 - Vertical Air Outlet Accessories

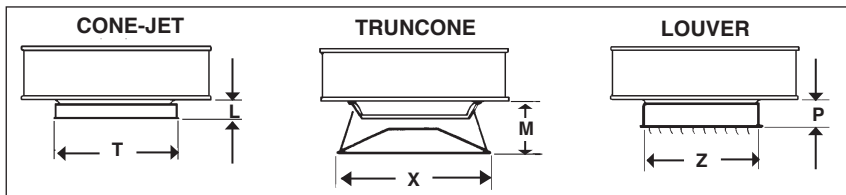


Table 22.2 - Vertical Air Outlet Accessories Dimensions ⑤

| Model Number | Cone-Jet | | Truncone | | Louvers | |
|--------------|----------|--------|----------|----|---------|--------|
| | L | T | M | X | P | Z |
| V 42, V 59 | 6-1/2 | 18-7/8 | 12 | 22 | 6-1/2 | 16-7/8 |
| V 78, V 95 | 6-1/2 | 18-7/8 | 12 | 22 | 6-1/2 | 16-7/8 |
| V 139, V 212 | 7-1/2 | 24-3/4 | 13 | 27 | 7-1/2 | 19-3/4 |
| V 247, V 279 | 8 | 26-7/8 | 16 | 34 | 8 | 22-3/4 |
| V 333 | 8-1/2 | 28 | 16 | 34 | 8-1/2 | 22-3/4 |
| V 385, V 500 | 10 | 22-3/4 | 21 | 41 | 10 | 27-3/4 |
| V 610 | 10-1/2 | 36-3/4 | 21 | 41 | 10-1/2 | 30-3/4 |
| V-952 | - | - | - | - | 19-1/2 | 32 |

⑤ All dimensions in inches.

Motor Data, Step-Down Transformer Accessory Data

Table 23.1 - Motor Data ① ②

| Model Number | Motor HP ③ | Amp Draw by Motor Type, Voltage and Power Code | | | | | | | |
|-----------------------|------------|--|----------|----------|----------|------------|----------|-----------------|--------------|
| | | Totally Enclosed | | | | | | Explosion-proof | |
| | | 115/60/1 | 208/60/1 | 230/60/1 | 208/60/3 | 230/460/3 | 575/60/3 | 115/60/1 | 230/460/60/3 |
| | | 01 | N/A | 02 | 04 | 05 | 10 | 06 | 09 |
| HSB/HC 18 | 1/60 | 0.8 | ④ | 0.44 | ④ | ④ | ④ | 4.3 | - |
| HSB/HC 24, 33 | 1/25 | 1.6 | ④ | 1.0 | ④ | ④ | ④ | 4.3 | - |
| HSB/HC 47, 63 | 1/12 | 3.0 | ④ | 1.0 | ④ | 1.4/0.7 ⑤ | ④ | 4.3 | - |
| HSB/HC 86, 108 | 1/8 | 2.3 | ④ | 1.0 | ④ | 1.4/0.7 ⑤ | ④ | 4.3 | - |
| HSB/HC 121 | 1/5 | 2.8 | ④ | 1.5 | 1.9 ⑤ | 2.1/1.05 ⑤ | ④ | 4.0 | 1.4/0.7 |
| HSB/HC 165, 193 | 1/3 | 5.4 | ④ | 2.5 | 1.9 ⑤ | 2.1/1.05 ⑤ | ④ | 6.5 | 1.4/0.7 |
| HSB/HC 258-340 | 1/2 | 6.7 | ④ | 3.5 | 2.6 ⑤ | 3.0/1.5 ⑤ | ④ | 9.0 | 2.0/1.0 |
| V/VN 42, 59 | 1/30 | 2.1 | ④ | 0.6 | 1.9 ⑤ | 2.1/1.05 ⑤ | ④ | 4.0 | - |
| V/VN 78, 95 | 1/15 | 2.5 | ④ | 1.3 | 1.9 ⑤ | 2.1/1.05 ⑤ | ④ | 4.0 | - |
| V/VN 139 | 1/5 | 2.8 | ④ | 1.5 | 1.9 ⑤ | 2.1/1.05 ⑤ | ④ | 4.0 | 1.4/0.7 |
| V/VN 161-212 | 1/3 | 5.4 | ④ | 2.5 | 1.9 ⑤ | 2.1/1.05 ⑤ | ④ | 6.5 | 1.4/0.7 |
| V/VN 247 | 1/2 | 6.7 | ④ | 3.5 | 2.6 ⑤ | 3.0/1.5 ⑤ | ④ | 9.0 | 2.0/1.0 |
| V/VN, PT/PTN 279 | 1/2 | 6.7 | ④ | 3.5 | 2.6 ⑤ | 3.0/1.5 ⑤ | ④ | 9.0 | 2.0/1.0 |
| V/VN, PT/PTN 333 | 3/4 | 8.8 | ④ | 4.4 | 3.7 ⑤ | 3.4/1.7 ⑤ | ④ | - | - |
| V/VN, PT/PTN 385 | 1 | - | - | - | 4.2 | 4.0/2.0 | 1.5 | - | 3.5/1.75 |
| V/VN, PT/PTN 500, 610 | 1-1/2 | - | - | - | 7.4 | 6.6/3.3 | 2.0 | - | 5.8/2.9 |
| V, PT 952 | 2 | - | - | - | 7.4 | 6.8/3.4 | - | - | 6.2/3.1 |

