

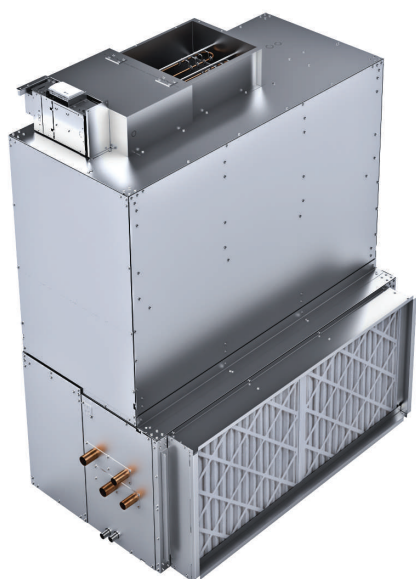


Product Catalog

# Blower Coil Air Handler

Models BCHE and BCVE

Single Zone Air Handler, 400 to 4000 CFM

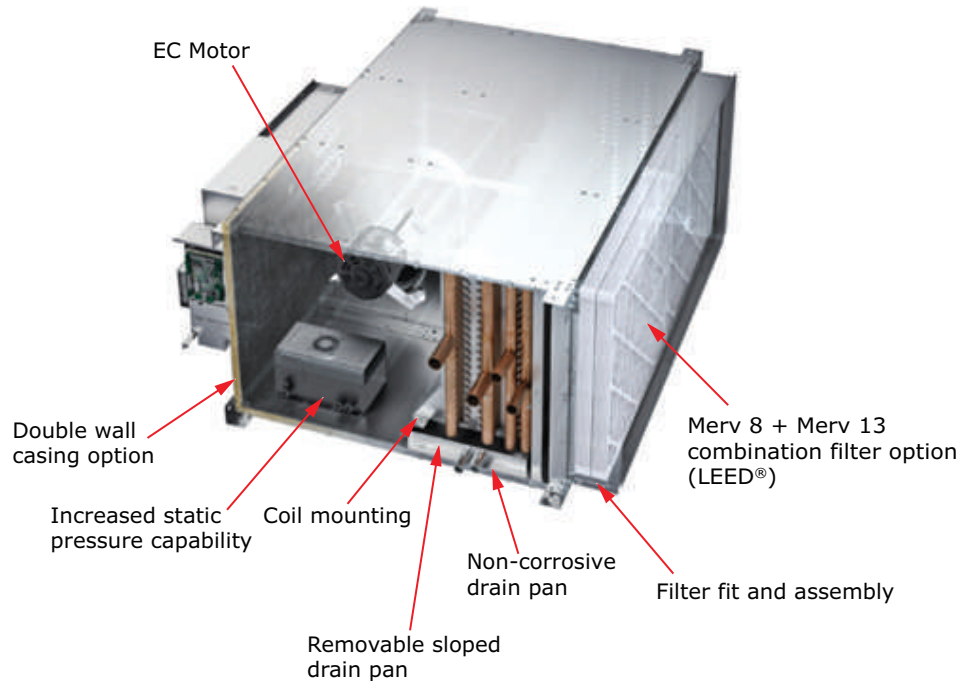




# Introduction

## Trane Blower Coils—Factory Packaged How You Need It...When You Need It

Figure 1. Horizontal blower coil (BCHE model)



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## Revision History

- Added construction protection LEED wrap option.
- Clarified Hydronic Coil Freeze Protection information for units with R-454B refrigerant.



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## Features and Benefits

### Factory Packaged – What You Need – When You Need It

Trane Blower Coil air handler, models BCHE and BCVE, accommodate a variety of applications while providing a low-cost method of air conditioning and/or heating buildings. These compact, low-profile units fit in small spaces and may be floor or ceiling mounted. With minimal effort, they can be relocated within the building as needs change.

Blower coils are light-duty air handlers, ranging from 1.0 to 10 tons nominal capacity. They are typically used in schools, hospitals, offices, stores, and similar applications. Trane Blower Coils are UL listed to U.S. and Canadian safety standards for the following:

- 115, 208, 230, 277, 460, and 575 volt 60 Hz motors
- 220, 240, 380, and 415 volt 50 Hz motors

**Figure 2. Horizontal blower coil**



### Proven Performance

Trane combines comprehensive performance certification by AHRI with thorough laboratory testing and advanced manufacturing methods. Together, these elements help assure that each Trane air handler operates predictably and reliably throughout the life of the unit.

Unlike other rating methods that check fan performance alone, Trane units are performance-tested in accordance with AHRI Standard 430. This certification process evaluates the air handler on the basis of airflow, static pressure, fan speed, and brake horsepower.

Heating and cooling coils are rigorously tested and certified with AHRI Standard 410 to assure that they, too, deliver published performance.

### Single Source Responsibility

Equipment and interoperable controls, engineered and provided by a single manufacturer, provide faster construction cycles and simplify job-site coordination efforts. This simplification reduces installation time, expense, and risk. Trane equipment and controls package provides the optimal performance when integrated in a Trane Earthwise™ system. This is a powerful system architecture that unifies Trane HVAC equipment, direct digital control, and building management into a cohesive whole with an assured source of support. This system is managed with the Tracer® building management system.



## Features and Benefits

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### Valve Kits

All Blower Coil air handlers are available with factory-provided valve kit options for field installation using field-supplied interconnecting piping. Kits are available with a variety of control valve options:

- Two- or Three-way
- 1/2-in., 3/4-in., 1-in., or 1 1/4-in.
- Two-position or Modulating Control
- Pressure Independent Control (PIC)

The kit also has shut-off ball valve(s), a strainer, and a circuit setter balancing valve or PIC valve. Kits with a three-way control valve also include a balancing fitting.

### Energy Efficiency

Trane's commitment to providing premium quality products has led to the exclusive use of Electronically Commutated Motors (ECM) in all blower coil models. These brushless DC motors incorporate the latest technology for optimized energy efficiency, acoustical abatement, maintenance free and extended motor life. Each motor comes with a VelociTach™ motor control board that allows for programmability, soft ramp-up, better airflow control, and serial communication.

Trane units equipped with ECMs are significantly more efficient than permanent split capacitor (PSC) motors or belt-drive motors and enable single-zone VAV control.

Single-zone VAV control varies the fan speed as the zone cooling or heating load changes, and can result in lower operating costs and improved occupant comfort compared to constant-speed units.

### Controls

Trane offers a broad array of control options, from a simple control interface (CSTI) to the Symbio™ 400-B controller.

**Note:** *Factory addressing is available for Symbio 400-B Air-Fi® WCI controller types. This option allows configuration of unit prior to ship, reducing field setup time.*

#### CSTI

The control interface is intended to be used with a field-supplied, low-voltage thermostat or controller. The control box contains a disconnect switch (optional for units with electric heat). All end devices are wired to a low-voltage terminal block and are run-tested, so only a power connection and thermostat connection is needed to commission the unit. Changeover sensors and controls are provided when a change-over coil is selected.

### End Devices

Optional factory-mounted end devices such as a condensate float switch, low-limit (freezestat), froststat, control valves and actuators are available. Factory-installed and -wired electric heat features single-point power connection.

### Leak Detection System

The Leak Detection System (LDS) consists of one or more refrigerant detection sensors and is required in ducted HVAC systems that have more than 3.91 lbs of A2L refrigerant charge, per safety standard UL 60335-2-40. For any units with more than 3.91 lbs of charge in a circuit, an LDS will be factory-installed.

**Note:** *If factory installed controls are not selected, leak detection sequence of operation must be programmed by controls contractor. See UL 60335-2-40 for more information.*

### Flexibility

The Trane Blower Coil is available in either horizontal or vertical configurations. Horizontal units are typically ceiling suspended via threaded rods. Mounting brackets are provided in all four corners on top and bottom to pass the rods through. Vertical units are typically floor mounted with legs. Legs are

required for seismic applications. Vertical unit sizes 72 - 120 ship in two pieces. Smaller capacity vertical units (24-60) are floor mounted and ship in one piece.

Blower Coils have acoustical benefits because they are typically located outside the occupied space, either in the ceiling or in a closet. This limits the amount of sound transmission (radiated) directly from the unit to the occupant. These units are applied with discharge ductwork, which is frequently lined to help reduce the sound transmission (discharge) through the ductwork into the occupied space. To further aid in reducing sound an optional inlet or discharge attenuator is selectable. Blower coils utilize a direct-drive motor solution for all units which eliminates the single phase motor hum which is evident in capacitor split motors in belt-drive applications. An optional inlet or discharge attenuator is selectable to provide flexibility in duct connection locations and reducing sound.

## **Coil Options**

Trane blower coils feature a wide variety of coil options that include:

- Four-, six-, eight-row hydronic cooling or heating.
- Three-, four-, or six-row DX coils can be utilized with a heat pump or VRF system.
  - Leak detection sensor for all R-454B coils is factory-installed as standard.
  - Refrigerant detection system sequence of operation is pre-programmed with factory controller. If a Trane factory-installed controller is not selected, the LDS sequence must be programmed in the field by the controls contractor.
- One- or two-row heating coil in either the preheat or reheat position.

## **Electric Heat**

A factory installed open-wire electric heater is available in a wide variety of voltages and kW's. Available with single stage, dual stage, or SCR modulating heat. All units have a single point power connection. Optional heater fuses and a heater door interlocking disconnect switch are available.

## **Filter Placement Options**

Units without accessories have a flat filter frame for 1-, 2-, or a combination 2-inch pre and 2-inch final filter on the air entering side of the unit. Other filter placement options include:

- Angle filter box for 2-inch filters
- Combination angle filter/mixing box
- Bottom/Top access filter box that accommodates 2-inch filters. This option allows easy filter access through a hinged door, from the bottom or top of the unit.

## **Motor Options**

Direct-drive motors range from 1/2 to 5 horsepower in a wide range of voltages. All motors have internal current overload protection, permanently sealed ball bearings, and rubber grommets on the mounting brackets to reduce noise and vibration transmission.

Motors come factory programmed for specific job requirements. Motors speeds have the ability to be adjusted on the job site with out the requirement of specialized tools. This enables the unit airflow to be adjusted for changes to design static pressures.

## **Indoor Air Quality**

Indoor air quality is becoming a greater concern every day. Trane provides the most complete indoor air quality options of any manufacturer.

## **Construction Protection**

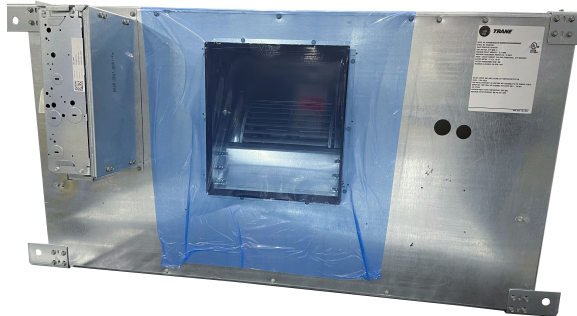
The LEED wrap option provides a pressure sensitive covering to prevent contamination of the Blower Coil during the construction phase. This option seals all openings without inhibiting the installation process.



## Features and Benefits

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**Figure 3. LEED wrap protection during construction**



### Filtration

The improved static pressure capability for units without an accessory have a flat filter frame that can accommodate 1-, 2-, or a combination 2-inch pre and 2-inch final filter on the air entering side of the unit. An optional bottom/top filter access box is also available for improved accessibility.

An optional angle filter box (2-inch only), or combination angle filter/mixing box, provides extra filter face area, which results in low face velocities and low pressure drop. With increased face area, the angle filters have substantially more dust-holding capacity than conventional flat filters. MERV 8 or MERV 13 pleated angle or flat filters options are available.

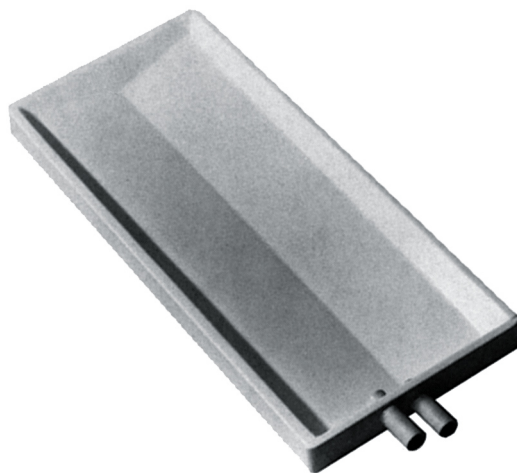
### Accessibility and Cleanability

Trane Blower Coils have 1-inch dual density insulation that meets NFPA90A and UL181, which is designed to withstand high velocities. Trane optionally offers double wall casing on the main unit and accessories to help with cleanability.

### Drain Pans

Trane Blower Coil uses non corrosive drain pans made from a polymer or optional stainless steel and sloped in both directions to drain properly. The drain pans are easily removable and cleanable. Also, the main and auxiliary connections are on the same side. Small capacity vertical units (24-60) include an internal condensate trap.

Coils mount above—not in—the drain pan and are not a structural part of the unit. The coils are easily removable and slide in and out on rails for cleaning.



### Ventilation

The optional mixing box delivers ventilation air directly to each unit. When the unit is equipped with a Symbio™ 400-B controller, the mixing box functions as a zero to 100 percent economizer to improve

energy efficiency. For units configured to automatically switch between high and low fan speeds, the Symbio™ 400-B controller automatically adjusts the mixing box damper to provide the correct amount of fresh air to the space at all fan speeds.

Blower Coil units are draw-thru configurations that use direct-drive fan motors with higher horsepower and static pressure capability than fan coils. This makes them an excellent choice as an entry level air handler for use in an air supply ductwork system with diffusers—rather than a direct discharge system—because it enhances the space air mixing and ventilation effectiveness.

## Dehumidification

For direct control of space humidity, a blower coil can be configured with a hydronic heating coil in the reheat position and equipped with a Symbio™ 400-B controller. These controllers can independently modulate the cooling and heating coils to directly control both temperature and humidity in the space.

## Easy to Service

The coils and motor are easily replaced within minutes, even when the unit is suspended. Coils slide in and out by removing the coil access panel and a few screws at the rear of the unit. With the bottom filter access option, filters are easily accessed from the bottom of the unit. If the motor requires servicing, only the motor side requires access. The flat filter section has a tool-less access door.

## Optional Accessory Sections

These accessory sections make the BCHE/BCVE product more flexible:

- Mixing box (size 12-120 Horizontal and size 72-120 Vertical)
- Angle filter box (size 12-120 Horizontal and size 72-120 Vertical)
- Angle filter and mixing box section (size 12-120 Horizontal and size 72-120 Vertical)
- Bottom hinged access filter box (size 12-120 Horizontal and size 72-120 Vertical)
- Discharge Attenuator (all sizes)
- Return Attenuator (all sizes)

## Mixing Box

The mixing box option ships separately and has internal low-leak dampers and access panels on both sides. The mixing box is insulated the same as the main unit: matte or double wall, as ordered. The mixing box can be easily rotated in field to allow "back/ bottom" or "back/top" dampers. The dampers are linked together. The back damper actuator can be selected as normally open or normally closed.



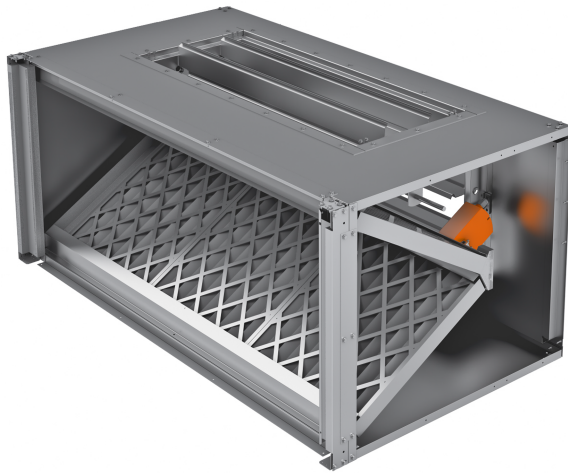
## Angle Filter or Angle Filter/Mixing Box Combination

The angle filter can be combined with the mixing box as one accessory module. The angle filter frame accommodates only 2-inch filters.



## Features and Benefits

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### Bottom (or Top) Access Filter

The bottom (or top) access filter section accommodates 2-inch filters and improves unit serviceability in ceiling (or floor) applications.



### Return and Discharge Attenuators

Attenuators allow for flexible return or discharge ducting configurations. Discharge attenuators also reduce noise transmission to the customer space.



# Application Considerations

## Single-Zone, Constant Volume Applications

Trane Blower Coil air handler offers a wide range of application flexibility between the fan coil unit and Climate Changer™ air handlers. Units are available in ten nominal capacities ranging from 1.0 to 10 tons cooling and 400 to 4000 cfm airflow. The basic unit is available in horizontal (model BCHE) and vertical (model BCVE) configurations.

The single-zone, constant volume applications discussed in this section are:

- Two-pipe hydronic units
- Two-pipe hydronic units with electric heat
- Four-pipe hydronic units
- DX cooling or heat pump
- Single-zone VAV
- Variable Refrigerant Flow (VRF)

## Two-Pipe Hydronic Units

The standard Blower Coil is equipped with a hydronic coil. The unit can perform cooling only, heating and cooling (changeover system), or heating only. In a changeover system, the unit cools during the spring, summer, and fall seasons (summer mode) and heats during the winter season (winter mode).

Use the Trane Select Assist™ program for specific design criteria such as flow rate, temperature rise/drop, pressure drop, glycol mixtures, and capacity.

When selecting two-pipe changeover units, note that Trane Select Assist will only provide output that meets both the cooling and heating capacity requirements. Because cooling and heating capacity requirements for a given unit may differ significantly, a given coil may be optimally sized for one load and over/under sized for the other load.

## Two-Pipe Hydronic Units With Electric Heat

With the addition of electric heat, the two-pipe system can heat or cool. In the non-changeover system, the main coil is always used for cooling and the electric heater is always used for heating. In the changeover system, during the summer mode (spring, summer and fall), the main coil is used for cooling and electric heater is used for heating. During the winter mode, the main coil is used for heating and the electric heater is disabled.

Two-pipe systems with electric heat are an economical solution to intermediate season (spring and fall) comfort problems associated with straight two-pipe systems. In moderate climates or where electric rates are low, non-changeover systems are typically used. In climates with significant heating loads and/or high electric rates, a changeover system—to allow hydronic heating—is typically used.

All units with factory mounted electric heat are UL listed and interlocked with the fan motor switch. A call for Electric heat operation will turn the fan on. Motors controls are synchronized with fan/valve operation to ensure safe operation and that two modes of heat are not operating simultaneously. A transformer is supplied on any voltage unit, eliminating the need for field installation of a step-down transformer. Units come with either contactors or relays on the electric heat. A high temperature cutout with automatic reset is provided as an integral part of the elements to de-energize the electric heat in the event of a malfunction.

## Changeover in Two-Pipe Systems

Changing between cooling and heating modes in a two-pipe system requires energy to heat or cool the mass of water in the piping system at switchover. ASHRAE Standard 90.1–2001 defines specific requirements for minimizing the energy impact of this switchover:

- The system must allow a deadband between changeover from one mode to the other of at least 15°F outdoor-air temperature.



## Application Considerations

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- The system must include controls that allow the system to operate in one mode for at least four hours before changing to the other mode.
- Reset controls must be provided to allow heating and cooling supply-water temperatures, at the changeover point, to be no more than 30°F apart.

## Four-Pipe Hydronic Units

The addition of a one-row or two-row heating coil to the basic blower coil makes it compatible for a four-pipe cooling and heating system. The heating coil is available factory installed in either the preheat or reheat position.

Four-pipe systems solve the intermediate season (spring and fall) comfort problems associated with straight two-pipe systems because they only either cool or heat year-round. However, they do require chiller and boiler operation to be available to operate year-round.

When making the choice between a two or four-pipe system, also consider:

- Cooling/heating loads in perimeter zones of the building
- Importance of temperature and humidity control for the zone
- First cost

Trane Select Assist™ allows independent selection of the cooling and heating coils for flexibility in flow rates, pressure drops, temperature rise/drop, and fluid type.

## Hydronic Branch Conductor

The Hydronic Branch Conductor is a self-contained valve assembly with integrated controls. This innovative system features advanced controller logic that detects both hot and cold water temperatures, seamlessly directing flow from the appropriate heat pump loops to either heat or cool specific thermal areas.

Trane Hydronic Branch Conductor revolutionizes building climate control by enabling the use of dual-purpose coils within a four-pipe distribution system, while efficiently delivering heating or cooling through just two pipes. Unlike traditional two-pipe changeover systems that switch between hot and cold water seasonally for the entire building, this advanced system can adapt to varying heating and cooling demands in different areas multiple times throughout the day.

With a central four-pipe distribution system providing the benefits of year-round heating and cooling, and area branches utilizing a two-pipe setup, the Hydronic Branch Conductor offers reduced piping complexity and enhanced efficiency. Experience the best of both worlds with a heat pump system that combines the advantages of four-pipe and two-pipe configurations for optimal climate control.

Application Considerations for the Hydronic Branch Conductor:

- Hydronic Branch Conductors are for use in hydronic heat pump systems where the cooling fluid and heating fluid are the same fluid from the same central plant. It is not for use in systems with a chiller plant for cooling and a traditional boiler system for heat.
- The Hydronic Branch Conductor conducts—commands valves to provide the appropriate fluid to meet the received thermal area HEAT/COOL mode. It also monitors and reports the status of the hydronic flows for the thermal area.
- The Hydronic Branch Conductor is placed between the main building pipe chase and a thermal area's branch piping.
- The Hydronic Branch Conductor does not take the place or function of zone control valves.
- The Hydronic Branch Conductor does not take the place of any necessary shut off or balancing valves.
- Systems with Hydronic Branch Conductors have airside equipment with dual purpose coils. These coils work well using hot water supply temperature of 100F(+/-10F) and traditional chilled water temperatures.
- See *Hydronic Branch Conductor Application Guide* (APP-APG024\*-EN) for more information on system design.



## DX Cooling Units

Blower coils with a DX cooling coil will often be connected to an air-cooled condensing unit. Some condensing units have two, independent refrigeration circuits; DX coils on BCHE and BCVE sizes 12 to 120 are single-circuited, with the following exceptions, which are dual-circuited:

- Six-row coils on BCHE sizes 54 to 120
- Six-row coils on BCVE sizes 72 to 120

**Note:** Do not manifold two independent refrigeration circuits into a single-circuited DX (evaporator) coil.

## Dehumidification

Dehumidification is possible with the following types of units:

- Two-pipe unit with electric heat
- Four-pipe units with reheat

Blower coils equipped with a Symbio™ 400-B controller and a heating source (electric or hydronic) in the reheat position will provide direct control of space humidity. If the space humidity level does not exceed the desired upper limit, the unit responds to reduced cooling load by modulating the control valve and, if in AUTO mode, switching between fan speeds. However, if the space humidity level rises above the upper limit, the capacity of the cooling coil is increased, overcooling the air to maintain the space humidity below the upper limit. Then, the capacity of the heating source modulates, adding a small amount of heat to temper the air and avoid overcooling the space.

The Symbio 400-B controller responds to a signal from a humidity sensor installed in the space or a signal from a building automation system, and independently modulates the cooling and heating coils to directly control both temperature and humidity in the space. While this configuration can directly control indoor humidity levels, it does require the boiler (or other source of heat) to be available year-round.

## Location and Installation

For applications in spaces where sound levels may be critical, refer to Trane Select Assist acoustic data to determine if further attenuation may be required. Install horizontal units over false ceilings. Install vertical units in closets or mechanical rooms.

Horizontal units are installed by suspending the corners of the unit with threaded rods. Use suitable vibration isolators and take the following precautions to comply with generally accepted installation practices. Vertical units are to be floor mounted on factory supplied legs.

- Use flexible duct connectors or supply and return sides (if ducted).
- Use acoustic lining on the inside of main supply duct for noise control.
- Do not attach ceiling suspension wires to unit or through ducts.
- Locate return air grilles as far as possible from the unit to avoid noise transmission.
- Design and install ductwork as per ASHRAE guides, SMACNA, and local code requirements.

## Acoustics

Controlling outdoor and equipment noise within the occupied space is increasingly important to system designers and building occupants/owners. Therefore, give proper consideration to this subject in the application of the Blower Coil. Applying an inlet or discharge attenuator will provide further acoustic benefits.

Selecting fan and coil combinations is inherently flexible for sound-sensitive applications. In such instances, a fan running at low speed with a high capacity coil normally yields satisfactory results. It also may be desirable to select a larger nominal capacity unit and operate it at less than nominal airflow for further acoustic benefit.

BCHE/BCVE sound power, Lw, data for ducted discharge, inlet + casing, and casing radiated components is available in Trane Select Assist™. The sound power provided includes accessory attenuation. This sound power data is useful in estimating the sound levels in the occupied space for a given application.



