Engineered Comfort

VERTICAL HI-RISE

Engineered Comfort

Model Series 39VH & 39L

Features and Benefits

Engineered Comfort fan coil units are the only true commercial quality fan coil units available today. They are also the most versatile units on the market, because Engineered Comfort offers the largest list of options and features.

- Variable Air Volume Cooling and Heating with ECM / EPIC Fan Technology® eliminates noisy 3-speed fans and provides superior room comfort (optional).
- ECM Motor will save 67% of the energy at typical set points (more at others), which gives the owner a major reduction in electrical usage (optional).
- Motor/blower combinations are mounted on special 16 ga. (1.61) angles and isolated from casing with rubber insulators.
- The units are designed for easy installation and, with modular construction, easy repair.
- Units are available with chilled / hot water coils and electric heat.
- All units are certified by AHRI and listed by ETL and display the AHRI and ETL symbols.
- Coil options allow for 3 to 5 row chilled water and 1 or 2 row hot water. 5 rows total in combination.
- The units are shipped completely assembled to reduce field labor cost.
- All units are fully inspected and run tested at the factory to eliminate potential problems at start up.
- Available with stand-alone electronic controls, Digital controls (BacNet compliant) or with factory mounted Digital controls supplied by others.
- Factory supplied controls are tested and calibrated at the factory.
- Custom needs that are job specific can be incorporated into the units
- Ultra-violet light option helps keep the coil clean and reduces re-circulation of microbes which reduces: Allergy Asthma, Upper respiratory ailments, Headaches, Sinus congestion and even Colds and Flu.
- Most models can be configured in a stand alone, master/slave or paired arrangement.

- **Risers (2 and 4 pipe configurations) can be located on the back, left or right side of unit**
- **Commercial Grade Supply Grille(s) are available on the front, left or right side of unit**
- **Quarter turn latches for easy, quick panel removal and access**
- **Removable controls enclosure**
- **Powder coat painted finish resists scuffing and scratching**
- **Slide out blower for easy maintenance**
- **Nailor ECM/EPIC Fan Technology®, ECM Motor with variable air volume (optional)**
- **Stainless steel flex hoses with full port ball valves**
- **UV Light w/safety switch (optional)**
- **Factory mounted control valves and piping packages**
- **Filter rack**
- **Coils are AHRI 410 listed and labeled**
- **Commercial grade return grille**
- **1" (25) Throwaway (default)**
  1" (25) MERV 8 pleated (optional)
- **Insulated galvanized drain pan (Stainless steel available)**

Not Shown:

- Fan access panel
- Electrical knockout
- Rubber condensate P-trap
- Adjustable shroud (optional)
- Condensate pump (optional)
- DDC controller (optional)
- Dust tight controls enclosure (optional)
- Electric heat (optional)
- Freeze thermostat (optional)
- Outside air damper (optional)
- Stainless steel coil casing (optional)
- Sub-base (optional)

1-6-20

Engineered Comfort

Model Series 39VH & 39L

Standard Features

CONSTRUCTION:
- 20 ga. (1.00) G60 galvanized steel casing.
- 1/2" (13) thick, 2 lb/cu. ft. density fiberglass (tough guard) insulation with water repellent facing.
- Integral filter rack with 1" (25) throwaway filter.
- AHRI 440 certified and labeled.

FAN ASSEMBLIES:
- Forward curved, DWDI centrifuged type blowers.
- Single phase, 3-speed tap PSC induction motors with thermal overload protection.
- Quick disconnect motor connections.
- Easily removable slide out fan/motor deck for service.

COILS:
- Cooling – 3 or 4 row chilled water.
- Heating – 1 or 2 row hot water. Reheat position.
- 5 Rows total in combination.
- 1/2" (12.7) O.D. seamless copper tubes.
- 0.016" (0.406) tube wall thickness.
- 0.0045" (0.114) aluminum corrugated fins.
- Easily removable for service.
- Manual air vent(s).
- AHRI 410 certified and labeled.

DRAIN PANS:
- Single wall galvanized steel with fiber-free elastomeric external insulation.
- Positively sloped to drain connection.
- 7/8" (22.2) O.D. drain connection.
- Factory installed P-trap.

FRONT RETURN AIR PANEL:
- High performance louvered blade return air grille.
- Quarter-turn cam lock fasteners.
- Durable baked powder coat Appliance White paint finish.

SUPPLY AIR LOCATION:
- Front, left, right and back supply grille options.
- Top outlet (ducted for remote grilles).
- Aluminum double deflection grille(s).

ELECTRIC HEAT:
- ETL listed as an assembly.
- See separate page for construction details.

ELECTRICAL:
- ETL listed for safety compliance.
- Removable electrical enclosure with hinged access door for controls and electric heat.120, 208, 240 or 277 Volts (60 Hz) power supply.

AHRI CERTIFIED™ www.ahridirectory.org Room Fan-Coils AHRI Standard 440

ETL LISTED C US Intertek

Options and Accessories

CONSTRUCTION:
- 1/2" (13) Steri-liner, 4 lb/cu. ft. density foil backed insulation.
- 1/2" (13) Fiber-free elastomeric closed cell foam insulation.
- 1" (25) MERV 8 pleated filter.
- Manual or motorized outside air damper.
- Custom built sub-base.
- Adjustable ceiling shroud on exposed units.

FAN ASSEMBLIES:
- Ultra-high efficiency ECM fan motor with fuse protection.
- Variable Air Volume control with ECM/EPIC Fan Technology®.

COILS:
- Automatic air vent(s).
- Stainless steel coil casings.
- Increased tube wall thickness 0.025" (0.635).

DRAIN PANS:
- Stainless steel construction with fiber-free elastomeric external insulation.

FRONT RETURN AIR PANEL:
- Full unit height with integral supply grille.
- Custom colors to suit architect.

SUPPLY AIR LOCATION:
- Double or triple outlets.
- Sight and sound baffles for double outlets where required.
- Opposed blade dampers.

ELECTRICAL:
- Fan relay packages.
- Toggle disconnect switch.
- Drain pan overflow float switch.
- Dust tight enclosure
- Sump pump.
- Ultraviolet lights.
- Main fusing.
- Quiet contactors.

CONTROLS:
- Digital VAV sequences.
- 3-speed fan operation with LCD digital display or programmable thermostats.
- Unit or wall mounted thermostats.
- Automatic and manual changeover.

RISERS:
- 2 pipe configuration (cooling only or heat/cool changeover).
- 4 pipe configuration (cooling and heating).
- Type K, L or M copper with swaged connections.
- 3/4" to 3" (19 to 76) diameter.
- 1/2" and 3/4" (13 and 19) closed cell foam insulation.
- Riser extensions.
- Riser chase.
- Factory mounted or shipped in advance.

PIPING PACKAGES:
- Factory assembled and installed.
- Stainless steel flexible hoses with isolation ball valves and memory stop.
- 2-way or 3-way valves.
- 2 position or modulating valve actuators.
- Flow control devices.

Engineered Comfort

Model Series 39VH • High Performance (88" High)

MODELS:

39VHZ Chilled/Hot Water (2-pipe).
39VHZW Chilled & Hot Water (4-pipe).
39VHZE Chilled Water & Electric Heat (2-pipe).
39VHW Hot Water (2-pipe).

TYPES:

C Concealed **E** Exposed **A/B** Paired
M Master **S** Slave

The 39VH Series Vertical Hi-rise Fan Coil Units are designed for quick installation, easy maintenance and a wide range of customer configurations. These units are designed to be "stacked" on each floor of a building, either alone or in pairs This allows for a small, space-saving footprint with one set of risers for supply, return and drain lines. Flexible hoses allow for quick hook-up of water lines. The drain line connects with one ring clamp. Whether units are mounted behind drywall or are free standing in the room, the front panel and supply grille provide easy access to all internal parts. Filters can be replaced in seconds. Most major components are removed by loosening four to six screws or crown nuts. The 39VH family of products is designed to allow literally hundreds of different options involving heating and cooling capacities, air flow, fittings, power needs, fan coil configurations and riser layouts.

STANDARD FEATURES:

- Nine unit sizes ranging from 300 – 2100 CFM (142 – 991 l/s).
- Outer casing constructed of 20 gauge (1.00) galvanized steel.
- Energy efficient three speed PSC motors with thermal overload protection.
- Fully lined with 1/2" (13) x 2 lb. / cu. ft. density water repellent insulation.
- Removable controls enclosure with hinged access door.
- Easy access front panel and front supply grille for quick servicing.
- 1" (25) throwaway filter.
- AW Appliance White powder coat baked enamel finish on supply grille(s) and return air panel.

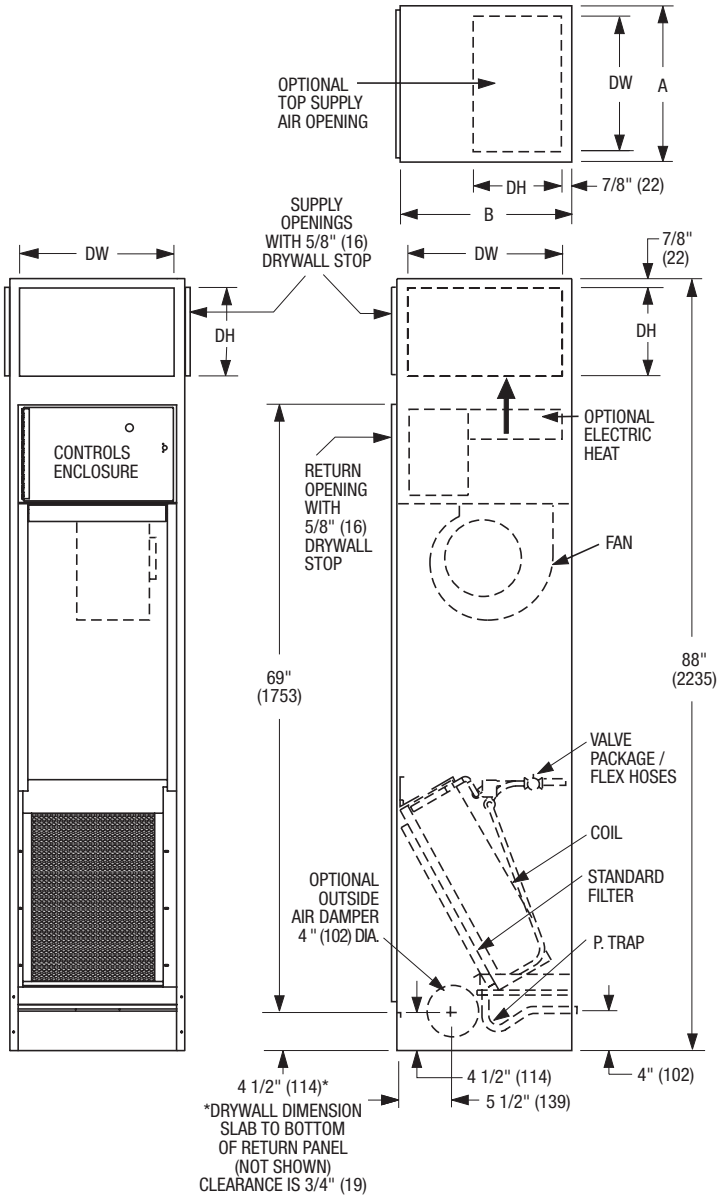
COIL OPTIONS:

2-pipe System:

- 1 Row HW only.
- 2 Row HW only.
- 3 Row C/HW.
- 4 Row C/HW.

4-pipe System:

- 3/1 CW/HW Rows.
- 3/2 CW/HW Rows.
- 4/1 CW/HW Rows.



Dimensional Data

Unit Size	Footprint A x B	Supply Grille Nominal DW x DH	Filter Size Width x Height
3, 5, 6	18 x 18 (457 x 457)	16 x 10 (406 x 254)	13 1/8 x 16 3/4 (333 x 425)
8, 10	20 x 20 (508 x 508)	18 x 10 (457 x 254)	15 1/2 x 24 (394 x 610)
12, 15	24 x 24 (610 x 610)	22 x 10 (559 x 254)	18 1/2 x 29 (470 x 737)
19, 21	30 x 24 (762 x 610)	28 x 10 (711 x 254)	24 1/2 x 29 (622 x 737)

3-SPEED ECM / EPIC ECM MOTOR OPTION:

- 3-Speed ECM Motor: Nine unit sizes ranging from 300 – 2100 CFM (142 – 991 l/s).
- EPIC ECM Motor: Four unit sizes (6, 10, 15, 19) ranging from 600 – 1900 CFM (283 – 897 l/s). Wider turndown ratio.
- Significant energy savings.
- Variable Air Volume capability.

Model Series 39L • Low Profile (80" high)

MODELS:

39LZ Chilled/Hot Water (2-pipe).
39LZW Chilled & Hot Water (4-pipe).
39LZE Chilled Water & Electric Heat (2-pipe).
39LW Hot Water (2-pipe).

TYPES:

C Concealed **M** Master **S** Slave

The 39L Series Low Profile Vertical Hi-Rise Fan Coil Units are 8" (203) shorter than the standard model and are designed for use in buildings with a smaller than normal floor to floor height (e.g. 8 ft.). The reduced height of the unit enables better access to the rear risers for brazing. Other than the reduced height, the 39L Series shares all of the features and benefits of the 39VH Series described on the previous page.

STANDARD FEATURES:

- Nine unit sizes ranging from 300 – 2100 CFM (142 – 991 l/s).
- Outer casing constructed of 20 gauge (1.0) galvanized steel.
- Energy efficient PSC motor with thermal overload protection.
- Fully lined with 1/2" (13) x 2 lb. / cu. ft. density water repellent insulation.
- Removable controls enclosure with hinged access door.
- Easy access front panel and front supply grille for quick servicing.
- 1" (25) throwaway filter.
- AW Appliance White powder coat baked enamel finish on supply grille(s) and return air panel.

COIL OPTIONS:

2-pipe System:

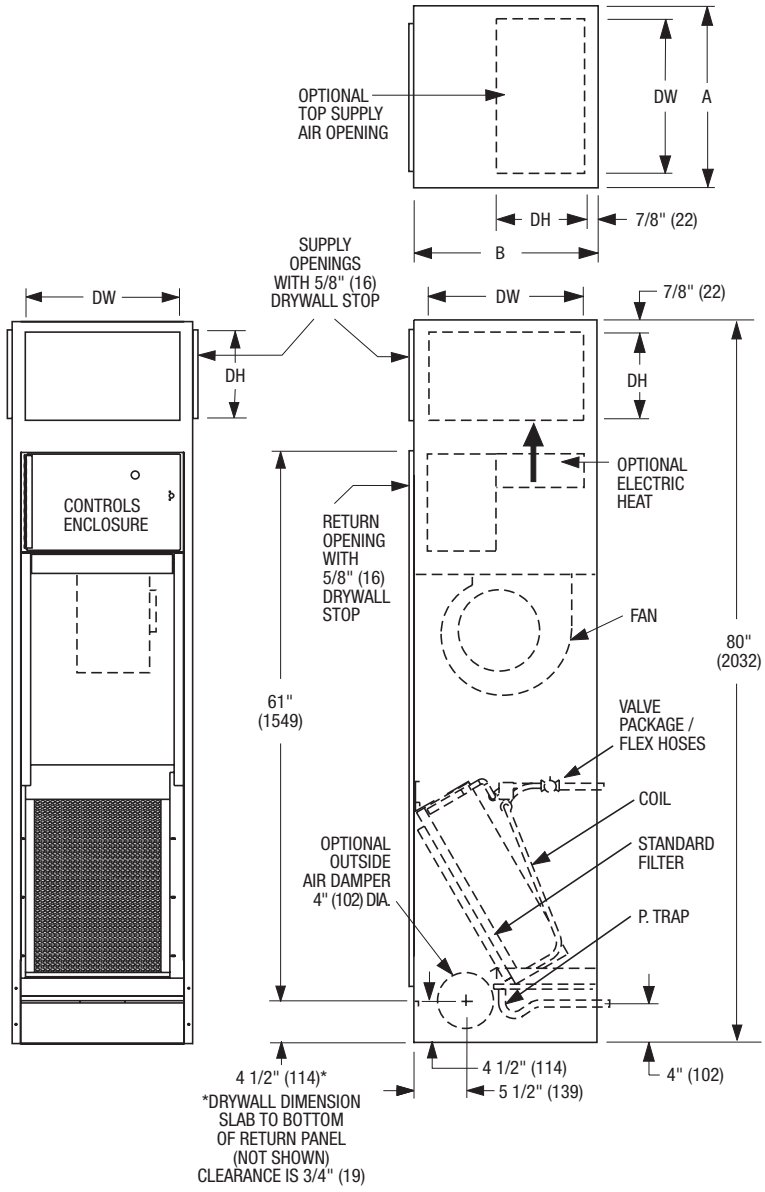
- 1 Row HW only.
- 2 Row HW only.
- 3 Row C/HW.
- 4 Row CW.

4-pipe System:

- 3/1 CW/HW Rows.
- 3/2 CW/HW Rows.
- 4/1 CW/HW Rows.

3-SPEED ECM / EPIC ECM MOTOR OPTION:

- 3-Speed ECM Motor: Nine unit sizes ranging from 300 – 2100 CFM (142 – 991 l/s).
- EPIC ECM Motor: Four unit sizes (6, 10, 15, 19) ranging from 600 – 1900 CFM (283 – 897 l/s).
- Significant energy savings.
- Variable Air Volume capability.



Dimensional Data

Unit Size	Footprint A x B	Supply Grille Nominal DW x DH	Filter Size Width x Height
3, 5, 6	18 x 18 (457 x 457)	16 x 10 (406 x 254)	13 1/8 x 16 3/4 (333 x 425)
8, 10	20 x 20 (508 x 508)	18 x 10 (457 x 254)	15 1/2 x 24 (394 x 610)
12, 15	24 x 24 (610 x 610)	22 x 10 (559 x 254)	18 1/2 x 29 (470 x 737)
19, 21	30 x 24 (762 x 610)	28 x 10 (711 x 254)	24 1/2 x 29 (622 x 737)

Dimensions are in inches (mm).

Engineered Comfort

Model Series 39MU • Low Profile • Updraft Design

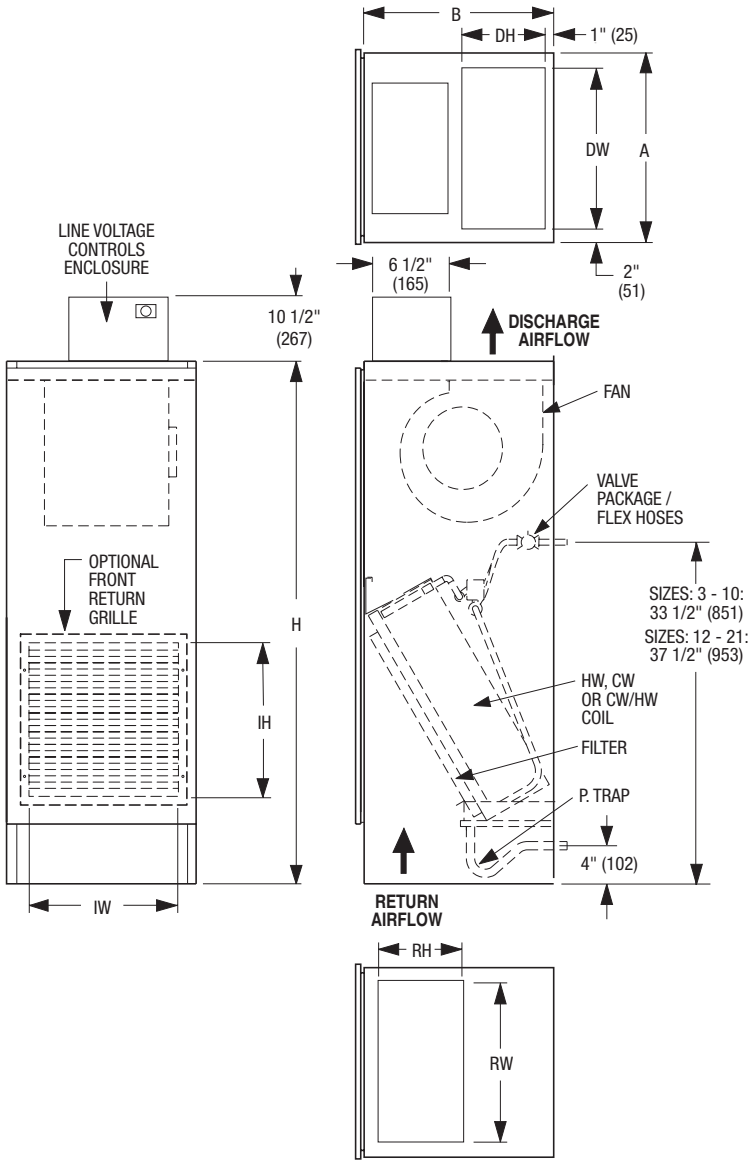
MODELS:

39MUZ Chilled Water.
39MUZW Chilled and Hot Water.
39MUZE Chilled Water and Electric Heat.
39MUW Hot Water (2-pipe).

The 39MU Low Boy Vertical Fan Coil Unit product line is a compact design for concealed stand-alone applications (such as in a closet). The standard Updraft model features bottom return air entry and is raised off the floor by mounting on a platform. When the optional front panel return grille is selected, the unit may be floor mounted or mounted in a pipe chase. The top discharge is designed for ducted connection to a remote grille(s).

The units are designed with a small space-saving footprint for quick installation, easy maintenance and with a wide range of options and configurations. A removable front panel provides easy access to all internal components.

Flexible hoses allow for quick hook-up of water lines. The drain line connects with one ring clamp.



STANDARD FEATURES:

- Nine unit sizes ranging from 300 – 2100 CFM (142 – 991 l/s).
- Outer case constructed of 20 gauge (1.0) galvanized steel.
- Energy efficient PSC motor with thermal overload protection.
- Fully lined with 1/2" (13) thick, 2 lb/cu. ft. density water repellent insulation.
- Controls enclosure with door interlock disconnect for safety.
- Easy access front panel for quick servicing.
- 1" (25) throwaway filter.
- Galvanized steel insulated drain pan.
- Factory installed P-Trap.

COIL OPTIONS:

2-pipe System:
- 1 Row HW only.
- 2 Row HW only.
- 3 Row C/HW.
- 4 Row C/HW.

4-pipe System:
- 3/1 CW/HW Rows.
- 3/2 CW/HW Rows.
- 4/1 CW/HW Rows.

3-SPEED ECM/EPIC ECM MOTOR OPTION:

- 3-Speed ECM Motor: Nine unit sizes ranging from 300 – 2100 CFM (142 – 991 l/s).
- EPIC ECM Motor: Four unit sizes (6, 10, 15, 19) ranging from 600 –1900 CFM (283 – 897 l/s). Wider turndown ratio.
- Significant energy savings.
- Variable Air Volume capability.

Dimensional Data

Unit Size	Footprint A x B	Height H	Discharge Nominal DW x DH	Return Opening RW x RH	Opt. Return Grille Nominal IW x IH	Filter Size Width x Height
3, 5, 6	18 x 18 (457 x 457)	55 (1397)	16 x 10 (406 x 254)	15 x 8 (381 x 203)	16 x 15 (406 x 381)	13 1/8 x 16 3/4 (333 x 425)
8, 10	20 x 20 (508 x 508)	55 (1397)	18 x 10 (457 x 254)	17 x 9 (432 x 229)	18 x 21 (457 x 533)	15 1/2 x 24 (394 x 610)
12, 15	24 x 24 (610 x 610)	60 (1524)	22 x 10 (559 x 254)	21 x 12 (533 x 305)	22 x 26 (559 x 660)	18 1/2 x 29 (470 x 737)
19, 21	30 x 24 (762 x 610)	60 (1524)	28 x 10 (711 x 254)	27 x 12 (686 x 305)	28 x 26 (711 x 660)	24 1/2 x 29 (622 x 737)

Model Series 39MU • Low Profile • Updraft Design

POWER SUPPLY VOLTAGE:

(Units without electric heat)

Single Phase (60 Hz):
- 120, 208, 240 and 277V.

ECM MOTOR:

- Ultra-high efficiency ECM fan motor with fuse protection.
- Variable Air Volume control with ECM/EPIC fan technology®.

OTHER OPTIONS:

- 1" (25) MERV 8 pleated disposable filter.
- Remote mounted thermostat.
- Custom build sub-base.

ELECTRIC HEAT SECTION:

Power Supply Voltage:

Single Phase, 60Hz:
- 120V • 208V • 240V • 277V

NOTE:

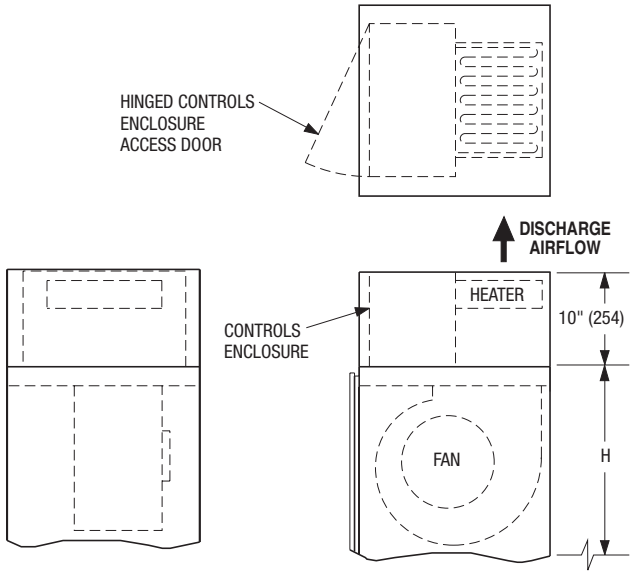
Incompatible heater/motor voltage selections require either a dual point power connection or a step-down transformer (consult Nailor).

STANDARD FEATURES:

- Heater is installed on unit discharge.
- Controls enclosure incorporates a hinged door and is recessed inside the heater unit. The enclosure is top mounted on updraft unit.
- Class A 80/20 Ni/Cr wire.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire fan coil unit.
- Fan interlock relay.
- Fan coil unit with electric heat is ETL Listed as an assembly.
- Door interlock disconnect switch.

OPTIONS:

- Dust tight construction.
- Quiet contactors.
- Mercury contactors.
- Power circuit fusing.
- Toggle disconnect switch.
- Manual reset secondary thermal cut-out.
- Airflow safety switch.



39MU UPDRAFT HEATER SECTION

AHRI CERTIFIED™ www.ahridirectory.org Room Fan-Coils AHRI Standard 440

C ETL US LISTED Intertek

Engineered Comfort

Model Series 39VH & 39L • Electric Heating Coils • Construction Features, Selection and Capacities

Engineered Comfort Electric Coils are tested with the fan coil in accordance with UL Standard 1995 and meet all requirements of the National Electric Code and CSA. Units are listed and labeled by the ETL Testing Laboratory as an assembly. All controls are enclosed in a NEMA 1 electrical enclosure for easy access.

All wiring for the motor and heater terminates in the enclosure for single point electrical connection in the field. Each unit is supplied with a wiring diagram.

Note: NEC requires a means to disconnect the heater power supply within sight of or on the fan coil unit.

Power Supply Voltage:

Single Phase, 60Hz:

• 120V • 208V • 240V • 277V

STANDARD FEATURES:

- Controls enclosure incorporates a hinged door and is recessed inside the unit. To access the controls enclosure remove the front panel.
- Automatic reset high limit thermal cut-outs.
- Magnetic contactors per stage on fan coils with DDC or electronic controls.
- Class A 80/20 Ni/Cr wire.
- Control voltage transformer (Class 2) for DDC and electronic fan coils.

Optional Accessories:

- Toggle disconnect switch
- Main Switch
- Door interlocking disconnect switch
- Drain pan heat switch
- Quiet contactors
- Mercury contactors
- Power circuit fusing
- Dust tight control enclosure
- Manual reset secondary high limit
- Airflow safety switch

Recommended Selection:

The table below is a quick reference guide, to illustrate the relationship between electrical power supply, heater capacity in kilowatts and fan coil unit size that are available.

- Fan coils are available with 1 stage of heat as standard (2 stages of heat are optional with digital controls). A minimum of 0.5 kW per stage is required.
- Voltage and kilowatt ratings are sized so as not to exceed 48 amps, in order to avoid the NEC code requirement for circuit fusing.
- A minimum airflow of 70 CFM (33 l/s) per kW is required for any given fan coil in order to avoid possible nuisance tripping of the thermal cut-outs.
- Discharge air temperature should not exceed 115°F (46°C).

Useful Formulae:

$$kW = \frac{CFM \times \Delta T}{3160}$$

$$\Delta T = \frac{kW \times 3160}{CFM}$$

$$1ph.Amps = \frac{kW \times 1000}{volts}$$

C ETL US LISTED

Intertek

Tested and approved to the following standards:

UL1995, 4th. ed.
CSA C22.2
No. 236-11.

Unit Size	Max.		Electric Heat Maximum Kilowatts			
	CFM	l/s	120V	208V	240V	277V
3	375	177	4	5	5	6.5
5	575	271	4	5	5	6.5
6	730	344	4	5	5	6.5
8	940	444	4	9	9	11.5
10	1100	519	4	9	9	11.5
12	1300	613	4	9	9	11.5
15	1700	802	4	9	9	11.5
19	1950	920	4	9	9	11.5
21	2200	1038	3.5	9	9	11.5

Electric Heating Coils • Application Guidelines

Discharge Air Temperature

When considering the capacity and airflow for the heater, discharge air temperature can be an important factor. Rooms use different types of diffusers, and they are intended to perform different functions. Slots that blend the air at the glass and set up air curtains within the room, must be able to blow the air very low in the room. Hot air will be too buoyant to be effective in this case. Discharge air temperatures for this application should be in the 85 – 90°F (29 – 32°C) maximum range.

Diffusers in the center of the room blend their discharge air as it crosses the ceiling. Discharge air temperatures in this application can be as high as 105°F (41°C) and still be effective. However, if the return air grilles are in the discharge air pattern, the warm air will be returned to the plenum before it heats the room. Again, the air temperature needs to be blended down to an acceptable temperature that can be forced down into the occupied space by the time the air gets to the walls. Discharging warm air into the room at temperatures above 105°F (41°C) usually will set up stratification layers and will not keep the occupants warm if there is a ceiling return because only the top 12" – 24" (300 – 600 mm) of the room will be heated.

The maximum approved discharge air temperature for any Engineered Comfort Fan Coil Units with supplemental heat is 120°F (49°C). No heater should be applied to exceed this temperature.

Electric Heater Selection

To properly select an electric heater, three things must be determined: the heat requirement for the room, the entering air temperature and the desired discharge air temperature. The heat requirement for the room is the sum of the heat loss calculation and the amount of heat required to raise the entering air temperature to the desired room temperature. Usually, the second item is small compared to the first for fan coil units in a return air plenum. MBH can be converted to kW by using the chart or by calculation. There are 3413 BTU's in 1 kW. If using the chart, find the MBH on the left scale, then move horizontally to the right and read kW.

Next, the desired discharge air temperature should be ascertained. This will depend on the type of diffusers that are in the room.

The desired heating airflow for the room can then be calculated using the following equation:

$$CFM = \frac{kW \times 3160}{\Delta T \text{ (Discharge air temp – Inlet air temp.) °F}}$$

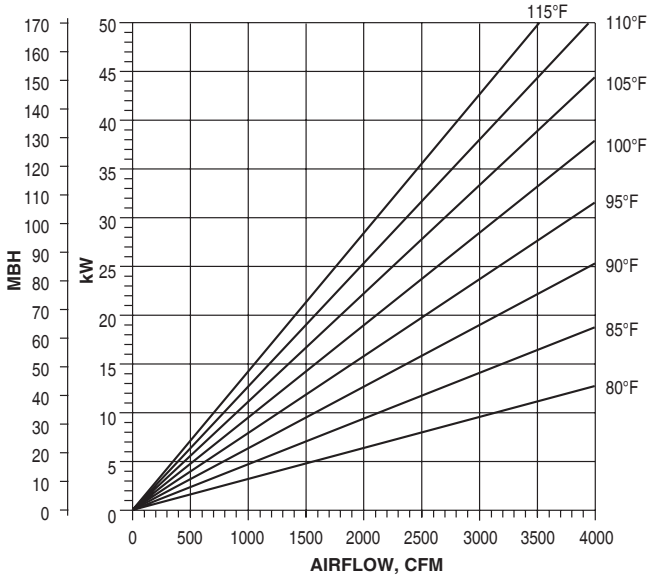
Assuming 70°F (21°C) supply air temperature to the heater, the room airflow can be selected directly from the chart. Start at the left at the design kW. Move horizontally to the desired discharge air temperature. Then, move vertically down to the CFM at the bottom of the chart.

The kW can be selected directly from the chart. Start at the bottom with the design CFM into the room. Move vertically up to the line that represents the desired discharge air temperature. Then, move left to the kW.

The discharge air temperature can also be selected directly from the chart. Start at the bottom with the design CFM into the room. Move to the left side of the chart and find the design kW. Move horizontally and vertically into the chart until the lines intersect. The intersection will be the desired discharge air temperature. Interpolation between the curves is linear.

Heater Selection Chart

Assuming 70°F inlet air temperature at heater.

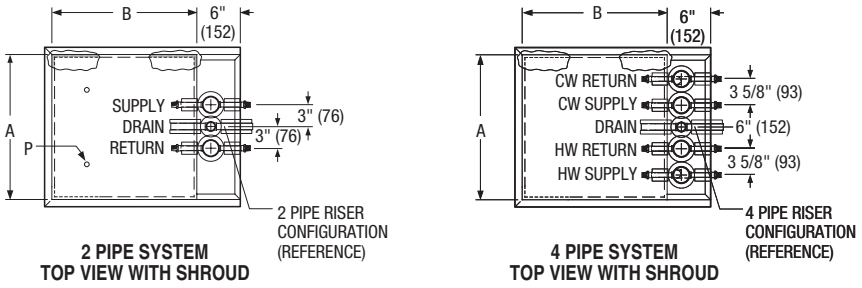


Diagonal lines are constant output temperature.

Engineered Comfort

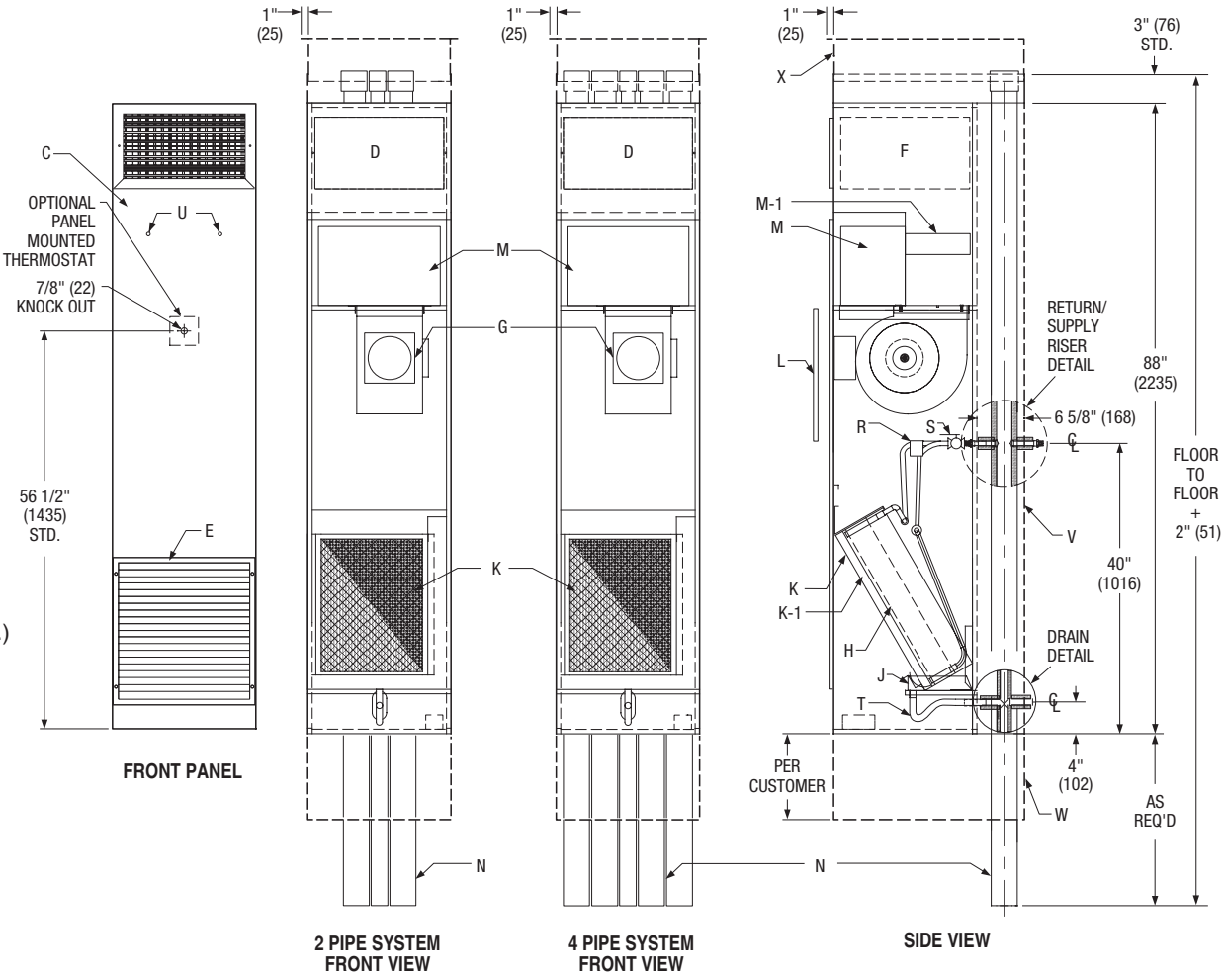
Model Series 39VH • 2 or 4-pipe System with Full Face Cover

- **C** Front Panel
- **D** Supply Grille
- **E** Return Air Grille
- **F** Alternate Side Grille Location
- **G** Fan Assembly
- **H** CW/HW Coil
- **J** Drain Pan
- **K** Filter
- **K-1** Filter Rack
- **L** Fan Access Panel
- **M** Controls Enclosure
- **M-1** Electric Heat (Opt.)
- **N** Risers (Opt.)
- **P** Electrical Knock-out
- **R** Control Valve
- **S** Flex Hose with Shut-off Valve
- **T** P-Trap
- **U** Quarter Turn Latches
- **V** Riser Chase (Opt.)
- **W** Sub-Base (Opt.)
- **X** Adjustable Ceiling Shroud for exposed units (Opt.)