- ① Ratings shown are for Standard and Low Outlet Temperature Models.
- ② All HSB/HC units, V/VN 42 thru V/VN, PT/PTN 333 motor HP listed for power code 01. V/VN PT/PTN 333 thru V/VN, PT/PTN 610 motor HP listed for power code 04 and V/PT 952 motor HP listed for power code 05.
- ③ For model sizes V/VN/PT/PTN 385 and above, motors for Power Codes 04, 05, and 10 do not have thermal overload protection.
- ④ For supply voltages of 208V/60Hz/1ph and all non-explosion-proof 3 phase voltages of 208, 230, 460 and 575, Model Numbers indicated with Note ④, require that a 115V/60Hz/1 phase Power Code 01 unit heater be used with a shipped loose accessory transformer. See Table 23.2 for Transformer Sizes.
- ⑤ For non-explosion-proof 3 phase supply voltages of 208, 230, and 460, Model Numbers indicated with Note ⑤, can be ordered with a Power Code (208V/3ph=04, 230/460V/3ph=05) that provides a motor matched to the supply voltage with amp draw as shown. Alternately, a 115V/60Hz/1 phase Power Code 01 unit heater could be used with a shipped loose accessory transformer. See Table 23.2 for Transformer Sizes.

Figure 23.1 Field Installed Transformer Accessory



Table 23.2 - Step-Down Transformer Accessory Selection

| | 208V/60Hz/1 or 3 phase | 230/460V/60Hz/3 phase | 575V/60Hz/3 phase |
|----------------|------------------------|-----------------------|-------------------|
| Model Number | kVA | kVA | kVA |
| HSB/HC 18-63 | 0.50 | 0.25 | 0.25 |
| HSB/HC 86-121 | | 0.50 | 0.50 |
| HSB/HC 165-193 | 1.00 | 0.75 | 0.75 |
| HSB/HC 258-340 | | 1.00 | 1.00 |
| V/VN 42-59 | 0.50 | 0.25 | 0.25 |
| V/VN 78-139 | | 0.50 | 0.50 |
| V/VN 161-212 | 1.00 | 0.75 | 0.75 |
| V/VN 247-333 | | 1.00 | 1.00 |
| PT/PTN 279-333 | 1.00 | 1.00 | 1.00 |

| kVA Size | Ship Wt. (Lb.) |
|----------|----------------|
| 0.25 | 7 |
| 0.50 | 13 |
| 0.75 | 15 |
| 1.00 | 19 |