### Operating Limitations

Reference the General Data section for minimum and maximum operating limits. Units must not operate above maximum fan rpm or unit airflow. Unit operation above the maximum fan rpm will drastically reduce bearing life and may result in catastrophic failure. Operating the unit above the maximum airflow in the cooling mode may result in unsatisfactory operation due to water carryover from the coil. In addition, it is often uneconomical to operate a unit at its maximum rpm due to greater motor power requirements.

The unit may not perform at an optimal acoustical performance level if it operates in the fans traditional stall region.

Do not operate units with electric heat below the minimum airflow limit to prevent excessive leaving air temperatures and electric heat limit trips.

Do not operate hydronic and electric heat simultaneously to prevent excessive leaving air temperatures and limit trips. Electric heat units have a lockout switch to disable the electric heater if the temperature off the hydronic coil is greater than 95°F.

Do not operate units with a leaving air temperature above 104°F for units with a single-phase motor. Do not operate units with a leaving air temperature above 130° F for units with a three-phase motor.

Do not operate coils above the water flow limits to prevent erosion and noise. A minimum or self venting water flow rate is also listed in the General Data Section. If the coil is set to operate below this flow rate, vent it periodically by flushing at a higher flow rate.

Do not operate valve kits and water valves above the water flow limit to prevent erosion and noise. Water valves supplied with Blower Coils as accessories are intended for use in treated closed loop chilled or hot water systems.

**Note:** *Do not use valves with open or potable water systems. Untreated water may cause scaling and particulate collection interference with the valve function, and reduce the life and effectiveness of the valve.*

### A2L Application Considerations

This product is listed to UL standard 60335-2-40, Household and Similar Electrical Appliances – Safety – Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers, which defines safe design and use strategies for equipment using A2L refrigerants. This standard limits the refrigerant concentration in a space in the event of a refrigerant leak. To meet the requirements, the UL standard defines minimum room area, refrigerant charge limit, minimum circulation airflow and/or ventilation airflow requirements, and limits the use of ignition sources in spaces. The standard may require a unit refrigerant leak detection system.

For equipment with R-454B and charge amounts less than or equal to 3.91 lbs per circuit, this UL standard does not prescribe a room area limit and does not require a refrigerant leak detection system or any circulation airflow or ventilation airflow mitigation strategies. However, ignition sources in ductwork must be evaluated.

Depending on the application, a specific requirement of ANSI/ASHRAE Standard 15, Safety Standard for Refrigeration Systems, could be more stringent than UL 60335-2-40 requirements. See *Refrigeration Systems and Machinery Rooms Application Considerations for Compliance with ASHRAE® Standard 15-2022 Application Engineering Manual* (APP-APM001\*-EN) for more information.

### Leak Detection System (Refrigerant charge greater than 3.91 lb per circuit)

The leak detection system consists of one or more refrigerant detection sensors. When the system detects a leak, the following mitigation actions will be initiated until refrigerant has not been detected for at least 5 minutes:

- Energize the supply fan(s) to deliver a required minimum amount of circulation airflow.
- Disable compressor operation.
- Provide an output signal to fully open all zoning dampers, such as VAV boxes.
- Provide an output to energize additional mechanical ventilation (if needed).

- Units without airflow proving will disable electric heat sources.

Building fire and smoke systems may override this function.

If the refrigerant sensor has a fault, is at the end of its life, or is disconnected, the unit will initiate the mitigation actions. Mitigation actions may be verified by disconnecting the sensor.



# Model Number Description

## Digit 1, 2, 3, 4 — Unit Model

BCHE = Horizontal Blower Coil  
BCVE = Vertical Blower Coil

## Digit 5, 6, 7 — Unit Size

012 = Unit size 12 - 1 Ton  
018 = Unit size 18 - 1.5 Ton  
024 = Unit size 24 - 2 Ton  
036 = Unit size 36 - 3 Ton  
048 = Unit size 48 - 4 Ton  
054 = Unit size 54 - 4.5 Ton  
060 = Unit size 60 - 5 Ton  
072 = Unit size 72 - 6 Ton  
090 = Unit size 90 - 7.5 Ton  
120 = Unit size 120 - 10 Ton

## Digit 8 — Unit Voltage

A = 115V/60 Hz/1 pH  
B = 208V/60 Hz/1 pH  
C = 230V/60 Hz/1 pH  
D = 277V/60 Hz/1 pH  
E = 208V/60 Hz/3 pH  
F = 230V/60 Hz/3 pH  
G = 460V/60 Hz/3 pH  
J = 220V/50 Hz/1 pH  
K = 240V/50 Hz/1 pH  
L = 380V/50 Hz/3 pH  
M = 415V/50 Hz/3 pH  
N = 575V/60 Hz/3 pH

## Digit 9 — Insulation

A = Matte faced insulation 1-in.  
B = Double wall insulation 1-in.

## Digit 10, 11 — Design Sequence

\*\* = Factory assigned

## Digit 12 — Motor/Control Box Location or Inlet Location

A = Same side as coil connections  
B = Front return  
C = Bottom return

## Digit 13 — Coil Connection Side

0 = None  
1 = PVC drain pan right hand coil  
2 = PVC drain pan left hand coil  
3 = SST drain pan right hand coil  
4 = SST drain pan left hand coil  
5 = PVC drain pan front connection  
6 = SST drain pan front connection

## Digit 14 — Coil #1 First Coil in Air Stream

0 = None  
A = 1-row hydronic preheat  
B = 4-row hydronic  
C = 6-row hydronic  
D = 4-row hydronic changeover / dual purpose coil  
E = 6-row hydronic changeover / dual purpose coil  
F = 2-row hydronic preheat  
G = 3-row DX 3/16-in.  
H = 4-row DX 3/16-in.  
J = 6-row DX 3/16-in.  
K = 4-row DX 3/16-in. (0.049) Dist, Heat Pump  
L = 6-row DX 3/16-in. (0.049) Dist, heat pump  
M = 8-row hydronic  
N = 8-row hydronic changeover / dual purpose coil

## Digit 15 — Coil #2 Second Coil in Air Stream

0 = None  
A = 1-row hydronic reheat  
B = 4-row hydronic  
C = 6-row hydronic  
F = 2-row hydronic reheat  
G = 3-row DX 3/16-in.  
H = 4-row DX 3/16-in.  
J = 6-row DX 3/16-in.  
K = 4-row DX 3/16-in. Dist, Heat Pump  
L = 6-row DX 3/16-in. Dist, heat pump

## Digit 16 — Motor Horsepower

2 = 0.5 HP ( 0.4 HP 3PH 50 HZ)  
4 = 1 HP ( 0.8 HP 3PH 50 HZ)  
5 = 1.5 HP ( 1.25 HP 3PH 50 HZ)  
7 = 3 HP ( 2.5 HP 3PH 50 HZ)  
8 = 2.3 HP  
9 = 3.5 HP  
A = 5 HP (4.5 HP 3PH 50 HZ)

## Digit 17 — Refrigerant Types

A = No Refrigerant  
B = R-410A VRF/international only  
C = R-454B  
D = R-410A replacement only

## Digit 18 — Electric Heat Stages

0 = None  
1 = 1-stage  
2 = 2-stage  
3 = SCR

## Digit 19, 20, 21 — Electric Heat kW

000 = None  
010 = 1.0 kW  
050 = 5.0 kW  
100 = 10.0 kW  
150 = 15.0 kW  
200 = 20.0 kW  
240 = 24.0 kW  
300 = 30.0 kW

## Digit 22 — Reserved

0 = Factory Set

## Digit 23 — Electric Heat Options

0 = None  
A = Interlocking disconnect switch  
B = Interlock disc and heater fuse  
  
Digit 24 — Filters  
  
0 = None  
A = 1-in. Throwaway  
B = 2-in. MERV 8  
C = 2-in. MERV 13  
D = 2-in. MERV 8 and 2-in MERV 13 Combination

## Digit 25 — Accessory Section

0 = None  
B = Angle filter box  
C = Angle filter/mix box  
D = Bottom (or top) access filter mod  
E = Discharge attenuator  
G = Discharge attenuator and angle filter box  
H = Discharge attenuator and angle filter/mixing box  
J = Discharge attenuator and bottom (or top) access filter mod  
L = Return attenuator with angle filter box  
M = Return attenuator with bottom (or top) access filter mod  
N = Discharge and inlet attenuator  
P = Return attenuator and discharge attenuator and Bottom (or Top) access filter mod  
Q = Return attenuator and discharge attenuator and angle filter box  
R = Bottom (or top) access filter mod and mixing box

## Digit 26 — Control Type

A = CSTI fan status  
B = CSTI  
E = Symbio™ 400B  
F = Symbio 400B and WCI

## Digit 27 — Coil #1 Control Valve Type

0 = None  
A = 2-way, 2 position N.C.  
B = 2-way, 2 position N.O.  
C = 3-way, 2 position N.C.  
D = 3-way, 2 position N.O.  
E = 2-way, modulating  
F = 3-way, modulating  
G = Field supplied, 2 position N.C.  
H = Field supplied, 2 position N.O.  
J = Field supplied, modulating  
K = Field supplied, analog (2-10 Vdc)

**Digit 28 — Coil #1 Control Valve Cv**

**0** = None  
**A** = 2-way 2.3 Cv 3/4-in. valve  
**B** = 2-way 3.3 Cv 3/4-in. valve  
**C** = 2-way 4.6 Cv 3/4-in. valve  
**D** = 2-way and 3-way 7.4 Cv 1-in. valve  
**E** = 2-way and 3-way 10.0 Cv 1-in. valve  
**F** = 3-way 1.0 Cv 1/2-in. valve  
**G** = 3-Way 2.7 Cv 1/2-in. valve  
**H** = 3-Way 4.6 Cv 3/4-in. valve  
**J** = 2-way PIC 0.9 GPM  
**K** = 2-way PIC 2 GPM  
**L** = 2-way PIC 4.3 GPM  
**M** = 2-way PIC 9 GPM

**Digit 29 — Reserved**

**0** = Factory set

**Digit 30 — Coil #2 Control Valve**

**0** = None  
**A** = 2-way, 2 position N.C.  
**B** = 2-way, 2 position N.O.  
**C** = 3-way, 2 position N.C.  
**D** = 3-way, 2 position N.O.  
**E** = 2-way, modulating  
**F** = 3-way, modulating  
**G** = Field supplied, 2 position N.C.  
**H** = Field supplied, 2 position N.O.  
**J** = Field supplied, modulating  
**K** = Field supplied, analog (2-10 VDC)

**Digit 31 — Coil #2 Control Valve Cv**

**0** = None  
**A** = 2-way 2.3 Cv 3/4-in. valve  
**B** = 2-way 3.3 Cv 3/4-in. valve  
**C** = 2-way 4.6 Cv 3/4-in. valve  
**D** = 2-way and 3-way 7.4 Cv 1-in.  
**E** = 2-way and 3-way 10.0 Cv 1-in. valve  
**F** = 3-way 1.0 Cv 1/2-in. valve  
**G** = 3-way 2.7 Cv 1/2-in. valve  
**H** = 3-way 4.6 Cv 3/4-in. valve  
**J** = 2-way PIC 0.9 GPM  
**K** = 2-way PIC 2 GPM  
**L** = 2-way PIC 4.3 GPM  
**M** = 2-way PIC 9 GPM

**Digit 32 — Reserved**

**0** = Future offering

**Digit 33 — Reserved**

**0** = Future offering

**Digit 34 — Mixing Box Damper Actuator**

**0** = None  
**2** = Modulating, N.C.  
**3** = Modulating, N.O.

**Digit 35 — Factory Mounted Control Options**

**0** = None  
**A** = Condensate overflow  
**B** = Condensate Overflow and Low Limit

**Digit 36 — Control Options 2**

**0** = None  
**A** = Outside air sensor, field mounted  
**B** = Discharge air sensor  
**C** = Outside air and discharge air sensor

**Digit 37 — Control Options 3**

**0** = None  
**A** = Dehumidification with local sensor  
**B** = CO<sub>2</sub> sensor  
**C** = Air-Fi® Dehumidification and CO<sub>2</sub>  
**D** = Air-Fi Dehumidification  
**E** = Air-Fi CO<sub>2</sub>

**Digit 38 — Zone Sensors**

**0** = None  
**A** = Wall-mounted temperature sensor (OCC/UNOCC, COMM)  
**B** = Wall-mounted  
**C** = Wall-mounted temperature sensor (SP, OALMH, OCC/UNOCC, COMM)  
**D** = Wall-mounted display sensor (SP, OALHH, COMM)  
**E** = Wireless display sensor, Unit-mounted receiver (SP, OALMH)  
**F** = Wall-mounted FSS

**Digit 39 — Seismic Certification**

**0** = None  
**A** = IBC seismic certification  
**B** = OSHPD seismic certification

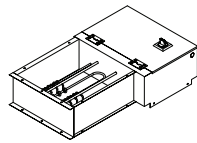
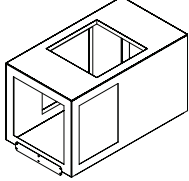
**Digit 40 — Extra filter**

**0** = None  
**1** = Extra 1-in. throwaway ship loose  
**2** = Extra 2-in. MERV 8 pleated throwaway ship loose  
**3** = Extra 2-in. MERV 13 pleated throwaway ship loose  
**4** = Extra 2-in. MERV 8 and MERV 13 pleated throwaway ship loose

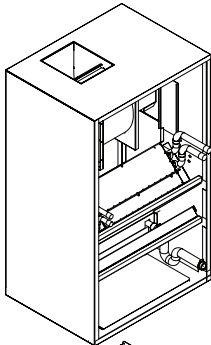
## General Data

**Figure 4. BCVE sizes 24 to 60**

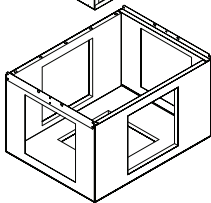
DISCHARGE  
ATTENUATOR



ELECTRIC HEATER



UNIT

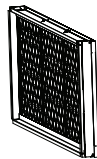


RETURN ATTENUATOR

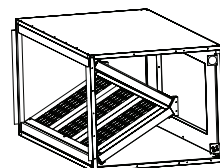
**Figure 5. BCHE sizes 12 to 120 (except sizes 48 and 60)**



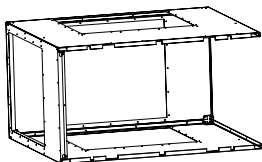
ELECTRIC HEATER



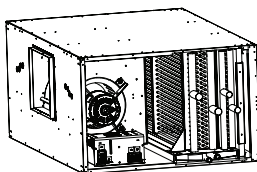
FLAT FILTER RACK



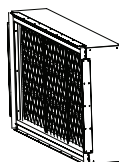
ANGLE FILTER



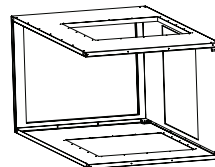
DISCHARGE  
ATTENUATOR



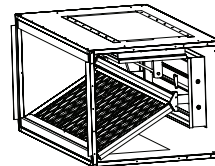
UNIT



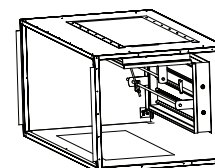
BOTTOM ACCESS  
FILTER



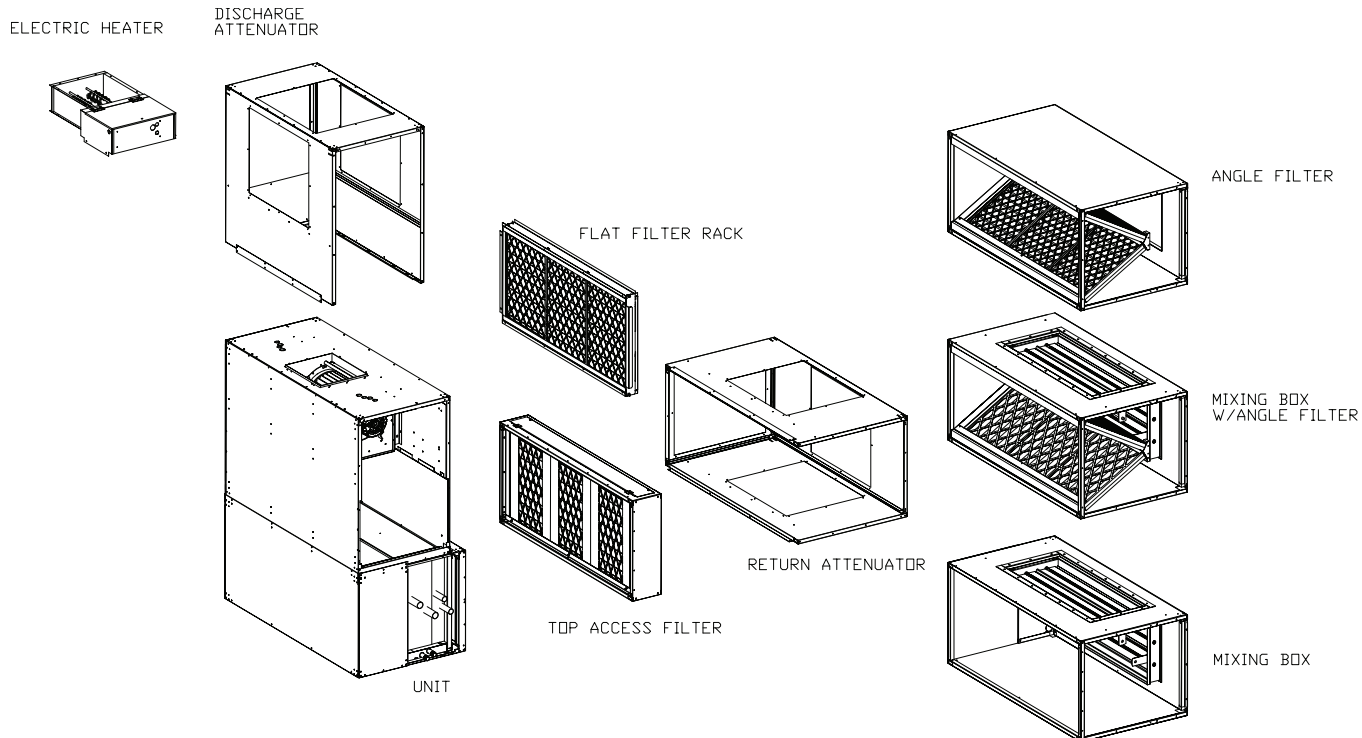
RETURN ATTENUATOR



MIXING BOX  
W/ ANGLE FILTER



MIXING BOX

**Figure 6. BCVE sizes 72 to 120**

**Table 1. BCHE coil general data**

Unit Size	12	18	24	36	54	72	90	120
Nominal cfm	400	600	800	1200	1800	2400	3000	4000
Hydronic and DX coil data								
Area - ft <sup>2</sup> (a)	0.9	1.1	1.7	2.7	3.7	4.9	6.1	7.6
Width - in. (b)	8	8	12	12	14	14	22	22
Length - in. (c)	16	20	20	32	38	50	40	50
Velocity - ft/min.	450	540	480	450	487	494	491	524
1-row coil								
Minimum gpm (d)	1	1	1	1	3.5	3.5	5.5	5.5
Maximum gpm (e)	5.2	5.2	5.2	5.2	18.6	18.6	29.3	29.3
Dry coil weight - lb (f)	7	8	10	13	17	22	24	28
Wet coil weight - lb (f)	8	9	11	15	20	25	28	34
Internal volume - in <sup>3</sup> (f)	16	19	29	45	60	78	99	123
2-row coil								
Minimum gpm (d)	1	1	2	2	3.5	4.7	7.4	7.4
Maximum gpm (e)	5.2	5.2	10.4	10.4	18.6	37.3	58.6	58.6
Dry coil weight - lb (f)	9	11	14	19	25	33	37	45
Wet coil weight - lb (kg) (f)	10	12	16	22	30	39	45	54
Internal volume - in <sup>3</sup> (f)	32	39	59	89	122	156	199	246
3-row coil - DX coil								
Internal volume - in <sup>3</sup>	48	58	87	133	181	234	299	368
4-row coil								



## General Data

**Table 1. BCHE coil general data (continued)**

Unit Size	12	18	24	36	54	72	90	120
Nominal cfm	400	600	800	1200	1800	2400	3000	4000
Minimum gpm	2	2	3	3	4.7	4.7	7.4	7.4
Maximum gpm	10.6	10.6	16.0	16.0	37.3	37.3	58.6	58.6
Dry coil weight - lb <sup>(f)</sup>	14	17	22	31	41	52	61	75
Wet coil weight - lb <sup>(f)</sup>	17	19	26	37	51	65	76	94
Internal volume - in <sup>3</sup> <sup>(f)</sup>	65	78	118	179	244	316	402	496
4-row coil - DX coil								
Internal volume - in <sup>3</sup> <sup>(f)</sup>	64	78	117	177	242	313	399	492
6-row coil								
Minimum gpm <sup>(d)</sup>	2	2	3	4	4.7	4.7	7.4	7.4
Maximum gpm <sup>(e)</sup>	10.6	10.6	16	32	37.3	37.3	58.6	58.6
Dry coil weight - lb <sup>(f)</sup>	19	22	29	43	56	72	84	104
Wet coil weight - lb <sup>(f)</sup>	22	26	35	54	70	90	106	131
Internal volume - in <sup>3</sup> <sup>(f)</sup>	98	118	177	268	367	475	605	746
6-row coil - DX coil								
Internal volume - in <sup>3</sup> <sup>(f)</sup>	96	117	175	266	364	469	597	736
8-row coil								
Minimum gpm <sup>(d)</sup>	2	2.7	3	4	4.7	4.7	7.4	7.4
Maximum gpm <sup>(d)</sup>	10.6	21.3	16.0	32.0	37.3	37.3	58.6	58.6
Dry coil weight - lb <sup>(f)</sup>	24	29	37	55	71	92	107	133
Wet coil weight - lb <sup>(f)</sup>	28	34	45	69	89	115	136	169
Internal volume - in <sup>3</sup> <sup>(f)</sup>	130	157	237	359	490	634	808	996

(a) Area is rounded, use length and width to calculate the precise area.

(b) Coil width = Length in the direction of a coil header, typically vertical.

(c) Coil length = Length of coil in direction of the coil tubes, typically horizontal and perpendicular to airflow.

(d) The minimum waterflow at 1-1.5 fps tubeside velocity is to ensure the coil self-vents properly. There is no minimum waterflow limit for coils that do not require self venting. See "Water Coil Piping" section for minimum self venting velocities.

(e) Maximum gpm limits are to prevent erosion and noise problems.

(f) DX coil height and width dimensions are same as comparable hydronic coils. Four- and six-row DX coil dry weight dimensions are same as comparable 4-row and 6-row hydronic coils. A 3-row DX coil dry weight is 25% less than a comparable 4-row hydronic coil. Internal volumes exclude headers. Weights are rounded up to the nearest pound.

**Table 2. BCVE coil general data**

Unit Size	24	36	48	60	72	90	120
Nominal cfm	800	1200	1600	2000	2400	3000	4000
Hydronic and DX coil data							
Area - ft <sup>2</sup> (a)	1.7	2.5	3.5	4.2	4.9	6.1	7.7
Width - in. (b)	12	18	20	24	14	22	22
Length - in. (c)	20	20	25	25	50	40	50
Velocity - ft/min.	480	480	461	480	494	491	524
1-row coil							
Minimum gpm <sup>(d)</sup>	1.4	1.4	2.3	2.7	3.5	5.5	5.5
Maximum gpm <sup>(e)</sup>	7.1	7.1	11.8	14.1	18.6	29.3	29.3
Dry coil weight - lb <sup>(f)</sup>	5	7	9	10	22	24	29
Wet coil weight - lb <sup>(f)</sup>	7	9	11	13	25	28	34
Internal volume - in <sup>3</sup> <sup>(f)</sup>	29	44	59	71	78	99	123



**Table 2. BCVE coil general data (continued)**

Unit Size	24	36	48	60	72	90	120
Nominal cfm	800	1200	1600	2000	2400	3000	4000
2-row coil							
Minimum gpm <sup>(d)</sup>	2.7	4.1	4.5	5.4	4.7	7.4	7.4
Maximum gpm <sup>(e)</sup>	14.1	21.2	23.6	28.3	37.3	58.6	58.6
Dry coil weight - lb <sup>(f)</sup>	8	11	14	17	33	37	45
Wet coil weight - lb (kg) <sup>(f)</sup>	10	15	19	22	39	45	54
Internal volume - in <sup>3</sup> <sup>(f)</sup>	58	87	118	142	156	199	246
3-row coil - DX coil							
Internal volume - in <sup>3</sup>	87	130	176	212	234	299	368
4-row coil							
Minimum gpm <sup>(d)</sup>	2.7	4.1	4.5	5.4	4.7	7.4	7.4
Maximum gpm <sup>(e)</sup>	14.1	21.2	23.6	28.3	37.3	58.6	58.6
Dry coil weight - lb <sup>(f)</sup>	15	20	27	32	52	61	75
Wet coil weight - lb <sup>(f)</sup>	20	28	37	44	65	76	94
Internal volume - in <sup>3</sup> <sup>(f)</sup>	118	177	239	287	316	402	496
4-row coil - DX coil							
Internal volume - in <sup>3</sup>	116	174	236	283	313	399	492
6-row coil							
Minimum gpm <sup>(d)</sup>	2.7	4.1	4.5	5.4	4.7	7.4	7.4
Maximum gpm <sup>(d)</sup>	14.1	21.2	23.6	28.3	37.3	58.6	58.6
Dry coil weight - lb <sup>(f)</sup>	20	28	38	45	72	84	104
Wet coil weight - lb <sup>(f)</sup>	27	39	52	62	90	106	131
Internal volume - in <sup>3</sup> <sup>(f)</sup>	177	266	360	431	475	605	746
6-row coil - DX coil							
Internal volume - in <sup>3</sup> <sup>(f)</sup>	175	262	355	426	469	597	736
8-row coil							
Minimum gpm <sup>(d)</sup>	N/A	N/A	N/A	N/A	4.7	7.4	7.4
Maximum gpm <sup>(e)</sup>	N/A	N/A	N/A	N/A	37.3	58.6	58.6
Dry coil weight - lb <sup>(f)</sup>	N/A	N/A	N/A	N/A	92	107	133
Wet coil weight - lb <sup>(f)</sup>	N/A	N/A	N/A	N/A	115	136	170
Internal volume - in <sup>3</sup> <sup>(f)</sup>	N/A	N/A	N/A	N/A	634	808	996

(a) Area is rounded, use length and width to calculate the precise area.