2 PIPE SYSTEM TOP VIEW WITH SHROUD

4 PIPE SYSTEM TOP VIEW WITH SHROUD



FRONT PANEL

2 PIPE SYSTEM FRONT VIEW

4 PIPE SYSTEM FRONT VIEW

SIDE VIEW

Model Sizes

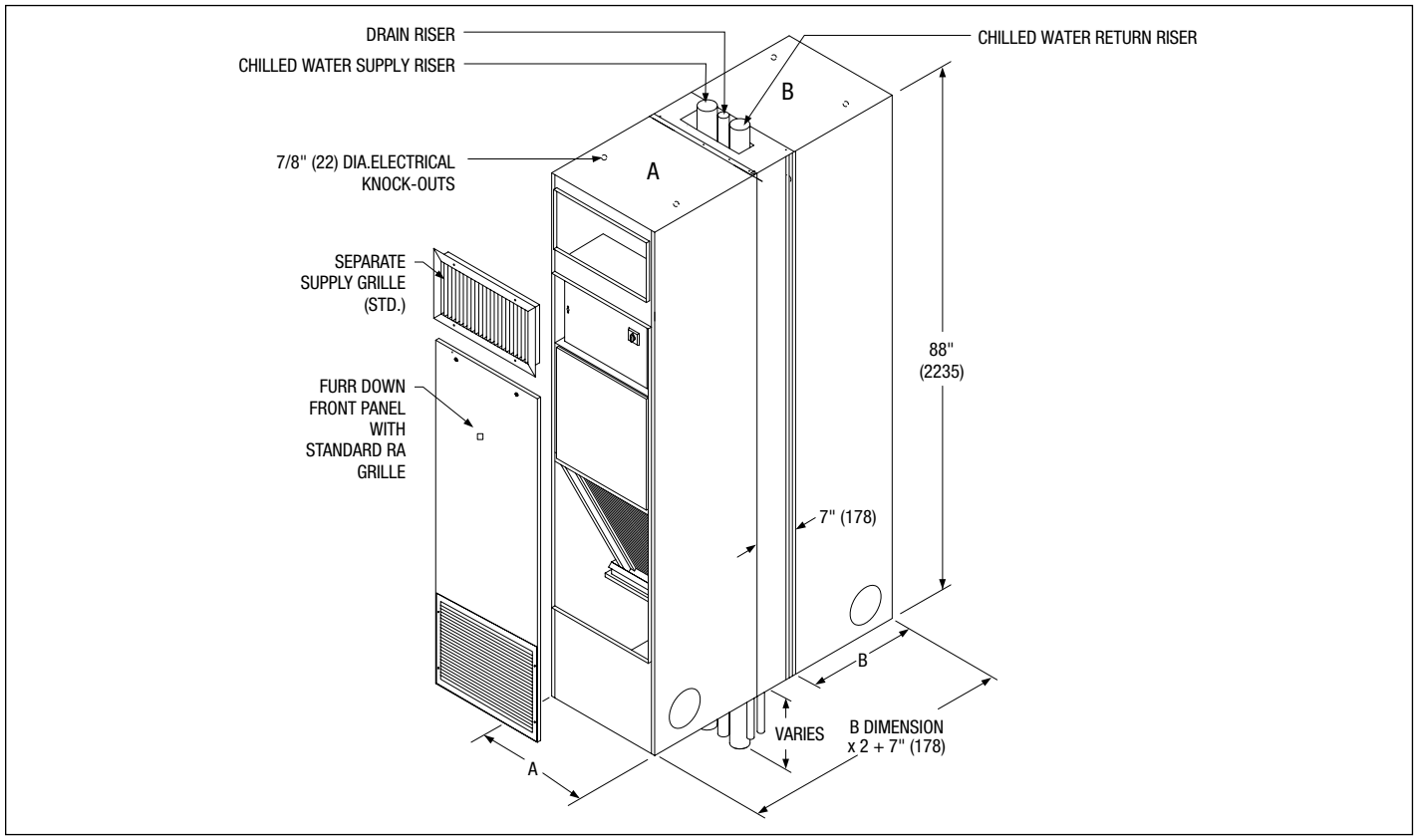
Unit Size	Nominal Airflow Range (CFM)	Nominal Cooling Capacity (MBH)	Footprint A x B inches (mm)
3, 5, 6	300, 500, 600	15, 18, 22	18 x 18 (457 x 457)
8, 10	800, 1000	30, 34	20 x 20 (508 x 508)
12, 15	1200, 1500	42, 46	24 x 24 (610 x 610)
19, 21	1900, 2100	60, 65	30 x 24 (762 x 610)

NOTES:

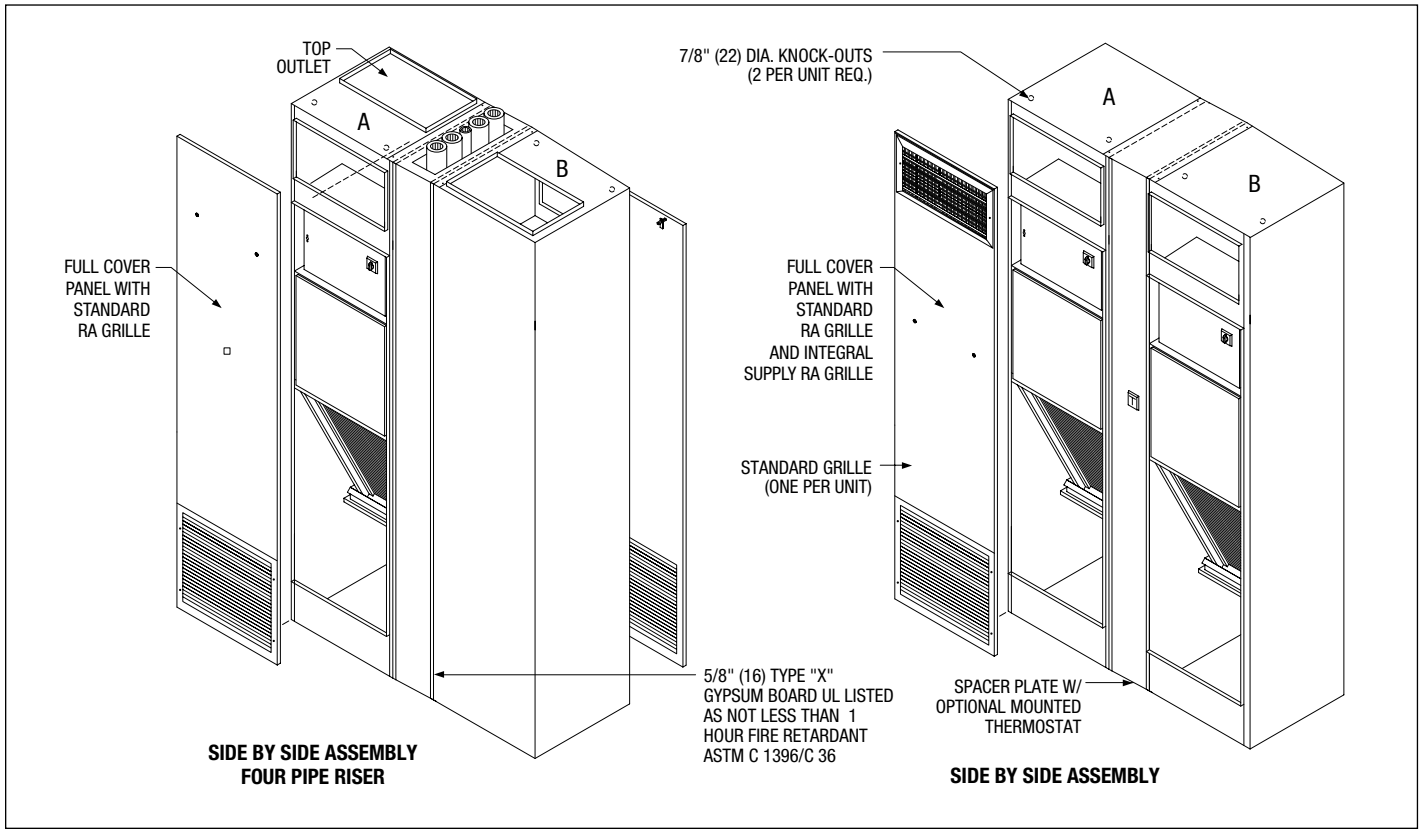
All units are designed to accept both two- and four-pipe riser configurations. Risers can be located on the right side, left side or back of the unit. Supply grilles can be located on the front right side or left side of the unit. Return grilles are located on the front of the unit.

Dimensions are in inches (mm).

Model Series 39VH • Piggyback Assembly

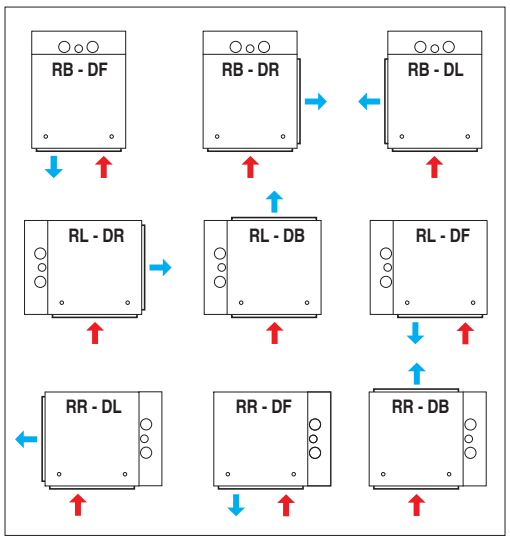


Type A/B Paired Unit • Side by Side Assembly

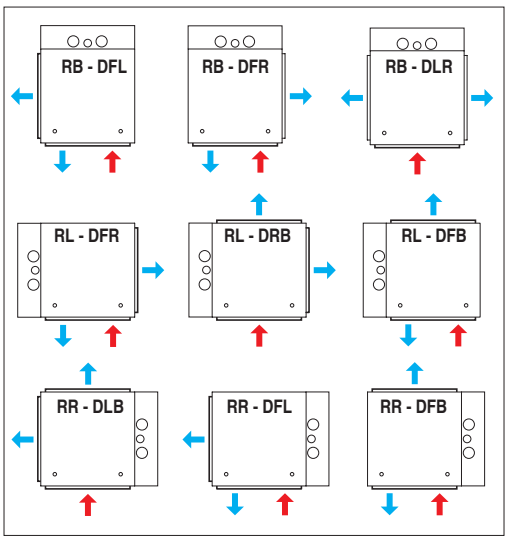


Model Series 39VH & 39L • Unit Configurations for Riser Location & Discharge Grille Arrangement

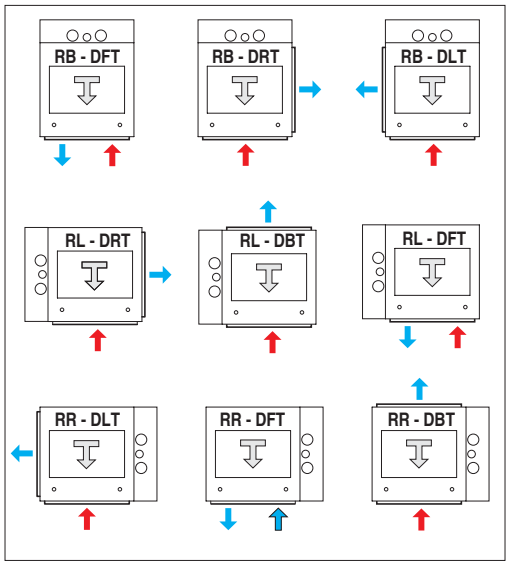
SINGLE SIDE SUPPLY



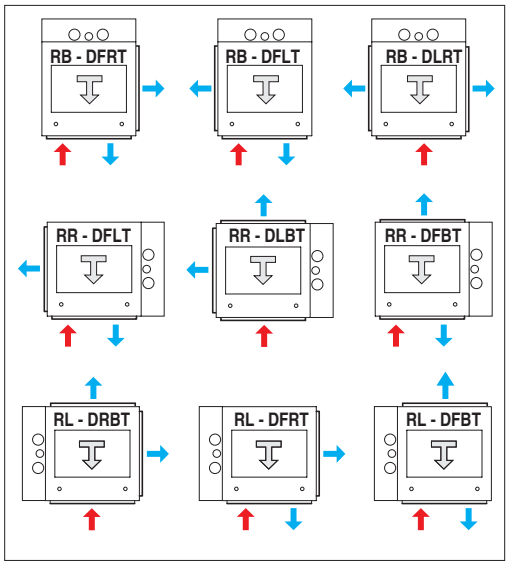
DOUBLE SIDE SUPPLY



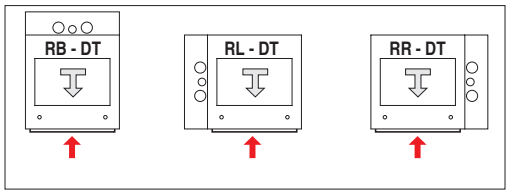
TOP AND SINGLE SIDE SUPPLY



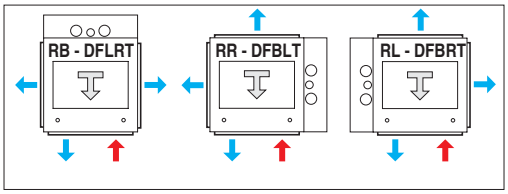
TOP AND DOUBLE SIDE SUPPLY



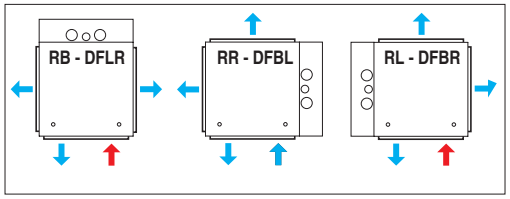
TOP ONLY SUPPLY



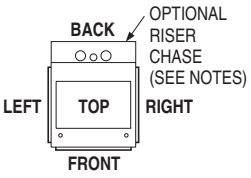
TOP AND TRIPLE SIDE SUPPLY



TRIPLE SIDE SUPPLY



UNIT DESIGNATIONS



EXAMPLE: RB-DFXXX-VR

RISER LOCATION:
RB = BACK
RR = RIGHT
RL = LEFT

DISCHARGE GRILLE LOCATION 1:
DF = FRONT
DT = TOP
DL = LEFT
DR = RIGHT

DISCHARGE GRILLE LOCATION 2, 3 & 4:
L = LEFT
B = BACK
R = RIGHT
T = TOP

OUTSIDE AIR LOCATION:
VL = LEFT
VR = RIGHT

SUPPLY AIRFLOW

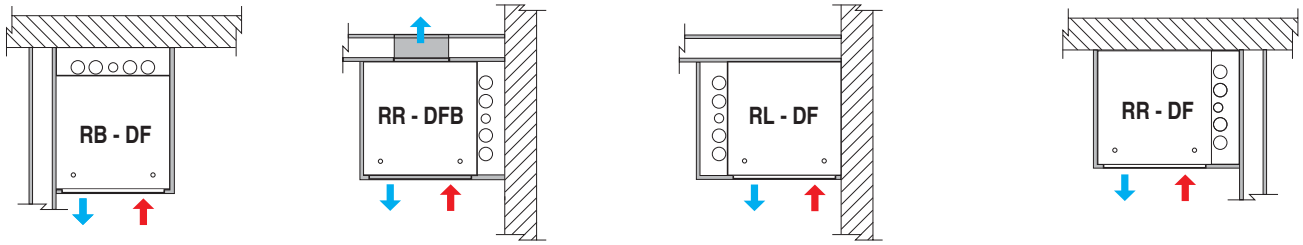
RETURN AIRFLOW

NOTES:

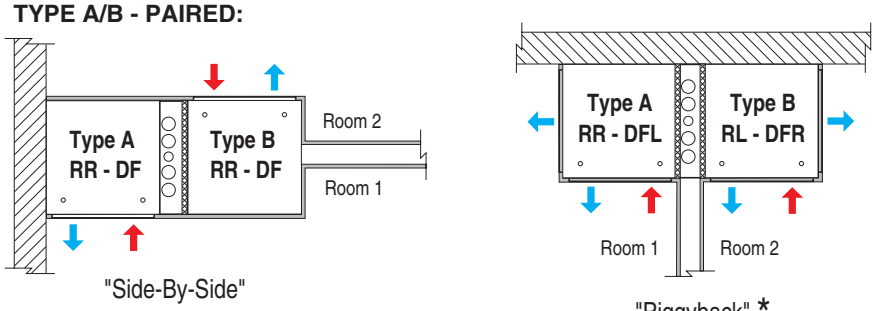
1. Return air panel and unit access are always on front of unit.
2. A sight and sound baffle is provided on double side supply units with a directly opposite grille location. Not available with triple supply or top outlets.
3. Opposed blade damper on one supply grille for units with double supply and two grilles for triple supply outlets.
4. Last optional character refers to ventilation outside air location. Options are left or right side only and must be opposite to any left or right riser.
5. Type C Stand-alone units shown with optional riser chase. Riser chase not available on Type M Master units. Type A units must be mated to Type B units. For Type B and S units, first character references connection location only (risers are on Type A or M unit respectively).
6. Exposed models are available as standard with RB Riser Back location only.

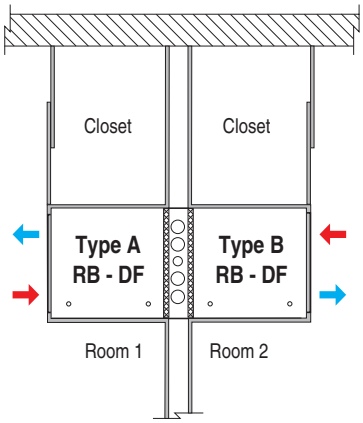
Model Series 39VH & 39L
Typical Stand-alone and Paired Unit Configurations

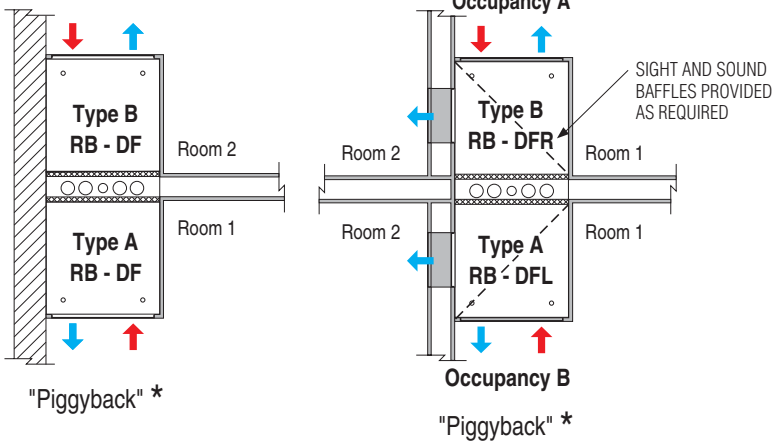
TYPE C - CONCEALED (STAND-ALONE):



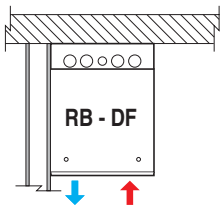
TYPE A/B - PAIRED:



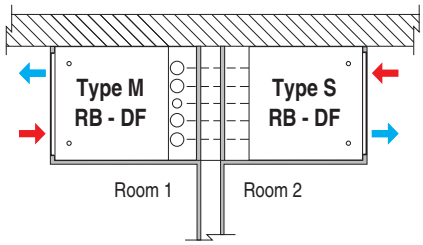




TYPE E - EXPOSED:



TYPE M/S - MASTER / REMOTE SLAVE:



Custom side-by-side exposed installation

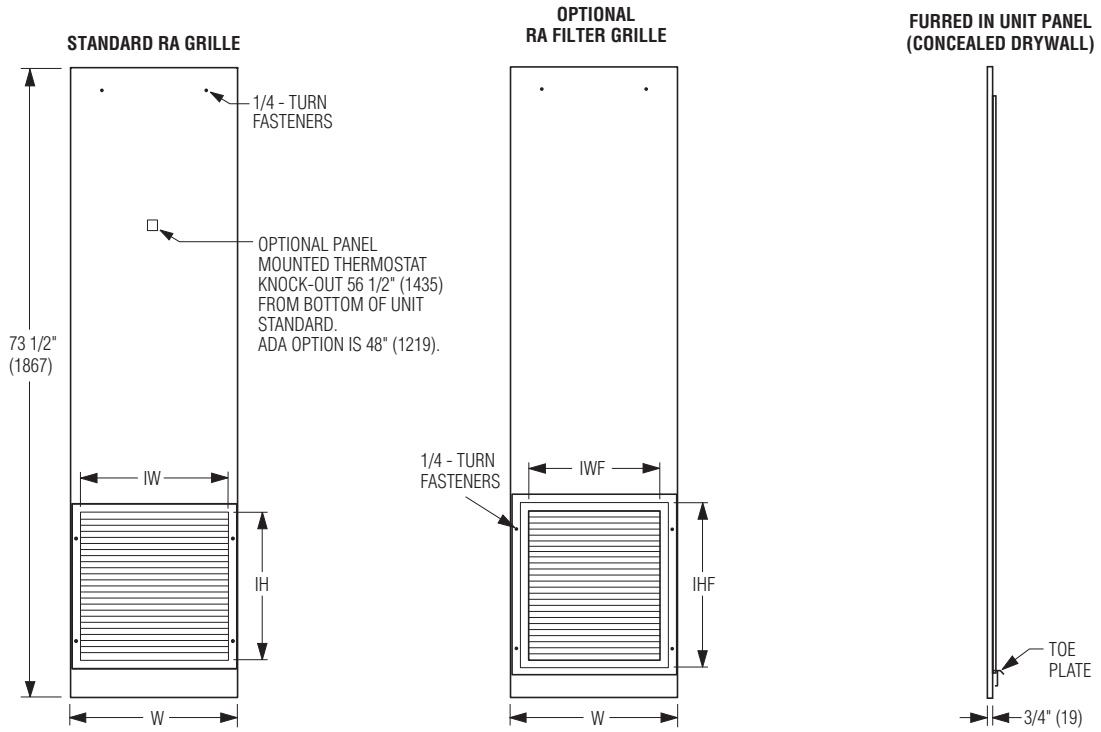
LEGEND:

- Exterior Wall
- Field Drywall (sheetrock)
- Interior Wall Partition or Separation
- Eng. Comfort "Type X" Gypsum wallboard
- Field installed piping
- Supply Air
- Return Air
- * Available in one-hour, UL fire-rated construction
- **A** Master Unit (with risers)
- **B** Slave Unit (with riser connection)

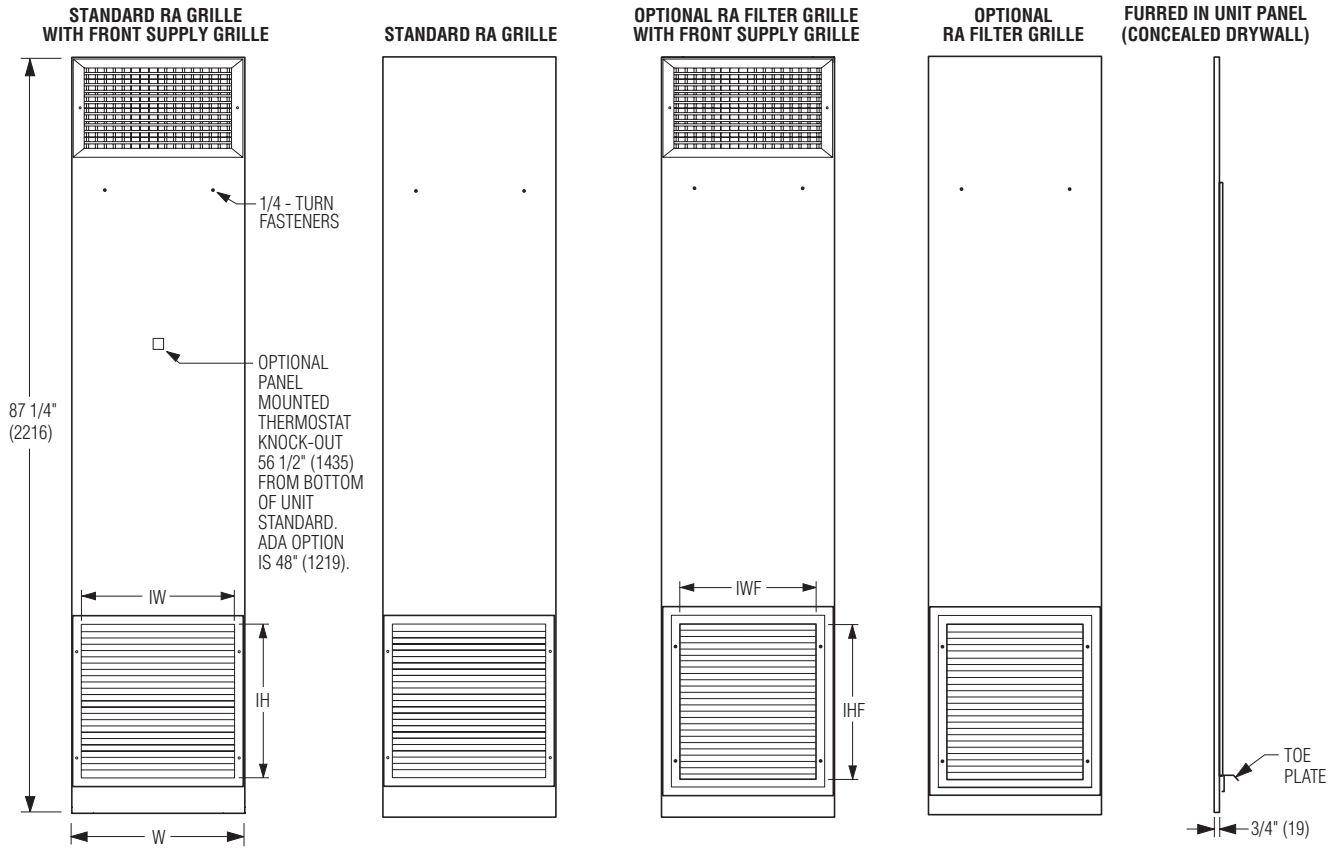
NOTES:

1. Above are just a few of the many arrangement possibilities.
2. For other combinations, see proceeding page and ensure compatibility.
3. Non-fire rated Paired units are standard (single wallboard) UL 1 Hour Label Fire-rated is an option (double "Type X" wallboard).

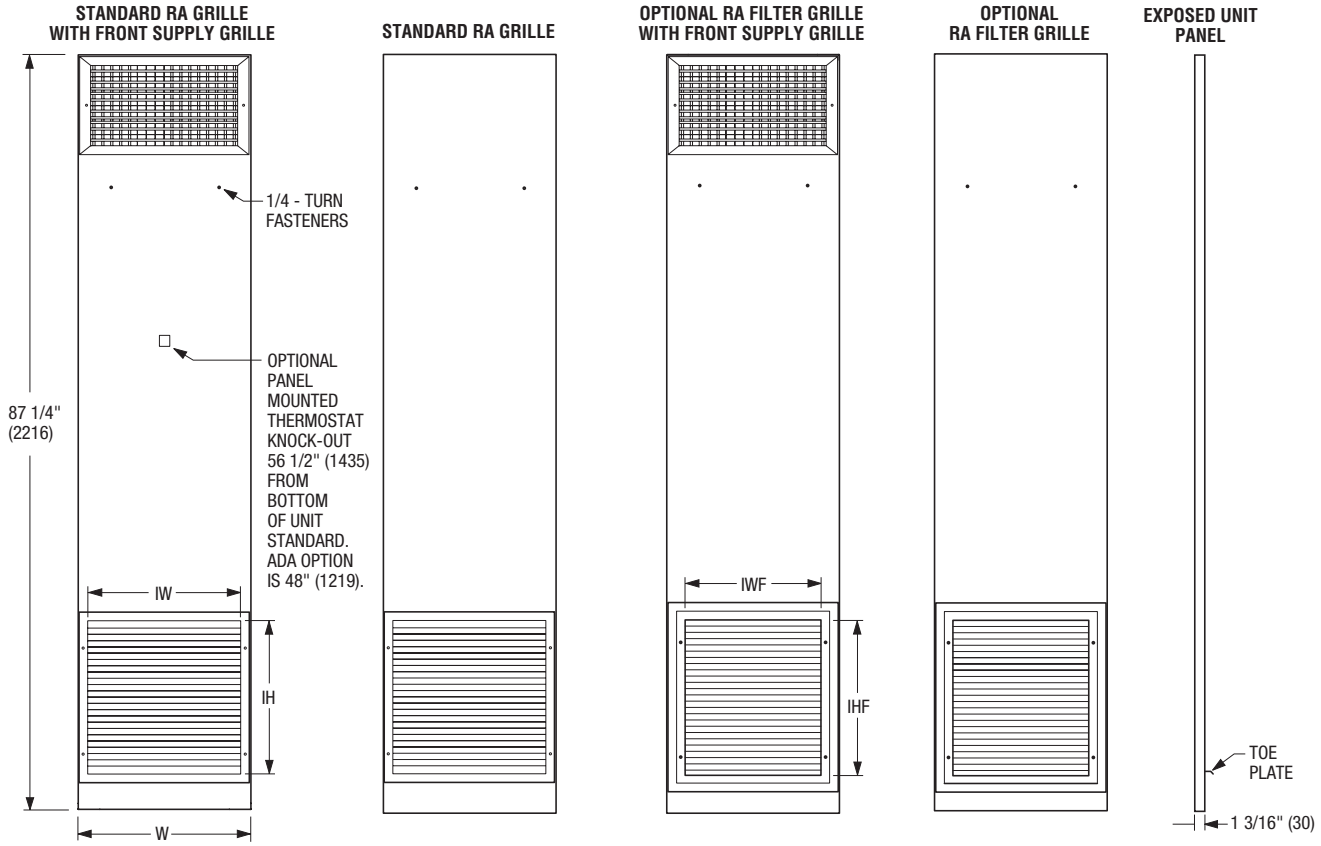
Model Series 39VH • Standard Front Return Air Panel for Type C Concealed Units Separate Supply Grille



Optional Front Return Air Panels for Type C Concealed Units Extended Cover (with integral front supply grille where specified)



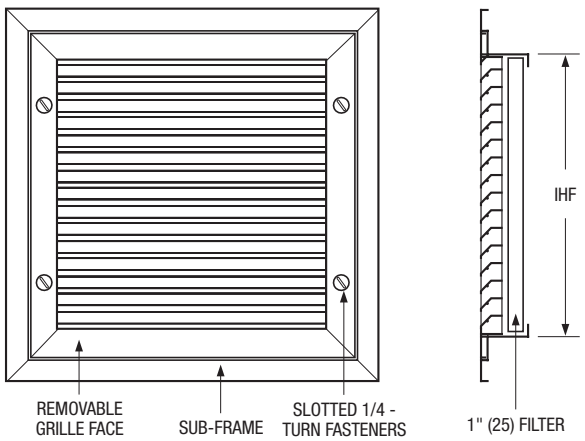
Model Series 39VH • Standard Front Return Air Panels for Type C Concealed Units • Extended Full Length Cover (with integral front supply grille where specified)



Dimensions:

Unit Size	W	Standard Return Air Grille IW x IH	Optional Return Air Filter Grille IWF x IHF
3, 5, 6	18 (457)	16 x 15 (406 x 381)	14 x 15 (356 x 381)
8, 10	20 (508)	18 x 21 (457 x 533)	16 x 21 (406 x 533)
12, 15	24 (610)	22 x 26 (559 x 660)	20 x 26 (508 x 660)
19, 21	30 (762)	28 x 26 (711 x 660)	26 x 26 (660 x 660)

Optional Aluminum Filter Return Grille:



NOTES:

1. All front panels feature a high free area louvered return grille.
2. A removable face filter return grille is available. This option eliminates having to remove the front panel for easier filter replacement.
3. The standard reduced height front panels are designed for (furred-in) unit installation concealed by drywall [1/2" to 5/8" (13 to 16)] only.
4. Optional full cover front panels with integral grille are also available for concealed drywall installation.
5. Hi-Rise fan coil units designed for exposed installation feature a full length front panel with integral front supply grille where specified. These one piece panels mount flush and completely cover the front of the unit. The entire fan coil unit on the non-riser sides is also painted to match. An optional ceiling shroud extension for the fan coil unit is also available.
6. Model Series 39L panels are 8" (203) shorter.
7. Thermostat mounting option: A 7/8" (22.2) knock-out is provided on the return panel where this option is specified. Where the mounting location is to be in accordance with the Americans with Disabilities Act (ADA), the thermostat mounting height is lower than standard; 48" (1219) above the floor.
8. Standard finish is a durable baked enamel powder coat, AW Appliance White. Custom colors are available.

Engineered Comfort

A

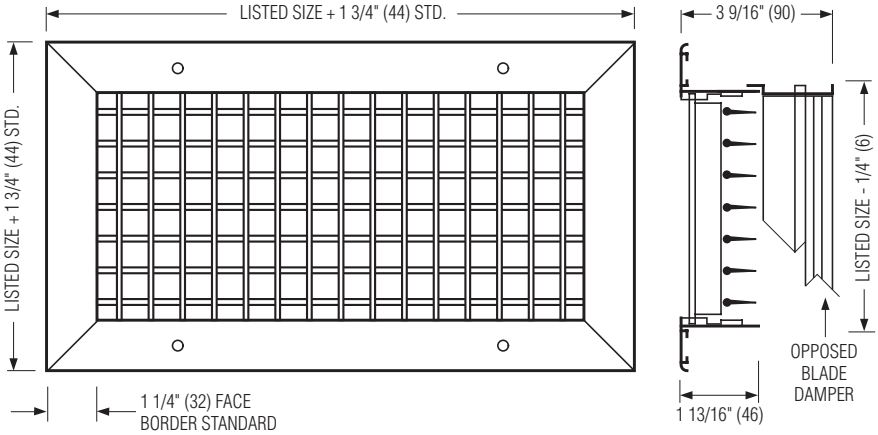
VERTICAL HI-RISE/STACK FAN COIL UNITS

Model Series 39VH & 39L
Double Deflection Adjustable Aluminum Discharge Grilles

Model 51DV Vertical Front Blades

Double Deflection Supply Grilles and Registers are recommended for application in systems requiring maximum flexibility. The front set of blades has the greatest effect on the air pattern. Vertical front blades control the spread and throw distance of the air pattern. Horizontal rear blades control the rise and drop of the air pattern, typically directing warm air downwards or cool air upwards along the ceiling.

The combination of streamlined 'teardrop' shaped blades and 3/4" (19) spacing maintains a high effective free area average capacity of 75%, which minimizes outlet velocity, reduces pressure drop and assures quiet operation.



Features

- High quality extruded aluminum construction.
- 1 1/4" (32) wide face border with a 1" (25) overlap margin standard, furnished with countersunk screw holes and mounting screws.
- Rigid, heavy gauge extruded frames with reinforced mitered corners.
- Streamlined shaped extruded blades on 3/4" (19) centers. Blades positively hold deflection setting under all conditions of velocity and pressure.
- Adjustable air pattern - Blades are friction pivoted and easily adjusted to provide desired spread or deflection.
- An opposed blade damper is required on one supply grille for units with two supply outlets and on two supply grilles for units with three supply outlets for field balancing.
- Grilles are shipped loose for field installation unless integral full cover panels are specified (optional).
- For "top outlet" fan coil units which are ducted to a discharge grille at a remote location(s), Model 51DV Grilles and Model 51DV-O Registers are available in sizes from 4" x 4" to 48" x 36" (102 x 102 to 1219 x 914) to suit airflow capacity and performance requirements.
- AW Appliance White powder coat baked enamel finish is standard. Other finishes are available.

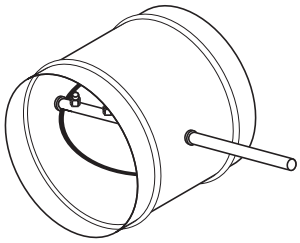
Performance Data

Unit	Nominal		Single Supply			Double Supply			Triple Supply		
Size	CFM	l/s	W x H	Throw	NC	W x H	Throw	NC	W x H	Throw	NC
3	360	170	16 x 10 (406 x 254)	10-16-30	<20	16 x 10 (406 x 254)	–	–	–	–	–
5	550	260		18-27-38	<20		8-12-24	<20	–	–	–
6	600	283		20-29-40	<20		9-15-29	<20	–	–	–
8	900	425	18 x 10 (457 x 254)	27-33-46	27	18 x 10 (457 x 254)	14-20-33	<20	–	–	–
10	1000	472		28-34-48	30		15-22-34	<20	–	–	–
12	1250	590	22 x 10 (559 x 254)	33-40-57	32	22 x 10 (559 x 254)	19-29-41	<20	22 x 10 (559 x 254)	11-18-33	<20
15	1500	708		37-45-64	37		22-31-45	<20		13-21-37	<20
19	1900	897	28 x 10 (711 x 254)	40-49-70	37	28 x 10 (711 x 254)	24-35-49	<20	28 x 10 (711 x 254)	14-22-40	<20
21	2150	1015		43-53-75	41		26-38-52	<20		17-26-43	<20

NOTES:

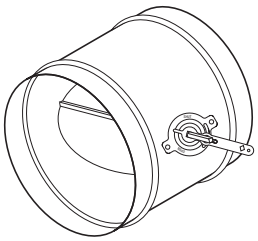
1. Performance data is based on double deflection grille without opposed blade damper. Data is for grille only and does not include fan coil unit sound.
2. Double and triple supply grilles may be ordered the same size (as shown) or smaller than single supply grille.
3. NC corrections for open damper and blade deflection:
   Without damper: 22 1/2° + 2 NC, 45° + 7 NC.
   With damper: 22 1/2° + 6 NC, 45° + 11 NC.
   (A throttling damper may add an additional 5 – 10 NC)
4. Throws are given for terminal velocities of 150,100 and 50 fpm under isothermal conditions at 0° deflection.
5. Throw corrections for blade deflection:
   22 1/2° Multiply listed throw values by x 0.80
   45° Multiply listed throw values by x 0.50
6. Data derived from tests conducted in accordance with ASHRAE Standard 70.

Model Series 39VH & 39L • Outside Air (IAQ) Inlet Dampers



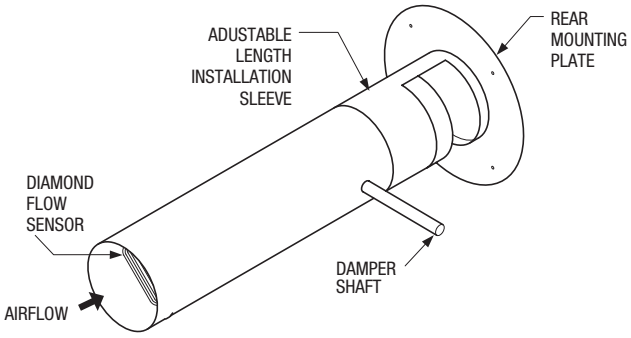
MOTORIZED DAMPER

WITH 2-position OPEN/ CLOSED ACTUATOR 4" (102) DIA. NOMINAL



MANUAL BALANCING DAMPER

4" (102) DIA. NOMINAL



PRESSURE INDEPENDENT DAMPER

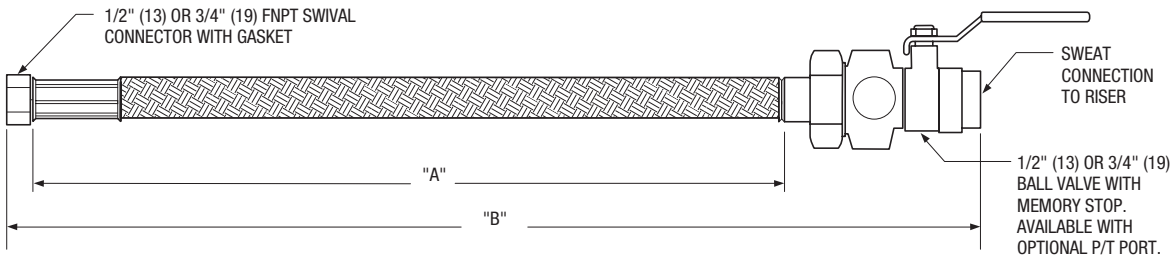
WITH FLOW SENSOR AND MODULATING ACTUATOR

4" (102) DIA. NOMINAL

NOTES:

1. Outside Air Inlet Damper available on Model Series 39VH and 39L.
2. Outside Air location may be on the right or left side of the unit (opposite from any side riser).
3. Dampers are undersized 1/8" (3) for ducted connection to nominal duct.