Dimensions - Horizontal Air Delivery Models

Figure 24.1 - Model Dimensions HSB 18-193

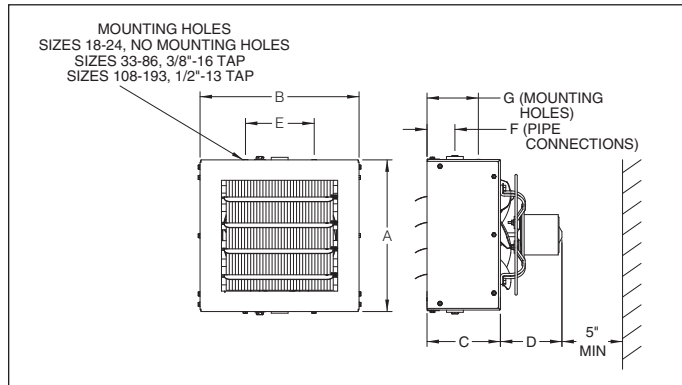


Figure 24.2 - Model Dimensions HSB 258-340

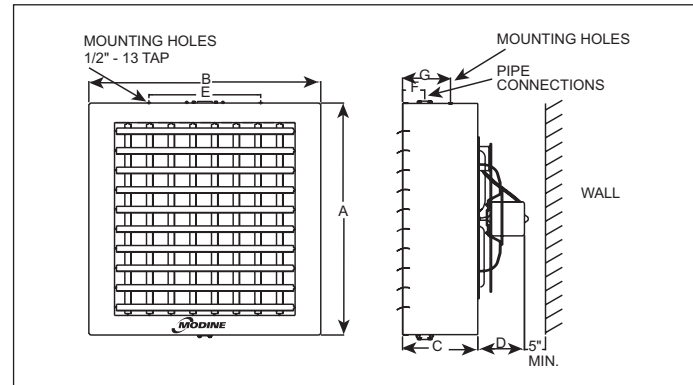


Figure 24.3 - Model Dimensions HC 18-165

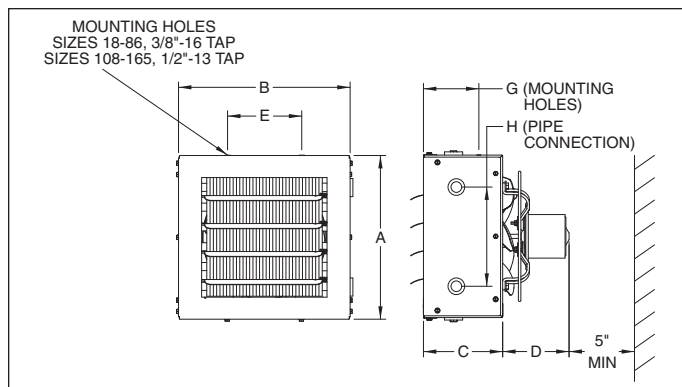
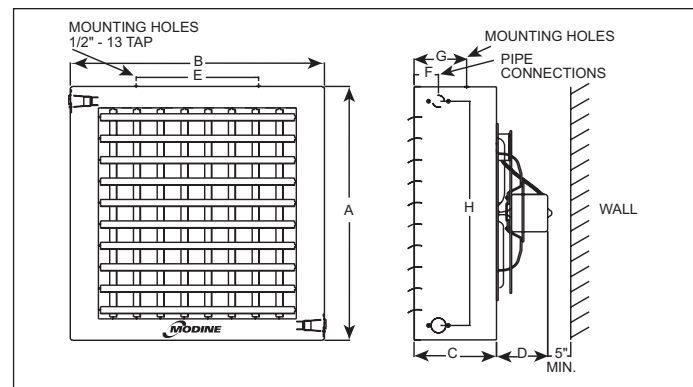


Figure 24.4 - Model Dimensions HC 193-340 ①



① Vertical deflector blades shown are standard on models HC 258-340 and optional on model HC 193.