(b) Coil width = Length in the direction of a coil header, typically vertical.

(c) Coil length = Length of coil in direction of the coil tubes, typically horizontal and perpendicular to airflow.

(d) The minimum waterflow at 1-1.5 fps tubeside velocity is to ensure the coil self-vents properly. There is no minimum waterflow limit for coils that do not require self venting. See "Water Coil Piping" section for minimum self venting velocities.

(e) Maximum gpm limits are to prevent erosion and noise problems.

(f) DX coil height and width dimensions are same as comparable hydronic coils. Four- and six-row DX coil dry weight dimensions are same as comparable 4-row and 6-row hydronic coils. A 3-row DX coil dry weight is 25% less than a comparable 4-row hydronic coil. Internal volumes exclude headers. Weights are rounded up to the nearest pound.

**Table 3. BCHE/BCVE fan, filter, and mixing box general data**

Unit Size	12	18	24	36	48	54	60	72	90	120
Nominal CFM	400	600	800	1200	1600	1800	2000	2400	3000	4000
Airflow										
Minimum cfm	250	375	500	750	1000	1125	1250	1500	1875	1500
Maximum cfm	500	675	1000	1600	2000	2400	2500	3000	4000	5000



## General Data

**Table 3. BCHE/BCVE fan, filter, and mixing box general data (continued)**

Unit Size	12	18	24	36	48	54	60	72	90	120
Nominal CFM	400	600	800	1200	1600	1800	2000	2400	3000	4000
<b>Fan Data</b>										
Fan wheel, in. (dia X width)	9 x 4	9 x 4	9 x 4	9 x 6	12 x 8	9 x 9	12 x 8	9 x 9	12 x 9	12 x 12
RPM range	800-2500	800-2500	800-2500	800-2500	600-1700	800-2500	600-1700	800-2500	600-1800	600-1800
Motor hp	0.5-1.0	0.5-1.0	0.5-1.0	0.5-2.3	0.5-3.5	1.0-3.5	1.0-3.5	1.0-3.5	1.0-5.0	1.5-5.0
<b>Flat Filter (BCHE)</b>										
(Qty) Size	(1) 12 x 20	(1) 12 x 24	(1) 12 x 24	(1) 12 x 12 (1) 12 x 24	—	(1) 16 x 16 (1) 16 x 25	—	(2) 16 x 25	(1) 20 x 24 (1) 24 x 24	(3) 18 x 24
<b>Flat Filter (BCVE)</b>										
(Qty) Size	—	—	(1) 12 x 24	(1) 18 x 24	(1) 18 x 20 (1) 12 x 20	—	(1) 18 x 24 (1) 12 x 24	(2) 16 x 25	(1) 20 x 24 (1) 24 x 24	(3) 18 x 24
<b>Combination Flat Filter (BCHE/BCVE)</b>										
Merv 8 (Qty) Size	(1) 12 x 20	(1) 12 x 24	(1) 12 x 24	(1) 12 x 12 (1) 12 x 24	—	(1) 16 x 16 (1) 16 x 25	—	(2) 16 x 25	(1) 24 x 20 (1) 24 x 24	(3) 24 x 18
Merv 13 (Qty) Size	(1) 12 x 20	(1) 12 x 24	(1) 12 x 24	(1) 12 x 12 (1) 12 x 24	—	(1) 16 x 16 (1) 16 x 25	—	(2) 16 x 25	(1) 24 x 20 (1) 24 x 24	(3) 24 x 18
<b>Bottom (or Top) Access Filter</b>										
(Qty) Size	(1) 12 x 20	(1) 12 x 24	(1) 12 x 24	(1) 12 x 12 (1) 12 x 24	—	(1) 16 x 16 (1) 16 x 25	—	(2) 16 x 25	(1) 20 x 24 (1) 24 x 24	(3) 18 x 24
<b>Angle Filter</b>										
(Qty) Size	(2) 12 x 20	(2) 12 x 24	(2) 12 x 24	(2) 12 x 12 (2) 12 x 24	—	(2) 12 x 20 (2) 12 x 24	—	(2) 12 x 12 (4) 12 x 20	(2) 20 x 20 (2) 20 x 25	(6) 18 x 20
<b>Mixing Box</b>										
Damper opening width, in.	14	14	20	20	—	36	—	36	38	38
Damper opening height, in.	8.3	8.3	8.3	8.3	—	10.5	—	10.5	15.5	15.5
<b>Return/Discharge Attenuator (BCHE)</b>										
Opening width, in.	9	9	9	14	—	20	—	26	20	26
Opening height, in.	13	13	13	13	—	14	—	14	22	22
<b>Return Attenuator (BCVE)</b>										
Opening width, in.	—	—	13	13	18	—	18	26	20	26
Opening height, in.	—	—	13	13	16	—	16	14	22	22
<b>Discharge Attenuator (BCVE)</b>										
Opening width, in.	—	—	10	13	15	—	18	26	20	26
Opening height, in.	—	—	13	13	16	—	16	14	22	22

**Notes:**

1. Minimum air flow limits apply to units with hot water or electric heat only. There is no minimum airflow limit on cooling only units. Maximum airflow limits are to help prevent moisture carryover.
2. 2.3 and 3.5 are only available at 575V.



# Performance Data

## Air Pressure Drop Adjustments

Table 4. BCHE/BCVE coil air pressure drop adjustments (in. wg)

Unit Size	Unit Orientation	CFM	Coil Face Velocity	Heating		Cooling				Electric Heat	
				1 Row	2 Row	3 Row	4 Row	6 Row	8 Row	Discharge Velocity	Delta P
12	Horizontal	250	281	0.05	0.08	0.17	0.23	0.34	0.46	533	0.03
		300	338	0.06	0.11	0.24	0.32	0.48	0.64	640	0.04
		350	394	0.08	0.14	0.32	0.43	0.64	0.84	747	0.04
		400	450	0.1	0.17	0.4	0.54	0.8	1.07	853	0.05
		450	506	0.13	0.21	0.49	0.66	0.98	1.3	960	0.05
		500	563	0.15	0.25	0.59	0.78	1.16	1.54	1067	0.06
18	Horizontal	375	338	0.06	0.11	0.24	0.32	0.48	0.64	800	0.04
		450	405	0.09	0.15	0.34	0.45	0.67	0.89	960	0.05
		525	473	0.11	0.19	0.44	0.59	0.87	1.16	1120	0.06
		600	540	0.14	0.23	0.55	0.73	1.09	1.44	1280	0.07
		675	608	0.17	0.28	0.66	0.88	1.31	1.74	1440	0.08
24	Horizontal	500	300	0.05	0.09	0.19	0.26	0.39	0.51	640	0.06
		600	360	0.07	0.12	0.27	0.36	0.54	0.72	768	0.07
		700	420	0.09	0.16	0.36	0.48	0.71	0.95	896	0.08
		800	480	0.11	0.19	0.45	0.6	0.9	1.19	1024	0.11
		900	540	0.14	0.23	0.55	0.73	1.09	1.44	1152	0.14
		1000	600	0.17	0.28	0.65	NA	NA	NA	1280	0.18
24	Vertical	500	300	0.06	0.1	0.22	0.29	0.44	NA	780	0.06
		600	360	0.07	0.13	0.31	0.41	0.61	NA	937	0.07
		700	420	0.1	0.16	0.4	0.54	0.8	NA	1093	0.08
		800	480	0.12	0.2	0.51	0.68	1.01	NA	1249	0.11
		900	540	0.15	0.25	0.62	0.82	1.22	NA	1405	0.14
		1000	600	0.18	0.29	0.73	NA	NA	NA	1561	0.18
36	Horizontal	750	281	0.05	0.08	0.17	0.23	0.34	0.46	1193	0.08
		900	338	0.06	0.11	0.24	0.32	0.48	0.64	1431	0.11
		1050	394	0.08	0.14	0.32	0.43	0.63	0.84	1670	0.16
		1200	450	0.1	0.17	0.41	0.54	0.8	1.06	1908	0.22
		1350	506	0.13	0.21	0.5	0.66	0.98	1.3	2147	0.29
		1500	563	0.15	0.23	0.59	0.78	1.16	1.54	2385	0.37
36	Vertical	750	300	0.06	0.1	0.22	0.29	0.44	NA	1171	0.07
		900	360	0.08	0.13	0.31	0.41	0.61	NA	1405	0.09
		1050	420	0.1	0.16	0.4	0.54	0.8	NA	1639	0.13
		1200	480	0.12	0.2	0.51	0.68	1.01	NA	1873	0.18
		1350	540	0.15	0.25	0.62	0.82	1.22	NA	2107	0.24
		1500	600	0.18	0.29	0.73	0.97	1.44	NA	2341	0.31
48	Vertical	1000	288	0.05	0.09	0.21	0.27	0.4	NA	945	0.06
		1200	346	0.07	0.12	0.29	0.38	0.56	NA	1134	0.07
		1400	403	0.09	0.16	0.38	0.5	0.74	NA	1323	0.08
		1600	461	0.11	0.19	0.48	0.63	0.94	NA	1512	0.1
		1800	518	0.14	0.23	0.58	0.77	1.14	NA	1701	0.14
		2000	576	0.17	0.27	0.69	0.91	1.35	NA	1890	0.17



## Performance Data

**Table 4. BCHE/BCVE coil air pressure drop adjustments (in. wg) (continued)**

Unit Size	Unit Orientation	CFM	Coil Face Velocity	Heating		Cooling				Electric Heat	
				1 Row	2 Row	3 Row	4 Row	6 Row	8 Row	Discharge Velocity	Delta P
54	Horizontal	1125	305	0.05	0.09	0.2	0.27	0.4	0.53	1293	0.08
		1350	365	0.07	0.12	0.28	0.37	0.55	0.74	1552	0.11
		1575	426	0.09	0.16	0.37	0.49	0.73	0.97	1811	0.16
		1800	487	0.12	0.2	0.46	0.61	0.92	1.22	2069	0.22
		2025	548	0.14	0.24	0.56	0.75	1.11	1.48	2328	0.29
		2250	609	0.17	0.28	0.67	0.88	1.31	1.74	2586	0.37
60	Vertical	1250	300	0.06	0.1	0.22	0.29	0.43	NA	1181	0.07
		1500	360	0.08	0.13	0.31	0.41	0.61	NA	1418	0.09
		1750	420	0.1	0.17	0.41	0.54	0.8	NA	1654	0.13
		2000	480	0.12	0.2	0.51	0.68	1.01	NA	1890	0.17
		2250	540	0.15	0.25	0.62	0.82	1.22	NA	2126	0.23
		2500	600	0.18	0.29	0.73	0.97	1.44	NA	2363	0.3
72	Horizontal/ Vertical	1500	309	0.05	0.1	0.21	0.27	0.41	0.54	1724	0.14
		1800	370	0.07	0.13	0.29	0.38	0.57	0.76	2069	0.22
		2100	432	0.1	0.16	0.38	0.5	0.75	0.99	2414	0.32
		2400	494	0.12	0.2	0.48	0.63	0.94	1.25	2759	0.44
		2700	555	0.15	0.24	0.58	0.76	1.14	1.51	3104	0.58
		3000	617	0.18	0.29	0.68	0.9	1.34	NA	3449	0.75
90	Horizontal/ Vertical	1875	307	0.05	0.1	0.2	0.27	0.4	0.73	2155	0.11
		2250	368	0.07	0.13	0.29	0.38	0.56	0.75	2586	0.17
		2625	430	0.09	0.16	0.38	0.5	0.74	0.98	3018	0.25
		3000	491	0.12	0.2	0.47	0.62	0.93	1.23	3449	0.34
		3375	552	0.15	0.24	0.57	0.76	1.13	1.49	3880	0.45
		3750	614	0.18	0.28	0.67	0.89	1.33	1.76	4311	0.58
120	Horizontal/ Vertical	2500	327	0.06	0.11	0.23	0.3	0.45	0.71	2186	0.13
		3000	393	0.08	0.14	0.32	0.42	0.63	0.84	2624	0.2
		3500	458	0.11	0.18	0.42	0.55	0.83	1.1	3061	0.29
		4000	524	0.13	0.22	0.52	0.69	1.03	1.37	3498	0.4
		4500	589	0.16	0.27	0.63	0.84	1.25	1.66	3935	0.54
		5000	655	0.2	0.32	0.74	0.98	1.46	1.94	4373	0.69

**Notes:**

1. Cooling coil APD is for a 100 percent fully wetted fin.
2. Heating coil APD is for dry fin surface.

**Table 5. BCHE filter, mix box, and attenuator air pressure drop (in. wg)**

Unit Size	CFM	Flat Filters				Angle Filters			Mixing Box		Return Attenuator		Discharge Attenuator	
		Velocity	1-inch Throw-away	2-inch Merv8	2-inch Merv13	Velocity	2-inch Merv8	2-inch Merv13	Velocity	Pressure Drop	Velocity	Pressure Drop	Velocity	Pressure Drop
12	250	161	0.02	0.05	0.09	80	0.02	0.04	309	0.02	308	0.00	308	0.03
	300	193	0.03	0.06	0.11	96	0.03	0.05	371	0.02	369	0.00	369	0.04
	350	225	0.04	0.07	0.13	112	0.03	0.06	432	0.03	431	0.01	431	0.05
	400	257	0.05	0.09	0.15	128	0.04	0.07	494	0.04	492	0.01	492	0.06
	450	289	0.06	0.10	0.17	144	0.04	0.08	556	0.06	554	0.01	554	0.03
	500	321	0.07	0.12	0.20	161	0.05	0.09	618	0.07	615	0.01	615	0.04
18	375	203	0.03	0.07	0.11	102	0.03	0.05	463	0.04	462	0.01	462	0.06
	450	244	0.04	0.08	0.14	122	0.04	0.06	556	0.06	554	0.01	554	0.08
	525	284	0.06	0.10	0.17	142	0.04	0.07	649	0.08	646	0.01	646	0.11
	600	325	0.07	0.12	0.20	162	0.05	0.09	741	0.10	738	0.02	738	0.15
	675	366	0.08	0.14	0.23	183	0.06	0.10	834	0.13	831	0.02	831	0.07
24	500	271	0.05	0.09	0.16	135	0.04	0.07	432	0.03	615	0.01	615	0.1
	600	325	0.07	0.12	0.20	162	0.05	0.09	519	0.05	738	0.02	738	0.15
	700	379	0.09	0.14	0.24	190	0.06	0.10	605	0.07	862	0.02	862	0.2
	800	433	0.11	0.17	0.29	217	0.07	0.12	692	0.09	985	0.03	985	0.26
	900	487	0.14	0.20	0.34	244	0.08	0.14	778	0.11	1108	0.04	1108	0.13
	1000	542	0.17	0.23	0.39	271	0.09	0.16	865	0.14	1231	0.05	1231	0.16
36	750	270	0.05	0.09	0.16	134	0.04	0.07	649	0.08	593	0.01	593	0.16
	900	324	0.07	0.12	0.20	160	0.05	0.09	778	0.11	712	0.02	712	0.24
	1050	378	0.09	0.14	0.24	187	0.06	0.10	908	0.15	831	0.02	831	0.32
	1200	432	0.11	0.17	0.29	214	0.07	0.12	1038	0.19	949	0.03	949	0.42
	1350	487	0.14	0.20	0.34	241	0.08	0.14	1168	0.25	1068	0.04	1068	0.19
	1500	541	0.17	0.23	0.39	267	0.09	0.16	1297	0.30	1187	0.04	1187	0.24
54	1125	256	0.05	0.09	0.15	164	0.05	0.09	429	0.03	579	0.01	579	0.19
	1350	307	0.06	0.11	0.19	197	0.06	0.11	514	0.05	694	0.02	694	0.27
	1575	358	0.08	0.13	0.23	230	0.08	0.13	600	0.07	810	0.02	810	0.37
	1800	409	0.1	0.16	0.27	263	0.09	0.15	686	0.09	926	0.03	926	0.48
	2025	460	0.13	0.18	0.31	296	0.10	0.18	771	0.11	1041	0.03	1041	0.22
	2250	511	0.15	0.21	0.36	329	0.12	0.20	857	0.13	1157	0.04	1157	0.27
72	1500	284	0.06	0.10	0.17	185	0.06	0.10	571	0.06	593	0.01	593	0.32
	1800	341	0.08	0.12	0.21	222	0.07	0.13	686	0.09	712	0.02	712	0.47
	2100	398	0.1	0.15	0.26	259	0.09	0.15	800	0.12	831	0.02	831	0.64
	2400	455	0.12	0.18	0.31	296	0.10	0.18	914	0.15	949	0.03	949	0.83
	2700	512	0.15	0.21	0.36	333	0.12	0.21	1029	0.19	1068	0.04	1068	0.36
	3000	569	0.18	0.24	0.42	370	0.14	0.24	1143	0.24	1187	0.04	1187	0.45



## Performance Data

**Table 5. BCHE filter, mix box, and attenuator air pressure drop (in. wg) (continued)**

Unit Size	CFM	Flat Filters				Angle Filters			Mixing Box		Return Attenuator		Discharge Attenuator	
		Velocity	1-inch Throw-away	2-inch Merv8	2-inch Merv13	Velocity	2-inch Merv8	2-inch Merv13	Velocity	Pressure Drop	Velocity	Pressure Drop	Velocity	Pressure Drop
90	1875	270	0.05	0.09	0.16	157	0.05	0.08	458	0.04	614	0.01	614	0.25
	2250	324	0.07	0.12	0.20	189	0.06	0.10	550	0.05	736	0.02	736	0.36
	2625	378	0.09	0.14	0.24	220	0.07	0.12	642	0.07	859	0.02	859	0.49
	3000	432	0.11	0.17	0.29	252	0.09	0.15	733	0.10	982	0.03	982	0.64
	3750	540	0.17	0.23	0.39	315	0.11	0.19	917	0.15	1227	0.05	1227	0.36
	3375	486	0.14	0.20	0.34	283	0.10	0.17	825	0.12	1105	0.04	1105	0.29
120	2500	295	0.06	0.10	0.18	176	0.06	0.10	611	0.07	629	0.01	629	0.29
	3000	355	0.08	0.13	0.22	211	0.07	0.12	733	0.10	755	0.02	755	0.41
	3500	414	0.1	0.16	0.27	246	0.08	0.14	856	0.13	881	0.02	881	0.56
	4000	473	0.13	0.19	0.33	281	0.10	0.17	978	0.17	1007	0.03	1007	0.73
	4500	532	0.16	0.22	0.38	316	0.11	0.19	1100	0.22	1133	0.04	1133	0.33
	5000	591	0.2	0.26	0.44	352	0.13	0.22	1222	0.27	1259	0.05	1259	0.40

Note: Data based on clean filters.

**Table 6. BCVE filter, mix box, and attenuator air pressure drop (in. wg)**

Unit Size	CFM	Flat Filters				Angle Filters			Mixing Box		Return Attenuator		Discharge Attenuator	
		Velocity	1-inch Throw-away	2-inch Merv8	2-inch Merv13	Velocity	2-inch Merv8	2-inch Merv13	Velocity	Pressure Drop	Velocity	Pressure Drop	Velocity	Pressure Drop
24	500	271	0.05	0.09	0.16	-	-	-	-	-	426	0.01	554	0.10
	600	325	0.07	0.12	0.20	-	-	-	-	-	511	0.01	665	0.14
	700	379	0.09	0.14	0.24	-	-	-	-	-	596	0.01	775	0.19
	800	433	0.11	0.17	0.29	-	-	-	-	-	682	0.01	886	0.25
	900	487	0.14	0.20	0.34	-	-	-	-	-	767	0.02	997	0.12
	1000	542	0.17	0.23	0.39	-	-	-	-	-	852	0.02	1108	0.15
36	750	266	0.05	0.09	0.16	-	-	-	-	-	639	0.01	639	0.15
	900	319	0.07	0.11	0.20	-	-	-	-	-	767	0.02	767	0.22
	1050	372	0.09	0.14	0.24	-	-	-	-	-	895	0.02	895	0.30
	1200	425	0.11	0.17	0.28	-	-	-	-	-	1022	0.03	1022	0.39
	1350	479	0.13	0.19	0.33	-	-	-	-	-	1150	0.04	1150	0.19
	1500	532	0.16	0.22	0.38	-	-	-	-	-	1278	0.05	1278	0.23
48	1000	255	0.05	0.09	0.15	-	-	-	-	-	500	0.01	600	0.10
	1200	306	0.06	0.11	0.18	-	-	-	-	-	600	0.01	720	0.14
	1400	356	0.08	0.13	0.22	-	-	-	-	-	700	0.02	840	0.20
	1600	407	0.1	0.16	0.27	-	-	-	-	-	800	0.02	960	0.26
	1800	458	0.13	0.18	0.31	-	-	-	-	-	900	0.03	1080	0.13
	2000	509	0.15	0.21	0.36	-	-	-	-	-	1000	0.03	1200	0.16

**Table 6. BCVE filter, mix box, and attenuator air pressure drop (in. wg) (continued)**

Unit Size	CFM	Flat Filters				Angle Filters			Mixing Box		Return Attenuator		Discharge Attenuator	
		Velocity	1-inch Throw-away	2-inch Merv8	2-inch Merv13	Velocity	2-inch Merv8	2-inch Merv13	Velocity	Pressure Drop	Velocity	Pressure Drop	Velocity	Pressure Drop
60	1250	268	0.05	0.09	0.16	-	-	-	-	-	625	0.01	625	0.15
	1500	321	0.07	0.12	0.20	-	-	-	-	-	750	0.02	750	0.22
	1750	375	0.09	0.14	0.24	-	-	-	-	-	875	0.02	875	0.30
	2000	429	0.11	0.17	0.29	-	-	-	-	-	1000	0.03	1000	0.39
	2250	482	0.14	0.20	0.33	-	-	-	-	-	1125	0.04	1125	0.18
	2500	536	0.16	0.23	0.39	-	-	-	-	-	1250	0.05	1250	0.23
72	1500	284	0.06	0.10	0.17	185	0.06	0.10	571	0.06	593	0.01	593	0.32
	1800	341	0.08	0.12	0.21	222	0.07	0.13	686	0.09	712	0.02	712	0.47
	2100	398	0.1	0.15	0.26	259	0.09	0.15	800	0.12	831	0.02	831	0.64
	2400	455	0.12	0.18	0.31	296	0.10	0.18	914	0.15	949	0.03	949	0.83
	2700	512	0.15	0.21	0.36	333	0.12	0.21	1029	0.19	1068	0.04	1068	0.36
	3000	569	0.18	0.24	0.42	370	0.14	0.24	1143	0.24	1187	0.04	1187	0.45
90	1875	270	0.05	0.09	0.16	157	0.05	0.08	458	0.04	614	0.01	614	0.25
	2250	324	0.07	0.12	0.20	189	0.06	0.10	550	0.05	736	0.02	736	0.36
	2625	378	0.09	0.14	0.24	220	0.07	0.12	642	0.07	859	0.02	859	0.49
	3000	432	0.11	0.17	0.29	252	0.09	0.15	733	0.10	982	0.03	982	0.64
	3750	540	0.17	0.23	0.39	315	0.11	0.19	917	0.15	1227	0.05	1227	0.35
	3375	486	0.14	0.20	0.34	283	0.10	0.17	825	0.12	1105	0.04	1105	0.29
120	2500	295	0.06	0.10	0.18	176	0.06	0.10	611	0.07	629	0.01	629	0.29
	3000	355	0.08	0.13	0.22	211	0.07	0.12	733	0.10	755	0.02	755	0.41
	3500	414	0.1	0.16	0.27	246	0.08	0.14	856	0.13	881	0.02	881	0.56
	4000	473	0.13	0.19	0.33	281	0.10	0.17	978	0.17	1007	0.03	1007	0.73
	4500	532	0.16	0.22	0.38	316	0.11	0.19	1100	0.22	1133	0.04	1133	0.33
	5000	591	0.2	0.26	0.44	352	0.13	0.22	1222	0.27	1259	0.05	1259	0.40

**Note:** Data based on clean filters.

## Fan Arrangements

Figure 7. BCHE horizontal draw-through arrangement

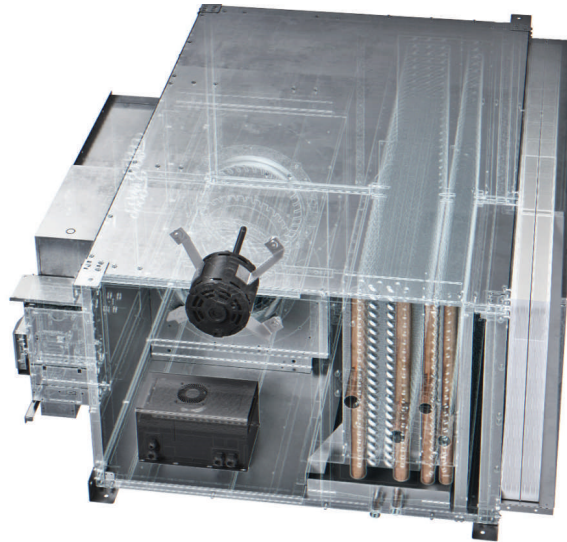
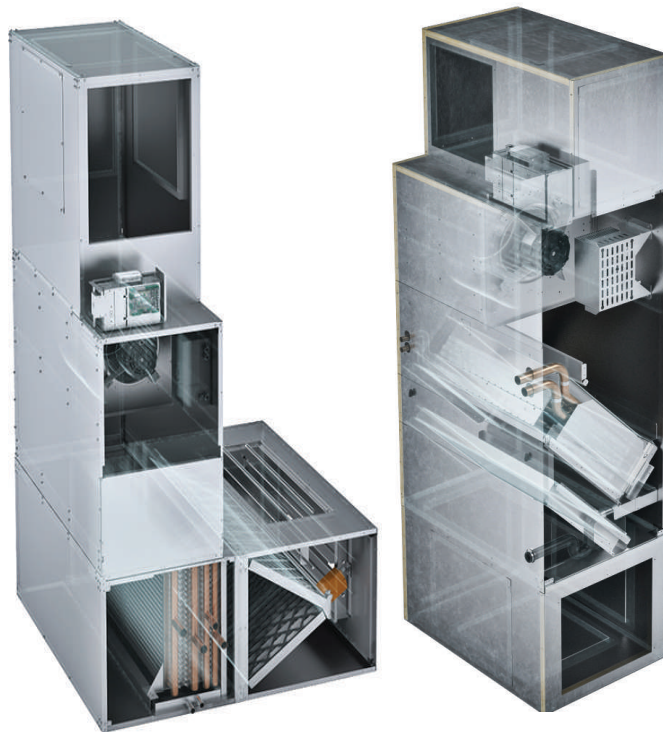


Figure 8. BCVE vertical arrangement







# Controls

## Why Trane Controls?

Trane offers a broad range of control packages from a field convertible end-device package, to a complete building automation system solution with BACnet® controls.