Stainless Steel Flexible Hoses



Piping packages on Nailor Vertical Hi-Rise fan coil units feature 1/2" (13) or 3/4" (19) flexible stainless steel braided hoses on all 2-pipe and 4-pipe configurations as standard. Flexible hose kits provide significant benefits over hard piping during installation, commissioning, operation and maintenance.

- Flexible hoses allow for easy field configuration of left hand, right hand and back riser connections without the need for thermal cutting and joining of piping, saving time and money.
- Permit looping the pipe lines and bypassing the coil in order to flush the system for debris prior to operation.
- Flexible hoses allow for thermal expansion and contraction.
- Threaded swivel end connections facilitate coil and piping package removal for service and repair.
- Pressure rating: 375 PSIG @ 250°F (450 PSI test pressure).
- Flame and Smoke Spread meet 25/50 per UL 723.
- Ball valve with memory stop allows the ball valve to be closed and returned to the balance setting position, without re-testing the system.

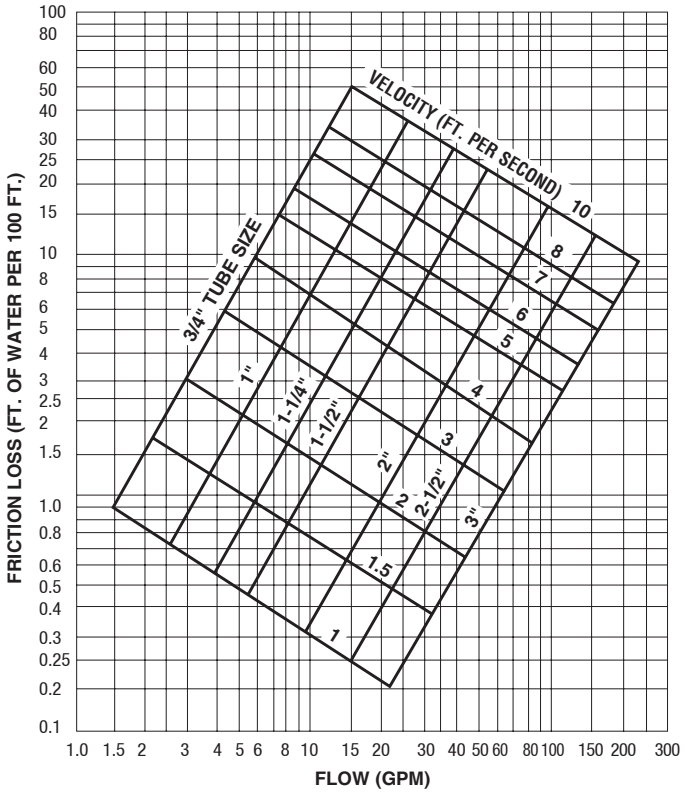
Available Hose Lengths		
No.	**"A" inches (mm)**	**"B" inches (mm)**
1	18 (457)	22 (559)
2	24 (610)	28 (711)
3	36 (914)	40 (1016)
4	48 (1219)	52 (1321)

Model Series 39VH & 39L • Riser Selection and Data

Riser Application and Sizing

Technical information on heat transfer, fluid flow and pipe sizing can be found in the ASHRAE Fundamentals Handbook and various other technical documents and publications. Some of the factors affecting riser application and sizing are noise, tube erosion and economics. The friction loss for risers chart displays riser tube diameter sizes as a function of flow (GPM), friction loss and water velocity. For maximum riser velocity and pressure drop per 100 ft., refer to latest ASHRAE Fundamentals Handbook, Pipe Sizing Chapter. Riser sizes can be of a single diameter on low rise buildings, or varying sizes on medium to high rise buildings. Generally, riser copper type, size, length and insulation thickness are determined by the location of the fan coil unit in the building. Chilled and hot water risers are available in Type K, L or M copper, varying diameters from 3/4" (19) to 3" (76) and with either 1/2" (13) or 3/4" (19) thick closed cell foam insulation. Drain risers are available in Type M copper, varying diameters from 3/4" (19) to 3" (76) and with either 1/2" (13) or 3/4" (19) thick closed cell foam insulation.

Friction Loss for Risers Chart

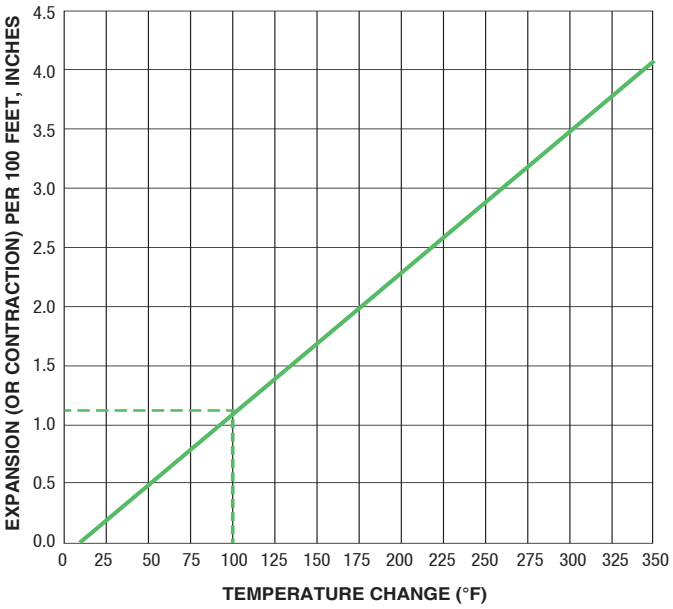


Riser Expansion

Generally, in medium to high rise buildings, allowance must be made for pipe expansion. Model Series 39 Hi-Rise fan coil units are furnished with hoses which act as expansion loops integral to the unit. The hose will allow for +/- 1 1/2" (38) of riser expansion and contraction. Additional expansion compensation must be made in the riser system in the field where movement is expected to exceed the factory allowances. Technical information on pipe expansion, contraction and anchoring can be found in the ASHRAE HVAC Systems and Equipment Handbook and various other technical documents and publications.

Risers may not be anchored to fan coil units. They must be anchored to structure.

Riser Expansion Chart



The above chart shows the change in length per 100 feet of copper tube with temperature. The following equation is used to calculate riser expansion.

Temperature Rise (°F) x Length (ft.) x 12 (in. per ft.) x 0.0000094 (in. per in. per °F) = Expansion (in.)

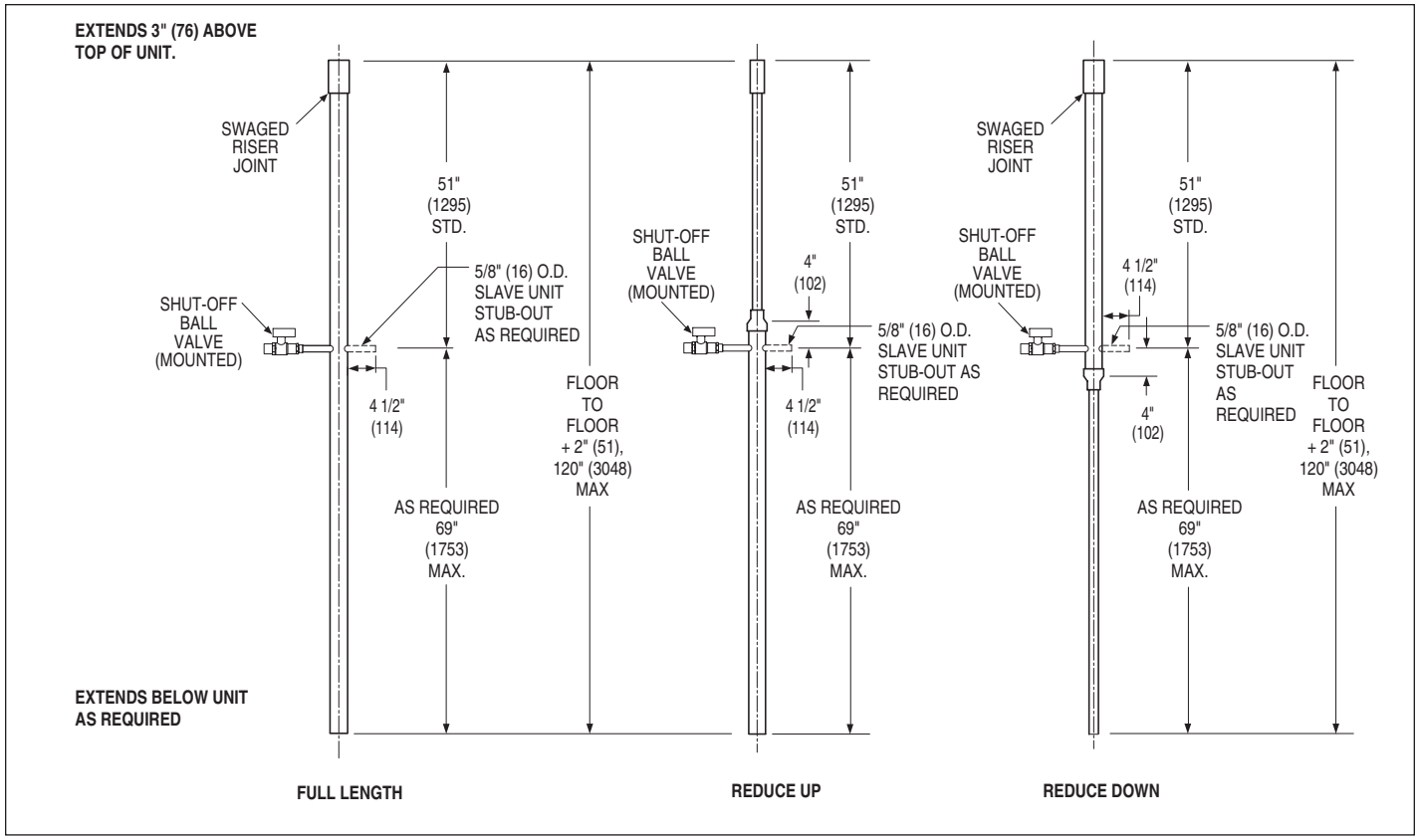
For example:

The expansion of each 100 ft. of length of any size tube heated from room temperature 70°F to 170°F (a 100°F rise) is 1.128 in.

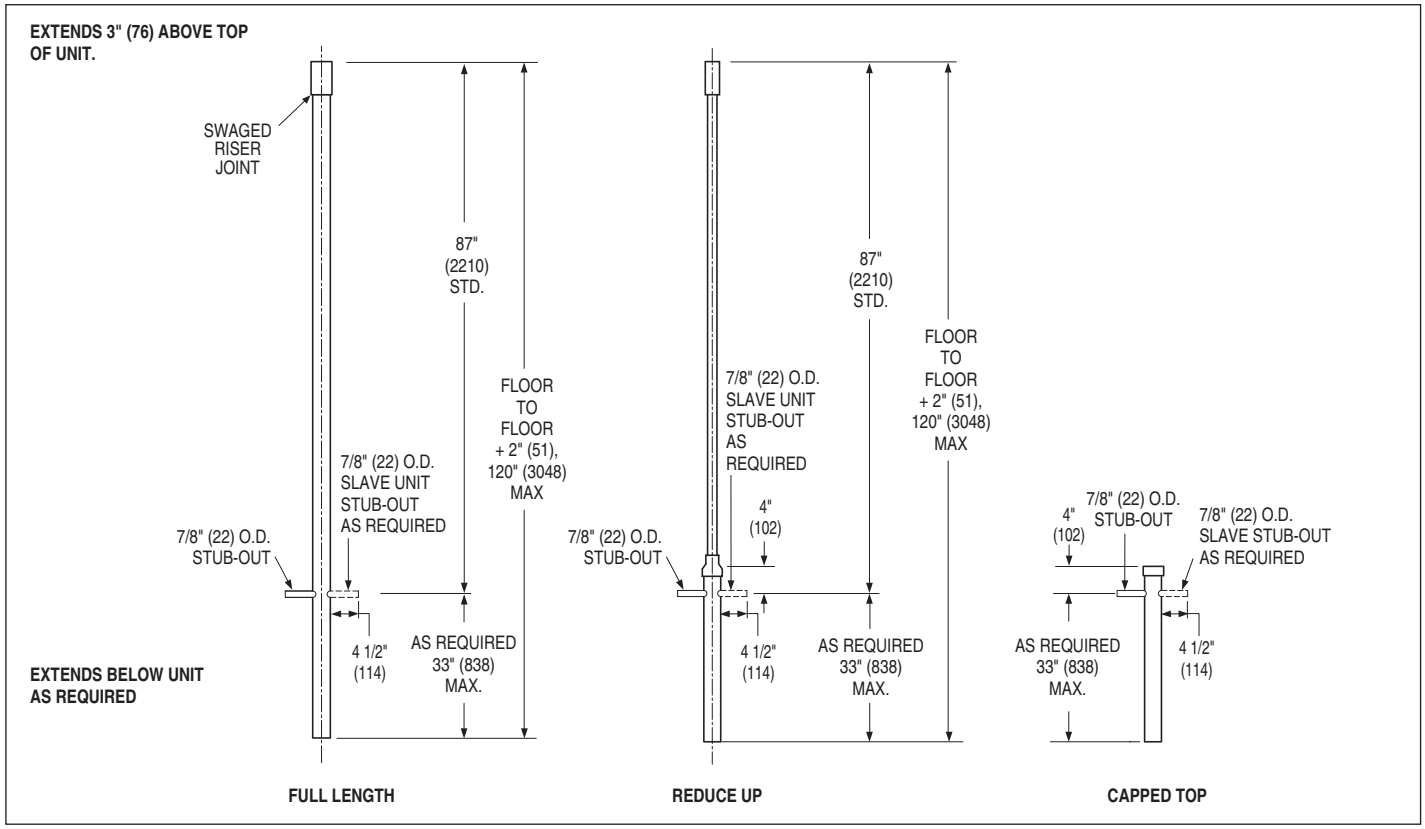
100°F x 100 ft. x 12 in./ft. x 0.0000094 in./in./°F = 1.128 in.

Model Series 39VH & 39L

Standard Capped Supply/Return Risers • Full Length & Reducing

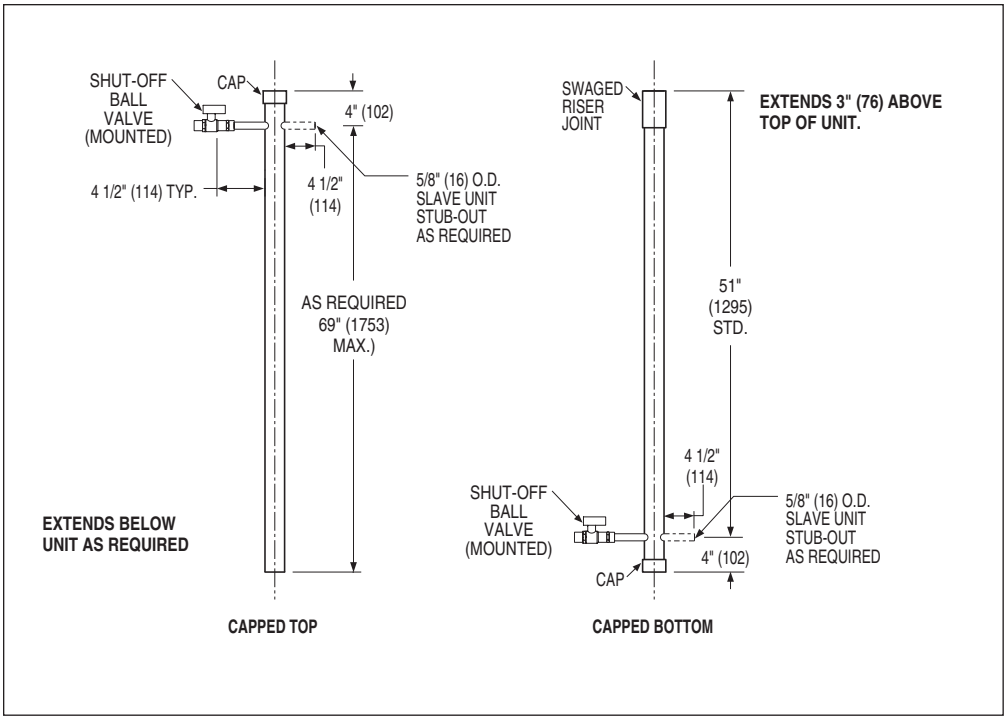


Standard Capped Supply/Return Risers • Full Length, Reducing & Capped

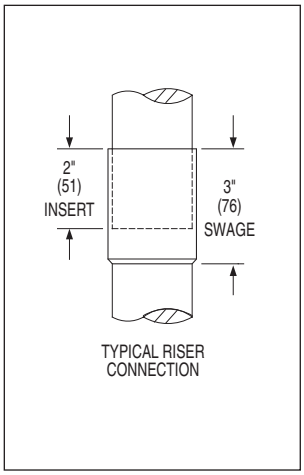


Engineered Comfort

Model Series 39VH • Standard Capped Supply/Return Risers



Swaged Riser Joint Detail



NOTES:

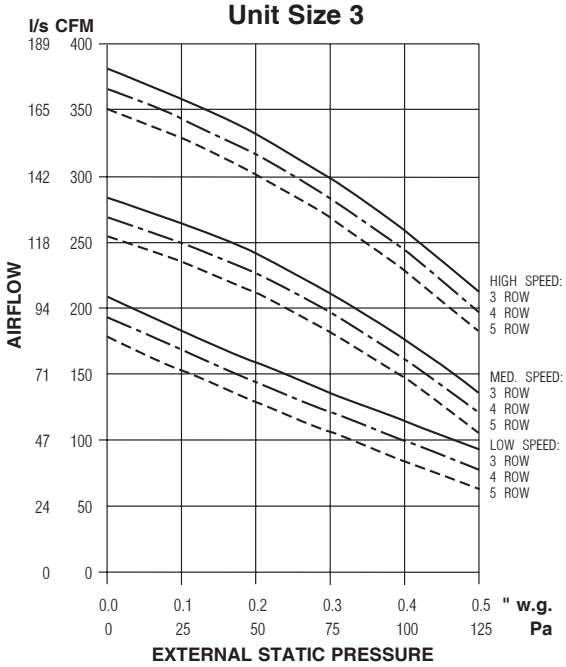
1. Supply and Return Risers are available from 3/4" (19) to 3" (76) diameter in Type K (heavy wall), Type M (medium wall) and Type L (light wall) copper with either 1/2" (13) or 3/4" (19) insulation (flexible closed cell foam).
2. Risers are available "full length" (one piece), "capped top", "capped bottom", "reduced up" and "reduced down". Risers are reduced one nominal pipe size only.
3. Drain Risers are Type M copper only and maximum 1 1/4" diameter with maximum 1/2" (13) insulation. Drain risers are available in "full length", "reduced up" and "capped top" only.
4. Risers extend 3" (76) above the top of the unit as standard. The riser extension below the bottom of the unit is variable and dependent upon the floor to floor height for the building installation. Stacked unit risers are designed with a swaged socket connection in the top to accommodate 2" (51) of tail piece insertion from the riser above. Connections require field brazing.
5. Risers are ordered by specifying the exact overall length. The required overall riser length = Floor to Floor height + 2" (51).
6. Maximum riser length is 120" (3048). Minimum is 100" (2540). If required riser length exceeds 120" (3048), which represents a floor to floor height of 118" (2997), riser extensions will be required. Consult Nailor.
7. 39L Series risers are available 92" (2337) to 112" (2845) long. (See submittal drawing for dimensional details).
8. Factory mounted risers are standard. Risers may be ordered and shipped in advance to facilitate field installation.
9. Total width of riser assembly (pipes plus insulation) cannot exceed unit cabinet width for factory mounted risers. This should be reviewed carefully for 4-pipe system with risers larger than 2" (51) dia. for unit sizes 3 – 10.

Engineered Comfort

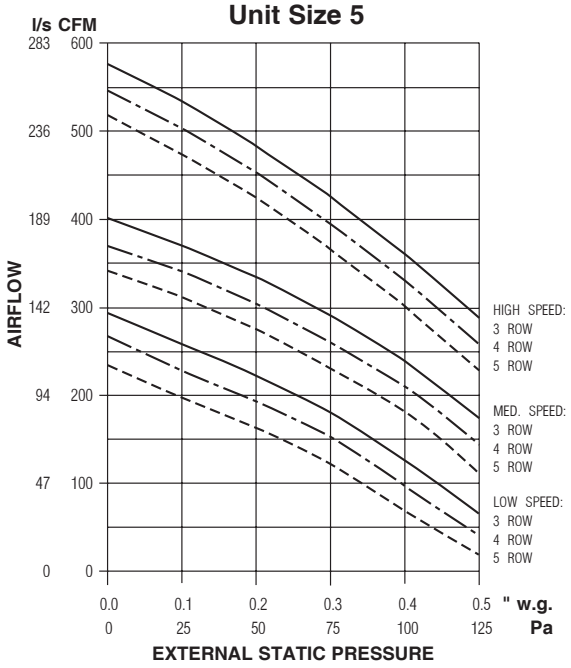
Model Series 39VH, 39L & 39MU • PSC Motor Fan Performance Curves

Airflow vs. Downstream Static Pressure

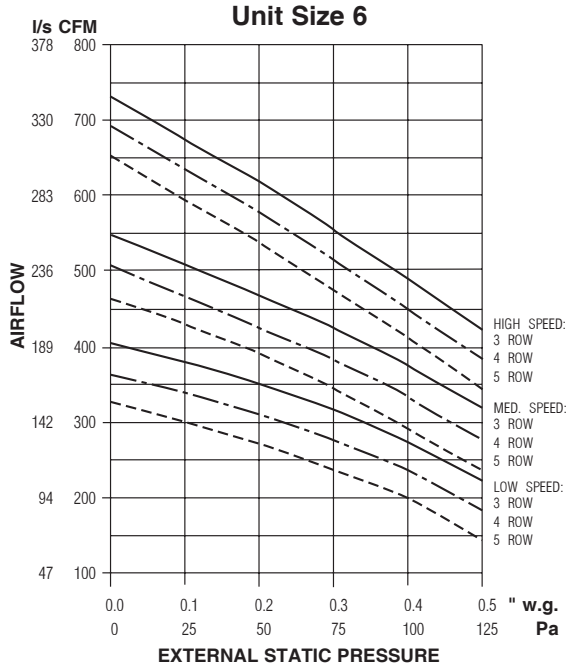
Unit Size 3



Unit Size 5



Unit Size 6



PSC Motor Fan Notes:

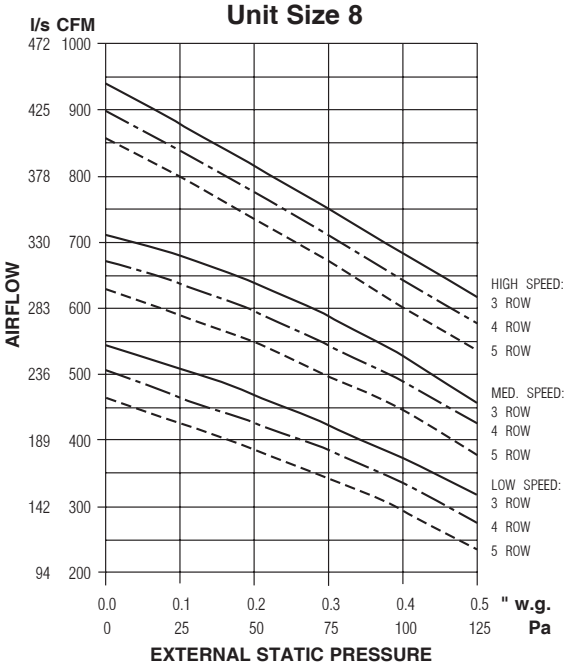
1. Fan coil units equipped with permanent split capacitor (PSC) motors are of the three speed type with separate taps (High, Medium and Low) which provide variable horsepower outputs. Commonly, units are selected and sized on a conservative basis and actual airflow requirements are lower than specified. When this is the case, the unit fan motor can be run at low or medium speed, reducing power consumption and operating cost.
2. Fan curves are applicable to both the total number of rows for a 2-pipe system chilled water or changeover coil and the total number of rows for a 4-pipe system chilled/hot water combination coil.
3. All fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase motors and include internal losses for cabinet, return grille, electric heater, 3, 4 or 5 row water coil and clean 1" (25) throwaway filter. See page A28 for electrical motor performance data.
4. The operating point for units with standard grilles is 0.0 w.g. ESP. Additional external static pressure should be taken into account for top outlet units with remote ducted grilles, MERV rated filters and general filter loading.
5. For one (1) or two (2) row hot water coils (-W heating units) performance will be slightly better. See SelectWorks for performance data Characteristics.
6. Filter pressure drops table shown on page A29.

Engineered Comfort

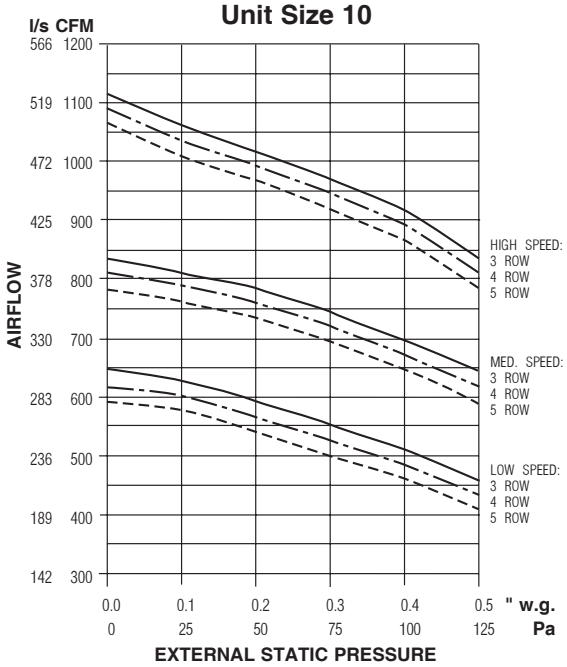
Model Series 39VH, 39L & 39MU • PSC Motor Fan Performance Curves

Airflow vs. Downstream Static Pressure

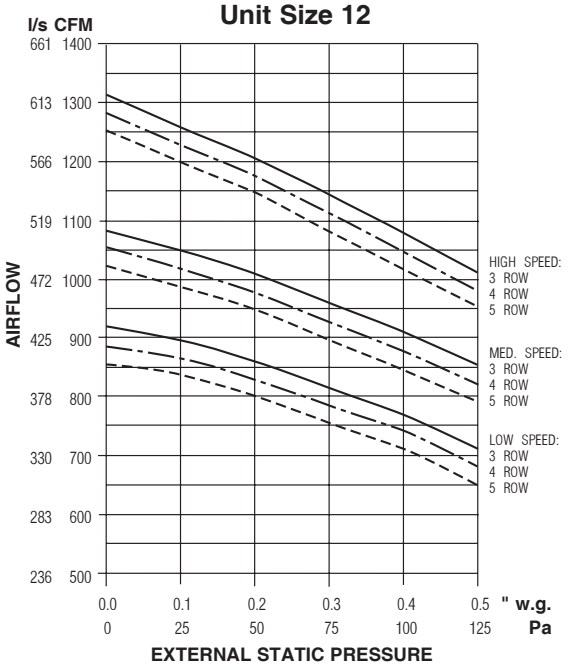
Unit Size 8



Unit Size 10



Unit Size 12



PSC Motor Fan Notes:

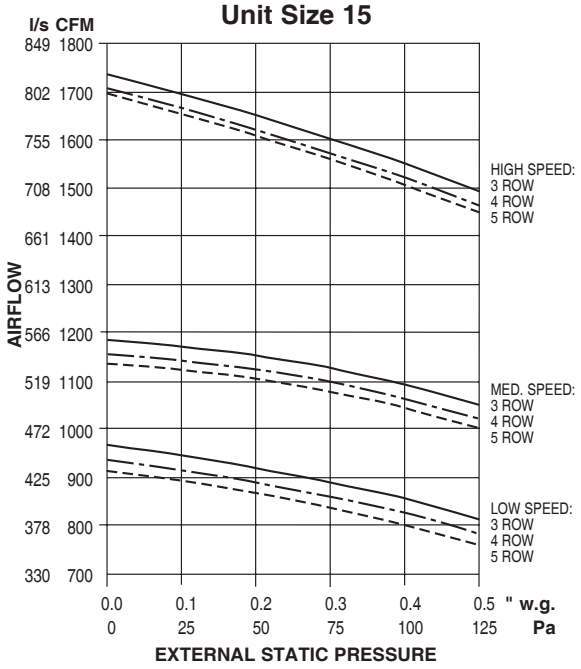
1. Fan coil units equipped with permanent split capacitor (PSC) motors are of the three speed type with separate taps (High, Medium and Low) which provide variable horsepower outputs. Commonly, units are selected and sized on a conservative basis and actual airflow requirements are lower than specified. When this is the case, the unit fan motor can be run at low or medium speed, reducing power consumption and operating cost.
2. Fan curves are applicable to both the total number of rows for a 2-pipe system chilled water or changeover coil and the total number of rows for a 4-pipe system chilled/hot water combination coil.
3. All fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase motors and include internal losses for cabinet, return grille, electric heater, 3, 4 or 5 row water coil and clean 1" (25) throwaway filter. See page A28 for electrical motor performance data.
4. The operating point for units with standard grilles is 0.0 w.g. ESP. Additional external static pressure should be taken into account for top outlet units with remote ducted grilles, MERV rated filters and general filter loading.
5. For one (1) or two (2) row hot water coils (-W heating units) performance will be slightly better. See SelectWorks for performance data Characteristics.
6. Filter pressure drops table shown on page A29.

Engineered Comfort

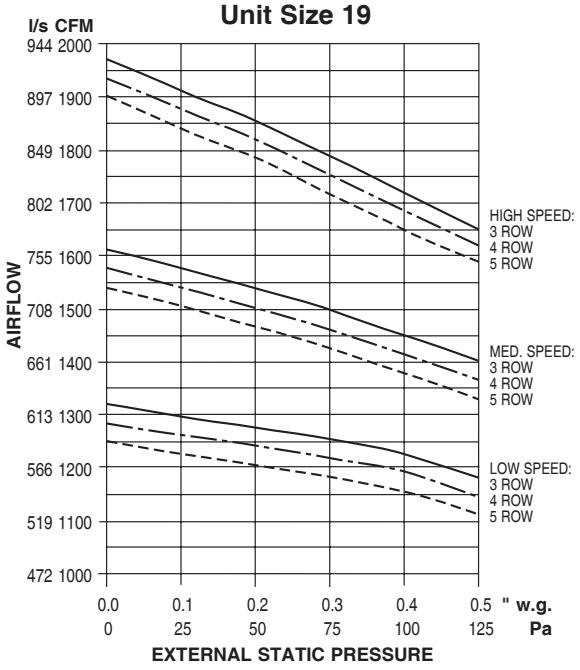
Model Series 39VH, 39L & 39MU • PSC Motor Fan Performance Curves

Airflow vs. External Static Pressure

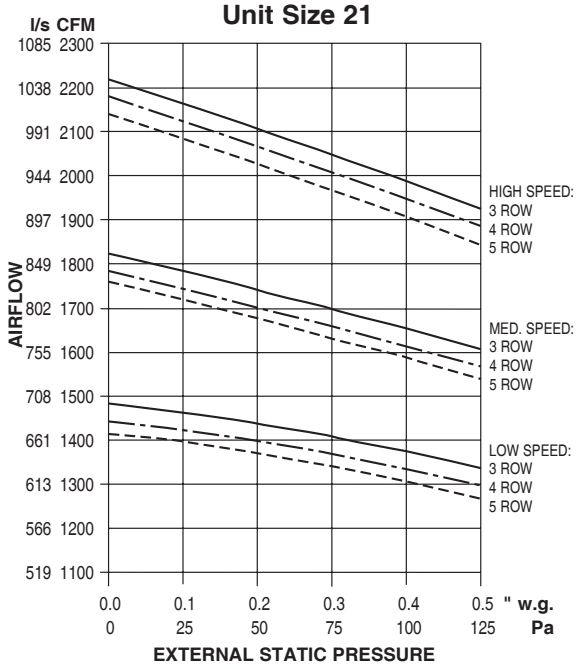
Unit Size 15



Unit Size 19



Unit Size 21



PSC Motor Fan Notes:

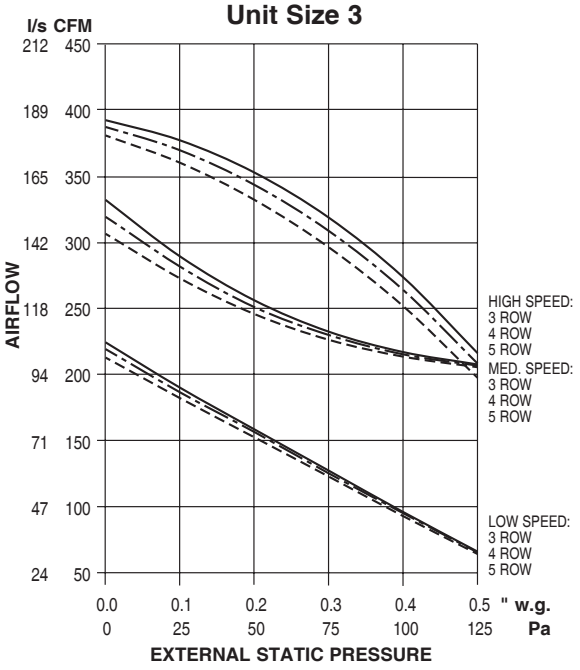
1. Fan coil units equipped with permanent split capacitor (PSC) motors are of the three speed type with separate taps (High, Medium and Low) which provide variable horsepower outputs. Commonly, units are selected and sized on a conservative basis and actual airflow requirements are lower than specified. When this is the case, the unit fan motor can be run at low or medium speed, reducing power consumption and operating cost.
2. Fan curves are applicable to both the total number of rows for a 2-pipe system chilled water or changeover coil and the total number of rows for a 4-pipe system chilled/hot water combination coil.
3. All fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase motors and include internal losses for cabinet, return grille, electric heater, 3, 4 or 5 row water coil and clean 1" (25) throwaway filter. See page A28 for electrical motor performance data.
4. The operating point for units with standard grilles is 0.0 w.g. ESP. Additional external static pressure should be taken into account for top outlet units with remote ducted grilles, MERV rated filters and general filter loading.
5. For one (1) or two (2) row hot water coils (-W heating units) performance will be slightly better. See SelectWorks for performance data Characteristics.
6. Filter pressure drops table shown on page A29.

Engineered Comfort

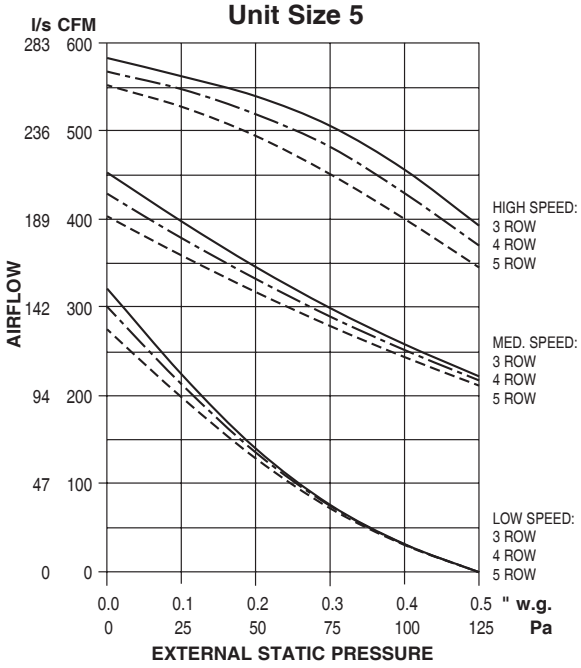
Model Series 39VH, 39L & 39MU • 3-Speed ECM • Fan Performance Curves

Airflow vs. External Static Pressure

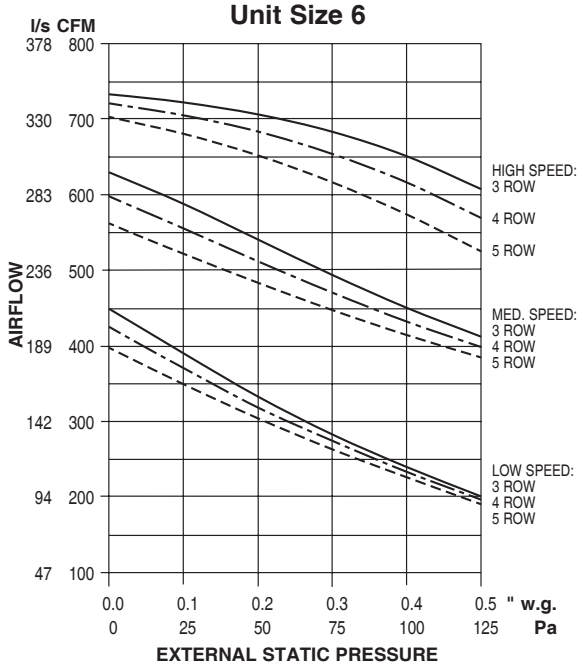
Unit Size 3



Unit Size 5



Unit Size 6



3-Speed ECM Fan Notes:

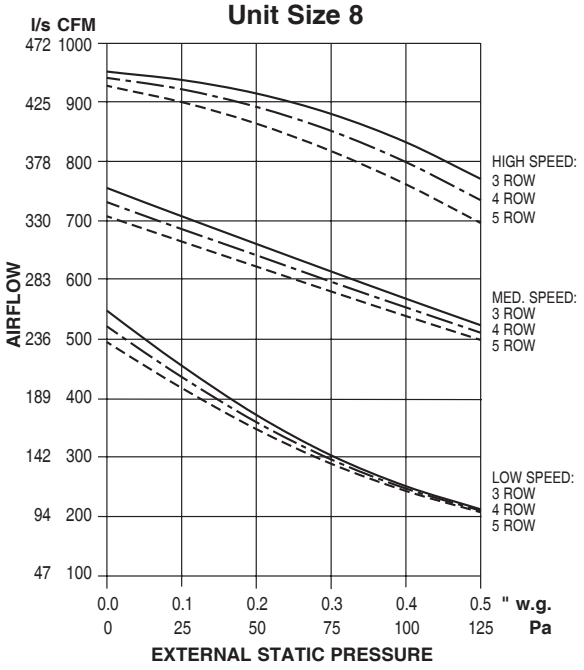
1. Fan coil units equipped with 3-speed ECM are of the three speed type with separate taps (High, Medium and Low) which provide variable horsepower outputs. Commonly, units are selected and sized on a conservative basis and actual airflow requirements are lower than specified. When this is the case, the unit fan motor can be run at low or medium speed, reducing power consumption and operating cost.
2. Fan curves are applicable to both the total number of rows for a 2-pipe system chilled water or changeover coil and the total number of rows for a 4-pipe system chilled/hot water combination coil.
3. All fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase motors and include internal losses for cabinet, return grille, electric heater, 3, 4 or 5 row water coil and clean 1" (25) throwaway filter. See page A28 for electrical motor performance data.
4. The operating point for units with standard grilles is 0.0 w.g. ESP. Additional external static pressure should be taken into account for top outlet units with remote ducted grilles, MERV rated filters and general filter loading.
5. For one (1) or two (2) row hot water coils (-W heating units) performance will be slightly better. See SelectWorks for performance data Characteristics.
6. Filter pressure drops table shown on page A29.