Table 24.1 - Model HSB and HC Dimensions ② ③

| Model Number | A | B | C | D | | E | F | G | H | Female Connections NPT | Fan Diameter | Approx. Shipping Wt. lb. |
|--------------|---------|--------|--------|----------------|-----------------|--------|-------|-------|-------|------------------------|--------------|--------------------------|
| | | | | 115 Std. Motor | 115V Exp. Motor | | | | | | | |
| HSB 18 | 12-3/8 | 13 | 6 | 5 | 12-1/4 | - | 3 | - | - | 3/4 | 9 | 16 |
| HSB 24 | 12-3/8 | 13 | 6 | 5 | 12-1/4 | - | 3 | - | - | 3/4 | 9 | 20 |
| HSB 33 | 16-3/8 | 17-1/2 | 8-3/4 | 6 | 11-3/4 | 11 | 3-5/8 | 6 | - | 1-1/4 | 12 | 34 |
| HSB 47 | 16-3/8 | 17-1/2 | 8-3/4 | 6 | 11-3/4 | 11 | 3-5/8 | 6 | - | 1-1/4 | 12 | 36 |
| HSB 63 | 20-7/16 | 21-1/2 | 8-3/4 | 7-3/4 | 12 | 15 | 3-5/8 | 6 | - | 1-1/4 | 14 | 48 |
| HSB 86 | 20-7/16 | 21-1/2 | 8-3/4 | 7-3/4 | 12 | 15 | 3-5/8 | 6 | - | 1-1/4 | 14 | 52 |
| HSB 108 | 24-7/16 | 25-1/2 | 9-1/2 | 6-3/4 | 13-1/4 | 18 | 3-3/4 | 6-3/8 | - | 1-1/4 | 18 | 74 |
| HSB 121 | 24-7/16 | 25-1/2 | 9-1/2 | 6-3/4 | 13-1/4 | 18 | 3-3/4 | 6-3/8 | - | 1-1/4 | 18 | 76 |
| HSB 165 | 30-1/2 | 30-1/2 | 9-1/4 | 8-1/2 | 14 | 21-1/4 | 3-3/4 | 6-3/8 | - | 1-1/4 | 22 | 92 |
| HSB 193 | 30-1/2 | 30-1/2 | 9-1/4 | 8-1/2 | 14 | 21-1/4 | 3-3/4 | 6-3/8 | - | 1-1/4 | 22 | 98 |
| HSB 258 | 38-1/2 | 38-1/2 | 12-1/2 | 10 | 15 | 18-1/2 | 3-5/8 | 7-7/8 | - | 1-1/4 | 22 | 162 |
| HSB 290 | 38-1/2 | 38-1/2 | 12-1/2 | 10 | 15 | 18-1/2 | 3-5/8 | 7-7/8 | - | 1-1/4 | 24 | 168 |
| HSB 340 | 38-1/2 | 44-1/2 | 12-1/2 | 10 | 15 | 18-1/2 | 3-5/8 | 7-7/8 | - | 1-1/4 | 24 | 176 |
| HC 18 | 11-1/2 | 13 | 6 | 5 | 12-1/4 | 5-5/8 | 2-1/4 | 4-1/8 | 7-1/2 | 1/2 | 9 | 16 |
| HC 24 | 11-1/2 | 13 | 6 | 5 | 12-1/4 | 5-5/8 | 2-1/4 | 4-1/8 | 7-1/2 | 1/2 | 9 | 20 |
| HC 33 | 15 | 17-1/2 | 8-3/4 | 6 | 11-3/4 | 11 | 3-5/8 | 6 | 10 | 3/4 | 12 | 34 |
| HC 47 | 15 | 17-1/2 | 8-3/4 | 6 | 11-3/4 | 11 | 3-5/8 | 6 | 10 | 3/4 | 12 | 35 |
| HC 63 | 18-1/2 | 21-1/2 | 8-3/4 | 7-3/4 | 12 | 15 | 3-5/8 | 6 | 14 | 3/4 | 12 | 48 |
| HC 86 | 18-1/2 | 21-1/2 | 8-3/4 | 7-3/4 | 12 | 15 | 3-5/8 | 6 | 14 | 3/4 | 14 | 52 |
| HC 108 | 22-1/2 | 25-1/2 | 9-1/2 | 6-3/4 | 13-1/4 | 18 | 3-5/8 | 6-3/8 | 18 | 3/4 | 18 | 74 |
| HC 121 | 22-1/2 | 25-1/2 | 9-1/2 | 6-3/4 | 13-1/4 | 18 | 3-5/8 | 6-3/8 | 18 | 3/4 | 18 | 76 |
| HC 165 | 26-1/2 | 29-1/2 | 9-1/4 | 8-1/2 | 14 | 21-1/4 | 3-5/8 | 6-3/8 | 22 | 3/4 | 22 | 92 |
| HC 193 | 30-1/2 | 32-1/2 | 9-1/4 | 8-1/2 | 14 | 21-1/4 | 3-5/8 | 4-3/4 | 26 | 1-1/4 | 22 | 98 |
| HC 258 | 38-1/2 | 38-1/2 | 12-1/2 | 10 | 15 | 18-1/2 | 3-5/8 | 8 | 34 | 1-1/4 | 22 | 163 |
| HC 290 | 38-1/2 | 38-1/2 | 12-1/2 | 10 | 15 | 18-1/2 | 3-5/8 | 8 | 34 | 1-1/4 | 24 | 168 |
| HC 340 | 38-1/2 | 44-1/2 | 12-1/2 | 10 | 15 | 18-1/2 | 3-5/8 | 8 | 34 | 1-1/4 | 24 | 176 |