Trane controls are factory-mounted, wired, tested and configured or programmed with Trane application expertise to provide comfort, efficiency, and reliability, as well as single-source warranty and service. With Trane integrated controls, the installed costs are lower because the equipment has turn-key factory controls and every component of the system is optimized to fit with the controller. Trane installs not only the controller, but also the hardware that works intimately with the controller to allow the system to function properly (i.e., valves, dampers, actuators, etc.).

**Note:** Some Trane controllers have the ability to be pre-addressed in the factory. If addressing is not provided, the controllers will be kept at the default setting.

**Table 7. Tracer® controller input/output summary**

Binary outputs	Symbio™ 400-B
Variable speed fan control	X
2-position hydronic valve	X
1-stage electric heat	X
Modulating mixed air damper	X
Modulating hydronic valve	X
2-stage electric heat	X
Reheat (hydronic)	X
Generic	X
<b>Binary inputs</b>	
Condensate overflow detection	X
Low temperature detection	X
Occupancy	X
Generic input	X
<b>Analog inputs</b>	
Zone temperature	X
Setpoint	X
Fan mode: auto, high, medium, low	X
Entering water	X
Discharge air	X
Outside air	X
Generic	X
Hydronic Valve	X
SCR Electric Heat	X

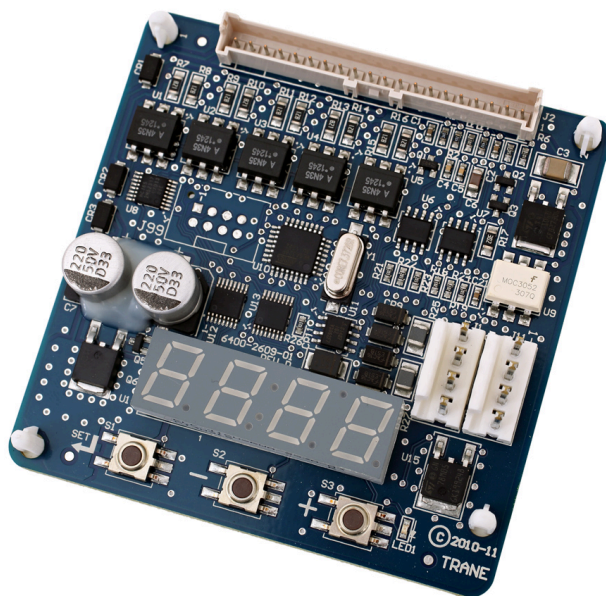
**Table 8. Controller function summary**

Control functions	Symbio 400-B
Air-Fi Factory Addressing	X
Entering water temp. sampling (purge)	X
Timed override	X
Auto changeover	X
Fan cycling	X
Continuous fan	X
Warm-up	X
Pre-cool	X
Random start	X
Dehumidification	X
Staged capacity (2-stage electric supplementary)	X
DX cooling	X
Two-stage DX cooling	X
DX Frost Protection	X
<b>Other Functions</b>	
Manual test	X
Filter maintenance timer	X
Setpoint limits	X

## VelociTach™ Motor Control Board

The VelociTach motor control board controls and reports the performance of up to two Trane brushless DC (BLDC) motors.

**Figure 9. VelociTach motor control board**

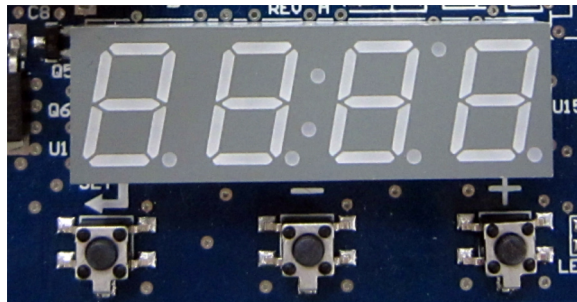


The motor control board also:

- Coordinates the operation of the fan in response to electric heat behavior and electric behavior in response to hydronic heat behavior.
- Incorporates a user interface that allows adjustment of certain unit parameters and provides constant feedback on motor operation.
- Integrates service and troubleshooting tools.
- Integrates a versatile configurable auxiliary temperature sensor.
- Incorporates various safety and lockout features, such as maintaining proper fan speeds if electric heat is called for.

## Status Display

**Figure 10. Status display**



The motor control board contains a four-digit, seven-segment display that is used to present information in a format close to real-world language, while having a small-form factor. Most characters are immediately recognizable; however, refer the screen representation of alphabetical characters and numeric characters shown in the following tables.

## Manual Fan Speed Switch

A fan speed control is selectable on units with CSTI options. It provides variable speed of the motor RPM between the low and high speed factory settings.

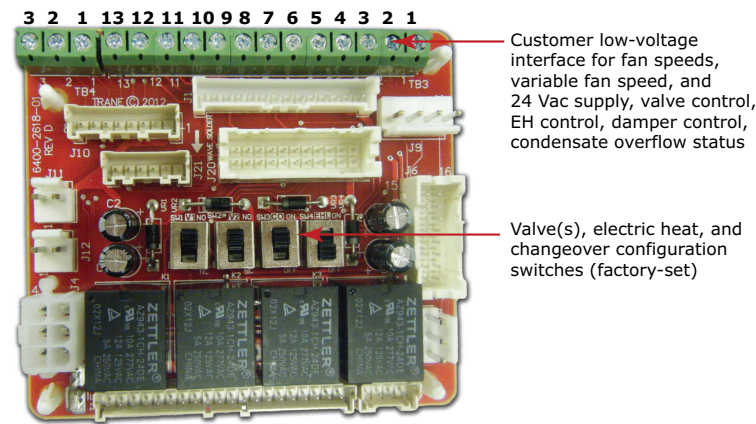
**Figure 11. Fan speed switch**



## Customer Supplied Terminal Interface (CSTI)

The CSTI is intended to be used with a field-supplied, low-voltage thermostat or controller. The control box contains a relay board which includes a line voltage to 24-volt transformer and disconnect switch (for non-electric heat units). All end devices are wired to a low-voltage terminal block and are run-tested, so the only a power connection and thermostat connection is needed to commission the unit. Changeover sensors and controls are provided whenever a change-over coil is selected. When N.O. valves are selected, inverting relays are provided for use with standard thermostats.

**Figure 12. CSTI adapter board and field connections**



The CSTI adapter board provides all the hookups as the standard adapter board, but in addition, provides hookups for valve control (main and pre-heat or re-heat), electric heat control, and damper control. Screw terminal blocks provide convenient access to fan controls and to end device control. In addition, a courtesy 10-Vdc supply is provided for use with an external potentiometer or rheostat. The 10-Vdc supply supports up to 10 mA draw.

## Symbio™ 400-B Controller

The Tracer® Symbio™ 400-B single-zone VAV controller can be used in a stand-alone application or as part of a Tracer control system.

In the stand-alone configuration, Symbio 400-B receives operation commands from the zone sensor and/or the auto changeover sensor (on auto changeover units). The entering water temperature is read from the auto changeover sensor and determines if the unit is capable of cooling or heating. The zone sensor module is capable of transmitting the following information to the controller:

- Timed override on/cancel request
- Zone setpoint
- Current zone temperature
- Fan mode selection (off-auto-high-med-low)

For optimal system performance, units can operate as part of a Tracer® SC building automation system. The controller is linked directly to the Tracer SC via a twisted pair communication wire, requiring no additional interface device (i.e., a command unit). The Tracer control system can monitor or override Symbio 400-B control points. This includes such points as temperature and output positions.

## Tracer Controller Features

The Tracer® family of controllers, Symbio™ 400-B, offer the combined advantages of simple and dependable operation with the latest Trane-designed controller. Standard control features include options normally available on more elaborate control systems. All control options are available factory-configured or can be field-configured using Tracer® TU service software. For more detailed information, refer to *Symbio 400-B/500 Programmable Controllers For Blower Coil, Fan Coil, and Unit Ventilator Installation, Operation, and Maintenance* (BAS-SVX093\*-EN).

## Features Available on All Controllers

The following control functions are standard features on units with Symbio™ 400-B.

### Entering Water Temperature Sampling Function

A system that uses a two-way control valve option might not sense the correct entering water temperature during long periods when the control valve is closed. If the demand for heating or cooling does not exist for a long period, the entering water will eventually approach ambient temperature.

Using the entering water temperature sampling function, the controller provides accurate two-pipe system changeover-without sacrificing the benefits of two-way control valves. Also, it eliminates inefficient bleed or bypass lines that can allow unnecessary waterflow through the system.

This function periodically samples the entering water temperature by opening the hydronic valve. The valve opens for 20 seconds to allow the water temperature to stabilize, and then the controller reads the entering water temperature for up to three minutes to see if the correct water temperature is available for the selected operating mode.

The entering water temperature must be five degrees or more above the space temperature to allow hydronic heating and five degrees or more below the space temperature to allow hydronic cooling. If the correct water temperature for the operating mode is available, the unit begins normal heating or cooling operation. If the correct water temperature is not available, the controller closes the control valve and waits 60 minutes before attempting to sample the entering water temperature again.

A factory-mounted thermistor senses the entering water temperature on changeover cooling/ heating coil units. If the fan coil has a factory-mounted piping package, the sensor is strapped to the entering water pipe. If the fan coil does not have a piping package, the sensor is coiled in the end pocket for mounting on customer-supplied piping. This sensor must detect accurate water temperature for proper changeover.

### Automatic Heat/Cool Mode Determination

The controller automatically determines whether heating or cooling is needed-based on space and system conditions. Using a proportional/integral (PI) control algorithm to maintain the space temperature at the active heating or cooling setpoint. The controller measures the space temperature and active setpoint temperature to determine the unit's heating or cooling capacity (zero to 100 percent).

### Occupied/Unoccupied Operation

The occupancy input uses a binary switch (i.e., motion sensor, time clock, etc.) that allows the zone sensor to use its unoccupied internal setpoints.

### Random Start

This feature randomly staggers multiple unit start-up to reduce electrical demand spikes.

### Warm-up

The two-position fresh air damper option closes during the occupied mode when the space temperature is three degrees or more below the heating setpoint temperature. The damper remains closed during warm-up until the space temperature is within two degrees of the heating setpoint temperature.

### Cool-down

The two-position fresh air damper option closes during the occupied mode when the space temperature is three degrees or more above the cooling setpoint temperature. The damper remains closed during cool-down until the space temperature is within two degrees of the cooling setpoint temperature.

### Manual Output Test

This function may be initiated from the blue test push button on the controller or through the Tracer® TU service tool. This feature is used to manually exercise the outputs in a defined sequence.

The purpose of this test sequence is to verify output and end device operation. The manual output test function may also be used in the following situations:

- Reset latching diagnostics
- Verify output wiring and operation
- Force the water valve(s) open to balance the hydronic system during installation set-up or service.

## Peer-to-Peer Communication

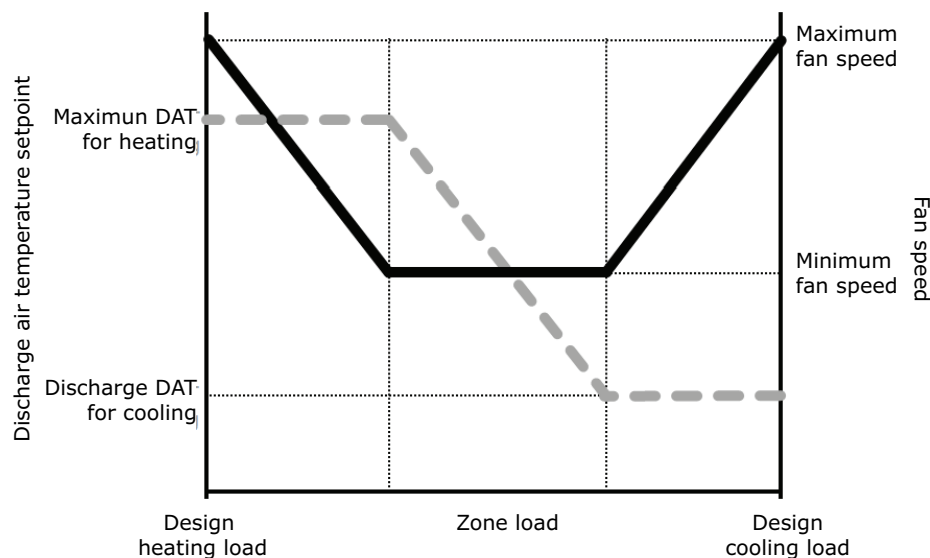
Peer-to-peer communication allows multiple units in one space to share the same zone sensor and provide simultaneous heating and cooling. On the Symbio™ 400-B controller, zone sensor data sharing can be accomplished by use of the BAS system controller.

A thermistor to sense fresh air is factory-mounted at the unit's fresh air opening for use in economizer applications or as a read-only point for Tracer® SC. If the fresh air temperature is a read-only value, it will not impact the control algorithm. In an economizer application, a fresh air temperature signal must be provided either by this thermistor, Tracer SC.

## Additional Features

### Single-zone VAV control

**Figure 13. Single-zone VAV control**



Single-zone VAV control varies the speed of the EC fan motor as the zone cooling or heating load changes. When the zone is at design cooling load, the unit operates the fan at maximum speed and cooling capacity is modulated or cycled to deliver the air at the design discharge air temperature (DAT) setpoint for cooling. As the zone cooling load decreases, fan speed is reduced to maintain zone temperature at cooling setpoint, while cooling capacity (and/or economizer) is modulated or cycled to maintain DAT at the same design setpoint. When the fan has reached minimum speed, and the zone cooling load continues to decrease, the fan continues to operate at minimum speed while the DAT setpoint begins to reset upward to maintain zone temperature at cooling setpoint. Cooling capacity (and/or economizer) is modulated or cycled to maintain this DAT setpoint.

When the zone temperature drops to heating setpoint, the fan continues to operate at minimum speed and the DAT setpoint is reset further upward. Heating capacity is modulated or staged to maintain this DAT setpoint. If the zone heating load increases to the point where DAT reaches the maximum limit, fan speed is again increased, while heating capacity is modulated or staged to maintain DAT at this maximum limit.

### Automatic Fan and Ventilation Reset

A two-speed fan control for the unit delivers the airflow output customized to support the cfm space needs. When less cfm is necessary to meet the load of the classroom (typically 75 to 80 percent of the time), the equipment operates on low speed. However, if the room temperature rises, the controller will switch to high speed, and the outside air damper will adjust to satisfy the space needs. This helps maintain the proper amount of ventilation air to the occupants independent of the fan speed. As part of the ventilation strategy, the controller will reposition the outside air damper to confirm the minimum outside air cfm is met at both operating conditions.

## Filter Maintenance

Filter status for the controller is based on the cumulative run hours of the unit fan. The controller compares the amount of fan run time against an adjustable fan run hour (stored in the controller) to determine when maintenance is recommended for the unit. The run-hours value may be user edited as required (Tracer® TU). The valid range for the fan run hours limit is 0 to 5000 hours with a default of 600 hours. Once the run hours limit has been exceeded, the controller generates a maintenance required diagnostic (unit will not shut-down). The user will be notified of this diagnostic through the building automation system or when a Trane service tool is communicating with the controller.

## Active Dehumidification

On units with reheat coils, the controller can provide active dehumidification. This means that the relative humidity in the space can be kept below an adjustable setpoint independent of outdoor weather conditions. Indoor humidity levels are recommended by ASHRAE to be kept below 60 percent in order to minimize microbial growth and the life span of airborne illness causing

## Client Server (Data Sharing)

The controller can send or receive data (setpoint, heat/cool mode, fan request, space temperature, etc.) to and from other controllers on the communication link with or without the existence of a building automation system. This applies to applications where multiple units might share one zone sensor for both stand-alone (with communication wiring between units) and a building automation system.

## Water Valve Override

The controller can be commanded via the Tracer® TU to open all hydronic valves 100 percent. This allows for the faster water balancing of each unit and the entire system when the command is sent globally to all controllers. A properly balanced system is essential for proper and efficient operation.

## Hydronic Coil Freeze Protection (Freeze Avoidance)

Systems in cold climates need to take precautions to avoid hydronic coil freeze-up. The controller does this from three different aspects. Any of these methods of protections will result in the unit fan being disabled, the outside air damper being shut, and the hydronic valves being opened 100 percent.

The three methods of freeze avoidance include:

1. A binary freeze protection thermostat is mounted on the coil and will cause a latching diagnostic if the coil temperature falls below 35°F.  
**Note:** Units with R-454B refrigerant will not have a binary freeze protection mounted to the coil. These units will rely on the binary freeze protection on the DX coil and protection methods 2 and 3.
2. An analog discharge air sensor monitors the temperature of the air coming off of the coil and if the temperature falls below 40°F the outside air damper is closed, the fan is turned off and the valves are fully opened.
3. When in the unoccupied mode, the controller has an adjustable freeze avoidance setpoint. If the outside air temperature is below the setpoint, the unit will open the valves to allow water to flow through the coils.

## Interoperability

Inter-operability allows the owner freedom to select multiple vendors, and multiple products. With this advantage, the owner can choose the best products, the best application, and the best service from a variety of suppliers to meet their evolving building control needs in a cost effective manner.

## Generic Binary Input/Output

The three generic binary inputs/outputs are not part of the normal control, but are actually controlled through the Tracer® SC or Tracer® system (when present) to issue commands to the controller to turn the generic inputs/outputs of add-on equipment (such as baseboard heating, exhaust fans, occupancy sensors, lighting, etc.) on and off. This binary port is not affected when other binary diagnostics interrupt unit operation.

## Tracer® Controls Sequence of Operation

### Symbio™ 400-B

**Off:** Fan is off; control valve options and mixing box damper options close. The low air temperature detection option is still active.

**Auto:** Fan speed control in the auto setting allows the modulating control valve option and single or three-speed fan to work cooperatively to meet precise capacity requirements, while minimizing fan speed (motor/energy/acoustics) and valve position (pump energy/chilled water reset). As the capacity requirement increases at low fan speed, the water valve opens. When the low fan speed capacity switch point is reached, the fan switches to the next higher speed and the water valve repositions to maintain an equivalent capacity. The reverse sequence takes place with a decrease in required capacity.

**Units with three-speed fans on low, medium, or high:** The fan runs continuously at the selected speed and the valve option cycles to meet setpoint.

## Air-Fi® Wireless Systems

For more detailed information on Air-Fi Wireless systems and devices, see:

- BAS-SVX40\*: *Air-Fi® Wireless System Installation, Operation, and Maintenance*
- BAS-PRD021\*-EN: *Air-Fi® Wireless Product Data Sheet*
- BAS-SVX55\*: *Air-Fi® Wireless Network Design Installation, Operation, and Maintenance*

### Air-Fi Wireless Communications Interface (WCI)



A factory-installed Air-Fi Wireless Communications Interface (WCI) provides wireless communication between the Tracer® SC and unit controllers. The Air-Fi WCI is the perfect alternative to a Trane BACnet® wired communication link. Eliminating the communication wire between terminal products, space sensors, and system controllers has substantial benefits:

- Reduced installation time and associated risks.
- Completion of projects with fewer disruptions.
- Easier and more cost-effective re-configurations, expansions, and upgrades.

### Air-Fi Wireless Communications Sensor (WCS)



Communicates wirelessly to a Tracer® unit controller. A WCS is an alternative to a wired sensor when access and routing of communication cable are issues. A WCS allows flexible mounting and relocation.

## Zone Sensor Options

A variety of wall-mounted zone sensors are available for design flexibility. Zone sensors have an internal thermistor and operate on 24 Vac. Options with setpoint knobs are available in Fahrenheit or Celsius.



Figure 14. Wall-mounted zone sensor with occupied/unoccupied, COMM (Digit 38 = A)



Figure 15. Wall-mounted zone sensor with setpoint dial, OALMH, occupied/unoccupied, COMM (Digit 38 = C)



Figure 16. Wall-mounted wired display sensor (WDS) with setpoint adjustment, OALMH (Digit 38 = D)



Figure 17. Air-Fi Wireless Communications Sensor (WCS) with setpoint, OALMH (Symbio 400-B only) (Digit 38 = E)



Figure 18. Wall-mounted fan speed switch (Digit 38 = F)



## End Device Options

All end device options are factory-installed and -tested.

Table 9. End device option availability

Device	Symbio™ 400-B	CSTI
Condensate float switch	X	X
Low limit	X	X
Filter run-time diagnostic	X	
Fan status	X	X
2-position control valves	X	X
Modulating control valves	X	X
1-stage electric heat	X	X
2-stage electric heat	X	X
Frostat™ protection (DX coils)	X	X

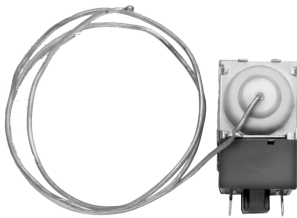
**Table 9. End device option availability (continued)**

Device	Symbio™ 400-B	CSTI
SCR Electric Heat	X	X

**Notes:**

1. Symbio 400-B are factory-provided controllers that control the end devices listed in the table.
2. CSTI provides an adapter board with screw down terminals for wiring to end devices for a field-supplied controller.
3. Positive proof fan status switch included with all Trane-controlled units.