Engineered Comfort

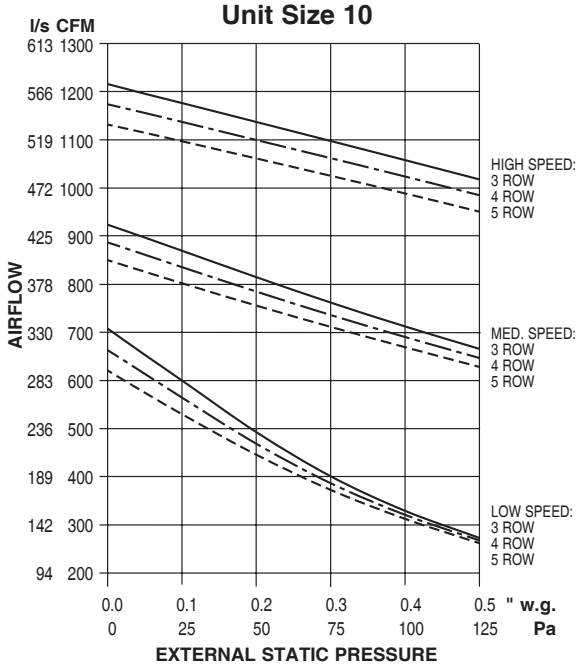
Model Series 39VH, 39L & 39MU • 3-Speed ECM • Fan Performance Curves

Airflow vs. External Static Pressure

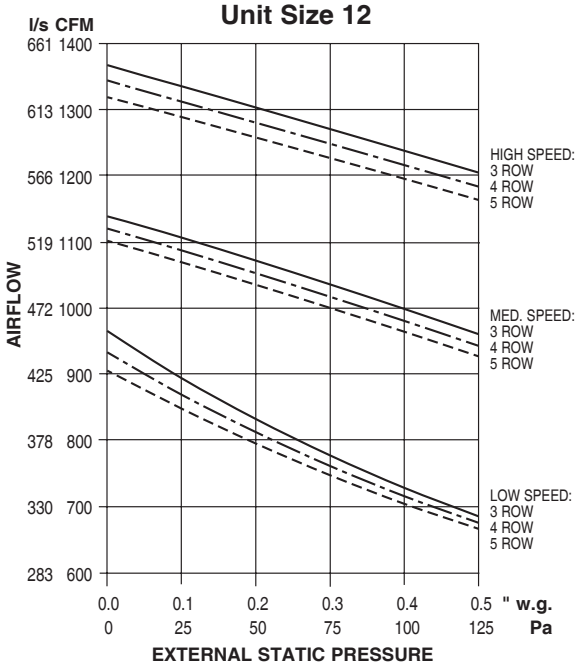
Unit Size 8



Unit Size 10



Unit Size 12



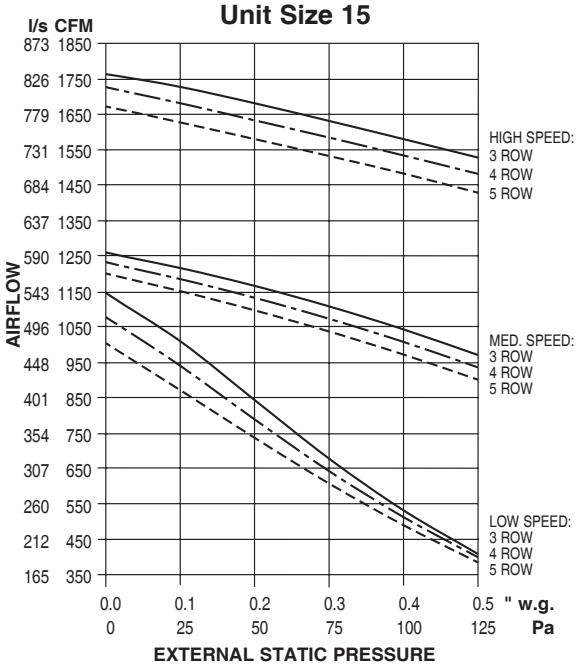
3-Speed ECM Fan Notes:

1. Fan coil units equipped with 3-speed ECM are of the three speed type with separate taps (High, Medium and Low) which provide variable horsepower outputs. Commonly, units are selected and sized on a conservative basis and actual airflow requirements are lower than specified. When this is the case, the unit fan motor can be run at low or medium speed, reducing power consumption and operating cost.
2. Fan curves are applicable to both the total number of rows for a 2-pipe system chilled water or changeover coil and the total number of rows for a 4-pipe system chilled/hot water combination coil.
3. All fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase motors and include internal losses for cabinet, return grille, electric heater, 3, 4 or 5 row water coil and clean 1" (25) throwaway filter. See page A28 for electrical motor performance data.
4. The operating point for units with standard grilles is 0.0 w.g. ESP. Additional external static pressure should be taken into account for top outlet units with remote ducted grilles, MERV rated filters and general filter loading.
5. For one (1) or two (2) row hot water coils (-W heating units) performance will be slightly better. See SelectWorks for performance data Characteristics.
6. Filter pressure drops table shown on page A29.

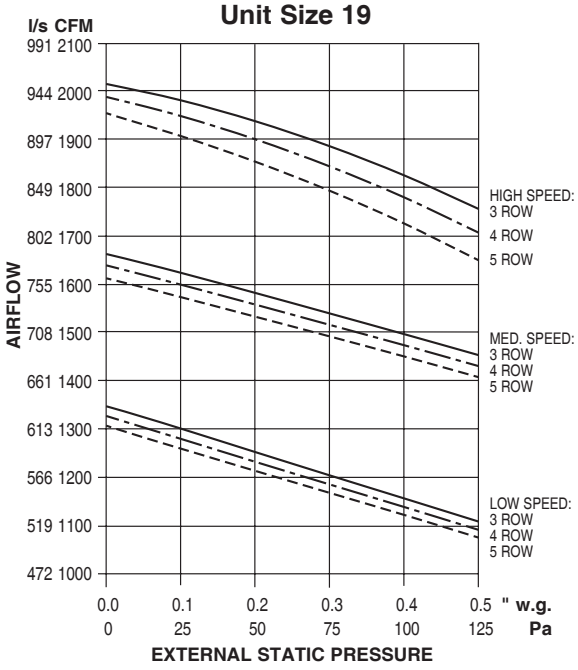
Model Series 39VH, 39L & 39MU • 3-Speed ECM • Fan Performance Curves

Airflow vs. External Static Pressure

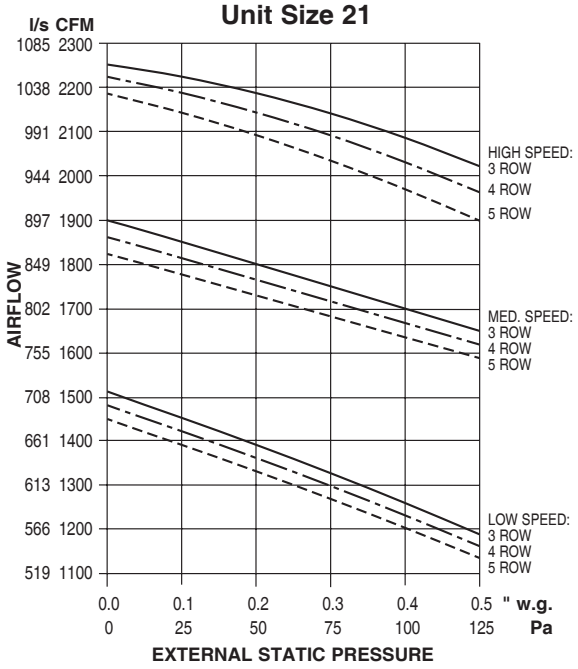
Unit Size 15



Unit Size 19



Unit Size 21

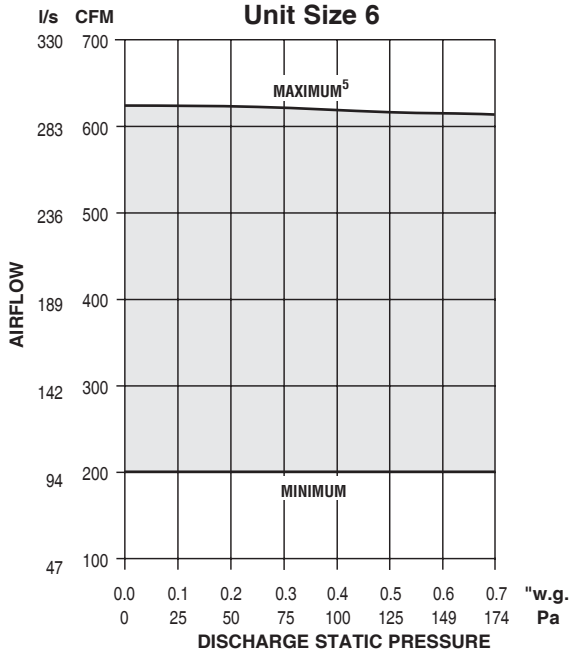


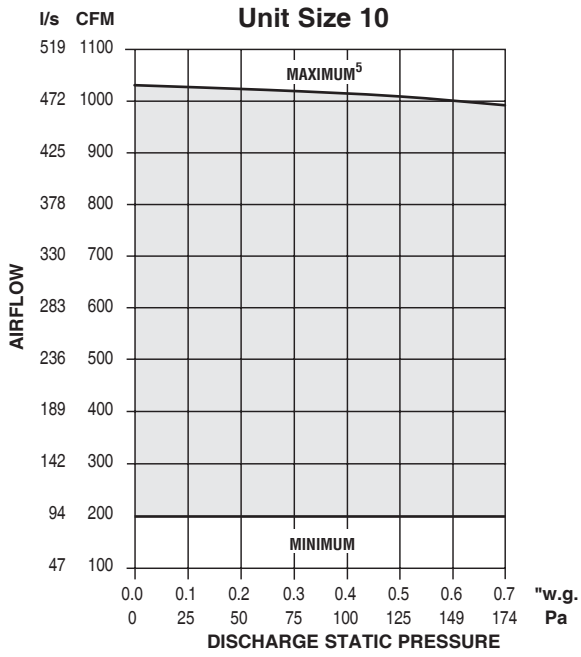
3-Speed ECM Fan Notes:

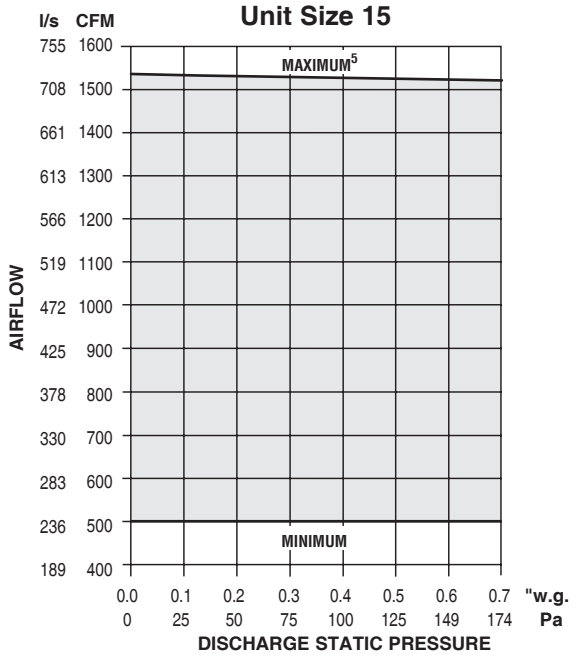
1. Fan coil units equipped with 3-speed ECM are of the three speed type with separate taps (High, Medium and Low) which provide variable horsepower outputs. Commonly, units are selected and sized on a conservative basis and actual airflow requirements are lower than specified. When this is the case, the unit fan motor can be run at low or medium speed, reducing power consumption and operating cost.
2. Fan curves are applicable to both the total number of rows for a 2-pipe system chilled water or changeover coil and the total number of rows for a 4-pipe system chilled/hot water combination coil.
3. All fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase motors and include internal losses for cabinet, return grille, electric heater, 3, 4 or 5 row water coil and clean 1" (25) throwaway filter. See page A28 for electrical motor performance data.
4. The operating point for units with standard grilles is 0.0 w.g. ESP. Additional external static pressure should be taken into account for top outlet units with remote ducted grilles, MERV rated filters and general filter loading.
5. For one (1) or two (2) row hot water coils (-W heating units) performance will be slightly better. See SelectWorks for performance data Characteristics.
6. Filter pressure drops table shown on page A29.

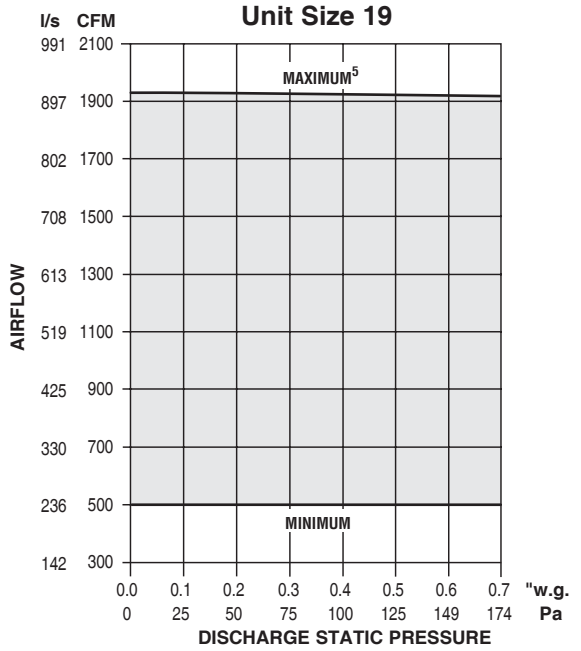
Model Series 39VH, 39L & 39MU • EPIC ECM Motor • Fan Performance Curves

Airflow vs. External Static Pressure









EPIC ECM Notes:

1. The EPIC ECM is a pressure independent constant volume device at set point and airflow does not vary with changing static pressure condition. The motor compensates for any changes in static pressure such as filter loading. Variations in airflow are generated by the controls which reset the fan airflow based on room demand. (See control sequence).
2. Airflow can be set to operate at any point within shaded area under the selected water coil curve using the EPIC volume controller provided.
3. Engineered Comfort Fan Coil units featuring the optional EPIC ECM have considerably wider turn-down ratios than conventional PSC motors. Hence, a reduced number of unit sizes will provide the same fan airflow range when compared with fan coils equipped with PSC motors. A reduction in the number of different fan coil sizes, required on a typical project, simplifies design lay-out, installation and reduces inventory of field service parts.
4. Fan curves shown are applicable to 120/208/240 and 277 volt, single phase EPIC ECM (motors). See page A28 for electrical motor performance data.
5. The maximum curve represents unit performance with a 3-row coil. For one (1) and two (2) row coils (heating only units) performance will be slightly better. Four (4) and five (5) coils are comparable to the maximum curves. See SelectWorks for performance data Characteristics.
6. Filter pressure drops table shown on page A29.

Model Series 39VH, 39L & 39MU • Performance Data

Electrical Motor Characteristics

Unit Size	Voltage	No. of Fans/ Motors	EPIC ECM		3-speed ECM		PSC Motor	
			FLA	Full Load Watts	FLA	Full Load Watts	FLA	HP
3	120	1/1			1.6	105	1.8	1/10
	208	1/1			1.1		0.7	
	240	1/1			1.1		0.7	
	277	1/1			1.0		0.6	
5	120	1/1			2.0	140	1.9	1/10
	208	1/1			1.4		0.7	
	240	1/1			1.4		0.7	
	277	1/1			1.2		0.6	
6	120	1/1	3.6	260	2.5	180	2.7	1/6
	208	1/1	2.3		1.8		1.1	
	240	1/1	2.2		1.7		1.1	
	277	1/1	2.0		1.6		0.9	
8	120	1/1			3.4	250	2.7	1/6
	208	1/1			2.4		1.1	
	240	1/1			2.3		1.1	
	277	1/1			2.1		0.9	
10	120	1/1	6.8	520	4.7	350	4.7	1/3
	208	1/1	4.0		3.3		2.0	
	240	1/1	4.3		3.2		2.0	
	277	1/1	3.6		2.9		1.8	
12	120	1/1			5.3	380	5.5	1/3
	208	1/1			3.7		2.6	
	240	1/1			3.7		2.6	
	277	1/1			3.3		2.1	
15	120	1/1	8.7	710	8.0	590	3.5	1/2
	208	1/1	5.8		5.6		3.8	
	240	1/1	5.4		5.5		3.8	
	277	1/1	4.6		5.0		2.8	
19	120	1/1	12.7	1060	11.9	935	4.3	3/4
	208	1/1	8.5		8.3		5.1	
	240	1/1	7.8		8.2		5.1	
	277	1/1	6.5		7.4		4.1	
21	120	1/1			12.5	1010	4.2	3/4
	208	1/1			8.8		5.1	
	240	1/1			8.6		5.1	
	277	1/1			7.8		4.1	

The FLA and watts are shown at the maximum setting for selected motor type and unit size. The EPIC ECM motor will provide a much lower amp and watt consumption under application conditions. Refer to SelectWorks selection software for application specific data.

Model Series 39VH, 39L & 39MU

Filter Pressure Drop Adjustments (in w.g.)

Unit Size	Airflow		Velocity		Filter Type		Filter Size Width x Height
	CFM	l/s	FPM	m/s	1" (25) Throwaway	1" (25) MERV 8	
	380	179	248	1.260	0.05	0.165	
3	285	134	186	0.945	0.025	0.115	
	210	99	137	0.696	0.006	0.076	
	575	271	376	1.910	0.101	0.267	
5	400	189	261	1.326	0.055	0.176	16 3/4 x 13 1/8 (425 x 333)
	295	139	193	0.980	0.028	0.121	
	730	344	477	2.423	0.142	0.348	
6	550	260	359	1.824	0.094	0.254	
	410	193	268	1.361	0.058	0.181	
	935	441	362	1.839	0.096	0.256	
8	715	337	277	1.407	0.062	0.188	
	550	260	213	1.082	0.036	0.137	
	1115	526	432	2.195	0.124	0.312	24 x 15 1/2 (6110 x 394)
10	835	394	324	1.646	0.08	0.225	
	650	307	252	1.280	0.051	0.168	
	1315	621	353	1.793	0.092	0.248	
12	1080	510	290	1.473	0.067	0.198	
	920	434	247	1.255	0.049	0.164	
	1735	819	465	2.362	0.137	0.339	29 x 18 1/2 (737 x 470)
15	1185	559	318	1.615	0.078	0.221	
	970	458	260	1.321	0.055	0.174	
	1975	932	401	2.037	0.111	0.287	
19	1615	762	328	1.666	0.082	0.228	
	1315	621	267	1.356	0.057	0.180	
	2220	1048	450	2.286	0.131	0.327	29 x 24 1/2 (737 x 622)
21	1820	859	369	1.875	0.098	0.262	
	1480	698	300	1.524	0.071	0.207	

NOTES:

1. Pressure drop based on clean filters. Using any type of filter will lower unit airflow.
2. To determine fan airflow with the addition of a filter, add the filter pressure drop to the external static pressure on the fan curve or use Selectworks.

Model Series 39VH, 39L & 39MU • Sound Power Performance Data

Tested Per AHRI 350 – 2000 — Reverberation Room										
Unit Size	Airflow		Octave Bands / Frequency (Hz) / Sound Power (Lw)							
	cfm	l/s	2	3	4	5	6	7	8	LWA
			125	250	500	1k	2k	4k	8k	
6	110	52	—	—	24	19	—	—	—	24
	200	94	50	38	35	29	—	—	—	37
	300	142	50	48	42	34	30	27	—	43
	400	189	57	52	47	40	34	30	—	48
	600	283	62	57	52	46	41	36	27	54
10	300	142	48	47	40	31	25	18	—	41
	500	236	59	56	50	43	35	29	20	51
	600	283	63	60	53	46	39	32	26	54
	800	378	69	66	58	53	47	41	33	61
	900	425	72	69	61	56	51	46	37	64
	1000	472	74	71	64	59	54	50	42	66
15	600	283	58	52	47	39	32	—	—	48
	800	378	63	58	52	46	41	35	—	54
	1000	472	68	63	57	52	46	41	31	60
	1200	566	72	68	60	56	52	48	39	64
	1300	613	74	69	61	58	54	50	41	65
	1500	708	78	74	66	63	59	56	48	70
19	500	236	52	49	42	36	34	34	38	46
	700	330	57	54	49	42	37	34	38	50
	1000	472	64	59	56	50	46	39	38	57
	1300	613	71	65	62	57	53	48	41	63
	1600	755	75	71	65	63	59	55	47	69
	1900	897	79	75	69	67	64	61	54	73

AHRI CERTIFIED™ www.ahridirectory.org
Room Fan-Coils
AHRI Standard 440

Performance Notes:

1. Sound data was taken with 30% pleated filter in place.
2. Sound power levels are in decibels, dB re 10^{-12} watts.
3. LWA is the A-Weighted Sound Power Level, expressed in decibels (dBA).
4. All sound data listed by octave bands are raw data without any corrections for room absorption or duct attenuation.
5. Data derived from independent tests conducted in accordance with latest version of AHRI Standard 350.

Model Series 39VH, 39L & 39MU • AHRI Standard Ratings

EPIC ECM Motor

Unit Size	Coil Row	Airflow (Dry Flow) CFM	Airflow (Dry Flow) l/s	Cooling Capacity QT (BTUH)	Cooling Capacity QS (BTUH)	Water Flow Rate (GPM)	Water WPD ft-wg	Power Input (Watts)
6	3	600	283	16000	12000	3.6	7.4	280
	4			19000	13000	4.5	15.1	280
10	3	1000	472	28000	21000	5.9	12.5	510
	4			33000	22000	7.3	11.1	510
15	3	1500	708	38000	29000	8.5	7.4	790
	4			49000	34000	10.8	13.4	790

Performance Notes:

1. Based on 80°F DB and 67°F WB EAT, 45°F EWT 10° temperature rise, maximum fan speed. Motor type is ECM or PSC as noted and motor voltage is 115/1/60. Airflow under dry coil conditions. All models tested at 0.0" external static pressure.
2. Unit size 19 to 21 fall outside the scope of AHRI Standard 440 Certification Program (above 1500 CFM).

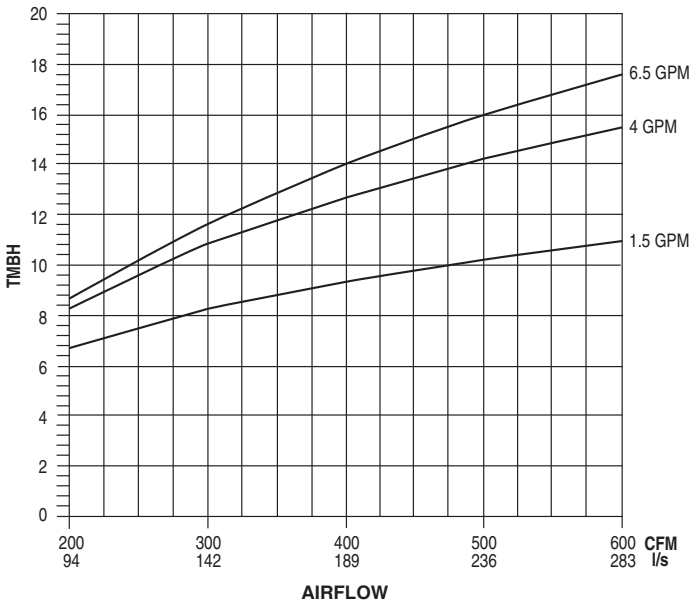
PSC Motor

Unit Size	Coil Row	Airflow (Dry Flow) CFM	Airflow (Dry Flow) l/s	Cooling Capacity QT (BTUH)	Cooling Capacity QS (BTUH)	Water Flow Rate (GPM)	Water WPD ft-wg	Power Input (Watts)
3	3	375	177	12000	9000	2.7	4.2	180
	4			13000	9000	2.9	2.7	
5	3	550	260	16000	12000	3.5	6.9	230
	4			17000	12000	3.6	4.3	
6	3	700	330	18000	14000	4.0	8.9	290
	4	675	319	20000	14000	4.3	5.9	
8	3	900	425	26000	19000	5.5	11.1	350
	4	875	413	31000	21000	6.7	9.4	
10	3	1100	519	29000	21000	6.3	14	500
	4	1075	507	35000	24000	7.6	12	
12	3	1200	566	34000	25000	7.5	5.7	650
	4	1175	554	42000	28000	9.2	9.8	

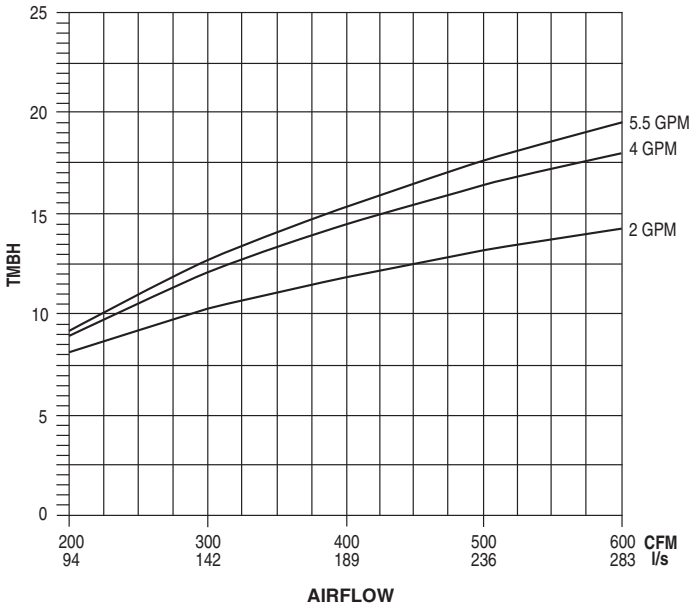
Model Series 39VH, 39L & 39MU • Chilled Water Coil Performance Data
Unit Sizes 3, 5 and 6

Data Based on 75°F DB 63°F WB Entering Air & 45°F Entering Water

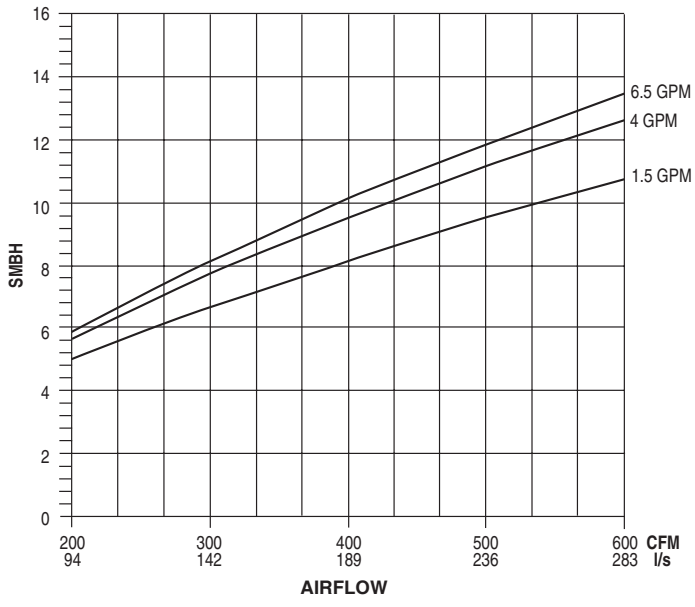
3 Row (Total MBH)



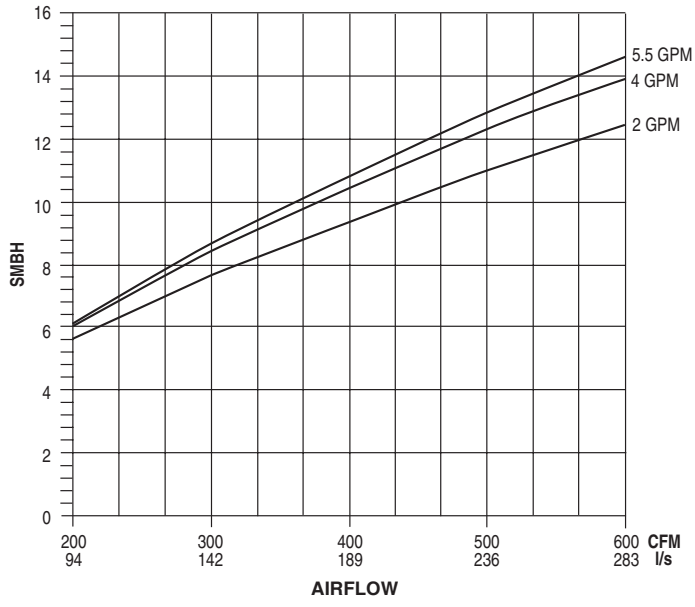
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

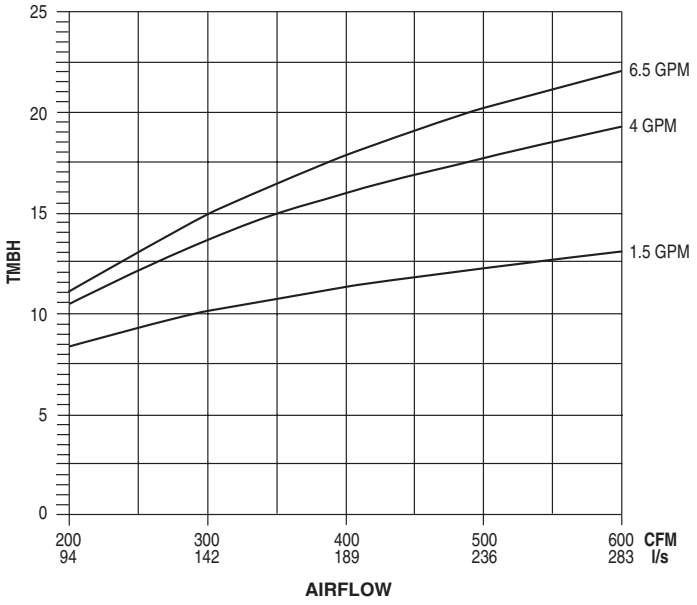
Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./cu. ft)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

Notes:

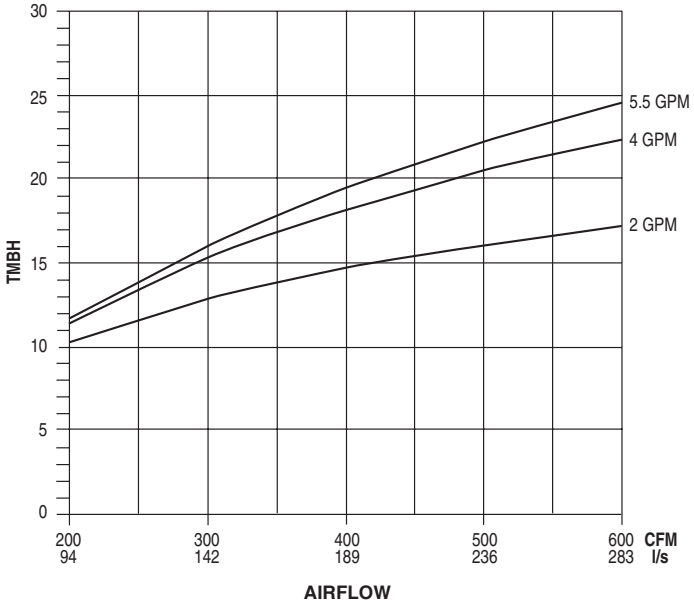
1. Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply the coil capacity or fan curve data by the tabulated correction factor.
2. Connections: 3 and 4 Row 5/8" (15.9) O.D. male solder.

Model Series 39VH, 39L & 39MU • Chilled Water Coil Performance Data
Unit Sizes 3, 5 and 6
Data Based on 80°F DB 67°F WB Entering Air & 45°F Entering Water

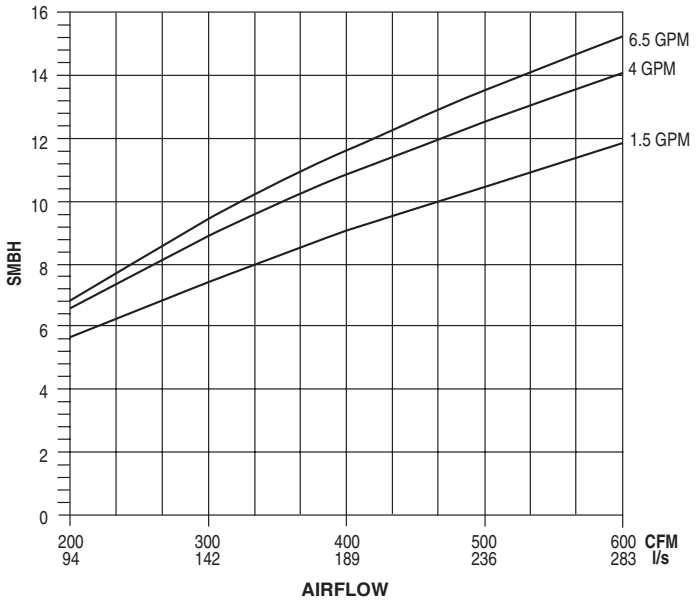
3 Row (Total MBH)



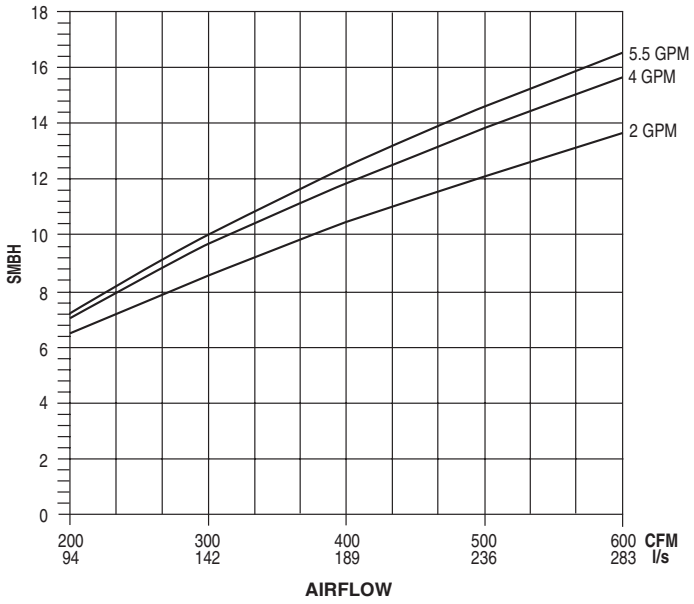
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./cu. ft)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

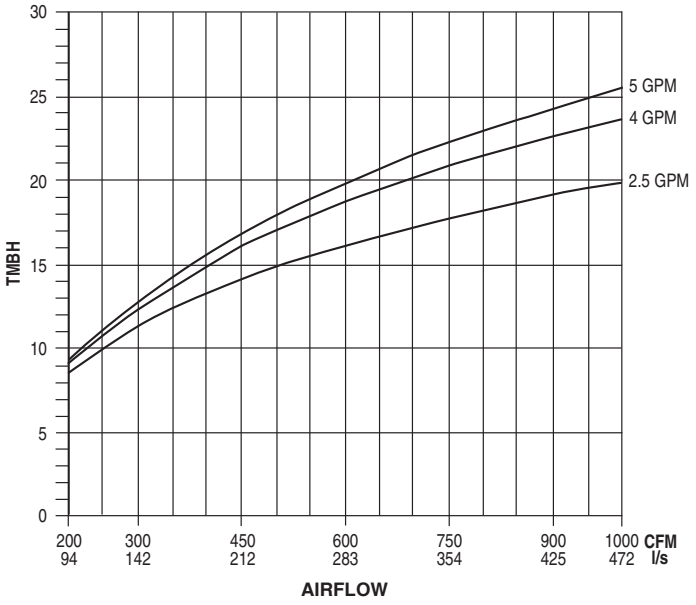
Notes:

1. Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply the coil capacity or fan curve data by the tabulated correction factor.
2. Connections: 3 and 4 Row 5/8" (15.9) O.D. male solder.