② All dimensions in inches.

③ Dimensions shown are for Standard and Low Outlet Temperature Models.

DIMENSIONAL DATA



Dimensions - Vertical Air Delivery Models

Figure 25.1 - Model V/VN and PT/PTN Dimensions

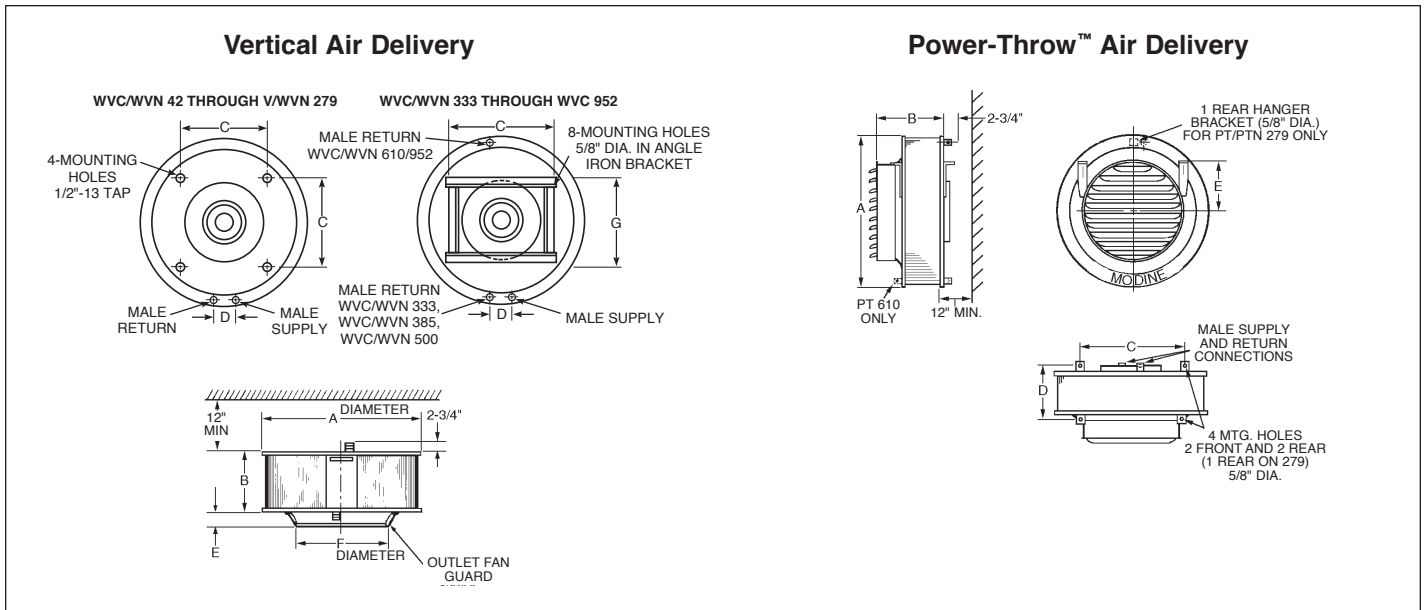


Table 25.1 - Model V/VN and PT/PTN Dimensions ①②③

| Model Number | A | B | C | D | E | F | G | Fan Diameter | Male Connections NPT | | Approx. Shipping Wt. (lb.) |
|--------------|--------|--------|--------|--------|--------|--------|--------|--------------|----------------------|--------|----------------------------|
| | | | | | | | | | Top | Bottom | |
| V/VN 42 | 24-3/4 | 3-5/8 | 11-3/8 | 2-1/8 | 4-3/8 | 14-1/2 | - | 14 | 1-1/4 | 1-1/4 | 36 |
| V/VN 59 | 24-3/4 | 5-1/8 | 11-3/8 | 2-1/8 | 4-3/8 | 14-1/2 | - | 14 | 1-1/4 | 1-1/4 | 42 |
| V/VN 78 | 24-3/4 | 6-5/8 | 11-3/8 | 2-1/8 | 2-5/8 | 16-1/2 | - | 16 | 1-1/4 | 1-1/4 | 46 |
| V/VN 95 | 24-3/4 | 8-1/8 | 11-3/8 | 2-1/8 | 2-5/8 | 16-1/2 | - | 16 | 1-1/4 | 1-1/4 | 48 |
| V/VN 139 | 34-3/4 | 6-7/8 | 18-3/8 | 2-1/8 | 3 | 19-1/2 | - | 19 | 1-1/2 | 1 | 70 |
| V/VN 161 | 34-3/4 | 8-3/8 | 18-3/8 | 2-1/8 | 3 | 19-1/2 | - | 19 | 1-1/2 | 1 | 80 |
| V/VN 193 | 34-3/4 | 9-7/8 | 18-3/8 | 2-1/8 | 3 | 19-1/2 | - | 19 | 1-1/2 | 1 | 86 |