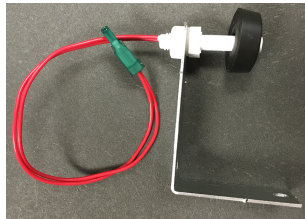
## Low Temperature Detection



When the low temperature detection device senses an entering air temperature of 36°F to the hydronic coil, the normally-closed switch opens a corresponding set of binary input terminals. The fan disables, control valves open, and the fresh air damper closes when used with a Tracer controller.

The low temperature detection device is an averaging type capillary tube and will reset when it detects an entering air temperature of at least 44°F.

## Condensate Overflow Detection



A float switch is factory-installed in the drain pan to detect a high condensate water level. When the float switch rises, the normally closed input opens a corresponding set of binary input terminals. With Trane controls installed, this also causes the fan to disable, and the control valve and fresh air damper options to close. Although the float switch will close when the high condensate level recedes, the controller must be manually reset before normal unit operation can occur. If using a Symbio™ 400-B controller you can reset using Tracer® SC+. Use Tracer® TU for units with a Symbio 400-B. When wired to the CSTI, the switch does not deenergize the unit when open position occurs.

**Important:** This is a dry contact only and sequence of operation of unit when this condition is reached is the responsibility of the field provided controller or thermostat.

## Mixing Box Damper Actuator

**Note:** Available with Symbio 400-B controller only.

This option is a modulating, NO or NC spring-return damper actuator and is factory-wired and mounted to the mixing box damper assembly. When the controller enables the mixing box damper and the unit is in occupied mode, the damper modulates between its minimum position (configurable) and the full open position to maintain setpoint temperature. If mixing box operation stops or if the unit is in the heating mode, the damper adjusts to its minimum position.

**Note:** Trane highly recommends using the low temperature detection option with a mixing box damper to detect possible freeze conditions.

## CO<sub>2</sub> Sensor for Demand-Controlled Ventilation

**Note:** Available with Symbio 400-B controller only.

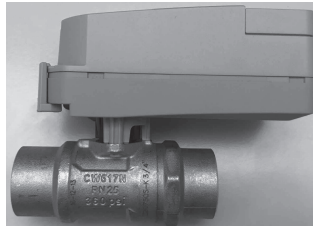
The unit is provided with a CO<sub>2</sub> sensor to enable demand-controlled ventilation (DCV). This sensor provides a 4-20mA signal and ships separate for field installation (wired to UI1). DCV can be used for modulating ECM, single-speed, two-speed, three-speed. It functions during occupied modes (Occupied, Occupied Standby, Occupied Bypass), in either heating or cooling mode, as long as the fan is operating (high, medium, low, On, or Auto). Refer to Symbio™ 400-B/500 Programmable Controllers For Blower Coil, Fan Coil, and Unit Ventilator Installation, Operation, and Maintenance (BAS-SVX093\*-EN) for a description of DCV control and guidance in determining the appropriate CO<sub>2</sub> and economizer damper setpoints for a given application.

## Humidity Sensor

**Note:** Available with Symbio 400-B controller only.

The value can be communicated from the Building Automation System via BACnet or the unit can be ordered with a local (wall mounted) RH sensor.

## Control Valves



Units with either the control interface or the Symbio™ 400-B controller are available with chilled and/or hot water control valves for each coil configuration. Control valves are available as two way, three way, or pressure independent (PIC) configurations. Valve actuator options include:

- Modulating
- Two-position, normally-open or normally-closed

See the valve availability table for a complete list of available valve options by size.

### Two-Position Control Valves

Two-position valve options are spring-return or capacitor discharge-return types. Valves respond to a 24V signal and will either fully open or close. These valves cannot be driven or actuated to a partially open or closed position. If the valve loses power, the valve returns to its de-energized position.

### Modulating Control Valves

Modulating control valves offer an alternative for more precise capacity control by modulating or varying the water flow through the coil. The valve responds to a 24V signal from the controller, which determines the valve position by a control algorithm. If the valve loses power, it remains in the position it was in when the power loss occurred.

### Pressure Independent Control Valves (PIC)

The PIC valve combines a differential pressure regulator with a 2-way control valve to supply a specific flow regardless of system pressure fluctuations. The valve performs the function of a balancing valve and control valve in one unit.

PIC valves are available with modulating actuators.



### Field-Supplied Valves

This option allows the controller to be factory-configured for the normal position of the field supplied valve, as well as running a wiring harness from the control box to the piping side of the unit. When the field-supplied valve option is chosen, the control box is provided with low voltage components and wired back to a terminal strip (CSTI) or controller.

## How to Choose the Correct Control Valve

Valve flow coefficient or Cv, is defined as the volume of water flow through a control valve in the fully open position with a 1 psig differential across the valve. Trane Select Assist will default to a program calculated Cv based on individual selections. There is an option for the user to enter their chosen value. It is calculated using the following formula:

$C_v = Q / \text{Square root } \Delta P$  where:

- $C_v$  = flow coefficient
- $Q$  = flow rate (Gpm)
- $\Delta P$  = pressure drop across the valve or coil (psig).

Branch authority or  $\beta$  (modulating valves only), which is represented by the following formula:

- $\beta$  = pressure drop across the valve divided by the pressure drop across the branch circuit \* x 100%  
=  $\Delta P \text{ valve} / \Delta P \text{ branch circuit}$ .

\* Branch circuit includes the coil and piping package (control valve, circuit setter, ball valves, fittings, and piping) between the supply and return riser.

**Note:** For good control,  $\beta$  should be between 25 and 70 percent.

### Modulating Valve Selection Example

Assume a size 12 Blower Coil is selected to operate at the following conditions:

Entering water temperature = 45°F

Leaving water temperature = 55°F

EAT conditions = 80/67.

The coil is selected as a four-row coil.

Select the best modulating valve size for this unit.

1. Find the  $\Delta P$  across the water coil. Refer to the AHRI performance table to determine the  $\Delta P$  across the water coil (or use Trane Select Assist™ selection program). The water pressure drop is found to be 2.00 of water at a flow rate of 2.67 gpm. This converts to a pressure drop of 0.87 psig (1.0 feet of water = 0.4328 psig.)

2. Calculate the  $C_v$  of the water coil.

$$C_v = \text{Gpm} / \text{Square root } \Delta P$$

$$C_v = 2.67 / \text{Square root } 0.87$$

$$C_v = 2.86$$

Therefore, the valve with the  $C_v$  of 3.3 should be selected since it has the  $C_v$  which is closest to the  $C_v$  of the water coil.

**Table 10. Valve availability**

Option		A 2-way, 2-position, N.C.	B 2-way, 2-position, N.O.	C 3-way, 2-position, N.C.	D 3-way, 2-position, N.O.	E 2-way, modulating	F 3-way, modulating
A	2.3 Cv 3/4 in. Valve					X	
B	3.3 Cv 3/4 in. Valve					X	
C	4.6 Cv 3/4 in. Valve	X	X			X	
D	7.4 Cv 1 in. Valve	X	X	X	X	X	X
E	10 Cv 1 in. Valve	X	X	X	X	X	X
F	1.0 Cv 1/2 in. Valve						X
G	2.7 Cv 1/2 in. Valve						X
H	4.6 Cv 3/4 in. Valve			X	X		X
J	0.9 GPM 1/2 in. PIC Valve					X	
K	2.0 GPM 1/2 in. PIC Valve					X	
L	4.3 GPM 1/2 in. PIC Valve					X	
M	9.0 GPM 3/4 in. PIC Valve					X	



# Electrical Data

## MCA and MOP Calculations

### Minimum Circuit Ampacity (MCA) and Maximum Fuse Size (MFS) Calculations for Non-Electric Heat Units

MCA = 1.25 x motor FLAs

MFS or HACR type circuit breaker = 2.25 x motor FLA

### Minimum Circuit Ampacity (MCA) and Maximum Fuse Size (MFS) Calculations for Units with Electric Heat

Heater amps = (heater kW x 1000) / heater voltage

#### Notes:

- Use 120V heater voltage for 115V units.
- Use 240V heater voltage for 230V units.
- Use 208V heater voltage for 208V units.
- Use 277V heater voltage for 277V units.
- Use 480V heater voltage for 460V units.
- Use 600V heater voltage for 575V units.

MCA = 1.25 x (heater amps + all motor FLAs) MFS or HACR type circuit breaker = (2.25 x motor FLA) + heater amps

HACR (Heating, Air-Conditioning, and Refrigeration) type circuit breakers are required in the branch circuit wiring for all units with electric heat.

Select a standard fuse size equal to the calculated MFS. Use the next smaller size if the calculated MFS does not equal a standard size.

Standard fuse sizes: 15, 20, 25, 30, 35, 40, 45, 50, 60 amps.

### Useful Formulas

kW = (cfm x DT) / 3145

DT = (kW x 3145) / air flow

Single phase amps = (kW x 1000) / voltage

Electric heat MBh = (Heater kW) (3.413)

Three-phase amps = (kW x 1000)/(voltage x 1.73)



## Electrical Data

**Table 11. Available motor horsepower**

Motor	Unit Voltage	Motor Horse Power						
		0.5	1.0	1.5	2.3	3.0	3.5	5.0
60 Hz	115/1	X	X					
	208/1	X	X					
	230/1	X	X					
	277/1	X	X					
	208/3	X	X	X		X		X
	230/3	X	X	X		X		X
	460/3	X	X	X		X		X
	575/3	X	X		X		X	X
50 Hz	220/1	X	X					
	240/1	X	X					
	380/3	X	X	X		X		X
	415/3	X	X	X		X		X

**Table 12. Available electric heat (kW)**

	115/ 60Hz 1P	115/ 60Hz 1P	208/ 60Hz 1P	220/ 50Hz 1P	230/ 60Hz 1P	240/ 50Hz 1P	277/ 60Hz 1P	208/ 60Hz 3P	230/ 60Hz 3P	380/ 50Hz 3P	415/ 50Hz 3P	460/ 60Hz 3P	575/ 60Hz 3P
1	Size 12-120												
5		Size 18-120											Size 24-120
10							Size 36-120						
15										Size 48-120			
20										Size 72-120			
24										Size 90, 120			
30											Size 90, 120		

**Notes:**

1. Magnetic contactors are standard.
2. Units with electric heat are available with or without door interlocking disconnect switch.
3. Units with electric heat are available with or without line fuses.
4. Units with electric heat must not be run below the minimum cfm listed. Refer to the General Data section for more information.
5. Electric heat is balanced staging: 1 stage = 100 percent, 2 stages = 50 percent/50 percent.

**Table 13. Airflow min/max for BCHE/BCVE Blower Coils**

Unit Size	12	18	24	36	48	60	72	90	120
Nominal cfm	400	600	800	1200	1600	2000	2400	3000	4000
Airflow									
Minimum cfm	250	375	500	750	1000	1250	1500	1875	2500
Maximum cfm	500	675	1000	1600	2000	2500	3000	4000	5000

**Note:** Minimum airflow limits apply to units with hot water or electric heat. There is no minimum airflow limit on cooling coil units. Maximum airflow limits are to help prevent moisture carryover.

**Table 14. Motor electrical data**

Voltage	Voltage Range	Rated HP	Weight (lbs)	FLA
115/60/1	104-127	0.5	14.0	7.46
115/60/1	104-127	1.0	19.0	13.3
208/60/1	187-229	0.5	14.0	4.58
208/60/1	187-229	1.0	19.0	7.73
230/60/1	207-253	0.5	14.0	4.48
230/60/1	207-253	1.0	19.0	7.10
277/60/1	249-305	0.5	14.0	3.76
277/60/1	249-305	1.0	19.0	5.78
220/50/1	198-242	0.5	14.0	4.58
220/50/1	198-242	1.0	19.0	7.10
240/50/1	216-264	0.5	14.0	4.48
240/50/1	216-264	1.0	19.0	7.10
208/60/3	187-229	0.5	13.4	2.40
208/60/3	187-229	1.0	17.1	4.60
208/60/3	187-229	1.5	37.5	7.60
208/60/3	187-229	3.0	53.6	11.20
208/60/3	187-229	5.0	56.0	15.80
230/60/3	207-253	0.5	13.4	2.60
230/60/3	207-253	1.0	17.1	4.80
230/60/3	207-253	1.5	37.5	6.50
230/60/3	207-253	3.0	53.6	11.20
230/60/3	207-253	5.0	56.0	15.30
380/50/3	342-418	0.5	13.4	1.20
380/50/3	342-418	1.0	17.1	2.30
380/50/3	342-418	1.5	37.5	4.20
380/50/3	342-418	3.0	53.6	5.30
380/50/3	342-418	5.0	56.0	8.50
415/50/3	374-457	0.5	13.4	1.30
415/50/3	374-457	1.0	17.1	2.40
415/50/3	374-457	1.5	37.5	4.0
415/50/3	374-457	3.0	53.6	5.50
415/50/3	374-457	5.0	56.0	8.40
460/60/3	414-506	0.5	13.4	1.30
460/60/3	414-506	1.0	17.1	2.50
460/60/3	414-506	1.5	37.5	3.30
460/60/3	414-506	3.0	53.6	5.50
460/60/3	414-506	5.0	56.0	7.80
575/60/3	518 - 633	0.5	13.9	1.10
575/60/3	518 - 633	1.0	18.0	2.10
575/60/3	518 - 633	2.3	28.8	2.80



## Electrical Data

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**Table 14. Motor electrical data (continued)**

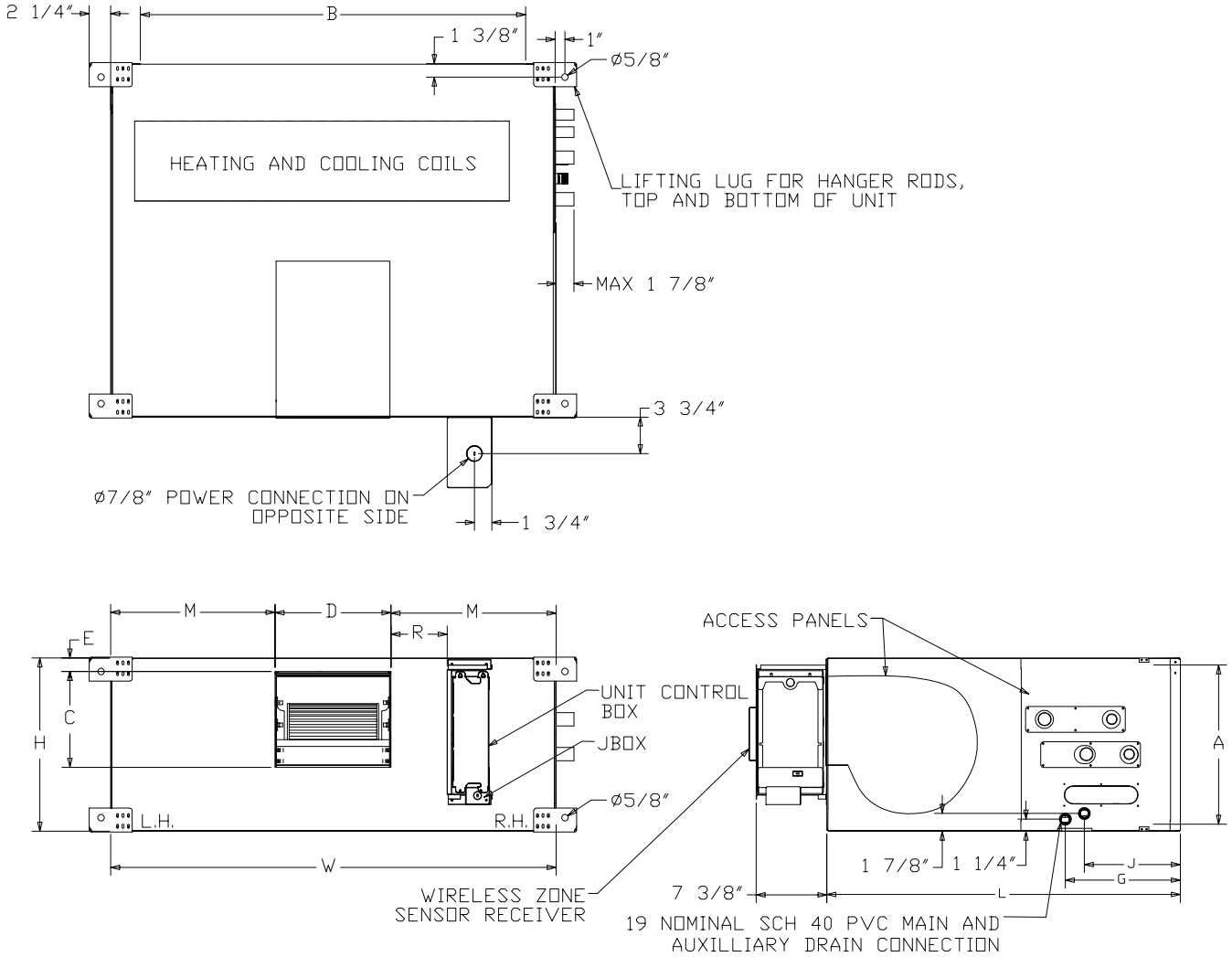
Voltage	Voltage Range	Rated HP	Weight (lbs)	FLA
575/60/3	518 - 633	3.5	53.6	4.60
575/60/3	518 - 633	5.0	56.0	6.50



# Dimensions and Weights

## Horizontal Blower Coil

**Figure 19. BCHE horizontal Blower Coil**



**Table 15. BCHE horizontal Blower Coil dimensions (inches) and weights (lb)**

Unit Size	H	W	L	A	B	C	D	E
12	17	24	30 1/4	15	18	10 3/4	7 1/8	2 1/4
18	17	28	30 1/4	15	22	10 3/4	7 1/8	2 1/4
24	17	30	30 1/4	15	24	10 3/4	7 1/8	2 1/4
36	17	42	34 1/4	15	36	9 7/8	8 5/8	1 1/8
54	18	46	36 7/8	16	40	10	12 1/8	1 3/8
72	18	58	35 7/8	16	52	10	12 1/8	1 3/8
90	26	48	40 3/4	24	42	13 3/4	12 5/8	2 7/8
120	26	58	40 3/4	24	52	13 3/4	15 5/8	2 7/8



## Dimensions and Weights

**Table 15. BCHE horizontal Blower Coil dimensions (inches) and weights (lb) (continued)**

Unit Size	G(RH)	G(LH)	J(RH)	J(LH)	M	R	Weight SW	Weight DW
12	10 5/8	12 5/8	8 5/8	10 5/8	8 3/8	1 1/2	86	109
18	10 5/8	12 5/8	8 5/8	10 5/8	10 3/8	3 1/2	90	115
24	10 5/8	12 5/8	8 5/8	10 5/8	11 3/8	2 1/4	92	118
36	10 5/8	12 5/8	8 5/8	10 5/8	16 3/4	5 5/8	113	150
54	12	14	10	12	17	5 7/8	127	169
72	12	14	10	12	23	11 7/8	147	198
90	12	14	10	12	17 3/4	6 5/8	151	209
120	12	14	10	12	21 1/4	10 1/8	172	238

**Notes:**

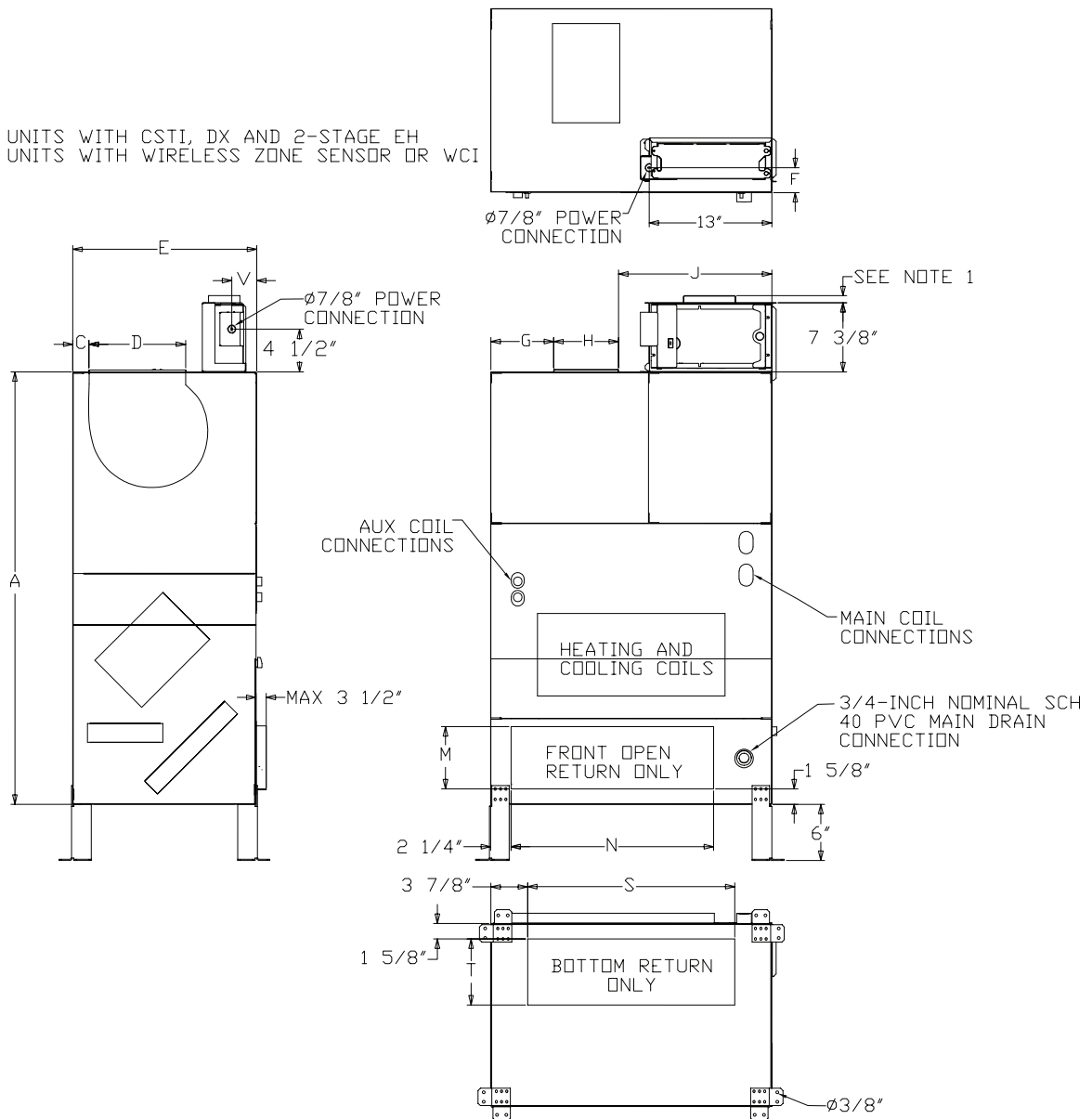
1. All coil connections are sweat style.
2. Weight of basic unit includes cabinet, fan, wiring and average filter. It does not include coil, motor or shipping package.
3. Control box factory-mounted on drive side.
4. Single Wall (SW), Double Wall (DW). Dimensions are the same for SW and DW units.
5. All weights and dimensions are nominal.

## Vertical Blower Coil

**Figure 20. Size 24 to 60 BCVE vertical Blower Coil**

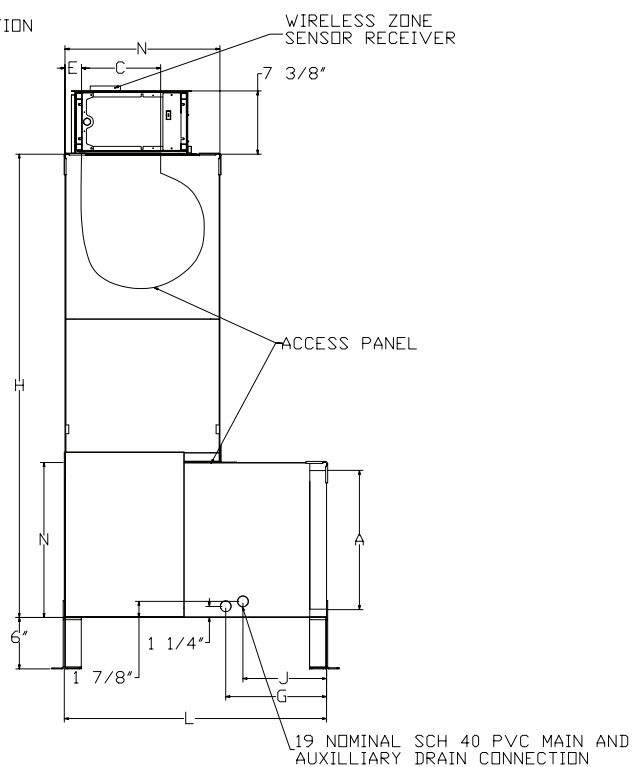
NOTE 1

3 1/2" FOR UNITS WITH CSTI, DX AND 2-STAGE EH  
1 3/8" FOR UNITS WITH WIRELESS ZONE SENSOR OR WCI





This technical drawing shows the right-hand (R.H.) side view of the machine frame. It includes dimensions B (overall width), U (height from base to top rail), and T (distance from front support to rear support). The drawing also indicates the location of the L.H. (left-hand) side and the R.H. (right-hand) side. A note specifies the diameter of the mounting holes as Ø3/8" and Ø5/8".