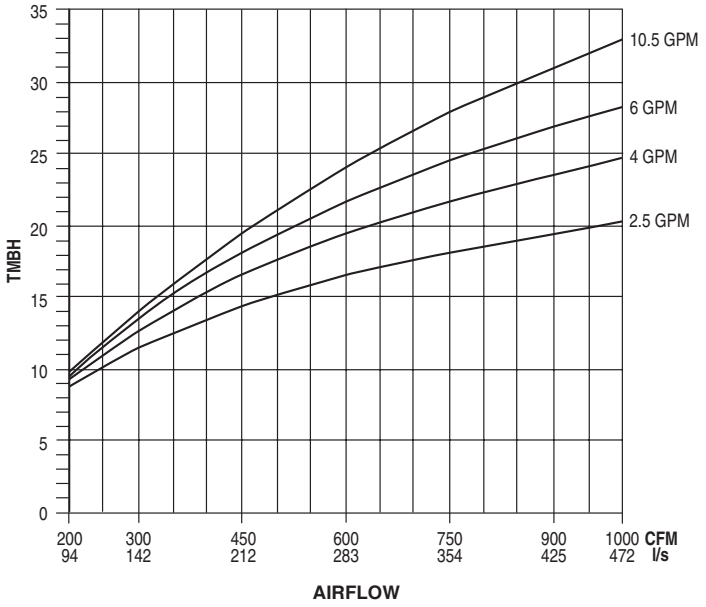
Model Series 39VH, 39L & 39MU • Chilled Water Coil Performance Data
Unit Sizes 8 and 10

Data Based on 75°F DB 63°F WB Entering Air & 45°F Entering Water

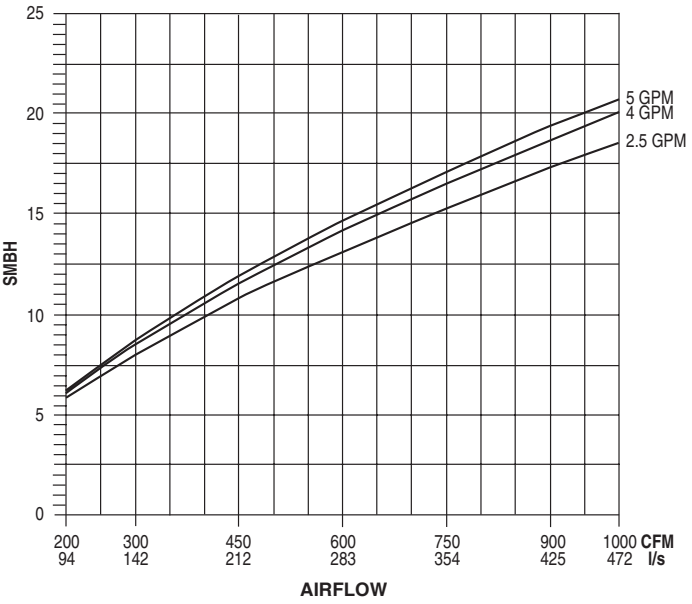
3 Row (Total MBH)



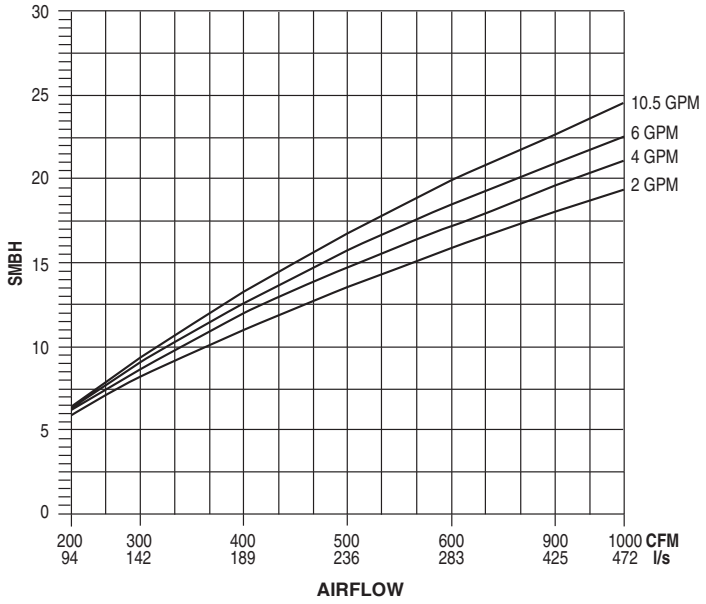
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./cu. ft)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

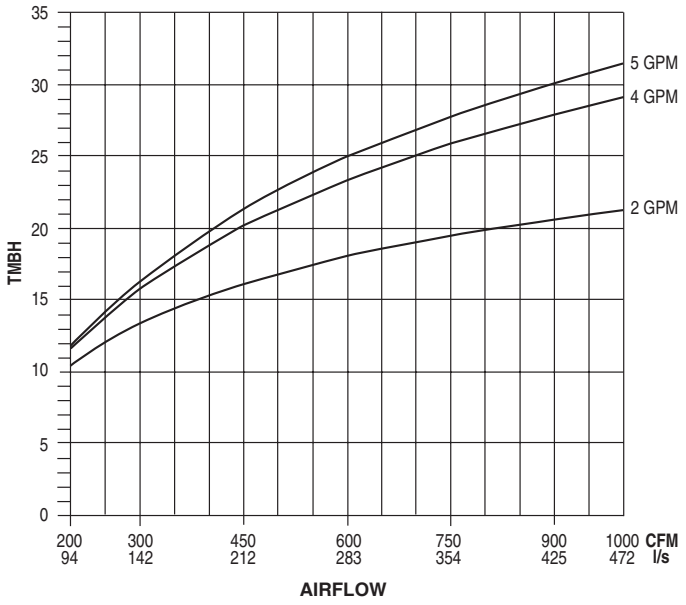
Notes:

1. Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply the coil capacity or fan curve data by the tabulated correction factor.
2. Connections: 3 and 4 Row 5/8" (15.9) O.D. male solder.

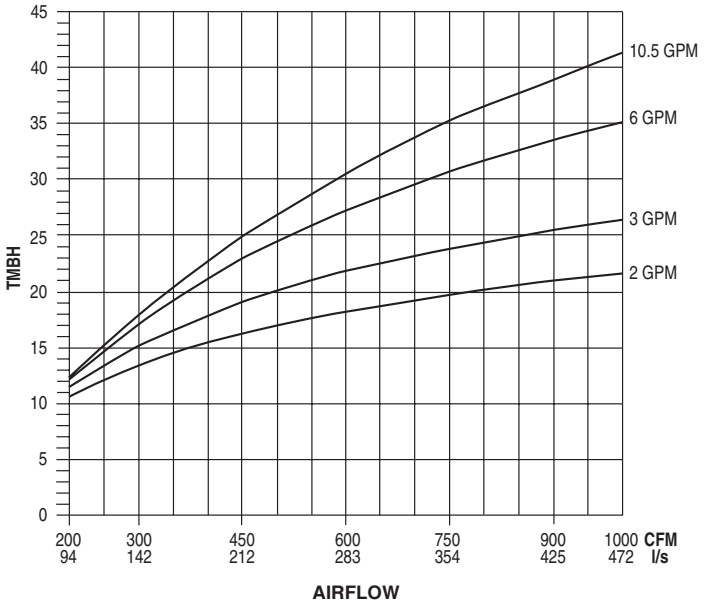
Model Series 39VH, 39L & 39MU • Chilled Water Coil Performance Data
Unit Sizes 8 and 10

Data Based on 80°F DB 67°F WB Entering Air & 45°F Entering Water

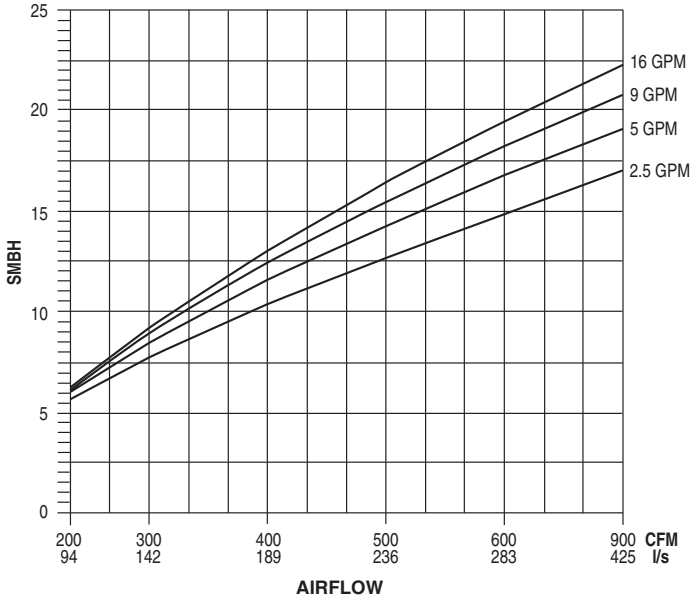
3 Row (Total MBH)



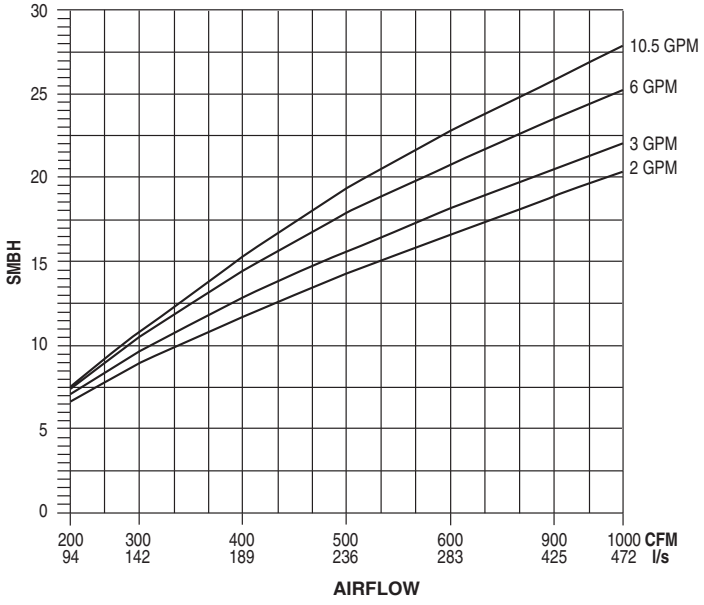
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./cu. ft)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

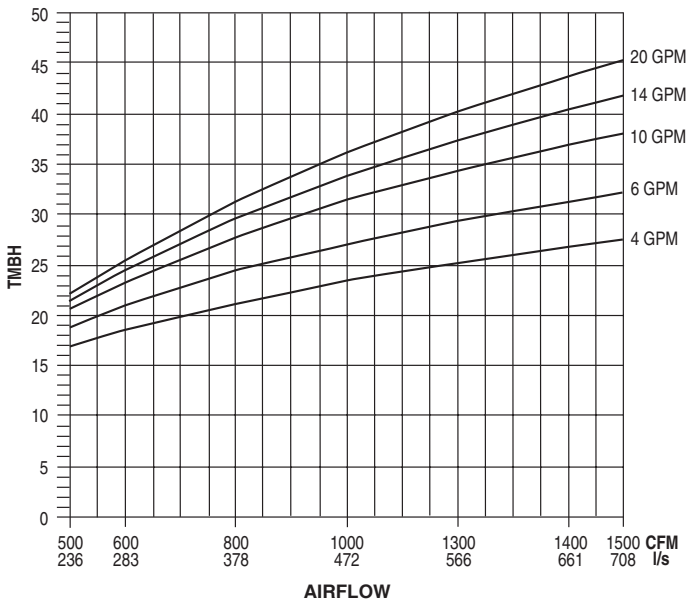
Notes:

1. Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply the coil capacity or fan curve data by the tabulated correction factor.
2. Connections: 3 and 4 Row 5/8" (15.9) O.D. male solder.

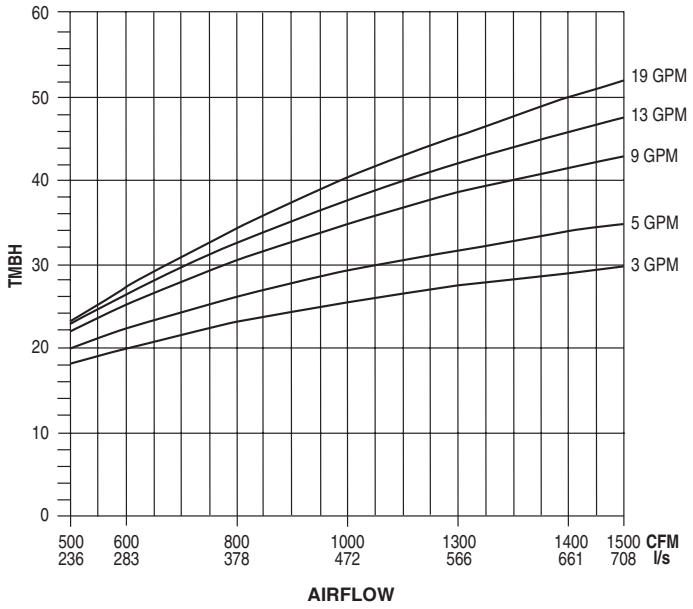
Model Series 39VH, 39L & 39MU • Chilled Water Coil Performance Data
Unit Sizes 12 and 15

Data Based on 75°F DB 63°F WB Entering Air & 45°F Entering Water

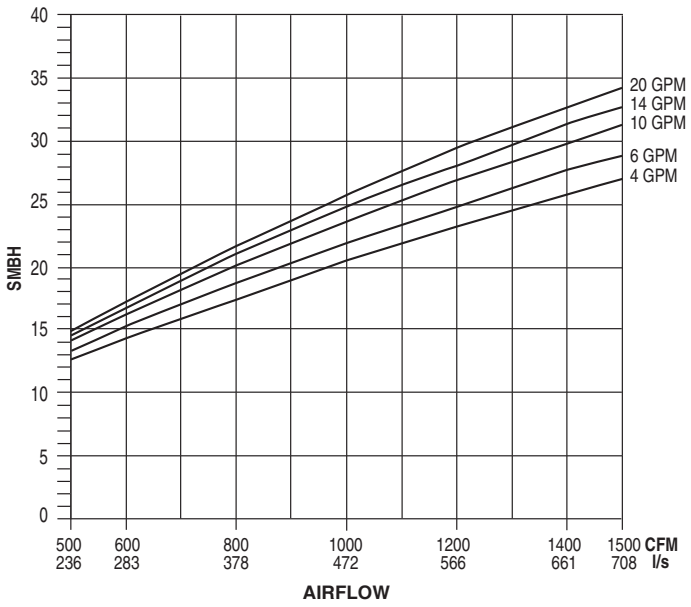
3 Row (Total MBH)



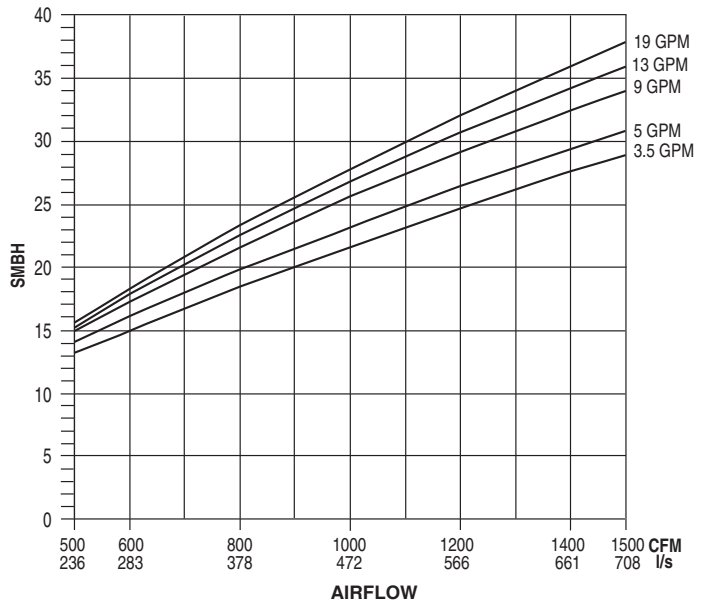
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

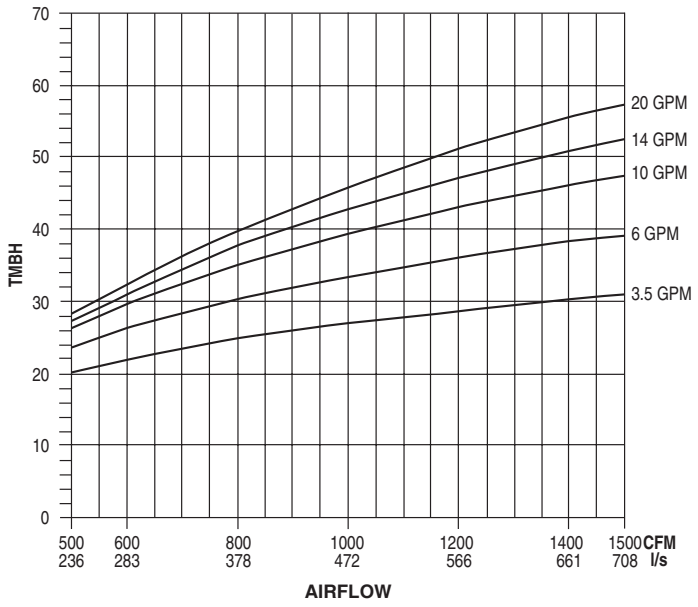
Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./cu. ft)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

Notes:

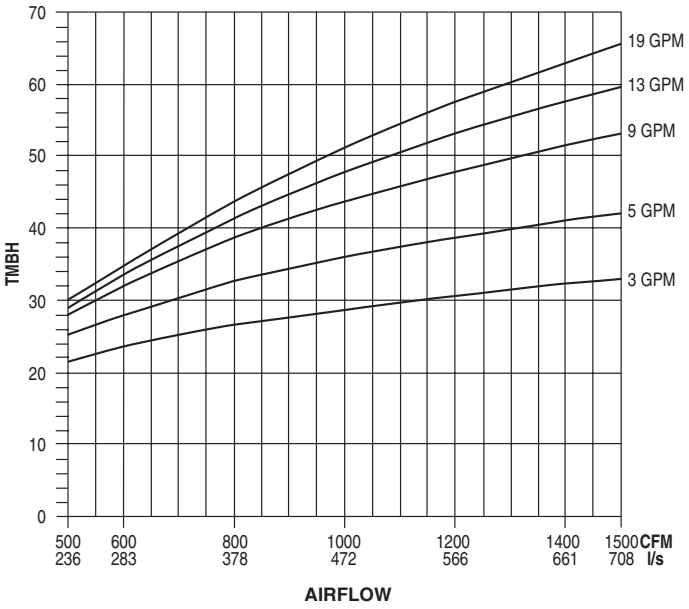
1. Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply the coil capacity or fan curve data by the tabulated correction factor.
2. Connections: 3 and 4 Row 7/8" (22.2) O.D. male solder.

Model Series 39VH, 39L & 39MU • Chilled Water Coil Performance Data
Unit Sizes 12 and 15
Data Based on 80°F DB 67°F WB Entering Air & 45°F Entering Water

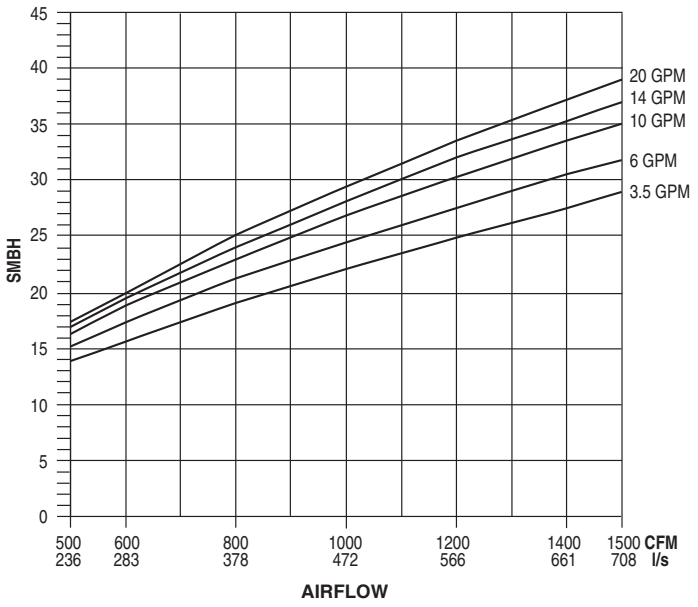
3 Row (Total MBH)



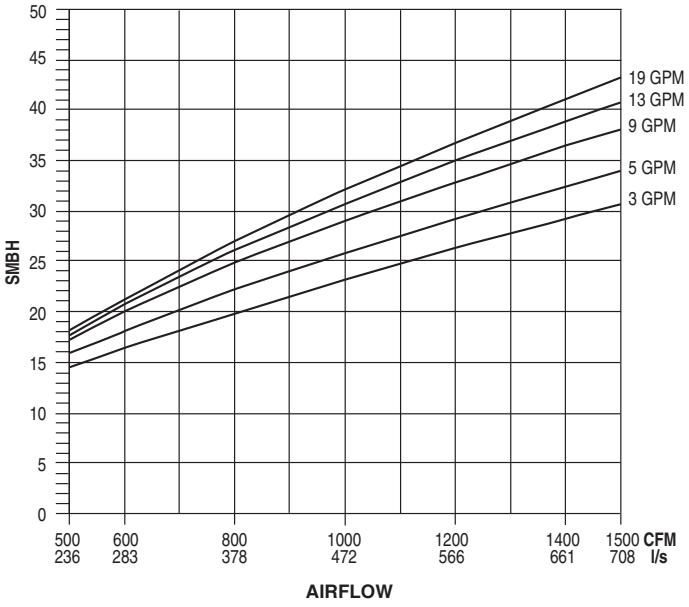
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./cu. ft)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

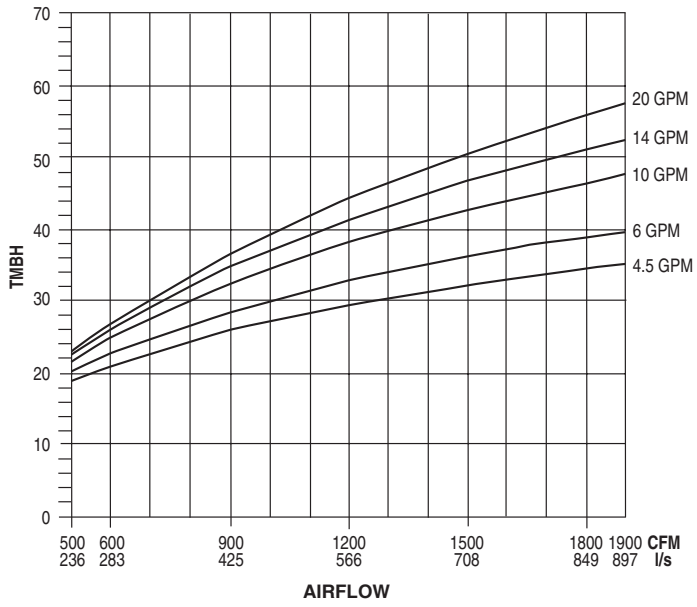
Notes:

1. Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply the coil capacity or fan curve data by the tabulated correction factor.
2. Connections: 3 and 4 Row 7/8" (22.2) O.D. male solder.

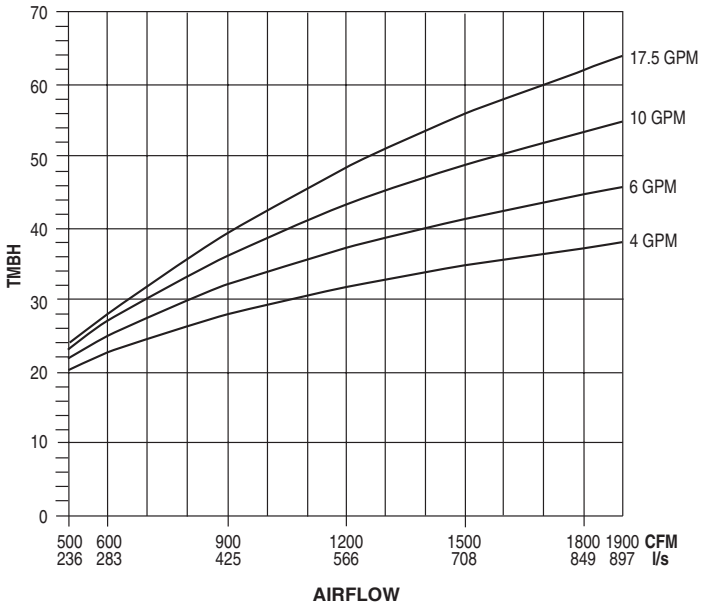
Model Series 39VH, 39L & 39MU • Chilled Water Coil Performance Data
Unit Sizes 19 and 21

Data Based on 75°F DB 63°F WB Entering Air & 45°F Entering Water

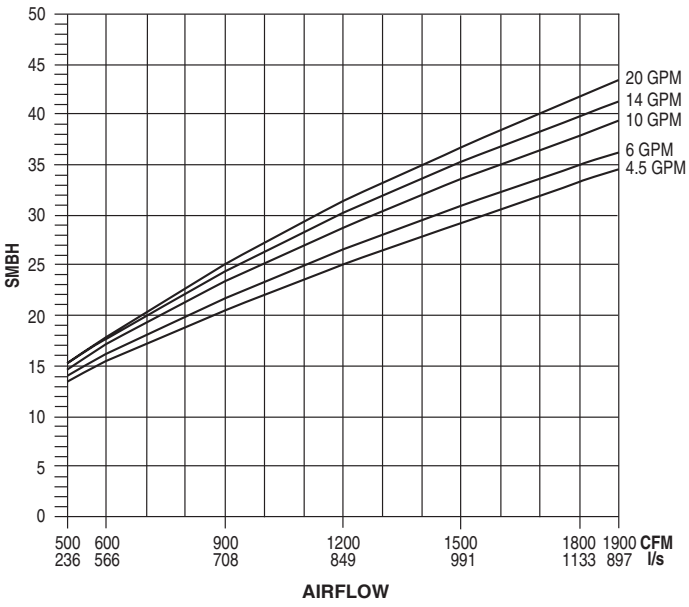
3 Row (Total MBH)



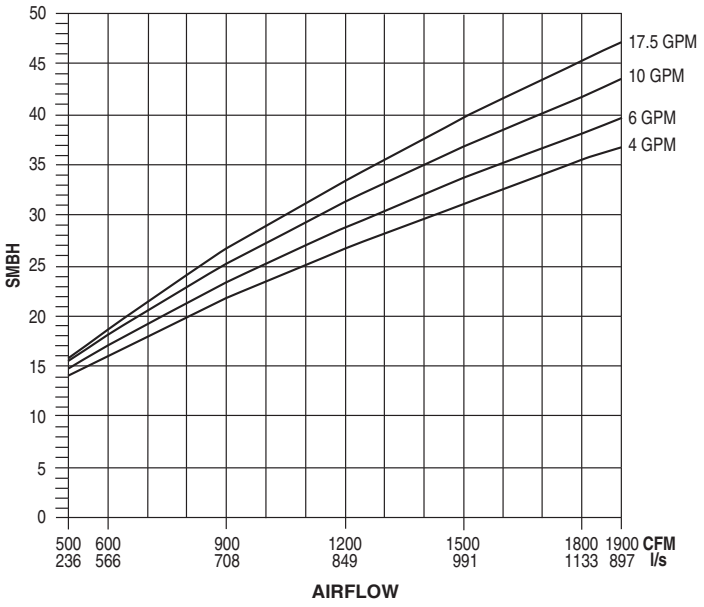
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./cu. ft)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

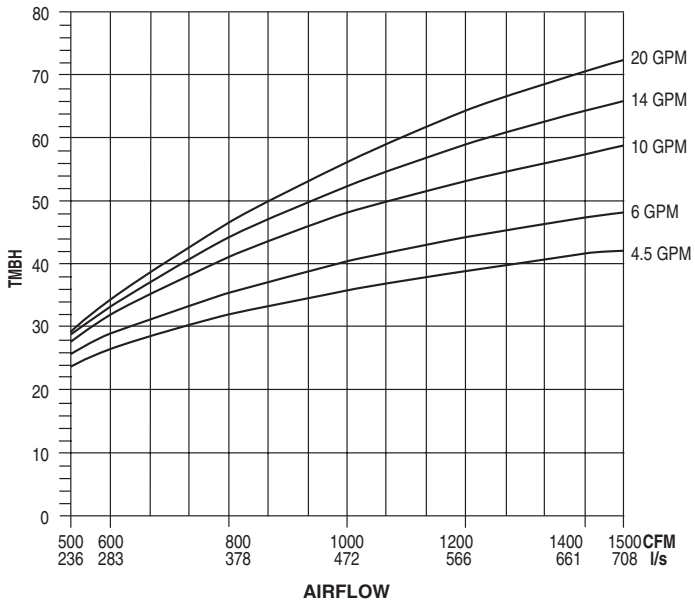
Notes:

1. Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply the coil capacity or fan curve data by the tabulated correction factor.
2. Connections: 3 and 4 Row 7/8" (22.2) O.D. male solder.

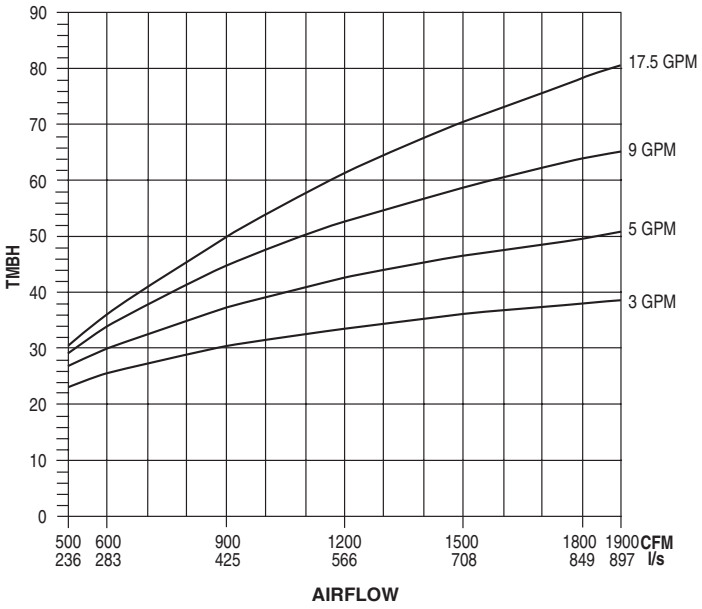
Model Series 39VH, 39L & 39MU • Chilled Water Coil Performance Data
Unit Sizes 19 and 21

Data Based on 80°F DB 67°F WB Entering Air & 45°F Entering Water

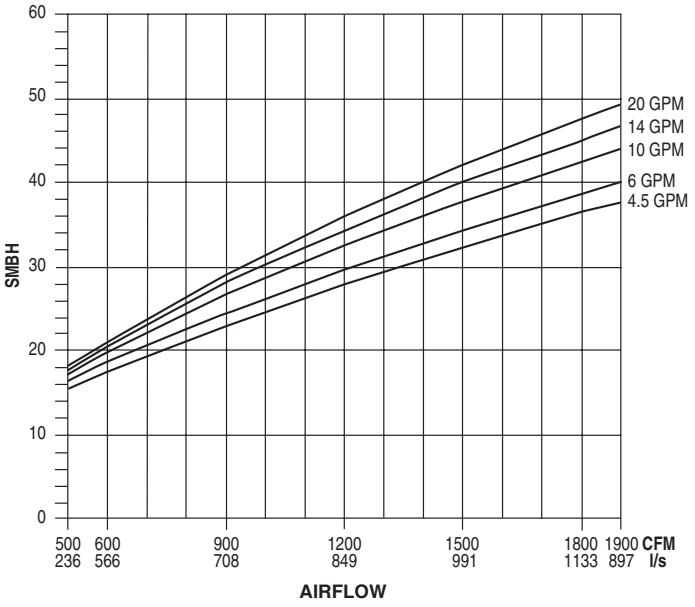
3 Row (Total MBH)



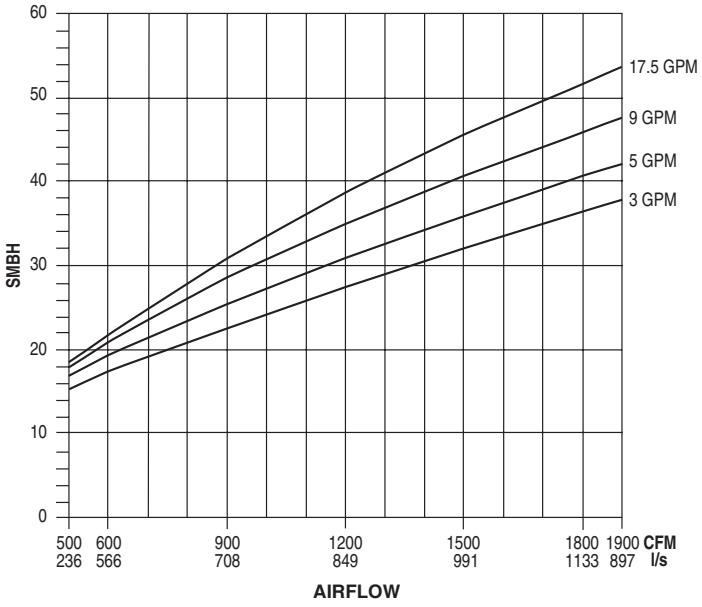
4 Row (Total MBH)



3 Row (Sensible MBH)



4 Row (Sensible MBH)



Altitude Correction Factors

Altitude (ft.)	0	1000	2000	3000	4000	5000	6000	7000
Air Density (lb./cu. ft)	0.075	0.072	0.070	0.067	0.065	0.063	0.060	0.058
Total Capacity	1000	0.988	0.986	0.983	0.981	0.979	0.977	0.975
Sensible Capacity	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770
Static Pressure	1000	0.960	0.930	0.900	0.860	0.830	0.800	0.770

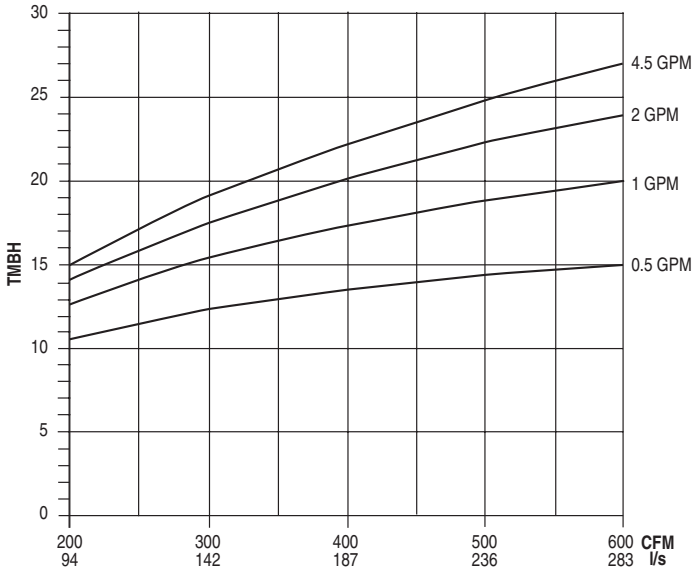
Notes:

1. Capacity and static pressure will be affected for applications above sea level. To apply correction factors, multiply the coil capacity or fan curve data by the tabulated correction factor.
2. Connections: 3 and 4 Row 7/8" (22.2) O.D. male solder.

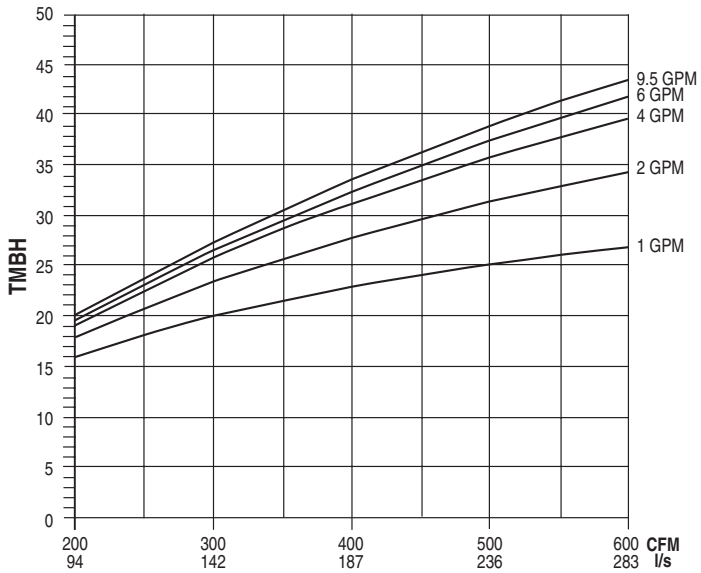
Model Series 39VH, 39L & 39MU • Hot Water Coil Performance Data
Unit Sizes 3, 5 and 6

Data Based on 70°F DB Entering Air & 180°F Entering Water

1 Row (Total MBH)

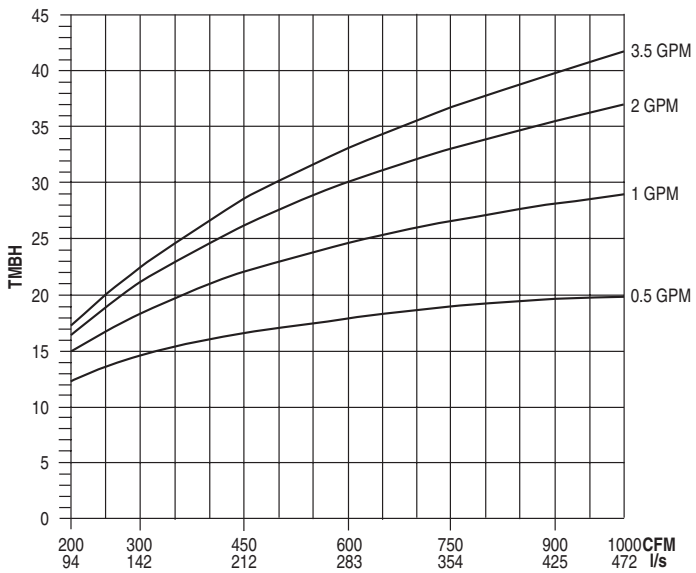


2 Row (Total MBH)

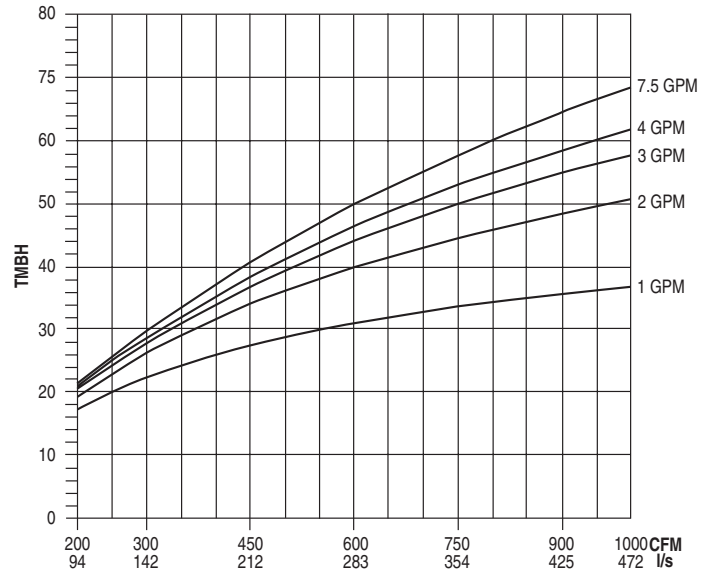


Unit Sizes 8 and 10

1 Row (Total MBH)



2 Row (Total MBH)



NOTES:

1. Capacities are in MBH (kW), ***thousands of Btu per hour (kiloWatts)***.
2. MBH (kW) values are based on a Δt (temperature difference) of 110°F (61°C) between entering air and entering water. For other Δt's; multiply the MBH (kW) values by the factors below.
3. Air Temperature Rise.
   ATR (°F) = 927 x $\frac{MBH}{CFM}$, ATR (°C) = 829 x $\frac{kW}{l/s}$
4. Water Temp. Drop.
   WTD (°F) = 2.04 x $\frac{MBH}{GPM}$, WTD (°C) = .224 x $\frac{kW}{l/s}$
5. Connections: One and two row 5/8" (15.9) O.D. male solder.