| V/VN 212 | 34-3/4 | 12-7/8 | 18-3/8 | 2-1/2 | 3 | 19-1/2 | - | 19 | 2 | 1-1/4 | 94 |
| V/VN 247 | 34-3/4 | 12-7/8 | 18-3/8 | 2-1/2 | 3 | 21-1/2 | - | 21 | 2 | 1-1/4 | 108 |
| V/VN 279 | 34-3/4 | 14-3/8 | 18-3/8 | 2-1/2 | 3 | 21-1/2 | - | 21 | 2 | 1-1/4 | 112 |
| V/VN 333 | 43-1/4 | 14-5/8 | 31-1/2 | 2-7/8 | 3-1/8 | 22-1/2 | 18-1/5 | 22 | 2-1/2 | 1-1/2 | 166 |
| V/VN 385 | 43-1/4 | 14-1/2 | 31-1/2 | 2-7/8 | 3-1/2 | 27-1/2 | 18-1/5 | 27 | 2-1/2 | 1-1/2 | 168 |
| V/VN 500 | 43-1/4 | 19 | 31-1/2 | 2-7/8 | 3-1/2 | 27-1/2 | 18-1/5 | 27 | 2-1/2 | 1-1/2 | 360 |
| V/VN 610 | 51-1/2 | 19-1/8 | 31-3/8 | - | 3-3/4 | 30-1/2 | 31-3/8 | 30 | 2-1/2 | 1-1/2 | 450 |
| V 952 | 53-3/4 | 21-1/8 | 30 | - | 3-1/2 | 31 | 30 | 30 | 3 | 3 | 487 |
| PT/PTN 279 | 34-3/4 | 22-5/8 | 25-1/4 | 16-3/4 | 16-3/4 | - | - | 21 | 2 | 1-1/4 | 122 |
| PT/PTN 333 | 43-1/4 | 23-7/8 | 30 | 15-3/4 | 14-3/8 | - | - | 22 | 2-1/2 | 1-1/2 | 176 |
| PT/PTN 385 | 43-1/4 | 25-3/4 | 30 | 15-3/4 | 14-3/8 | - | - | 27 | 2-1/2 | 1-1/2 | 184 |
| PT/PTN 500 | 43-1/4 | 29 | 30 | 20-1/4 | 14-3/8 | - | - | 27 | 2-1/2 | 1-1/2 | 376 |
| PT/PTN 610 | 51-1/2 | 29-5/8 | 30 | 20-3/8 | 21 | - | - | 30 | 2-1/2 | 1-1/2 | 472 |
| PT 952 | 53-3/4 | 26-3/8 | 30 | 23-1/8 | 26-7/8 | - | - | 30 | 3 | 3 | 487 |