**Table 16. BCVE 24 to 60 vertical Blower Coil dimensions (inches) and weights (lb)**

Unit Size	A	B	C	D	E	F	G	H
24	45 7/8	29 3/4	1 1/2	10 3/4	19 1/2	2 5/8	6 5/8	7 1/8
36	49 7/8	29 3/4	2 1/4	10 7/8	23	2 5/8	6 3/8	9
48	56 5/8	34 3/4	1 5/8	13 7/8	24 1/2	2 5/8	7 7/8	11 1/2
60	58 5/8	34 3/4	1 1/2	13 7/8	27 1/2	2 5/8	7 7/8	11 1/2
Unit Size	J	M	N	S	T	V	Weight SW	Weight DW
24	16	6 3/4	21 3/4	22	7	2 5/8	118	163
36	14 3/8	10 1/4	21 3/4	22	11 1/4	2 5/8	135	188
48	15 3/8	12 1/8	26 3/4	27	12 1/2	2 5/8	170	237
60	15 3/8	14 3/4	24 7/8	27	15 1/2	2 5/8	190	263

**Notes:**

1. All coil connections are sweat style.
2. Weight of basic unit includes cabinet, fan, wiring and average filter. It does not include coil, motor or shipping package.
3. Vertical units (size 24 to 60) provided with 6-inch mounting legs. Legs are required for seismic installations.
4. Single Wall (SW), Double Wall (DW). Dimensions are the same for SW and DW units.
5. All weights and dimensions are nominal.

**Table 17. BCVE 72 to 120 vertical Blower Coil dimensions (inches) and weights (lb)**

Unit Size	W	H	L	A	B	C	D	E	F	G(RH)
72	58	53 7/8	30 1/2	16	52	10	12	1 3/8	23	12
90	48	66 3/4	30 1/2	24	42	13 5/8	12 1/2	2 7/8	17 3/4	12
120	58	66 3/4	30 1/2	24	52	13 5/8	15 1/2	2 7/8	21 1/4	12
Unit Size	G(LH)	J(RH)	J(LH)	N	T	U	V	Weight SW	Weight DW	
72	14	10	12	18	11 7/8	3 3/4	8 1/8	214	302	
90	14	10	12	26	6 5/8	11 3/4	8 1/8	223	319	
120	14	10	12	26	10 1/8	11 3/4	8 1/8	245	355	

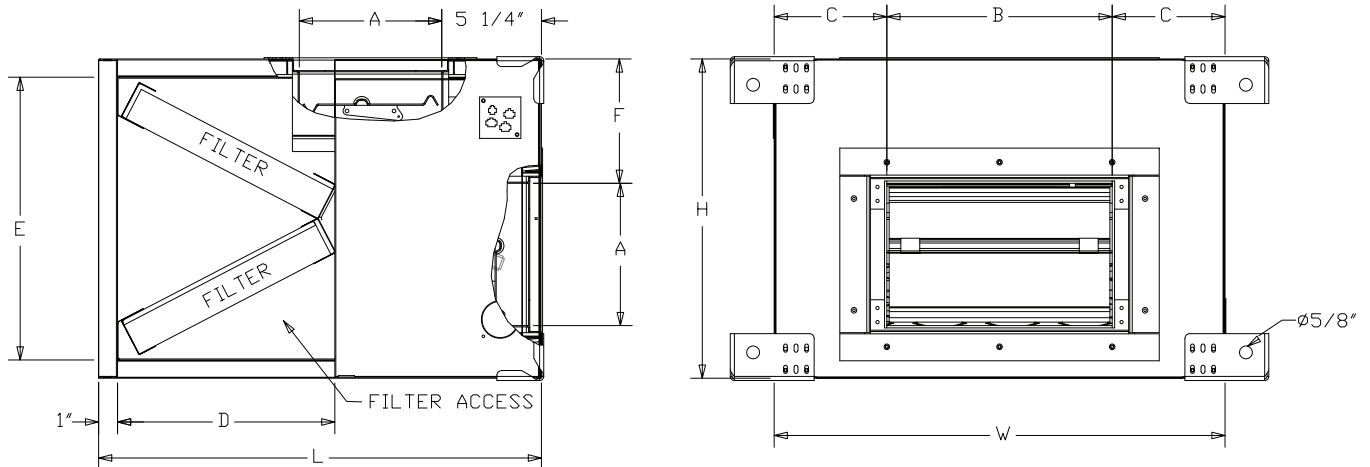
**Notes:**

1. All coil connections are sweat style.
2. Weight of basic unit includes cabinet, fan, wiring and average filter. It does not include coil, motor or shipping package.
3. Vertical coil and filter section ships separate for field installation.
4. Vertical units (size 24 to 60) provided with 6-inch mounting legs. Legs are required for seismic installations.
5. Single Wall (SW), Double Wall (DW). Dimensions are the same for SW and DW units.
6. All weights and dimensions are nominal.

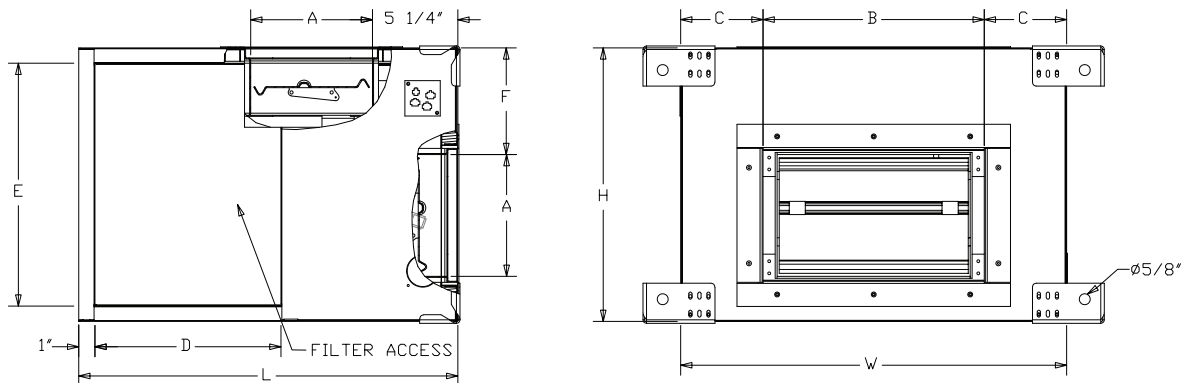
## Options

### Angle Filter and Mixing Box

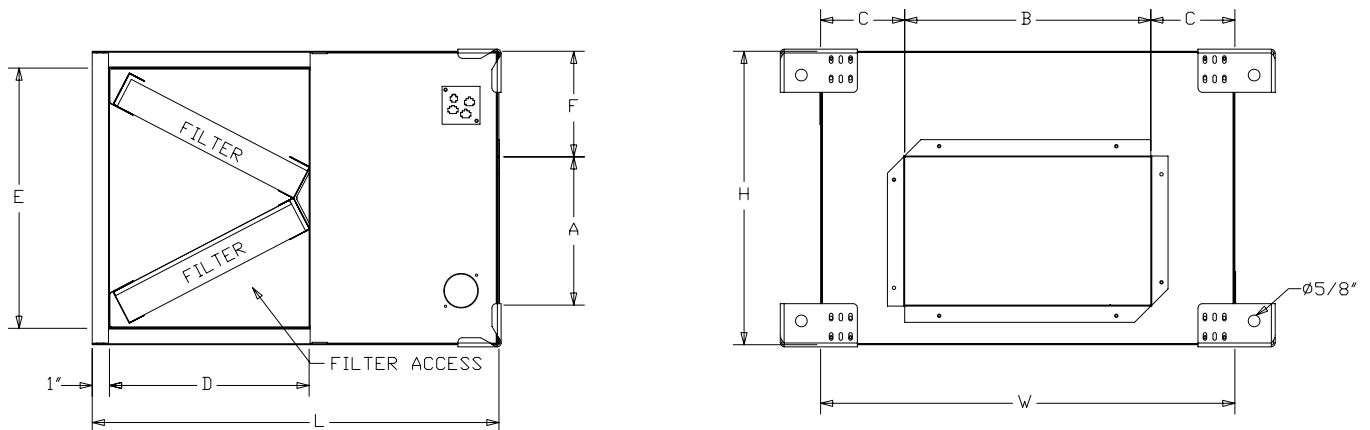
**Figure 22. Combination angle filter and mixing box dimension**



**Figure 23. Mixing box dimension**



**Figure 24. Angle filter box dimension**



**Table 18. Angle filter and mixing box dimensions (inches) and weights (lb)**

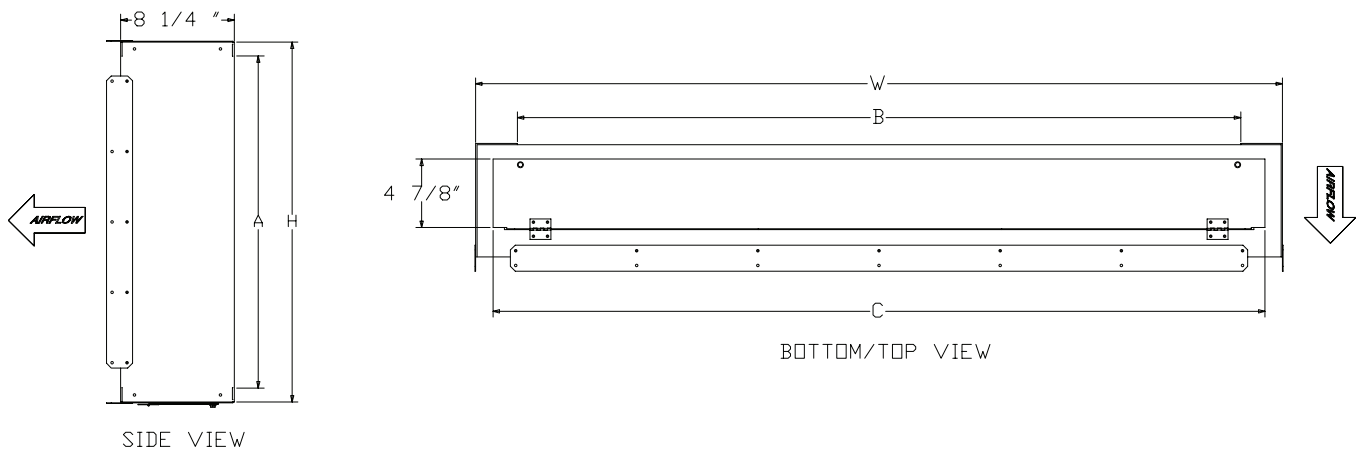
Unit Size	H <sup>(a)</sup>	W	L	A	B	C	D	E
12	17	24	23 5/8	8 3/8	14	5	11 5/8	15
18	17	28	23 5/8	8 3/8	14	7	11 5/8	15
24	17	30	23 5/8	8 3/8	20	5	11 5/8	15
36	17	42	23 5/8	8 3/8	20	11	11 5/8	15
54	18	46	24 1/8	10 1/2	36	5	11 3/8	16
72	18	58	24 1/8	10 1/2	36	11	11 3/8	16
90	26	48	30 1/4	15 1/2	38	5	18 3/8	24
120	26	58	30 1/4	15 1/2	38	10	18 3/8	24
Unit Size	F	Weight Singe Wall			Weight Double Wall			
		Mix Box and Angle Filter	Mix Box Only	Angle Filter Only	Mix Box and Angle Filter	Mix Box Only	Angle Filter Only	
12	6 1/4	56	48	38	72	64	54	
18	6 1/4	59	51	41	77	69	59	
24	6 1/4	66	57	43	84	75	61	
36	6 1/4	80	67	55	104	91	79	
54	5	102	89	56	126	113	80	
72	5	116	99	69	146	129	99	
90	5	140	122	76	175	157	111	
120	5	155	133	90	196	175	131	

**Notes:**

1. A and B dimensions do not include damper flanges.
2. All weights and dimensions are nominal.

<sup>(a)</sup> Add 6-inch to height for size 72-120 BCVE units with legs. Legs are required for seismic installations.

## Bottom/Top Access Filter Box

**Figure 25. Bottom/top access filter box**




## Dimensions and Weights

**Table 19. Bottom/top access filter box dimensions (inches) and weights (lb)**

Unit Size	Unit Type	H	W	L	A	B	C	SW Weight	DW Weight
12	BCHE	17	24	8 1/8	15	18	19 7/8	15	22
18	BCHE	17	28	8 1/8	15	22	23 7/8	17	24
24	BCHE	17	30	8 1/8	15	24	25 7/8	17	25
36	BCHE	17	42	8 1/8	15	36	37 7/8	23	32
54	BCHE	18	46	8 1/8	16	40	41 7/8	25	35
72	BCHE/BCVE	18	58	8 1/8	16	52	53 7/8	30	43
90	BCHE/BCVE	26	48	8 1/8	24	42	43 7/8	29	41
120	BCHE/BCVE	26	58	8 1/8	24	52	53 7/8	33	46

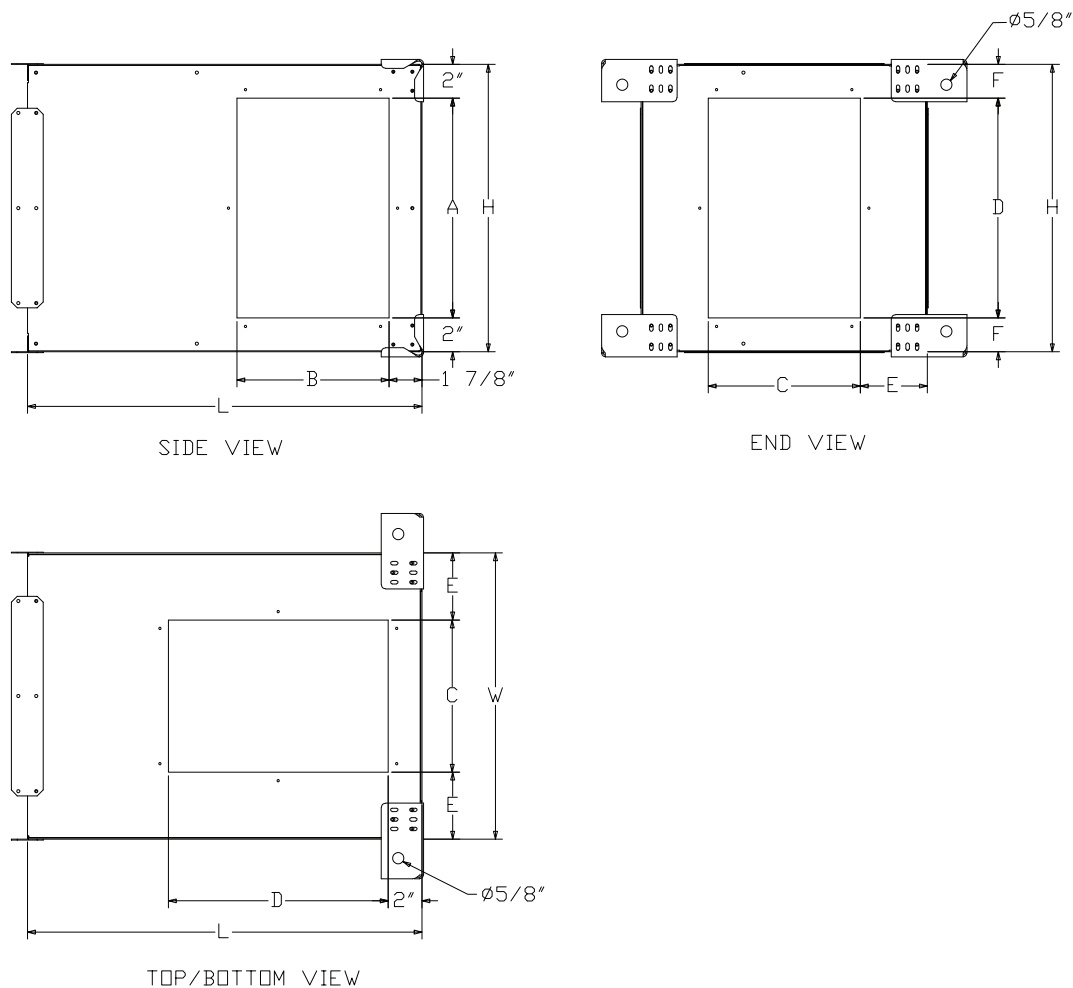
**Notes:**

1. Out swing hinged door on bottom of unit.
2. Single Wall (SW), Double Wall (DW). Dimensions are the same for SW and DW units.
3. All weights and dimensions are nominal.

## Return and Discharge Attenuators

**Figure 26. BCHE 12 to 120 and BCVE 72 to 120 attenuator**

BCHE 12 to 120 and BCVE 72 to 120 attenuator





**Table 20. BCHE 12 to 120 and BCVE 72 to 120 return attenuator dimensions (inches) and weights (lb)**

Unit Size	H <sup>(a)</sup>	L	W	A	B	C	D	E	F	Weight
12	17	14	24	13	9	13	9	5 1/2	4	26
18	17	14	28	13	9	13	9	7 1/2	4	28
24	17	14	30	13	9	13	9	8 1/2	4	29
36	17	19	42	13	14	14	13	14	2	42
54	18	25	46	14	20	20	14	13	2	54
72	18	31	58	14	26	26	14	16	2	73
90	26	25	48	22	20	22	20	13	3	65
120	26	31	58	22	26	26	22	16	2	84

**Note:** All weights and dimensions are nominal.

<sup>(a)</sup> Add 6-inch to height for size 72-120 BCVE units with legs. Legs are required for seismic installations.

**Table 21. BCHE 12 to 120 and BCVE 72 to 120 discharge attenuator dimensions (inches) and weights (lb)**

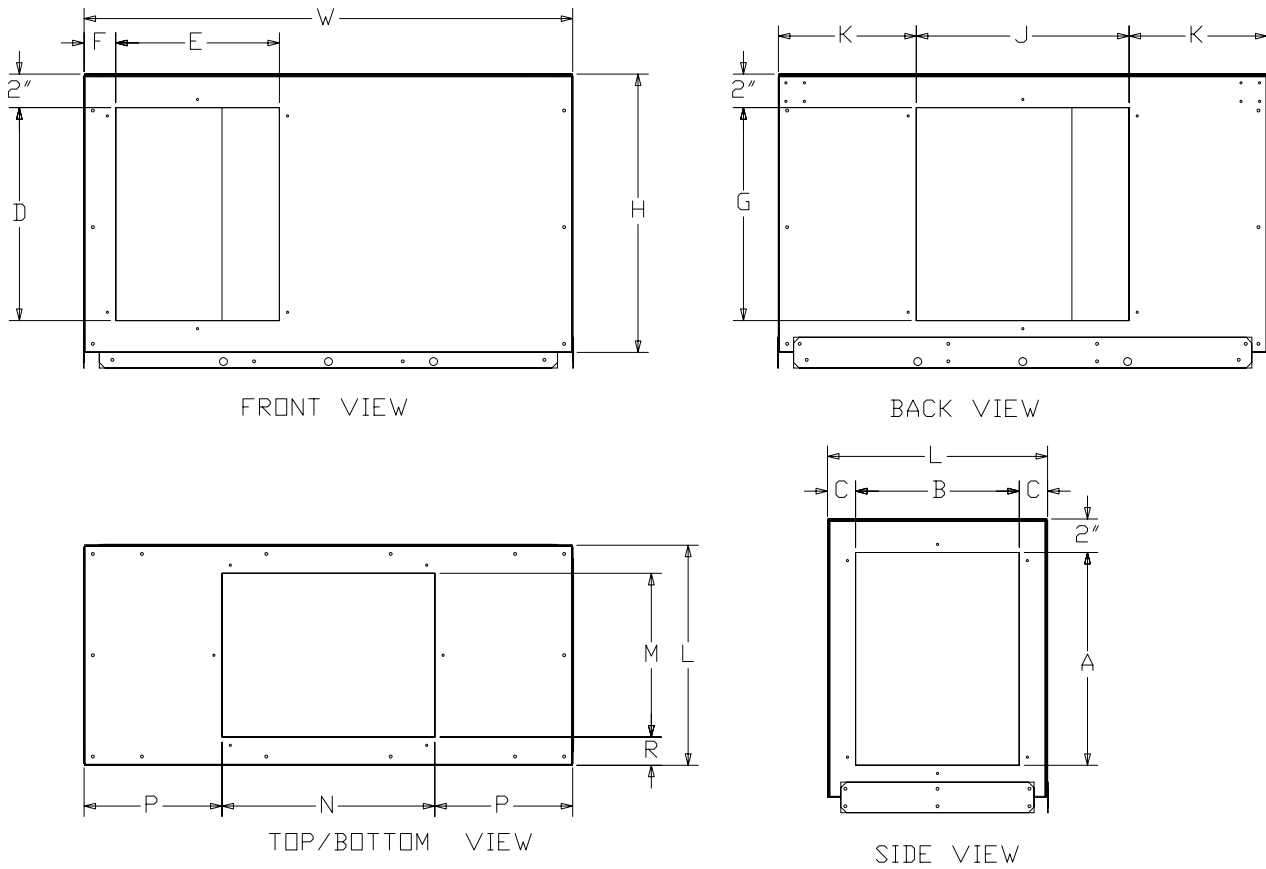
Unit Size	H <sup>(a)</sup>	L	W	A	B	C	D	E	F	Weight
12	17	23 1/4	16 7/8	13	9	13	9	1.9	4	29
18	17	23 1/4	20 7/8	13	9	13	9	3.9	4	31
24	17	23 1/4	20 3/4	13	9	13	9	3 7/8	4	31
36	17	28 1/4	30 3/4	13	14	14	13	8 3/8	2	44
54	18	34 1/4	34 3/4	14	20	20	14	7 3/8	2	60
72	18	40 1/4	46 3/4	14	26	26	14	10 3/8	2	81
90	26	34 1/4	36 3/4	22	20	22	20	7 3/8	3	72
120	26	40 1/4	46 3/4	22	26	26	22	10 3/8	2	93

**Note:** All weights and dimensions are nominal.

<sup>(a)</sup> Add 6-inch to height for size 72-120 BCVE units with legs. Legs are required for seismic installations.

