



# SMARTSOURCE®

## VERTICAL STACK WATER SOURCE HEAT PUMP

Models WSVF & WSVC

Unit Sizes 009–036

R-32 Refrigerant



Model WSVF




Model WSVC

|  |           |   |           |
|--|-----------|---|-----------|
| <b>Introduction</b> . . . . .              | <b>3</b>  | <b>System Considerations</b> . . . . .      | <b>65</b> |
| General Unit Information . . . . .         | 3         | Operating Limits . . . . .                  | 65        |
| Model Nomenclature . . . . .               | 4         | Unit Selection . . . . .                    | 67        |
| <b>Components and Technology</b> . . . . . | <b>7</b>  | Manual Selections . . . . .                 | 68        |
| Component and Option Details . . . . .     | 7         | Water System Quality . . . . .              | 68        |
| Controls . . . . .                         | 12        | <b>Engineering Specifications</b> . . . . . | <b>70</b> |
| Accessories . . . . .                      | 13        |   |           |
| Wireless Temperature Control . . . . .     | 15        |   |           |
| <b>AHRI Performance Data</b> . . . . .     | <b>16</b> |   |           |
| PSC Motor . . . . .                        | 16        |   |           |
| EC Motor . . . . .                         | 17        |   |           |
| <b>Capacity Data</b> . . . . .             | <b>18</b> |   |           |
| PSC Motor . . . . .                        | 18        |   |           |
| EC Motor . . . . .                         | 32        |   |           |
| <b>Hydronic Heat Performance</b> . . . . . | <b>46</b> |   |           |
| <b>Fan Performance</b> . . . . .           | <b>48</b> |   |           |
| <b>Electrical Data</b> . . . . .           | <b>50</b> |   |           |
| PSC Motor . . . . .                        | 50        |   |           |
| EC Motor . . . . .                         | 51        |   |           |
| Typical Wiring Diagrams . . . . .          | 52        |   |           |
| <b>Dimensional Drawings</b> . . . . .      | <b>61</b> |   |           |
| 18" × 18" Cabinet, Sizes 009–012 . . . . . | 61        |   |           |
| 18" × 20" Cabinet, Sizes 015–018 . . . . . | 62        |   |           |
| 24" × 24" Cabinet, Sizes 024–036 . . . . . | 63        |   |           |
| Unit Doors . . . . .                       | 64        |   |           |

## Hazard Identification

|  |
|--|
|  <b>DANGER</b>                                    |
| Danger indicates a hazardous situation, which will result in death or serious injury if not avoided.                                 |
|  <b>WARNING</b>                                   |
| Warning indicates a potentially hazardous situations, which can result in property damage, personal injury, or death if not avoided. |

|  |
|--|
|  <b>CAUTION</b>                       |
| Caution indicates a potentially hazardous situations, which can result in minor injury or equipment damage if not avoided. |

|  |
|--|
| <b>NOTICE</b>  |
| Notice indicates practices not related to physical injury. |

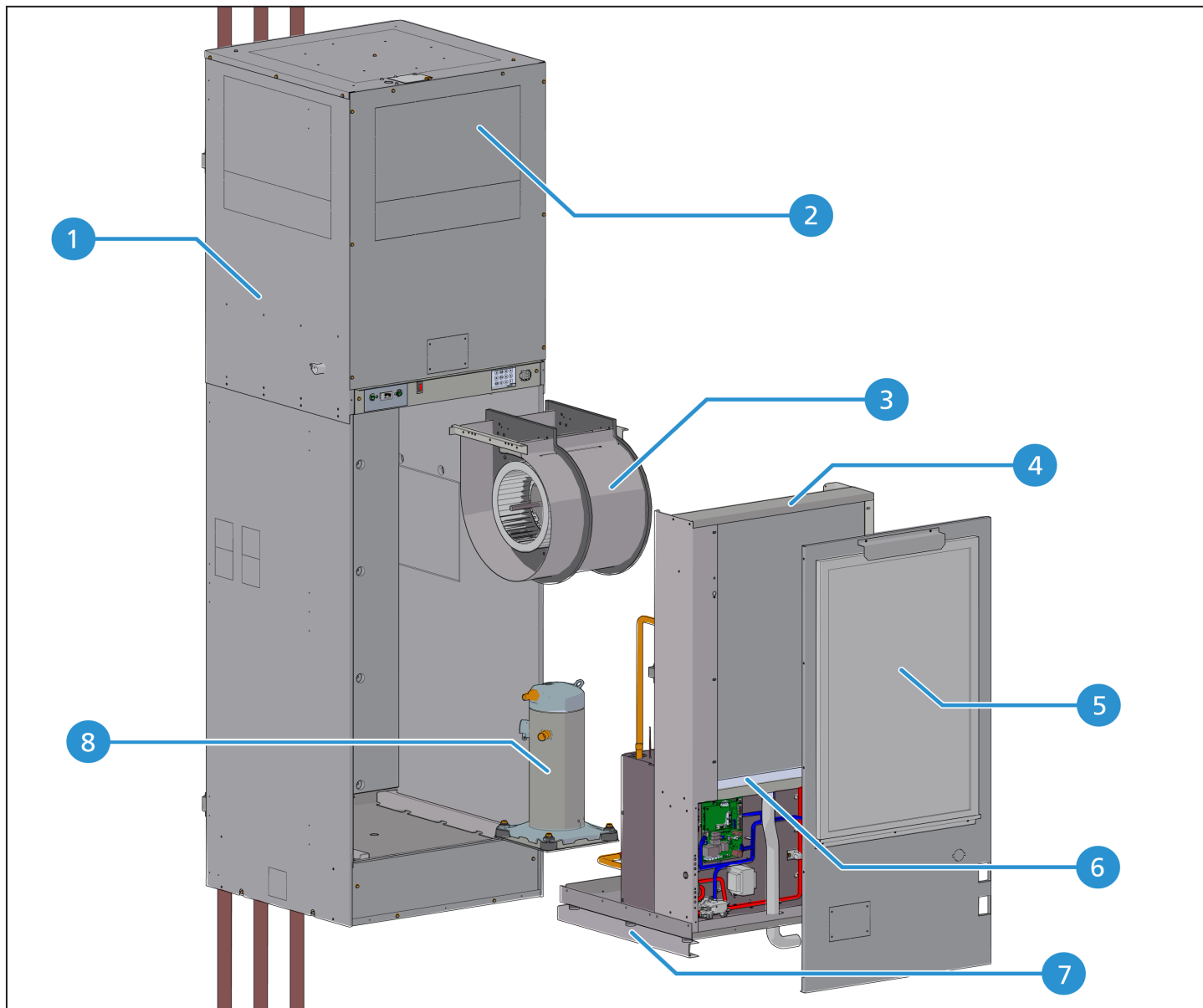
**NOTE:** Indicates important details or clarifying statements for information presented.

©2025 Daikin Applied, Minneapolis, MN. All rights reserved throughout the world. This document contains the most current product information as of this printing. Daikin Applied Americas Inc. has the right to change the information, design, and construction of the product represented within the document without prior notice. For the most up-to-date product information, please go to [www.DaikinApplied.com](http://www.DaikinApplied.com).

™® MicroTech, SiteLine, SmartSource, and Daikin Applied are trademarks or registered trademarks of Daikin Applied Americas Inc. The following are trademarks or registered trademarks of their respective companies: BACnet from American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; Modbus from Schneider Electric; and Windows from Microsoft Corporation.

# Introduction

**Figure 1: Component Locations**



**Table 1: Component locations**

| No. | Component                    |
|-----|------------------------------|
| 1   | Cabinet                      |
| 2   | Supply air plenum            |
| 3   | Motor/blower assembly        |
| 4   | Chassis                      |
| 5   | Replaceable air filter       |
| 6   | Primary condensate drain pan |
| 7   | Chassis vibration isolators  |
| 8   | Compressor                   |

## General Unit Information

Daikin Applied Vertical Stack (V-Stack) units are designed for use in multiple floor apartments, office buildings, hotels, nursing homes and other similar applications. They require minimal floor space and are designed for multiple discharge arrangements.

- Available in multiple unit sizes—009 (3/4 tons, 2.6kW) through 036 (3 tons, 10.6kW)
- Units exceed ASHRAE 90.1 efficiency levels
- R-32 refrigerant, environmentally friendly with low GWP

## Model Nomenclature

**Table 2: Model Nomenclature**

| 1 | 2-3 | 4 | 5-7 | 8 | 9 | 10-12 | 13 | 14 | 15-16 | 17 | 18 | 19-20 | 21 | 22 | 23-24 | 25 | 26 |
|---|-----|---|-----|---|---|-------|----|----|-------|----|----|-------|----|----|-------|----|----|
| W | SV  | C | 024 | E | 1 | TTY   | C  | M  | 13    | A  | Y  | YY    | S  | Y  | YY    | Y  | Y  |

| 27 | 28 | 29 | 30-32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43-44 | 45-47 | 48-50 |
|----|----|----|-------|----|----|----|----|----|----|----|----|----|----|-------|-------|-------|
| Y  | N  | Y  | 088   | Y  | Y  | Y  | Y  | Y  | Y  | Y  | S  | 2  | L  | YY    | YYY   | YYY   |

| Category                | Code Position | Code | Description                                  |
|-------------------------|---------------|------|--|
| Product Category        | 1             | W    | Water Source Heat Pump                       |
| Model Type              | 2-3           | SV   | SmartSource Vertical Stack                   |
| Configuration           | 4             | C    | Chassis                                      |
|                         |               | F    | Cabinet                                      |
| Nominal Capacity        | 5-7           | 009  | 9,000 BtuH Nominal Cooling                   |
|                         |               | 012  | 12,000 BtuH Nominal Cooling                  |
|                         |               | 015  | 15,000 BtuH Nominal Cooling                  |
|                         |               | 018  | 18,000 BtuH Nominal Cooling                  |
|                         |               | 024  | 24,000 BtuH Nominal Cooling                  |
|                         |               | 030  | 30,000 BtuH Nominal Cooling                  |
|                         |               | 036  | 36,000 BtuH Nominal Cooling                  |
| Voltage                 | 8             | A    | 115/60/1                                     |
|                         |               | E    | 208-230/60/1                                 |
|                         |               | J    | 265/60/1                                     |
| Design Series (Vintage) | 9             | 1    | Design Series 1                              |
| Discharge Air           | 10            | B**  | Primary Supply - Back                        |
|                         |               | F**  | Primary Supply - Front                       |
|                         |               | L**  | Primary Supply - Left                        |
|                         |               | R**  | Primary Supply - Right                       |
|                         |               | T**  | Primary Supply - Top                         |
|                         |               | Y**  | None (Chassis Only)                          |
|                         | 11            | *B*  | Secondary Supply - Back                      |
|                         |               | *F*  | Secondary Supply - Front                     |
|                         |               | *L*  | Secondary Supply - Left                      |
|                         |               | *R*  | Secondary - Right                            |
|                         |               | *T*  | Secondary - Top                              |
|                         |               | *Y*  | None (Chassis Only)                          |
|                         | 12            | **T  | Tertiary - Top (88", 92", 96" Cabinets Only) |
|                         |               | **Y  | None (Chassis Only)                          |
| Water Coil Type         | 13            | C    | Copper Inner Tube                            |
|                         |               | G    | Copper Inner Tube (Geothermal)               |
|                         |               | S    | Cupronickel Inner Tube                       |
|                         |               | J    | Geothermal Inner Tube                        |
|                         |               | Y    | None (Cabinet Only)                          |
| Unit Control            | 14            | M    | MicroTech Unit Controller                    |
|                         |               | B    | MicroTech Unit Controller + BACnet           |
|                         |               | T    | MicroTech Unit Controller + Wireless         |
| Fan Motor Options       | 15            | 1*   | PSC  |
|                         |               | 3*   | ECM - Constant CFM (015-036)                 |
|                         |               | 5*   | ECM - Constant Torque (009-012)              |
|                         | 16            | *3   | 2-Speed Fan—Unit Toggle Switch               |
|                         |               | *4   | PWM Controlled (ECM Only)                    |
| Insulation              | 17            | A    | 1/2" Fiberglass—Skin Faced                   |
|                         |               | E    | 3/8" Closed Cell Foam                        |
|                         |               | F    | 1/2" Fiberglass—Foil Faced (Cabinet Only)    |

| Category               | Code Position | Code | Description  |                          |
|------------------------|---------------|------|--|--------------------------|
| Sound Package          | 18            | S    | Mass Plate Only  | Chassis Only             |
|                        |               | M    | Mass Plate & Compressor Blanket (sizes 024–036)                            |                          |
|                        |               | Y    | None   |                          |
| Supplemental Heating   | 19            | H*   | Hot Water Coil–1-Row   | Requires EC Motor Option |
|                        |               | J*   | Hot Water Coil–2-Row   |                          |
|                        |               | Y*   | None   |                          |
|                        | 20            | *V   | 3-Way Motorized Valve for Hot Water Coil                                   |                          |
|                        |               | *Y   | None   |                          |
| Filters                | 21            | S    | Standard, 1" Fiberglass  |                          |
|                        |               | M    | 1" MERV 8  |                          |
|                        |               | H    | 2" MERV 13 (Requires EC Motor Option)                                      |                          |
|                        |               | Y    | None (Chassis Only)  |                          |
| Water Flow Options     | 22            | C    | 2-Way Motorized Iso-Valve, General Close-Off Pressure NC (Normally Closed) |                          |
|                        |               | V    | 2-Way Motorized Iso-Valve, General Close-Off Pressure NC (Normally Open)   |                          |
|                        |               | H    | 2-Way Motorized Iso-Valve, High Close-Off Pressure NC (Normally Closed)    |                          |
|                        |               | E    | 3-Way Motorized Iso-Valve, General Close-Off Pressure NC (Normally Closed) |                          |
|                        |               | G    | 3-Way Motorized Iso-Valve, High Close-Off Pressure NC (Normally Closed)    |                          |
|                        |               | Y    | None   |                          |
| Piping Package         | 23            | B*   | Auto Flow Regulator 1.5 GPM  |                          |
|                        |               | C*   | Auto Flow Regulator 2.0 GPM  |                          |
|                        |               | D*   | Auto Flow Regulator 2.5 GPM  |                          |
|                        |               | E*   | Auto Flow Regulator 3.0 GPM  |                          |
|                        |               | F*   | Auto Flow Regulator 3.5 GPM  |                          |
|                        |               | G*   | Auto Flow Regulator 4.0 GPM  |                          |
|                        |               | H*   | Auto Flow Regulator 4.5 GPM  |                          |
|                        |               | I*   | Auto Flow Regulator 5.0 GPM  |                          |
|                        |               | J*   | Auto Flow Regulator 5.5 GPM  |                          |
|                        |               | K*   | Auto Flow Regulator 6.0 GPM  |                          |
|                        |               | L*   | Auto Flow Regulator 7.0 GPM  |                          |
|                        |               | M*   | Auto Flow Regulator 8.0 GPM  |                          |
|                        |               | N*   | Auto Flow Regulator 9.0 GPM  |                          |
|                        |               | O*   | Auto Flow Regulator 10.5 GPM   |                          |
|                        |               | Y*   | None   |                          |
|                        | 24            | *S   | Strainer   |                          |
|                        |               | *Y   | None   |                          |
| Future Use             | 25            | Y    | None   |                          |
| Corrosion Protection   | 26            | C    | Anti-Coil Protection Package   |                          |
|                        |               | Y    | None   |                          |
| Future Use             | 27            | Y    | None   |                          |
| Electrical Options     | 28            | F    | Fused Disconnect with Wire Harness   |                          |
|                        |               | N    | Non-Fused Disconnect with Wire Harness                                     |                          |
|                        |               | H    | HACR Breaker (115V/208-230V only)  |                          |
| Power & Control Access | 29            | S    | Side   | Cabinet Only             |
|                        |               | T    | Top  |                          |
|                        |               | Y    | None (Chassis Only)  |                          |
| Cabinet Height         | 30-32         | 080  | 80" Cabinet Height   | Cabinet Only             |
|                        |               | 088  | 88" Cabinet Height   |                          |
|                        |               | 092  | 92" Cabinet Height   |                          |
|                        |               | 096  | 96" Cabinet Height   |                          |
|                        |               | KDN  | 63.5" Cabinet Height   |                          |
|                        |               | YYY  | None (Chassis Only)  |                          |

| Category                         | Code Position | Code | Description  |              |
|----------------------------------|---------------|------|--|--------------|
| Factory-Installed Subbase        | 33            | 2    | 2" Subbase   | Cabinet Only |
|                                  |               | 3    | 3" Subbase   |              |
|                                  |               | 4    | 4" Subbase   |              |
|                                  |               | 5    | 5" Subbase   |              |
|                                  |               | Y    | None   |              |
| Secondary Drain Pan              | 34            | G    | Galvanized   |              |
|                                  |               | S    | Stainless Steel  |              |
|                                  |               | Y    | None (Chassis Only)  |              |
| Riser Location                   | 35            | L    | Left Cabinet   |              |
|                                  |               | R    | Right Cabinet  |              |
|                                  |               | B    | Back Cabinet   |              |
|                                  |               | A    | Alternate Back Cabinet Piping  |              |
|                                  |               | Y    | None   |              |
| Riser Mounting                   | 36            | F    | Factory Supplied–Shipped Attached  |              |
|                                  |               | J    | Factory Supplied–Shipped Loose   |              |
|                                  |               | Y    | None   |              |
| Future                           | 37            | Y    | None   |              |
| Future                           | 38            | Y    | None   |              |
| Future                           | 39            | Y    | None   |              |
| Standard or Special              | 40            | S    | Standard   |              |
|                                  |               | X    | Special  |              |
| Packaging                        | 41            | 1    | Standard Packaging   |              |
|                                  |               | 2    | Multipack Cabinets - Multiple Cabinets on 1 Pallet Group                         |              |
|                                  |               | 6    | 63.5" Cabinet Multipack - 4 per Pallet   | KDN Only     |
|                                  |               | 7    | 63.5" Single Cabinet - 1 per Pallet  |              |
| Extended Warranty                | 42            | F    | 4-Year Extended Compressor Only Parts Warranty with 1st Year Labor Allowance     |              |
|                                  |               | H    | 4-Year Extended Refrigerant Circuit Parts Warranty with 1st Year Labor Allowance |              |
|                                  |               | J    | 4-Year Extended Complete Unit Parts Warranty with 1st Year Labor Allowance       |              |
|                                  |               | L    | First-Year Labor Allowance   |              |
|                                  |               | M    | 1-Year Extended Compressor Only Parts Warranty with 1st Year Labor Allowance     |              |
|                                  |               | N    | 1-Year Extended Refrigerant Circuit Parts Warranty with 1st Year Labor Allowance |              |
|                                  |               | S    | 1-Year Extended Complete Unit Parts Warranty with 1st Year Labor Allowance       |              |
| Secondary Connection Stub Length | 43-44         | YY   | None   |              |
|                                  |               | 06   | 6" Stub Out  |              |
| Riser Extension Above Cabinet    | 45-47         | YYY  | None   |              |
|                                  |               | A**  | 0-20" Maximum  |              |
| Riser Extension Below Cabinet    | 48-50         | YYY  | None   |              |
|                                  |               | B**  | 0-20" Maximum  |              |

# Components and Technology

## Component and Option Details

### Cabinet

Constructed of unpainted galvanized steel with a small footprint. 18" × 18" cabinet for unit sizes 009 through 012, 18" × 20" for unit sizes 015 and 018, and 24" × 24" for unit sizes 024 through 036.

### Chassis

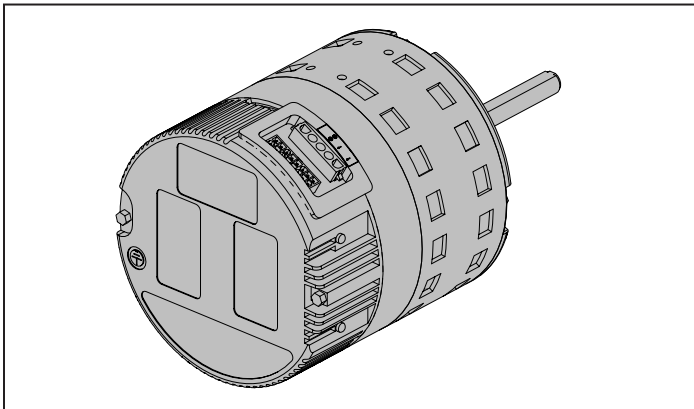
Removable, allowing staged installation and ease of service and routine maintenance.

### Motor/Blower Assembly

The standard blower motor is a multi-speed, permanent split capacitor (PSC) with thermal overload protection. The fan, motor and housing are easy to remove and slide out from the cabinet front. The fan and motor are attached to an orifice ring, and this assembly is mounted to the fan housing, easily removable should service be necessary.

All units are available with a variable eight-speed electronically commutated motor (ECM), featuring eight selectable CFM settings for quiet operation and reduced energy consumption. Perfect for sound sensitive spaces and controlling the amount of air delivery, and can control to 1% duty cycle via BACnet. Unit sizes 009–012 utilize a constant torque ECM and unit sizes 015–036 utilize a constant CFM ECM (Figure 2).

**Figure 2: EC Motor**



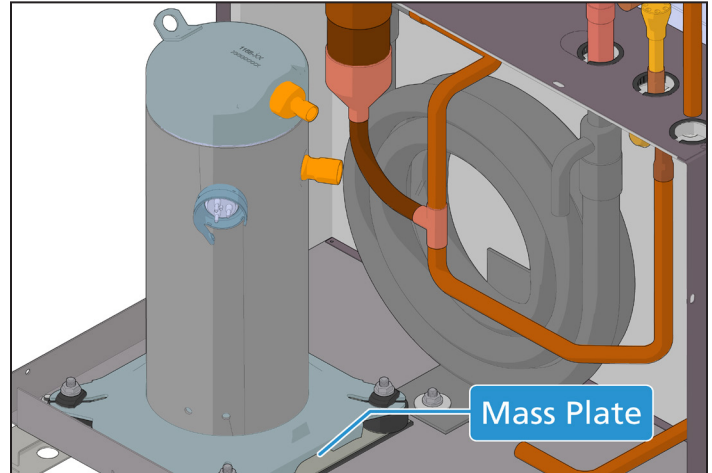
### Supply Air Plenum

Allows for multiple discharge air configurations. Supply air diffuser 1/2" foam seal is field-furnished and installed.

### Compressors

High efficiency rotary and scroll, available with optional mass plate (Figure 3) and/or compressor blanket for quiet operation (blanket only available for scroll compressors).

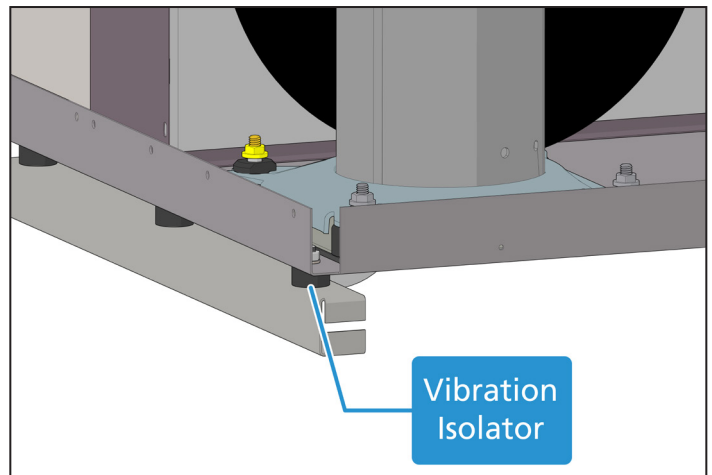
**Figure 3: Optional Mass Plate**



### Chassis Vibration Isolators

Isolators are integral to the chassis support rails to help minimize noise and vibration transmission, resulting in a quiet occupied space (Figure 4).

**Figure 4: Vibration Isolators**



### LED Annunciators

LED status lights on the control board display fault conditions to provide easy troubleshooting and diagnosis and are viewable via the LED status view port.

### Primary Condensate Drain Pan

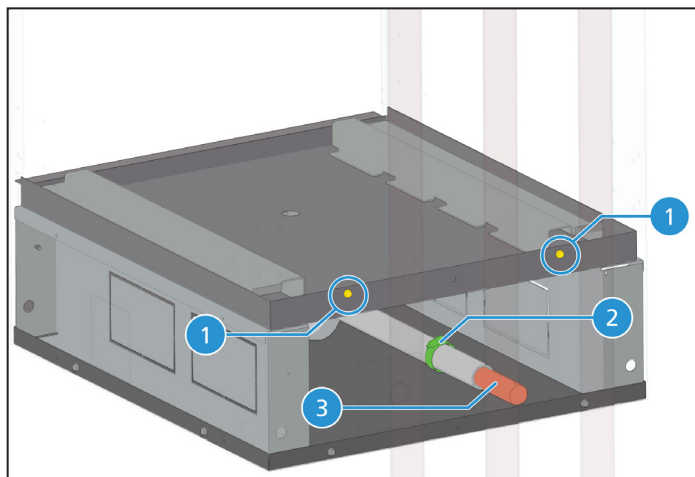
Sloped and constructed of a corrosion resistant ABS plastic. The primary drain pan sits below the air coil to capture all condensate in cooling mode. A factory-installed condensate overflow sensor disables unit operation when the condensate level reaches the sensor.



## Secondary Condensate Drain Pan

Available as an option in corrosion-resistant stainless steel or standard galvanized steel, and sits below the chassis to prevent condensate or other liquids from dripping into the cabinet and possibly reaching the living space. This drain pan also includes a factory-installed condensate overflow sensor.

**Figure 5: Secondary Condensate Drain Pan**

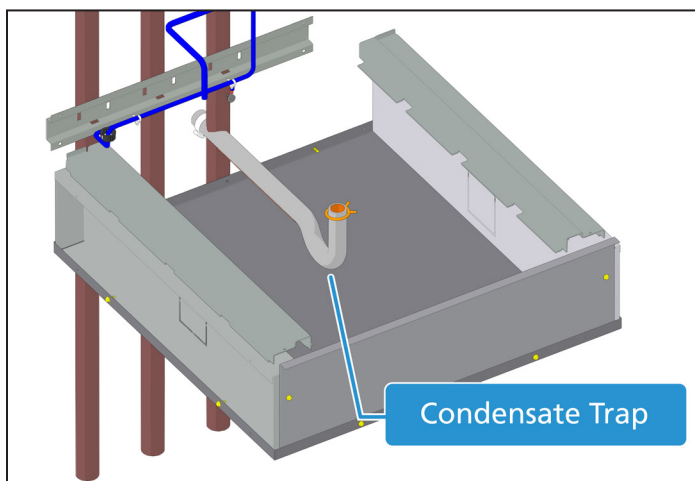


| No. | Component        |
|-----|------------------|
| 1   | Drain Pan Screws |
| 2   | Clamp            |
| 3   | Drain Stub-Out   |

## Condensate Drain Hose

Equipped with a formed drain hose with a flexible condensate trap.

**Figure 6: Condensate Drain Hose**



## Front-Mounted Disconnect Switch

Easy access disconnect switch allows the user to turn off power to the unit for service/maintenance (Figure 7).

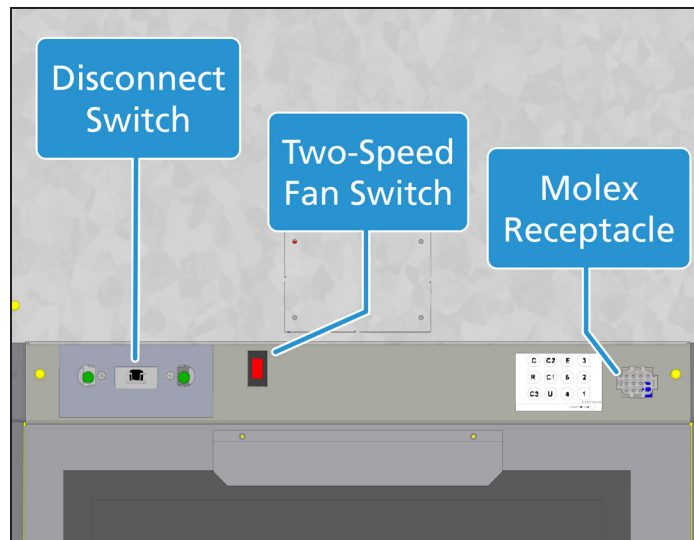
## Two-Speed Fan Switch (Option)

Convenient location of the fan speed switch allows for easy fan speed change (units with PSC motor, Figure 7).

## Molex Receptacle for Thermostat or Room Sensor

Provides easy plug-in connection of wall-mounted thermostat or room temperature sensor (Figure 7).

**Figure 7: Disconnect And Fan Switches And Molex Receptacle**



## Cabinet

The cabinet can be separated into two sections for ease of handling, making it easier to move the unit to the upper floors in a multi-story building.

### Cabinet Insulation

The standard cabinet is lined with 1/2"-thick dual-density fiberglass insulation. Foil- or skin-faced, dual-density fiberglass insulation is available as an option.

With the optional Indoor Air Quality (IAQ) insulation package, the cabinet is available with 3/8"-thick closed-cell foam insulation.

### Chassis Insulation

The standard chassis compressor compartment is lined with 1/2"-thick dual-density fiberglass insulation.

In combination with the fiberglass options, a compressor compartment Sound Reduction Package option adds a compressor mass plate and for 024–036 units, an optional compressor sound blanket.

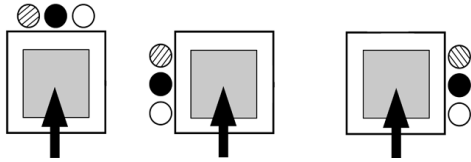
With the optional IAQ insulation package, the chassis compressor compartment is available with 3/8"-thick closed-cell foam insulation.

In combination with the IAQ option, a compressor compartment Sound Reduction Package option adds a compressor mass plate and for 024–036 units, an optional compressor sound blanket.

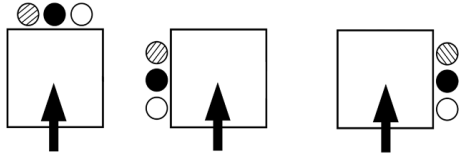


## Configurations

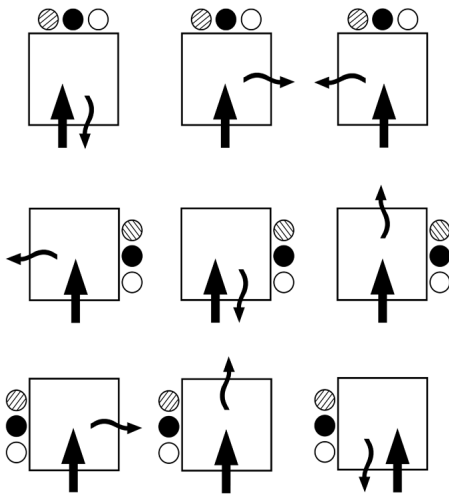
**Figure 8: Single Discharge—Top Only**



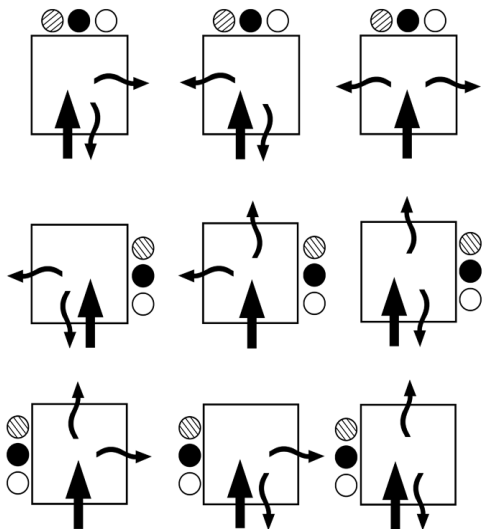
**Figure 9: Closed Plenum—Field Modification Required**



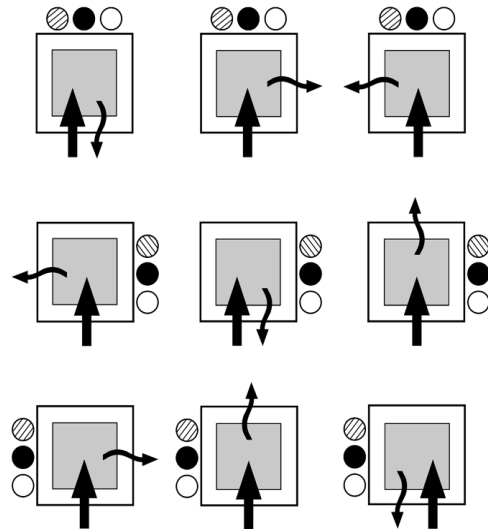
**Figure 10: Single-Side Discharge**



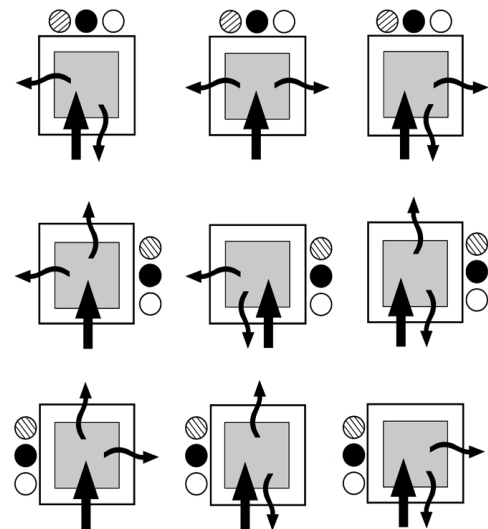
**Figure 11: Double-Side Discharge**



**Figure 12: Side and Top Discharge**



**Figure 13: Double-Side and Top Discharge**



(hatched circle) = Return Riser      (solid black circle) = Supply Riser      (white circle) = Drain  
 (thick arrow) = Return Air      (curved arrow) = Discharge Air      (grey square) = Top Discharge

**NOTE:** 80"-high cabinet not available with side discharge, top discharge only.

## Hinged Perimeter Return Air Panel Door

Constructed of heavy gauge steel, lined with insulation to help attenuate sound from the compressor and fan assembly. Magnetic latching clips ensure the panel door stays closed during operation. An optional dual locking feature is available. Available with electrostatic powder coat finish in colors of cupola white or antique ivory.

**Figure 14: Hinged Perimeter Return Air Panel Door**



## Louvered Return Air Panel Door with Optional Motorized Damper

The louvered return air panel door has two 1-5/8" x 7" cutouts available to connect ductwork for delivering outdoor air into the space using the optional motorized outdoor air damper. The optional motorized outdoor air damper mounts only on the hinge side of the door, which is selectable as right or left hand. Available with electrostatic powder coat finish in colors of cupola white or antique ivory.

**Figure 15: Louvered Return Air Panel Door With Optional Motorized Damper**



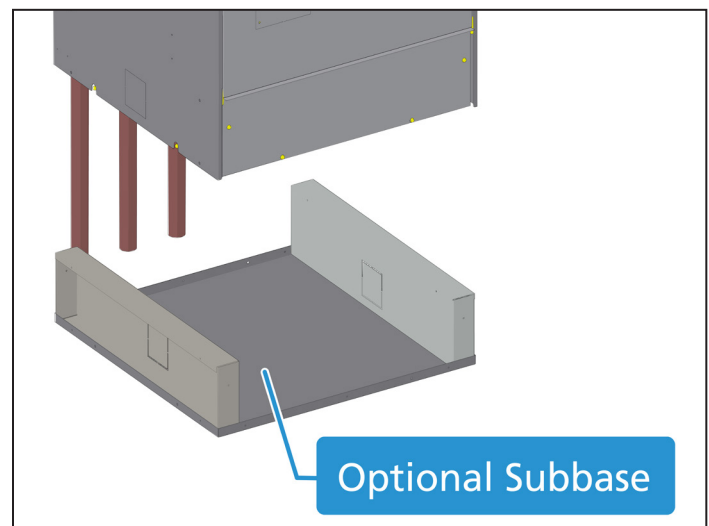
## Supply Air Diffusers

Diffusers are constructed of aluminum with a mill finish or an optional painted finish, available in three variations: double deflection, double deflection with optional extension, and double deflection with adjustable damper. Damper blades are positioned vertically and adjust easily for directing the unit discharge air.