- ① All dimensions in inches.
- ② Dimensions shown are for Standard and Low Outlet Temperature Models.
- ③ See page 23 for optional air outlet accessory dimensions.

Model Identification

Figure 26.1
Model Number Designation

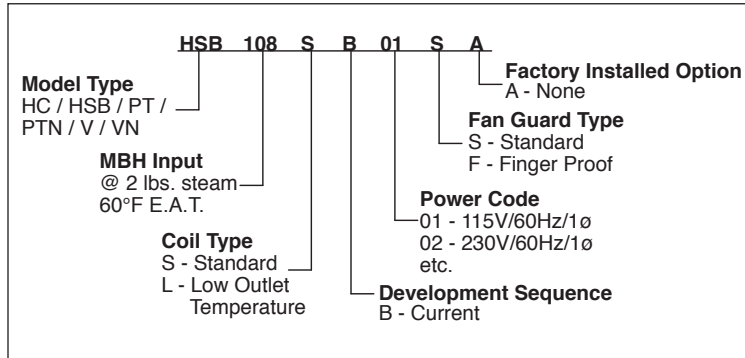


Figure 26.2
Serial Number Designation

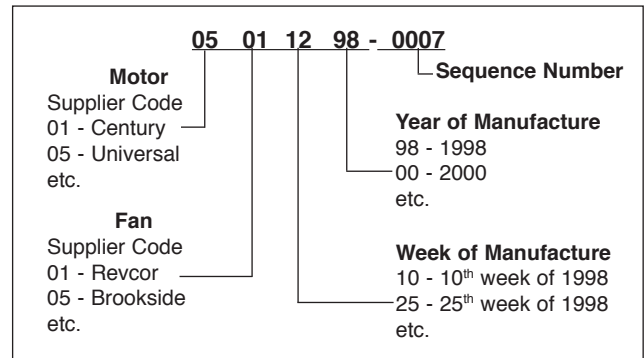


Figure 26.3
Model Identification Plate

| HYDRONIC UNIT HEATER | | | COMMON PARTS | | |
|---|-------------------------------|----------------------------|--|------------------|-------------------|
| Model No. HSB108SB01SA | Serial No. 05014005-0007 | | Motor 9F30212A | Fan 5H58108C4 | Coil 3H32251C2 |
| Motor HP 1/8 | Volts/Hertz/Phase 115/60/1 | Amps 2.3 | <small>Units with Hazardous Location Designation are suitable for Class I Group D, Class II Groups F and G and Class III locations, and may be operated with maximum fluid pressure of 87 psig, per temperature code T3B.</small> WARNING: INSTALL UNIT AT LEAST 8 FT. ABOVE THE FLOOR AND OUT OF REACH. ATTENTION: INSTALLER A 2.45M MINIMUM AU DESSUS DU SOL ET HORS D'ATTEINTE. | | |
| Location Designation Ordinary Location | | CSA File No. 0307470000 | | | |
| Modine Manufacturing Company 604 Liberty Lane, P.O. Box 308 West Kingston, Rhode Island 02893 | | | <small>Made in U.S.A.</small> | | |

Specification for Horizontal, Vertical and Power-Throw™ Models

General

Contractor shall furnish and install steam/hot water unit heater model _____. Performance shall be as indicated on the equipment schedule in the plans. Units shall be listed by CSA as certified to CAN/CSA-C22.2 No. 236-05 "Heating and Cooling Equipment" and UL Std. No. 1995 "Heating and Cooling Equipment." Additionally for Canada, the units shall have CRN registered heat exchangers.

Casing

HSB and HC Models - Casings on model sizes 18 through 86 are 20 gauge steel (18 gauge on all other models) and consist of front and back halves. Both halves are joined together at the top and bottom utilizing the condenser mounting screws. Casing top is provided with threaded hanger connections for unit suspension (except for HSB 18 and HSB 24 which are directly mounted to the supply and return piping). Fan venturi is formed in casing back half.

Vertical and Power-Throw™ Models - Casings consist of two circular 18 gauge steel covers. With the coil in between, the covers are securely bolted together to form a single unit. The bottom cover has a die-formed fan venturi. The top cover incorporates a motor cooling cone, which shields the motor from coil heat therefore prolonging motor life. An opening is also provided for circulation of motor cooling air.

All Models - Casing shall be treated to prevent corrosion and painted with a corrosion resistant, baked, polyester powdercoat gray-green finish.

Condenser

Condenser coils are of the extended surface type, utilizing aluminum fins and DLP-type copper tubes with malleable iron supply and return connections for HSB units, cast bronze connections for HC models and Schedule 40 steel pipe for V/PT models. Tubes are mechanically bonded to the collars of the fins. The condensers are warranted for operation at steam or hot water pressures and temperatures up to 150 psig and 375°F for copper coils and 250 psig and 400°F for 90/10 cupro-nickel coils.

Fins are continuous across the width and depth of the condenser and are vertically oriented to minimize the collection of dirt and dust.

Canadian Standards Association (CSA) requirements state that explosion-proof units (Power Codes 06 and 09) may not be used with fluid temperatures in excess of 329°F or pressures in excess of 87 psig and still maintain their explosion-proof rating for National Electric Code ignition temperature rating T3B for grain dust.

All coils are leak tested at 165 to 200 psig, air under water.

Horizontal Models - Coils are of serpentine design with horizontal tubes, vertical fins and center supply and return connections at top and bottom of unit (except HC models, which have side connections). All tube bends are brazed. All tubes have individual expansion bends. Copper tubes are 1" O.D. with 0.030" wall thickness (except HSB/HC 18 and 24 which are 5/8" O.D. with 0.028" wall thickness).

Vertical and Power-Throw™ Models - Coils are circular, providing for natural expansion. Each tube is continuous between supply and return header. All tube joints are silver soldered. Copper tubes are 5/8" O.D. with 0.028" wall thickness.

Motors - See page 8 for Power Code and motor descriptions and page 23 for motor amp draw information. Motors are designed for continuous duty and can operate in a maximum ambient temperature of 104°F(40°C).

Fans/Fan Guards - Fans are aluminum on all units and are secured to a steel hub. Each fan is balanced and is designed specifically for the unit heater on which it is installed. Horizontal units are equipped with a combination fan guard/motor-mounting bracket. The guard is constructed of steel rod. Vertical units are supplied with an outlet fan guard covering the opening in the bottom of the unit.

Air Deflectors - Horizontal units, including the Power-Throw™ units, are furnished with horizontal air deflectors as standard. The deflectors are adjustable to almost any desired position for downward, straight or upward airflow. Vertical deflectors are available as an accessory for HSB/HC models through size 193, standard on model sizes 258-340. See page 22 for air outlet accessories for vertical models.

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

Geothermal

- Water-to-Water
- Water-to-Air
- Combination

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



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