## Dimensions and Weights

**Figure 27. BCVE 24 to 60 attenuator**



**Table 22. BCVE 24 to 60 return attenuator dimensions (inches) and weights (lb)**

Unit Size	H	L	W	A	B	C	D	E	F	G	J	K	M	N	P	R	Weight
24	17	19 3/8	29 3/4	13	13	3 1/4	13	13	8 3/8	13	13	8 3/8	13	13	8 3/8	3 1/4	30
36	17	22 7/8	29 3/4	13	13	5	13	13	8 3/8	13	13	8 3/8	13	13	8 3/8	5	32
48	20	24 3/8	34 3/4	16	18	3 1/4	16	18	8 3/8	16	18	8 3/8	16	18	8 3/8	4 1/4	42
60	20	27 3/8	34 3/4	16	18	4 3/4	16	18	8 3/8	16	18	8 3/8	16	18	8 3/8	5 3/4	43

**Note:** All weights and dimensions are nominal.

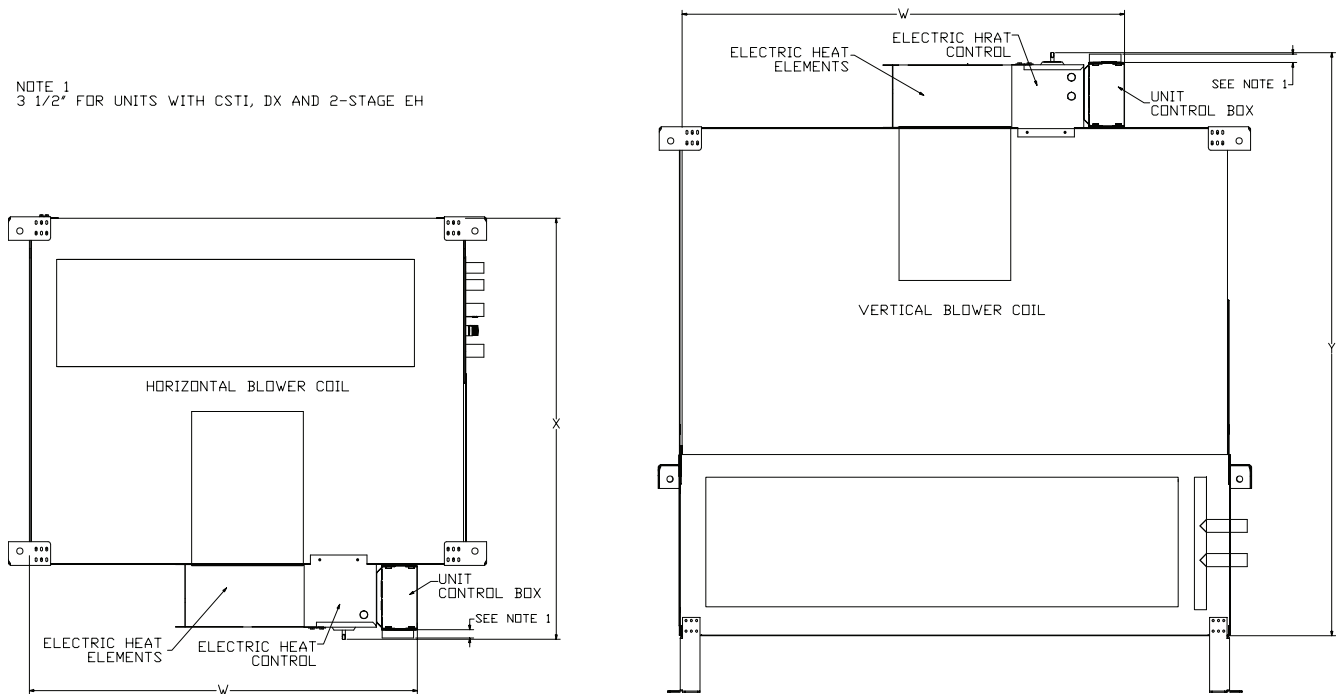
**Table 23. BCVE 24 to 60 discharge attenuator dimensions (inches) and weights (lb)**

Unit Size	H	L	W	A	B	C	D	E	F	G	J	K	M	N	P	R	Weight
24	17	13 3/8	29 3/4	13	10	1 3/4	13	10	1 7/8	13	13	8 3/8	10	13	8 3/8	1 3/4	26
36	17	16 7/8	29 3/4	13	13	2	13	10	1 7/8	13	13	8 3/8	13	13	8 3/8	2	29
48	20	18 3/8	34 3/4	16	15	1 3/4	16	15	1 7/8	16	18	8 3/8	15	16	9 3/8	1 3/4	37
60	20	21 3/8	34 3/4	16	18	1 3/4	16	15	1 7/8	16	18	8 3/8	18	16	9 3/8	1 3/4	40

**Note:** All weights and dimensions are nominal.

## Electric Heat

**Figure 28. BCHE/BCVE Blower Coils with electric heat section**



**Table 24. BCHE/BCVE Blower Coils with electric heat section dimensions (inches)**

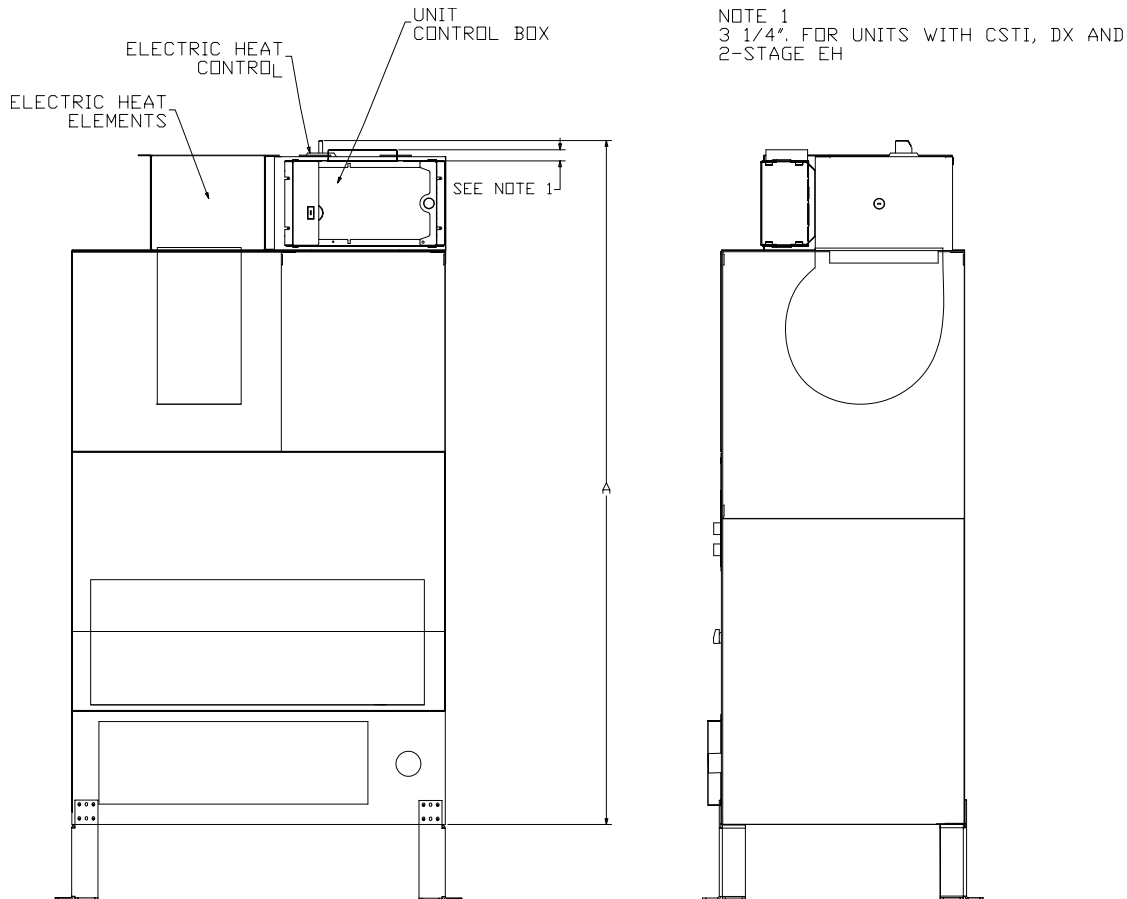
Unit Size	W	X	Y
12	28	38 1/4	N/A
18	32	38 1/4	N/A
24	33	38 1/4	N/A
36	44 1/8	42 1/4	N/A
54	41	45	N/A
72	47	44	62
90	48 1/4	48 7/8	74 7/8
120	54 3/4	48 7/8	74 7/8

**Notes:**

1. All weights and dimensions are nominal.
2. The minimum clearance from the appliance to combustible surfaces is 0 inches.

## Dimensions and Weights

**Figure 29. BCVE 24 to 60 Blower Coil with electric heat section**



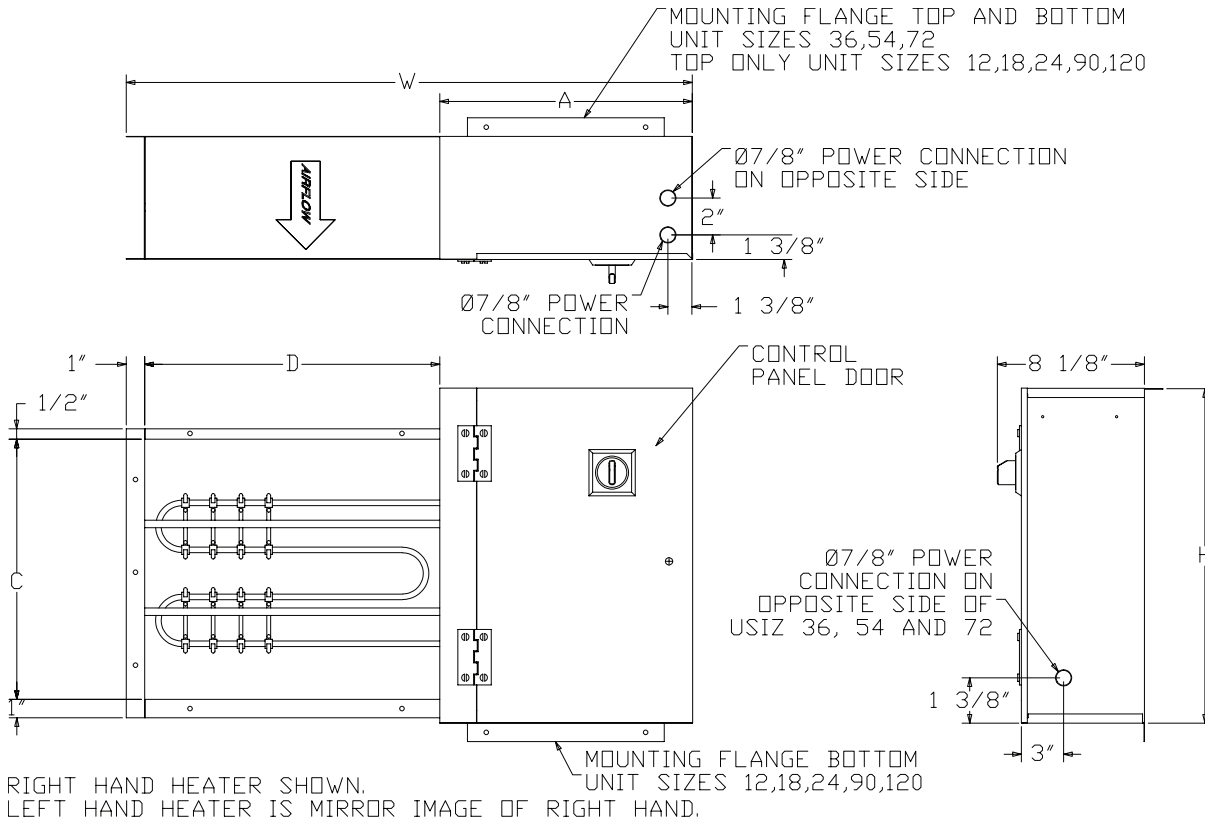
**Table 25. BCVE 24 to 60 Blower Coils with electric heat section dimensions (inches)**

Unit size	A
24	55
36	59
48	65 3/4
60	67 3/4

**Notes:**

1. All dimensions are nominal.
2. The minimum clearance from the appliance to combustible surfaces is 0 inches.

**Figure 30. Electric heat section for BCHE/BCVE**



**Table 26. Electric heat section for size BCHE 12 to 120 and BCVE 72 to 120 dimensions (inches) and weights (lb)**

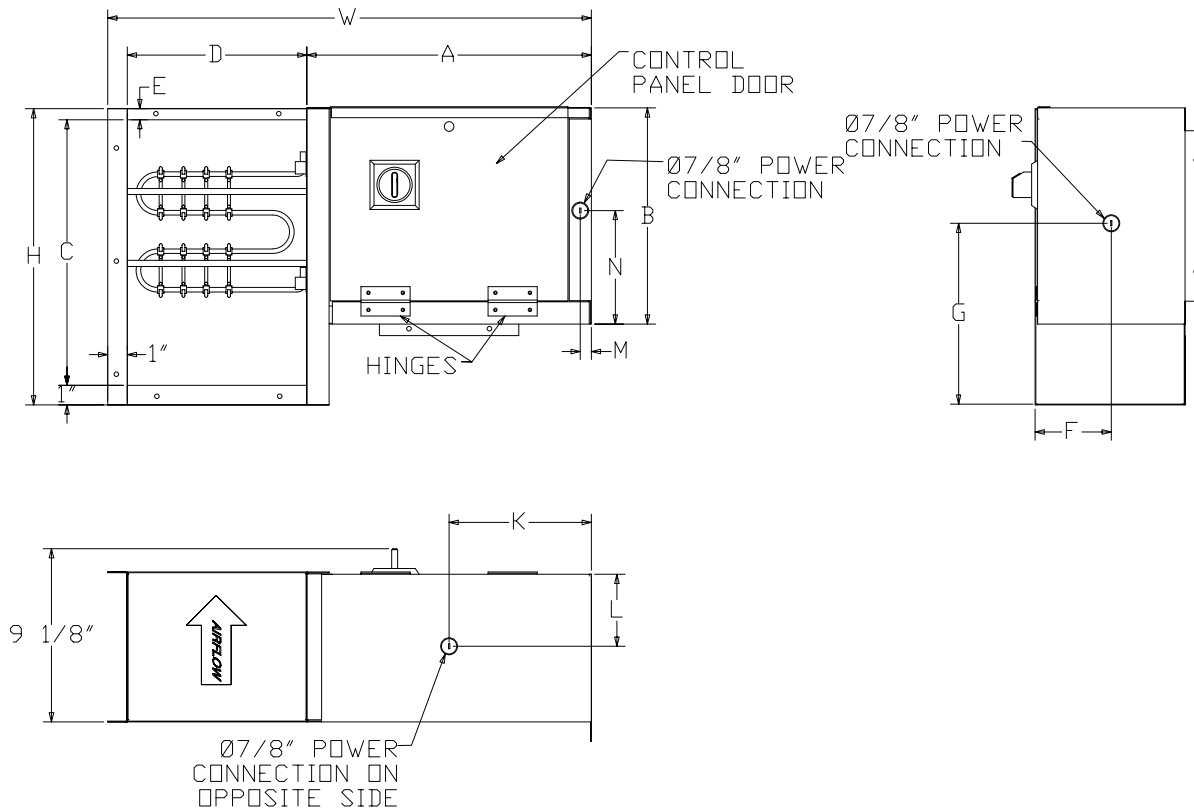
Unit Size	W	H	A	C	D	Min Weight	Max Weight
12	17 7/8	14 1/8	8 1/8	10 1/2	8 3/4	14	23
18	19 7/8	14 1/8	10 1/8	10 1/2	8 3/4	15	25
24	19 7/8	14 1/8	10 1/8	10 1/2	8 3/4	15	25
36	24 5/8	17 1/8	14 1/2	13 1/2	9 1/8	20	30
54	21 1/4	18 1/8	7 5/8	13 1/2	12 5/8	17	28
72	21 1/4	18 1/8	7 5/8	13 1/2	12 5/8	17	28
90	21 1/4	18 1/8	13 5/8	13 1/2	12 5/8	22	32
120	30 5/8	18 1/8	13 5/8	14	16	23	34

**Notes:**

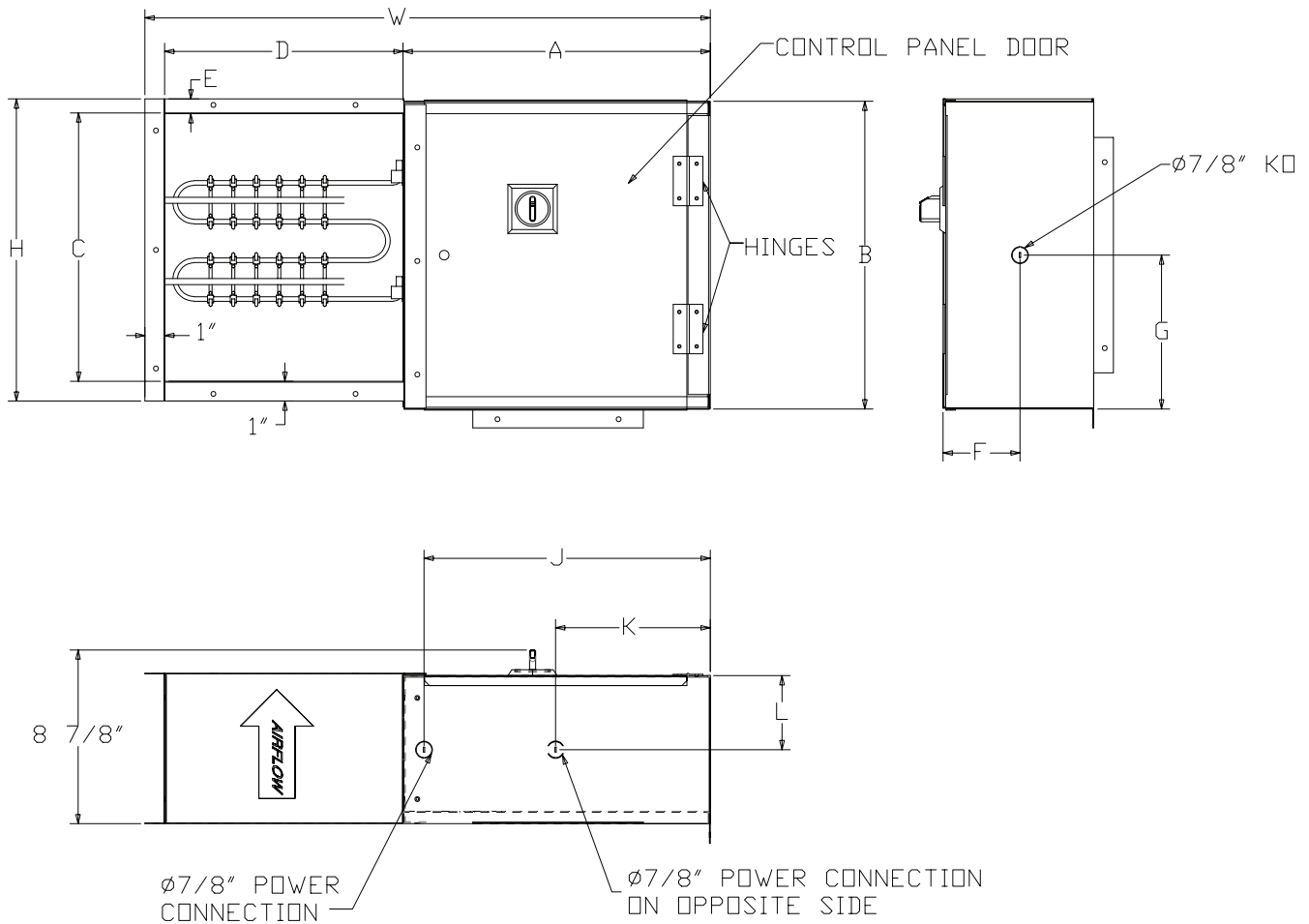
1. Electric heater is factory mounted on unit discharge face and wired to unit control box.
2. Heater may be mounted with horizontal or vertical up airflow.
3. Electric heat may need field-supplied externally-wrapped insulation if the unit is installed in an unconditioned space or if sweating is an issue.
4. All weights and dimensions are nominal.

## Dimensions and Weights

**Figure 31. Electric heat section for BCVE size 24 to 36**



**Figure 32. Electric heat section for BCVE size 48 to 60**



**Table 27. Electric heat section for size BCVE 24 to 60 dimensions (inches) and weights (lb)**

Unit Size	W	H	A	B	C	D	E	F
24	24 5/8	15 1/8	14 1/2	11	13 1/2	9 1/8	5/8	3 7/8
26	24 5/8	15 1/8	14 1/2	13 1/2	13 1/2	9 1/8	5/8	4 1/4
48	28 3/4	15 1/4	15 1/2	15 5/8	13 1/2	12 1/8	3/4	3 7/8
60	28 3/4	18 1/2	15 1/2	18 1/2	13 1/2	12 1/8	7/8	3 7/8
Unit Size	G	J	K	L	M	N	Min Weight	Max Weight
24	9 1/4	N/A	7 1/4	3 5/8	1/2	5 3/4	18	28
26	8	N/A	7 3/4	3 3/4	5/8	7 1/8	19	29
48	7 3/8	14 1/2	7 7/8	3 3/4	N/A	N/A	23	33
60	9 1/4	14 3/8	7 3/4	3 7/8	N/A	N/A	25	35

**Notes:**

1. Electric heater is factory mounted on unit discharge face and wired to unit control box.
2. Electric heat may need field-supplied externally-wrapped insulation if the unit is installed in an unconditioned space or if sweating is an issue.
3. All weights and dimensions are nominal.



## Dimensions and Weights

### Coil Connections

**Table 28. BCHE hydronic coil connection sizes, OD (inches)**

Unit Size	1-Row	2-Row	4-Row	6-Row	8-Row
12	5/8	5/8	3/4	3/4	3/4
18	5/8	5/8	3/4	3/4	1-1/8
24	3/4	7/8	7/8	7/8	7/8
36	3/4	3/4	7/8	1-3/8	1-3/8
54	1-1/8	1-1/8	1-3/8	1-3/8	1-3/8
72	1-1/8	1-3/8	1-3/8	1-3/8	1-3/8
90	1-1/8	1-3/8	1-5/8	1-5/8	1-5/8
120	1-1/8	1-3/8	1-5/8	1-5/8	1-5/8

**Table 29. BCVE hydronic coil connection sizes, OD (inches)**

Unit Size	1-Row	2-Row	4-Row	6-Row	8-Row
24	7/8	7/8	1-1/8	1-1/8	-
36	7/8	7/8	1-1/8	1-1/8	-
48	7/8	7/8	1-3/8	1-3/8	-
60	7/8	7/8	1-3/8	1-3/8	-
72	1-1/8	1-3/8	1-3/8	1-3/8	1-3/8
90	1-1/8	1-3/8	1-5/8	1-5/8	1-5/8
120	1-1/8	1-3/8	1-5/8	1-5/8	1-5/8

**Table 30. BCHE DX coil connection sizes, OD (inches)**

Unit Size	3-Row		4-Row		6-Row	
	Suction	Liquid	Suction	Liquid	Suction	Liquid
12	5/8	5/8	5/8	5/8	5/8	5/8
18	5/8	5/8	5/8	5/8	5/8	5/8
24	5/8	5/8	5/8	5/8	7/8	7/8
36	7/8	5/8	7/8	7/8	7/8	7/8
54	1-1/8	7/8	1-1/8	7/8	1-1/8	5/8
72	1-1/8	7/8	1-1/8	7/8	1-3/8	7/8
90	1-3/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8
120	1-3/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8

**Table 31. BCVE DX coil connection sizes, OD (inches)**

Unit Size	3-Row		4-Row		6-Row	
	Suction	Liquid	Suction	Liquid	Suction	Liquid
24	7/8	5/8	7/8	5/8	7/8	5/8
36	7/8	5/8	7/8	5/8	7/8	5/8
48	1-1/8	7/8	1-1/8	7/8	1-1/8	7/8
60	1-1/8	7/8	1-1/8	7/8	1-1/8	7/8
72	1-1/8	7/8	1-1/8	7/8	1-3/8	7/8



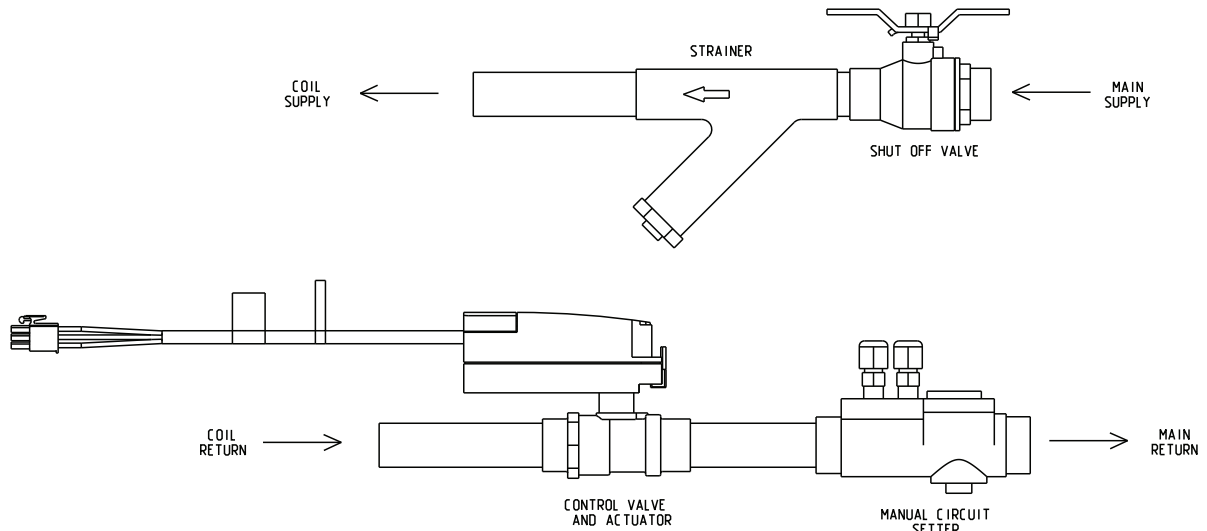
**Table 31. BCVE DX coil connection sizes, OD (inches) (continued)**

Unit Size	3-Row		4-Row		6-Row	
	Suction	Liquid	Suction	Liquid	Suction	Liquid
90	1-3/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8
120	1-3/8	1-1/8	1-3/8	1-1/8	1-3/8	1-1/8