## Subbase Kit

An optional subbase is available in heights of 2", 3", 4" and 5" to accommodate interiors with higher baseboard mouldings.

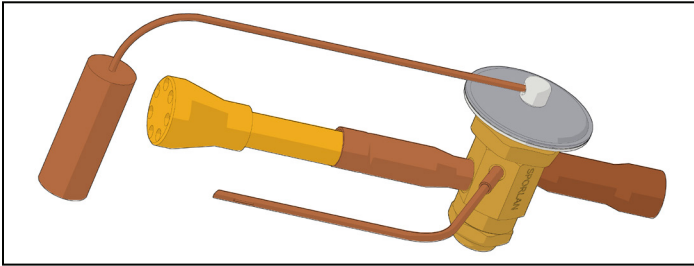
**Figure 16: Optional Subbase**



## TXV Refrigerant Metering Device

Vertical stack water source heat pump units include a thermal expansion valve (TXV) for refrigerant metering. The TXV allows the unit to operate at optimum efficiency with fluid temperatures and entering air temperatures. The TXV precisely meters the exact amount of refrigerant flow through the system to meet the load and deliver rated heating and cooling capacity.

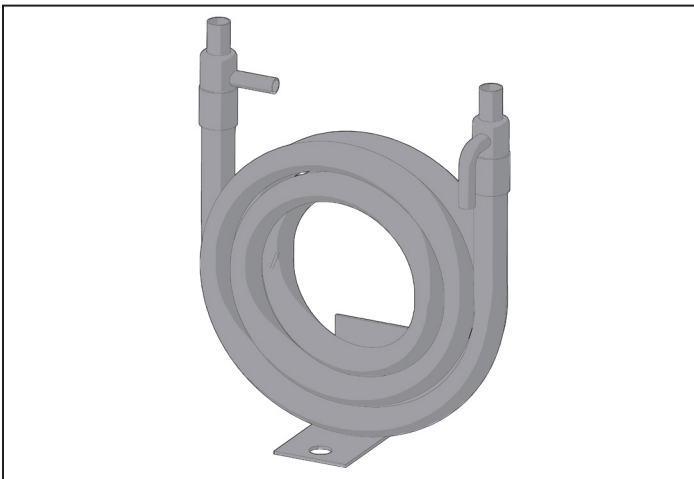
**Figure 17: TXV Refrigerant Metering Device**



## Water-to-Refrigerant Coil

The copper or cupronickel (optional) tube-in-tube coaxial heat exchanger used in vertical stack water source heat pumps is designed for maximum heat transfer at nominal water flow rates resulting in minimum pressure drop. The inside tube is deeply fluted to enhance heat transfer and minimize fouling. All coaxial coils are tested to 500 psig on the water side and 600 psig on the refrigerant side. The geothermal range chassis includes an insulated coax coil, and insulated refrigerant and water piping insulation to protect against condensation in low-temperature geothermal applications.

**Figure 18: Coaxial Heat Exchanger**



## Two-Way and Three-Way Motorized Valves

Two-way valves are used for variable pumping applications when more than one unit is installed on a common loop. These valves are also used to conserve water when used for ground water applications.

Three-way valves are used for constant flow applications or installed at the end of a variable flow branch piping run to maintain minimum flow conditions.

On a call for cooling or heating, the valve opens, providing full water flow prior to compressor operation. A 24-volt control wire harness is included with the factory-provided control valve option. One end of the wire harness plugs into terminal H6 on the MicroTech 2300 unit controller and the other to the control valve actuator.

## Hydronic Heat

The hydronic heat option helps to reduce energy consumption by using hot loop water temperatures to condition a space without energizing mechanical heating. Hydronic heat can help maximize heat transfer from rooms that require cooling to ones that require heating without the added cost of operating the compressor.

The unit includes a hydronic heating coil located downstream of the unit's evaporator coil and after the filter. When entering water temperatures are between 90° and 120°F, a two-stage thermostat or room temperature sensor in conjunction with a factory-installed entering water temperature sensor and a two-position, three-way diverting valve determine when loop water can be diverted to the hydronic coil and the unit coax coil for hydronic heating. Smart fan controls further reduce energy consumption and sound levels by delivering optimum air flow during hydronic heat operation.

## Corrosion Protection (Option)

Coils can be coated with an optional inorganic, silicon-based nano-ceramic coating. This coating has a 3,000-hour salt spray rating per ASTM B-117.

## Filters

1" standard (factory-provided) or an optional 1" MERV 8 or 2" MERV 13 for improved indoor air quality.

## Stainless Steel Braided Hoses

Daikin Applied sells a variety of flexible supply, return and condensate hoses and hose assemblies to connect the chassis water lines to the risers to complete a building's hard piping system.

Contact your Daikin Applied representative for more detailed hose kit features.

## Field-Adjustable EC Fan Motor

EC motors are optional on units sizes 009 through 036. EC motors provide the ultimate in efficiency and performance flexibility with eight field-selectable CFM settings and is customizable over BACnet, providing quieter operation and lower energy consumption. The factory-installed dipswitches on the expansion board allow for easy commissioning through a simple click of the switch to set the CFM delivered to the space. This allows for field adjustment of air delivery to the space for sound-sensitive applications or for increased air distribution.

## Controls

### MicroTech 2300 Unit Controller

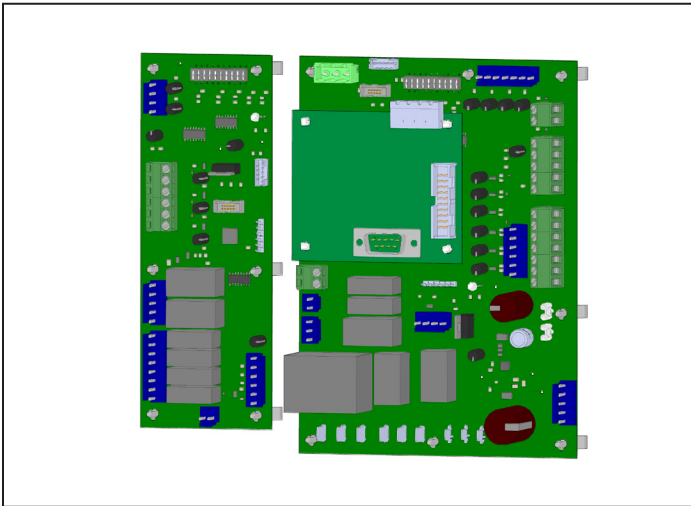
The MicroTech 2300 unit controller is a microprocessor-based controller and is provided on every Vertical Stack WSVF/WSVC unit. The controller monitors the safety devices to protect the unit from unsafe operating conditions, and controls the reversing valve, compressor and fan operation for efficient unit operation.

Safety controls included as standard:

- High-pressure switch located in the refrigerant discharge line.
- Low-pressure switch located in the refrigerant suction line for loss of refrigerant charge protection.
- Low-suction temperature sensor located in the compressor suction line to protect against coil freeze-up.
- Condensate overflow protection sensor is factory-mounted in the drain pan of the unit.

The controller is accessible within the electrical control box through the bottom front access panel.

**Figure 19: MicroTech 2300 and 2310 Unit Controllers and BACnet Card**



Each option features direct quick-connect wiring to all unit-controlled components for “clean” wiring inside the control box. Each control circuit board receives power from a 50 VA or optional 75 VA transformer. The main board can be wired for 24-volt AC output to the wall thermostat by using terminals R and C.

## Controls Integration

For protocol information including, integration points list for BACnet networks, refer to ED 19129.

Two control choices are offered with the MicroTech Unit SmartSource unit control system:

- MicroTech Unit SmartSource unit controller (stand-alone)
- MicroTech Unit SmartSource unit controller with BACnet communication module

### MicroTech Unit SmartSource Controller with BACnet Communication Module

Daikin Applied water source heat pumps are available with a BACnet MS/TP communication module that is designed to communicate over a BACnet MS/TP communications network to a building automation system (BAS). It can be factory- or field-installed.

The unit controller is programmed and tested with all the logic required to monitor and control the unit. An optional wall sensor may be used with the communication module to provide limited local control of the water source heat pump. The unit controller monitors water and air temperatures and passes information to the communication module. The module communicates with the BAS, to provide network control of the water source heat pump.





The module makes operational data and commands available on a communications network using BACnet objects and properties:

- The network cable is a shielded twisted-pair cable
- Network communications run up to 76.8 Kbps
- DIP switches on the controller enable the MS/TP MAC address to be set in the range 0–127
- Four green status LEDs on the communication module indicate communication activity on the MS/TP communication network and with the unit controller





The MicroTech Unit SmartSource unit controller with communication module includes a factory-installed leaving water temperature sensor, field-installed discharge air and return air temperature sensor. A Daikin Applied wall-mounted temperature sensor may be used in place of the factory-provided return air temperature sensor.

## Accessories

**Table 3: Thermostat Selections**

| Wall-Mounted Thermostats & Remote Sensor for use with all SmartSource WSHP units |                             | Thermostats   |   |  |   | Remote Sensor                     |
|--|-----------------------------|---|---|--|---|-----------------------------------|
|  |                             | Non-Programmable  | Programmable (7 Day or 5+1+1) Non-Programmable                                    |  | 7 Day Programmable Non-Programmable   | Remote Indoor Thermostat Sensor   |
|  |                             | 2H/2C   | 2H/2C   | 2H/3C Humidity Control   | 2H/3C Humidity Control WIFI   |                                   |
|  |                             |  |  |  |  |                                   |
| Daikin Applied Part Number   |                             | 910411879   | 910411880   | 910417943  | 910417944   | 910420874                         |
| Feature  |                             |   |   |  |   |                                   |
| LCD Display  | Room Temperature & Setpoint | •   | •   | •  | •   | Allows Remote Temperature Sensing |
|  | Room Humidity %             |   |   | •  | •   |                                   |
| Glow in the dark Display light   |                             | •   | •   | •  | •   |                                   |
| Operating Modes  | System                      | Heat-Off-Cool-Auto  | Heat-Off-Cool-Auto  | Heat-Off-Cool-Auto   | Heat-Off-Cool-Auto  |                                   |
|  | Fan                         | On-Auto   | On-Auto   | On-Auto-IAQ  | On-Auto-IAQ   |                                   |
| Changeover   | Manual                      | •   | •   | •  | •   |                                   |
|  | Auto                        | •   | •   | •  | •   |                                   |
| Temperature Control Range  |                             | 44°F to 90°F (7°C to 32°C)  | 44°F to 90°F (7°C to 32°C)  | 44°F to 90°F (7°C to 32° C)  | 44°F to 90°F (7°C to 32°C)  |                                   |
| Adjustable Setpoint Limits   |                             | •   | •   | •  | •   |                                   |
| Keypad Lockout   |                             |   |   | •  | •   |                                   |
| Filter Change Reminder   |                             |   | •   | •  | •   |                                   |
| Programmable Fan   |                             | •   | •   | •  | •   |                                   |
| Power Type   | Battery                     | 2 AA Alkaline Batteries   |   |  |   |                                   |
|  | Hardwire (Common Wire)      | 18 to 30 VAC  | 18 to 30 VAC  | 18 to 30 VAC   | 18 to 30 VAC  |                                   |
| Permanent Memory Retention   |                             | •   | •   | •  | •   |                                   |
| Remote Indoor Sensor Capable (Requires Daikin Applied P/N: 910420874)            |                             |   | •   | •  | •   |                                   |
| Terminals  |                             | Rh, RC, G, Y, Y2, C, O, B, W/E, W2  | Rh, RC, C, Y, Y2, W/E, W2, G, B, O, S1, S2  | Rh, RC, C, Y, Y2, W/E, W2, G, B, O, S1, S2, H, D                                   | Rh, RC, C, Y, Y2, W/E, W2, G, B, O, S1, S2, H, D                                    |                                   |
| Application  |                             |   |   |  |   |                                   |
| Dehumidification   | Smart Dehumidification      |   |   | •  | •   |                                   |
|  | Simplified                  | •   | •   | •  | •   |                                   |
|  | Humidistat Controlled       |   |   | •  | •   |                                   |
| Electric Heat  | Boilerless                  | •   | •   | •  | •   |                                   |
|  | Supplemental                | •   | •   | •  | •   |                                   |
|  | Primary                     | •   | •   | •  | •   |                                   |
| Waterside Economizer   |                             | •   | •   | •  | •   |                                   |
| Hydronic Heat  |                             | •   | •   | •  | •   |                                   |

**Table 4: Room Temperature Sensors**

| Room Temperature Sensors  |                             |   |  |  |  |
|---|-----------------------------|---|--|--|--|
| Room Sensors for Use with All SmartSource WSHP Units with a BACnet Communication Module |                             | Basic Room Sensor   | Cool to Warm Adjust  | Digitally Adjustable Display Sensor  |  |
|   |                             |  |       |                         |                                   |
|   |                             | Temperature Sensing, LED Status Indication, Override/Reset Button                 | Cool/Warm Temperature Sensing Adjustment, LED Status Indication, Override/Reset Button | Temperature, Occupancy, Alarm, Setpoint and Status Display, Override/Reset and Occupied/Unoccupied Buttons | Temperature, Humidity, Occupancy, Alarm, Setpoint and Status Display, Override/Reset and Occupied/Unoccupied Buttons |
| Daikin Applied Part Number  |                             | 910152149   | 910171464  | 910152147  | 910121754  |
| Feature   |                             |   |  |  |  |
| Setpoint Adjustment   |                             | None  | Cool to Warm   | Digitally Adjustable   | Digitally Adjustable   |
| Display   | Room Temperature & Setpoint |   |  | •  | •  |
|   | Room Humidity & Setpoint    |   |  |  | •  |
| Stages  | Heating                     | 4   | 4  | 4  | 4  |
|   | Cooling                     | 3   | 3  | 3  | 3  |
| Operating Modes   | System                      |   |  |  | Heat-Off-Cool-Auto Dehumidify  |
|   | Fan                         |   |  |  | On-Auto  |
|   | Occupancy                   |   |  | LCD Display of Occupied-Unoccupied Icon  | LCD Display of Occupied-Unoccupied Icon  |
| Annunciation  | Status LED                  | •   | •  | LCD Display of Unit Status   | LCD Display of Unit Status   |
|   | LCD Alarm Display           |   |  | •  | •  |
| Reset   | Alarm                       | •   | •  | •  | •  |
|   | Setback Override            | •   | •  | •  | •  |
| Application   |                             |   |  |  |  |
| Dehumidification  | Smart Dehumidification      |   |  |  | •  |
| Electric Heat   | Boilerless                  | •   | •  | •  | •  |
|   | Supplemental                | •   | •  | •  | •  |
|   | Primary                     | •   | •  | •  | •  |
| Waterside Economizer  |                             | •   | •  | •  | •  |
| Hydronic Heat   |                             | •   | •  | •  | •  |

## Wireless Temperature Control

The wireless thermostat option is designed to provide precision temperature control without the installation labor and expense of wiring.

- Powered by AA batteries
- Mounts in any suitable location that will provide good temperature control.
- Large LCD display provides the user with current room temperature, set point temperature, time, program interval, and other system status information.

For detailed installation and operation information, refer to the manual provided with the thermostat.

**Figure 20: Wireless Thermostat**



The second part of the wireless system is called a Remote Control Node or "RCN." An RCN interfaces with specific desired HVAC equipment, and communicates with its thermostat wirelessly. At the time of installation, the wireless thermostat is linked to the RCN. The thermostat and RCN that have been linked will not interfere with, or be affected by, any other thermostat or RCN in adjacent rooms, apartments, or neighboring homes.

**Figure 21: Remote Control Node (RCN)**





# AHRI Performance Data

## PSC Motor

Table 5: WSHP AHRI Performance Data with PSC Motor

| Unit Size | Unit Voltage | Rated CFM | Rated GPM | Water Loop       |      |                  |     | Ground Loop (Geothermal) |      |                  |     |
|-----------|--------------|-----------|-----------|------------------|------|------------------|-----|--------------------------|------|------------------|-----|
|           |              |           |           | Cooling—EWT 86°F |      | Heating—EWT 68°F |     | Cooling—EWT 77°F         |      | Heating—EWT 32°F |     |
|           |              |           |           | Btuh/hr          | EER  | Btuh/hr          | COP | Btuh/hr                  | EER  | Btuh/hr          | COP |
| 009       | 115/60/1     | 300       | 2.25      | 8700             | 15.5 | 10,500           | 5.1 | 9200                     | 18.5 | 6200             | 3.3 |
|           | 208-230/60/1 |           |           | 8900             | 14.8 | 10,900           | 5.0 | 9500                     | 17.8 | 6400             | 3.2 |
|           | 265/60/1     |           |           | 9000             | 14.1 |                  | 4.8 | 9600                     | 16.5 | 6500             |     |
| 012       | 115/60/1     | 400       | 3.0       | 11,400           | 14.2 | 13,500           | 4.7 | 12,000                   | 16.6 | 8200             | 3.2 |
|           | 208-230/60/1 |           |           | 11,500           | 14.3 | 13,600           |     | 12,100                   | 16.8 | 8300             | 3.3 |
|           | 265/60/1     |           |           | 11,200           | 13.7 | 13,200           | 4.6 | 11,700                   | 16.1 | 8100             | 3.2 |
| 015       | 208-230/60/1 | 500       | 3.75      | 14,700           | 14.1 | 16,600           | 4.6 | 15,500                   | 16.6 | 10,500           | 3.2 |
|           | 265/60/1     |           |           | 15,500           | 14.3 | 17,500           |     | 16,300                   | 16.9 | 11,000           | 3.3 |
| 018       | 208-230/60/1 | 600       | 4.5       | 18,700           | 13.7 | 23,400           | 4.3 | 19,800                   | 16.1 | 14,600           | 3.2 |
|           | 265/60/1     |           |           | 18,500           | 13.6 | 23,200           |     | 19,600                   | 15.9 | 14,500           |     |
| 024       | 208-230/60/1 | 800       | 6.0       | 23,800           | 14.7 | 27,800           | 4.9 | 24,800                   | 17.1 | 17,500           | 3.3 |
|           | 265/60/1     |           |           | 23,300           | 14.4 | 27,200           | 4.8 | 24,300                   | 16.8 | 17,200           |     |
| 030       | 208-230/60/1 | 1000      | 7.5       | 28,100           | 14.5 | 33,100           | 4.6 | 29,400                   | 16.8 | 20,800           | 3.2 |
|           | 265/60/1     |           |           | 28,100           | 14.2 |                  | 4.5 |                          | 16.5 |                  |     |
| 036       | 208-230/60/1 | 1200      | 9.0       | 35,000           | 14.5 | 39,300           | 4.4 | 36,300                   | 16.4 | 27,200           | 3.3 |
|           | 265/60/1     |           |           | 33,600           | 13.5 | 37,700           | 4.1 | 34,800                   | 15.3 | 26,100           | 3.2 |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) EAT and 86°F (30°C) EWT.

**NOTE 2:** Heating capacity is based on 68°F db, 59.0°F wb (20/15°C) EAT and 68°F (20°C) EWT.

## EC Motor

**Table 6: WSHP AHRI Performance Data with EC Motor**

| Unit Size | Unit Voltage | Rated CFM | Rated GPM | Water Loop       |      |                  |     | Ground Loop (Geothermal) |      |                  |     |
|-----------|--------------|-----------|-----------|------------------|------|------------------|-----|--------------------------|------|------------------|-----|
|           |              |           |           | Cooling—EWT 86°F |      | Heating—EWT 68°F |     | Cooling—EWT 77°F         |      | Heating—EWT 32°F |     |
|           |              |           |           | Btuh/hr          | EER  | Btuh/hr          | COP | Btuh/hr                  | EER  | Btuh/hr          | COP |
| 009       | 115/60/1     | 300       | 2.25      | 8700             | 16.0 | 10500            | 5.2 | 9400                     | 19.0 | 6300             | 3.4 |
|           | 208-230/60/1 |           |           | 8900             | 15.3 | 10,900           | 5.1 | 9500                     | 18.4 | 6400             | 3.3 |
|           | 265/60/1     |           |           | 9000             | 14.8 |                  | 5.0 |                          | 17.8 |                  |     |
| 012       | 115/60/1     | 400       | 3.0       | 11,500           | 14.8 | 13,300           | 4.7 | 12,100                   | 17.5 | 8000             | 3.2 |
|           | 208-230/60/1 |           |           | 11,600           | 15.0 | 13,400           | 4.8 | 12,200                   | 17.6 | 8100             | 3.3 |
|           | 265/60/1     |           |           | 11,300           | 14.4 | 13,000           | 4.6 | 11,800                   | 16.9 | 7900             | 3.2 |
| 015       | 208-230/60/1 | 500       | 3.75      | 14,800           | 14.8 | 17,200           | 4.7 | 15,700                   | 17.4 | 10,800           | 3.3 |
|           | 265/60/1     |           |           | 15,600           | 14.9 | 18,100           | 4.8 | 16,500                   | 17.6 | 11,400           | 3.4 |
| 018       | 208-230/60/1 | 600       | 4.5       | 18,900           | 14.7 | 22,700           | 4.4 | 20,000                   | 17.3 | 14,200           | 3.2 |
|           | 265/60/1     |           |           | 18,700           | 14.5 | 22,500           | 4.3 | 18,300                   | 17.0 | 18,300           |     |
| 024       | 208-230/60/1 | 800       | 6.0       | 23,800           | 15.3 | 27,000           | 4.9 | 24,800                   | 17.9 | 16,900           | 3.3 |
|           | 265/60/1     |           |           | 23,300           | 15.0 | 26,500           | 4.8 | 24,300                   | 17.6 | 16,600           |     |
| 030       | 208-230/60/1 | 1000      | 7.5       | 28,900           | 16.6 | 33,600           | 4.9 | 30,200                   | 19.3 | 21,200           | 3.4 |
|           | 265/60/1     |           |           | 28,900           | 16.0 |                  | 4.7 |                          | 18.5 |                  | 3.3 |
| 036       | 208-230/60/1 | 1200      | 9.0       | 35,000           | 14.8 | 38,900           | 4.5 | 36,300                   | 16.9 | 26,900           | 3.3 |
|           | 265/60/1     |           |           | 33,600           | 13.9 | 37,300           | 4.2 | 34,800                   | 15.9 | 25,800           | 3.2 |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) EAT and 77°F (25°C) EWT.

**NOTE 2:** Heating capacity is based on 68°F db, 59.0°F wb (20/15°C) EAT and 32°F (0°C) EWT.

# Capacity Data

## PSC Motor

Table 7: Size 009 (300 CFM)

| EWT (°F) | GPM  | WPD |          | Cooling—EAT 80/67° F      |                   |                  |              |      | Heating—EAT 70° F |                  |              |          |     |
|----------|------|-----|----------|---------------------------|-------------------|------------------|--------------|------|-------------------|------------------|--------------|----------|-----|
|          |      | PSI | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER  | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25       | 1.5  | 2.3 | 5.3      | Operation not recommended |                   |                  |              |      | 5300              | 0.566            | 3400         | 86       | 2.7 |
|          | 2.25 | 4.7 | 10.7     |                           |                   |                  |              |      | 5600              | 0.570            | 3700         | 87       | 2.9 |
|          | 3    | 7.6 | 17.6     |                           |                   |                  |              |      | 5900              | 0.574            | 3900         | 88       | 3.0 |
| 30       | 1.5  | 2.3 | 5.3      | 11200                     | 7200              | 0.309            | 12300        | 36.2 | 5800              | 0.576            | 3800         | 88       | 3.0 |
|          | 2.25 | 4.6 | 10.6     | 11400                     | 7300              | 0.289            | 12400        | 39.5 | 6100              | 0.580            | 4100         | 89       | 3.1 |
|          | 3    | 7.5 | 17.4     | 11700                     | 7300              | 0.269            | 12600        | 43.6 | 6400              | 0.584            | 4400         | 90       | 3.2 |
| 40       | 1.5  | 2.2 | 5.1      | 11000                     | 7100              | 0.336            | 12100        | 32.7 | 7000              | 0.597            | 5000         | 91       | 3.4 |
|          | 2.25 | 4.4 | 10.3     | 11200                     | 7200              | 0.316            | 12300        | 35.5 | 7300              | 0.601            | 5200         | 92       | 3.6 |
|          | 3    | 7.3 | 16.9     | 11400                     | 7300              | 0.295            | 12400        | 38.6 | 7600              | 0.606            | 5500         | 93       | 3.7 |
| 50       | 1.5  | 2.2 | 5.0      | 10700                     | 7000              | 0.378            | 12000        | 28.3 | 8300              | 0.618            | 6200         | 95       | 3.9 |
|          | 2.25 | 4.3 | 10.0     | 10900                     | 7100              | 0.358            | 12100        | 30.5 | 8600              | 0.622            | 6500         | 96       | 4.1 |
|          | 3    | 7.1 | 16.4     | 11100                     | 7100              | 0.337            | 12300        | 32.9 | 9000              | 0.626            | 6900         | 98       | 4.2 |
| 60       | 1.5  | 2.1 | 4.9      | 10300                     | 6800              | 0.433            | 11800        | 23.8 | 9600              | 0.636            | 7400         | 99       | 4.4 |
|          | 2.25 | 4.2 | 9.8      | 10500                     | 6900              | 0.413            | 11900        | 25.4 | 9900              | 0.640            | 7700         | 100      | 4.5 |
|          | 3    | 6.9 | 16.0     | 10700                     | 6900              | 0.392            | 12000        | 27.3 | 10200             | 0.644            | 8000         | 101      | 4.6 |
| 70       | 1.5  | 2.1 | 4.8      | 9700                      | 6600              | 0.498            | 11400        | 19.5 | 10800             | 0.651            | 8600         | 103      | 4.9 |
|          | 2.25 | 4.1 | 9.6      | 10000                     | 6600              | 0.478            | 11600        | 20.9 | 11100             | 0.655            | 8900         | 104      | 5.0 |
|          | 3    | 6.8 | 15.7     | 10200                     | 6700              | 0.457            | 11800        | 22.3 | 11400             | 0.659            | 9100         | 105      | 5.1 |
| 80       | 1.5  | 2.0 | 4.7      | 9200                      | 6300              | 0.570            | 11100        | 16.1 | 11800             | 0.665            | 9500         | 106      | 5.2 |
|          | 2.25 | 4.1 | 9.4      | 9400                      | 6300              | 0.550            | 11300        | 17.1 | 12100             | 0.669            | 9800         | 107      | 5.3 |
|          | 3    | 6.7 | 15.4     | 9600                      | 6400              | 0.530            | 11400        | 18.1 | 12400             | 0.673            | 10100        | 108      | 5.4 |
| 90       | 1.5  | 2.0 | 4.6      | 8500                      | 5900              | 0.648            | 10700        | 13.1 | 12900             | 0.677            | 10600        | 110      | 5.6 |
|          | 2.25 | 4.0 | 9.2      | 8700                      | 6000              | 0.627            | 10800        | 13.9 | 13200             | 0.681            | 10900        | 111      | 5.7 |
|          | 3    | 6.6 | 15.1     | 8900                      | 6100              | 0.607            | 11000        | 14.7 | 13500             | 0.685            | 11200        | 111      | 5.8 |

### Table Legend

|          |                                     |     |                          |
|----------|-------------------------------------|-----|--------------------------|
| Btu/h    | British Thermal Units per Hour      | GPM | Gallons per Minute       |
| CFM      | Airflow rate, Cubic Feet per Minute | kW  | Kilowatts                |
| COP      | Coefficient of Performance          | LAT | Leaving Air Temperature  |
| EAT      | Entering Air Temperature            | PSI | Pounds per square Inch   |
| EER      | Energy Efficiency Ratio             | THA | Total Heat of Absorption |
| EWT      | Entering Water Temperature          | THR | Total Heat of Rejection  |
| Ft of WC | Feet of Water Column                | WPD | Waterside Pressure Drop  |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD |          | Cooling—EAT 80/67° F |                      |                        |                 |                          | Heating—EAT 70° F         |                        |                 |          |     |
|--------------|-------------------------------------|-----|----------|----------------------|----------------------|------------------------|-----------------|--------------------------|---------------------------|------------------------|-----------------|----------|-----|
|              |                                     | PSI | Ft of WC | Total<br>(Btu/hr)    | Sensible<br>(Btu/hr) | Power<br>Input<br>(kW) | THR<br>(Btu/hr) | EER                      | Total<br>(Btu/hr)         | Power<br>Input<br>(kW) | THA<br>(Btu/hr) | LAT (°F) | COP |
| 100          | 1.5                                 | 2.0 | 4.5      | 7800                 | 5600                 | 0.727                  | 10300           | 10.7                     | Operation not recommended |                        |                 |          |     |
|              | 2.25                                | 3.9 | 9.1      | 8000                 | 5700                 | 0.707                  | 10400           | 11.3                     |                           |                        |                 |          |     |
|              | 3                                   | 6.5 | 14.9     | 8200                 | 5700                 | 0.686                  | 10500           | 11.9                     |                           |                        |                 |          |     |
| 110          | 1.5                                 | 1.9 | 4.5      | 7000                 | 5300                 | 0.806                  | 9800            | 8.7                      |                           |                        |                 |          |     |
|              | 2.25                                | 3.9 | 9.0      | 7200                 | 5300                 | 0.785                  | 9900            | 9.2                      |                           |                        |                 |          |     |
|              | 3                                   | 6.4 | 14.8     | 7500                 | 5400                 | 0.765                  | 10100           | 9.8                      |                           |                        |                 |          |     |
| 120          | 1.5                                 | 1.9 | 4.4      | 6200                 | 4900                 | 0.881                  | 9200            | 7.0                      |                           |                        |                 |          |     |
|              | 2.25                                | 3.9 | 8.9      | 6500                 | 5000                 | 0.861                  | 9400            | 7.6                      |                           |                        |                 |          |     |
|              | 3                                   | 6.3 | 14.6     | 6700                 | 5100                 | 0.840                  | 9600            | 8.0                      |                           |                        |                 |          |     |
| Table Legend |                                     |     |          |                      |                      |                        |                 |                          |                           |                        |                 |          |     |
| Btu/h        | British Thermal Units per Hour      |     |          |                      |                      |                        | GPM             | Gallons per Minute       |                           |                        |                 |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |     |          |                      |                      |                        | kW              | Kilowatts                |                           |                        |                 |          |     |
| COP          | Coefficient of Performance          |     |          |                      |                      |                        | LAT             | Leaving Air Temperature  |                           |                        |                 |          |     |
| EAT          | Entering Air Temperature            |     |          |                      |                      |                        | PSI             | Pounds per square Inch   |                           |                        |                 |          |     |
| EER          | Energy Efficiency Ratio             |     |          |                      |                      |                        | THA             | Total Heat of Absorption |                           |                        |                 |          |     |
| EWT          | Entering Water Temperature          |     |          |                      |                      |                        | THR             | Total Heat of Rejection  |                           |                        |                 |          |     |
| Ft of WC     | Feet of Water Column                |     |          |                      |                      |                        | WPD             | Waterside Pressure Drop  |                           |                        |                 |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

**Table 8: Size 012 (400 CFM)**

| EWT (°F)            | GPM                                 | WPD  |          | Cooling—EAT 80/67° F      |                   |                  |              |                          | Heating—EAT 70° F |                  |              |          |     |
|---------------------|-------------------------------------|------|----------|---------------------------|-------------------|------------------|--------------|--------------------------|-------------------|------------------|--------------|----------|-----|
|                     |                                     | PSI  | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25                  | 2                                   | 3.4  | 7.9      | Operation not recommended |                   |                  |              |                          | 6900              | 0.688            | 4500         | 86       | 2.9 |
|                     | 3                                   | 7.1  | 16.5     |                           |                   |                  |              |                          | 7300              | 0.698            | 4900         | 87       | 3.1 |
|                     | 4                                   | 12.0 | 27.7     |                           |                   |                  |              |                          | 7700              | 0.708            | 5300         | 88       | 3.2 |
| 30                  | 2                                   | 3.4  | 7.8      | 14200                     | 9200              | 0.424            | 15600        | 33.5                     | 7600              | 0.700            | 5200         | 88       | 3.2 |
|                     | 3                                   | 7.0  | 16.3     | 14300                     | 9300              | 0.395            | 15600        | 36.2                     | 8000              | 0.711            | 5600         | 89       | 3.3 |
|                     | 4                                   | 11.8 | 27.3     | 14400                     | 9300              | 0.365            | 15600        | 39.5                     | 8400              | 0.721            | 5900         | 90       | 3.4 |
| 40                  | 2                                   | 3.3  | 7.6      | 13700                     | 8900              | 0.493            | 15400        | 27.8                     | 9100              | 0.739            | 6600         | 92       | 3.6 |
|                     | 3                                   | 6.8  | 15.8     | 13800                     | 9000              | 0.463            | 15400        | 29.8                     | 9500              | 0.749            | 6900         | 93       | 3.7 |
|                     | 4                                   | 11.5 | 26.5     | 13900                     | 9000              | 0.434            | 15400        | 32.1                     | 9900              | 0.759            | 7300         | 94       | 3.8 |
| 50                  | 2                                   | 3.2  | 7.4      | 13300                     | 8800              | 0.552            | 15200        | 24.1                     | 10600             | 0.776            | 8000         | 95       | 4.0 |
|                     | 3                                   | 6.7  | 15.4     | 13400                     | 8800              | 0.522            | 15200        | 25.7                     | 11000             | 0.786            | 8300         | 96       | 4.1 |
|                     | 4                                   | 11.2 | 25.8     | 13500                     | 8900              | 0.492            | 15200        | 27.4                     | 11400             | 0.796            | 8700         | 97       | 4.2 |
| 60                  | 2                                   | 3.1  | 7.2      | 13000                     | 8700              | 0.608            | 15100        | 21.4                     | 12100             | 0.803            | 9400         | 99       | 4.4 |
|                     | 3                                   | 6.5  | 15.0     | 13100                     | 8800              | 0.579            | 15100        | 22.6                     | 12500             | 0.814            | 9700         | 100      | 4.5 |
|                     | 4                                   | 10.9 | 25.2     | 13200                     | 8800              | 0.549            | 15100        | 24.0                     | 12900             | 0.824            | 10100        | 101      | 4.6 |
| 70                  | 2                                   | 3.1  | 7.1      | 12500                     | 8600              | 0.671            | 14800        | 18.6                     | 13500             | 0.826            | 10700        | 102      | 4.8 |
|                     | 3                                   | 6.4  | 14.7     | 12600                     | 8600              | 0.642            | 14800        | 19.6                     | 13900             | 0.836            | 11000        | 103      | 4.9 |
|                     | 4                                   | 10.7 | 24.7     | 12800                     | 8700              | 0.612            | 14900        | 20.9                     | 14300             | 0.846            | 11400        | 104      | 5.0 |
| 80                  | 2                                   | 3.0  | 6.9      | 11900                     | 8300              | 0.748            | 14500        | 15.9                     | 14800             | 0.852            | 11900        | 105      | 5.1 |
|                     | 3                                   | 6.2  | 14.4     | 12100                     | 8400              | 0.719            | 14600        | 16.8                     | 15200             | 0.862            | 12300        | 106      | 5.2 |
|                     | 4                                   | 10.5 | 24.2     | 12200                     | 8500              | 0.689            | 14600        | 17.7                     | 15600             | 0.872            | 12600        | 107      | 5.2 |
| 90                  | 2                                   | 3.0  | 6.8      | 11200                     | 8000              | 0.847            | 14100        | 13.2                     | 16000             | 0.883            | 13000        | 108      | 5.3 |
|                     | 3                                   | 6.1  | 14.2     | 11300                     | 8000              | 0.817            | 14100        | 13.8                     | 16400             | 0.894            | 13300        | 109      | 5.4 |
|                     | 4                                   | 10.3 | 23.8     | 11400                     | 8100              | 0.788            | 14100        | 14.5                     | 16800             | 0.904            | 13700        | 110      | 5.4 |
| <b>Table Legend</b> |                                     |      |          |                           |                   |                  |              |                          |                   |                  |              |          |     |
| Btu/h               | British Thermal Units per Hour      |      |          |                           |                   |                  | GPM          | Gallons per Minute       |                   |                  |              |          |     |
| CFM                 | Airflow rate, Cubic Feet per Minute |      |          |                           |                   |                  | kW           | Kilowatts                |                   |                  |              |          |     |
| COP                 | Coefficient of Performance          |      |          |                           |                   |                  | LAT          | Leaving Air Temperature  |                   |                  |              |          |     |
| EAT                 | Entering Air Temperature            |      |          |                           |                   |                  | PSI          | Pounds per square Inch   |                   |                  |              |          |     |
| EER                 | Energy Efficiency Ratio             |      |          |                           |                   |                  | THA          | Total Heat of Absorption |                   |                  |              |          |     |
| EWT                 | Entering Water Temperature          |      |          |                           |                   |                  | THR          | Total Heat of Rejection  |                   |                  |              |          |     |
| Ft of WC            | Feet of Water Column                |      |          |                           |                   |                  | WPD          | Waterside Pressure Drop  |                   |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD  |          | Cooling—EAT 80/67° F |                   |                  |              |                          | Heating—EAT 70° F         |                  |              |          |     |
|--------------|-------------------------------------|------|----------|----------------------|-------------------|------------------|--------------|--------------------------|---------------------------|------------------|--------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total (Btu/hr)       | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)            | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 100          | 2                                   | 2.9  | 6.7      | 10300                | 7500              | 0.975            | 13600        | 10.6                     | Operation not recommended |                  |              |          |     |
|              | 3                                   | 6.1  | 14.0     | 10500                | 7600              | 0.946            | 13700        | 11.1                     |                           |                  |              |          |     |
|              | 4                                   | 10.2 | 23.5     | 10600                | 7700              | 0.916            | 13700        | 11.6                     |                           |                  |              |          |     |
| 110          | 2                                   | 2.9  | 6.6      | 9500                 | 7100              | 1.142            | 13400        | 8.3                      |                           |                  |              |          |     |
|              | 3                                   | 6.0  | 13.8     | 9600                 | 7100              | 1.112            | 13400        | 8.6                      |                           |                  |              |          |     |
|              | 4                                   | 10.1 | 23.2     | 9700                 | 7200              | 1.082            | 13400        | 9.0                      |                           |                  |              |          |     |
| 120          | 2                                   | 2.9  | 6.6      | 8800                 | 6700              | 1.353            | 13400        | 6.5                      |                           |                  |              |          |     |
|              | 3                                   | 5.9  | 13.7     | 8900                 | 6800              | 1.323            | 13400        | 6.7                      |                           |                  |              |          |     |
|              | 4                                   | 10.0 | 23.0     | 9000                 | 6900              | 1.294            | 13400        | 7.0                      |                           |                  |              |          |     |
| Table Legend |                                     |      |          |                      |                   |                  |              |                          |                           |                  |              |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                      |                   |                  | GPM          | Gallons per Minute       |                           |                  |              |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                      |                   |                  | kW           | Kilowatts                |                           |                  |              |          |     |
| COP          | Coefficient of Performance          |      |          |                      |                   |                  | LAT          | Leaving Air Temperature  |                           |                  |              |          |     |
| EAT          | Entering Air Temperature            |      |          |                      |                   |                  | PSI          | Pounds per square Inch   |                           |                  |              |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                      |                   |                  | THA          | Total Heat of Absorption |                           |                  |              |          |     |
| EWT          | Entering Water Temperature          |      |          |                      |                   |                  | THR          | Total Heat of Rejection  |                           |                  |              |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                      |                   |                  | WPD          | Waterside Pressure Drop  |                           |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