Altitude Correction Factors:

Altitude ft. (m)	Sensible Heat Factor
0 (0)	1.00
2000 (610)	0.94
3000 (914)	0.90
4000 (1219)	0.87
5000 (1524)	0.84
6000 (1829)	0.81
7000 (2134)	0.78

Correction factors at other entering conditions:

Δt °F (°C)	50 (28)	60 (33)	70 (39)	80 (44)	90 (50)	100 (56)	110 (61)	120 (67)	130 (72)	140 (78)	150 (83)
Factor	.455 (.459)	.545 (.541)	.636 (.639)	.727 (.721)	.818 (.820)	.909 (.918)	1.00 (1.00)	1.09 (1.10)	1.18 (1.18)	1.27 (1.28)	1.36 (1.36)

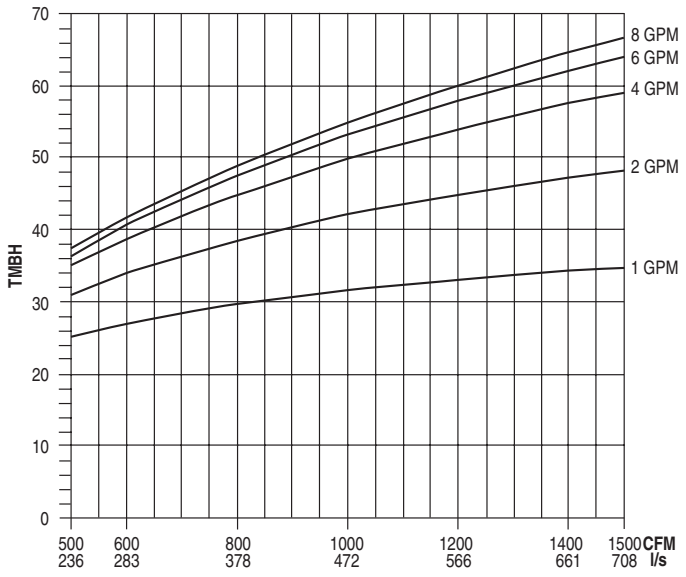
Engineered Comfort

Model Series 39VH, 39L & 39MU • Hot Water Coil Performance Data

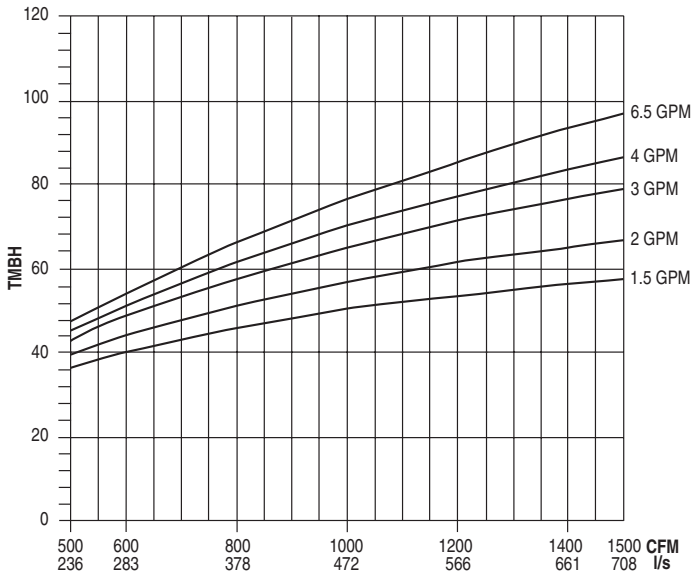
Unit Sizes 12 and 15

Data Based on 70°F DB Entering Air & 180°F Entering Water

1 Row (Total MBH)

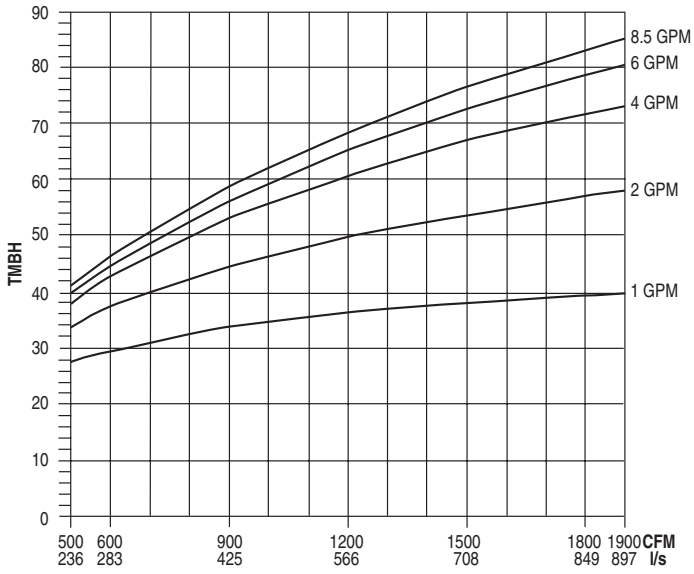


2 Row (Total MBH)

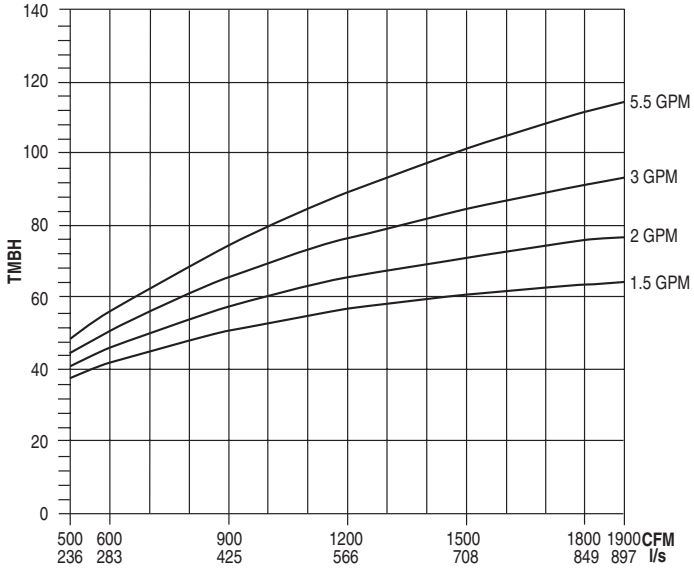


Unit Sizes 19 and 21

1 Row (Total MBH)



2 Row (Total MBH)



NOTES:

1. Capacities are in MBH (kW), ***thousands of Btu per hour (kiloWatts)***.
2. MBH (kW) values are based on a Δt (temperature difference) of 110°F (61°C) between entering air and entering water. For other Δt's; multiply the MBH (kW) values by the factors below.
3. Air Temperature Rise.
   ATR (°F) = 927 x $\frac{MBH}{CFM}$, ATR (°C) = 829 x $\frac{kW}{l/s}$
4. Water Temp. Drop.
   WTD (°F) = 2.04 x $\frac{MBH}{GPM}$, WTD (°C) = .224 x $\frac{kW}{l/s}$
5. Connections: One and two row 5/8" (15.9) O.D. male solder.

Altitude Correction Factors:

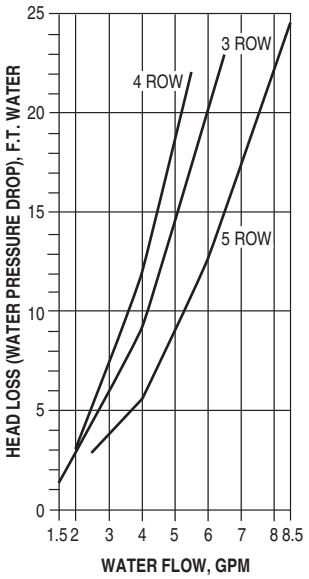
Altitude ft. (m)	Sensible Heat Factor
0 (0)	1.00
2000 (610)	0.94
3000 (914)	0.90
4000 (1219)	0.87
5000 (1524)	0.84
6000 (1829)	0.81
7000 (2134)	0.78

Correction factors at other entering conditions:

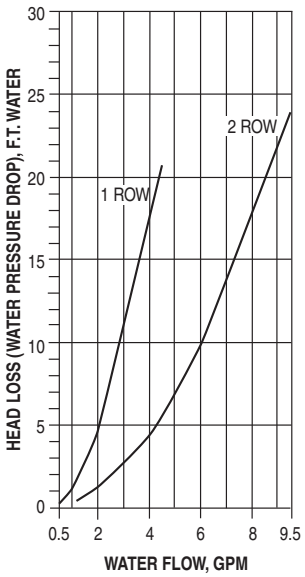
Δt °F (°C)	50 (28)	60 (33)	70 (39)	80 (44)	90 (50)	100 (56)	110 (61)	120 (67)	130 (72)	140 (78)	150 (83)
Factor	.455 (.459)	.545 (.541)	.636 (.639)	.727 (.721)	.818 (.820)	.909 (.918)	1.00 (1.00)	1.09 (1.10)	1.18 (1.18)	1.27 (1.28)	1.36 (1.36)

Model Series 39VH, 39L & 39MU • Coil Performance Data • Pressure Drop
Unit Sizes 3, 5 and 6

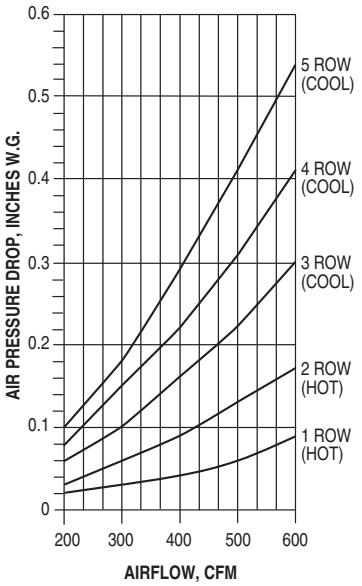
Chilled Water Pressure Drop



Hot Water Pressure Drop

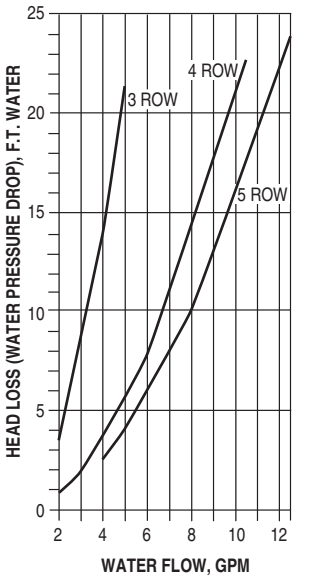


Chilled and Hot Water Air Pressure Drop

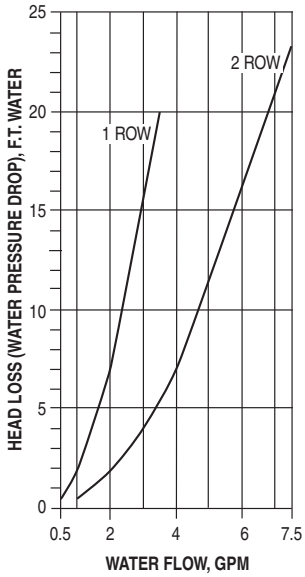


Unit Sizes 8 and 10

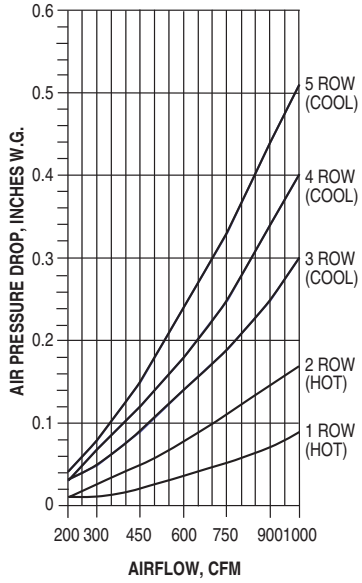
Chilled Water Pressure Drop



Hot Water Pressure Drop



Chilled and Hot Water Air Pressure Drop

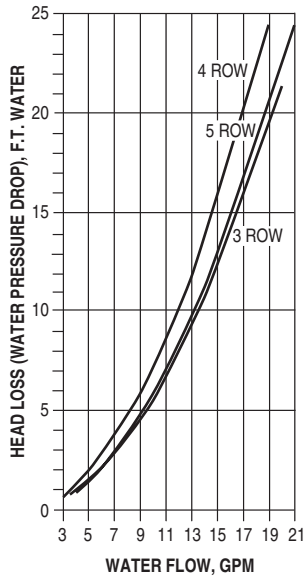


Metric Conversion Factors:

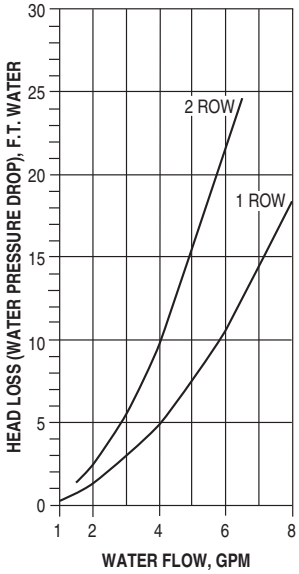
1. Water Flow (liters per second)
   l/s = gpm x 0.6309
2. Water Head Loss (kilopascals):
   kPa = ft. w.g. x 2.9837
3. Airflow Volume (liters per second)
   l/s = CFM x 0.472
4. Air Pressure Drop (Pascals):
   Pa = in. w.g. x 248.6
5. Heat (kilowatts):
   kW = Mbh x 0.293
6. Air Temperature Rise.
   $ATR = 927 \times \frac{Mbh}{CFM}$
7. Water Temp. Drop.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$

Model Series 39VH, 39L & 39MU • Coil Performance Data • Pressure Drop
Unit Sizes 12 and 15

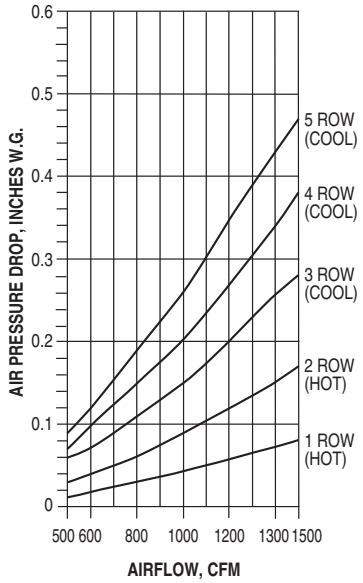
Chilled Water Pressure Drop



Hot Water Pressure Drop

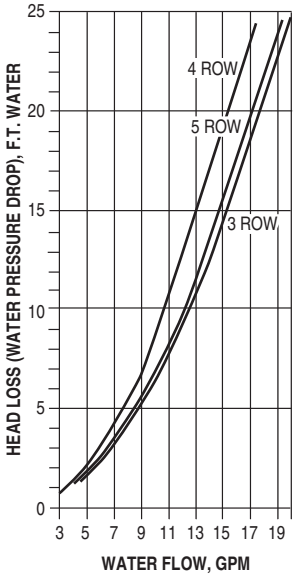


Chilled and Hot Water Air Pressure Drop

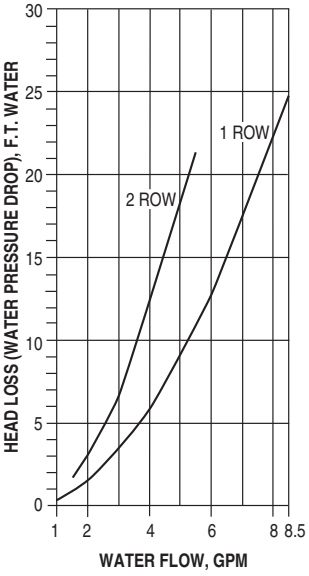


Unit Sizes 19 and 21

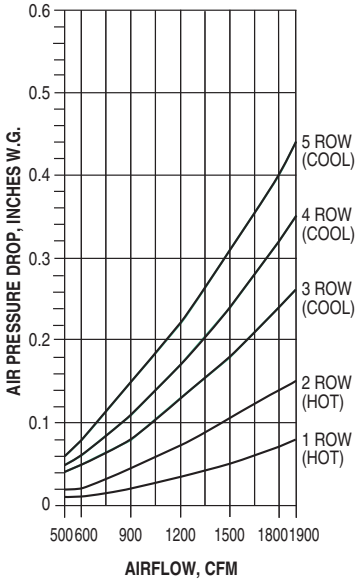
Chilled Water Pressure Drop



Hot Water Pressure Drop



Chilled and Hot Water Air Pressure Drop



Metric Conversion Factors:

1. Water Flow (liters per second)
   l/s = gpm x 0.6309
2. Water Head Loss (kilopascals):
   kPa = ft. w.g. x 2.9837
3. Airflow Volume (liters per second)
   l/s = CFM x 0.472
4. Air Pressure Drop (Pascals):
   Pa = in. w.g. x 248.6
5. Heat (kilowatts):
   kW = Mbh x 0.293
6. Air Temperature Rise.
   $ATR = 927 \times \frac{Mbh}{CFM}$
7. Water Temp. Drop.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$

Model Series 39VH, 39L & 39MU • Suggested Specifications

1. General

   Furnish and install Engineered Comfort Vertical Hi-Rise Direct Drive Fan Coil Units where indicated on the plans and in the specifications. Units shall be completely factory assembled, tested, and shipped as one piece. All units shall be capable of meeting or exceeding the scheduled capacities for cooling, heating, and air delivery. All unit dimensions for each model and size shall be considered maximums. Units shall be ETL listed in compliance with UL/ANSI Standard 1995, and be certified as complying with the latest edition of AHRI Standard 440.

2. Construction
   a. All unit chassis shall be fabricated of heavy gauge galvanized steel panels able to meet 125-hour salt spray test per ASTM B-117. All exterior panels shall be insulated with 1/2" (13) thick insulation with a maximum k value of .24 (BTU • in) / (hr • ft^2 • °F) and rated for a maximum air velocity of 6000 fpm. Insulation must meet all requirements of ASTM C 1071 (including ASTM C 665), UL 181 for erosion, and carry a 25/50 rating for flame spread/smoke developed per ASTM E-84, UL 723, NFPA 90A, and NFPA 255.

   Optional
   - For units with multiple outlets, include an insulated sheet metal baffle inside the discharge plenum to break the sight lines between the two discharge outlets and to attenuate room noise that could be transmitted through the openings.
   - All units shall have decorator front panels fabricated of not less than 18 gauge (1.31) galvanized steel. The front panel shall include a commercial grade return air grille and be attached with quarter turn quick open fasteners to allow for easy removal and access for service.
   - All exposed units shall have exterior panels fabricated of not less than 18 gauge (1.31) galvanized steel. The front panel shall be attached with quarter turn quick open fasteners to allow for easy removal and access for service.

   b. Provide an architectural grade double deflection aluminum discharge grille.

   Optional
   - Provide foil faced insulation in lieu of standard. Foil insulation shall meet or exceed the requirements stated above, and in addition meet ASTM Standards C-665 and C-1136 for biological growth in insulation. Insulation shall be lined with aluminum foil, fiberglass scrim reinforcement, and 30 pound Kraft paper laminated together with a flame-resistant adhesive. All exposed edges shall be sealed to prevent any fibers from reaching the air stream.
   - Provide Elastomeric Closed Cell Foam Insulation in lieu of standard. Insulation shall conform to UL 181 for erosion and NFPA 90A for fire, smoke and melting, and comply with a 25/50 Flame Spread and Smoke Developed Index per ASTM E-84 or UL 723. Additionally, insulation shall comply with Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21. Polyethylene insulation is not acceptable.

3. Painted Finish

   All painted cabinet exterior panels shall be finished with a TGIC Polyester powder paint of the standard factory color.

4. Sound

   Units shall have published sound power performance level data derived from independent tests conducted in accordance with latest version of AHRI Standard 350.

5. Fan Assembly
   a. Unit fan shall be dynamically balanced, forward curved, DWDI centrifugal type constructed of 18 ga. (1.31) galvanized steel for corrosion resistance. Motors shall be high efficiency, permanently lubricated sleeve bearing, permanent split-capacitor type with UL and CSA listed automatic reset thermal overload protection and three separate horsepower taps. Single speed motors are not acceptable.
   b. Provide a blower panel to cover the entire fan assembly. The blower panel shall be tight fitting to prevent air bypass and prohibit accidental contact with the fan assembly. Units that allow accidental contact with the fan assembly with the decorator front panel removed are not acceptable.
   c. The fan assembly shall be removed and serviced through the front and safety panels. The entire assembly shall be able to come out of the unit easily by removing four screws and unplugging the motor.

6. Coils
   a. All cooling and heating coils shall optimize rows and fins per inch to meet the specified capacity. Coils shall have seamless copper tubes and shall be mechanically expanded to provide an efficient, permanent bond between the tube and fin. Fins shall have high efficiency aluminum surface optimized for heat transfer, air pressure drop and carryover.
   b. All coils shall be tested at 360 PSIG air pressure, and rated for a maximum 300 PSIG working pressure at 200°F (93°C). All coils are pressure tested with a minimum 360 PSIG of dry air with higher test pressures performed as required.
   c. Heating coils shall be furnished in the reheat position as standard.
   d. All water coils shall be provided with a manual air vent fitting to allow for coil venting.

   Optional
   - Provide automatic air vents in lieu of manual air vents.
   - Coil casing shall be fabricated from stainless steel.

7. Drain Pans
   a. Primary condensate drain pans shall be single wall, heavy gauge galvanized steel for corrosion resistance, and extend under the entire coil section. Drain pans shall be of one-piece construction and be positively sloped for condensate removal. A P-Trap shall be furnished, factory piped to the condensate drain riser.
   b. The drain pan shall be externally insulated with fire retardant, closed cell foam insulation. The insulation shall carry no more than a 25/50 Flame Spread and Smoke Developed Rating per ASTM E-84 and UL 723 and an Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21. The P-Trap shall be easily removed and serviced through the front panel.

   Optional
   - Provide a primary drain pan constructed entirely of heavy gauge type stainless steel for superior corrosion resistance. Stainless steel drain pans shall be externally insulated and meet or exceed the requirements stated above.

8. Filters

   All units shall be furnished with a minimum 1" (25) nominal glass fiber throwaway filter. Filters shall be tight fitting to prevent air bypass. Filters shall be easily removable from the return air opening with the front panel removed, without the need for tools.

   Optional
   - Provide unit with 1" (25) MERV 8 pleated filter.

9. Electrical

   Units shall be furnished with single point power connection. Provide a terminal strip for motor and other electrical terminations. The factory mounted terminal wiring strip consists of a multiple position screw terminal block to facilitate wiring terminations for the electric control valves and thermostats.

10. Electric Heat
    a. Furnish an electric resistance heating assembly as an integral part of the fan coil unit, with the heating capacity, voltage and kilowatts scheduled. The heater assembly shall be rated for installation on the fan coil unit and be located so as not to expose the fan assembly to excessive leaving air temperatures that could affect motor performance.

Model Series 39VH, 39L & 39MU • Suggested Specifications (continued)

b. The heater and unit assembly shall be listed for zero clearance and meet all NEC requirements, and be ETL listed with the unit as an assembly in compliance with UL/ANSI Standard 1995.

c. All heating elements shall be open coil type Ni-Chrome wire mounted in ceramic insulators and located in an insulated heavy gauge galvanized steel housing. All elements shall terminate in a machine staked stainless steel terminal secured with stainless steel hardware for corrosion resistance. The element support brackets shall be spaced no greater than 3-1/2" (89) on center. All internal wiring shall be rated for 221°F (105°C) minimum.

d. All heaters shall include over temperature protection consisting of an automatic reset primary thermal limit.

Optional

- Provide a manual reset secondary thermal limit.

e. All units with electric heat shall be provided with an incoming line power distribution block, designated to accept single point power wiring capable of carrying 125% of the calculated load current.

11. Piping Packages

a. Provide a standard factory assembled valve piping package to consist of a 2 or 3-way, on/off, motorized electric control valve and two ball isolation valves. Control valves shall be piped normally closed to the coil. Maximum entering water temperature on the control valve shall be 200°F (93°C), and maximum close-off pressure 25 PSIG. Maximum operating pressure shall be 300 PSIG.

b. Piping packages shall include stainless steel braided hoses to allow for thermal expansion within the unit cabinet. The hose shall be EPDM inner lined and Kevlar® reinforced, with stainless steel FNPT swivels and/or fittings. The hoses shall be rated for a maximum 450 PSIG working pressure at 250°F (121°C), and shall conform to NFPA 90A and carry no more than a 25/50 Flame Spread and Smoke Developed Rating, per ASTM E-84 and UL 723.

Optional

- Provide a 0-10 VDC modulating control valve (fail-in-place) in lieu of standard 2-position control valve with factory assembled valve piping package.
- Provide either a fixed or adjustable flow control device for each piping package.
- Provide pressure-temperature ports for each piping package.

c. Piping packages shall be completely factory assembled, including interconnecting pipe, and mounted inside the unit in a serviceable location over the coil and primary drain pan.

12. Risers

a. Furnish chilled and hot water supply and return risers mounted to the unit. Risers shall be Type-M seamless copper tube and include swaged connections at the top for connection to the unit above. Slip couplings are not acceptable.

Optional

- Provide Type-L copper risers that meet or exceed the requirements stated above.

b. Risers shall be insulated with 1/2" (13) closed cell foam insulation covering the entire riser. Insulation shall conform to NFPA 90A and carry no more than a 25/50 Flame Spread and Smoke Developed Rating, per ASTM E-84 and UL 723.

Optional

- Provide 3/4" (19) closed cell foam insulation that meets or exceeds the requirements stated above.

c. Condensate drain risers shall be Type-M seamless copper tube and meet the requirements stated above.

Optional

- Risers shall be factory fabricated, bundled, and tagged separate from the fan coil units, allowing for shipment and installation of risers prior to the fan coil units. The riser tag must show the corresponding FCU tag, floor number, room number, riser number, CW, HW, and condensate pipe diameters. Refer to submittal drawing on ship separate/loose riser assembly.

13. Outside Air Damper

Optional

- Provide a manual outside air damper with hand-locking quadrant.
- Provide a motorized outside air damper integral to the unit. The damper actuator shall be spring return closed.

Features & Benefits

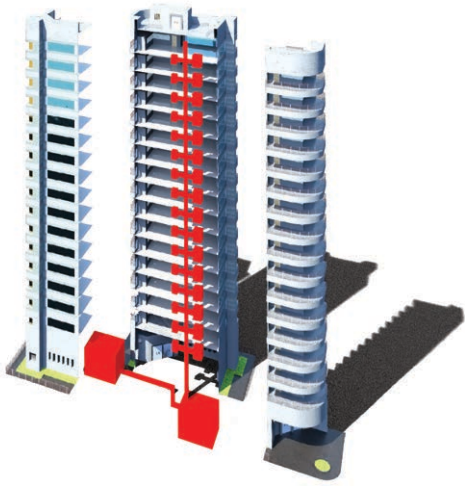
When designing a multi-tenant residential or hospitality hi-rise building there are several different choices for the air conditioning system. The system selection must consider how the decision affects all the interested parties over the life of the building, including the developer, contractors, building management, owner, and/or dwelling owner in the case of a condominium. Ultimately, all these groups have common goals, but how they prioritize these goals may differ. The developer is concerned with return on investment, the contractor is concerned with ease of installation and reduced call backs, the building management wants to reduce maintenance, and the owner wants a reliable and comfortable space.

An easy choice to meet all these needs is a Water Source Heat Pump (WSHP) system. This system provides a refrigerant based heating/cooling system in each unit that is served by a building level water loop. Fundamentally the dwelling unit-based heat pump rejects/draws heat from a building water loop that has also has a heat addition or rejection system. The building system includes a cooling tower (heat rejection), boiler (heat addition), and piping to transport the water. The unit system includes a compressor, reversing valve, mixing valve, coil, heat exchanger and fan.

WSHP Systems benefit all interested parties

From a developer standpoint the WSHP system provides a lower up-front cost than the traditional chilled water system. A chilled water system would require a chiller, (possible cooling tower), boiler, 4-pipe insulated system, and fan coil systems. The WSHP system eliminates one set of pipes and doesn't require insulation. Also, the cooling tower is less expensive, less complex, and easier to maintain than an air-cooled chiller system. A WSHP eliminates the need for dwelling unit based external equipment as you would need from an air-cooled heat pump system, decreasing sound pollution and increasing the aesthetics of the building exterior. These benefits increase the return on investment of the building.

For the contractor a WSHP system is less complex and easier to install. Without the need for insulated pipes there is no worries of condensation causing an issue and a call back. In the case of the Nailor Serenity Vertical Stacked heat pumps, the assembly is modular. This allows



the cabinets to be delivered and installed separately from the cooling cool and compressor chassis. This reduces risk of damage while on the job site.

A less complex system also benefits the building management through reduced maintenance costs and worry. The modular design on the Serenity Vertical Stacked WSHP makes it easy to service, the building maintenance can easily replace the chassis while maintenance is performed. This reduces downtime of the dwelling air conditioning. Concentrating most of the cooling work, and electricity used, in the unit allows the conditioning costs to be individually monitored. For a condominium development, it makes it easier for each unit to be responsible for these costs, which is not easy for a centralized chilled water system.

Finally, for the occupant or dwelling unit owner the highly efficient, reliable, and quiet system reduces their costs while providing a comfortable space. A study published in 2011 found that a WSHP system reduced overall building energy use by 8% when compared to an air-cooled chiller system and 20% compared to a water-cooled chiller system. Individual owners who understand the implications of this will be attracted to a building that makes a low impact on the environment.

Engineered Comfort Serenity vertical stacked units are the optimal choice for water source heat pumps high rise residential or hospitality project. They require a minimum amount of floor space and can be configured fit the needs of any project. These new units have been designed from the ground up to provide the most efficient assembly on the market. The vertical cabinets provide for efficient use of the valuable floor space in your project. The modular nature of the assembly, Cabinet + Chassis, allows for efficient installation and maintenance. And, the heat pumps utilize the latest technology to bring the provide the most energy efficient portfolio of products in the industry. Units are available in a wide range of sizes (3/4 to 3 ton) and with industry leading factory installed options, to support the needs of a wide range of applications resulting in reduced time, material and labor.

Model Series 44VH

Standard Features

CONSTRUCTION:
- 20 ga. (1.00) G60 galvanized steel casing.
- Vibration Isolators are integral to the chassis support rails to help minimize noise and vibration transmission resulting in quiet operation.
- Drain pan insulated wuth closed cell foam Sloped and constructed of stainless steel. The primary drain pan sits below the air coil to capture all condensate in cooling mode. A factory installed condensate overflow sensor disables unit operation when the condensate level reaches the sensor.

FAN ASSEMBLIES:
- Forward curved, DWDI centrifuged type blower.
- Singel phase, 3-Speed ECM motors with thermal overload protection.
- Quick disconnect motor connections.
- Easily removable slide out fan/motor deck for service.

COMPRESSOR
- Highly efficient rotary (sizes 9-12) and scroll (sizes 15+) compressors provide energy efficient operation.
- Vibration isolated mounting and insulated compressor compartment allow for quiet operation.

HEAT EXCHANGER
- High efficiency coiled coaxial heat exchanger is designed to reduce space requirements and increase energy efficiency.

THERMAL EXPANSION VALVE
- Thermal expansion valve with internal check valve reduces piping needs for construction.

FRONT RETURN PANEL
- Dual doors for separate access to fan and filter.
- High performance louvered return air grille.
- Quarter-turn cam lock fasteners.
- Durable baked powder coat Appliance White paint finish.

SUPPLY AIR LOCATION
- Front, left, right, and back supply grille options.
- Top outlet (ducted for remote grilles).
- Aluminum double deflection grille(s).

CHASSIS:
- Removable, allows staged installation and ease of service and routine maintenance. By utilizing a single set of risers, Serenity® units stack from floor to floor to simplify installation. For staged installation projects, cabinets can be shipped separately from the refrigerant chassis.
- The chassis, which includes the complete refrigerant circuit, slides into the cabinet after the construction debris has been removed to ensure trouble-free operation at start-up.
- When a chassis requires service, it can be quickly replaced in a matter of minutes by sliding the existing chassis out and sliding a spare chassis into the cabinet.

COIL
- 3 Rows, 3 Circuits, 14 fins/in

FILTERS
- 1" throwaway standard (factory provided) or an optional 1" or 2" Merv 8 for improved indoor air quality.

ELECTRICAL:
- ETL listed for safety compliance.
- Removable electrical enclosure with hinged access door for controls, fan and chassis.120, 208, 240 or 277 Volts (60 Hz) power supply.

WATER HOSES:
- Stainless steel braided hoses connect the chassis to the supply and return water piping, while also isolating the compressor vibration from the building's piping system.

BALL VALVES
- Shutoff valves with hose bib connection are standard on every unit.

Options

CABINET
- ½" (13) Steri-liner, 4 lb/ft^3 density foil backed insulation.
- ½" (13) Fiber-free elastomeric closed cell foam insulation.
- Manual or motorized outside air damper.
- Custom built sub-base.

SUPPLY/RETURN RISERS
- Custom lengths can be provided to meet the exact floor-to-floor dimension of the project, along with standard options available to meet the requirements of the job site specifications.
- Supply, Return, and Condensate risers can be factory installed and piped to ball valves within the cabinet, or they can be shipped separately to the job site.
- Type K, L or M copper with swaged connections.
- ¾" to 3" (19 to 76) diameter.
- ½" and ¾" (13 and 19) closed cell foam insulation.
- Rider extensions
- Riser chase

RISER CHASE
- For added protection a galvanized steel cover attached to the unit can be ordered as an option to avoid riser damage during shipping, handling and installation.

Model Series 44VH • High Performance (88" and 80" High)

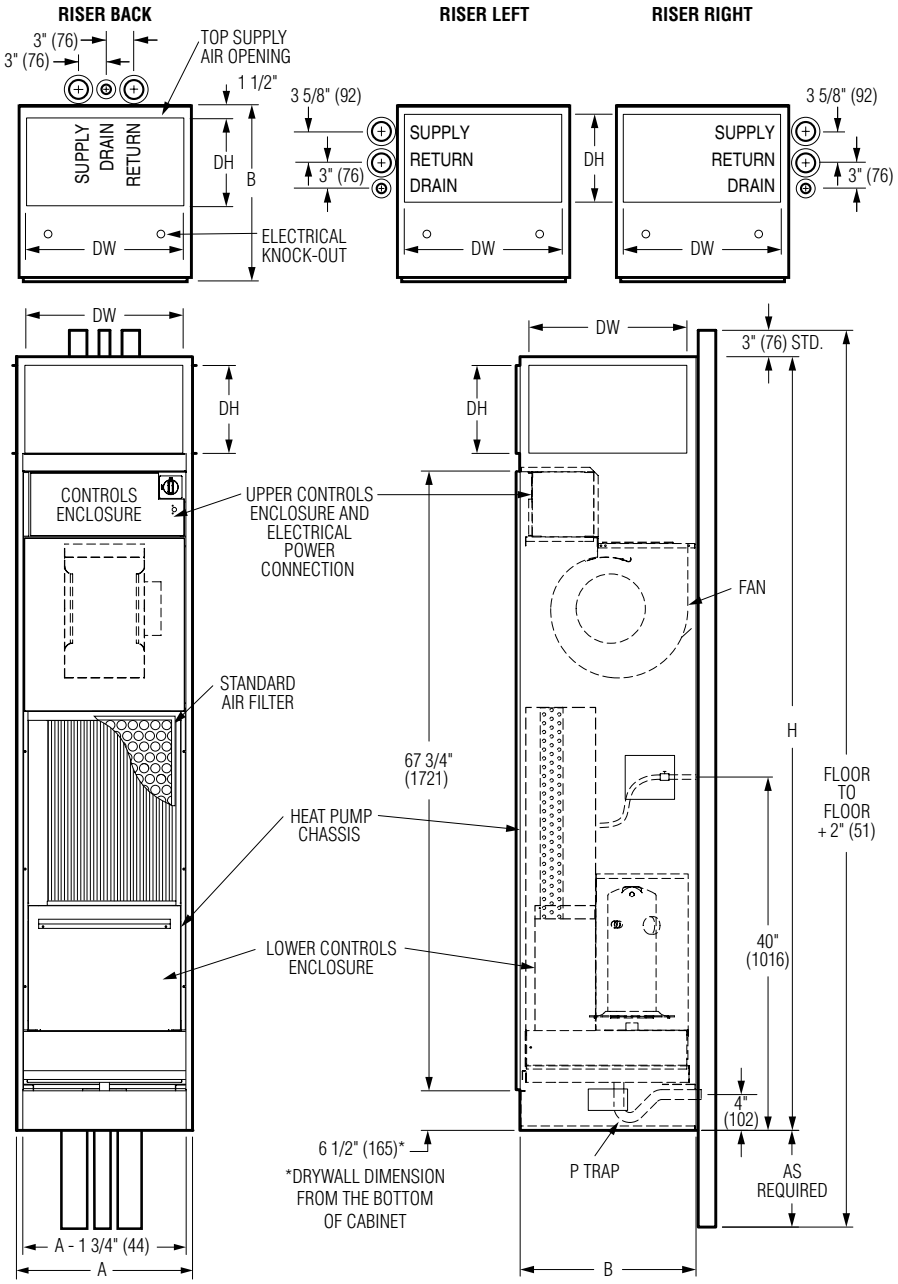
TYPES:
C Concealed **M** Master **S** Slave

CABINET OPTIONS:
SSS Standard (Chassis ships separately)
SWC Standard (Shipped with Chassis)
LSS Low Profile (Chassis ships separately)
LWC Low Profile (Shipped with Chassis)

STANDARD FEATURES:
- 20 ga. (1.0) galvanized steel casing.
- Removable chassis allows staged installation and ease of maintenance.
- ECM Ultra-high efficiency fan motor with overload protection.
- High-efficiency rotary & scroll compressors.
- Stainless steel braided hose kits for connection from piping risers to chassis.
- TXV metering device.
- 1/2" (13) dual density insulation, exposed edges coated to prevent air erosion.
- 1" (25) throwaway filter.
- Galvanized steel insulated drain pans.
- Factory installed P-Trap.
- Integrated drain pan with condensate overflow sensor.
- Multiple supply air discharge options, factory or field configurable.
- Unique double isolation compressor mounting for quiet operation.
- Front return panel with AW Appliance White powder coat finish.
- Exceeds ASHRAE 90.1 efficiencies.

OPTIONS:
- 1" (25) MERV 8 pleated filter.
- 2" (51) MERV 8 pleated filter.
- Plaque return panel with optional finishes.
- Full riser chase.
- Factory mounted risers.
- Stainless steel drain pans.
- Toggle disconnect switch.
- Door interlocking type disconnect switch.
- Cabinet stand.
- Tamper proof fasteners.
- Condensate pump.
- Insulated heat exchanger.
- Outside air damper.
- Thermostat/Controls (by EC).

Voltage:
Single phase, 60 Hz.
❑ 208V/230V ❑ 265V



Dimensional Data

Unit Size	Footprint A x B	Supply Grille Nominal DW x DH	Cabinet SSS/SWC H	Cabinet LSS/LWC H	Filter Size
9, 12	17 x 17 (432 x 432)	15 x 10 (281 x 254)	88 (2236)	80 (2031)	14 x 24 (356 x 610)
15, 18	20 x 20 (508 x 508)	18 x 10 (457 x 254)			16 x 25 (406 x 635)
24	24 x 24 (610 x 610)	22 x 10 (559 x 254)			20 x 25 (508 x 635)
30, 36	24 x 24 (610 x 610)	22 x 10 (559 x 254)			20 x 30 (508 x 762)

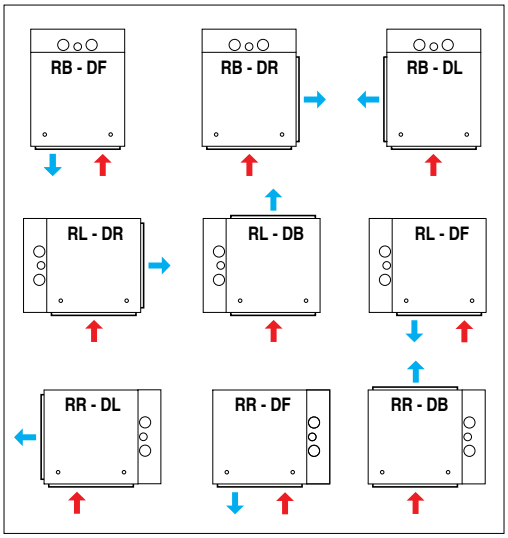
NOTES:
1. Wiring from electrical entry knock-out to controls enclosure is furnished and field installed by others.
2. Risers available from 3/4" (19) to 3" (76) dia. with either 1/2" (13) or 3/4" (19) thick insulation.
3. Max. riser length is 120" (3048), 100" (2540) min.
4. Back riser location shown.
5. For indoor use only.