## Sample Piping Schematics

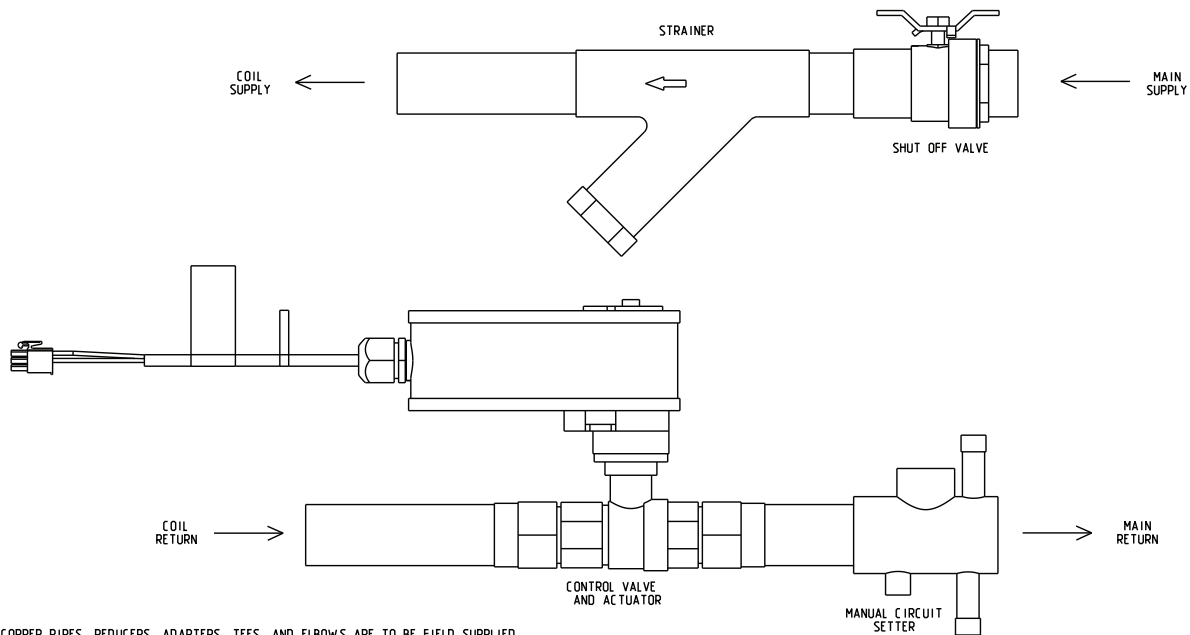
*Note: Parts are representative and may slightly change based on vendor components.*

**Figure 33. 2 way valve 2.3, 3.3, and 4.6 CV**



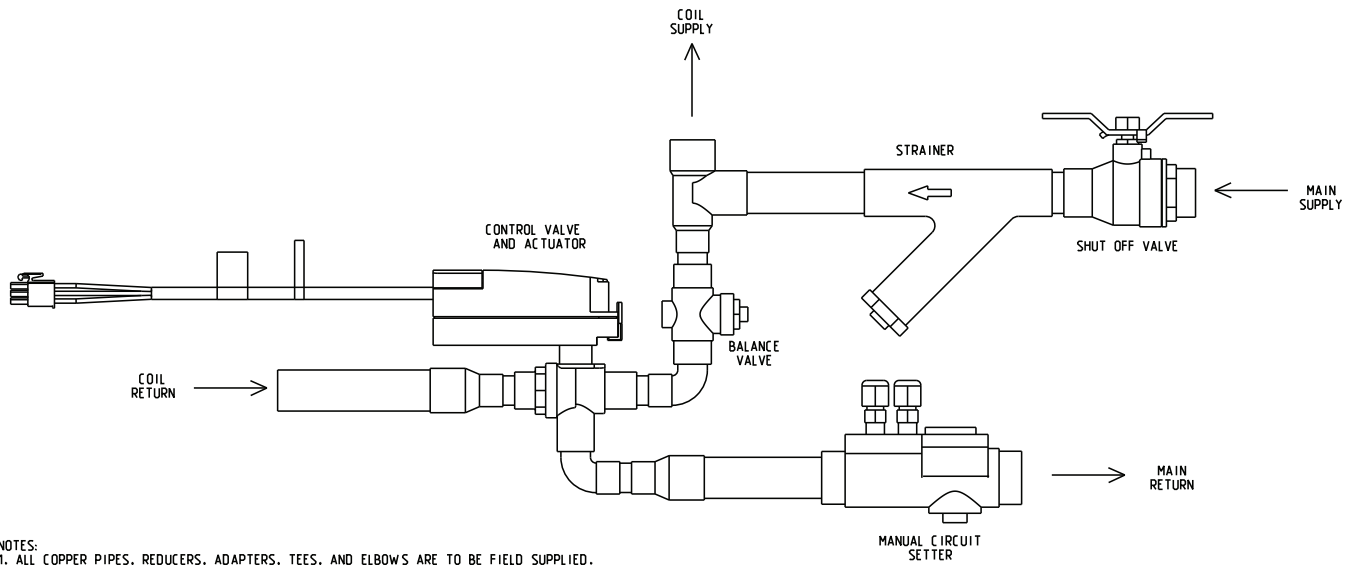
NOTES:  
 1. ALL COPPER PIPES, REDUCERS, ADAPTERS, TEES, AND ELBOWS ARE TO BE FIELD SUPPLIED.  
 2. REMOVE ACTUATOR BEFORE SOLDERING PIPES.

**Figure 34. 2 way valve 7.4 and 10.0 CV**

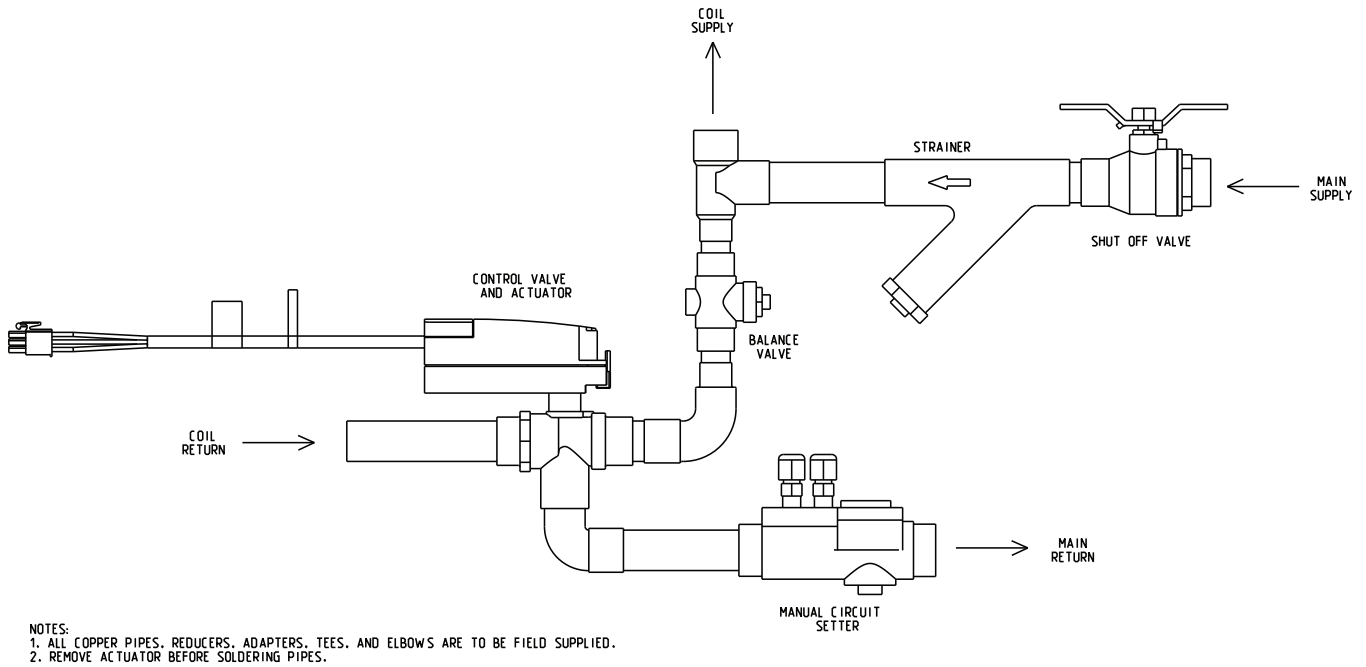


NOTES:  
 1. ALL COPPER PIPES, REDUCERS, ADAPTERS, TEES, AND ELBOWS ARE TO BE FIELD SUPPLIED.

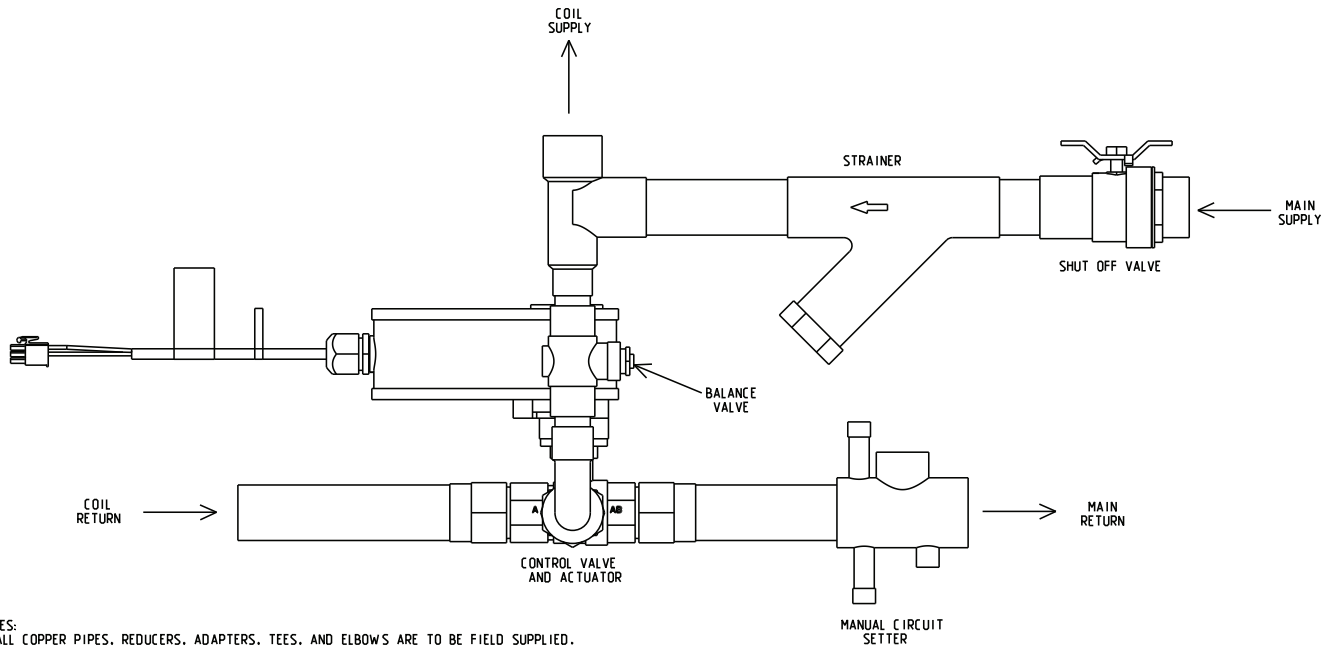
**Figure 35. 3 way valve 1.0 and 2.7 CV**



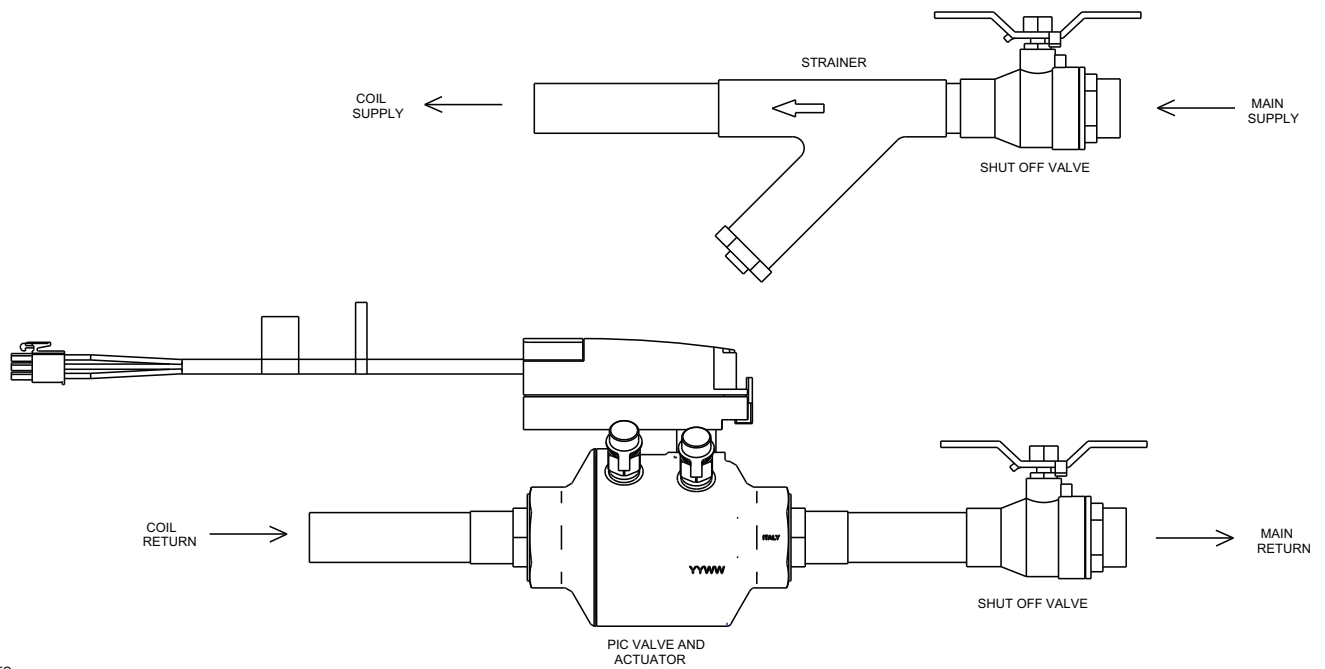
**Figure 36. 3 way valve 4.6 CV**



**Figure 37. 3 way valve 7.4 and 10.0 CV**



**Figure 38. 2-way PIQCV valve**





# Mechanical Specifications

## General

The product line consists of horizontal and vertical air handling units and mixing boxes. Units are tested and certified with AHRI 430 and tested in accordance with AHRI 260. The unit is UL listed to U.S. and Canadian safety standards.

Air handlers consist of a hydronic and/or DX coil, drain pan, and centrifugal fan with motor mounted in a common cabinet. Coil connections are independent for the same or opposite side location.

Horizontal air handlers are provided with knockouts in all four corners for installing the unit suspended from the ceiling with threaded rods.

Unit and accessories are insulated with 1-inch, 1-1/2 lb/ft<sup>3</sup> density fiberglass insulation. One-inch matte-faced and one-inch double wall insulation are also available.

Large motor access panels are provided on both sides of the unit and accessories for vertical models BCVE 72-120, and one side of horizontal model BCHE. Vertical models BCVE size 72-120 ship in two pieces.

## Casings

Casings (structural components) are constructed of heavy-gauge galvanized steel, insulated with one-inch, 1-1/2 lb density fiberglass fire resistant and odorless glass fiber material to provide thermal and acoustical insulation. Fan housing sides are directly attached to the air handler top and bottom panels strengthening the entire unit assembly. Coil access panels are located on the sides of BCHE/BCVE size 72-120 air handlers and allow easy removal of the internal coils and drain pan. Coil access is located on the front of the BCVE size 24-60 model. Main access panels provide generous access to the fan and motor from the side of the BCHE/BCVE size 72-120 air handler, and the front of the BCVE size 24-60 unit.

## Coils

### Hydronic Coils

Cooling coils are four-, six-, or eight-row chilled water. Heating coils are one- or two-row hot water. Heating coils are available factory-installed in the preheat or reheat position. All hydronic coils are 12 fins per inch, with 0.012 inch wall thickness. All hydronic coils use highly efficient aluminum fins, mechanically bonded to seamless copper tubes. All coils are specifically designed and circuited for water use. All coils are factory tested with 450 psi air under water. Maximum standard operating conditions are: 300 psig, 200°F. Sweat type connections are standard.

### Direct Expansion (DX) Coils

DX coils use refrigerant 454B, have 3/8-inch OD internally grooved, round seamless copper tubes expanded into full fin collars for permanent fin-tube bond. Three-, four-, and six-row DX coils use highly efficient aluminum fins mechanically bonded to stainless copper tubes with 12 fins per inch fin spacing.

The DX and Hydronic coils have 18-gauge top and bottom channels, and 16-gauge end supports. A foam sealing strip between the casing (top and bottom) channels and fins helps eliminate air bypass and reduce potential water carryover. Coils have round, seamless, copper pipe liquid lines and suction headers with sweat connections. Suction headers have bottom connections to aid drainage of any oil that may collect in the coil. Liquid line and suction connections are outside the unit casing (on the same side of the unit) to facilitate field piping. Connections are clearly labeled to ensure coils are piped correctly. Coils have a venturi-type distributor assembly designed with a vertical downflow feed for low pressure drops.

Coils are proof tested at 715 psig and leak tested at 650 psig air-under-water. Coils are dehydrated and sealed with a dry air charge. Maximum standard operating conditions are 650 psig at 127°F with R-454B.

## Leak Detection Sensors

Unit shall be furnished with a leak detection system from the factory when a circuit refrigerant charge exceeds 3.91 lbs. The leak detection system shall consist of one or more refrigerant detection sensors. When the system detects a leak, the unit controller shall initiate mitigation actions.

**Note:** *If factory installed controls are not selected, leak detection sequence of operation must be programmed by controls contractor for all field-installed controls. See UL 60335–2–40 for more information.*

## Fan

The fans are DWDI (double width double inlet) forward curved centrifugal blower type. The fans are direct drive mounted directly to the motor shaft. All fans are dynamically balanced. All air handlers have a single fan.

## EC Motors

A 50/60 Hertz, variable speed, multiple voltage EC motor has a plus or minus 10 percent voltage utilization range. The motor is open type with permanently sealed ball bearings, internal overload protection, and uses a radial mount. The motor is factory installed, programmed, and wired to the air handler control panel.

All motors are brushless DC (BLDC)/electronically commutated motors (ECM) factory programmed and run-tested in assembled units. The motor controller is mounted in a touch-safe control box with a built-in integrated user interface and LED tachometer. If adjustments are needed, motor parameters can be adjusted through momentary contact switches on the motor control board accessible without factory service personnel.

Motors will soft-ramp between speeds to lessen the acoustics due to sudden speed changes. Motors can be operated at single speed, three speeds or with single zone VAV control. The motor will choose the highest speed if there are simultaneous/conflicting speed requests.

All motors have integral thermal overload protection and are permanently lubricated. BCHE/BCVE single-phase motors have a maximum ambient operating temperature of 104°F and three-phase motors have a maximum ambient operating temperature of 130°F. Motors are capable of operating at 90 percent of rated voltage on all speed settings. Motors can operate up to 10 percent over voltage.

## Drain Pan

The drain pan is noncorrosive and double-sloped to allow condensate drainage. The drain pan construction is polymer or optional stainless steel. Coils mount above the drain pan—not in the drain pan—thus allowing the drain pan to be fully inspected and cleaned. The drain pan can also be removed for cleaning. The polymer drain pan connections are unthreaded 3/4-inch schedule 40 PVC for solvent bonding. The stainless steel drain pan connection is 3/4-inch NPT schedule 40 stainless steel pipe. The main drain connection is at the lowest point of the drain pan. An auxiliary drain connection is provided on the same side as the main connection for BCHE and BCVE 72-120. BCVE size 24-60 utilizes a rubber hose for an internal trap. A 3/4-inch schedule 40 PVC can connect to the internal trap with the provided hose clamp.

## Filters

One-inch standard efficiency throwaway, two-inch MERV 8, and two-inch MERV 13 are available on all Blower Coil units. Units have a standard flat filter rack that is sized for less than 600 feet per minute at nominal airflow. An optional angle filter rack is available; this is sized for less than 300 feet per minute at nominal airflow. All units and filter racks use standard filter sizes.

## Mixing Box

Mixing boxes are constructed of galvanized steel and can be ordered with single or double wall panels. They have two low-leak parallel blade dampers that are factory-linked together. Mixing boxes also include two side access panels as standard to provide access to filters and the damper actuator.



### Electric Heater

The heater is a UL recognized resistance open-wire heater with disc-type automatic and manual reset-type thermal safety devices. The electric heater is factory-mounted and an air handler with this heater is a UL/CUL product. One stage, two stage, or SCR modulating control options are available. A single-point power connection to the unit is provided. Optional heater fuses, and a heater door interlocking disconnect switch are available.

### Controls

Controls options are CSTI and Symbio™ 400-B. A variety of inputs and outputs are available for the CSTI and Tracer controller options. A disconnect switch (for nonelectric heat units), fused transformer, contactor(s), and terminal strip are provided with the control interface and Tracer controller options

#### Customer Supplied Terminal Interface (CSTI)

The control interface is intended to be used with a field-supplied, low-voltage thermostat or controller. The control box contains a line voltage to 24-volt transformer and a disconnect switch on non-electric heat units.

#### Symbio™ 400-B

The Symbio 400-B controller delivers single zone VAV control in a stand-alone application or as part of a building automation system with BACnet® communication. The Symbio 400-B ships with unit of measure over BACnet link in SI units. When a BAS system is unable to convert to other desired units a free software tool is available for changing to other unit of measure. The Symbio 400-B offers the combined advantages of a factory mounted, wired and programmed controller for dependable out-of-the box operation. Standard control features include options normally available on more elaborate control systems. All control options are available factory programmed with additional configuration and programming in the field using a service tool.

#### Air-Fi® Wireless Comm Interface (WCI)

The Wireless Communications Interface (WCI) enables wireless communications between system controls, unit controls, and wireless sensors for Air-Fi control products that use the BACnet protocol. The WCI replaces the need for communications wire in all system applications.

### Valve Kits

Control valves are included in all factory valve kits. Kits do not include interconnecting copper tubing. Kits come in a variety of control valve options:

- Two- or Three-way
- 1/2-in, 3/4-in, 1-in, or 1 1/4-in.
- Two-position or Modulating Control
- Pressure Independent Control (PIC)

#### Two Position Control Valves

Two position control valves are ball valve design with zero leakage. The ball valve incorporates self-cleaning technology to provide superior clog resistance. The actuator is easily removable for service without removing the valve body.

Control valves with a Cv of 2.3 to 4.6 are capacitor discharge return. Valves with a Cv of 7.4 and 10.0 are spring return.

## Modulating Control Valves

Modulating control valves are ball valve design with zero leakage. The ball valve incorporates self cleaning technology to provide superior clog resistance. The actuator is easily removable for service without removing the valve body. The actuator is easily removable for service without removing the valve body. Actuators are fail in place.

Figure 39. Control valve

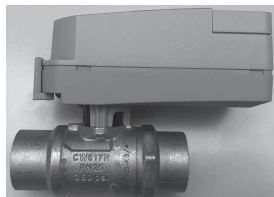


Table 32. Control valve - 2.3-4.6 Cv

Material	Media Temperature	Working Pressure	Differential Pressure	Close off Pressure
Body - Forged Brass Ball - Chrome Plated Brass Stem - Brass Seats - PTFE O-rings - EPDM (lubricated)	36°F Min 200°F Max	360 psig	40 psig	75 psig

Figure 40. Control valve



Table 33. Control valve - 7.4-10.0 Cv

Material	Media Temperature	Working Pressure	Differential Pressure	Close off Pressure
Body - Forged Brass Nickel Plated Ball - Stainless Steel Stem - Stainless Steel Seats - PTFE O-rings - EPDM (lubricated) Characterizing Disk - Tefzel®	0°F Min 250°F Max	600 psig	50 psig	200psig

Figure 41. PIC valve



Table 34. PIC valve

Material	Media Temperature	Working Pressure	Differential Pressure	Close off Pressure
Body - Forged Brass Ball - Stainless steel Stem - Stainless Steel Stem packing - EPDM (Lubricated) Seats - TEFLON® PTFE O-rings - PTFE Seat O-rings - EPDM Spring - Stainless steel	36°F Min 200°F Max	360 psig	5-50 psig	200 psig

## End Valves

Each valve kit includes a ball valve for the entering water pipe and one of the following end valves on the leaving water pipe: ball valve or manual circuit setter.

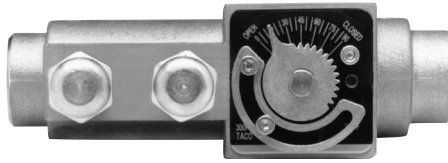
### Ball Valve

The ball valve is manual shutoff with a maximum working pressure of 600 psig. The valve handle rotates 90° to a fully open position.

### Manual Circuit Setter

The manual circuit setter acts as both a flow setting device and a stop valve. The manual circuit setter includes 1/4-in. Schrader ports in the valve body to measure pressure drop across the valve. The working pressure of the valve is 300 psig with a maximum water temperature of 250° F.

**Figure 42. Manual circuit setter**



## **Strainer**

The strainer is provided with a plug to access the basket. The strainer contains a 20 mesh screen with a working pressure of 300 psig and a maximum water temperature of 210° F.

## **Bypass Balance Valve**

All three-way control valve packages include a balance fitting in the bypass line to allow flow balancing in the bypass position. The balance valve incorporates both a brass gland screw and stem for manual flow adjustment. The working pressure of this valve is 400 psig.







## Notes

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