**Table 9: Size 015 (500 CFM)**

| EWT (°F)            | GPM                                 | WPD |          | Cooling—EAT 80/67° F      |                   |                  |              |                          | Heating—EAT 70° F |                  |              |          |     |
|---------------------|-------------------------------------|-----|----------|---------------------------|-------------------|------------------|--------------|--------------------------|-------------------|------------------|--------------|----------|-----|
|                     |                                     | PSI | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25                  | 2.5                                 | 2.5 | 5.8      | Operation not recommended |                   |                  |              |                          | 9100              | 0.942            | 5900         | 87       | 2.8 |
|                     | 3.75                                | 5.1 | 11.9     |                           |                   |                  |              |                          | 9700              | 0.952            | 6400         | 88       | 3.0 |
|                     | 5                                   | 8.5 | 19.7     |                           |                   |                  |              |                          | 10300             | 0.963            | 7000         | 89       | 3.1 |
| 30                  | 2.5                                 | 2.5 | 5.7      | 17900                     | 11900             | 0.610            | 20000        | 29.3                     | 10000             | 0.959            | 6700         | 88       | 3.1 |
|                     | 3.75                                | 5.1 | 11.7     | 18100                     | 11900             | 0.554            | 20000        | 32.7                     | 10500             | 0.969            | 7200         | 89       | 3.2 |
|                     | 5                                   | 8.4 | 19.4     | 18200                     | 11900             | 0.498            | 19900        | 36.6                     | 11100             | 0.979            | 7800         | 90       | 3.3 |
| 32                  | 2.5                                 | 2.4 | 5.5      | 18000                     | 11900             | 0.681            | 20300        | 26.4                     | 11700             | 0.996            | 8300         | 92       | 3.4 |
|                     | 3.75                                | 4.9 | 11.4     | 18200                     | 11900             | 0.625            | 20300        | 29.1                     | 12300             | 1.007            | 8900         | 93       | 3.6 |
|                     | 5                                   | 8.2 | 18.9     | 18300                     | 11900             | 0.568            | 20200        | 32.2                     | 12900             | 1.017            | 9400         | 94       | 3.7 |
| 50                  | 2.5                                 | 2.3 | 5.4      | 18000                     | 11800             | 0.743            | 20500        | 24.2                     | 13600             | 1.035            | 10100        | 95       | 3.9 |
|                     | 3.75                                | 4.8 | 11.1     | 18200                     | 11800             | 0.687            | 20500        | 26.5                     | 14200             | 1.045            | 10600        | 96       | 4.0 |
|                     | 5                                   | 8.0 | 18.4     | 18300                     | 11800             | 0.630            | 20500        | 29.0                     | 14800             | 1.055            | 11200        | 97       | 4.1 |
| 60                  | 2.5                                 | 2.3 | 5.3      | 17700                     | 11600             | 0.819            | 20500        | 21.6                     | 15400             | 1.069            | 11700        | 98       | 4.2 |
|                     | 3.75                                | 4.7 | 10.8     | 17800                     | 11600             | 0.763            | 20400        | 23.3                     | 16000             | 1.079            | 12300        | 99       | 4.3 |
|                     | 5                                   | 7.8 | 17.9     | 18000                     | 11600             | 0.707            | 20400        | 25.5                     | 16600             | 1.089            | 12900        | 101      | 4.5 |
| 70                  | 2.5                                 | 2.2 | 5.2      | 17000                     | 11300             | 0.917            | 20100        | 18.5                     | 17200             | 1.098            | 13400        | 102      | 4.6 |
|                     | 3.75                                | 4.6 | 10.6     | 17200                     | 11300             | 0.861            | 20100        | 20.0                     | 17800             | 1.108            | 14000        | 103      | 4.7 |
|                     | 5                                   | 7.6 | 17.5     | 17300                     | 11300             | 0.805            | 20000        | 21.5                     | 18400             | 1.118            | 14600        | 104      | 4.8 |
| 80                  | 2.5                                 | 2.2 | 5.1      | 16100                     | 10800             | 1.035            | 19600        | 15.6                     | 18700             | 1.121            | 14900        | 104      | 4.9 |
|                     | 3.75                                | 4.5 | 10.4     | 16300                     | 10900             | 0.978            | 19600        | 16.7                     | 19300             | 1.132            | 15400        | 106      | 5.0 |
|                     | 5                                   | 7.5 | 17.2     | 16400                     | 10900             | 0.922            | 19500        | 17.8                     | 19900             | 1.142            | 16000        | 107      | 5.1 |
| 90                  | 2.5                                 | 2.2 | 5.0      | 15200                     | 10400             | 1.163            | 19200        | 13.1                     | 20000             | 1.140            | 16100        | 107      | 5.1 |
|                     | 3.75                                | 4.4 | 10.2     | 15300                     | 10400             | 1.107            | 19100        | 13.8                     | 20600             | 1.150            | 16700        | 108      | 5.3 |
|                     | 5                                   | 7.3 | 16.9     | 15500                     | 10400             | 1.050            | 19100        | 14.8                     | 21200             | 1.160            | 17200        | 109      | 5.4 |
| <b>Table Legend</b> |                                     |     |          |                           |                   |                  |              |                          |                   |                  |              |          |     |
| Btu/h               | British Thermal Units per Hour      |     |          |                           |                   |                  | GPM          | Gallons per Minute       |                   |                  |              |          |     |
| CFM                 | Airflow rate, Cubic Feet per Minute |     |          |                           |                   |                  | kW           | Kilowatts                |                   |                  |              |          |     |
| COP                 | Coefficient of Performance          |     |          |                           |                   |                  | LAT          | Leaving Air Temperature  |                   |                  |              |          |     |
| EAT                 | Entering Air Temperature            |     |          |                           |                   |                  | PSI          | Pounds per square Inch   |                   |                  |              |          |     |
| EER                 | Energy Efficiency Ratio             |     |          |                           |                   |                  | THA          | Total Heat of Absorption |                   |                  |              |          |     |
| EWT                 | Entering Water Temperature          |     |          |                           |                   |                  | THR          | Total Heat of Rejection  |                   |                  |              |          |     |
| Ft of WC            | Feet of Water Column                |     |          |                           |                   |                  | WPD          | Waterside Pressure Drop  |                   |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.



| EWT<br>(°F)  | GPM                                 | WPD |          | Cooling—EAT 80/67° F |                   |                  |              |                          | Heating—EAT 70° F         |                  |              |          |     |
|--------------|-------------------------------------|-----|----------|----------------------|-------------------|------------------|--------------|--------------------------|---------------------------|------------------|--------------|----------|-----|
|              |                                     | PSI | Ft of WC | Total (Btu/hr)       | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)            | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 100          | 2.5                                 | 2.1 | 4.9      | 14300                | 10000             | 1.293            | 18700        | 11.1                     | Operation not recommended |                  |              |          |     |
|              | 3.75                                | 4.4 | 10.1     | 14500                | 10000             | 1.237            | 18700        | 11.7                     |                           |                  |              |          |     |
|              | 5                                   | 7.2 | 16.7     | 14600                | 10000             | 1.181            | 18600        | 12.4                     |                           |                  |              |          |     |
| 110          | 2.5                                 | 2.1 | 4.9      | 13500                | 9700              | 1.421            | 18400        | 9.5                      |                           |                  |              |          |     |
|              | 3.75                                | 4.3 | 9.9      | 13600                | 9700              | 1.365            | 18300        | 10.0                     |                           |                  |              |          |     |
|              | 5                                   | 7.1 | 16.5     | 13800                | 9700              | 1.308            | 18300        | 10.5                     |                           |                  |              |          |     |
| 120          | 2.5                                 | 2.1 | 4.8      | 12500                | 9300              | 1.549            | 17800        | 8.1                      |                           |                  |              |          |     |
|              | 3.75                                | 4.3 | 9.8      | 12600                | 9300              | 1.493            | 17700        | 8.4                      |                           |                  |              |          |     |
|              | 5                                   | 7.1 | 16.4     | 12800                | 9300              | 1.437            | 17700        | 8.9                      |                           |                  |              |          |     |
| Table Legend |                                     |     |          |                      |                   |                  |              |                          |                           |                  |              |          |     |
| Btu/h        | British Thermal Units per Hour      |     |          |                      |                   |                  | GPM          | Gallons per Minute       |                           |                  |              |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |     |          |                      |                   |                  | kW           | Kilowatts                |                           |                  |              |          |     |
| COP          | Coefficient of Performance          |     |          |                      |                   |                  | LAT          | Leaving Air Temperature  |                           |                  |              |          |     |
| EAT          | Entering Air Temperature            |     |          |                      |                   |                  | PSI          | Pounds per square Inch   |                           |                  |              |          |     |
| EER          | Energy Efficiency Ratio             |     |          |                      |                   |                  | THA          | Total Heat of Absorption |                           |                  |              |          |     |
| EWT          | Entering Water Temperature          |     |          |                      |                   |                  | THR          | Total Heat of Rejection  |                           |                  |              |          |     |
| Ft of WC     | Feet of Water Column                |     |          |                      |                   |                  | WPD          | Waterside Pressure Drop  |                           |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

**Table 10: Size 018 (600 CFM)**

| EWT (°F)            | GPM                                 | WPD  |          | Cooling—EAT 80/67° F      |                   |                  |              |                          | Heating—EAT 70° F |                  |              |          |     |
|---------------------|-------------------------------------|------|----------|---------------------------|-------------------|------------------|--------------|--------------------------|-------------------|------------------|--------------|----------|-----|
|                     |                                     | PSI  | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25                  | 3                                   | 3.6  | 8.3      | Operation not recommended |                   |                  |              |                          | 12300             | 1.267            | 8000         | 89       | 2.8 |
|                     | 4.5                                 | 7.6  | 17.6     |                           |                   |                  |              |                          | 13300             | 1.296            | 8900         | 90       | 3.0 |
|                     | 6                                   | 13.0 | 30.1     |                           |                   |                  |              |                          | 14300             | 1.326            | 9800         | 92       | 3.2 |
| 30                  | 3                                   | 3.5  | 8.2      | 22500                     | 13800             | 0.817            | 25300        | 27.5                     | 13300             | 1.302            | 8900         | 90       | 3.0 |
|                     | 4.5                                 | 7.5  | 17.4     | 22800                     | 14000             | 0.744            | 25300        | 30.7                     | 14300             | 1.331            | 9800         | 92       | 3.1 |
|                     | 6                                   | 12.8 | 29.7     | 23100                     | 14100             | 0.670            | 25400        | 34.5                     | 15400             | 1.361            | 10800        | 94       | 3.3 |
| 40                  | 3                                   | 3.4  | 7.9      | 22300                     | 13700             | 0.846            | 25200        | 26.4                     | 15700             | 1.371            | 11000        | 94       | 3.4 |
|                     | 4.5                                 | 7.3  | 16.9     | 22600                     | 13900             | 0.773            | 25200        | 29.3                     | 16800             | 1.400            | 12000        | 96       | 3.5 |
|                     | 6                                   | 12.5 | 28.8     | 22900                     | 14000             | 0.699            | 25300        | 32.8                     | 17800             | 1.430            | 12900        | 97       | 3.6 |
| 50                  | 3                                   | 3.3  | 7.7      | 22200                     | 13700             | 0.920            | 25300        | 24.1                     | 18300             | 1.439            | 13400        | 98       | 3.7 |
|                     | 4.5                                 | 7.1  | 16.4     | 22500                     | 13900             | 0.846            | 25400        | 26.6                     | 19300             | 1.468            | 14300        | 100      | 3.9 |
|                     | 6                                   | 12.1 | 28.0     | 22800                     | 14000             | 0.773            | 25400        | 29.5                     | 20300             | 1.498            | 15200        | 101      | 4.0 |
| 60                  | 3                                   | 3.3  | 7.5      | 21700                     | 13500             | 1.027            | 25200        | 21.1                     | 20800             | 1.506            | 15700        | 102      | 4.0 |
|                     | 4.5                                 | 6.9  | 16.0     | 22100                     | 13700             | 0.954            | 25400        | 23.2                     | 21800             | 1.535            | 16600        | 103      | 4.2 |
|                     | 6                                   | 11.8 | 27.4     | 22400                     | 13800             | 0.880            | 25400        | 25.5                     | 22900             | 1.565            | 17600        | 105      | 4.3 |
| 70                  | 3                                   | 3.2  | 7.4      | 20900                     | 13100             | 1.158            | 24900        | 18.0                     | 23300             | 1.573            | 17900        | 106      | 4.3 |
|                     | 4.5                                 | 6.8  | 15.7     | 21200                     | 13300             | 1.085            | 24900        | 19.5                     | 24300             | 1.603            | 18800        | 107      | 4.4 |
|                     | 6                                   | 11.6 | 26.8     | 21600                     | 13400             | 1.011            | 25100        | 21.4                     | 25300             | 1.632            | 19700        | 109      | 4.5 |
| 80                  | 3                                   | 3.1  | 7.2      | 19800                     | 12600             | 1.305            | 24300        | 15.2                     | 25700             | 1.641            | 20100        | 109      | 4.6 |
|                     | 4.5                                 | 6.7  | 15.4     | 20100                     | 12700             | 1.231            | 24300        | 16.3                     | 26700             | 1.670            | 21000        | 111      | 4.7 |
|                     | 6                                   | 11.4 | 26.3     | 20400                     | 12800             | 1.158            | 24400        | 17.6                     | 27800             | 1.700            | 22000        | 113      | 4.8 |
| 90                  | 3                                   | 3.1  | 7.1      | 18600                     | 12000             | 1.461            | 23600        | 12.7                     | 28000             | 1.707            | 22200        | 113      | 4.8 |
|                     | 4.5                                 | 6.6  | 15.1     | 18900                     | 12200             | 1.387            | 23600        | 13.6                     | 29000             | 1.736            | 23100        | 114      | 4.9 |
|                     | 6                                   | 11.2 | 25.9     | 19300                     | 12300             | 1.314            | 23800        | 14.7                     | 30100             | 1.766            | 24100        | 116      | 5.0 |
| <b>Table Legend</b> |                                     |      |          |                           |                   |                  |              |                          |                   |                  |              |          |     |
| Btu/h               | British Thermal Units per Hour      |      |          |                           |                   |                  | GPM          | Gallons per Minute       |                   |                  |              |          |     |
| CFM                 | Airflow rate, Cubic Feet per Minute |      |          |                           |                   |                  | kW           | Kilowatts                |                   |                  |              |          |     |
| COP                 | Coefficient of Performance          |      |          |                           |                   |                  | LAT          | Leaving Air Temperature  |                   |                  |              |          |     |
| EAT                 | Entering Air Temperature            |      |          |                           |                   |                  | PSI          | Pounds per square Inch   |                   |                  |              |          |     |
| EER                 | Energy Efficiency Ratio             |      |          |                           |                   |                  | THA          | Total Heat of Absorption |                   |                  |              |          |     |
| EWT                 | Entering Water Temperature          |      |          |                           |                   |                  | THR          | Total Heat of Rejection  |                   |                  |              |          |     |
| Ft of WC            | Feet of Water Column                |      |          |                           |                   |                  | WPD          | Waterside Pressure Drop  |                   |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD  |          | Cooling—EAT 80/67° F |                   |                  |              |                          | Heating—EAT 70° F         |                  |              |          |     |
|--------------|-------------------------------------|------|----------|----------------------|-------------------|------------------|--------------|--------------------------|---------------------------|------------------|--------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total (Btu/hr)       | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)            | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 100          | 3                                   | 3.0  | 7.0      | 17600                | 11500             | 1.625            | 23200        | 10.8                     | Operation not recommended |                  |              |          |     |
|              | 4.5                                 | 6.5  | 14.9     | 17900                | 11700             | 1.552            | 23200        | 11.5                     |                           |                  |              |          |     |
|              | 6                                   | 11.0 | 25.5     | 18200                | 11800             | 1.478            | 23200        | 12.3                     |                           |                  |              |          |     |
| 110          | 3                                   | 3.0  | 6.9      | 16600                | 11100             | 1.803            | 22800        | 9.2                      |                           |                  |              |          |     |
|              | 4.5                                 | 6.4  | 14.8     | 16900                | 11200             | 1.730            | 22800        | 9.8                      |                           |                  |              |          |     |
|              | 6                                   | 10.9 | 25.2     | 17200                | 11400             | 1.656            | 22900        | 10.4                     |                           |                  |              |          |     |
| 120          | 3                                   | 3.0  | 6.9      | 15200                | 10400             | 2.007            | 22100        | 7.6                      |                           |                  |              |          |     |
|              | 4.5                                 | 6.3  | 14.6     | 15500                | 10600             | 1.933            | 22100        | 8.0                      |                           |                  |              |          |     |
|              | 6                                   | 10.8 | 25.0     | 15800                | 10700             | 1.860            | 22200        | 8.5                      |                           |                  |              |          |     |
| Table Legend |                                     |      |          |                      |                   |                  |              |                          |                           |                  |              |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                      |                   |                  | GPM          | Gallons per Minute       |                           |                  |              |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                      |                   |                  | kW           | Kilowatts                |                           |                  |              |          |     |
| COP          | Coefficient of Performance          |      |          |                      |                   |                  | LAT          | Leaving Air Temperature  |                           |                  |              |          |     |
| EAT          | Entering Air Temperature            |      |          |                      |                   |                  | PSI          | Pounds per square Inch   |                           |                  |              |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                      |                   |                  | THA          | Total Heat of Absorption |                           |                  |              |          |     |
| EWT          | Entering Water Temperature          |      |          |                      |                   |                  | THR          | Total Heat of Rejection  |                           |                  |              |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                      |                   |                  | WPD          | Waterside Pressure Drop  |                           |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

**Table 11: Size 024 (800 CFM)**

| EWT (°F)            | GPM                                 | WPD  |          | Cooling—EAT 80/67° F      |                   |                  |              |                          | Heating—EAT 70° F |                  |              |          |     |
|---------------------|-------------------------------------|------|----------|---------------------------|-------------------|------------------|--------------|--------------------------|-------------------|------------------|--------------|----------|-----|
|                     |                                     | PSI  | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25                  | 4                                   | 4.2  | 9.6      | Operation not recommended |                   |                  |              |                          | 15000             | 1.468            | 10000        | 86       | 3.0 |
|                     | 6                                   | 8.2  | 19.0     |                           |                   |                  |              |                          | 15600             | 1.482            | 10500        | 87       | 3.1 |
|                     | 8                                   | 13.4 | 30.9     |                           |                   |                  |              |                          | 16200             | 1.495            | 11100        | 88       | 3.2 |
| 30                  | 4                                   | 4.1  | 9.5      | 28300                     | 18900             | 0.955            | 31600        | 29.6                     | 16200             | 1.480            | 11100        | 88       | 3.2 |
|                     | 6                                   | 8.1  | 18.7     | 28100                     | 18800             | 0.918            | 31200        | 30.6                     | 16800             | 1.494            | 11700        | 88       | 3.3 |
|                     | 8                                   | 13.2 | 30.4     | 27900                     | 18700             | 0.880            | 30900        | 31.7                     | 17400             | 1.507            | 12300        | 89       | 3.4 |
| 40                  | 4                                   | 4.0  | 9.2      | 28400                     | 19000             | 0.991            | 31800        | 28.7                     | 19200             | 1.517            | 14000        | 91       | 3.7 |
|                     | 6                                   | 7.9  | 18.2     | 28200                     | 18900             | 0.953            | 31500        | 29.6                     | 19800             | 1.531            | 14600        | 91       | 3.8 |
|                     | 8                                   | 12.8 | 29.5     | 28000                     | 18800             | 0.916            | 31100        | 30.6                     | 20300             | 1.544            | 15000        | 92       | 3.9 |
| 50                  | 4                                   | 3.9  | 8.9      | 27900                     | 18700             | 1.079            | 31600        | 25.9                     | 22300             | 1.563            | 17000        | 94       | 4.2 |
|                     | 6                                   | 7.7  | 17.7     | 27700                     | 18600             | 1.041            | 31300        | 26.6                     | 22900             | 1.577            | 17500        | 95       | 4.3 |
|                     | 8                                   | 12.4 | 28.7     | 27500                     | 18500             | 1.003            | 30900        | 27.4                     | 23500             | 1.590            | 18100        | 95       | 4.3 |
| 60                  | 4                                   | 3.8  | 8.7      | 27100                     | 18200             | 1.200            | 31200        | 22.6                     | 25200             | 1.611            | 19700        | 97       | 4.6 |
|                     | 6                                   | 7.5  | 17.3     | 26900                     | 18100             | 1.162            | 30900        | 23.1                     | 25800             | 1.625            | 20300        | 98       | 4.7 |
|                     | 8                                   | 12.1 | 28.0     | 26700                     | 18000             | 1.124            | 30500        | 23.7                     | 26400             | 1.639            | 20800        | 99       | 4.7 |
| 70                  | 4                                   | 3.7  | 8.5      | 26000                     | 17600             | 1.345            | 30600        | 19.3                     | 27600             | 1.658            | 21900        | 100      | 4.9 |
|                     | 6                                   | 7.3  | 16.9     | 25900                     | 17500             | 1.307            | 30400        | 19.8                     | 28200             | 1.672            | 22500        | 100      | 4.9 |
|                     | 8                                   | 11.9 | 27.4     | 25700                     | 17500             | 1.269            | 30000        | 20.2                     | 28700             | 1.685            | 22900        | 101      | 5.0 |
| 80                  | 4                                   | 3.6  | 8.4      | 24900                     | 17200             | 1.513            | 30100        | 16.5                     | 29400             | 1.702            | 23600        | 102      | 5.1 |
|                     | 6                                   | 7.2  | 16.6     | 24700                     | 17100             | 1.475            | 29700        | 16.7                     | 29900             | 1.716            | 24000        | 102      | 5.1 |
|                     | 8                                   | 11.7 | 26.9     | 24600                     | 17000             | 1.437            | 29500        | 17.1                     | 30500             | 1.729            | 24600        | 103      | 5.2 |
| 90                  | 4                                   | 3.6  | 8.3      | 23800                     | 16700             | 1.714            | 29700        | 13.9                     | 30600             | 1.746            | 24600        | 103      | 5.1 |
|                     | 6                                   | 7.1  | 16.3     | 23600                     | 16600             | 1.676            | 29300        | 14.1                     | 31200             | 1.760            | 25200        | 104      | 5.2 |
|                     | 8                                   | 11.5 | 26.5     | 23400                     | 16600             | 1.638            | 29000        | 14.3                     | 31800             | 1.774            | 25700        | 104      | 5.3 |
| <b>Table Legend</b> |                                     |      |          |                           |                   |                  |              |                          |                   |                  |              |          |     |
| Btu/h               | British Thermal Units per Hour      |      |          |                           |                   |                  | GPM          | Gallons per Minute       |                   |                  |              |          |     |
| CFM                 | Airflow rate, Cubic Feet per Minute |      |          |                           |                   |                  | kW           | Kilowatts                |                   |                  |              |          |     |
| COP                 | Coefficient of Performance          |      |          |                           |                   |                  | LAT          | Leaving Air Temperature  |                   |                  |              |          |     |
| EAT                 | Entering Air Temperature            |      |          |                           |                   |                  | PSI          | Pounds per square Inch   |                   |                  |              |          |     |
| EER                 | Energy Efficiency Ratio             |      |          |                           |                   |                  | THA          | Total Heat of Absorption |                   |                  |              |          |     |
| EWT                 | Entering Water Temperature          |      |          |                           |                   |                  | THR          | Total Heat of Rejection  |                   |                  |              |          |     |
| Ft of WC            | Feet of Water Column                |      |          |                           |                   |                  | WPD          | Waterside Pressure Drop  |                   |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD  |          | Cooling—EAT 80/67° F |                      |                        |                 |                          | Heating—EAT 70° F         |                        |                 |          |     |
|--------------|-------------------------------------|------|----------|----------------------|----------------------|------------------------|-----------------|--------------------------|---------------------------|------------------------|-----------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total<br>(Btu/hr)    | Sensible<br>(Btu/hr) | Power<br>Input<br>(kW) | THR<br>(Btu/hr) | EER                      | Total<br>(Btu/hr)         | Power<br>Input<br>(kW) | THA<br>(Btu/hr) | LAT (°F) | COP |
| 100          | 4                                   | 3.5  | 8.1      | 22500                | 16300                | 1.965                  | 29200           | 11.4                     | Operation not recommended |                        |                 |          |     |
|              | 6                                   | 7.0  | 16.1     | 22300                | 16200                | 1.928                  | 28900           | 11.6                     |                           |                        |                 |          |     |
|              | 8                                   | 11.3 | 26.1     | 22100                | 16100                | 1.890                  | 28600           | 11.7                     |                           |                        |                 |          |     |
| 110          | 4                                   | 3.5  | 8.0      | 20900                | 15600                | 2.295                  | 28700           | 9.1                      |                           |                        |                 |          |     |
|              | 6                                   | 6.9  | 15.9     | 20700                | 15500                | 2.258                  | 28400           | 9.2                      |                           |                        |                 |          |     |
|              | 8                                   | 11.2 | 25.8     | 20500                | 15400                | 2.220                  | 28100           | 9.2                      |                           |                        |                 |          |     |
| 120          | 4                                   | 3.5  | 8.0      | 18800                | 14500                | 2.740                  | 28200           | 6.9                      |                           |                        |                 |          |     |
|              | 6                                   | 6.8  | 15.8     | 18600                | 14400                | 2.703                  | 27800           | 6.9                      |                           |                        |                 |          |     |
|              | 8                                   | 11.1 | 25.6     | 18500                | 14300                | 2.665                  | 27600           | 6.9                      |                           |                        |                 |          |     |
| Table Legend |                                     |      |          |                      |                      |                        |                 |                          |                           |                        |                 |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                      |                      |                        | GPM             | Gallons per Minute       |                           |                        |                 |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                      |                      |                        | kW              | Kilowatts                |                           |                        |                 |          |     |
| COP          | Coefficient of Performance          |      |          |                      |                      |                        | LAT             | Leaving Air Temperature  |                           |                        |                 |          |     |
| EAT          | Entering Air Temperature            |      |          |                      |                      |                        | PSI             | Pounds per square Inch   |                           |                        |                 |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                      |                      |                        | THA             | Total Heat of Absorption |                           |                        |                 |          |     |
| EWT          | Entering Water Temperature          |      |          |                      |                      |                        | THR             | Total Heat of Rejection  |                           |                        |                 |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                      |                      |                        | WPD             | Waterside Pressure Drop  |                           |                        |                 |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

Table 12: Size 030 (1000 CFM)

| EWT (°F)     | GPM                                 | WPD  |          | Cooling—EAT 80/67° F      |                   |                  |              |                          | Heating—EAT 70° F |                  |              |          |     |
|--------------|-------------------------------------|------|----------|---------------------------|-------------------|------------------|--------------|--------------------------|-------------------|------------------|--------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25           | 5                                   | 3.6  | 8.2      | Operation not recommended |                   |                  |              |                          | 17800             | 1.808            | 11600        | 86       | 2.9 |
|              | 7.5                                 | 7.0  | 16.2     |                           |                   |                  |              |                          | 18800             | 1.830            | 12500        | 87       | 3.0 |
|              | 10                                  | 11.4 | 26.2     |                           |                   |                  |              |                          | 19900             | 1.853            | 13600        | 88       | 3.1 |
| 30           | 5                                   | 3.5  | 8.1      | 33200                     | 22700             | 1.265            | 37500        | 26.2                     | 19400             | 1.826            | 13200        | 88       | 3.1 |
|              | 7.5                                 | 6.9  | 16.0     | 33600                     | 22700             | 1.171            | 37600        | 28.7                     | 20400             | 1.848            | 14100        | 89       | 3.2 |
|              | 10                                  | 11.2 | 25.8     | 34000                     | 22800             | 1.077            | 37700        | 31.6                     | 21500             | 1.871            | 15100        | 90       | 3.4 |
| 40           | 5                                   | 3.4  | 7.9      | 33300                     | 22800             | 1.326            | 37800        | 25.1                     | 22800             | 1.874            | 16400        | 91       | 3.6 |
|              | 7.5                                 | 6.7  | 15.5     | 33700                     | 22900             | 1.232            | 37900        | 27.3                     | 23800             | 1.897            | 17300        | 92       | 3.7 |
|              | 10                                  | 10.9 | 25.1     | 34100                     | 22900             | 1.138            | 38000        | 30.0                     | 24900             | 1.919            | 18300        | 93       | 3.8 |
| 50           | 5                                   | 3.3  | 7.7      | 32800                     | 22700             | 1.407            | 37600        | 23.3                     | 26300             | 1.932            | 19700        | 94       | 4.0 |
|              | 7.5                                 | 6.5  | 15.1     | 33200                     | 22800             | 1.313            | 37700        | 25.3                     | 27400             | 1.955            | 20700        | 95       | 4.1 |
|              | 10                                  | 10.6 | 24.4     | 33600                     | 22800             | 1.219            | 37800        | 27.6                     | 28400             | 1.977            | 21600        | 96       | 4.2 |
| 60           | 5                                   | 3.2  | 7.5      | 32000                     | 22400             | 1.514            | 37200        | 21.1                     | 29900             | 1.994            | 23100        | 98       | 4.4 |
|              | 7.5                                 | 6.4  | 14.7     | 32400                     | 22500             | 1.420            | 37200        | 22.8                     | 30900             | 2.017            | 24000        | 99       | 4.5 |
|              | 10                                  | 10.3 | 23.8     | 32800                     | 22500             | 1.326            | 37300        | 24.7                     | 32000             | 2.040            | 25000        | 100      | 4.6 |
| 70           | 5                                   | 3.2  | 7.3      | 30900                     | 21900             | 1.654            | 36500        | 18.7                     | 33300             | 2.060            | 26300        | 101      | 4.7 |
|              | 7.5                                 | 6.2  | 14.4     | 31300                     | 21900             | 1.560            | 36600        | 20.1                     | 34300             | 2.083            | 27200        | 102      | 4.8 |
|              | 10                                  | 10.1 | 23.3     | 31700                     | 22000             | 1.467            | 36700        | 21.6                     | 35400             | 2.105            | 28200        | 103      | 4.9 |
| 80           | 5                                   | 3.1  | 7.2      | 29600                     | 21200             | 1.835            | 35900        | 16.1                     | 36600             | 2.131            | 29300        | 104      | 5.0 |
|              | 7.5                                 | 6.1  | 14.2     | 30000                     | 21300             | 1.741            | 35900        | 17.2                     | 37700             | 2.154            | 30300        | 105      | 5.1 |
|              | 10                                  | 9.9  | 22.9     | 30400                     | 21300             | 1.647            | 36000        | 18.5                     | 38700             | 2.176            | 31300        | 106      | 5.2 |
| 90           | 5                                   | 3.1  | 7.1      | 28100                     | 20400             | 2.062            | 35100        | 13.6                     | 39800             | 2.209            | 32300        | 107      | 5.3 |
|              | 7.5                                 | 6.0  | 13.9     | 28500                     | 20500             | 1.968            | 35200        | 14.5                     | 40900             | 2.231            | 33300        | 108      | 5.4 |
|              | 10                                  | 9.7  | 22.5     | 28900                     | 20500             | 1.875            | 35300        | 15.4                     | 41900             | 2.254            | 34200        | 109      | 5.4 |
| Table Legend |                                     |      |          |                           |                   |                  |              |                          |                   |                  |              |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                           |                   |                  | GPM          | Gallons per Minute       |                   |                  |              |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                           |                   |                  | kW           | Kilowatts                |                   |                  |              |          |     |
| COP          | Coefficient of Performance          |      |          |                           |                   |                  | LAT          | Leaving Air Temperature  |                   |                  |              |          |     |
| EAT          | Entering Air Temperature            |      |          |                           |                   |                  | PSI          | Pounds per square Inch   |                   |                  |              |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                           |                   |                  | THA          | Total Heat of Absorption |                   |                  |              |          |     |
| EWT          | Entering Water Temperature          |      |          |                           |                   |                  | THR          | Total Heat of Rejection  |                   |                  |              |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                           |                   |                  | WPD          | Waterside Pressure Drop  |                   |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD |          | Cooling—EAT 80/67° F |                      |                        |                 |                          | Heating—EAT 70° F         |                        |                 |          |     |
|--------------|-------------------------------------|-----|----------|----------------------|----------------------|------------------------|-----------------|--------------------------|---------------------------|------------------------|-----------------|----------|-----|
|              |                                     | PSI | Ft of WC | Total<br>(Btu/hr)    | Sensible<br>(Btu/hr) | Power<br>Input<br>(kW) | THR<br>(Btu/hr) | EER                      | Total<br>(Btu/hr)         | Power<br>Input<br>(kW) | THA<br>(Btu/hr) | LAT (°F) | COP |
| 100          | 5                                   | 3.0 | 7.0      | 26500                | 19600                | 2.344                  | 34500           | 11.3                     | Operation not recommended |                        |                 |          |     |
|              | 7.5                                 | 5.9 | 13.7     | 26900                | 19600                | 2.250                  | 34600           | 12.0                     |                           |                        |                 |          |     |
|              | 10                                  | 9.6 | 22.2     | 27300                | 19700                | 2.156                  | 34700           | 12.7                     |                           |                        |                 |          |     |
| 110          | 5                                   | 3.0 | 6.9      | 24900                | 18800                | 2.686                  | 34100           | 9.3                      |                           |                        |                 |          |     |
|              | 7.5                                 | 5.9 | 13.6     | 25300                | 18800                | 2.592                  | 34200           | 9.8                      |                           |                        |                 |          |     |
|              | 10                                  | 9.5 | 22.0     | 25700                | 18800                | 2.498                  | 34200           | 10.3                     |                           |                        |                 |          |     |
| 120          | 5                                   | 3.0 | 6.8      | 23100                | 18100                | 3.096                  | 33700           | 7.5                      |                           |                        |                 |          |     |
|              | 7.5                                 | 5.8 | 13.5     | 23500                | 18100                | 3.002                  | 33800           | 7.8                      |                           |                        |                 |          |     |
|              | 10                                  | 9.4 | 21.8     | 23900                | 18100                | 2.908                  | 33800           | 8.2                      |                           |                        |                 |          |     |
| Table Legend |                                     |     |          |                      |                      |                        |                 |                          |                           |                        |                 |          |     |
| Btu/h        | British Thermal Units per Hour      |     |          |                      |                      |                        | GPM             | Gallons per Minute       |                           |                        |                 |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |     |          |                      |                      |                        | kW              | Kilowatts                |                           |                        |                 |          |     |
| COP          | Coefficient of Performance          |     |          |                      |                      |                        | LAT             | Leaving Air Temperature  |                           |                        |                 |          |     |
| EAT          | Entering Air Temperature            |     |          |                      |                      |                        | PSI             | Pounds per square Inch   |                           |                        |                 |          |     |
| EER          | Energy Efficiency Ratio             |     |          |                      |                      |                        | THA             | Total Heat of Absorption |                           |                        |                 |          |     |
| EWT          | Entering Water Temperature          |     |          |                      |                      |                        | THR             | Total Heat of Rejection  |                           |                        |                 |          |     |
| Ft of WC     | Feet of Water Column                |     |          |                      |                      |                        | WPD             | Waterside Pressure Drop  |                           |                        |                 |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.



**Table 13: Size 036 (1200 CFM)**

| EWT (°F)            | GPM                                 | WPD  |          | Cooling—EAT 80/67° F      |                   |                  |              |                          | Heating—EAT 70° F |                  |              |          |     |
|---------------------|-------------------------------------|------|----------|---------------------------|-------------------|------------------|--------------|--------------------------|-------------------|------------------|--------------|----------|-----|
|                     |                                     | PSI  | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25                  | 6                                   | 4.8  | 11.2     | Operation not recommended |                   |                  |              |                          | 23700             | 2.262            | 16000        | 88       | 3.1 |
|                     | 9                                   | 9.8  | 22.7     |                           |                   |                  |              |                          | 24600             | 2.280            | 16800        | 89       | 3.2 |
|                     | 12                                  | 16.2 | 37.4     |                           |                   |                  |              |                          | 25500             | 2.299            | 17600        | 90       | 3.3 |
| 30                  | 6                                   | 4.8  | 11.0     | 39300                     | 25900             | 1.538            | 44600        | 25.5                     | 25800             | 2.295            | 18000        | 90       | 3.3 |
|                     | 9                                   | 9.7  | 22.3     | 39700                     | 26000             | 1.416            | 44500        | 28.0                     | 26700             | 2.314            | 18800        | 90       | 3.4 |
|                     | 12                                  | 15.9 | 36.8     | 40100                     | 26100             | 1.293            | 44500        | 31.0                     | 27600             | 2.332            | 19600        | 91       | 3.5 |
| 40                  | 6                                   | 4.6  | 10.7     | 41100                     | 27300             | 1.612            | 46600        | 25.5                     | 29800             | 2.360            | 21700        | 93       | 3.7 |
|                     | 9                                   | 9.4  | 21.7     | 41500                     | 27400             | 1.490            | 46600        | 27.9                     | 30700             | 2.379            | 22600        | 94       | 3.8 |
|                     | 12                                  | 15.5 | 35.7     | 41900                     | 27500             | 1.367            | 46600        | 30.7                     | 31600             | 2.397            | 23400        | 94       | 3.9 |
| 50                  | 6                                   | 4.5  | 10.4     | 40800                     | 27500             | 1.730            | 46700        | 23.6                     | 33400             | 2.421            | 25100        | 96       | 4.0 |
|                     | 9                                   | 9.1  | 21.1     | 41200                     | 27600             | 1.607            | 46700        | 25.6                     | 34300             | 2.440            | 26000        | 96       | 4.1 |
|                     | 12                                  | 15.1 | 34.8     | 41600                     | 27700             | 1.485            | 46700        | 28.0                     | 35200             | 2.458            | 26800        | 97       | 4.2 |
| 60                  | 6                                   | 4.4  | 10.2     | 39600                     | 27100             | 1.884            | 46000        | 21.0                     | 36700             | 2.479            | 28200        | 98       | 4.3 |
|                     | 9                                   | 8.9  | 20.6     | 39900                     | 27200             | 1.761            | 45900        | 22.7                     | 37600             | 2.498            | 29100        | 99       | 4.4 |
|                     | 12                                  | 14.7 | 33.9     | 40300                     | 27300             | 1.639            | 45900        | 24.6                     | 38400             | 2.516            | 29800        | 99       | 4.5 |
| 70                  | 6                                   | 4.3  | 9.9      | 38100                     | 26400             | 2.070            | 45200        | 18.4                     | 39500             | 2.533            | 30800        | 100      | 4.6 |
|                     | 9                                   | 8.7  | 20.1     | 38500                     | 26500             | 1.947            | 45100        | 19.8                     | 40400             | 2.551            | 31700        | 101      | 4.6 |
|                     | 12                                  | 14.4 | 33.2     | 38900                     | 26600             | 1.824            | 45100        | 21.3                     | 41300             | 2.570            | 32500        | 102      | 4.7 |
| 80                  | 6                                   | 4.2  | 9.8      | 36700                     | 25600             | 2.288            | 44500        | 16.0                     | 42100             | 2.583            | 33300        | 102      | 4.8 |
|                     | 9                                   | 8.6  | 19.8     | 37100                     | 25700             | 2.165            | 44500        | 17.1                     | 43000             | 2.601            | 34100        | 103      | 4.8 |
|                     | 12                                  | 14.1 | 32.6     | 37500                     | 25800             | 2.043            | 44500        | 18.4                     | 43900             | 2.620            | 35000        | 104      | 4.9 |
| 90                  | 6                                   | 4.2  | 9.6      | 35200                     | 24900             | 2.543            | 43900        | 13.8                     | 44200             | 2.628            | 35200        | 104      | 4.9 |
|                     | 9                                   | 8.4  | 19.4     | 35600                     | 25000             | 2.420            | 43900        | 14.7                     | 45100             | 2.646            | 36100        | 105      | 5.0 |
|                     | 12                                  | 13.9 | 32.1     | 36000                     | 25100             | 2.298            | 43800        | 15.7                     | 46000             | 2.665            | 36900        | 105      | 5.1 |
| <b>Table Legend</b> |                                     |      |          |                           |                   |                  |              |                          |                   |                  |              |          |     |
| Btu/h               | British Thermal Units per Hour      |      |          |                           |                   |                  | GPM          | Gallons per Minute       |                   |                  |              |          |     |
| CFM                 | Airflow rate, Cubic Feet per Minute |      |          |                           |                   |                  | kW           | Kilowatts                |                   |                  |              |          |     |
| COP                 | Coefficient of Performance          |      |          |                           |                   |                  | LAT          | Leaving Air Temperature  |                   |                  |              |          |     |
| EAT                 | Entering Air Temperature            |      |          |                           |                   |                  | PSI          | Pounds per square Inch   |                   |                  |              |          |     |
| EER                 | Energy Efficiency Ratio             |      |          |                           |                   |                  | THA          | Total Heat of Absorption |                   |                  |              |          |     |
| EWT                 | Entering Water Temperature          |      |          |                           |                   |                  | THR          | Total Heat of Rejection  |                   |                  |              |          |     |
| Ft of WC            | Feet of Water Column                |      |          |                           |                   |                  | WPD          | Waterside Pressure Drop  |                   |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD  |          | Cooling—EAT 80/67° F |                   |                  |              |                          | Heating—EAT 70° F         |                  |              |          |     |
|--------------|-------------------------------------|------|----------|----------------------|-------------------|------------------|--------------|--------------------------|---------------------------|------------------|--------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total (Btu/hr)       | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)            | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 100          | 6                                   | 4.1  | 9.5      | 33500                | 24200             | 2.843            | 43200        | 11.8                     | Operation not recommended |                  |              |          |     |
|              | 9                                   | 8.3  | 19.2     | 33900                | 24300             | 2.720            | 43200        | 12.5                     |                           |                  |              |          |     |
|              | 12                                  | 13.7 | 31.6     | 34300                | 24400             | 2.598            | 43200        | 13.2                     |                           |                  |              |          |     |
| 110          | 6                                   | 4.1  | 9.4      | 31500                | 23400             | 3.201            | 42400        | 9.8                      |                           |                  |              |          |     |
|              | 9                                   | 8.2  | 19.0     | 31900                | 23500             | 3.078            | 42400        | 10.4                     |                           |                  |              |          |     |
|              | 12                                  | 13.5 | 31.3     | 32300                | 23500             | 2.955            | 42400        | 10.9                     |                           |                  |              |          |     |
| 120          | 6                                   | 4.0  | 9.3      | 29200                | 22200             | 3.632            | 41600        | 8.0                      |                           |                  |              |          |     |
|              | 9                                   | 8.1  | 18.8     | 29600                | 22300             | 3.510            | 41600        | 8.4                      |                           |                  |              |          |     |
|              | 12                                  | 13.4 | 31.0     | 30000                | 22400             | 3.387            | 41600        | 8.9                      |                           |                  |              |          |     |
| Table Legend |                                     |      |          |                      |                   |                  |              |                          |                           |                  |              |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                      |                   |                  | GPM          | Gallons per Minute       |                           |                  |              |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                      |                   |                  | kW           | Kilowatts                |                           |                  |              |          |     |
| COP          | Coefficient of Performance          |      |          |                      |                   |                  | LAT          | Leaving Air Temperature  |                           |                  |              |          |     |
| EAT          | Entering Air Temperature            |      |          |                      |                   |                  | PSI          | Pounds per square Inch   |                           |                  |              |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                      |                   |                  | THA          | Total Heat of Absorption |                           |                  |              |          |     |
| EWT          | Entering Water Temperature          |      |          |                      |                   |                  | THR          | Total Heat of Rejection  |                           |                  |              |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                      |                   |                  | WPD          | Waterside Pressure Drop  |                           |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

# EC Motor

**Table 14: Size 009 (300 CFM)**

| EWT (°F) | GPM  | WPD |          | Cooling—EAT 80/67° F      |                   |                  |              |      | Heating—EAT 70° F |                  |              |          |     |
|----------|------|-----|----------|---------------------------|-------------------|------------------|--------------|------|-------------------|------------------|--------------|----------|-----|
|          |      | PSI | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER  | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25       | 1.5  | 2.3 | 5.3      | Operation not recommended |                   |                  |              |      | 5200              | 0.541            | 3400         | 86       | 2.8 |
|          | 2.25 | 4.7 | 10.7     |                           |                   |                  |              |      | 5500              | 0.545            | 3600         | 87       | 3.0 |
|          | 3    | 7.6 | 17.6     |                           |                   |                  |              |      | 5900              | 0.549            | 4000         | 88       | 3.1 |
| 30       | 1.5  | 2.3 | 5.3      | 11300                     | 7200              | 0.281            | 12300        | 40.2 | 5700              | 0.551            | 3800         | 87       | 3.0 |
|          | 2.25 | 4.6 | 10.6     | 11500                     | 7300              | 0.261            | 12400        | 44.1 | 6000              | 0.555            | 4100         | 88       | 3.2 |
|          | 3    | 7.5 | 17.4     | 11700                     | 7400              | 0.241            | 12500        | 48.6 | 6300              | 0.559            | 4400         | 89       | 3.3 |
| 40       | 1.5  | 2.2 | 5.1      | 11100                     | 7200              | 0.308            | 12200        | 36.1 | 7000              | 0.572            | 5000         | 91       | 3.6 |
|          | 2.25 | 4.4 | 10.3     | 11300                     | 7200              | 0.287            | 12300        | 39.3 | 7300              | 0.576            | 5300         | 92       | 3.7 |
|          | 3    | 7.3 | 16.9     | 11500                     | 7300              | 0.267            | 12400        | 43.0 | 7600              | 0.581            | 5600         | 93       | 3.8 |
| 50       | 1.5  | 2.2 | 5.0      | 10700                     | 7000              | 0.349            | 11900        | 30.6 | 8300              | 0.593            | 6300         | 95       | 4.1 |
|          | 2.25 | 4.3 | 10.0     | 10900                     | 7100              | 0.329            | 12000        | 33.1 | 8600              | 0.597            | 6600         | 96       | 4.2 |
|          | 3    | 7.1 | 16.4     | 11200                     | 7200              | 0.309            | 12300        | 36.2 | 8900              | 0.601            | 6800         | 97       | 4.3 |
| 60       | 1.5  | 2.1 | 4.9      | 10300                     | 6800              | 0.404            | 11700        | 25.5 | 9600              | 0.611            | 7500         | 99       | 4.6 |
|          | 2.25 | 4.2 | 9.8      | 10500                     | 6900              | 0.384            | 11800        | 27.4 | 9900              | 0.615            | 7800         | 100      | 4.7 |
|          | 3    | 6.9 | 16.0     | 10700                     | 7000              | 0.363            | 11900        | 29.4 | 10200             | 0.619            | 8100         | 101      | 4.8 |
| 70       | 1.5  | 2.1 | 4.8      | 9800                      | 6600              | 0.468            | 11400        | 20.9 | 10700             | 0.626            | 8600         | 103      | 5.0 |
|          | 2.25 | 4.1 | 9.6      | 10000                     | 6700              | 0.448            | 11500        | 22.3 | 11000             | 0.630            | 8800         | 104      | 5.1 |
|          | 3    | 6.8 | 15.7     | 10200                     | 6700              | 0.428            | 11700        | 23.8 | 11300             | 0.634            | 9100         | 105      | 5.2 |
| 80       | 1.5  | 2.0 | 4.7      | 9200                      | 6300              | 0.540            | 11000        | 17.0 | 11800             | 0.640            | 9600         | 106      | 5.4 |
|          | 2.25 | 4.1 | 9.4      | 9400                      | 6400              | 0.520            | 11200        | 18.1 | 12100             | 0.644            | 9900         | 107      | 5.5 |
|          | 3    | 6.7 | 15.4     | 9600                      | 6400              | 0.500            | 11300        | 19.2 | 12400             | 0.648            | 10200        | 108      | 5.6 |
| 90       | 1.5  | 2.0 | 4.6      | 8500                      | 6000              | 0.616            | 10600        | 13.8 | 12800             | 0.652            | 10600        | 109      | 5.8 |
|          | 2.25 | 4.0 | 9.2      | 8800                      | 6000              | 0.596            | 10800        | 14.8 | 13100             | 0.656            | 10900        | 110      | 5.9 |
|          | 3    | 6.6 | 15.1     | 9000                      | 6100              | 0.576            | 11000        | 15.6 | 13400             | 0.660            | 11100        | 111      | 6.0 |

## Table Legend

|          |                                     |     |                          |
|----------|-------------------------------------|-----|--------------------------|
| Btu/h    | British Thermal Units per Hour      | GPM | Gallons per Minute       |
| CFM      | Airflow rate, Cubic Feet per Minute | kW  | Kilowatts                |
| COP      | Coefficient of Performance          | LAT | Leaving Air Temperature  |
| EAT      | Entering Air Temperature            | PSI | Pounds per square Inch   |
| EER      | Energy Efficiency Ratio             | THA | Total Heat of Absorption |
| EWT      | Entering Water Temperature          | THR | Total Heat of Rejection  |
| Ft of WC | Feet of Water Column                | WPD | Waterside Pressure Drop  |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD |          | Cooling—EAT 80/67° F |                   |                  |              |                          | Heating—EAT 70° F         |                  |              |          |     |
|--------------|-------------------------------------|-----|----------|----------------------|-------------------|------------------|--------------|--------------------------|---------------------------|------------------|--------------|----------|-----|
|              |                                     | PSI | Ft of WC | Total (Btu/hr)       | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)            | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 100          | 1.5                                 | 2.0 | 4.5      | 7800                 | 5600              | 0.695            | 10200        | 11.2                     | Operation not recommended |                  |              |          |     |
|              | 2.25                                | 3.9 | 9.1      | 8000                 | 5700              | 0.675            | 10300        | 11.9                     |                           |                  |              |          |     |
|              | 3                                   | 6.5 | 14.9     | 8300                 | 5800              | 0.654            | 10500        | 12.7                     |                           |                  |              |          |     |
| 110          | 1.5                                 | 1.9 | 4.5      | 7000                 | 5300              | 0.773            | 9600         | 9.1                      |                           |                  |              |          |     |
|              | 2.25                                | 3.9 | 9.0      | 7300                 | 5300              | 0.753            | 9900         | 9.7                      |                           |                  |              |          |     |
|              | 3                                   | 6.4 | 14.8     | 7500                 | 5400              | 0.732            | 10000        | 10.2                     |                           |                  |              |          |     |
| 120          | 1.5                                 | 1.9 | 4.4      | 6200                 | 4900              | 0.847            | 9100         | 7.3                      |                           |                  |              |          |     |
|              | 2.25                                | 3.9 | 8.9      | 6500                 | 5000              | 0.827            | 9300         | 7.9                      |                           |                  |              |          |     |
|              | 3                                   | 6.3 | 14.6     | 6700                 | 5100              | 0.807            | 9500         | 8.3                      |                           |                  |              |          |     |
| Table Legend |                                     |     |          |                      |                   |                  |              |                          |                           |                  |              |          |     |
| Btu/h        | British Thermal Units per Hour      |     |          |                      |                   |                  | GPM          | Gallons per Minute       |                           |                  |              |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |     |          |                      |                   |                  | kW           | Kilowatts                |                           |                  |              |          |     |
| COP          | Coefficient of Performance          |     |          |                      |                   |                  | LAT          | Leaving Air Temperature  |                           |                  |              |          |     |
| EAT          | Entering Air Temperature            |     |          |                      |                   |                  | PSI          | Pounds per square Inch   |                           |                  |              |          |     |
| EER          | Energy Efficiency Ratio             |     |          |                      |                   |                  | THA          | Total Heat of Absorption |                           |                  |              |          |     |
| EWT          | Entering Water Temperature          |     |          |                      |                   |                  | THR          | Total Heat of Rejection  |                           |                  |              |          |     |
| Ft of WC     | Feet of Water Column                |     |          |                      |                   |                  | WPD          | Waterside Pressure Drop  |                           |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

**Table 15: Size 012 (400 CFM)**

| EWT (°F)            | GPM                                 | WPD  |          | Cooling—EAT 80/67° F      |                   |                  |              |      | Heating—EAT 70° F        |                  |              |          |     |
|---------------------|-------------------------------------|------|----------|---------------------------|-------------------|------------------|--------------|------|--------------------------|------------------|--------------|----------|-----|
|                     |                                     | PSI  | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER  | Total (Btu/hr)           | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25                  | 2                                   | 3.4  | 7.9      | Operation not recommended |                   |                  |              |      | 6700                     | 0.668            | 4400         | 86       | 2.9 |
|                     | 3                                   | 7.1  | 16.5     |                           |                   |                  |              |      | 7100                     | 0.678            | 4800         | 87       | 3.1 |
|                     | 4                                   | 12.0 | 27.7     |                           |                   |                  |              |      | 7500                     | 0.688            | 5100         | 88       | 3.2 |
| 30                  | 2                                   | 3.4  | 7.8      | 14300                     | 9300              | 0.394            | 15600        | 36.3 | 7400                     | 0.680            | 5100         | 88       | 3.2 |
|                     | 3                                   | 7.0  | 16.3     | 14400                     | 9300              | 0.365            | 15600        | 39.5 | 7800                     | 0.691            | 5400         | 89       | 3.3 |
|                     | 4                                   | 11.8 | 27.3     | 14500                     | 9400              | 0.335            | 15600        | 43.3 | 8200                     | 0.701            | 5800         | 89       | 3.4 |
| 40                  | 2                                   | 3.3  | 7.6      | 13800                     | 9000              | 0.463            | 15400        | 29.8 | 8900                     | 0.719            | 6400         | 91       | 3.6 |
|                     | 3                                   | 6.8  | 15.8     | 13900                     | 9000              | 0.433            | 15400        | 32.1 | 9300                     | 0.729            | 6800         | 92       | 3.7 |
|                     | 4                                   | 11.5 | 26.5     | 14000                     | 9100              | 0.404            | 15400        | 34.7 | 9700                     | 0.739            | 7200         | 93       | 3.8 |
| 50                  | 2                                   | 3.2  | 7.4      | 13400                     | 8800              | 0.522            | 15200        | 25.7 | 10400                    | 0.756            | 7800         | 95       | 4.0 |
|                     | 3                                   | 6.7  | 15.4     | 13500                     | 8900              | 0.492            | 15200        | 27.4 | 10800                    | 0.766            | 8200         | 96       | 4.1 |
|                     | 4                                   | 11.2 | 25.8     | 13600                     | 9000              | 0.462            | 15200        | 29.4 | 11200                    | 0.776            | 8500         | 97       | 4.2 |
| 60                  | 2                                   | 3.1  | 7.2      | 13100                     | 8800              | 0.578            | 15100        | 22.6 | 11900                    | 0.783            | 9200         | 98       | 4.5 |
|                     | 3                                   | 6.5  | 15.0     | 13200                     | 8800              | 0.549            | 15100        | 24.0 | 12300                    | 0.794            | 9600         | 99       | 4.5 |
|                     | 4                                   | 10.9 | 25.2     | 13300                     | 8900              | 0.519            | 15100        | 25.6 | 12700                    | 0.804            | 10000        | 100      | 4.6 |
| 70                  | 2                                   | 3.1  | 7.1      | 12600                     | 8600              | 0.641            | 14800        | 19.6 | 13300                    | 0.806            | 10500        | 102      | 4.8 |
|                     | 3                                   | 6.4  | 14.7     | 12700                     | 8700              | 0.612            | 14800        | 20.8 | 13700                    | 0.816            | 10900        | 103      | 4.9 |
|                     | 4                                   | 10.7 | 24.7     | 12900                     | 8800              | 0.582            | 14900        | 22.2 | 14100                    | 0.826            | 11300        | 103      | 5.0 |
| 80                  | 2                                   | 3.0  | 6.9      | 12000                     | 8400              | 0.718            | 14500        | 16.7 | 14600                    | 0.832            | 11800        | 105      | 5.1 |
|                     | 3                                   | 6.2  | 14.4     | 12200                     | 8500              | 0.689            | 14600        | 17.7 | 15000                    | 0.842            | 12100        | 106      | 5.2 |
|                     | 4                                   | 10.5 | 24.2     | 12300                     | 8500              | 0.659            | 14600        | 18.7 | 15400                    | 0.852            | 12500        | 107      | 5.3 |
| 90                  | 2                                   | 3.0  | 6.8      | 11300                     | 8100              | 0.817            | 14100        | 13.8 | 15800                    | 0.863            | 12900        | 108      | 5.4 |
|                     | 3                                   | 6.1  | 14.2     | 11400                     | 8100              | 0.787            | 14100        | 14.5 | 16200                    | 0.874            | 13200        | 108      | 5.4 |
|                     | 4                                   | 10.3 | 23.8     | 11500                     | 8200              | 0.758            | 14100        | 15.2 | 16600                    | 0.884            | 13600        | 109      | 5.5 |
| <b>Table Legend</b> |                                     |      |          |                           |                   |                  |              |      |                          |                  |              |          |     |
| Btu/h               | British Thermal Units per Hour      |      |          |                           |                   |                  |              | GPM  | Gallons per Minute       |                  |              |          |     |
| CFM                 | Airflow rate, Cubic Feet per Minute |      |          |                           |                   |                  |              | kW   | Kilowatts                |                  |              |          |     |
| COP                 | Coefficient of Performance          |      |          |                           |                   |                  |              | LAT  | Leaving Air Temperature  |                  |              |          |     |
| EAT                 | Entering Air Temperature            |      |          |                           |                   |                  |              | PSI  | Pounds per square Inch   |                  |              |          |     |
| EER                 | Energy Efficiency Ratio             |      |          |                           |                   |                  |              | THA  | Total Heat of Absorption |                  |              |          |     |
| EWT                 | Entering Water Temperature          |      |          |                           |                   |                  |              | THR  | Total Heat of Rejection  |                  |              |          |     |
| Ft of WC            | Feet of Water Column                |      |          |                           |                   |                  |              | WPD  | Waterside Pressure Drop  |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD  |          | Cooling—EAT 80/67° F |                   |                  |              |                          | Heating—EAT 70° F         |                  |              |          |     |
|--------------|-------------------------------------|------|----------|----------------------|-------------------|------------------|--------------|--------------------------|---------------------------|------------------|--------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total (Btu/hr)       | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)            | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 100          | 2                                   | 2.9  | 6.7      | 10400                | 7600              | 0.945            | 13600        | 11.0                     | Operation not recommended |                  |              |          |     |
|              | 3                                   | 6.1  | 14.0     | 10600                | 7700              | 0.916            | 13700        | 11.6                     |                           |                  |              |          |     |
|              | 4                                   | 10.2 | 23.5     | 10700                | 7700              | 0.886            | 13700        | 12.1                     |                           |                  |              |          |     |
| 110          | 2                                   | 2.9  | 6.6      | 9600                 | 7200              | 1.112            | 13400        | 8.6                      |                           |                  |              |          |     |
|              | 3                                   | 6.0  | 13.8     | 9700                 | 7200              | 1.082            | 13400        | 9.0                      |                           |                  |              |          |     |
|              | 4                                   | 10.1 | 23.2     | 9800                 | 7300              | 1.052            | 13400        | 9.3                      |                           |                  |              |          |     |
| 120          | 2                                   | 2.9  | 6.6      | 8900                 | 6800              | 1.323            | 13400        | 6.7                      |                           |                  |              |          |     |
|              | 3                                   | 5.9  | 13.7     | 9000                 | 6900              | 1.293            | 13400        | 7.0                      |                           |                  |              |          |     |
|              | 4                                   | 10.0 | 23.0     | 9100                 | 7000              | 1.264            | 13400        | 7.2                      |                           |                  |              |          |     |
| Table Legend |                                     |      |          |                      |                   |                  |              |                          |                           |                  |              |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                      |                   |                  | GPM          | Gallons per Minute       |                           |                  |              |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                      |                   |                  | kW           | Kilowatts                |                           |                  |              |          |     |
| COP          | Coefficient of Performance          |      |          |                      |                   |                  | LAT          | Leaving Air Temperature  |                           |                  |              |          |     |
| EAT          | Entering Air Temperature            |      |          |                      |                   |                  | PSI          | Pounds per square Inch   |                           |                  |              |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                      |                   |                  | THA          | Total Heat of Absorption |                           |                  |              |          |     |
| EWT          | Entering Water Temperature          |      |          |                      |                   |                  | THR          | Total Heat of Rejection  |                           |                  |              |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                      |                   |                  | WPD          | Waterside Pressure Drop  |                           |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

**Table 16: Size 015 (500 CFM)**

| EWT (°F)            | GPM                                 | WPD |          | Cooling—EAT 80/67° F      |                   |                  |              |                          | Heating—EAT 70° F |                  |              |          |     |
|---------------------|-------------------------------------|-----|----------|---------------------------|-------------------|------------------|--------------|--------------------------|-------------------|------------------|--------------|----------|-----|
|                     |                                     | PSI | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25                  | 2.5                                 | 2.5 | 5.8      | Operation not recommended |                   |                  |              |                          | 9400              | 0.942            | 6200         | 87       | 2.9 |
|                     | 3.75                                | 5.1 | 11.9     |                           |                   |                  |              |                          | 10000             | 0.952            | 6700         | 88       | 3.1 |
|                     | 5                                   | 8.5 | 19.7     |                           |                   |                  |              |                          | 10600             | 0.963            | 7300         | 90       | 3.2 |
| 30                  | 2.5                                 | 2.5 | 5.7      | 18100                     | 12000             | 0.592            | 20100        | 30.5                     | 10300             | 0.959            | 7000         | 89       | 3.1 |
|                     | 3.75                                | 5.1 | 11.7     | 18300                     | 12000             | 0.538            | 20100        | 34.0                     | 10900             | 0.969            | 7600         | 90       | 3.3 |
|                     | 5                                   | 8.4 | 19.4     | 18400                     | 12000             | 0.483            | 20000        | 38.1                     | 11500             | 0.979            | 8200         | 91       | 3.4 |
| 40                  | 2.5                                 | 2.4 | 5.5      | 18200                     | 12000             | 0.661            | 20500        | 27.5                     | 12100             | 0.996            | 8700         | 92       | 3.6 |
|                     | 3.75                                | 4.9 | 11.4     | 18400                     | 12000             | 0.606            | 20500        | 30.3                     | 12700             | 1.007            | 9300         | 93       | 3.7 |
|                     | 5                                   | 8.2 | 18.9     | 18500                     | 12000             | 0.552            | 20400        | 33.5                     | 13300             | 1.017            | 9800         | 94       | 3.8 |
| 50                  | 2.5                                 | 2.3 | 5.4      | 18200                     | 11900             | 0.721            | 20700        | 25.2                     | 14000             | 1.035            | 10500        | 96       | 4.0 |
|                     | 3.75                                | 4.8 | 11.1     | 18300                     | 11900             | 0.667            | 20600        | 27.4                     | 14600             | 1.045            | 11000        | 97       | 4.1 |
|                     | 5                                   | 8.0 | 18.4     | 18500                     | 12000             | 0.612            | 20600        | 30.2                     | 15300             | 1.055            | 11700        | 98       | 4.3 |
| 60                  | 2.5                                 | 2.3 | 5.3      | 17900                     | 11700             | 0.795            | 20600        | 22.5                     | 15900             | 1.069            | 12200        | 99       | 4.4 |
|                     | 3.75                                | 4.7 | 10.8     | 18000                     | 11700             | 0.741            | 20500        | 24.3                     | 16500             | 1.079            | 12800        | 100      | 4.5 |
|                     | 5                                   | 7.8 | 17.9     | 18200                     | 11800             | 0.686            | 20500        | 26.5                     | 17100             | 1.089            | 13400        | 101      | 4.6 |
| 70                  | 2.5                                 | 2.2 | 5.2      | 17200                     | 11400             | 0.891            | 20200        | 19.3                     | 17700             | 1.098            | 13900        | 103      | 4.7 |
|                     | 3.75                                | 4.6 | 10.6     | 17300                     | 11400             | 0.836            | 20200        | 20.7                     | 18300             | 1.108            | 14500        | 104      | 4.8 |
|                     | 5                                   | 7.6 | 17.5     | 17500                     | 11400             | 0.781            | 20200        | 22.4                     | 18900             | 1.118            | 15100        | 105      | 5.0 |
| 80                  | 2.5                                 | 2.2 | 5.1      | 16300                     | 11000             | 1.004            | 19700        | 16.2                     | 19300             | 1.121            | 15500        | 106      | 5.0 |
|                     | 3.75                                | 4.5 | 10.4     | 16400                     | 11000             | 0.950            | 19600        | 17.3                     | 19900             | 1.132            | 16000        | 107      | 5.2 |
|                     | 5                                   | 7.5 | 17.2     | 16600                     | 11000             | 0.895            | 19700        | 18.5                     | 20500             | 1.142            | 16600        | 108      | 5.3 |
| 90                  | 2.5                                 | 2.2 | 5.0      | 15300                     | 10500             | 1.129            | 19200        | 13.6                     | 20600             | 1.140            | 16700        | 108      | 5.3 |
|                     | 3.75                                | 4.4 | 10.2     | 15500                     | 10500             | 1.074            | 19200        | 14.4                     | 21200             | 1.150            | 17300        | 109      | 5.4 |
|                     | 5                                   | 7.3 | 16.9     | 15600                     | 10500             | 1.020            | 19100        | 15.3                     | 21900             | 1.160            | 17900        | 110      | 5.5 |
| <b>Table Legend</b> |                                     |     |          |                           |                   |                  |              |                          |                   |                  |              |          |     |
| Btu/h               | British Thermal Units per Hour      |     |          |                           |                   |                  | GPM          | Gallons per Minute       |                   |                  |              |          |     |
| CFM                 | Airflow rate, Cubic Feet per Minute |     |          |                           |                   |                  | kW           | Kilowatts                |                   |                  |              |          |     |
| COP                 | Coefficient of Performance          |     |          |                           |                   |                  | LAT          | Leaving Air Temperature  |                   |                  |              |          |     |
| EAT                 | Entering Air Temperature            |     |          |                           |                   |                  | PSI          | Pounds per square Inch   |                   |                  |              |          |     |
| EER                 | Energy Efficiency Ratio             |     |          |                           |                   |                  | THA          | Total Heat of Absorption |                   |                  |              |          |     |
| EWT                 | Entering Water Temperature          |     |          |                           |                   |                  | THR          | Total Heat of Rejection  |                   |                  |              |          |     |
| Ft of WC            | Feet of Water Column                |     |          |                           |                   |                  | WPD          | Waterside Pressure Drop  |                   |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.



| EWT<br>(°F)  | GPM                                 | WPD |          | Cooling—EAT 80/67° F |                      |                        |                 |                          | Heating—EAT 70° F         |                        |                 |          |     |
|--------------|-------------------------------------|-----|----------|----------------------|----------------------|------------------------|-----------------|--------------------------|---------------------------|------------------------|-----------------|----------|-----|
|              |                                     | PSI | Ft of WC | Total<br>(Btu/hr)    | Sensible<br>(Btu/hr) | Power<br>Input<br>(kW) | THR<br>(Btu/hr) | EER                      | Total<br>(Btu/hr)         | Power<br>Input<br>(kW) | THA<br>(Btu/hr) | LAT (°F) | COP |
| 100          | 2.5                                 | 2.1 | 4.9      | 14500                | 10100                | 1.256                  | 18800           | 11.5                     | Operation not recommended |                        |                 |          |     |
|              | 3.75                                | 4.4 | 10.1     | 14600                | 10100                | 1.201                  | 18700           | 12.2                     |                           |                        |                 |          |     |
|              | 5                                   | 7.2 | 16.7     | 14800                | 10100                | 1.146                  | 18700           | 12.9                     |                           |                        |                 |          |     |
| 110          | 2.5                                 | 2.1 | 4.9      | 13600                | 9800                 | 1.380                  | 18300           | 9.9                      |                           |                        |                 |          |     |
|              | 3.75                                | 4.3 | 9.9      | 13800                | 9800                 | 1.325                  | 18300           | 10.4                     |                           |                        |                 |          |     |
|              | 5                                   | 7.1 | 16.5     | 13900                | 9800                 | 1.270                  | 18200           | 10.9                     |                           |                        |                 |          |     |
| 120          | 2.5                                 | 2.1 | 4.8      | 12600                | 9400                 | 1.504                  | 17700           | 8.4                      |                           |                        |                 |          |     |
|              | 3.75                                | 4.3 | 9.8      | 12700                | 9400                 | 1.449                  | 17700           | 8.8                      |                           |                        |                 |          |     |
|              | 5                                   | 7.1 | 16.4     | 12900                | 9400                 | 1.395                  | 17700           | 9.2                      |                           |                        |                 |          |     |
| Table Legend |                                     |     |          |                      |                      |                        |                 |                          |                           |                        |                 |          |     |
| Btu/h        | British Thermal Units per Hour      |     |          |                      |                      |                        | GPM             | Gallons per Minute       |                           |                        |                 |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |     |          |                      |                      |                        | kW              | Kilowatts                |                           |                        |                 |          |     |
| COP          | Coefficient of Performance          |     |          |                      |                      |                        | LAT             | Leaving Air Temperature  |                           |                        |                 |          |     |
| EAT          | Entering Air Temperature            |     |          |                      |                      |                        | PSI             | Pounds per square Inch   |                           |                        |                 |          |     |
| EER          | Energy Efficiency Ratio             |     |          |                      |                      |                        | THA             | Total Heat of Absorption |                           |                        |                 |          |     |
| EWT          | Entering Water Temperature          |     |          |                      |                      |                        | THR             | Total Heat of Rejection  |                           |                        |                 |          |     |
| Ft of WC     | Feet of Water Column                |     |          |                      |                      |                        | WPD             | Waterside Pressure Drop  |                           |                        |                 |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

Table 17: Size 018 (600 CFM)

| EWT (°F)     | GPM                                 | WPD  |          | Cooling—EAT 80/67° F      |                   |                  |              |                          | Heating—EAT 70° F |                  |              |          |     |
|--------------|-------------------------------------|------|----------|---------------------------|-------------------|------------------|--------------|--------------------------|-------------------|------------------|--------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25           | 3                                   | 3.6  | 8.3      | Operation not recommended |                   |                  |              |                          | 11900             | 1.176            | 7900         | 88       | 3.0 |
|              | 4.5                                 | 7.6  | 17.6     |                           |                   |                  |              |                          | 12900             | 1.207            | 8800         | 90       | 3.1 |
|              | 6                                   | 13.0 | 30.1     |                           |                   |                  |              |                          | 13900             | 1.237            | 9700         | 91       | 3.3 |
| 30           | 3                                   | 3.5  | 8.2      | 22700                     | 14000             | 0.737            | 25200        | 30.8                     | 12900             | 1.212            | 8800         | 90       | 3.1 |
|              | 4.5                                 | 7.5  | 17.4     | 23000                     | 14100             | 0.664            | 25300        | 34.7                     | 13900             | 1.243            | 9700         | 91       | 3.3 |
|              | 6                                   | 12.8 | 29.7     | 23400                     | 14200             | 0.590            | 25400        | 39.7                     | 14900             | 1.273            | 10600        | 93       | 3.4 |
| 40           | 3                                   | 3.4  | 7.9      | 22500                     | 13900             | 0.766            | 25100        | 29.4                     | 15300             | 1.284            | 10900        | 93       | 3.5 |
|              | 4.5                                 | 7.3  | 16.9     | 22800                     | 14000             | 0.693            | 25200        | 32.9                     | 16200             | 1.314            | 11700        | 95       | 3.6 |
|              | 6                                   | 12.5 | 28.8     | 23200                     | 14100             | 0.619            | 25300        | 37.5                     | 17200             | 1.345            | 12600        | 96       | 3.7 |
| 50           | 3                                   | 3.3  | 7.7      | 22400                     | 13900             | 0.840            | 25300        | 26.7                     | 17700             | 1.354            | 13100        | 97       | 3.8 |
|              | 4.5                                 | 7.1  | 16.4     | 22700                     | 14000             | 0.766            | 25300        | 29.6                     | 18700             | 1.384            | 14000        | 99       | 4.0 |
|              | 6                                   | 12.1 | 28.0     | 23100                     | 14100             | 0.693            | 25500        | 33.4                     | 19700             | 1.415            | 14900        | 100      | 4.1 |
| 60           | 3                                   | 3.3  | 7.5      | 22000                     | 13700             | 0.947            | 25200        | 23.2                     | 20200             | 1.423            | 15300        | 101      | 4.2 |
|              | 4.5                                 | 6.9  | 16.0     | 22300                     | 13800             | 0.874            | 25300        | 25.5                     | 21200             | 1.454            | 16200        | 103      | 4.3 |
|              | 6                                   | 11.8 | 27.4     | 22600                     | 13900             | 0.800            | 25300        | 28.2                     | 22200             | 1.484            | 17100        | 104      | 4.4 |
| 70           | 3                                   | 3.2  | 7.4      | 21100                     | 13300             | 1.078            | 24800        | 19.6                     | 22600             | 1.492            | 17500        | 105      | 4.4 |
|              | 4.5                                 | 6.8  | 15.7     | 21400                     | 13400             | 1.005            | 24800        | 21.3                     | 23600             | 1.523            | 18400        | 106      | 4.5 |
|              | 6                                   | 11.6 | 26.8     | 21800                     | 13500             | 0.931            | 25000        | 23.4                     | 24600             | 1.553            | 19300        | 108      | 4.6 |
| 80           | 3                                   | 3.1  | 7.2      | 20000                     | 12700             | 1.225            | 24200        | 16.3                     | 24900             | 1.562            | 19600        | 108      | 4.7 |
|              | 4.5                                 | 6.7  | 15.4     | 20300                     | 12800             | 1.151            | 24200        | 17.6                     | 25900             | 1.593            | 20500        | 110      | 4.8 |
|              | 6                                   | 11.4 | 26.3     | 20600                     | 13000             | 1.078            | 24300        | 19.1                     | 26900             | 1.623            | 21400        | 111      | 4.9 |
| 90           | 3                                   | 3.1  | 7.1      | 18800                     | 12100             | 1.381            | 23500        | 13.6                     | 27200             | 1.630            | 21600        | 112      | 4.9 |
|              | 4.5                                 | 6.6  | 15.1     | 19100                     | 12300             | 1.307            | 23600        | 14.6                     | 28200             | 1.661            | 22500        | 113      | 5.0 |
|              | 6                                   | 11.2 | 25.9     | 19500                     | 12400             | 1.234            | 23700        | 15.8                     | 29100             | 1.691            | 23300        | 115      | 5.0 |
| Table Legend |                                     |      |          |                           |                   |                  |              |                          |                   |                  |              |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                           |                   |                  | GPM          | Gallons per Minute       |                   |                  |              |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                           |                   |                  | kW           | Kilowatts                |                   |                  |              |          |     |
| COP          | Coefficient of Performance          |      |          |                           |                   |                  | LAT          | Leaving Air Temperature  |                   |                  |              |          |     |
| EAT          | Entering Air Temperature            |      |          |                           |                   |                  | PSI          | Pounds per square Inch   |                   |                  |              |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                           |                   |                  | THA          | Total Heat of Absorption |                   |                  |              |          |     |
| EWT          | Entering Water Temperature          |      |          |                           |                   |                  | THR          | Total Heat of Rejection  |                   |                  |              |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                           |                   |                  | WPD          | Waterside Pressure Drop  |                   |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD  |          | Cooling—EAT 80/67° F |                      |                        |                 |                          | Heating—EAT 70° F         |                        |                 |          |     |
|--------------|-------------------------------------|------|----------|----------------------|----------------------|------------------------|-----------------|--------------------------|---------------------------|------------------------|-----------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total<br>(Btu/hr)    | Sensible<br>(Btu/hr) | Power<br>Input<br>(kW) | THR<br>(Btu/hr) | EER                      | Total<br>(Btu/hr)         | Power<br>Input<br>(kW) | THA<br>(Btu/hr) | LAT (°F) | COP |
| 100          | 3                                   | 3.0  | 7.0      | 17700                | 11700                | 1.545                  | 23000           | 11.5                     | Operation not recommended |                        |                 |          |     |
|              | 4.5                                 | 6.5  | 14.9     | 18100                | 11800                | 1.472                  | 23100           | 12.3                     |                           |                        |                 |          |     |
|              | 6                                   | 11.0 | 25.5     | 18400                | 11900                | 1.398                  | 23200           | 13.2                     |                           |                        |                 |          |     |
| 110          | 3                                   | 3.0  | 6.9      | 16700                | 11200                | 1.723                  | 22600           | 9.7                      |                           |                        |                 |          |     |
|              | 4.5                                 | 6.4  | 14.8     | 17100                | 11300                | 1.650                  | 22700           | 10.4                     |                           |                        |                 |          |     |
|              | 6                                   | 10.9 | 25.2     | 17400                | 11500                | 1.576                  | 22800           | 11.0                     |                           |                        |                 |          |     |
| 120          | 3                                   | 3.0  | 6.9      | 15300                | 10500                | 1.927                  | 21900           | 7.9                      |                           |                        |                 |          |     |
|              | 4.5                                 | 6.3  | 14.6     | 15700                | 10700                | 1.853                  | 22000           | 8.5                      |                           |                        |                 |          |     |
|              | 6                                   | 10.8 | 25.0     | 16000                | 10800                | 1.780                  | 22100           | 9.0                      |                           |                        |                 |          |     |
| Table Legend |                                     |      |          |                      |                      |                        |                 |                          |                           |                        |                 |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                      |                      |                        | GPM             | Gallons per Minute       |                           |                        |                 |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                      |                      |                        | kW              | Kilowatts                |                           |                        |                 |          |     |
| COP          | Coefficient of Performance          |      |          |                      |                      |                        | LAT             | Leaving Air Temperature  |                           |                        |                 |          |     |
| EAT          | Entering Air Temperature            |      |          |                      |                      |                        | PSI             | Pounds per square Inch   |                           |                        |                 |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                      |                      |                        | THA             | Total Heat of Absorption |                           |                        |                 |          |     |
| EWT          | Entering Water Temperature          |      |          |                      |                      |                        | THR             | Total Heat of Rejection  |                           |                        |                 |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                      |                      |                        | WPD             | Waterside Pressure Drop  |                           |                        |                 |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

**Table 18: Size 024 (800 CFM)**

| EWT (°F)            | GPM                                 | WPD  |          | Cooling—EAT 80/67° F      |                   |                  |              |                          | Heating—EAT 70° F |                  |              |          |     |
|---------------------|-------------------------------------|------|----------|---------------------------|-------------------|------------------|--------------|--------------------------|-------------------|------------------|--------------|----------|-----|
|                     |                                     | PSI  | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25                  | 4                                   | 4.2  | 9.6      | Operation not recommended |                   |                  |              |                          | 14600             | 1.418            | 9800         | 86       | 3.0 |
|                     | 6                                   | 8.2  | 19.0     |                           |                   |                  |              |                          | 15200             | 1.432            | 10300        | 86       | 3.1 |
|                     | 8                                   | 13.4 | 30.9     |                           |                   |                  |              |                          | 15800             | 1.445            | 10900        | 87       | 3.2 |
| 30                  | 4                                   | 4.1  | 9.5      | 28300                     | 18900             | 0.885            | 31300        | 32.0                     | 15800             | 1.430            | 10900        | 87       | 3.2 |
|                     | 6                                   | 8.1  | 18.7     | 28100                     | 18800             | 0.848            | 31000        | 33.1                     | 16400             | 1.444            | 11500        | 88       | 3.3 |
|                     | 8                                   | 13.2 | 30.4     | 27900                     | 18700             | 0.810            | 30700        | 34.4                     | 16900             | 1.457            | 11900        | 88       | 3.4 |
| 40                  | 4                                   | 4.0  | 9.2      | 28400                     | 19000             | 0.921            | 31500        | 30.8                     | 18600             | 1.467            | 13600        | 90       | 3.7 |
|                     | 6                                   | 7.9  | 18.2     | 28200                     | 18900             | 0.883            | 31200        | 31.9                     | 19200             | 1.481            | 14100        | 91       | 3.8 |
|                     | 8                                   | 12.8 | 29.5     | 28000                     | 18800             | 0.846            | 30900        | 33.1                     | 19800             | 1.494            | 14700        | 91       | 3.9 |
| 50                  | 4                                   | 3.9  | 8.9      | 27900                     | 18700             | 1.009            | 31300        | 27.7                     | 21700             | 1.513            | 16500        | 93       | 4.2 |
|                     | 6                                   | 7.7  | 17.7     | 27700                     | 18600             | 0.971            | 31000        | 28.5                     | 22300             | 1.527            | 17100        | 94       | 4.3 |
|                     | 8                                   | 12.4 | 28.7     | 27500                     | 18500             | 0.933            | 30700        | 29.5                     | 22800             | 1.540            | 17500        | 95       | 4.3 |
| 60                  | 4                                   | 3.8  | 8.7      | 27100                     | 18200             | 1.130            | 31000        | 24.0                     | 24500             | 1.561            | 19200        | 96       | 4.6 |
|                     | 6                                   | 7.5  | 17.3     | 26900                     | 18100             | 1.092            | 30600        | 24.6                     | 25100             | 1.575            | 19700        | 97       | 4.7 |
|                     | 8                                   | 12.1 | 28.0     | 26700                     | 18000             | 1.054            | 30300        | 25.3                     | 25600             | 1.589            | 20200        | 98       | 4.7 |
| 70                  | 4                                   | 3.7  | 8.5      | 26000                     | 17600             | 1.275            | 30400        | 20.4                     | 26800             | 1.608            | 21300        | 99       | 4.9 |
|                     | 6                                   | 7.3  | 16.9     | 25900                     | 17500             | 1.237            | 30100        | 20.9                     | 27400             | 1.622            | 21900        | 100      | 5.0 |
|                     | 8                                   | 11.9 | 27.4     | 25700                     | 17500             | 1.199            | 29800        | 21.4                     | 27900             | 1.635            | 22300        | 100      | 5.0 |
| 80                  | 4                                   | 3.6  | 8.4      | 24900                     | 17200             | 1.443            | 29800        | 17.3                     | 28500             | 1.652            | 22900        | 101      | 5.1 |
|                     | 6                                   | 7.2  | 16.6     | 24700                     | 17100             | 1.405            | 29500        | 17.6                     | 29100             | 1.666            | 23400        | 101      | 5.1 |
|                     | 8                                   | 11.7 | 26.9     | 24600                     | 17000             | 1.367            | 29300        | 18.0                     | 29600             | 1.679            | 23900        | 102      | 5.2 |
| 90                  | 4                                   | 3.6  | 8.3      | 23800                     | 16700             | 1.644            | 29400        | 14.5                     | 29700             | 1.696            | 23900        | 102      | 5.1 |
|                     | 6                                   | 7.1  | 16.3     | 23600                     | 16600             | 1.606            | 29100        | 14.7                     | 30300             | 1.710            | 24500        | 103      | 5.2 |
|                     | 8                                   | 11.5 | 26.5     | 23400                     | 16600             | 1.568            | 28800        | 14.9                     | 30900             | 1.724            | 25000        | 103      | 5.3 |
| <b>Table Legend</b> |                                     |      |          |                           |                   |                  |              |                          |                   |                  |              |          |     |
| Btu/h               | British Thermal Units per Hour      |      |          |                           |                   |                  | GPM          | Gallons per Minute       |                   |                  |              |          |     |
| CFM                 | Airflow rate, Cubic Feet per Minute |      |          |                           |                   |                  | kW           | Kilowatts                |                   |                  |              |          |     |
| COP                 | Coefficient of Performance          |      |          |                           |                   |                  | LAT          | Leaving Air Temperature  |                   |                  |              |          |     |
| EAT                 | Entering Air Temperature            |      |          |                           |                   |                  | PSI          | Pounds per square Inch   |                   |                  |              |          |     |
| EER                 | Energy Efficiency Ratio             |      |          |                           |                   |                  | THA          | Total Heat of Absorption |                   |                  |              |          |     |
| EWT                 | Entering Water Temperature          |      |          |                           |                   |                  | THR          | Total Heat of Rejection  |                   |                  |              |          |     |
| Ft of WC            | Feet of Water Column                |      |          |                           |                   |                  | WPD          | Waterside Pressure Drop  |                   |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD  |          | Cooling—EAT 80/67° F |                      |                        |                 |                          | Heating—EAT 70° F         |                        |                 |          |     |
|--------------|-------------------------------------|------|----------|----------------------|----------------------|------------------------|-----------------|--------------------------|---------------------------|------------------------|-----------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total<br>(Btu/hr)    | Sensible<br>(Btu/hr) | Power<br>Input<br>(kW) | THR<br>(Btu/hr) | EER                      | Total<br>(Btu/hr)         | Power<br>Input<br>(kW) | THA<br>(Btu/hr) | LAT (°F) | COP |
| 100          | 4                                   | 3.5  | 8.1      | 22500                | 16300                | 1.895                  | 29000           | 11.9                     | Operation not recommended |                        |                 |          |     |
|              | 6                                   | 7.0  | 16.1     | 22300                | 16200                | 1.858                  | 28600           | 12.0                     |                           |                        |                 |          |     |
|              | 8                                   | 11.3 | 26.1     | 22100                | 16100                | 1.820                  | 28300           | 12.1                     |                           |                        |                 |          |     |
| 110          | 4                                   | 3.5  | 8.0      | 20900                | 15600                | 2.225                  | 28500           | 9.4                      |                           |                        |                 |          |     |
|              | 6                                   | 6.9  | 15.9     | 20700                | 15500                | 2.188                  | 28200           | 9.5                      |                           |                        |                 |          |     |
|              | 8                                   | 11.2 | 25.8     | 20500                | 15400                | 2.150                  | 27800           | 9.5                      |                           |                        |                 |          |     |
| 120          | 4                                   | 3.5  | 8.0      | 18800                | 14500                | 2.670                  | 27900           | 7.0                      |                           |                        |                 |          |     |
|              | 6                                   | 6.8  | 15.8     | 18600                | 14400                | 2.633                  | 27600           | 7.1                      |                           |                        |                 |          |     |
|              | 8                                   | 11.1 | 25.6     | 18500                | 14300                | 2.595                  | 27400           | 7.1                      |                           |                        |                 |          |     |
| Table Legend |                                     |      |          |                      |                      |                        |                 |                          |                           |                        |                 |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                      |                      |                        | GPM             | Gallons per Minute       |                           |                        |                 |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                      |                      |                        | kW              | Kilowatts                |                           |                        |                 |          |     |
| COP          | Coefficient of Performance          |      |          |                      |                      |                        | LAT             | Leaving Air Temperature  |                           |                        |                 |          |     |
| EAT          | Entering Air Temperature            |      |          |                      |                      |                        | PSI             | Pounds per square Inch   |                           |                        |                 |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                      |                      |                        | THA             | Total Heat of Absorption |                           |                        |                 |          |     |
| EWT          | Entering Water Temperature          |      |          |                      |                      |                        | THR             | Total Heat of Rejection  |                           |                        |                 |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                      |                      |                        | WPD             | Waterside Pressure Drop  |                           |                        |                 |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

Table 19: Size 030 (1000 CFM)

| EWT (°F)     | GPM                                 | WPD  |          | Cooling—EAT 80/67° F      |                   |                  |              |                          | Heating—EAT 70° F |                  |              |          |     |
|--------------|-------------------------------------|------|----------|---------------------------|-------------------|------------------|--------------|--------------------------|-------------------|------------------|--------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER                      | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25           | 5                                   | 3.6  | 8.2      | Operation not recommended |                   |                  |              |                          | 18100             | 1.715            | 12200        | 87       | 3.1 |
|              | 7.5                                 | 7.0  | 16.2     |                           |                   |                  |              |                          | 19200             | 1.737            | 13300        | 88       | 3.2 |
|              | 10                                  | 11.4 | 26.2     |                           |                   |                  |              |                          | 20300             | 1.759            | 14300        | 89       | 3.4 |
| 30           | 5                                   | 3.5  | 8.1      | 34100                     | 23300             | 1.101            | 37900        | 31.0                     | 19800             | 1.732            | 13900        | 88       | 3.3 |
|              | 7.5                                 | 6.9  | 16.0     | 34500                     | 23300             | 1.012            | 38000        | 34.1                     | 20800             | 1.754            | 14800        | 89       | 3.5 |
|              | 10                                  | 11.2 | 25.8     | 34900                     | 23400             | 0.923            | 38100        | 37.8                     | 21900             | 1.777            | 15800        | 90       | 3.6 |
| 40           | 5                                   | 3.4  | 7.9      | 34100                     | 23400             | 1.159            | 38100        | 29.4                     | 23200             | 1.780            | 17100        | 91       | 3.8 |
|              | 7.5                                 | 6.7  | 15.5     | 34600                     | 23500             | 1.070            | 38300        | 32.3                     | 24300             | 1.802            | 18100        | 92       | 4.0 |
|              | 10                                  | 10.9 | 25.1     | 35000                     | 23500             | 0.981            | 38400        | 35.7                     | 25400             | 1.824            | 19200        | 93       | 4.1 |
| 50           | 5                                   | 3.3  | 7.7      | 33700                     | 23400             | 1.235            | 37900        | 27.3                     | 26800             | 1.837            | 20500        | 95       | 4.3 |
|              | 7.5                                 | 6.5  | 15.1     | 34100                     | 23400             | 1.146            | 38000        | 29.8                     | 27900             | 1.859            | 21600        | 96       | 4.4 |
|              | 10                                  | 10.6 | 24.4     | 34500                     | 23400             | 1.058            | 38100        | 32.6                     | 28900             | 1.881            | 22500        | 97       | 4.5 |
| 60           | 5                                   | 3.2  | 7.5      | 32900                     | 23000             | 1.336            | 37500        | 24.6                     | 30400             | 1.898            | 23900        | 98       | 4.7 |
|              | 7.5                                 | 6.4  | 14.7     | 33300                     | 23100             | 1.247            | 37600        | 26.7                     | 31400             | 1.920            | 24800        | 99       | 4.8 |
|              | 10                                  | 10.3 | 23.8     | 33700                     | 23100             | 1.159            | 37700        | 29.1                     | 32500             | 1.942            | 25900        | 100      | 4.9 |
| 70           | 5                                   | 3.2  | 7.3      | 31700                     | 22500             | 1.469            | 36700        | 21.6                     | 33800             | 1.963            | 27100        | 101      | 5.0 |
|              | 7.5                                 | 6.2  | 14.4     | 32100                     | 22500             | 1.380            | 36800        | 23.3                     | 34900             | 1.985            | 28100        | 102      | 5.2 |
|              | 10                                  | 10.1 | 23.3     | 32600                     | 22600             | 1.291            | 37000        | 25.2                     | 36000             | 2.007            | 29100        | 103      | 5.3 |
| 80           | 5                                   | 3.1  | 7.2      | 30400                     | 21800             | 1.639            | 36000        | 18.5                     | 37200             | 2.032            | 30300        | 104      | 5.4 |
|              | 7.5                                 | 6.1  | 14.2     | 30800                     | 21800             | 1.551            | 36100        | 19.9                     | 38200             | 2.054            | 31200        | 105      | 5.4 |
|              | 10                                  | 9.9  | 22.9     | 31200                     | 21900             | 1.462            | 36200        | 21.3                     | 39300             | 2.076            | 32200        | 106      | 5.5 |
| 90           | 5                                   | 3.1  | 7.1      | 28900                     | 21000             | 1.854            | 35200        | 15.6                     | 40400             | 2.108            | 33200        | 107      | 5.6 |
|              | 7.5                                 | 6.0  | 13.9     | 29300                     | 21000             | 1.766            | 35300        | 16.6                     | 41500             | 2.130            | 34200        | 108      | 5.7 |
|              | 10                                  | 9.7  | 22.5     | 29700                     | 21100             | 1.677            | 35400        | 17.7                     | 42500             | 2.152            | 35100        | 109      | 5.8 |
| Table Legend |                                     |      |          |                           |                   |                  |              |                          |                   |                  |              |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                           |                   |                  | GPM          | Gallons per Minute       |                   |                  |              |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                           |                   |                  | kW           | Kilowatts                |                   |                  |              |          |     |
| COP          | Coefficient of Performance          |      |          |                           |                   |                  | LAT          | Leaving Air Temperature  |                   |                  |              |          |     |
| EAT          | Entering Air Temperature            |      |          |                           |                   |                  | PSI          | Pounds per square Inch   |                   |                  |              |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                           |                   |                  | THA          | Total Heat of Absorption |                   |                  |              |          |     |
| EWT          | Entering Water Temperature          |      |          |                           |                   |                  | THR          | Total Heat of Rejection  |                   |                  |              |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                           |                   |                  | WPD          | Waterside Pressure Drop  |                   |                  |              |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

| EWT<br>(°F)  | GPM                                 | WPD |          | Cooling—EAT 80/67° F |                      |                        |                 |                          | Heating—EAT 70° F         |                        |                 |          |     |
|--------------|-------------------------------------|-----|----------|----------------------|----------------------|------------------------|-----------------|--------------------------|---------------------------|------------------------|-----------------|----------|-----|
|              |                                     | PSI | Ft of WC | Total<br>(Btu/hr)    | Sensible<br>(Btu/hr) | Power<br>Input<br>(kW) | THR<br>(Btu/hr) | EER                      | Total<br>(Btu/hr)         | Power<br>Input<br>(kW) | THA<br>(Btu/hr) | LAT (°F) | COP |
| 100          | 5                                   | 3.0 | 7.0      | 27300                | 20100                | 2.120                  | 34500           | 12.9                     | Operation not recommended |                        |                 |          |     |
|              | 7.5                                 | 5.9 | 13.7     | 27700                | 20200                | 2.032                  | 34600           | 13.6                     |                           |                        |                 |          |     |
|              | 10                                  | 9.6 | 22.2     | 28100                | 20200                | 1.943                  | 34700           | 14.5                     |                           |                        |                 |          |     |
| 110          | 5                                   | 3.0 | 6.9      | 25600                | 19300                | 2.444                  | 33900           | 10.5                     |                           |                        |                 |          |     |
|              | 7.5                                 | 5.9 | 13.6     | 26000                | 19300                | 2.355                  | 34000           | 11.0                     |                           |                        |                 |          |     |
|              | 10                                  | 9.5 | 22.0     | 26400                | 19400                | 2.266                  | 34100           | 11.6                     |                           |                        |                 |          |     |
| 120          | 5                                   | 3.0 | 6.8      | 23800                | 18600                | 2.831                  | 33500           | 8.4                      |                           |                        |                 |          |     |
|              | 7.5                                 | 5.8 | 13.5     | 24200                | 18600                | 2.743                  | 33600           | 8.8                      |                           |                        |                 |          |     |
|              | 10                                  | 9.4 | 21.8     | 24600                | 18700                | 2.654                  | 33700           | 9.3                      |                           |                        |                 |          |     |
| Table Legend |                                     |     |          |                      |                      |                        |                 |                          |                           |                        |                 |          |     |
| Btu/h        | British Thermal Units per Hour      |     |          |                      |                      |                        | GPM             | Gallons per Minute       |                           |                        |                 |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |     |          |                      |                      |                        | kW              | Kilowatts                |                           |                        |                 |          |     |
| COP          | Coefficient of Performance          |     |          |                      |                      |                        | LAT             | Leaving Air Temperature  |                           |                        |                 |          |     |
| EAT          | Entering Air Temperature            |     |          |                      |                      |                        | PSI             | Pounds per square Inch   |                           |                        |                 |          |     |
| EER          | Energy Efficiency Ratio             |     |          |                      |                      |                        | THA             | Total Heat of Absorption |                           |                        |                 |          |     |
| EWT          | Entering Water Temperature          |     |          |                      |                      |                        | THR             | Total Heat of Rejection  |                           |                        |                 |          |     |
| Ft of WC     | Feet of Water Column                |     |          |                      |                      |                        | WPD             | Waterside Pressure Drop  |                           |                        |                 |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

**Table 20: Size 036 (1200 CFM)**

| EWT (°F) | GPM | WPD  |          | Cooling—EAT 80/67° F      |                   |                  |              |      | Heating—EAT 70° F |                  |              |          |     |
|----------|-----|------|----------|---------------------------|-------------------|------------------|--------------|------|-------------------|------------------|--------------|----------|-----|
|          |     | PSI  | Ft of WC | Total (Btu/hr)            | Sensible (Btu/hr) | Power Input (kW) | THR (Btu/hr) | EER  | Total (Btu/hr)    | Power Input (kW) | THA (Btu/hr) | LAT (°F) | COP |
| 25       | 6   | 4.8  | 11.2     | Operation not recommended |                   |                  |              |      | 23400             | 2.182            | 15900        | 88       | 3.1 |
|          | 9   | 9.8  | 22.7     |                           |                   |                  |              |      | 24300             | 2.200            | 16800        | 89       | 3.2 |
|          | 12  | 16.2 | 37.4     |                           |                   |                  |              |      | 25200             | 2.219            | 17600        | 89       | 3.3 |
| 30       | 6   | 4.8  | 11.0     | 39300                     | 25900             | 1.478            | 44300        | 26.6 | 25500             | 2.215            | 17900        | 90       | 3.4 |
|          | 9   | 9.7  | 22.3     | 39700                     | 26000             | 1.356            | 44300        | 29.3 | 26400             | 2.234            | 18800        | 90       | 3.5 |
|          | 12  | 15.9 | 36.8     | 40100                     | 26100             | 1.233            | 44300        | 32.5 | 27300             | 2.252            | 19600        | 91       | 3.6 |
| 40       | 6   | 4.6  | 10.7     | 41100                     | 27300             | 1.552            | 46400        | 26.5 | 29500             | 2.280            | 21700        | 93       | 3.8 |
|          | 9   | 9.4  | 21.7     | 41500                     | 27400             | 1.430            | 46400        | 29.0 | 30400             | 2.299            | 22500        | 93       | 3.9 |
|          | 12  | 15.5 | 35.7     | 41900                     | 27500             | 1.307            | 46400        | 32.1 | 31200             | 2.317            | 23300        | 94       | 3.9 |
| 50       | 6   | 4.5  | 10.4     | 40800                     | 27500             | 1.670            | 46500        | 24.4 | 33100             | 2.341            | 25100        | 95       | 4.1 |
|          | 9   | 9.1  | 21.1     | 41200                     | 27600             | 1.547            | 46500        | 26.6 | 33900             | 2.360            | 25800        | 96       | 4.2 |
|          | 12  | 15.1 | 34.8     | 41600                     | 27700             | 1.425            | 46500        | 29.2 | 34800             | 2.378            | 26700        | 97       | 4.3 |
| 60       | 6   | 4.4  | 10.2     | 39600                     | 27100             | 1.824            | 45800        | 21.7 | 36300             | 2.399            | 28100        | 98       | 4.4 |
|          | 9   | 8.9  | 20.6     | 39900                     | 27200             | 1.701            | 45700        | 23.5 | 37200             | 2.418            | 28900        | 99       | 4.5 |
|          | 12  | 14.7 | 33.9     | 40300                     | 27300             | 1.579            | 45700        | 25.5 | 38000             | 2.436            | 29700        | 99       | 4.6 |
| 70       | 6   | 4.3  | 9.9      | 38100                     | 26400             | 2.010            | 45000        | 19.0 | 39100             | 2.453            | 30700        | 100      | 4.7 |
|          | 9   | 8.7  | 20.1     | 38500                     | 26500             | 1.887            | 44900        | 20.4 | 40000             | 2.471            | 31600        | 101      | 4.7 |
|          | 12  | 14.4 | 33.2     | 38900                     | 26600             | 1.764            | 44900        | 22.0 | 40900             | 2.490            | 32400        | 101      | 4.8 |
| 80       | 6   | 4.2  | 9.8      | 36700                     | 25600             | 2.228            | 44300        | 16.5 | 41600             | 2.503            | 33100        | 102      | 4.9 |
|          | 9   | 8.6  | 19.8     | 37100                     | 25700             | 2.105            | 44300        | 17.6 | 42500             | 2.521            | 33900        | 103      | 4.9 |
|          | 12  | 14.1 | 32.6     | 37500                     | 25800             | 1.983            | 44300        | 18.9 | 43400             | 2.540            | 34700        | 103      | 5.0 |
| 90       | 6   | 4.2  | 9.6      | 35200                     | 24900             | 2.483            | 43700        | 14.2 | 43800             | 2.548            | 35100        | 104      | 5.0 |
|          | 9   | 8.4  | 19.4     | 35600                     | 25000             | 2.360            | 43700        | 15.1 | 44700             | 2.566            | 35900        | 104      | 5.1 |
|          | 12  | 13.9 | 32.1     | 36000                     | 25100             | 2.238            | 43600        | 16.1 | 45500             | 2.585            | 36700        | 105      | 5.2 |

**Table Legend**

|          |                                     |     |                          |
|----------|-------------------------------------|-----|--------------------------|
| Btu/h    | British Thermal Units per Hour      | GPM | Gallons per Minute       |
| CFM      | Airflow rate, Cubic Feet per Minute | kW  | Kilowatts                |
| COP      | Coefficient of Performance          | LAT | Leaving Air Temperature  |
| EAT      | Entering Air Temperature            | PSI | Pounds per square Inch   |
| EER      | Energy Efficiency Ratio             | THA | Total Heat of Absorption |
| EWT      | Entering Water Temperature          | THR | Total Heat of Rejection  |
| Ft of WC | Feet of Water Column                | WPD | Waterside Pressure Drop  |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.



| EWT<br>(°F)  | GPM                                 | WPD  |          | Cooling—EAT 80/67° F |                      |                        |                 |                          | Heating—EAT 70° F         |                        |                 |          |     |
|--------------|-------------------------------------|------|----------|----------------------|----------------------|------------------------|-----------------|--------------------------|---------------------------|------------------------|-----------------|----------|-----|
|              |                                     | PSI  | Ft of WC | Total<br>(Btu/hr)    | Sensible<br>(Btu/hr) | Power<br>Input<br>(kW) | THR<br>(Btu/hr) | EER                      | Total<br>(Btu/hr)         | Power<br>Input<br>(kW) | THA<br>(Btu/hr) | LAT (°F) | COP |
| 100          | 6                                   | 4.1  | 9.5      | 33500                | 24200                | 2.783                  | 43000           | 12.0                     | Operation not recommended |                        |                 |          |     |
|              | 9                                   | 8.3  | 19.2     | 33900                | 24300                | 2.660                  | 43000           | 12.7                     |                           |                        |                 |          |     |
|              | 12                                  | 13.7 | 31.6     | 34300                | 24400                | 2.538                  | 43000           | 13.5                     |                           |                        |                 |          |     |
| 110          | 6                                   | 4.1  | 9.4      | 31500                | 23400                | 3.141                  | 42200           | 10.0                     |                           |                        |                 |          |     |
|              | 9                                   | 8.2  | 19.0     | 31900                | 23500                | 3.018                  | 42200           | 10.6                     |                           |                        |                 |          |     |
|              | 12                                  | 13.5 | 31.3     | 32300                | 23500                | 2.895                  | 42200           | 11.2                     |                           |                        |                 |          |     |
| 120          | 6                                   | 4.0  | 9.3      | 29200                | 22200                | 3.572                  | 41400           | 8.2                      |                           |                        |                 |          |     |
|              | 9                                   | 8.1  | 18.8     | 29600                | 22300                | 3.450                  | 41400           | 8.6                      |                           |                        |                 |          |     |
|              | 12                                  | 13.4 | 31.0     | 30000                | 22400                | 3.327                  | 41400           | 9.0                      |                           |                        |                 |          |     |
| Table Legend |                                     |      |          |                      |                      |                        |                 |                          |                           |                        |                 |          |     |
| Btu/h        | British Thermal Units per Hour      |      |          |                      |                      |                        | GPM             | Gallons per Minute       |                           |                        |                 |          |     |
| CFM          | Airflow rate, Cubic Feet per Minute |      |          |                      |                      |                        | kW              | Kilowatts                |                           |                        |                 |          |     |
| COP          | Coefficient of Performance          |      |          |                      |                      |                        | LAT             | Leaving Air Temperature  |                           |                        |                 |          |     |
| EAT          | Entering Air Temperature            |      |          |                      |                      |                        | PSI             | Pounds per square Inch   |                           |                        |                 |          |     |
| EER          | Energy Efficiency Ratio             |      |          |                      |                      |                        | THA             | Total Heat of Absorption |                           |                        |                 |          |     |
| EWT          | Entering Water Temperature          |      |          |                      |                      |                        | THR             | Total Heat of Rejection  |                           |                        |                 |          |     |
| Ft of WC     | Feet of Water Column                |      |          |                      |                      |                        | WPD             | Waterside Pressure Drop  |                           |                        |                 |          |     |

**NOTE 1:** Cooling capacity is based on 80.6°F db, 66.2°F wb (27/19°C) entering air temperature and 86°F (30°C) entering water temperature.

**NOTE 2:** Heating capacity is based on 68°F (20°C) entering air temperature and 68°F (20°C) entering water temperature.

**NOTE 3:** All capacity data at full load.

# Hydronic Heat Performance

**Table 21: One-Row Hydronic Heat Performance (Sizes 009–036)**

| Unit Size | GPM | WPD  |      | CFM  | 90° F EWT        |        |        | 100° F EWT       |        |        | 110° F EWT       |        |        | 120° F EWT       |        |        |
|-----------|-----|------|------|------|------------------|--------|--------|------------------|--------|--------|------------------|--------|--------|------------------|--------|--------|
|           |     | PSI  | FT   |      | Ca-pacity Btu/hr | LWT °F | LDB °F | Ca-pacity Btu/hr | LWT °F | LDB °F | Ca-pacity Btu/hr | LWT °F | LDB °F | Ca-pacity Btu/hr | LWT °F | LDB °F |
| 009       | 1.1 | 1.2  | 2.8  | 280  | 2,529            | 85.5   | 78.2   | 3,833            | 93.2   | 82.4   | 5,155            | 100.9  | 86.7   | 6,491            | 108.5  | 91.0   |
|           | 1.5 | 2.1  | 4.9  |      | 2,734            | 86.4   | 78.8   | 4,132            | 94.5   | 83.4   | 5,546            | 102.6  | 87.9   | 6,972            | 110.7  | 92.5   |
|           | 2.3 | 4.6  | 10.6 |      | 2,969            | 87.4   | 79.6   | 4,478            | 96.0   | 84.5   | 6,000            | 104.7  | 89.4   | 7,533            | 113.3  | 94.3   |
| 012       | 1.5 | 2.1  | 4.9  | 350  | 3,037            | 86.0   | 77.8   | 4,595            | 93.9   | 81.8   | 6,172            | 101.8  | 85.9   | 7,765            | 109.6  | 90.0   |
|           | 2.0 | 3.7  | 8.5  |      | 3,253            | 86.7   | 78.4   | 4,913            | 95.1   | 82.7   | 6,590            | 103.4  | 87.0   | 8,281            | 111.7  | 91.3   |
|           | 3.0 | 8.0  | 18.5 |      | 3,500            | 87.7   | 79.0   | 5,278            | 96.5   | 83.6   | 7,070            | 105.3  | 88.2   | 8,873            | 114.1  | 92.9   |
| 015       | 1.9 | 1.8  | 4.1  | 440  | 3,545            | 86.2   | 77.5   | 5,396            | 94.3   | 81.3   | 7,284            | 102.3  | 85.3   | 9,203            | 110.2  | 89.3   |
|           | 2.5 | 3.1  | 7.2  |      | 3,862            | 86.9   | 78.1   | 5,857            | 95.3   | 82.3   | 7,883            | 103.7  | 86.6   | 9,932            | 112.1  | 90.9   |
|           | 3.8 | 6.9  | 15.9 |      | 4,223            | 87.7   | 78.9   | 6,382            | 96.6   | 83.4   | 8,565            | 105.4  | 88.0   | 10,769           | 114.3  | 92.6   |
| 018       | 2.3 | 2.5  | 5.8  | 530  | 4,055            | 86.4   | 77.1   | 6,163            | 94.5   | 80.7   | 8,310            | 102.6  | 84.5   | 10,488           | 110.7  | 88.3   |
|           | 3.0 | 4.4  | 10.2 |      | 4,391            | 87.1   | 77.6   | 6,653            | 95.6   | 81.6   | 8,946            | 104.0  | 85.6   | 11,266           | 112.5  | 89.6   |
|           | 4.5 | 9.9  | 22.8 |      | 4,772            | 87.9   | 78.3   | 7,211            | 96.8   | 82.6   | 9,675            | 105.7  | 86.9   | 12,162           | 114.6  | 91.2   |
| 024       | 3.0 | 3.0  | 6.8  | 700  | 5,682            | 86.2   | 77.4   | 8,606            | 94.3   | 81.2   | 11,569           | 102.3  | 85.1   | 14,562           | 110.3  | 89.0   |
|           | 4.0 | 5.2  | 12.0 |      | 6,087            | 87.0   | 78.0   | 9,200            | 95.4   | 82.0   | 12,348           | 103.8  | 86.1   | 15,524           | 112.2  | 90.3   |
|           | 6.0 | 11.5 | 26.6 |      | 6,551            | 87.8   | 78.6   | 9,884            | 96.7   | 82.9   | 13,244           | 105.6  | 87.3   | 16,629           | 114.5  | 91.7   |
| 030       | 3.8 | 3.5  | 8.2  | 880  | 6,714            | 86.4   | 77.0   | 10,226           | 94.5   | 80.7   | 13,808           | 102.6  | 84.4   | 17,446           | 110.7  | 88.2   |
|           | 5.0 | 6.2  | 14.4 |      | 7,308            | 87.1   | 77.6   | 11,082           | 95.6   | 81.6   | 14,910           | 104.0  | 85.6   | 18,782           | 112.5  | 89.6   |
|           | 7.5 | 14.0 | 32.3 |      | 7,963            | 87.9   | 78.3   | 12,034           | 96.8   | 82.6   | 16,151           | 105.7  | 86.9   | 20,305           | 114.6  | 91.2   |
| 036       | 4.5 | 5.1  | 11.7 | 1060 | 7,661            | 86.6   | 76.6   | 11,644           | 94.8   | 80.0   | 15,697           | 103.0  | 83.5   | 19,805           | 111.2  | 87.1   |
|           | 6.0 | 9.0  | 20.7 |      | 8,271            | 87.2   | 77.1   | 12,525           | 95.8   | 80.8   | 16,839           | 104.4  | 84.5   | 21,204           | 112.9  | 88.3   |
|           | 9.0 | 20.1 | 46.4 |      | 8,957            | 88.0   | 77.7   | 13,533           | 97.0   | 81.7   | 18,158           | 106.0  | 85.7   | 22,825           | 114.9  | 89.7   |

## Table Legend

|       |                                     |
|-------|-------------------------------------|
| BTU/h | British Thermal Units per Hour      |
| CFM   | Airflow Rate, Cubic Feet per Minute |
| EDB   | Entering Dry Bulb                   |
| LDB   | Leaving Dry Bulb                    |
| EWT   | Entering Water Temperature          |
| LWT   | Leaving Water Temperature           |
| GPM   | Gallons per Minute                  |
| WPD   | Waterside Pressure Drop             |

**NOTE 1:** Data based on 70°F EDB

**NOTE 2:** All unit sizes include ECM

**NOTE 3:** Fan speed setting 3

Table 22: Two-Row Hydronic Heat Performance (Sizes 009–036)

| Unit Size | GPM  | WPD  |      | CFM  | 90° F EWT        |        |        | 100° F EWT       |        |        | 110° F EWT       |        |        | 120° F EWT       |        |        |
|-----------|------|------|------|------|------------------|--------|--------|------------------|--------|--------|------------------|--------|--------|------------------|--------|--------|
|           |      | PSI  | FT   |      | Ca-pacity Btu/hr | LWT °F | LDB °F | Ca-pacity Btu/hr | LWT °F | LDB °F | Ca-pacity Btu/hr | LWT °F | LDB °F | Ca-pacity Btu/hr | LWT °F | LDB °F |
| 009       | 1.13 | 1.6  | 3.7  | 280  | 3,592            | 83.6   | 81.6   | 5,415            | 90.4   | 87.5   | 7,251            | 97.2   | 93.4   | 9,097            | 103.9  | 99.4   |
|           | 1.50 | 2.6  | 6.0  |      | 3,867            | 84.8   | 82.5   | 5,822            | 92.2   | 88.8   | 7,787            | 99.6   | 95.2   | 9,760            | 107.0  | 101.5  |
|           | 2.25 | 5.2  | 12.0 |      | 4,177            | 86.3   | 83.5   | 6,282            | 94.4   | 90.3   | 8,395            | 102.5  | 97.1   | 10,514           | 110.7  | 104.0  |
| 012       | 1.50 | 2.6  | 6.0  | 350  | 4,323            | 84.2   | 81.1   | 6,515            | 91.3   | 86.8   | 8,721            | 98.4   | 92.5   | 10,937           | 105.4  | 98.2   |
|           | 2.00 | 4.2  | 9.8  |      | 4,630            | 85.4   | 81.9   | 6,970            | 93.0   | 88.0   | 9,322            | 100.7  | 94.0   | 11,684           | 108.3  | 100.1  |
|           | 3.00 | 8.5  | 19.7 |      | 4,974            | 86.7   | 82.8   | 7,481            | 95.0   | 89.3   | 9,998            | 103.3  | 95.8   | 12,522           | 111.7  | 102.3  |
| 015       | 1.88 | 2.1  | 5.0  | 440  | 6,195            | 83.4   | 83.0   | 9,345            | 90.1   | 89.6   | 12,518           | 96.7   | 96.3   | 15,709           | 103.3  | 103.0  |
|           | 2.50 | 3.6  | 8.3  |      | 6,645            | 84.7   | 84.0   | 10,010           | 92.0   | 91.0   | 13,393           | 99.3   | 98.2   | 16,792           | 106.6  | 105.3  |
|           | 3.75 | 7.5  | 17.2 |      | 7,151            | 86.2   | 85.0   | 10,759           | 94.3   | 92.6   | 14,382           | 102.3  | 100.2  | 18,018           | 110.4  | 107.9  |
| 018       | 2.25 | 3.0  | 6.8  | 530  | 7,183            | 83.6   | 82.5   | 10,833           | 90.4   | 88.9   | 14,509           | 97.1   | 95.3   | 18,206           | 103.8  | 101.7  |
|           | 3.00 | 5.0  | 11.5 |      | 7,695            | 84.9   | 83.4   | 11,591           | 92.3   | 90.2   | 15,511           | 99.7   | 97.0   | 19,449           | 107.0  | 103.9  |
|           | 4.50 | 10.4 | 24.0 |      | 8,271            | 86.3   | 84.4   | 12,446           | 94.5   | 91.7   | 16,640           | 102.6  | 99.0   | 20,849           | 110.7  | 106.3  |
| 024       | 3.00 | 3.4  | 7.8  | 700  | 9,315            | 83.8   | 82.2   | 14,058           | 90.6   | 88.4   | 18,839           | 97.4   | 94.6   | 23,649           | 104.0  | 100.9  |
|           | 4.00 | 5.7  | 13.2 |      | 9,988            | 85.0   | 83.0   | 15,051           | 92.5   | 89.7   | 20,149           | 99.9   | 96.3   | 25,275           | 107.2  | 103.0  |
|           | 6.00 | 12.0 | 27.7 |      | 10,745           | 86.4   | 84.0   | 16,175           | 94.6   | 91.1   | 21,633           | 102.7  | 98.3   | 27,113           | 110.8  | 105.4  |
| 030       | 3.75 | 3.9  | 9.0  | 880  | 9,962            | 84.7   | 80.4   | 15,086           | 92.0   | 85.8   | 20,274           | 99.2   | 91.2   | 25,509           | 106.4  | 96.7   |
|           | 5.00 | 6.7  | 15.6 |      | 10,794           | 85.7   | 81.3   | 16,300           | 93.5   | 87.0   | 21,854           | 101.3  | 92.8   | 27,445           | 109.0  | 98.7   |
|           | 7.50 | 14.5 | 33.6 |      | 11,704           | 86.9   | 82.2   | 17,636           | 95.3   | 88.4   | 23,606           | 103.7  | 94.7   | 29,608           | 112.1  | 100.9  |
| 036       | 4.50 | 5.5  | 12.7 | 1060 | 11,336           | 85.0   | 79.8   | 17,152           | 92.4   | 84.8   | 23,035           | 99.8   | 89.9   | 28,967           | 107.1  | 95.0   |
|           | 6.00 | 9.5  | 22.0 |      | 12,232           | 85.9   | 80.6   | 18,463           | 93.8   | 85.9   | 24,747           | 101.8  | 91.3   | 31,076           | 109.6  | 96.8   |
|           | 9.00 | 20.6 | 47.5 |      | 13,231           | 87.1   | 81.4   | 19,938           | 95.6   | 87.2   | 26,691           | 104.1  | 93.0   | 33,480           | 112.6  | 98.9   |

## Table Legend

|        |                                     |
|--------|-------------------------------------|
| BTU/hr | British Thermal Units per Hour      |
| CFM    | Airflow Rate, Cubic Feet per Minute |
| EDB    | Entering Dry Bulb                   |
| LDB    | Leaving Dry Bulb                    |
| EWT    | Entering Water Temperature          |
| LWT    | Leaving Water Temperature           |
| GPM    | Gallons per Minute                  |
| WPD    | Waterside Pressure Drop             |

NOTE 1: Data based on 70°F EDB

NOTE 2: All unit sizes include ECM

NOTE 3: Fan speed setting 3

# Fan Performance

**Table 23: Fan Performance for PSC Motor**

| Unit Size | Rated Airflow | Speed | External Static Pressure (in-H <sub>2</sub> O) (Dry Coil and STD Filter) (inches of water column) |      |      |      |      |      |      |      |      |      |      |
|-----------|---------------|-------|---|------|------|------|------|------|------|------|------|------|------|
|           |               |       | 0.00  | 0.05 | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.50 |
| 009       | 300           | Low   | 400   | 380  | 350  | 310  | 270  | 220  |      |      |      |      |      |
|           |               | High  | 430   | 410  | 370  | 330  | 290  | 250  | 210  |      |      |      |      |
| 012       | 400           | Low   | 400   | 380  | 350  | 310  |      |      |      |      |      |      |      |
|           |               | High  | 430   | 410  | 370  | 330  | 290  |      |      |      |      |      |      |
| 015       | 500           | Low   | 440   | 420  | 390  | 360  |      |      |      |      |      |      |      |
|           |               | High  | 520   | 500  | 470  | 420  | 380  |      |      |      |      |      |      |
| 018       | 600           | Low   | 580   | 560  | 550  | 530  | 520  | 500  | 490  | 470  | 450  |      |      |
|           |               | High  | 680   | 670  | 660  | 640  | 620  | 600  | 580  | 550  | 520  | 500  | 470  |
| 024       | 800           | Low   | 760   | 760  | 720  | 680  | 650  | 620  | 590  | 560  |      |      |      |
|           |               | High  | 920   | 880  | 840  | 800  | 760  | 720  | 670  | 620  | 560  |      |      |
| 030       | 1000          | Low   | 950   | 940  | 930  | 910  | 900  | 880  | 860  | 840  | 820  | 810  | 790  |
|           |               | High  | 1170  | 1150 | 1120 | 1100 | 1070 | 1040 | 1020 | 990  | 960  | 930  | 900  |
| 036       | 1200          | Low   | 1080  | 1070 | 1050 | 1040 | 1020 | 1000 | 980  | 950  | 910  | 850  |      |
|           |               | High  | 1300  | 1290 | 1260 | 1230 | 1190 | 1160 | 1140 | 1120 | 1100 | 1050 | 980  |

**NOTE:** Add 0.01" ESP for the optional discharge diffuser, and 0.02" ESP for the optional return air grille.

**Table 24: Constant Torque EC Motor CFM Values**

| Unit Size | Setting | Function | Airflow in SCFM   |      |      |      |      |      |      |      |      |      |     |
|-----------|---------|----------|---|------|------|------|------|------|------|------|------|------|-----|
|           |         |          | External Static Pressure (in-H <sub>2</sub> O) (Dry Coil and STD Filter) (inches of water column) |      |      |      |      |      |      |      |      |      |     |
|           |         |          | 0.00  | 0.05 | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.5 |
| 009       | 1       | Stage 2  | 340   | 320  | 295  | 275  | 250  | 230  | 210  |      |      |      |     |
|           | 2       |          | 330   | 305  | 280  | 260  | 235  | 210  |      |      |      |      |     |
|           | 3       |          | 310   | 285  | 260  | 235  | 215  |      |      |      |      |      |     |
|           | 4       |          | 295   | 270  | 245  | 220  |      |      |      |      |      |      |     |
|           | 5       |          | 320   | 295  | 270  | 250  | 225  |      |      |      |      |      |     |
|           | 6       |          | 305   | 280  | 255  | 230  |      |      |      |      |      |      |     |
|           | 7       |          | 285   | 260  | 235  | 210  |      |      |      |      |      |      |     |
|           | 8       |          | 275   | 245  | 220  |      |      |      |      |      |      |      |     |
|           | A       | Fan Only | 220   |      |      |      |      |      |      |      |      |      |     |
| 012       | 1       | Stage 2  | 450   | 435  | 415  | 400  | 380  | 365  | 345  | 330  | 310  | 295  |     |
|           | 2       |          | 425   | 410  | 390  | 370  | 355  | 335  | 315  | 300  | 280  |      |     |
|           | 3       |          | 405   | 385  | 365  | 345  | 325  | 310  | 290  |      |      |      |     |
|           | 4       |          | 380   | 360  | 340  | 320  | 300  | 280  |      |      |      |      |     |
|           | 5       |          | 415   | 395  | 380  | 360  | 340  | 320  | 305  | 285  |      |      |     |
|           | 6       |          | 390   | 370  | 350  | 335  | 315  | 295  |      |      |      |      |     |
|           | 7       |          | 365   | 345  | 325  | 305  | 285  |      |      |      |      |      |     |
|           | 8       |          | 340   | 320  | 295  |      |      |      |      |      |      |      |     |
|           | A       | Fan Only | 240   |      |      |      |      |      |      |      |      |      |     |

Table 25: Constant CFM EC Motor Values

| Unit Size | MicroTech Unit Controller |                                    |          |                           |                            |                           |                            |               |
|-----------|---------------------------|------------------------------------|----------|---------------------------|----------------------------|---------------------------|----------------------------|---------------|
|           | Setting                   | Maximum ESP (in. WC.) <sup>2</sup> | Fan Only | Low CFM Cool <sup>1</sup> | High CFM Cool <sup>1</sup> | Low CFM Heat <sup>1</sup> | High CFM Heat <sup>1</sup> | Hydronic Heat |
| 015       | Fan Speed 1               | 0.5                                | 310      | 500                       | 560                        | 500                       | 560                        | 500           |
|           | Fan Speed 2               |                                    | 310      | 465                       | 530                        | 465                       | 530                        | 465           |
|           | Fan Speed 3               |                                    | 310      | 435                       | 500                        | 435                       | 500                        | 435           |
|           | Fan Speed 4               |                                    | 310      | 405                       | 465                        | 405                       | 465                        | 405           |
|           | Fan Speed 5               |                                    | 310      | 450                       | 515                        | 450                       | 515                        | 450           |
|           | Fan Speed 6               |                                    | 310      | 420                       | 480                        | 420                       | 480                        | 420           |
|           | Fan Speed 7               |                                    | 310      | 405                       | 450                        | 405                       | 450                        | 405           |
|           | Fan Speed 8               |                                    | 310      | 405                       | 420                        | 405                       | 420                        | 405           |
| 018       | Fan Speed 1               | 0.5                                | 375      | 600                       | 675                        | 600                       | 675                        | 600           |
|           | Fan Speed 2               |                                    | 375      | 565                       | 640                        | 565                       | 640                        | 565           |
|           | Fan Speed 3               |                                    | 375      | 525                       | 600                        | 525                       | 600                        | 525           |
|           | Fan Speed 4               |                                    | 375      | 490                       | 565                        | 490                       | 565                        | 490           |
|           | Fan Speed 5               |                                    | 375      | 545                       | 620                        | 545                       | 620                        | 545           |
|           | Fan Speed 6               |                                    | 375      | 505                       | 580                        | 505                       | 580                        | 505           |
|           | Fan Speed 7               |                                    | 375      | 490                       | 545                        | 490                       | 545                        | 490           |
|           | Fan Speed 8               |                                    | 375      | 490                       | 505                        | 490                       | 505                        | 490           |
| 024       | Fan Speed 1               | 0.5                                | 500      | 800                       | 900                        | 800                       | 900                        | 800           |
|           | Fan Speed 2               |                                    | 500      | 750                       | 850                        | 750                       | 850                        | 750           |
|           | Fan Speed 3               |                                    | 500      | 700                       | 800                        | 700                       | 800                        | 700           |
|           | Fan Speed 4               |                                    | 500      | 650                       | 750                        | 650                       | 750                        | 650           |
|           | Fan Speed 5               |                                    | 500      | 725                       | 825                        | 725                       | 825                        | 725           |
|           | Fan Speed 6               |                                    | 500      | 675                       | 775                        | 675                       | 775                        | 675           |
|           | Fan Speed 7               |                                    | 500      | 650                       | 725                        | 650                       | 725                        | 650           |
|           | Fan Speed 8               |                                    | 500      | 650                       | 675                        | 650                       | 675                        | 650           |
| 030       | Fan Speed 1               | 0.5                                | 625      | 1000                      | 1125                       | 1000                      | 1125                       | 1000          |
|           | Fan Speed 2               |                                    | 625      | 940                       | 1065                       | 940                       | 1065                       | 940           |
|           | Fan Speed 3               |                                    | 625      | 875                       | 1000                       | 875                       | 1000                       | 875           |
|           | Fan Speed 4               |                                    | 625      | 815                       | 940                        | 815                       | 940                        | 815           |
|           | Fan Speed 5               |                                    | 625      | 905                       | 1030                       | 905                       | 1030                       | 905           |
|           | Fan Speed 6               |                                    | 625      | 845                       | 970                        | 845                       | 970                        | 845           |
|           | Fan Speed 7               |                                    | 625      | 815                       | 905                        | 815                       | 905                        | 815           |
|           | Fan Speed 8               |                                    | 625      | 815                       | 845                        | 815                       | 845                        | 815           |
| 036       | Fan Speed 1               | 0.5                                | 770      | 1205                      | 1350                       | 1205                      | 1350                       | 1205          |
|           | Fan Speed 2               |                                    | 770      | 1135                      | 1280                       | 1135                      | 1280                       | 1135          |
|           | Fan Speed 3               |                                    | 770      | 1060                      | 1205                       | 1060                      | 1205                       | 1060          |
|           | Fan Speed 4               |                                    | 770      | 990                       | 1135                       | 990                       | 1135                       | 990           |
|           | Fan Speed 5               |                                    | 770      | 1095                      | 1240                       | 1095                      | 1240                       | 1095          |
|           | Fan Speed 6               |                                    | 770      | 1025                      | 1170                       | 1025                      | 1170                       | 1025          |
|           | Fan Speed 7               |                                    | 770      | 990                       | 1095                       | 990                       | 1095                       | 990           |
|           | Fan Speed 8               |                                    | 770      | 990                       | 1025                       | 990                       | 1025                       | 990           |

**NOTE 1:** The unit is capable of high-low fan performance through the use of a two-stage thermostat wired to specific terminals for High-Low CFM.

**NOTE 2:** Units are shipped at setting 3 (standard).

# Electrical Data

## PSC Motor

Table 26: Standard PSC Motor

| Unit Size    | Voltage/Hz/ Phase | Compressor |      | Fan Motor RLA | Total Unit RLA | Minimum Voltage | Minimum Circuit Amps | Maximum Fuse or HACR Breaker Size |
|--------------|-------------------|------------|------|---------------|----------------|-----------------|----------------------|-----------------------------------|
|              |                   | RLA        | LRA  |               |                |                 |                      |                                   |
| 009          | 115/60/1          | 6.1        | 31.5 | 0.8           | 6.9            | 104             | 8.4                  | 15                                |
|              | 208-230/60/1      | 3.4        | 16.5 | 0.4           | 3.8            | 197             | 4.7                  | 15                                |
|              | 265/60/1          | 3          | 16.3 | 0.5           | 3.5            | 231             | 4.2                  | 15                                |
| 012          | 115/60/1          | 8.6        | 38.0 | 0.8           | 9.4            | 104             | 11.6                 | 20                                |
|              | 208-230/60/1      | 4.3        | 20.6 | 0.4           | 4.7            | 197             | 5.8                  | 15                                |
|              | 265/60/1          | 3.7        | 16.4 | 0.5           | 4.2            | 231             | 5.1                  | 15                                |
| 015          | 208-230/60/1      | 5.5        | 26.4 | 0.6           | 6.1            | 197             | 7.4                  | 15                                |
|              | 265/60/1          | 4.8        | 21.5 | 0.6           | 5.4            | 231             | 6.6                  | 15                                |
| 018          | 208-230/60/1      | 7.2        | 41.8 | 0.9           | 8.1            | 197             | 9.9                  | 15                                |
|              | 265/60/1          | 6.2        | 31.0 | 0.8           | 7.0            | 231             | 8.6                  | 15                                |
| 024          | 208-230/60/1      | 11.4       | 59.3 | 0.9           | 11.2           | 197             | 13.8                 | 20                                |
|              | 265/60/1          | 14.4       | 60.5 | 0.8           | 11.1           | 231             | 13.6                 | 20                                |
| 030          | 208-230/60/1      | 12.9       | 66.3 | 1.6           | 13.1           | 197             | 16.0                 | 25                                |
|              | 265/60/1          | 12.9       | 71.7 | 1.2           | 12.1           | 231             | 14.8                 | 25                                |
| 036          | 208-230/60/1      | 18.4       | 88.0 | 3.1           | 19.6           | 197             | 23.7                 | 40                                |
|              | 265/60/1          | 14.6       | 90.8 | 1.9           | 15.0           | 231             | 18.3                 | 30                                |
| Table Legend |                   |            |      |               |                |                 |                      |                                   |
| RLA          | Rated Load Amps   |            |      |               |                |                 |                      |                                   |
| LRA          | Locked Rotor Amps |            |      |               |                |                 |                      |                                   |

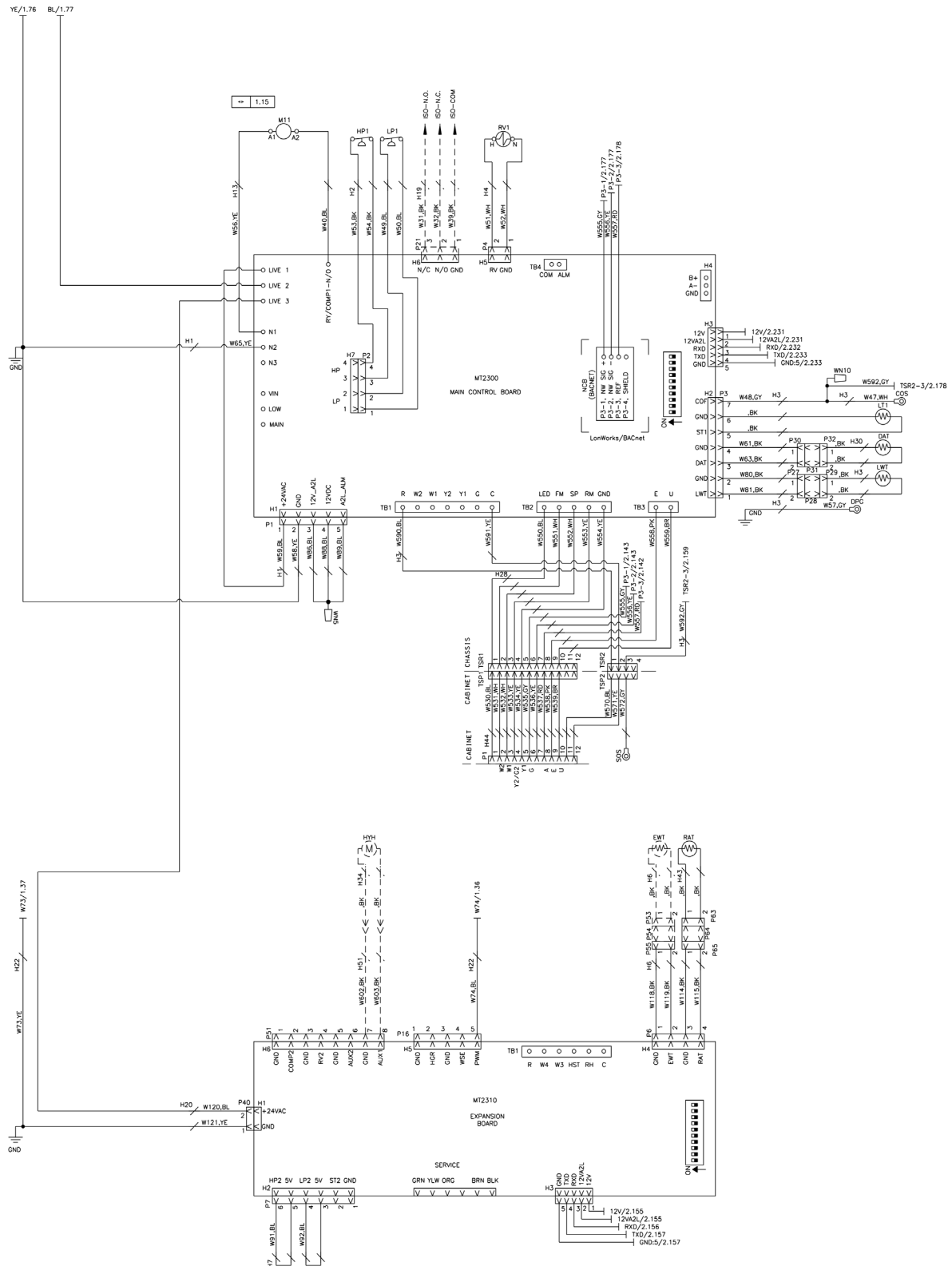
## EC Motor

**Table 27: Optional EC Motor**

| Unit Size    | Voltage/Hz/ Phase | Compressor |      | Fan Motor RLA | Total Unit RLA | Minimum Voltage | Minimum Circuit Amps | Maximum Fuse or HACR Breaker Size |
|--------------|-------------------|------------|------|---------------|----------------|-----------------|----------------------|-----------------------------------|
|              |                   | RLA        | LRA  |               |                |                 |                      |                                   |
| 009          | 115/60/1          | 6.1        | 31.5 | 1.8           | 7.9            | 104             | 9.4                  | 15                                |
|              | 208-230/60/1      | 3.4        | 16.5 | 0.9           | 4.3            | 197             | 5.2                  | 15                                |
|              | 265/60/1          | 3.0        | 16.3 | 1.8           | 4.8            | 231             | 5.6                  | 15                                |
| 012          | 115/60/1          | 8.6        | 38.0 | 1.8           | 10.4           | 104             | 12.6                 | 20                                |
|              | 208-230/60/1      | 4.3        | 20.6 | 0.9           | 5.2            | 197             | 6.3                  | 15                                |
|              | 265/60/1          | 3.7        | 16.4 | 1.8           | 5.5            | 231             | 6.4                  | 15                                |
| 015          | 208-230/60/1      | 5.5        | 26.4 | 3.0           | 8.5            | 197             | 9.9                  | 15                                |
|              | 265/60/1          | 4.8        | 21.5 | 2.6           | 7.4            | 231             | 8.6                  | 15                                |
| 018          | 208-230/60/1      | 7.2        | 41.8 | 3.0           | 10.2           | 197             | 12.0                 | 15                                |
|              | 265/60/1          | 6.2        | 31.0 | 2.6           | 8.8            | 231             | 10.4                 | 15                                |
| 024          | 208-230/60/1      | 11.4       | 59.3 | 3.0           | 13.3           | 197             | 15.9                 | 25                                |
|              | 265/60/1          | 14.4       | 60.5 | 2.6           | 12.9           | 231             | 15.5                 | 25                                |
| 030          | 208-230/60/1      | 12.9       | 66.3 | 3.0           | 14.5           | 197             | 17.4                 | 25                                |
|              | 265/60/1          | 12.9       | 71.7 | 2.6           | 13.5           | 231             | 16.2                 | 25                                |
| 036          | 208-230/60/1      | 18.4       | 88.0 | 5.0           | 21.5           | 197             | 25.6                 | 40                                |
|              | 265/60/1          | 14.6       | 90.8 | 4.1           | 17.2           | 231             | 20.5                 | 30                                |
| Table Legend |                   |            |      |               |                |                 |                      |                                   |
| RLA          | Rated Load Amps   |            |      |               |                |                 |                      |                                   |
| LRA          | Locked Rotor Amps |            |      |               |                |                 |                      |                                   |

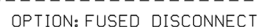
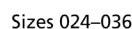
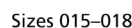
# Typical Wiring Diagrams

## MicroTech Unit Controller, EC Constant Torque Motor BACnet, 208–230/60/1-Control Voltage, Unit Sizes 009–012



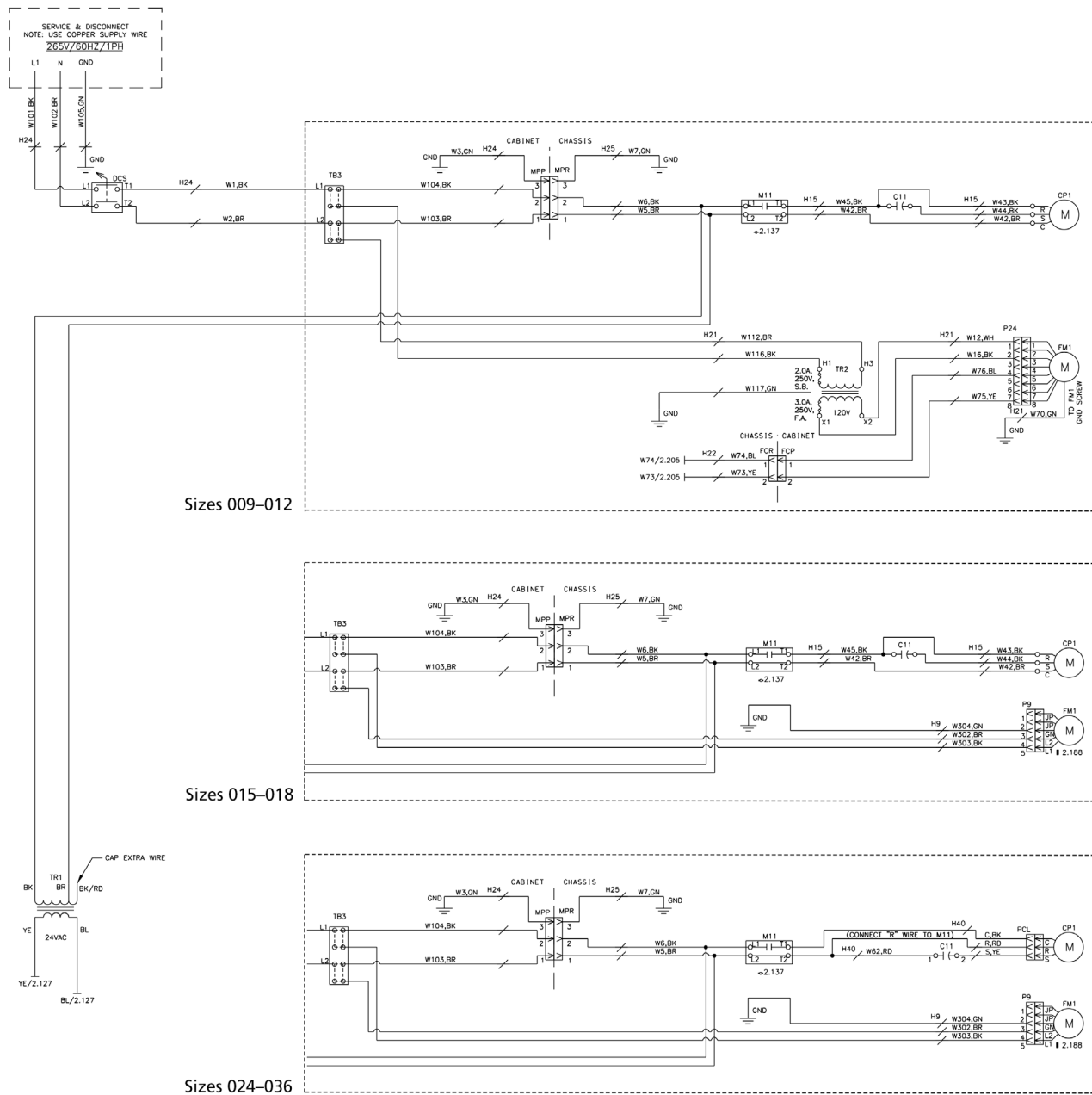




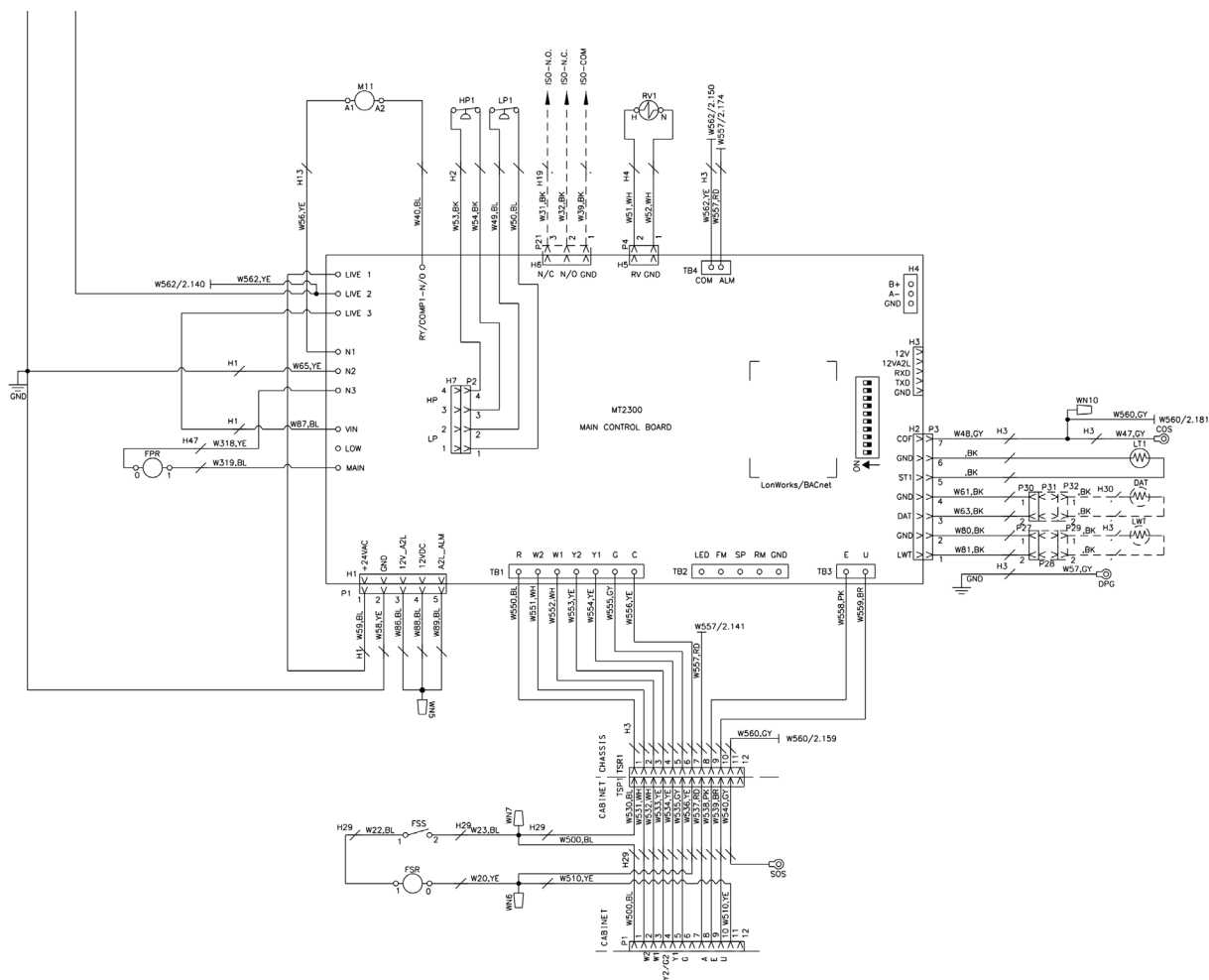


# MicroTech Unit Controller, EC Motor

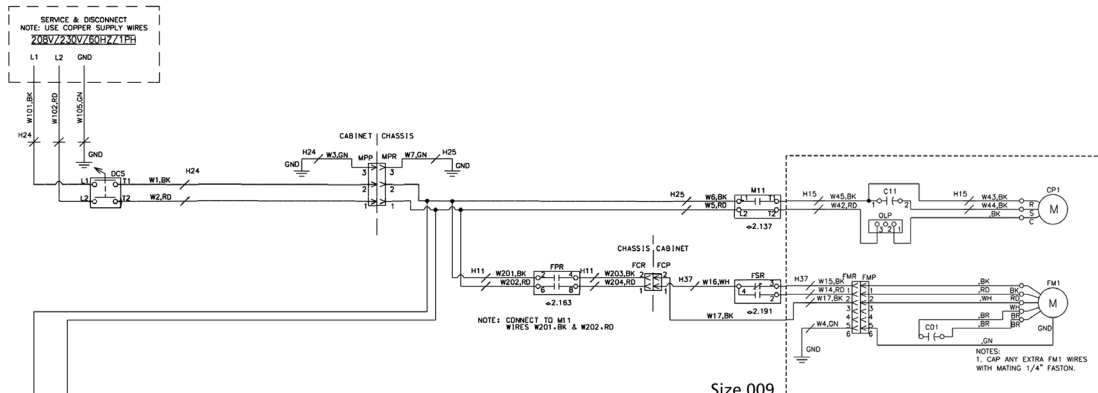
## Thermostat Control, 265/60/1, Unit Sizes 009–036



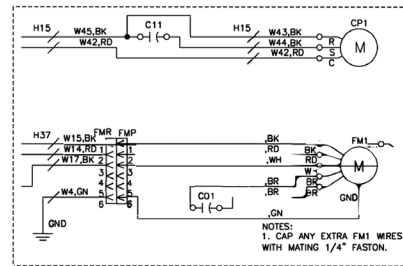
**MicroTech Unit Controller, PSC Motor**  
**Thermostat Control, 208–230/60/1-Control Voltage, Unit Sizes 009–036**



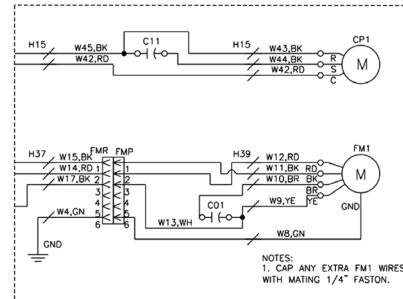
# MicroTech Unit Controller, PSC Motor Thermostat Control, 208–230/60/1, Unit Sizes 009–036



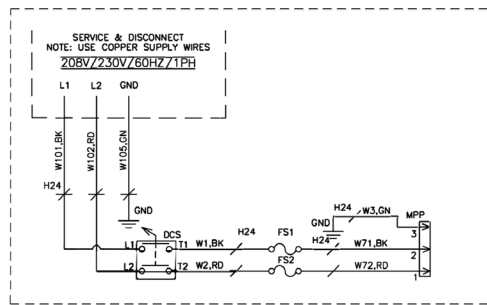
Size 009



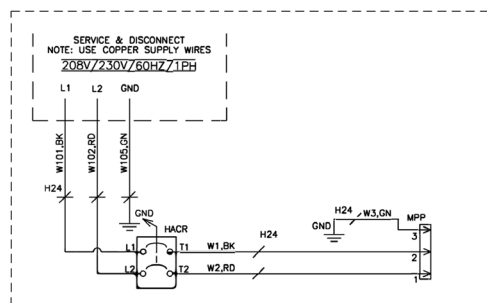
Size 012



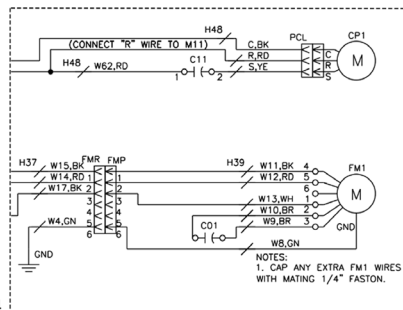
Sizes 015–018



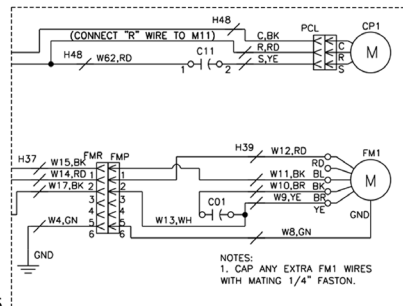
OPTION: FUSED DISCONNECT



OPTION: HACR BREAKER

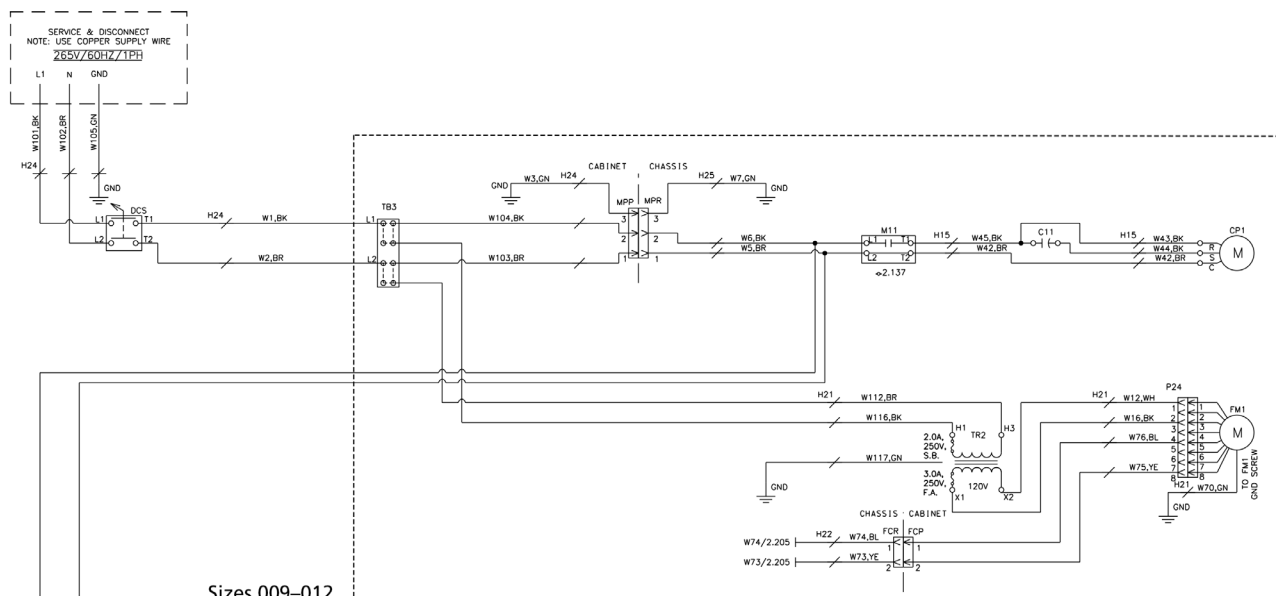


Size 024

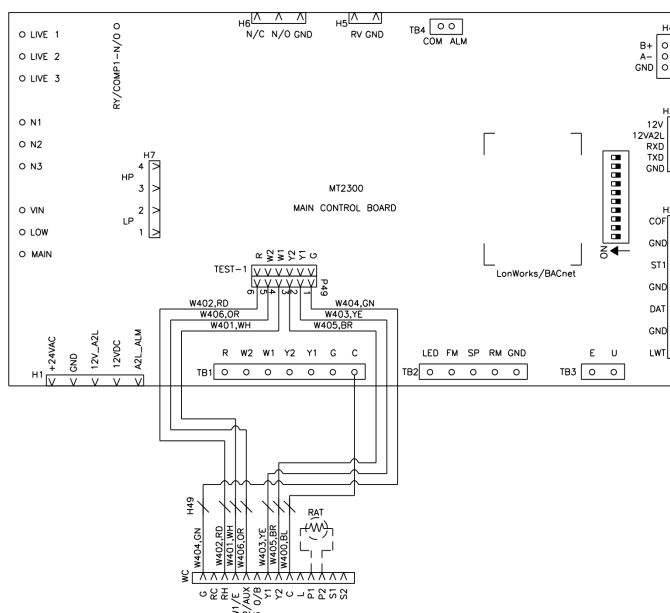


Sizes 030–036

# MicroTech Unit Controller, PSC Motor Thermostat Control, 265/60/1, Unit Sizes 009–036



## Wireless, Unit Sizes 009–036



**NOTE:** Remaining connections are shown in previous diagrams.

## Wiring Schematics Legend

### NOTICE

Devices in legend may or may not be on unit.

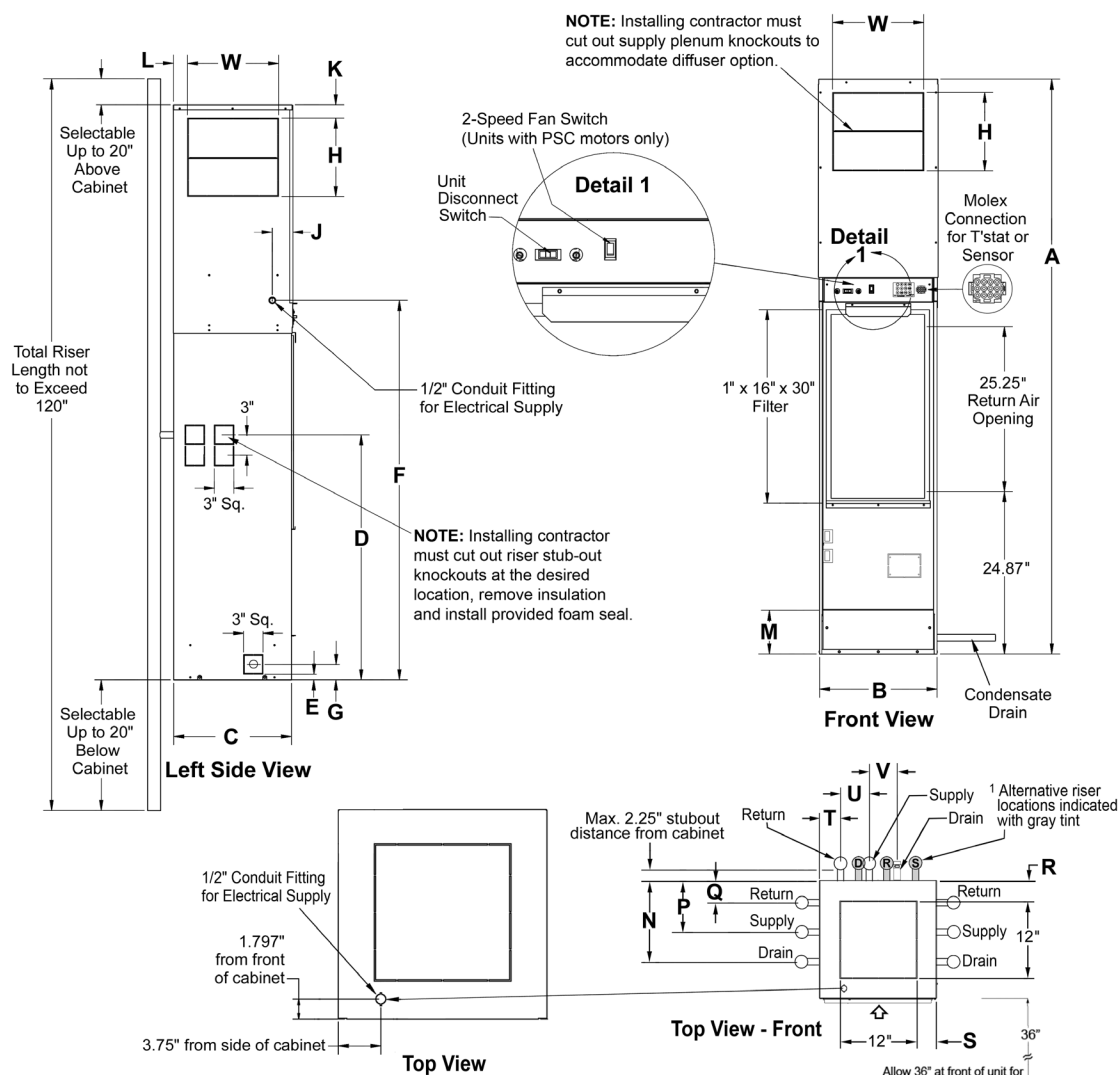
| Abbr.  | Description                                     |
|--------|---|
| CO1–4  | Fan Motor 1–4 Capacitor                         |
| C11–12 | Compressor 1, 2 Capacitor                       |
| CP1, 2 | Compressor 1, 2                                 |
| COE    | Condensate Overflow Protection Sensor–WSE       |
| COS    | Condensate Overflow Protection Sensor           |
| CUR    | Current Sensor                                  |
| DAT    | Discharge Air Temperature Sensor                |
| DCS    | Disconnect Switch                               |
| DPG    | Drain Pan Ground                                |
| EB1    | Expansion Control Board 1                       |
| EH1    | Electric Heat                                   |
| EWT    | Entering Water Temperature Sensor               |
| FCP    | Fan Connector Plug                              |
| FRC    | Fan Connector Receptacle                        |
| FM1–4  | Fan Motor 1–4                                   |
| FPR    | Fan Power Relay                                 |
| FSR    | Fan Speed Relay                                 |
| FSS    | Fan Speed Switch                                |
| FS1–4  | Fuse 1–4  |
| GND    | Ground  |
| HACR   | HACR Breaker                                    |
| HG1, 2 | Hot Gas Reheat Valve Actuator                   |
| HP1, 2 | High Pressure Switch 1, 2                       |
| HUM    | Humidistat Sensor                               |
| HYH    | Hot Water Heat Valve Actuator                   |
| LAT    | Leaving Air Temperature Sensor                  |
| LP1, 2 | Low Pressure Switch 1, 2                        |
| LT1, 2 | Compressor Suction Line Temperature Sensor 1, 2 |
| LWT    | Leaving Water Temperature Sensor                |
| M01–04 | Fan Motor 1–4 Contactor                         |
| M11–1  | Compressor 1, 2 Contactor                       |
| MCB    | Main Control Board                              |
| MPP    | Main Power Connector Plug                       |
| MPR    | Main Power Connector Receptacle                 |
| NCB    | Network Control Board                           |
| OLP    | Overload Protector–Compressor Motor             |
| PDPG   | Primary Drain Pan Ground                        |
| R15    | Relay, Field Contacts, Alarm Output             |
| R25    | Relay, Hot Gas Reheat                           |
| RAT    | Return Air Temperature Sensor                   |
| RV1, 2 | Reversing Valve 1, 2                            |
| SOS    | Secondary Overflow Sensor                       |
| TB1    | Terminal Block, Line Voltage                    |

| Abbr.  | Description                         |
|--------|-------------------------------------|
| TB2    | Terminal Block, 24V                 |
| TB3    | Terminal Block, EH1 Line Voltage    |
| TR1    | Transformer–Control                 |
| TR2    | Transformer–Fan Motor               |
| TSL    | Thermostat, Wireless                |
| TS1, 2 | Terminal Strip                      |
| TSP    | Terminal Strip Connector Plug       |
| TSR    | Terminal Strip Connector Receptacle |
| TSW    | Thermostat, Wired (Unit-Mounted)    |
| W001–^ | Wire                                |
| WC     | Wireless Controller                 |
| H001–^ | Wire Harness                        |
| WN1–^  | Wire Nut                            |
| P001–^ | Wire Plug                           |
| PCP1   | Wire Plug Assy–Compressor Power     |
| PT01   | Wire Plug Assy–2-Stage Comp Ctrl    |
| WSE    | Waterside Economizer Actuator       |



# Dimensional Drawings

## 18" × 18" Cabinet, Sizes 009–012



## Dimensions

| Unit Size 009–012 (18 in × 18 in) Cabinet (Dimensions in Inches) |        |       |        |      |        |      |                    |     |     |      |      |     |     |     |     |     |     |     |
|--|--------|-------|--------|------|--------|------|--------------------|-----|-----|------|------|-----|-----|-----|-----|-----|-----|-----|
| Unit Height "A"  | B      | C     | D      | E    | F      | G    | J                  | K   | L   | M    | N    | P   | Q   | R   | S   | T   | U   | V   |
| 80, 88,<br>92, 96  | 18.07  | 18.11 | 37.50  | 0.88 | 58.09  | 2.38 | 3.125              | 2.0 | 2.0 | 6.72 | 12.4 | 7.9 | 3.3 | 3.0 | 3.0 | 3.3 | 4.5 | 4.5 |
| Discharge Openings (Dimensions in Inches)                        |        |       |        |      |        |      |                    |     |     |      |      |     |     |     |     |     |     |     |
| Unit Size  | Single |       | Double |      | Triple |      | Single-Top Opening |     |     |      |      |     |     |     |     |     |     |     |
| 009–012  | W      | H     | W      | H    | W      | H    | W                  | H   |     |      |      |     |     |     |     |     |     |     |
|  | 14     | 16    | 14     | 8    | NR     | NR   | 12                 | 12  |     |      |      |     |     |     |     |     |     |     |

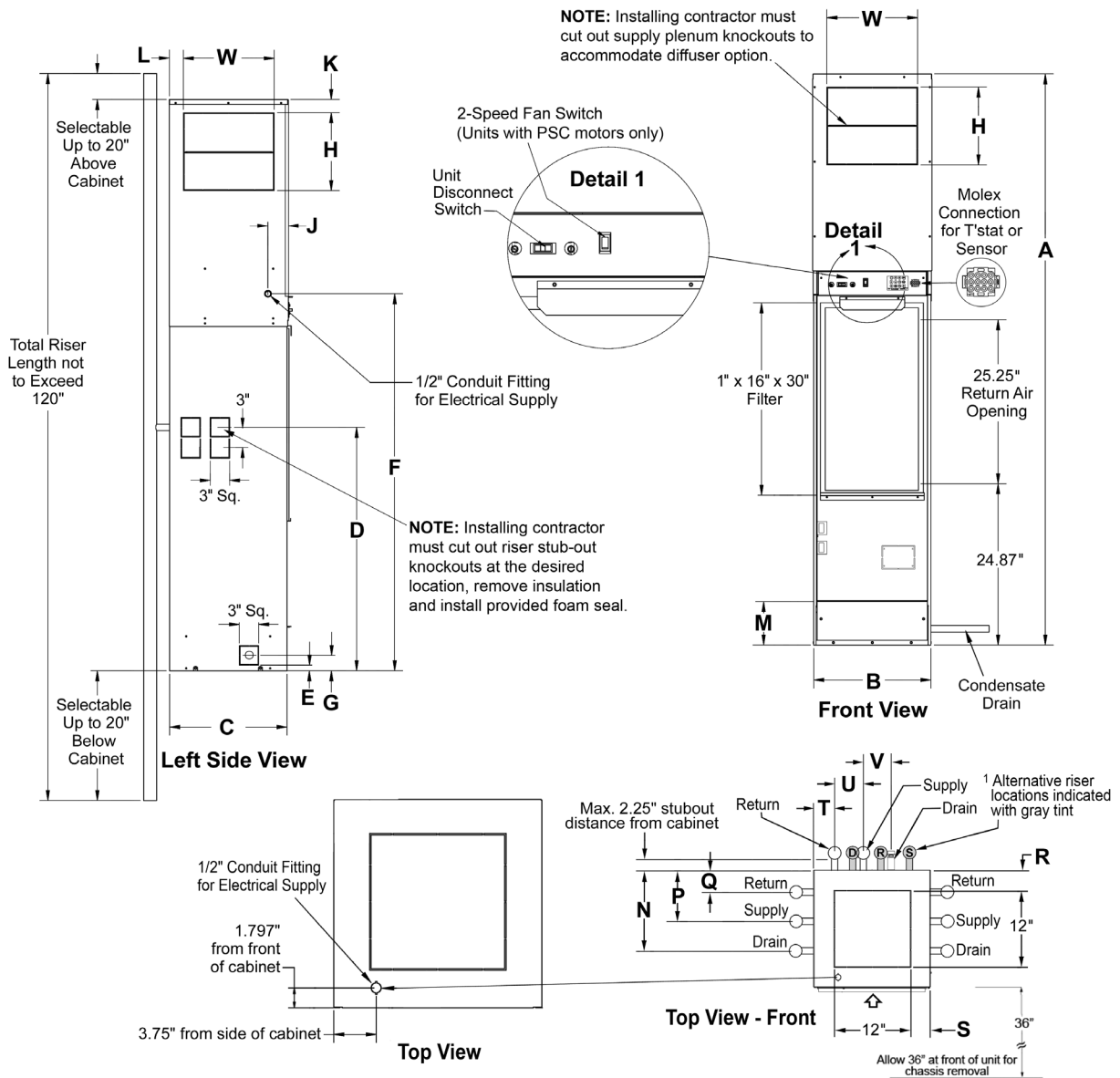
**NOTE 1:** Alternative riser locations dimensions mirror those shown as "T," "U," and "V"

**NOTE 2:** NR = Not Recommended

**NOTE 3:** 80"-high cabinet not available with side discharge, top discharge only.



# 24" × 24" Cabinet, Sizes 024–036



## Dimensions

| Unit Size 024–036 (24 in × 24 in) Cabinet (Dimensions in Inches) |        |       |        |      |        |      |                    |     |     |      |      |     |     |      |      |      |     |     |
|--|--------|-------|--------|------|--------|------|--------------------|-----|-----|------|------|-----|-----|------|------|------|-----|-----|
| Unit Height "A"  | B      | C     | D      | E    | F      | G    | J                  | K   | L   | M    | N    | P   | Q   | R    | S    | T    | U   | V   |
| 80, 88, 92, 96   | 24.00  | 24.04 | 37.50  | 0.88 | 58.08  | 2.38 | 4.54               | 2.0 | 3.0 | 6.72 | 12.4 | 7.9 | 3.3 | 3.09 | 3.10 | 3.12 | 4.5 | 4.5 |
| Discharge Openings (Dimensions in Inches)                        |        |       |        |      |        |      |                    |     |     |      |      |     |     |      |      |      |     |     |
| Unit Size  | Single |       | Double |      | Triple |      | Single-Top Opening |     |     |      |      |     |     |      |      |      |     |     |
| 024  | W      | H     | W      | H    | W      | H    | W                  | H   |     |      |      |     |     |      |      |      |     |     |
|  | NR     | NR    | 18     | 10   | 18     | 10   | 18                 | 18  |     |      |      |     |     |      |      |      |     |     |
| 030–036  | NR     | NR    | 18     | 14   | 18     | 10   | 18                 | 18  |     |      |      |     |     |      |      |      |     |     |

**NOTE 1:** NR = Not Recommended

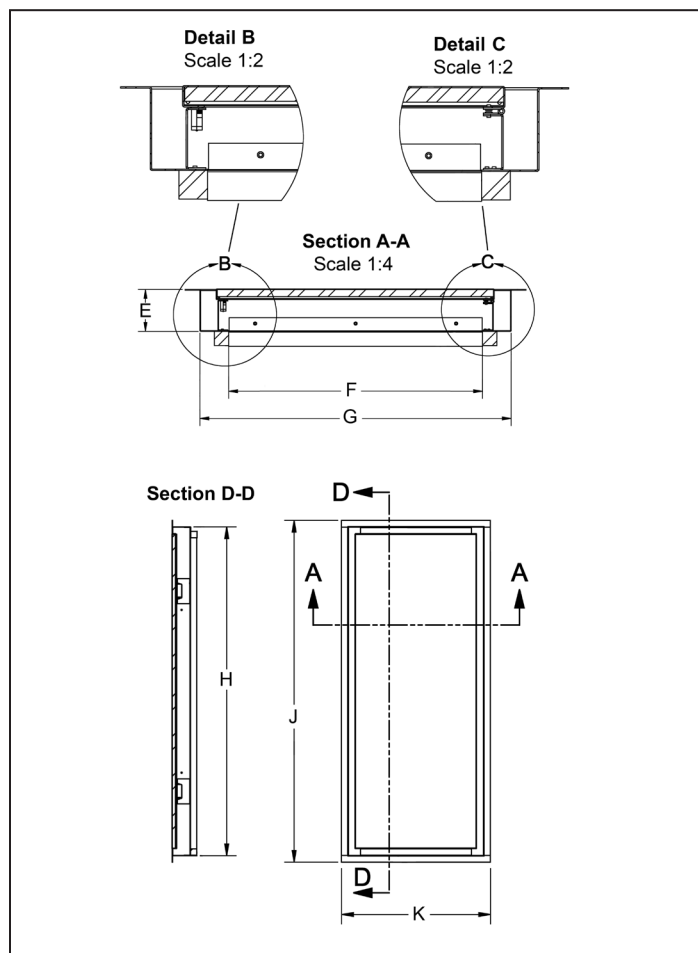
**NOTE 2:** 80"-high cabinet not available with side discharge, top discharge only.

## Unit Doors

### Hinged Perimeter Return Air Panel Door

Constructed of heavy-gauge steel, lined with insulation to help attenuate sound from the compressor and fan assembly. Magnetic latching clips ensure the panel door stays closed during operation. An optional dual locking feature is available. Available with electrostatic powder coat finish in colors of cupola white or antique ivory.

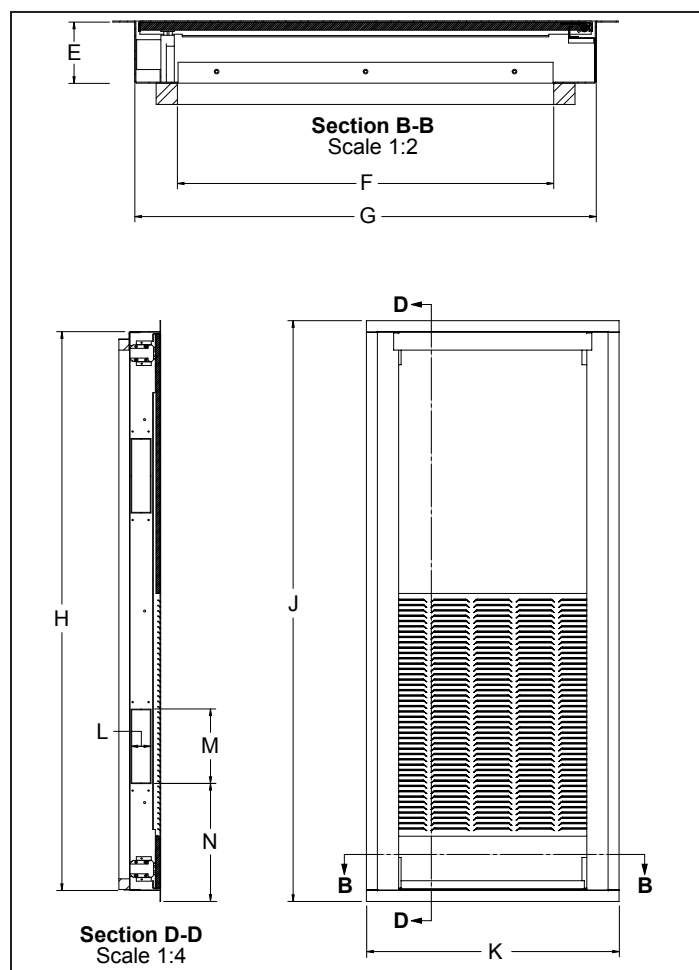
**Figure 22: Hinged Perimeter Return Air Door**



### Louvered Return Air Panel Door with Optional Motorized Damper

The louvered return air panel door has two 1-5/8" x 7" cut-outs available to connect ductwork for delivering outdoor air into the space using the optional motorized outdoor air damper. The optional motorized outdoor air damper mounts only on the hinge side of the door which is selectable as right or left hand. Available with electrostatic powder coat finish in colors of cupola white or antique ivory.

**Figure 23: Louvered Return Air Panel Door with Optional Motorized Damper**



**Table 28: Return air panel dimensions**

| Unit Size | E                         |                           | F      | G      | H      | J      | K      | Outdoor Air Opening |       |        |
|-----------|---------------------------|---------------------------|--------|--------|--------|--------|--------|---------------------|-------|--------|
|           | 1" Filter Compatible Door | 2" Filter Compatible Door |        |        |        |        |        | L                   | M     | N      |
| 009-018   | 2.92"                     | 3.92"                     | 17.69" | 21.69" | 52.53" | 54.60" | 23.75" | 1.88"               | 7.00" | 11.08" |
| 024-036   |                           |                           | 23.69" | 27.69" |        |        | 29.75" |                     |       |        |

# System Considerations

## Operating Limits

**This equipment is designed for indoor installation only.**

Sheltered locations such as attics, garages, etc. will not provide sufficient protection against extremes in temperature and/or humidity, and equipment performance, reliability, and service life may be adversely affected.



### CAUTION

Units must be checked for water leaks upon initial water system start-up. Water leaks may be a result of mishandling or damage during shipping. Failure by the installing contractor to check for leaks upon start-up of the water system could result in property damage.

### NOTICE

Altitude Limits: Maximum applied altitude not to exceed 3,000 meters/ 9,843 feet.

## Initial Unit Start-Up Temperature Range

### NOTICE

This is not for continuous operation. It is assumed that such a start-up is for the purpose of bringing the building space up to occupancy temperature.

### Standard range units

Units are designed to start in an ambient of 50°F (10°C), with entering air at 50°F (10°C), with entering water at 70°F (21°C), with both air and water at the flow rates used in the ISO 13256-1 rating test, for initial start-up in winter.

### Extended range units

Extended range heat pump conditioners are designed to start in an ambient of 40°F (5°C), with entering air at 40°F (5°C), with entering water at 40°F (5°C), with both air and water at the flow rates used in the ISO 13256-1 rating test, for initial start-up in winter.

**Table 29: Air Limits in °F (°C)**

| Air Limits                        | Standard Range Units   |             | Extended Range (Geothermal) Units |             |
|-----------------------------------|------------------------|-------------|-----------------------------------|-------------|
|                                   | Cooling (DB/WB)        | Heating     | Cooling (DB/WB)                   | Heating     |
| Minimum Ambient Air <sup>1</sup>  | 50°F (10°C)            | 50°F (10°C) | 40°F (4°C)                        | 40°F (4°C)  |
| Maximum Ambient Air <sup>2</sup>  | 100°F/77°F (38°C/25°C) | 85°F (29°C) | 100°F/77°F (38°C/25°C)            | 85°F (29°C) |
| Minimum Entering Air <sup>1</sup> | 65°F/55°F (18°C/13°C)  | 50°F (10°C) | 65°F/55°F (18°C/13°C)             | 50°F (10°C) |
| Common Design Entering Air        | 75°F/63°F (24°C/17°C)  | 70°F (21°C) | 75°F/63°F (24°C/17°C)             | 70°F (21°C) |
| Maximum Entering Air <sup>2</sup> | 85°F/71°F (29°C/22°C)  | 80°F (27°C) | 85°F/71°F (29°C/22°C)             | 80°F (27°C) |

**NOTE 1:** Maximum and minimum values may not be combined. If one value is at maximum or minimum, the other conditions may not exceed the normal condition for standard units. Extended range units may combine any two maximum conditions, but not more than two, with all other conditions being normal conditions.

**NOTE 2:** This is not for continuous operation. It is assumed that such a start-up is for the purpose of bringing the building space up to occupancy temperature.

**Table 30: Fluid Limits**

| Fluid Limits                 | Standard Range Units |             | Extended Range (Geothermal) Units |                    |
|------------------------------|----------------------|-------------|-----------------------------------|--------------------|
|                              | Cooling              | Heating     | Cooling                           | Heating            |
| Minimum Entering Fluid       | 55°F (13°C)          | 55°F (13°C) | 30°F (-1°C)                       | 25°F (-4°C)        |
| Common Design Entering Fluid | 85-90°F (29-32°C)    | 70°F (21°C) | 90°F (32°C)                       | 35-60°F (1.5-16°C) |
| Maximum Entering Fluid       | 120°F (49°C)         | 90°F (32°C) | 120°F (49°C)                      | 90°F (32°C)        |
| Minimum GPM/Ton              | 2.0                  |             |                                   |                    |
| Nominal GPM/Ton              | 3.0                  |             |                                   |                    |
| Maximum GPM/Ton              | 4.0                  |             |                                   |                    |

**Table 31: Airflow Correction Factors**

| Airflow |              | Cooling        |                   |       |                   | Heating          |       |                    |
|---------|--------------|----------------|-------------------|-------|-------------------|------------------|-------|--------------------|
| CFM/ton | % of Nominal | Total Capacity | Sensible Capacity | Power | Heat of Rejection | Heating Capacity | Power | Heat of Absorption |
| 445     | 112%         | 1.030          | 1.074             | 1.012 | 1.027             | 1.025            | 0.971 | 1.039              |
| 425     | 106%         | 1.016          | 1.038             | 1.006 | 1.014             | 1.013            | 0.985 | 1.020              |
| 410     | 103%         | 1.008          | 1.019             | 1.003 | 1.007             | 1.006            | 0.992 | 1.010              |
| 400     | 100%         | 1.000          | 1.000             | 1.000 | 1.000             | 1.000            | 1.000 | 1.000              |
| 390     | 97%          | 0.992          | 0.980             | 0.996 | 0.993             | 0.993            | 1.007 | 0.990              |
| 375     | 94%          | 0.985          | 0.962             | 0.994 | 0.986             | 0.987            | 1.015 | 0.980              |
| 355     | 88%          | 0.970          | 0.926             | 0.987 | 0.973             | 0.975            | 1.029 | 0.961              |
| 330     | 82%          | 0.958          | 0.889             | 0.981 | 0.959             | 0.962            | 1.043 | 0.942              |

**NOTE:** The correction factor table is for reference only. For precise performance numbers, use Daikin Select Tools.

**Table 32: Cooling Correction Factors**

| Entering Air WB °F | Total Cooling Capacity | Sensible Cooling Capacity Multipliers—Entering DB °F |       |       |       |       |       | Power | Heat of Rejection |
|--------------------|------------------------|--|-------|-------|-------|-------|-------|-------|-------------------|
|                    |                        | 65   | 70    | 75    | 80    | 80.6  | 85    |       |                   |
| 55                 | 0.797                  | 0.874  |       |       |       |       |       | 0.991 | 0.831             |
| 60                 | 0.882                  | 0.672  | 0.875 | 1.079 |       |       |       | 0.995 | 0.902             |
| 65                 | 0.966                  |  | 0.673 | 0.877 | 1.081 |       |       | 0.998 | 0.972             |
| 66.2               | 0.986                  |  | 0.625 | 0.829 | 1.032 | 1.057 |       | 0.999 | 0.989             |
| 67                 | 1.000                  |  | 0.592 | 0.796 | 1.000 | 1.024 | 1.204 | 1.000 | 1.000             |
| 70                 | 1.051                  |  |       | 0.675 | 0.879 | 0.903 | 1.083 | 1.002 | 1.042             |
| 71                 | 1.135                  |  |       |       | 0.677 | 0.701 | 0.880 | 1.006 | 1.113             |

**NOTE:** The correction factor table is for reference only. For precise performance numbers, use Daikin Select Tools.

**Table 33: Heating Correction Factors**

| Entering Air DB °F | Heating Capacity | Power | Heat of Absorption |
|--------------------|------------------|-------|--------------------|
| 50                 | 1.050            | 0.754 | 1.128              |
| 55                 | 1.038            | 0.816 | 1.096              |
| 60                 | 1.025            | 0.877 | 1.064              |
| 65                 | 1.013            | 0.939 | 1.032              |
| 68                 | 1.005            | 0.975 | 1.013              |
| 70                 | 1.000            | 1.000 | 1.000              |
| 75                 | 0.987            | 1.061 | 0.968              |
| 80                 | 0.975            | 1.123 | 0.936              |
| 85                 | 0.962            | 1.184 | 0.904              |

**NOTE:** The correction factor table is for reference only. For precise performance numbers, use Daikin Select Tools.

## Antifreeze



### CAUTION

Do not use an automotive-grade antifreeze. Industrial grade glycols must be used. Automotive antifreeze contains inhibitors which will cause plating on the copper components used with the unit. The type and handling of glycol used must be consistent with local codes.

Glycols and other alcohols are commonly used as antifreeze; however, higher percentage mixtures of alcohols such as ethanol and methanol are not recommended due to increased flammability. Your local sales office should be consulted to determine the antifreeze best suited to your area. The use of antifreeze may impact system performance depending on its concentration and should be considered during initial system design. When antifreeze is added to the water system for freeze protection, recognize that the refrigerant suction pressure drop will be higher. The reduction in performance depends upon the antifreeze concentration and temperature.

In areas where minimum entering loop temperatures drop below 50°F (10°C) or where piping will be routed through areas subject to freezing, antifreeze is required. If 3 GPM per ton is maintained, this limit can be lowered to 42°F (6°C). Care must be given to maintain proper water flow.

Freeze protection should be maintained to 15°F (9°C) below the lowest expected entering loop temperature. For example, if 30°F (-1°C) is the minimum expected entering loop temperature, the leaving loop temperature would be 22 to 25°F (-6 to -4°C) and freeze protection should be at least 15°F (-10°C). Calculation is as follows: 30°F - 15°F = 15°F (-1°C - 9°C = -10°C).

All alcohols should be premixed and pumped from a reservoir outside of the building when possible or introduced under the water level to prevent fumes. Calculate the total volume of fluid in the piping system. Then use the percentage by volume shown in Table 34 for the amount of antifreeze needed. Antifreeze concentration should be checked from a well mixed sample using a hydrometer to measure specific gravity.

**Table 34: Antifreeze Percentage by Volume**

| Type  | Minimum Temperature for Low Temperature Protection |                  |                  |                  |
|---|--|------------------|------------------|------------------|
|   | 10°F<br>(-12.2°C)                                  | 15°F<br>(-9.4°C) | 20°F<br>(-6.7°C) | 25°F<br>(-3.9°C) |
| <b>100% USP Food-Grade Propylene Glycol</b> | 38%  | 25%              | 22%              | 15%              |
| <b>Ethanol<sup>1</sup></b>                  | 29%  | 25%              | 20%              | 14%              |
| <b>Methanol</b>                             | 25%  | 21%              | 16%              | 10%              |

**NOTE 1:** Must not be denatured with any petroleum product.

**Table 35: Antifreeze Correction Factors**

| Ethylene Glycol         |       |       |       |       |       |
|-------------------------|-------|-------|-------|-------|-------|
|                         | 10%   | 20%   | 30%   | 40%   | 50%   |
| <b>Cooling Capacity</b> | 0.995 | 0.992 | 0.987 | 0.983 | 0.979 |
| <b>Heating Capacity</b> | 0.991 | 0.982 | 0.977 | 0.969 | 0.961 |
| <b>Pressure Drop</b>    | 1.07  | 1.13  | 1.18  | 1.26  | 1.28  |
| Propylene Glycol        |       |       |       |       |       |
|                         | 10%   | 20%   | 30%   | 40%   | 50%   |
| <b>Cooling Capacity</b> | 0.99  | 0.98  | 0.97  | 0.96  | 0.95  |
| <b>Heating Capacity</b> | 0.987 | 0.975 | 0.962 | 0.942 | 0.93  |
| <b>Pressure Drop</b>    | 1.07  | 1.15  | 1.25  | 1.37  | 1.42  |
| Ethanol                 |       |       |       |       |       |
|                         | 10%   | 20%   | 30%   | 40%   | 50%   |
| <b>Cooling Capacity</b> | 0.991 | 0.951 |       |       |       |
| <b>Heating Capacity</b> | 0.995 | 0.96  |       |       |       |
| <b>Pressure Drop</b>    | 1.035 | 0.96  |       |       |       |
| Methanol                |       |       |       |       |       |
|                         | 10%   | 20%   | 30%   | 40%   | 50%   |
| <b>Cooling Capacity</b> | 0.998 | 0.972 |       |       |       |
| <b>Heating Capacity</b> | 0.995 | 0.97  |       |       |       |
| <b>Pressure Drop</b>    | 1.023 | 1.057 |       |       |       |

**NOTE:** Higher percentage mixtures of ethanol and methanol are not recommended due to increased flammability.

## Unit Selection

Achieving optimal performance with water source heat pump systems requires both accurate system design and proper equipment selection. Use a building load program to determine the heating and cooling loads of each zone prior to making equipment selections. With this information, the Daikin SelectTools™ software selection program for water source heat pumps can be used to provide fast, accurate and complete selections of all water source heat pump products. Daikin SelectTools software is available by contacting your local Daikin Applied Representative.

While we recommend that you use Daikin SelectTools software

for all unit selections, manual selections can be accomplished using the same zone load information and the capacity tables available in this catalog.

## Manual Selections

The following example illustrates a typical selection for a zone in a boiler/tower system for a commercial building.

A building load program determines that this zone needs 23,500 Btuh of total cooling, 16,000 Btuh of sensible cooling and 27,000 Btuh of total heating. The water temperatures for the boiler/tower system are 90°F for cooling and 70°F for heating. The return air temperature is 80°F dry bulb with 67°F wet bulb for cooling and 70°F for heating.

## Zone Requirements

| Design Criteria       | Target Values    |
|-----------------------|------------------|
| Total Cooling Load    | 23,500 Btuh      |
| Sensible Cooling Load | 16,000 Btuh      |
| Total Heating Load    | 27,000 Btuh      |
| Air Flow Required     | 800 CFM          |
| Return Air Cooling    | 80°F DB/ 67°F WB |
| Return Air Heating    | 70°F DB          |

## Selection

**Table 36: Model WSVC (Boiler/Tower Model)**

| Design Criteria                      | Actual Value               |
|--------------------------------------|----------------------------|
| Total Cooling Capacity at 90° EWT    | 23,515 Btuh                |
| Sensible Cooling Capacity at 90° EWT | 16,139 Btuh                |
| Total Heating Capacity at 70° EWT    | 27,180 Btuh                |
| CFM                                  | 803 at 0.15 ESP (Wet Coil) |
| Water Flow Required To Meet Capacity | 4 GPM                      |
| Water Pressure Drop                  | 8.6 (ft H <sub>2</sub> O)  |
| Final Selection                      | WSVC 024                   |

## Water System Quality

The cleaning, flushing and chemical treatment of a water source heat pump system is fundamental to efficient operation and the life expectancy of the system.

Potential system problems produced by the use of water fall into three general categories:

- Scale formation: Mineral deposits which result from the crystallization and precipitation of dissolved salts in the water. The deposits form an insulating barrier, reducing the heat transfer rate and impeding the circulation of fluids due to increased pressure drop.
- Corrosion: Decomposition of the metal caused by

absorption of gases from the air. Corrosion may occur in any metal component of the system.

- Organic growths: Slime and algae which form under certain environmental conditions, and can reduce the heat transfer rate by forming an insulating coating or can promote corrosion by pitting.

The system water should be evaluated for degrees of impurity, with testing available from independent testing labs, health departments or state agencies.



**Table 37: Water Quality Conditions and Applications**

| Potential Problem | Chemical(s) or Condition            | Range for Copper Heat Exchangers | Range of Cupronickel Heat Exchanger |
|-------------------|-------------------------------------|----------------------------------|-------------------------------------|
| Scaling           | Calcium & Magnesium Carbonate       | Less than 350 ppm                | Less than 350 ppm                   |
| Corrosion         | pH Range                            | 7–9                              | 5–9                                 |
|                   | Total Dissolved Solids              | Less than 1000 ppm               | Less than 1500 ppm                  |
|                   | Ammonia, Ammonium Hydroxide         | Less than 0.5 ppm                | Less than 0.5 ppm                   |
|                   | Ammonium Chloride, Ammonium Nitrate | Less than 0.5 ppm                | Less than 0.5 ppm                   |
|                   | Calcium Chloride/ Sodium Chloride   | Less than 125 ppm                | Less than 125 ppm—Note 4            |
|                   | Chlorine                            | Less than 0.5 ppm                | Less than 0.5 ppm                   |
|                   | Hydrogen Sulfide                    | None Allowed                     | None Allowed                        |
| Biological Growth | Iron Bacteria                       | None Allowed                     | None Allowed                        |
|                   | Iron Oxide                          | Less than 1 ppm                  | Less than 1 ppm                     |
| Erosion           | Suspended Solids                    | Less than 10 ppm                 | Less than 10 ppm                    |
|                   | Water Velocity                      | Less than 8 ft./s                | Less than 12 ft./s                  |

**NOTE 1:** Water hardness in ppm is equivalent to hardness in mg/L.

**NOTE 2:** Grains/gallon = ppm divided by 17.1.

**NOTE 3:** Copper and cupronickel heat exchangers are not recommended for pool applications for water outside the range of the table. Secondary heat exchangers are required for applications not meeting the requirements shown above.

**NOTE 4:** Salt water applications (approximately 25,000 ppm) require secondary heat exchangers due to copper piping between the heat exchanger and the unit fittings.

## Supply & Return Piping

All units should be connected to supply and return piping in a two-pipe reverse return configuration. A reverse return system is inherently self-balancing and requires only trim balancing where multiple quantities of units with different flow and pressure drop characteristics exist in the same loop.

To insure proper water flow, measure the temperature differential between the supply and return connections. The temperature differential should be 10°F to 14°F (5°C to 8°C) for units in cooling mode.

A direct return system may also work acceptably, but proper water flow balancing is more difficult to achieve and maintain.



### **WARNING**

Polyolester Oil, commonly known as POE oil is a synthetic oil used in many refrigeration systems, and may be present in this Daikin Applied product. POE oil, if ever in contact with PVC/CPVC will coat the inside wall of PVC/CPVC pipe causing environmental stress fractures. Although there is no PVC/CPVC piping in this product, please keep this in mind when selecting piping materials for your application, as system failure and property damage could result.

The supply and return stub outs and the factory-provided shutoff valves have male JIC connections and usually join the unit via short lengths of high pressure flexible hose which are sound attenuators for both unit operating noise and hydraulic pumping noise.

Some flexible hose threaded fittings are supplied with sealant compound. If not, apply Teflon tape to assure a tight seal.

# Engineering Specifications

## SMARTSOURCE® VERTICAL STACK WATER SOURCE HEAT PUMP, MODELS WSVF & WSVS

### PART 1—GENERAL

#### 1.01 WORK INCLUDED

A. The contractor shall furnish and install where shown on the plans, packaged water source heat pumps. Sizes, types and performance shall be as indicated in the unit schedule. Each unit shall be complete with factory furnished components and accessories as shown in the plans and as herein specified.

B. Provide labor, materials, equipment and services to perform operations required for the complete installation and related work as required in contract documents.

C. Electrical work required as an integral part of the temperature control work is indicated on the mechanical drawings, and is the responsibility of this contractor to provide the complete system to perform the full sequence of operation shown, or as described in this specification.

#### 1.02 REFERENCES

A. This is a performance specification, which uses the first named manufacturer's equipment as basis of design. Other manufacturers are named as acceptable, providing the other named manufacturers comply fully with all construction details, scheduled performance requirements and the full scope of these specifications. This does not necessarily mean that the other named manufacturers equipment will fit the available space or design requirements. It shall be the responsibility of this contractor to be sure that the system provided fully meets or exceeds the specified requirements and should any changes or additional apparatus be required for other named manufacturers, this contractor shall be fully responsible for the material and installation cost (including claims by all other trades, which may be effected by the substitution), to complete the installation and comply fully with the systems as outlined in these plans and specifications. A request for a substitution shall constitute a representation that the contractor will:

1. Investigate the proposed product and determine that it is equal to or superior in all respects to that specified.
2. Provide the same warranties or bonds for the substitution as for the product specified.
3. Coordinate the installation of an accepted substitution in the work, and make such other changes in the work as may be required for installation to make the work complete and equal to the basis of design in all respects.

B. Any manufacturer not named in these specifications shall be submitted to the engineer for technical review not less than fourteen days prior to the published bid date. The solicitation for consideration of alternate manufacturers shall include, but not limited to, full submittal data on unit construction, performance, and shall include:

1. Drawings and samples to demonstrate the products compliance.
2. Outline any changes required in other elements of the work because of the substitution.
3. Availability of local service and source of replacement material and parts.
4. A comparison of the proposed manufacturer's equipment with that specified. A complete copy of these specifications, with a notation written in the right margin of the specification; "C" for full compliance, or "D" for deviation, for each specification line item. For every instance of deviation, a full explanation shall be attached, identified by specification number.
5. A list of local installations where equipment of like and kind have been installed, with names and telephone numbers of personnel for each installation, that may be contacted as references.

C. The engineer shall determine compliance with the specification and whether the proposed manufacturer's equipment is acceptable for bid submission. Any deviation from this procedure is not acceptable and shall disqualify the proposed manufacturer. Acceptance and approval of any proposed equipment by the engineer for bid submission shall not be interpreted to imply that the proposed equipment will fit the available space or the dimensional or design requirements. The engineer will review requests for substitutions with reasonable promptness, and the decision to accept or reject the requested substitution will be responded to only by addendum. The engineer may request additional information, which must be provided and reviewed before determining compliance. If the engineer finds the product to be of general acceptance, an addendum will be issued adding that manufacturer's name. If not added by addendum, that manufacturer's equipment will not be allowed or considered for the project if submitted.

D. The judgement of the engineer shall be final.

#### 1.03 SUBMITTALS

A. Shop drawings including weights, dimensions, and required clearances for service.

B. Electrical data, including minimum circuit ampacity and maximum overcurrent protection required, time delay fuse type or HACR circuit breaker required.

C. Computer-generated Certified Performance data at project application conditions.

D. Installation details

## 1.04 QUALITY ASSURANCE

A. Heat pump performance shall be certified in accordance with AHRI/ISO Standard 13256-1 and shall have the correct AHRI/ISO and CUL labels affixed to the cabinet. Heat pump performance at scheduled project operating conditions shall be substantiated by computer generated output data.

B. Heat pumps shall be listed by a nationally recognized safety-testing laboratory or agency, such as Underwriters Laboratory (UL), or Electrical Testing Laboratory (ETL), or Canadian Standards Association (CSA).

## PART 2—PRODUCTS

### 2.01 GENERAL

A. Units shall be supplied completely factory-assembled, piped, internally wired, fully charged with pure single-component R-32 refrigerant and capable of operation with an entering water temperature range from 55°F to 120°F on water loop (standard range) models and 25°F to 120°F on ground loop (geothermal) models. All equipment must be rated and certified in accordance with AHRI/ISO 13256-1 and must be tested, investigated, and determined to comply with the requirements of the standards for heating and cooling equipment UL-60335-2-40 Version 2 for the US and CAN/CSA-C22.2 NO. 60335-2-40 Version 2 for Canada. Each unit shall be ETL- and ETL-listed. Each unit shall be run tested at the factory. The installing contractor shall be responsible for furnishing and installing water source heat pumps as indicated on the plans and per installation instructions. Units with zeotropic blend refrigerants are not acceptable.

B. Electrical: All water source heat pump units shall be suitable for continuous operation with a supply voltage variation, measured at the factory power connection point, of 10% of the nameplate voltage. A control box shall be located within the unit and shall contain controls for standard components such as compressor, reversing valve, electric heat coil, and fan motor operation and shall have a standard 50VA, 24V control circuit transformer. Unit shall be name-plated to accept time delay fuses or HACR circuit breaker for branch over-current protection of the power source. All units shall have a short-circuit current rating of 5 kA rms symmetrical, 600 V maximum.

1. All heat pump nameplate electrical utilization voltages shall be in conformance with ANSI Standard C84.1 as follows:

| Nameplate Voltage | Phase | Distribution Voltage | Service, No. of Conductors |
|-------------------|-------|----------------------|----------------------------|
| 115               | 1     | 120                  | 3                          |
| 208/230           | 1     | 240                  | 3                          |
| 265/277           | 1     | 277                  | 3                          |

2. All units shall be suitable for continuous operation with a supply voltage variation measured at the factory power connection point of  $\pm 10\%$  of the nameplate voltage.

C. Chassis: The chassis section shall be constructed of heavy gauge G60 galvanized steel. The chassis section shall consist of the air coil, coaxial heat exchanger, primary condensate drain pan and complete refrigeration circuit. The primary condensate drain pan shall be constructed of non-corrosive ABS plastic and be sloped to prevent standing water. The chassis section shall be easily removed from the cabinet without removing the wall mounted hinged return air grille. The slide-in chassis shall have an insulated compressor compartment and must be lined with 1/2"-thick, 1–1/2 lb dual density fiberglass insulation. The compressor compartment shall be separated from the fan compartment with an insulated steel cover. Compressors in the airstream are unacceptable. The chassis base shall incorporate formed galvanized slide rails with vibration isolators to prevent vibration transmission to the cabinet. Supply and return water connections shall be copper JIC fittings and be supported to the chassis frame.

D. Refrigerant circuit: Units shall have an R-32 sealed refrigerant circuit, which includes a rotary or scroll compressor, thermostatic expansion valve, an aluminum lanced-fin and rifled copper tube refrigerant-to-air heat exchanger, reversing valve and a coaxial, tube-in-tube, refrigerant-to-water heat exchanger. The coaxial coil shall be made of a copper inner tube and a painted steel outer tube and shall be deeply fluted to enhance heat transfer and minimize fouling and scaling. The coaxial coil shall have a working pressure of 500 psig on the waterside and 600 psig on the refrigerant side. The airside coils shall be rated at a minimum of 600 psig working pressure.

E. Safety controls: High- and low-pressure switches and low temperature safety sensor shall be wired through a latching lockout circuit to disable the unit until it is reset electrically by interrupting the power supply to the unit. Automatic reset by wall sensor switching shall not be allowed. All safety switches shall be normally closed, opening upon fault detection. Control logic dependent upon the closing of a normally open switch shall not be allowed to preclude the possibility of simple, easily corrected faults being escalated into compressor or heat exchanger failure due to loss of integrity in control wiring.

F. Cold start-up (WSVC): Manufacturer shall guarantee heat pump units to start and operate in an ambient temperature of 40°F with entering air at 40°F, with entering water at 70°F, with both air and water at the flow rates used in the ARI/ISO standard rating test, for initial system start-up in winter. (This is not a normal or continuous operating condition, and it is assumed that such a start-up is only for the purpose of bringing the building or space up to initial occupancy temperature).

G. Air section: The air section of the unit shall be isolated from the compressor and control section with insulated walls to minimize the transmission of compressor noise and to permit operational service testing with the compressor compartment cover removed.

H. Fan and motor assembly: Unit shall have a direct drive centrifugal fan motor assembly. The fan housing shall

have a removable orifice ring to facilitate fan motor and fan wheel removal without removing the fan housing. The fan motor shall be multi-speed, permanently lubricated, PSC type isolated from the fan housing with vibration grommets and internal thermal overload protection. The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule.

I. Filters: All units shall be provided with one-inch thick, throwaway type fiberglass filters installed in a factory mounted one-inch filter rack.

J. Supply and return, condenser water connection: Supply and return water, and condensate connections shall be copper FPT fittings and be secured to the chassis frame. Risers with ball valves shall utilize JIC fittings. Supply, return, and condensate drain shall be connected to the loop and drain piping as detail on mechanical drawings.

K. Condensate pan: Units shall be G60 galvanized standard. Optional stainless steel is acceptable.

#### L. Control system

1. The unit control board shall be the main component of the system and shall contain the required inputs/outputs to operate a water source heat pump with a single speed fan.
2. Binary outputs: Seven total (main fan, compressor, reversing valve, isolation valve/pump request, one board status LEDs, room sensor status LED, alarm output).
  - a. Main fan switched output (line or low voltage) to control single-speed fan operation.
  - b. Compressor controls compressor operation (line or low voltage).
  - c. Reversing valve controls reversing valve operations via low voltage. When the reversing valve output is de-energized, the reversing valve is in the "cool" position.
  - d. Isolation valve/pump request switched output to send a signal that the water source heat pump requires loop fluid flow.
  - e. 1-Tricolor onboard status LED provides mode/alarm indication (5VDC).
  - f. Room sensor status LED provides unit status information (5VDC).
  - g. Alarm output will generate a 24VAC or ground signal (depending on field wiring) signal that turns on when the unit fan is in fault mode "A" Output 24VAC signal that turns on when the unit fan is in fault mode.

M. Unit controller inputs/outputs: The Microtech Unit Controller will be microprocessor-based and have capabilities, performance, and memory sufficient to execute the various functions detailed in this specification. This document will not specify a type, a manufacturer, or a family of microcontrollers to be considered for use. However, at a minimum, the following features are deemed essential:

1. Analog input: condensate overflow, brownout detection, suction-line temp sensor, timed override switch, setpoint adjust, fan mode (heat/cool/auto)
    - a. Condensate overflow: The presence of excessive condensate in the condensate drain pan is detected by a condensate sensor, which consists of a metal terminal ring mounted just below the top of the condensate pan. The analog input dedicated to condensate sensing must be capable of detecting the conductivity of water between the ring terminal and chassis ground. The conductivity trip point is 2.5 micro-ohms.
    - b. Brownout detection: This analog input will measure the 24VAC input voltage applied to the controller as a means of indirectly monitoring line voltage applied to the unit. The 24VAC input, once rectified, filtered, and fed to an appropriate voltage divider, will be applied to the analog input as a DC voltage level proportional to the input voltage. At a minimum, the measurable range will be between 70 and 120% of the corresponding unit nameplate voltage. Due to the tolerances involved with the various components associated with this approach, calibration will occur during factory test when exactly 100% nameplate voltage is applied to the unit while in cooling mode. The digitized value of the resultant DC voltage applied to the analog input during the calibration period will be saved within the controller (in non-volatile memory) and used as a reference value for subsequent operation in the field. The brownout trip and recovery levels are a function of the application software and are listed elsewhere in this specification.
    - c. Suction-line temp sensor: Sensing element shall be equivalent to NTC Thermistor—10K ohms at 25°C, 0.2°C interchangeability. Advanced Thermal Products—Curve Z.
- NOTE:** The timed (tenant) override switch will short out the Room sensor thermistor. Sensing range shall be 0 to 158°F with a resolution of 1°F and an accuracy of  $\pm 1.5^\circ\text{F}$  Maximum Total Error
- d. Setpoint Adjust: The setpoint adjust circuit of a remote room sensor shall consist of a 1.5K-ohm 2-wire potentiometer. The wiper of the potentiometer will be connected to the analog input. The other lead of the potentiometer is tied to analog common. The 0–1.5K-ohm range will be interpreted by the base controller as an offset to the current temperature Set point -5 to +5°F or a range of 55 to 95°F (jumper selectable and scaled accordingly in software).
  - e. Fan on/auto, heat/cool/auto: The room sensor shall incorporate switches and fixed resistors that present different resistance values to a single analog input which correspond to the fan and operating mode functions detailed below. The room sensor is designed with specific resistance values to coincide with the software in unit control module.



2. Temperature input: Sensing element in the Microtech room temperature sensor is equivalent to NTC Thermistor—10K ohms at 25°C, 0.2°C interchangeability. Advanced Thermal Products—Curve Z.

**NOTE:** The timed (tenant) override switch will short out the room sensor thermistor. Sensing range shall be 0 to 158°F with a resolution of 1°F and an accuracy of ±1.5°F Maximum Total Error.

3. Binary input: 19 total (low pressure, high pressure, emergency shutdown, 10-board level dipswitches, 5-thermostat, occupied/unoccupied) that employ the occupied/unoccupied control.

a. Low pressure switch: The low-pressure switch shall be sourced with 24VAC or DC, ±20%. The binary input detection circuit shall be designed such that a minimum of 7mA current flows through the external contacts.

b. High pressure switch: The high-pressure switch shall be part of an interlock circuit that interrupts power to the on-board compressor relay coil. Since this is a low voltage safety circuit as defined by UL, the designer must apply appropriate spacing as dictated by the relevant UL standards. As part of HP switch state detection, this circuit must sense the current flowing through the on-board compressor relay coil and communicate this information to the HP binary input. The current sensing circuit (example device: NEC/CEL PS2501-1-A opto-isolator) must be upstream of the high pressure switch, i.e., between the control output and the HP switch. In the unlikely event that the compressor binary output or HP current sensing circuit fails closed, the HP switch can still perform its intended safety function by opening the compressor relay coil circuit.

c. Emergency shutdown: This binary input will detect the presence of an earth grounded signal, which is supplied by an external, remote set of contacts – such as those provided by a condenser loop water controller.

d. Board level configuration switches

- Switch 1: Normal/test mode
- Switch 2: Continuous/cycling fan
- Switch 3: Water/glycol (loop fluid)
- Switch 4: Freeze fault detection
- Switch 5: Room temperature setpoint adjustment range
- Switch 6: Local control type (thermostat or room sensor)
- Switch 7: Primary heating source (compressor or other)
- Switch 8: I/O expansion module (present or not required)
- Switch 9: Application select (single compressor or two compressors)
- Switch 10: Fan select (future)

e. Thermostat inputs G, Y1, Y2, W1, W2, shall detect the presence of 24VAC sourced from the “R” terminal. The binary input conditioning circuitry for these inputs is designed to be compatible with conventional wall thermostats.

f. Unoccupied mode: This binary input will detect the presence of an earth grounded signal, which is supplied by an external, remote set of contacts, such as those provided by a condenser loop water controller.

N. The I/O expansion board shall provide a means of adding I/O capability to the base controller in the form of extra analog inputs, analog output, binary inputs, and binary outputs. The primary use of the I/O expansion board is variable speed fan control, two-stage compressor operation, dehumidification, waterside economizer, and one- or two-stage electric heat. Some configurations may also require options such as fan speed control, hot gas reheat coil control, and electric heater coil control.

1. Analog input: Three total (entering water temperature, return air temperature, space relative humidity)
  - a. Entering water temperature (EWT) monitors entering water temperature by means of a 10k Ohm thermistor.
  - b. Return air temperature (RAT) monitors return air temperature by means of a 10k Ohm thermistor,
  - c. Space relative humidity (RAH) monitors space relative humidity by means of a 0-10VDC signal.
2. Analog output: one total (PWM signal)
  - a. PWM signal provides constant CFM or torque for fan operation within maximum and minimum settings as defined in the fan motor control.
3. Binary inputs: three total (Heat Stage 3, Heat Stage 4, Humidistat)
  - a. Heat Stages 3 and 4 tell the Microtech Unit Controller that first- and second-stage electric heat are required.
  - b. Humidistat tells the Microtech Unit Controller that dehumidification is required.
4. Binary output: Six total (compressor high capacity, Auxiliary Heat Stage 1, Auxiliary Heat Stage 2, hot gas reheat dehumidification, waterside economizer, tricolor status LED)
  - a. Compressor high capacity (24VAC signal that enables the compressor at full load capacity.
  - b. Auxiliary Heat Stage 1 24VAC signal that enables Stage 1 electric heat.
  - c. Auxiliary Heat Stage 2 24VAC that enables Stage 2 electric heat.
  - d. Waterside economizer enables the three-way diverting valve upon a call for waterside economizer depending on unit configuration.
  - e. Tricolor status LED that indicates operating

conditions of the I/O expansion module as well as fan speed for variable-speed fans.

f. Board level configuration switches

- Switches 1–4: Fan speed adjustment signals
- Switches 5–6: Secondary heating options
- Switch 7: Hot gas reheat dehumidification
- Switch 8: Waterside economizer
- Switch 9: Single or two-compressor unit
- Switch 10: Single or two-stage compressor

O. Emergency shutdown: The controller will be in remote shutdown when the emergency shutdown contact closes to ground. Remote shutdown is provided so that when properly connected to a water loop controller or remote switch, the emergency shutdown input can be used to shut down the water source heat pump. When in remote shutdown no other thermostat or control inputs will have effect on unit operation. No faults or modes have higher priority than remote shutdown. Remote shutdown or brownout modes have the same level of priority. When the unit is in remote shutdown mode, the following occurs:

1. The compressor is immediately de-energized (minimum on timer is ignored).
2. The reversing valve is immediately de-energized.
3. The fan is immediately de-energized.
4. The alarm output is de-energized.
5. When the emergency shutdown input is opened, the unit will automatically return to normal operation.

P. Intelligent reset (low pressure and low temperature in heating only): The “fault retry” feature helps to minimize nuisance trips of automatic lockouts caused by low-pressure or low temperature faults. This feature automatically clears these faults the first two times they occur within a 24-hour period and triggers an automatic lockout on the third fault. The retry count is reset to zero every 24 hours. The fault retry feature does not apply to a high-pressure fault—which causes an immediate lockout and requires a manual reset, or condensate overflow or brownout faults, which are self-clearing.

Q. Microtech Unit Controller and I/O Expansion Board Fault and Status LEDs: Separate board-mounted tricolor LEDs

1. Room sensor status LED: A 5VDC signal shall operate as follows:

| Status LED              | Mode                                |
|-------------------------|-------------------------------------|
| On continually          | Occupied, Unoccupied Load Shed      |
| On 0.5 sec, off 5.5 sec | Unoccupied                          |
| On 5.5 sec, off 0.5 sec | Tenant Override, Override Load Shed |

| Status LED              | Mode  |
|-------------------------|---|
| On 0.1 sec, off 0.1 sec | Alarm Condition (Condensate Overflow, Brownout, Compressor Fault) |

## 2.02 BASIS OF DESIGN

A. Model types R-32 WSVF or WSVC by Daikin Applied.

B. Standard Warranty: Daikin Applied shall warranty defective parts for a period of twelve (12) months from initial startup or eighteen (18) months from the date shipped by Daikin Applied, whichever occurs first. This warranty is subject to the terms and conditions of the Daikin Applied Americas Inc. Limited Product Warranty.

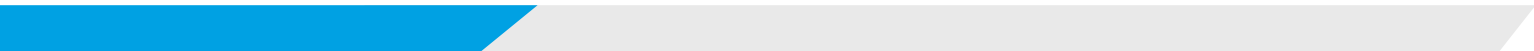
C. [OPTIONAL] Extended Warranty (All extended warranties are subject to the terms and conditions of the extended warranty statement):

1. An optional 1- or 4-Year Extended Compressor-Only Parts Warranty OR
2. An optional 1- or 4-Year Extended Refrigeration Circuit Parts Warranty OR
3. An optional 1- or 4-Year Extended Complete Unit Parts Warranty

## 2.03 ACCEPTABLE ALTERNATIVES

A. With prior approval only, submit a detailed summary listing of all variations in form, fit, or function, in addition to specified submittal data.

1. Verify that filters are provided as specified and are installed properly.
2. Verify that proper clearances for both operation and servicing have been provided.
3. Verify that the unit has been cleaned of all construction dust and debris.
4. Verify proper fan rotation, where applicable.
5. Start unit in accordance with manufacturer's written instructions.
6. Observe initial unit operation to verify suitability for continuous operation for a period of time of sufficient duration to permit system air balancing.



# COMPLETE HVAC SYSTEM SOLUTIONS

SELF-CONTAINED | ROOFTOPS | COILS | CONDENSING UNITS  
AIR HANDLERS | WATER-COOLED CHILLERS | AIR-COOLED CHILLERS  
MODULAR CENTRAL PLANTS | SITELINE BUILDING CONTROLS  
UNIT HEATERS | FAN COILS | AIR PURIFIERS | WATER SOURCE HEAT PUMPS  
VARIABLE AIR VOLUME UNITS | UNIT VENTILATORS



13600 INDUSTRIAL PARK BLVD. | MINNEAPOLIS, MN 55441  
1-800-432-1342 | 763-553-5330

LEARN MORE AT  
**DAIKINAPPLIED.COM**