Dimensions are in inches (mm).

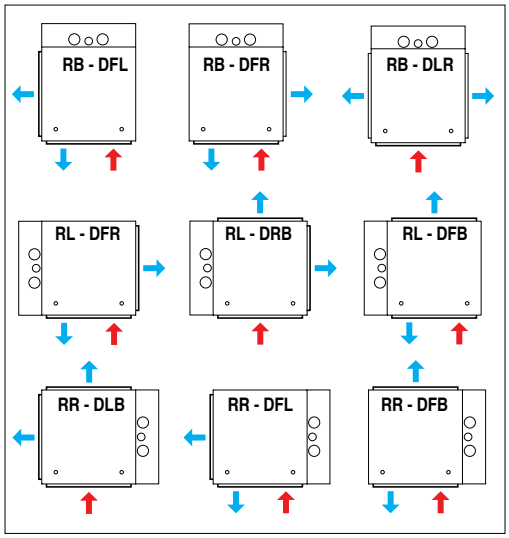
6-18-21

Model Series 44VH • Unit Configurations for Riser Location & Discharge Grille Arrangement

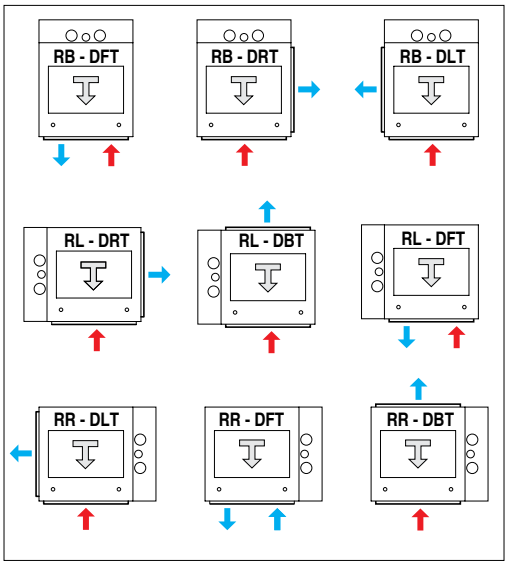
SINGLE SIDE SUPPLY



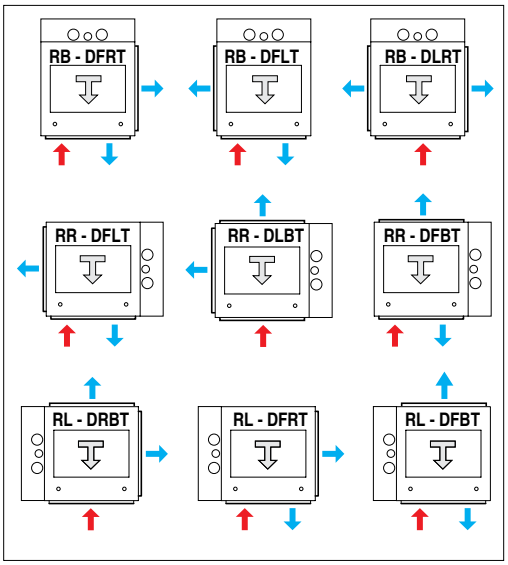
DOUBLE SIDE SUPPLY



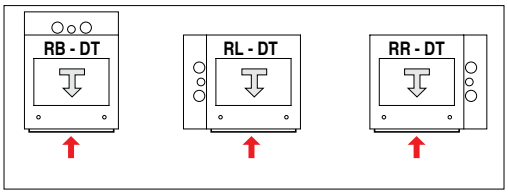
TOP AND SINGLE SIDE SUPPLY



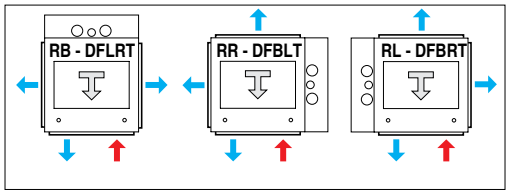
TOP AND DOUBLE SIDE SUPPLY



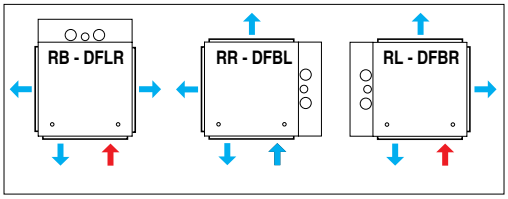
TOP ONLY SUPPLY



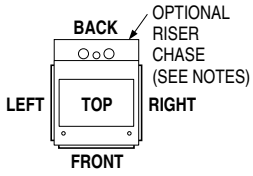
TOP AND TRIPLE SIDE SUPPLY



TRIPLE SIDE SUPPLY



UNIT DESIGNATIONS



EXAMPLE: RB-DFXXX-VR

RISER LOCATION:
RB = BACK
RR = RIGHT
RL = LEFT

DISCHARGE GRILLE LOCATION 1:
DF = FRONT
DT = TOP
DL = LEFT
DR = RIGHT

DISCHARGE GRILLE LOCATION 2, 3 & 4:
L = LEFT
B = BACK
R = RIGHT
T = TOP

OUTSIDE AIR LOCATION:
VL = LEFT
VR = RIGHT

SUPPLY AIRFLOW

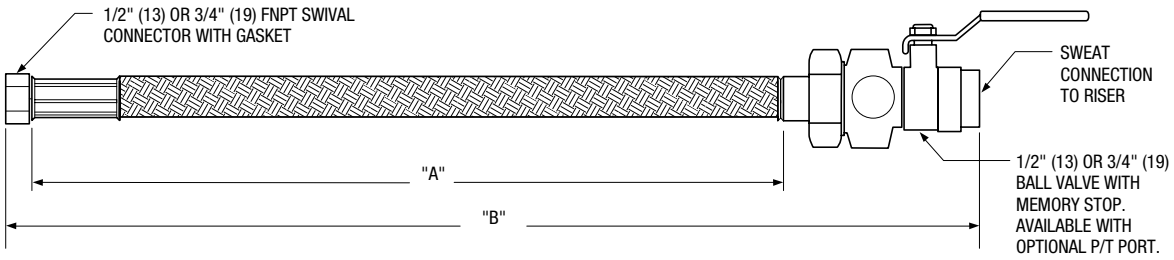
RETURN AIRFLOW

NOTES:

1. Return air panel and unit access are always on front of unit.
2. A sight and sound baffle is provided on double side supply units with a directly opposite grille location. Not available with triple supply or top outlets.
3. Opposed blade damper on one supply grille for units with double supply and two grilles for triple supply outlets.
4. Last optional character refers to ventilation outside air location. Options are left or right side only and must be opposite to any left or right riser.
5. Type C Stand-alone units shown with optional riser chase. Riser chase not available on Type M Master units. Type A units must be mated to Type B units. For Type B and S units, first character references connection location only (risers are on Type A or M unit respectively).
6. Exposed models are available as standard with RB Riser Back location only.

Model Series 44VH

Stainless Steel Flexible Hoses



Piping packages on Nailor Vertical Hi-Rise fan coil units feature 1/2" (13) or 3/4" (19) flexible stainless steel braided hoses on all 2-pipe and 4-pipe configurations as standard. Flexible hose kits provide significant benefits over hard piping during installation, commissioning, operation and maintenance.

- Flexible hoses allow for easy field configuration of left hand, right hand and back riser connections without the need for thermal cutting and joining of piping, saving time and money.
- Permit looping the pipe lines and bypassing the coil in order to flush the system for debris prior to operation.
- Flexible hoses allow for thermal expansion and contraction.
- Threaded swivel end connections facilitate coil and piping package removal for service and repair.
- Pressure rating: 375 PSIG @ 250°F (450 PSI test pressure).
- Flame and Smoke Spread meet 25/50 per UL 723.
- Ball valve with memory stop allows the ball valve to be closed and returned to the balance setting position, without re-testing the system.

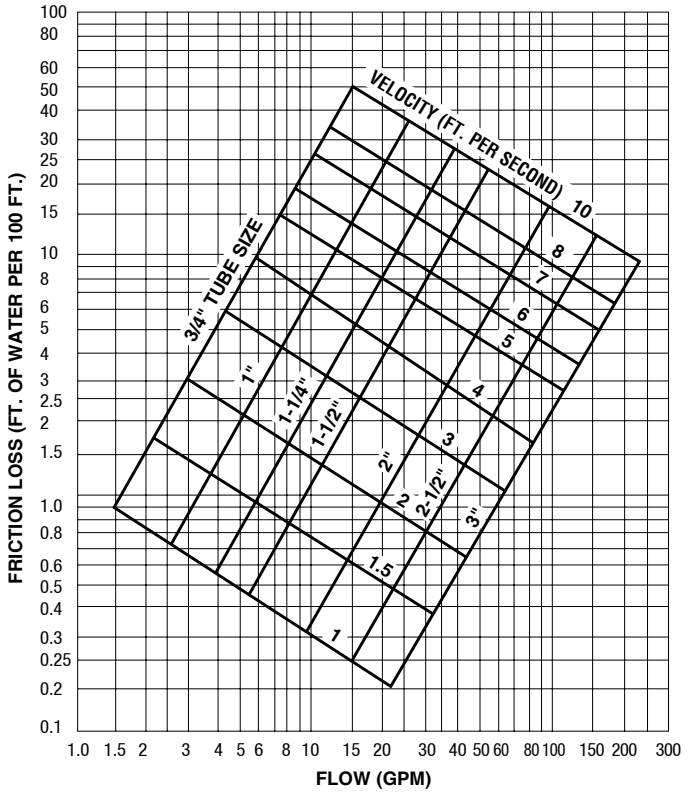
Available Hose Lengths		
No.	**"A" inches (mm)**	**"B" inches (mm)**
1	18 (457)	22 (559)
2	24 (610)	28 (711)
3	36 (914)	40 (1016)
4	48 (1219)	52 (1321)

Model Series 44VH • Riser Selection and Data

Riser Application and Sizing

Technical information on heat transfer, fluid flow and pipe sizing can be found in the ASHRAE Fundamentals Handbook and various other technical documents and publications. Some of the factors affecting riser application and sizing are noise, tube erosion and economics. The friction loss for risers chart displays riser tube diameter sizes as a function of flow (GPM), friction loss and water velocity. For maximum riser velocity and pressure drop per 100 ft., refer to latest ASHRAE Fundamentals Handbook, Pipe Sizing Chapter. Riser sizes can be of a single diameter on low rise buildings, or varying sizes on medium to high rise buildings. Generally, riser copper type, size, length and insulation thickness are determined by the location of the fan coil unit in the building. Chilled and hot water risers are available in Type K, L or M copper, varying diameters from 3/4" (19) to 3" (76) and with either 1/2" (13) or 3/4" (19) thick closed cell foam insulation. Drain risers are available in Type M copper, varying diameters from 3/4" (19) to 3" (76) and with either 1/2" (13) or 3/4" (19) thick closed cell foam insulation.

Friction Loss for Risers Chart

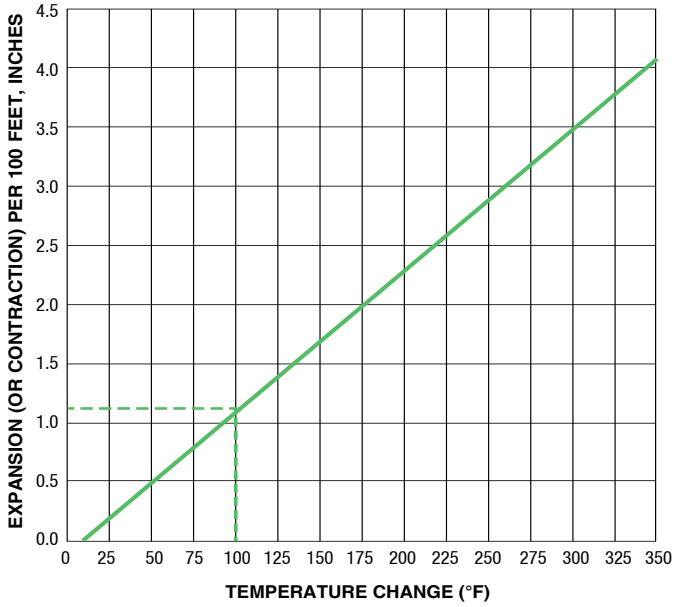


Riser Expansion

Generally, in medium to high rise buildings, allowance must be made for pipe expansion. Model Series 39 Hi-Rise fan coil units are furnished with hoses which act as expansion loops integral to the unit. The hose will allow for +/- 1 1/2" (38) of riser expansion and contraction. Additional expansion compensation must be made in the riser system in the field where movement is expected to exceed the factory allowances. Technical information on pipe expansion, contraction and anchoring can be found in the ASHRAE HVAC Systems and Equipment Handbook and various other technical documents and publications.

Risers may not be anchored to fan coil units. They must be anchored to structure.

Riser Expansion Chart



The above chart shows the change in length per 100 feet of copper tube with temperature. The following equation is used to calculate riser expansion.

Temperature Rise (°F) x Length (ft.) x 12 (in. per ft.) x 0.0000094 (in. per in. per °F) = Expansion (in.)

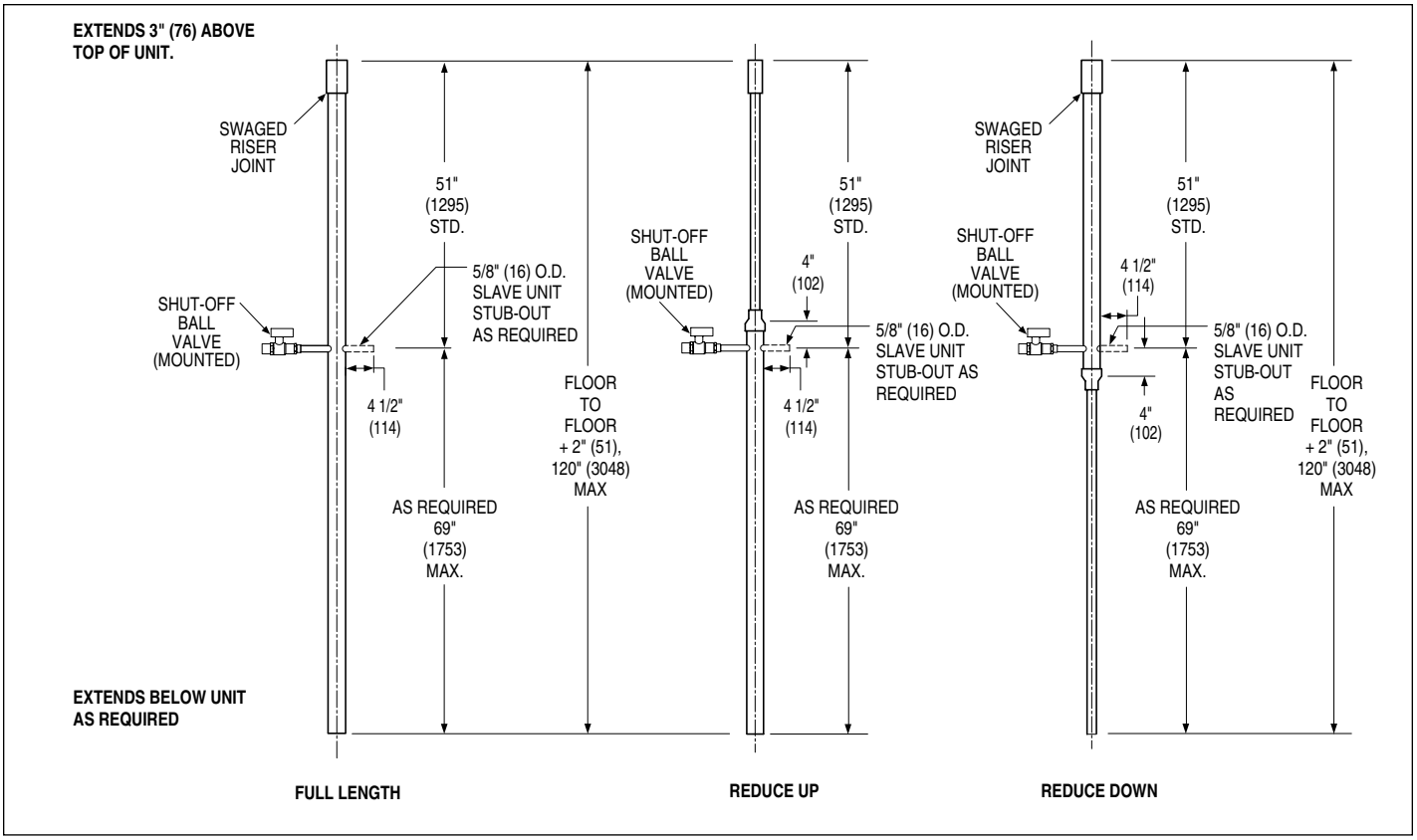
For example:

The expansion of each 100 ft. of length of any size tube heated from room temperature 70°F to 170°F (a 100°F rise) is 1.128 in.

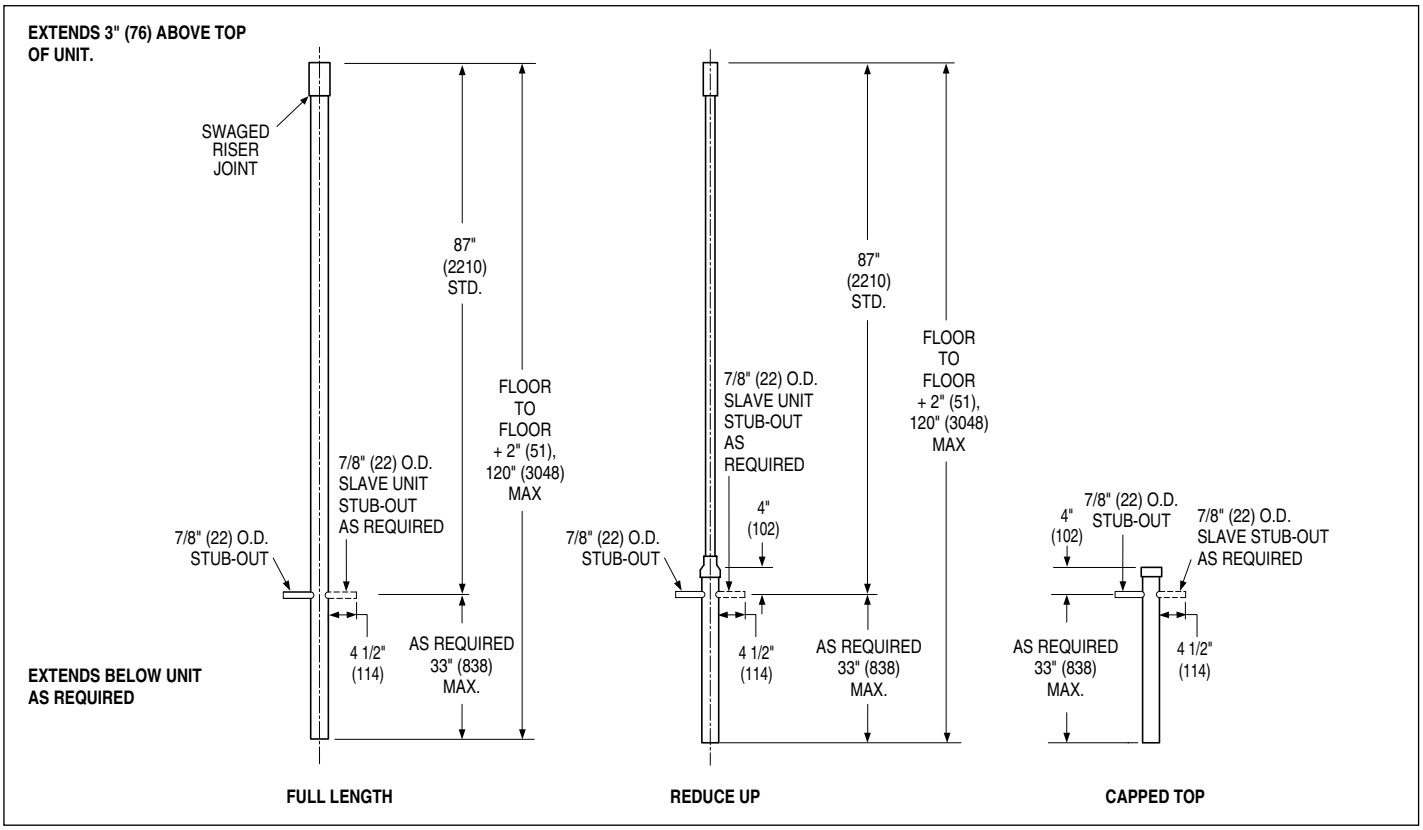
100°F x 100 ft. x 12 in./ft. x 0.0000094 in./in./°F = 1.128 in.

Model Series 44VH

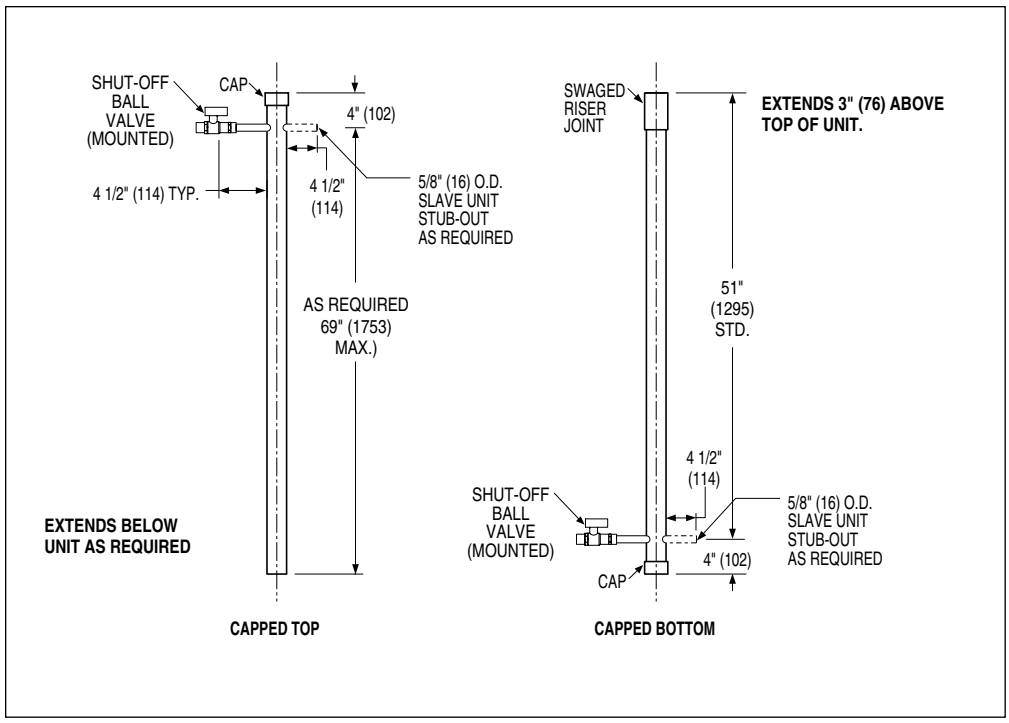
Standard Capped Supply/Return Risers • Full Length & Reducing



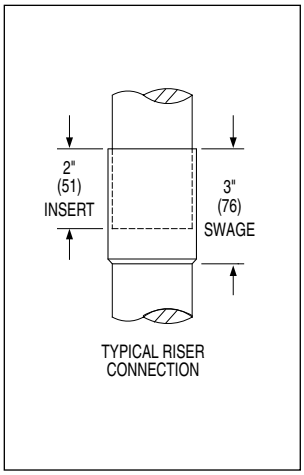
Standard Capped Supply/Return Risers • Full Length, Reducing & Capped



Model Series 44VH • Standard Capped Supply/Return Risers



Swaged Riser Joint Detail



NOTES:

1. Supply and Return Risers are available from 3/4" (19) to 3" (76) diameter in Type K (heavy wall), Type M (medium wall) and Type L (light wall) copper with either 1/2" (13) or 3/4" (19) insulation (flexible closed cell foam).
2. Risers are available "full length" (one piece), "capped top", "capped bottom", "reduced up" and "reduced down". Risers are reduced one nominal pipe size only.
3. Drain Risers are Type M copper only and maximum 1 1/4" diameter with maximum 1/2" (13) insulation. Drain risers are available in "full length", "reduced up" and "capped top" only.
4. Risers extend 3" (76) above the top of the unit as standard. The riser extension below the bottom of the unit is variable and dependent upon the floor to floor height for the building installation. Stacked unit risers are designed with a swaged socket connection in the top to accommodate 2" (51) of tail piece insertion from the riser above. Connections require field brazing.
5. Risers are ordered by specifying the exact overall length. The required overall riser length = Floor to Floor height + 2" (51).
6. Maximum riser length is 120" (3048). Minimum is 100" (2540). If required riser length exceeds 120" (3048), which represents a floor to floor height of 118" (2997), riser extensions will be required. Consult Nailor.
7. Factory mounted risers are standard. Risers may be ordered and shipped in advance to facilitate field installation.

Model Series 44VH • Performance Data

GENERAL INFORMATION

Unit Size	CFM	GPM	Cooling		Heating		Compressor		Charge (oz)
			Capacity (Btuh)	EER	Capacity (Btuh)	COP	Qty.	Type	
9	300	2.25	10,000	16	12,000	5	1	Rotary	26.0
12	400	3.00	12,500	16	14,500	5	1	Rotary	28.0
15	500	3.75	15,500	16	17,500	5	1	Rotary	36.0
18	625	4.50	18,500	16	21,000	5	1	Scroll	41.5
24	800	6.00	25,500	16	28,500	5	1	Scroll	63.0
30	1000	7.50	31,500	16	34,000	5	1	Scroll	70.0
36	1200	9.00	36,000	16	40,200	5	1	Scroll	74.0

ELECTRICAL DATA

Unit Size	Voltage	Horsepower - RPM	Blower FLA	Compressor RLA / LRA	Total FLA	MCA	Breaker Size
9	208 / 1	1/4-1600	1.1	3.7 / 29	4.8	5.8	15
	265 / 1	1/4-1600	1.0	3.5 / 22	4.5	5.4	15
12	208 / 1	1/4-1600	1.4	4.7 / 25	6.1	7.6	15
	265 / 1	1/4-1600	1.2	4.2 / 22	5.4	6.5	15
15	208 / 1	1/3-1075	1.8	5.6 / 22	7.4	8.8	15
	265 / 1	1/3-1075	1.6	5.0 / 28	6.6	7.9	15
18	208 / 1	1/3-1075	1.8	9.0 / 47.5	10.8	13.1	20
	265 / 1	1/3-1075	1.6	7.3 / 43.0	8.7	10.5	15
24	208 / 1	1/3-1075	2.4	10.9 / 62.9	13.3	16.1	25
	265 / 1	1/3-1075	2.1	9.0 / 54.0	11.1	13.4	20
30	208 / 1	1/3-1075	3.2	13.5 / 75.5	16.7	20.1	30
	265 / 1	1/3-1075	2.9	11.2 / 60.0	14.1	16.5	25
36	208 / 1	1/2-1075	3.7	14.1 / 72.2	17.8	21.4	30
	265 / 1	1/2-1075	3.3	12.2 / 72.0	15.5	18.6	30

NOTES:

1. Wiring from electrical entry knock-out to controls enclosure is furnished and field installed by others.
2. Risers available from 3/4" (19) to 3" (76) dia. with either 1/2" (13) or 3/4" (19) thick insulation.
3. Max. riser length is 120" (3048), 100" (2540) min.
4. Back riser location shown.
5. For indoor use only.

Model Series 44VH • ECM Motor Fan Performance Curves

Unit Size	Fan Speed	Unit	Static Pressure (in w.g.)					
			0	0.1	0.2	0.3	0.4	0.5
9	Hi	CFM	405	383	353	320	298	275
		RPM	876	975	1046	1119	1179	1261
		Watts	47	51	55	59	62	66
	Med Hi	CFM	370	343	311	276	255	231
		RPM	800	893	980	1059	1110	1224
		Watts	38	42	45	49	52	56
	Med	CFM	335	302	269	231	211	187
		RPM	723	810	914	998	1041	1186
		Watts	29	33	36	39	42	45
	Med Low	CFM	290	252	215	-	-	-
		RPM	652	736	855	-	-	-
		Watts	22	25	28	-	-	-
	Low	CFM	244	201	160	-	-	-
		RPM	580	662	796	-	-	-
		Watts	15	17	20	-	-	-
12	Hi	CFM	523	499	482	455	435	410
		RPM	1126	1148	1216	1264	1342	1400
		Watts	90	95	100	105	110	114
	Med Hi	CFM	468	442	418	403	372	343
		RPM	953	1028	1097	1159	1257	1318
		Watts	68	72	76	80	85	89
	Med	CFM	437	413	386	362	335	309
		RPM	915	1002	1072	1139	1218	1290
		Watts	58	61	65	69	74	78
	Med Low	CFM	405	383	353	320	298	275
		RPM	876	975	1046	1119	1179	1261
		Watts	47	51	55	59	62	66
	Low	CFM	335	302	269	231	211	187
		RPM	723	810	914	998	1041	1186
		Watts	29	33	36	39	42	45
15	Hi	CFM	594	521	482	424	342	297
		RPM	700	737	756	830	893	959
		Watts	64	66	73	76	79	85
	Med Hi	CFM	585	525	471	412	343	288
		RPM	709	736	761	835	885	960
		Watts	64	66	74	76	79	85
	Med	CFM	518	426	-	-	-	-
		RPM	635	655	-	-	-	-
		Watts	49	48	-	-	-	-
	Med Low	CFM	451	327	-	-	-	-
		RPM	560	573	-	-	-	-
		Watts	34	29	-	-	-	-
	Low	CFM	442	306	-	-	-	-
		RPM	548	559	-	-	-	-
		Watts	32	27	-	-	-	-
18	Hi	CFM	751	696	645	602	544	503
		RPM	857	884	925	964	998	1045
		Watts	119	121	126	131	133	139
	Med Hi	CFM	700	645	593	550	496	449
		RPM	809	843	881	927	962	1018
		Watts	100	102	105	112	114	120
	Med	CFM	585	525	471	412	343	288
		RPM	709	736	761	835	885	960
		Watts	64	66	74	76	79	85
	Med Low	CFM	518	525	471	412	343	288
		RPM	709	736	761	835	885	960
		Watts	64	66	74	76	79	85
	Low	CFM	451	327	-	-	-	-
		RPM	560	573	-	-	-	-
		Watts	34	29	-	-	-	-

Model Series 44VH • ECM Motor Fan Performance Curves

Unit Size	Fan Speed	Unit	Static Pressure (in w.g.)					
			0	0.1	0.2	0.3	0.4	0.5
24	Hi	CFM	918	872	821	779	736	688
		RPM	916	962	996	1024	1061	1091
		Watts	173	182	186	189	192	194
	Med Hi	CFM	844	787	750	696	649	601
		RPM	847	895	927	972	1008	1044
		Watts	140	144	147	154	158	161
	Med	CFM	801	752	706	654	597	547
		RPM	809	858	898	937	975	1018
		Watts	121	128	131	136	140	142
	Med Low	CFM	757	717	662	612	545	493
		RPM	770	820	869	902	942	992
		Watts	102	111	114	118	121	124
	Low	CFM	676	650	592	541	481	414
		RPM	686	746	797	838	888	952
		Watts	72	80	83	87	90	94
30	Hi	CFM	1189	1149	1098	1071	1012	970
		RPM	809	836	873	911	942	975
		Watts	244	248	257	266	271	279
	Med Hi	CFM	1053	1007	949	906	859	805
		RPM	719	757	796	836	873	923
		Watts	165	170	180	188	193	201
	Med	CFM	971	926	875	834	773	693
		RPM	668	707	754	790	834	880
		Watts	131	136	145	149	158	163
	Med Low	CFM	880	817	766	706	654	576
		RPM	613	653	703	748	802	850
		Watts	98	102	111	116	125	134
	Low	CFM	753	630	458	181	-	-
		RPM	531	553	576	622	-	-
		Watts	63	56	46	38	-	-
36	Hi	CFM	1357	1335	1288	1246	1206	1159
		RPM	909	933	967	988	1025	1053
		Watts	329	334	343	351	357	366
	Med Hi	CFM	1266	1236	1196	1153	1104	1078
		RPM	849	884	917	954	980	1012
		Watts	268	271	282	294	303	309
	Med	CFM	1173	1129	1093	1038	1022	970
		RPM	793	826	856	893	933	966
		Watts	213	219	227	233	243	254
	Med Low	CFM	1072	1026	982	932	884	840
		RPM	725	757	807	837	883	918
		Watts	159	167	173	183	193	198
	Low	CFM	898	833	762	725	664	598
		RPM	615	651	703	745	796	848
		Watts	97	100	106	114	121	128

Model Series 44VH • Sound Power Performance Data

Unit Size	Mode	Free Ductless Ultra Quiet Construction						
		Octave Band Frequency, Hz.						
		125	250	500	1000	2000	4000	8000
9	FO Low Sp	58	50	47	40	33	33	26
	FO Med. Sp	59	54	49	41	35	35	35
	FO High Sp	61	57	52	49	44	44	34
	Cooling Low Sp	58	51	55	46	38	38	34
	Cooling Med. Sp	59	53	57	50	43	43	34
	Cooling High Sp	60	56	55	50	45	45	42
	Heating Low Sp	58	52	56	48	43	41	39
	Heating Med. Sp	61	54	55	48	42	42	42
	Heating High Sp	61	56	57	51	45	45	39
12	FO Low Sp	59	51	47	40	33	33	26
	FO Med. Sp	61	55	49	41	35	35	35
	FO High Sp	62	57	52	49	44	44	34
	Cooling Low Sp	60	51	55	46	38	38	34
	Cooling Med. Sp	61	55	57	50	43	43	34
	Cooling High Sp	62	57	55	50	45	45	42
	Heating Low Sp	60	52	56	48	43	41	39
	Heating Med. Sp	61	55	55	48	42	42	42
	Heating High Sp	62	57	57	51	45	45	39
15	FO Low Sp	61	58	55	47	43	40	31
	FO Med. Sp	62	59	57	48	45	42	33
	FO High Sp	64	62	58	51	48	46	38
	Cooling Low Sp	61	58	55	48	43	40	31
	Cooling Med. Sp	62	58	56	49	44	42	33
	Cooling High Sp	64	60	58	52	48	45	38
	Heating Low Sp	61	56	54	47	45	40	32
	Heating Med. Sp	62	58	56	48	46	42	34
	Heating High Sp	64	60	59	51	49	46	39
18	FO Low Sp	61	58	55	47	43	40	31
	FO Med. Sp	62	59	57	48	45	41	33
	FO High Sp	65	62	58	51	48	46	38
	Cooling Low Sp	61	58	55	47	43	40	31
	Cooling Med. Sp	62	58	56	49	45	42	33
	Cooling High Sp	65	61	58	51	48	45	38
	Heating Low Sp	62	58	55	48	45	40	32
	Heating Med. Sp	62	59	56	49	46	42	34
	Heating High Sp	65	61	59	52	49	46	39
24	FO Low Sp	61	58	46	40	34	27	25
	FO Med. Sp	62	59	50	44	41	33	26
	FO High Sp	65	62	56	51	49	44	35
	Cooling Low Sp	62	59	49	43	35	27	25
	Cooling Med. Sp	63	60	50	46	39	33	26
	Cooling High Sp	66	62	55	52	48	41	33
	Heating Low Sp	69	60	49	45	42	33	28
	Heating Med. Sp	68	62	51	46	44	36	30
	Heating High Sp	69	62	57	53	52	45	41
30	FO Low Sp	65	62	57	53	50	43	38
	FO Med. Sp	69	66	60	55	54	47	39
	FO High Sp	76	73	63	58	54	52	44
	Cooling Low Sp	65	63	57	50	44	39	30
	Cooling Med. Sp	69	64	58	52	47	44	34
	Cooling High Sp	75	72	63	59	55	51	44
	Heating Low Sp	69	61	57	49	46	41	32
	Heating Med. Sp	70	65	59	51	49	44	37
	Heating High Sp	75	72	64	58	56	52	46
36	FO Low Sp	65	62	57	53	50	43	38
	FO Med. Sp	69	66	60	55	54	47	39
	FO High Sp	76	73	66	62	61	57	51
	Cooling Low Sp	64	62	57	52	49	42	36
	Cooling Med. Sp	70	66	60	56	52	47	37
	Cooling High Sp	74	72	65	61	59	54	48
	Heating Low Sp	67	62	57	51	51	44	36
	Heating Med. Sp	70	66	61	54	55	48	41
	Heating High Sp	75	72	65	61	61	56	50

6-21-21

Model Series 44VH • Performance Data
Unit Size 9

EWT [°F]	GPM	WPD		COOLING - EAT 80.6 / 66.2 °F					
		PSI	FT	TC (Btu/Hr)	SC (Btu/Hr)	S/T	W (Watts)	HR (Btu/Hr)	EER
40	1.5	0.7	1.6	12259	9190	0.75	377	13650	32.51
	2.3	1.3	3.1	12579	9430	0.75	311	13725	40.43
	3.0	2.2	5.1	12722	9537	0.75	287	13800	44.29
50	1.5	0.7	1.5	11912	9040	0.76	431	13500	27.63
	2.3	1.3	3.0	12148	9219	0.76	377	13500	32.24
	3.0	2.1	4.9	12267	9310	0.76	354	13650	34.62
60	1.5	0.6	1.5	11549	8885	0.77	488	13350	23.69
	2.3	1.2	2.9	11698	8999	0.77	445	13275	26.27
	3.0	2.0	4.7	11793	9072	0.77	424	13350	27.80
70	1.5	0.6	1.4	11172	8723	0.78	546	13125	20.45
	2.3	1.2	2.8	11231	8768	0.78	517	13050	21.74
	3.0	2.0	4.6	11300	8822	0.78	497	13050	22.73
80	1.5	0.6	1.4	10781	8553	0.79	607	12975	17.75
	2.3	1.2	2.7	10745	8524	0.79	591	12825	18.18
	3.0	1.9	4.4	10787	8558	0.79	573	12900	18.83
90	1.5	0.6	1.3	10375	8373	0.81	671	12750	15.47
	2.3	1.1	2.6	10241	8265	0.81	668	12600	15.33
	3.0	1.8	4.3	10256	8277	0.81	652	12600	15.74
100	1.5	0.5	1.3	9954	8181	0.82	736	12600	13.52
	2.3	1.1	2.5	9719	7988	0.82	748	12375	13.00
	3.0	1.8	4.1	9705	7976	0.82	733	12300	13.24
110	1.5	0.5	1.2	9519	7974	0.84	804	12375	11.83
	2.3	1.1	2.4	9179	7690	0.84	830	12150	11.05
	3.0	1.7	4.0	9135	7653	0.84	818	12000	11.17

EWT [°F]	GPM	WPD		HEATING - EAT 68 °F				
		PSI	FT	HC (Btu/Hr)	W	HA (Btu/Hr)	LAT	COP
30	1.5	1.0	2.2	7610	575	5700	86	3.88
	2.3	1.7	4.0	7285	564	5400	85	3.78
	3.0	2.7	6.2	7339	566	5400	85	3.80
40	1.5	0.9	2.0	8575	588	6600	88	4.27
	2.3	1.5	3.6	8486	581	6525	88	4.28
	3.0	2.4	5.5	8612	582	6750	88	4.34
50	1.5	0.8	1.9	9580	602	7575	90	4.66
	2.3	1.4	3.3	9737	597	7763	91	4.78
	3.0	2.2	5.1	9938	599	7950	91	4.86
60	1.5	0.8	1.8	10625	617	8625	93	5.05
	2.3	1.4	3.1	11038	615	9000	94	5.26
	3.0	2.1	4.8	11317	617	9300	94	5.37
70	1.5	0.8	1.8	11710	632	9600	95	5.43
	2.3	1.4	3.1	12389	633	10350	97	5.74
	3.0	2.0	4.7	12748	636	10650	98	5.88
80	1.5	0.8	1.9	12836	647	10725	98	5.81
	2.3	1.4	3.2	13789	652	11700	100	6.20
	3.0	2.1	4.7	14232	655	12150	101	6.37

COP = coefficient of performance
EER = energy efficiency ratio
HA = heat absorption
HC = heating capacity
HR = heat rejection
LAT = leaving air temp
S/T = sensible/cooling capacity
SC = sensible capacity
TC = total cooling capacity
W = power unit

Model Series 44VH • Performance Data
Unit Size 12

EWT [°F]	GPM	WPD		COOLING - EAT 80.6 / 66.2 °F					
		PSI	FT	TC (Btu/Hr)	SC (Btu/Hr)	S/T	W (Watts)	HR (Btu/Hr)	EER
40	1.8	0.6	1.4	14636	10637	0.73	440	16290	33.29
	2.7	1.2	2.8	14961	10874	0.73	349	16298	42.88
	3.5	1.9	4.5	14928	10850	0.73	326	16100	45.82
50	1.8	0.6	1.4	14274	10485	0.73	517	16200	27.62
	2.7	1.1	2.6	14537	10678	0.73	440	16165	33.03
	3.5	1.9	4.3	14511	10659	0.73	417	16100	34.80
60	1.8	0.6	1.3	13897	10330	0.74	597	16020	23.27
	2.7	1.1	2.5	14094	10476	0.74	535	16033	26.33
	3.5	1.8	4.1	14075	10462	0.74	512	15925	27.48
70	1.8	0.6	1.3	13504	10170	0.75	681	15930	19.83
	2.7	1.1	2.4	13633	10267	0.75	635	15900	21.48
	3.5	1.7	4.0	13621	10257	0.75	611	15750	22.28
80	1.8	0.5	1.2	13096	10003	0.76	768	15840	17.05
	2.7	1.0	2.4	13154	10048	0.76	738	15768	17.83
	3.5	1.7	3.9	13148	10044	0.76	715	15750	18.40
90	1.8	0.5	1.2	12672	9829	0.78	858	15750	14.76
	2.7	1.0	2.3	12656	9817	0.78	845	15635	14.98
	3.5	1.6	3.7	12658	9818	0.78	822	15575	15.41
100	1.8	0.5	1.2	12232	9644	0.79	952	15570	12.85
	2.7	1.0	2.2	12140	9572	0.79	956	15503	12.70
	3.5	1.6	3.6	12150	9580	0.79	933	15400	13.03
110	1.8	0.5	1.1	11776	9448	0.80	1049	15480	11.22
	2.7	0.9	2.2	11605	9311	0.80	1071	15370	10.83
	3.5	1.5	3.5	11623	9325	0.80	1048	15400	11.09

EWT [°F]	GPM	WPD		HEATING - EAT 68 °F				
		PSI	FT	HC (Btu/Hr)	W	HA (Btu/Hr)	LAT	COP
30	1.8	0.7	1.6	9153	722	6750	84.9	3.71
	2.7	1.3	3.1	9013	721	6625	84.7	3.66
	3.5	2.2	5.0	9442	733	7000	85.5	3.78
40	1.8	0.7	1.6	10363	744	7920	87.2	4.08
	2.7	1.3	2.9	10442	746	7950	87.3	4.10
	3.5	2.0	4.7	10864	755	8400	88.1	4.22
50	1.8	0.6	1.5	11623	766	9090	89.5	4.45
	2.7	1.2	2.8	11930	771	9408	90.1	4.54
	3.5	2.0	4.5	12345	779	9800	90.9	4.65
60	1.8	0.6	1.4	12933	789	10350	91.9	4.80
	2.7	1.2	2.7	13477	797	10865	93.0	4.96
	3.5	1.9	4.3	13885	803	11200	93.7	5.07
70	1.8	0.6	1.4	14293	813	11610	94.5	5.15
	2.7	1.1	2.6	15084	824	12323	95.9	5.36
	3.5	1.8	4.2	15483	828	12775	96.7	5.48
80	1.8	0.6	1.3	15704	838	12960	97.1	5.49
	2.7	1.1	2.5	16749	852	13913	99.0	5.76
	3.5	1.7	4.0	17140	854	14350	99.7	5.88

COP = coefficient of performance
EER = energy efficiency ratio
HA = heat absorption
HC = heating capacity
HR = heat rejection
LAT = leaving air temp
S/T = sensible/cooling capacity
SC = sensible capacity
TC = total cooling capacity
W = power unit

2-1-21

Model Series 44VH • Performance Data
Unit Size 15

EWT [°F]	GPM	WPD		COOLING - EAT 80.6 / 66.2 °F					
		PSI	FT	TC (Btu/Hr)	SC (Btu/Hr)	S/T	W (Watts)	HR (Btu/Hr)	EER
40	2.3	0.7	1.7	18061	13269	0.73	532	20010	33.97
	3.4	1.4	3.2	18630	13687	0.73	421	20230	44.27
	4.5	2.3	5.3	18938	13913	0.73	399	20475	47.46
50	2.3	0.7	1.6	17614	13126	0.75	617	19895	28.53
	3.4	1.3	3.1	18068	13465	0.75	522	20060	34.63
	4.5	2.2	5.1	18324	13655	0.75	498	20250	36.79
60	2.3	0.7	1.5	17148	12981	0.76	707	19665	24.26
	3.4	1.3	3.0	17482	13234	0.76	627	19720	27.88
	4.5	2.1	4.9	17684	13387	0.76	602	19800	29.39
70	2.3	0.6	1.5	16662	12831	0.77	800	19550	20.82
	3.4	1.3	2.9	16871	12992	0.77	737	19550	22.90
	4.5	2.1	4.8	17017	13104	0.77	710	19575	23.98
80	2.3	0.6	1.4	16158	12673	0.78	897	19320	18.01
	3.4	1.2	2.8	16236	12735	0.78	851	19210	19.08
	4.5	2.0	4.6	16324	12804	0.78	822	19350	19.86
90	2.3	0.6	1.4	15634	12506	0.80	998	19205	15.66
	3.4	1.2	2.7	15578	12460	0.80	970	19040	16.07
	4.5	1.9	4.5	15605	12482	0.80	939	18900	16.63
100	2.3	0.6	1.4	15091	12325	0.82	1103	18975	13.68
	3.4	1.1	2.7	14895	12164	0.82	1093	18700	13.63
	4.5	1.9	4.4	14859	12135	0.82	1060	18675	14.02
110	2.3	0.6	1.3	14529	12128	0.83	1211	18860	12.00
	3.4	1.1	2.6	14188	11843	0.83	1220	18530	11.63
	4.5	1.8	4.3	14087	11758	0.83	1185	18225	11.88

EWT [°F]	GPM	WPD		HEATING - EAT 68 °F				
		PSI	FT	HC (Btu/Hr)	W	HA (Btu/Hr)	LAT	COP
30	2.3	0.8	1.9	11010	807	8280	85.0	3.71
	3.4	1.6	3.7	11075	809	8330	85.1	3.66
	4.5	2.6	6.0	11797	824	9000	86.2	3.78
40	2.3	0.8	1.9	12334	827	9545	87.0	4.08
	3.4	1.5	3.5	12603	830	9860	87.4	4.10
	4.5	2.5	5.7	13251	842	10350	88.4	4.22
50	2.3	0.8	1.8	13712	847	10925	89.2	4.45
	3.4	1.5	3.4	14193	853	9010	89.9	4.54
	4.5	2.4	5.5	14764	862	11925	90.8	4.65
60	2.3	0.7	1.7	15144	869	12305	91.4	4.80
	3.4	1.4	3.2	15845	876	12920	92.5	4.96
	4.5	2.3	5.3	16337	882	13500	93.2	5.07
70	2.3	0.7	1.6	16631	891	13685	93.7	5.15
	3.4	1.4	3.1	17561	901	14620	95.1	5.36
	4.5	2.2	5.1	17968	903	15075	95.7	5.48
80	2.3	0.7	1.6	18173	914	15180	96.0	5.49
	3.4	1.3	3.0	19339	926	16320	97.8	5.76
	4.5	2.1	4.9	19659	925	16650	98.3	5.88

COP = coefficient of performance
EER = energy efficiency ratio
HA = heat absorption
HC = heating capacity
HR = heat rejection
LAT = leaving air temp
S/T = sensible/cooling capacity
SC = sensible capacity
TC = total cooling capacity
W = power unit

Model Series 44VH • Performance Data
Unit Size 18

EWT [°F]	GPM	WPD		COOLING - EAT 80.6 / 66.2 °F					
		PSI	FT	TC (Btu/Hr)	SC (Btu/Hr)	S/T	W (Watts)	HR (Btu/Hr)	EER
40	2.8	1.1	2.6	21759	16555	0.76	671	24360	32.43
	4.2	2.2	5.0	22369	17019	0.76	528	24693	42.36
	5.5	3.6	8.2	22459	17088	0.76	493	25025	45.54
50	2.8	1.1	2.5	21163	16296	0.77	778	24220	27.22
	4.2	2.1	4.8	21653	16673	0.77	654	24485	33.11
	5.5	3.4	7.9	21731	16733	0.77	618	24750	35.18
60	2.8	1.0	2.4	20542	16031	0.78	889	23940	23.11
	4.2	2.0	4.6	20906	16315	0.78	786	24070	26.61
	5.5	3.3	7.6	20973	16367	0.78	748	24200	28.04
70	2.8	1.0	2.3	19895	15757	0.79	1005	23800	19.80
	4.2	1.9	4.5	20129	15942	0.79	923	23863	21.81
	5.5	3.2	7.4	20183	15985	0.79	884	23925	22.84
80	2.8	1.0	2.2	19222	15470	0.80	1126	23520	17.08
	4.2	1.9	4.3	19320	15549	0.80	1066	23448	18.13
	5.5	3.1	7.1	19362	15583	0.80	1025	23650	18.89
90	2.8	0.9	2.1	18523	15168	0.82	1251	23380	14.81
	4.2	1.8	4.2	18481	15134	0.82	1214	23240	15.22
	5.5	3.0	6.9	18509	15156	0.82	1172	23100	15.80
100	2.8	0.9	2.1	17799	14847	0.83	1381	23100	12.89
	4.2	1.8	4.1	17611	14690	0.83	1368	22825	12.88
	5.5	2.9	6.7	17625	14702	0.83	1324	22825	13.31
110	2.8	0.9	2.0	17049	14503	0.85	1516	22960	11.25
	4.2	1.7	4.0	16710	14214	0.85	1527	22618	10.94
	5.5	2.9	6.6	16709	14213	0.85	1482	22275	11.28

EWT [°F]	GPM	WPD		HEATING - EAT 68 °F				
		PSI	FT	HC (Btu/Hr)	W	HA (Btu/Hr)	LAT	COP
30	2.8	1.3	3.0	13615	1061	10080	86.0	3.76
	4.2	2.5	5.7	13621	1059	10168	86.0	3.77
	5.5	4.0	9.3	14486	1075	11000	87.2	3.95
40	2.8	1.2	2.8	15173	1083	11620	88.1	4.11
	4.2	2.4	5.4	15415	1083	11828	88.4	4.17
	5.5	3.8	8.9	16183	1095	12650	89.4	4.33
50	2.8	1.2	2.7	16796	1105	13160	90.2	4.45
	4.2	2.3	5.2	17284	1108	13695	90.9	4.57
	5.5	3.7	8.5	17949	1116	14300	91.7	4.71
60	2.8	1.1	2.6	18484	1129	14700	92.4	4.80
	4.2	2.2	5.0	19227	1133	15563	93.4	4.97
	5.5	3.5	8.1	19785	1138	15950	94.2	5.09
70	2.8	1.1	2.5	20236	1153	16380	94.8	5.14
	4.2	2.1	4.8	21244	1160	17430	96.1	5.37
	5.5	3.4	7.9	21690	1161	17875	96.7	5.47
80	2.8	1.1	2.4	22052	1179	18200	97.2	5.48
	4.2	2.0	4.7	23335	1188	19505	98.9	5.76
	5.5	3.3	7.6	23664	1185	19800	99.3	5.85

COP = coefficient of performance
EER = energy efficiency ratio
HA = heat absorption
HC = heating capacity
HR = heat rejection
LAT = leaving air temp
S/T = sensible/cooling capacity
SC = sensible capacity
TC = total cooling capacity
W = power unit

2-1-21

Model Series 44VH • Performance Data
Unit Size 24

EWT [°F]	GPM	WPD		COOLING - EAT 80.6 / 66.2 °F					
		PSI	FT	TC (Btu/Hr)	SC (Btu/Hr)	S/T	W (Watts)	HR (Btu/Hr)	EER
40	4.4	1.8	4.1	29455	21315	0.72	854	32560	34.47
	5.7	2.8	6.4	30137	21809	0.72	753	33060	40.03
	7.0	4.0	9.2	30482	22059	0.72	724	33250	42.11
50	4.4	1.7	4.0	28576	20936	0.73	999	32340	28.59
	5.7	2.7	6.2	29127	21340	0.73	911	32490	31.97
	7.0	3.8	8.8	29401	21540	0.73	882	32550	33.33
60	4.4	1.6	3.8	27658	20545	0.74	1151	31900	24.03
	5.7	2.6	5.9	28073	20853	0.74	1076	31920	26.08
	7.0	3.7	8.5	28273	21001	0.74	1047	32200	26.99
70	4.4	1.6	3.7	26702	20138	0.75	1308	31460	20.41
	5.7	2.5	5.7	26976	20344	0.75	1249	31350	21.60
	7.0	3.5	8.2	27098	20436	0.75	1220	31500	22.22
80	4.4	1.5	3.5	25708	19711	0.77	1473	31020	17.46
	5.7	2.4	5.5	25834	19808	0.77	1428	31065	18.09
	7.0	3.4	7.9	25875	19839	0.77	1399	30800	18.50
90	4.4	1.5	3.4	24675	19258	0.78	1643	30580	15.02
	5.7	2.3	5.4	24649	19237	0.78	1614	30495	15.27
	7.0	3.3	7.7	24606	19204	0.78	1585	30100	15.52
100	4.4	1.4	3.3	23604	18775	0.80	1820	30140	12.97
	5.7	2.3	5.2	23419	18627	0.80	1808	29925	12.96
	7.0	3.2	7.5	23290	18524	0.80	1779	29750	13.09
110	4.4	1.4	3.3	22495	18255	0.81	2003	29480	11.23
	5.7	2.2	5.1	22146	17971	0.81	2008	29355	11.03
	7.0	3.2	7.3	21927	17793	0.81	1979	29050	11.08

EWT [°F]	GPM	WPD		HEATING - EAT 68 °F				
		PSI	FT	HC (Btu/Hr)	W	HA (Btu/Hr)	LAT	COP
30	4.4	0.8	1.9	11010	807	13420	79.3	3.71
	5.7	1.6	3.7	11075	809	13680	79.4	3.66
	7.0	2.6	6.0	11797	824	14350	80.1	3.78
40	4.4	0.8	1.9	12334	827	15620	80.7	4.08
	5.7	1.5	3.5	12603	830	15960	81.0	4.10
	7.0	2.5	5.7	13251	842	16800	81.6	4.22
50	4.4	0.8	1.8	13712	847	17820	82.1	4.45
	5.7	1.5	3.4	14193	853	18525	82.6	4.54
	7.0	2.4	5.5	14764	862	18900	83.2	4.65
60	4.4	0.7	1.7	15144	869	20240	83.6	4.80
	5.7	1.4	3.2	15845	876	20805	84.3	4.96
	7.0	2.3	5.3	16337	882	21350	84.8	5.07
70	4.4	0.7	1.6	16631	891	22660	85.1	5.15
	5.7	1.4	3.1	17561	901	23370	86.1	5.36
	7.0	2.2	5.1	17968	903	23800	86.5	5.48
80	4.4	0.7	1.6	18173	914	25080	86.7	5.49
	5.7	1.3	3.0	19339	926	25935	87.9	5.76
	7.0	2.1	4.9	19659	925	26250	88.2	5.88

COP = coefficient of performance
EER = energy efficiency ratio
HA = heat absorption
HC = heating capacity
HR = heat rejection
LAT = leaving air temp
S/T = sensible/cooling capacity
SC = sensible capacity
TC = total cooling capacity
W = power unit

Model Series 44VH • Performance Data
Unit Size 30

EWT [°F]	GPM	WPD		COOLING - EAT 80.6 / 66.2 °F					
		PSI	FT	TC (Btu/Hr)	SC (Btu/Hr)	S/T	W (Watts)	HR (Btu/Hr)	EER
40	5.5	1.5	3.5	36657	27594	0.75	1074	40700	34.14
	6.8	2.0	4.7	37371	28132	0.75	981	41175	38.08
	8.0	2.6	6.1	37823	28472	0.75	930	41200	40.66
50	5.5	1.4	3.3	35491	27020	0.76	1236	40150	28.71
	6.8	1.9	4.5	36069	27461	0.76	1158	40500	31.14
	8.0	2.6	5.9	36432	27737	0.76	1113	40400	32.73
60	5.5	1.3	3.1	34275	26427	0.77	1406	39325	24.38
	6.8	1.9	4.3	34711	26763	0.77	1343	39488	25.85
	8.0	2.5	5.7	34981	26972	0.77	1304	39600	26.83
70	5.5	1.3	3.0	33008	25809	0.78	1583	38775	20.86
	6.8	1.8	4.2	33296	26034	0.78	1535	38813	21.69
	8.0	2.4	5.5	33470	26170	0.78	1503	38800	22.27
80	5.5	1.2	2.8	31690	25160	0.79	1767	37950	17.94
	6.8	1.7	4.0	31824	25266	0.79	1735	38138	18.34
	8.0	2.3	5.4	31898	25325	0.79	1709	38000	18.66
90	5.5	1.2	2.7	30322	24474	0.81	1957	37400	15.49
	6.8	1.7	3.9	30296	24453	0.81	1943	37125	15.59
	8.0	2.3	5.2	30265	24428	0.81	1924	37200	15.73
100	5.5	1.1	2.6	28903	23743	0.82	2155	36575	13.41
	6.8	1.6	3.8	28711	23586	0.82	2158	36450	13.30
	8.0	2.2	5.1	28573	23472	0.82	2147	36000	13.31
110	5.5	1.1	2.6	27434	22962	0.84	2360	35750	11.62
	6.8	1.6	3.7	27070	22657	0.84	2382	35438	11.37
	8.0	2.1	4.9	26820	22448	0.84	2378	35200	11.28

EWT [°F]	GPM	WPD		HEATING - EAT 68 °F				
		PSI	FT	HC (Btu/Hr)	W	HA (Btu/Hr)	LAT	COP
30	5.5	1.7	3.8	21388	1669	15950	90.0	3.75
	6.8	2.3	5.4	21362	1688	15863	86.0	3.71
	8.0	3.1	7.2	21778	1697	16000	86.3	3.76
40	5.5	1.6	3.7	24088	1716	18425	88.3	4.11
	6.8	2.2	5.1	24247	1738	18563	88.4	4.09
	8.0	3.0	6.8	24691	1748	18800	88.8	4.14
50	5.5	1.5	3.5	26900	1764	21175	90.6	4.47
	6.8	2.1	4.9	27253	1790	21263	90.9	4.46
	8.0	2.8	6.5	27726	1801	21600	91.3	4.51
60	5.5	1.4	3.3	29825	1814	23925	93.1	4.82
	6.8	2.0	4.7	30379	1843	24300	93.6	4.83
	8.0	2.7	6.2	30881	1856	24800	94.0	4.88
70	5.5	1.4	3.2	32863	1866	26675	95.7	5.16
	6.8	1.9	4.5	33625	1899	27338	96.3	5.19
	8.0	2.6	6.0	34156	1912	28000	96.8	5.23
80	5.5	1.3	3.1	36013	1919	29700	98.3	5.50
	6.8	1.9	4.3	36990	1956	30713	99.1	5.54
	8.0	2.5	5.8	37552	1971	31200	99.6	5.58

COP = coefficient of performance
EER = energy efficiency ratio
HA = heat absorption
HC = heating capacity
HR = heat rejection
LAT = leaving air temp
S/T = sensible/cooling capacity
SC = sensible capacity
TC = total cooling capacity
W = power unit

2-1-21

Model Series 44VH • Performance Data
Unit Size 36

EWT [°F]	GPM	WPD		COOLING - EAT 80.6 / 66.2 °F					
		PSI	FT	TC (Btu/Hr)	SC (Btu/Hr)	S/T	W (Watts)	HR (Btu/Hr)	EER
40	6.0	1.6	3.6	42184	31825	0.75	1162	46500	36.31
	7.5	2.3	5.3	41742	31491	0.75	1070	45750	39.01
	9.0	3.1	7.2	41828	31557	0.75	1058	45900	39.54
50	6.0	1.5	3.5	41320	31590	0.76	1403	46500	29.46
	7.5	2.2	5.1	40778	31175	0.76	1324	45750	30.81
	9.0	3.0	7.0	40812	31201	0.76	1306	45450	31.26
60	6.0	1.5	3.4	40428	31364	0.78	1654	46500	24.45
	7.5	2.2	5.0	39783	30864	0.78	1588	45375	25.05
	9.0	3.0	6.9	39761	30847	0.78	1564	45450	25.42
70	6.0	1.4	3.3	39508	31144	0.79	1915	46500	20.63
	7.5	2.1	4.9	38756	30551	0.79	1864	45375	20.79
	9.0	2.9	6.7	38676	30489	0.79	1833	45450	21.10
80	6.0	1.4	3.2	38559	30925	0.80	2187	46500	17.63
	7.5	2.0	4.7	37696	30234	0.80	2150	45375	17.53
	9.0	2.8	6.6	37557	30122	0.80	2113	45000	17.78
90	6.0	1.3	3.1	37581	30703	0.82	2469	46500	15.22
	7.5	2.0	4.6	36605	29905	0.82	2448	45375	14.95
	9.0	2.8	6.4	36405	29741	0.82	2403	45000	15.15
100	6.0	1.3	3.0	36576	30472	0.83	2762	46500	13.24
	7.5	1.9	4.4	35482	29561	0.83	2756	45375	12.87
	9.0	2.7	6.2	35218	29340	0.83	2704	45000	13.02
110	6.0	1.2	2.8	35541	30227	0.85	3065	46500	11.60
	7.5	1.9	4.3	34327	29195	0.85	3076	45000	11.16
	9.0	2.6	6.1	33997	28914	0.85	3016	44550	11.27

EWT [°F]	GPM	WPD		HEATING - EAT 68 °F				
		PSI	FT	HC (Btu/Hr)	W	HA (Btu/Hr)	LAT	COP
30	6.0	1.9	4.3	26292	2117	19200	86.7	3.64
	7.5	2.7	6.2	26207	2115	19125	86.7	3.63
	9.0	3.7	8.5	26947	2136	19800	87.2	3.70
40	6.0	1.8	4.1	29362	2177	22200	88.9	3.95
	7.5	2.6	5.9	29500	2177	22125	89.0	3.97
	9.0	3.5	8.1	30248	2195	22950	89.5	4.04
50	6.0	1.7	3.9	32561	2240	25200	91.2	4.26
	7.5	2.4	5.6	32933	2242	25500	91.5	4.31
	9.0	3.3	7.7	33687	2256	26100	92.0	4.38
60	6.0	1.6	3.7	35890	2305	28200	93.6	4.56
	7.5	2.3	5.4	36505	2309	28875	94.0	4.63
	9.0	3.2	7.4	37265	2320	29700	94.5	4.71
70	6.0	1.6	3.6	39349	2373	31500	96.0	4.86
	7.5	2.3	5.2	40215	2379	32250	96.6	4.95
	9.0	3.1	7.1	40982	2387	33300	97.2	5.03
80	6.0	1.5	3.5	42938	2443	34800	98.6	5.15
	7.5	2.2	5.0	44065	2452	21000	99.4	5.27
	9.0	3.0	6.9	44837	2456	35100	99.9	5.35

COP = coefficient of performance
EER = energy efficiency ratio
HA = heat absorption
HC = heating capacity
HR = heat rejection
LAT = leaving air temp
S/T = sensible/cooling capacity
SC = sensible capacity
TC = total cooling capacity
W = power unit

Model Series 44VH • Suggested Specifications

General

1.1 Section includes

Vertical stack water source heat pumps description

.1 Furnish and install Engineered Comfort Serenity® "D44VH Vertical Stack" Water Source Heat Pumps, as indicated on the plans with capacities, characteristics and accessories required to complete the building closed loop heat pump system as listed in the schedule and the specifications that follow.

1.2 Related sections

1.3 References

.1 Air-Conditioning, Heating and Refrigeration Institute (AHRI) AHRI ISO 13256-1, Testing and rating for performance Water - Source Heat Pumps.

.2 ETL Listing Laboratories (ETL), UL Standard 1995.

1.4 Delivery & storage

.1 Deliver Water Source Heat Pump (WSHP) product to site, store and protect from outside weather conditions and protect from construction debris. The WSHP comes in two sections: a cabinet and a chassis, each must be individually packaged and tagged for identification on site for location, model number and configuration.

1.5 Environmental requirements

.1 Protect units from construction debris by covering openings with protective covering before start-up. Units must not be used for heating, cooling or ventilation prior to start-up, before equipment put into permanent use. Temporary heating, cooling or ventilation is prohibited.

1.6 factory testing

.1 All units are factory tested for normal operating conditions. The blowers and components are energized to verify operation and control. Refrigerant chassis is tested with cataloged water flow rates and sequenced to verify the proper operation of safety controls. Testing without cataloged flow rates is not acceptable. All factory risers shall be pressure tested for leaks.

1.7 shop drawings and product data

.1 Submit shop drawings in accordance Nailor's Submittal Procedures. The submittals shall

.2 Indicate:

.01 Capacities.

.02 AHRI Ratings.

.03 Sound Power levels.

.04 Installation instructions.

.05 Start-up Instructions.

.06 Instructions.

1.8 Training

.1 Provide training in accordance with Industry Standards Refer to Section 01 79 00.13 – Demonstration and Training for Building Commissioning.

Products

2.0 Water to air vertical stack water source heat pumps

.1 Units shall be supplied completely factory built capable of operating over an entering water temperature range from standard range 60–95°F and extended 20–120°F. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute/International Standards Organization (AHRI / ISO 13256-1). All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI / ISO and ETL-US-C labels.All units shall pass a factory acceptance test. The quality control system shall perform factory acceptance test.

.2 Casing and Cabinet: The cabinet panels shall be fabricated from heavy gauge 18/20 gauge galvanized steel. The rigid cabinet assembly shall be constructed so that it is self-supporting, and can be installed prior to the chassis arrival, and to be able to avoid damage during construction. Blower deck, and other metal structural parts are to be 16 gauge construction, while exterior panels to be 20 gauge .

Cabinet shall have a full panel over the chassis opening for structural rigidity of the cabinet during shipping. The cabinet base shall contain a secondary drain pan fully insulated with a drain p-trap connected to the condensate riser pipe, and guide rails for the slide in refrigeration chassis. Rubber grommet mounted to provide isolation of chassis from the cabinet. Drain pan(s) shall be easily accessible for cleaning. All interior surfaces shall be lined with 1/2 inch (12.7 mm) thick, 1-1/2 lb/ft^3 (24 kg/m^3) acoustic type fiberglass insulation. All insulation shall have exposed edges sealed up to flanges to prevent the introduction of glass fibers into the air stream.

Standard insulation must meet NFPA Fire Hazard Classification requirements 25/50 per ASTM E84, UL 723, CAN/ULC S102-M88 and NFPA 90A requirements; air erosion and mold growth limits of UL-181; stringent fungal resistance test per ASTM-C1071 and ASTM G21; and shall meet zero level bacteria growth per ASTM G22.

Standard is 1 inch (25mm) filter holder with 1" (25 mm) thick fiberglass throwaway filter.

1) 2" (50 mm) filter holder with 2" (50 mm) thick fiberglass throwaway filter.

   Cabinet arrangements shall allow placement of riser piping on any one of the three sides of the cabinet not used for the chassis access and air supply. All cabinets shall have supply air knockouts on all sides and top. Field shall configure cabinets by removing factory knockouts and install duct flanges per model configuration shown on plans.
2) Master and slave cabinets.
3) Isolation pad can be supplied to be placed upon installation on the bottom of cabinet for best sound attenuation.
4) Cabinet height 88" or 80" (223 or 203 cm)
5) Construction for unit mounted Thermostat (thermostat ordered separate) has a polarized connector inside for quick connection to thermostat.

   Full-length supply, return, and insulated condensate water risers shall be type M copper. Riser length up to 120" (305 cm) is standard. Supply and return risers have integral internal piping including ball valves (for shut off purposes at unit). Risers and piping shall be factory pressure tested to check for leaks. Factory hose kits are required to connect the chassis piping to the cabinet ball valve. The condensate riser shall be insulated with 1/2" (12.6 mm) Armaflex type insulation. The top of each riser shall be deeply swaged (3 in./76.2 mm) to accept connection to the riser above/below, allowing for a floor-to-floor dimensional variance of ± one inch (25.4 mm).
6) Type L & K riser piping.
7) Supply and return risers insulated with 1/2" (12.6 mm) ARMAFLEX (closed cell) type insulation. 1" through 3" diameter standard, 4" diameter available. Union style or brazed shutoffs available.

2.1 Chassis Refrigerant Circuit:

.1 The chassis, which incorporates the air coil, water coil, drain pan with solid-state electronic condensate overflow protection, compressor, and electrical components shall be easily installed for quick job site installation and future servicing purposes. The slide in chassis shall have closed cell foam insulated panels surrounding the compressor. Compressors are not in the air stream. The chassis base shall be fabricated from heavy gauge galvanized steel formed to match the slide in rails of the cabinet. Units shall have a factory installed 1 inch (25.4 mm) thick filter bracket and throwaway type fiberglass filter.

1) Chassis can ship upright in any cabinet that risers are not attached.

Model Series 44VH • Suggested Specifications (continued)

.2 Refrigerant Circuit: All units shall contain an HFC-410A sealed refrigerant circuit including a high efficiency scroll (1-1/2 – 3 ton) or rotary compressor (3/4 – 1-1/4) designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, a corrugated aluminum fin and rifled copper tube refrigerant to air heat exchanger, reversing valve, enhanced rifle tubing coaxial (tube in tube) refrigerant to water heat exchanger, and safety controls including a high pressure switch, low pressure switch (loss of charge), water coil low temperature sensor, and air coil low temperature sensor. Access fittings shall be factory installed on high- and low-pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via the WSHP microprocessor lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch.

Hermetic compressors shall be external isolated with specifically design rubber grommets. The compressor shall have a dual level vibration isolation system, floating base. The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation grommets to a large heavy gauge compressor base pan, which is then isolated from the cabinet by resting on condensate drain pan which is isolated by grommets for maximized vibration attenuation. Compressor shall have thermal overload protection.

Refrigerant to air heat exchangers shall utilize corrugated aluminum fins and rifled copper tube construction rated to withstand 625 PSIG (4309 kPa) refrigerant working pressure.

Refrigerant to water heat exchangers shall utilize rifled tubing surface for enhanced heat exchanger capability. The copper inner water tube and steel refrigerant outer tube design shall be, rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure and 600 PSIG (3445 kPa) working water pressure. The refrigerant to water heat exchanger shall be “electric-coated” painted. The coating shall provide a minimum of 1000 hours salt spray protection per ASTM B117-97 on all external steel and copper tubing. The material shall be formulated without the inclusion of any heavy metals and shall exhibit a pencil hardness of 2H (ASTM D3363-92A), crosshatch adhesion of 4B-5B (ASTM D3359-95), and impact resistance of 160 in-lbs (184 kg-cm) direct (ASTM D2794-93).

Refrigerant metering shall be accomplished by thermostatic expansion valve. Expansion valves shall be dual port balanced types with external equalizer for optimum refrigerant metering. Units shall be designed and tested for operating ranges of entering water temperatures from 20° to 120°F (-6.7° to 48.9°C). Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function.

1) The unit will be supplied with cupro-nickel coaxial water to refrigerant heat exchanger.
2) The unit will be supplied with internally factory mounted two-way normal closed water valve.
3) The unit will be supplied with internally factory mounted auto-flow water regulators.

2.2 Drain Pan:

The drain pan shall be constructed of stainless steel to inhibit corrosion. Drain pan to be isolated from cabinet with four EPDM vibration isolation grommets. Drain pan shall have a sloped surface to allow positive drainage to the outlet opening, which shall be at the lowest level of the entire pan surface. Drain outlet shall be connected from pan outlet to condensate riser (if supplied) with factory installed p-trap inside of cabinet. The cabinet drain pan as standard will be supplied with solid-state electronic condensate overflow protection.

2.3 Electrical:

A control compartment shall be located within the unit cabinet and shall contain a 40VA transformer, terminal block or optional toggle disconnect for high voltage and low voltage connections, relay and solid-state controller for WSHP unit operation. Units shall be name-plated for use with time delay fuses or HACR circuit breakers as maximum over current protect for field branch circuit protection. Unit controls shall be 24 V and provide heating or cooling as required by the remote thermostat/sensor. A control compartment shall be located within the compressor chassis cabinet and shall contain a 24 V, 2 pole compressor contactor and compressor run capacitor in the front of the chassis control box enclosure for easy access during servicing. All electrical connections between the chassis and cabinet shall be made via locking quick-connects. The following controls shall be available at the terminal strip:

.01 Cooling Operation
.02 Heating Operation
.03 Fan Only Operation
.04 Supply Fan Status
.05 Condensate Overflow

Unit control system shall provide heating or cooling as required by the setpoints of the wall thermostat. The unit control scheme shall provide for fan operation simultaneous with compressor operation (fan interlock) regardless of the thermostat type.

1) Disconnect Switch, Non-Fused, classified as motor disconnect.
2) Circuit Breaker, all 208/230 volt and 265 volt, 15 and 20 amp - HACR rated, 265 volt 25 amp and higher - supplemental rated.

2.4 Fan and Motor Assembly:

Each unit shall have a direct drive centrifugal fan. The fan motor shall be a multi-speed, ECM type with integral mounting brackets isolated from the fan housing. Units shall have a terminal strip to facilitate motor speed change.

2.5 WSHP Solid State Control System:

Unit shall have a self-contained microprocessor-based control system. The unit control logic shall provide heating and cooling operation as signaled by the DDC System or a wall sensor or thermostat. The control system microprocessor board shall be specifically designed to protect against building electrical system noise contamination, EMI, and RFI interference. The control system shall interface with a heat pump type thermostat. The control system shall have the following features:

a. Anti-short cycle time delay on compressor operation.
b. Random start timer on power up mode.
c. Low voltage protection.
d. High voltage protection.
e. Unit shutdown on high or low refrigerant pressures.
f. Unit shutdown on low water temperature.
g. Condensate overflow electronic protection.
h. Option to reset unit at thermostat or disconnect.
i. Automatic intelligent reset. Unit shall automatically reset the unit 5 minutes after trip if the fault has cleared. If a fault occurs 3 times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur.
j. Ability to defeat time delays for servicing with "Test" button.
k. LED on circuit board to indicate high pressure, low pressure, low voltage, high voltage, low water/air temperature cut-out, condensate overflow, and control voltage status.
l. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
m. 24V output to cycle a motorized water valve or other device when compressor relay is active.
o. Thermistor water coil low temperature sensing dip switch (for water or antifreeze).
p. Thermistor air coil low temperature sensing.

.5 Extra-quite Construction: Unit shall have additional isolation under the compressor for reduced sound/vibration transmission. This feature is standard on every unit

.6 Flex Hoses: Water connections on each unit shall be supplied with two 24" long fire rated flexible hoses with ASTM ratings

Model Series 44VH • Suggested Specifications (continued)

of Flame Spread 25, Fuel Contribution 25 and Smoke Density 50 for connection to unit and field piping. The hose kit shall be rated for 400 psi (2756 kPa) design working pressure.

.7 Control Valves: Each unit shall be supplied with 2 Way, 2 Position control valve, auto flow control and shutoff valves with the appropriate pressure rating to fit the application.

Field installed options

3.0 Return Panels:

.1 The return panel shall be architecturally designed, acoustic type, flush mounted with hinged door for easy and quick access to filter and unit interior. Chassis shall be easily removed. The hinged return panel shall be made of heavy gauge die formed galvanized steel with a powder coat finish in "Appliance White" color. The return air panel must be removed to install or remove chassis.

Return air panels that protrude from wall more than 5/8 inch (15.9mm) are not acceptable.

1) Motorized fresh air damper for panel with frame - allows outside air to enter on right or left side.

3.1 Supply grille(s):

.1 Supply grille(s) shall be architecturally designed “brushed” aluminum or powder coated steel (color: appliance white).

1) Supply grille with double deflection style louvers.

2) Supply grille with double deflection style louvers with opposed damper.

3.2 Cabinet Subbase:

.1 Heavy 16 gauge galvanized steel construction, bolts to bottom of cabinet. Heights 1" (25mm) to 12” (305 mm) by 1" (25mm) increments. Ships in bulk for field attachment.

3.3 Filters:

.1 Pleated media disposable 1 inch (25mm) thick MERV 4, MERV 8 or MERV 11, 2 inch (50mm) thick MERV 8, MERV 11.

3.4 Thermostats:

The thermostat shall be an Engineered Comfort electronic type thermostat as selected below with the described features:

a. Single Stage Digital Auto or Manual Changeover

Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch and fan ON-AUTO switch. Thermostat shall have an LCD display with temperature and setpoint(s) in ºF or ºC. The Thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to display specific fault condition. Thermostat shall provide temperature display offset for custom applications.

b. Single Stage Digital Auto or Manual Changeover Programmable 5/2 Day

Thermostat shall be 5 day/2 day programmable (with up to 4 setpoints per day), multi-stage (2H/1C), manual or automatic changeover with HEAT-OFF-COOL-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for ºF or ºC.

c. Single Stage Digital Auto or Manual Changeover Programmable 7 Day

Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a blue backlit dot matrix LCD display with temperature, setpoints, mode, and status indication. The temperature indication shall be selectable for ºF or ºC. Time display shall be selectable for 12 or 24-hour clock. Fault identification shall be provided (when used with Engineered Comfort WSHP controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

Execution

4.0 HEAT PUMP INSTALLATION

.1 Install heat pumps in accordance with the manufacturers recommendations.

.01 Contractor to be aware the space is limited in most of the buildings, and the size of the unit and condensate piping route to have particular attention paid to it, with regard to placement.

.02 The final arrangement of each heat pump shall allow easy access to all service panels and allow filter removal.

.03 Provide all wiring and refrigerant tubing as required to connect water control valve and water regulating valve.

.04 Provide detailed start-up reports for each heat pump to be completed by trained service technicians.

END OF SECTION

NOTES: