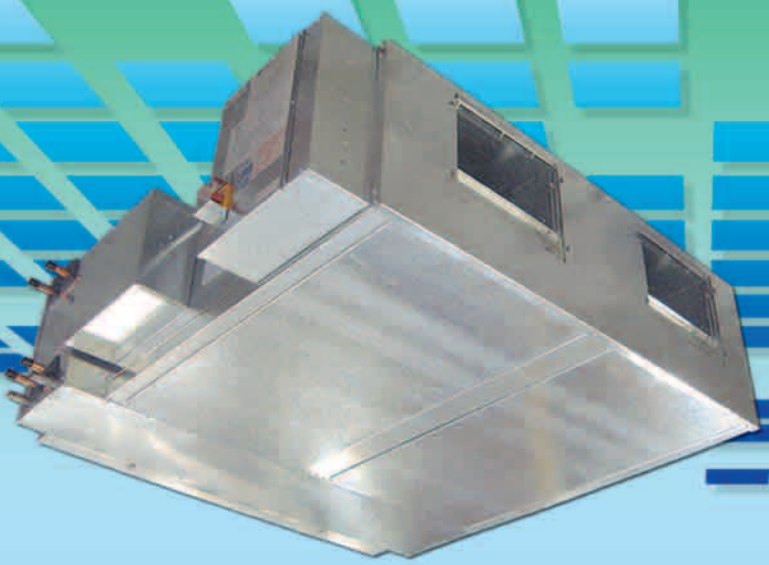
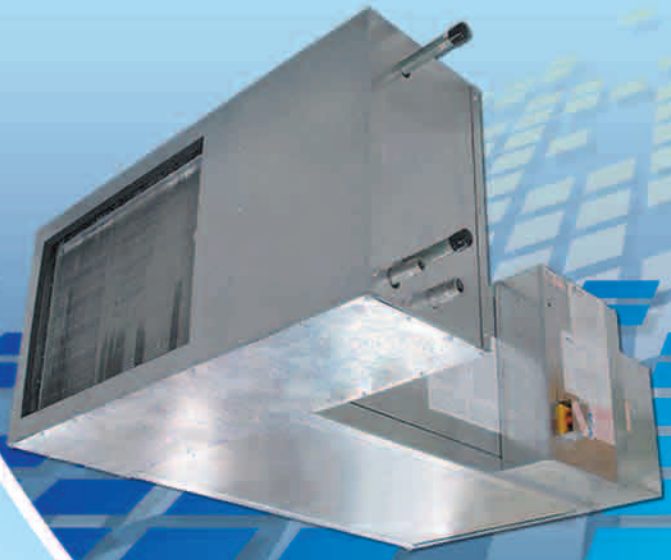
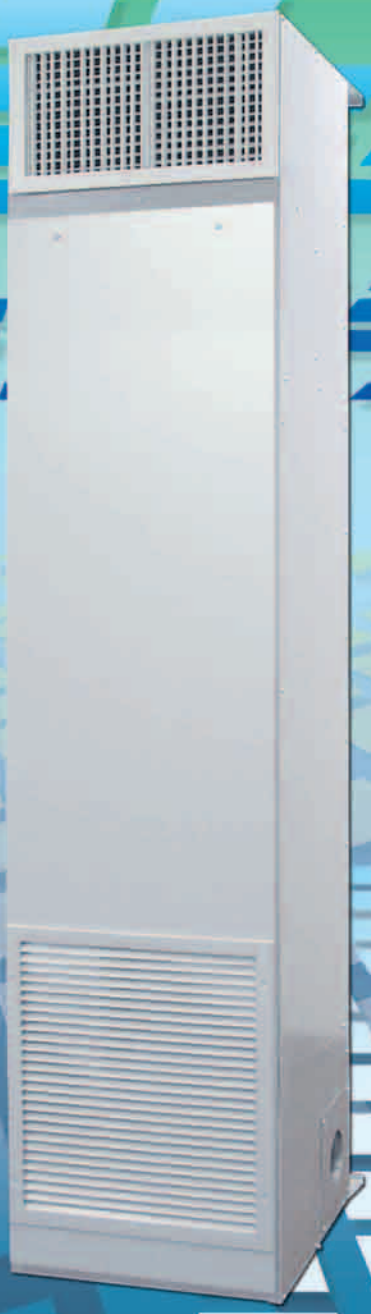
FAN COIL UNITS

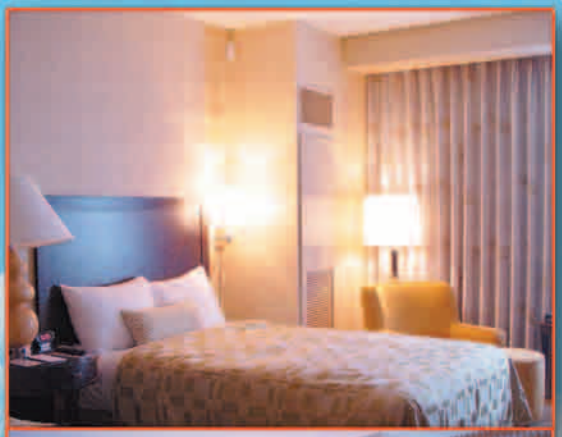






For the most up-to-date catalog information go to www.engineered-comfort.com

Engineered Comfort
by Nailor Industries Inc.



The New Standard For Vertical Hi-Rise Fan Coil Units Is Here...

Variable Air Volume Control with EPIC Fan Technology®

Most likely the fan coil unit you installed yesterday was pretty much the same as the one you could have installed 20 years ago. Nothing much had changed. Same old 3-speed induction motor, same old fan or valve cycle thermostat controls.

But now you have a choice!

39VH Series

Engineered Comfort is proud to offer a new generation of fan coil units available with EPIC Fan Technology® and ultra-high efficiency ECM motors that together provide Variable Air Volume control and unequaled comfort and efficiency.

A truly commercial quality Fan Coil Unit and the best choice for many applications including: Hotels, Condominiums, Apartment Buildings, Dormitories and Classrooms.

Simply the best in the industry:

Lowest operating cost - Energy savings of up to 80% compared to competitors' units.

Highest comfort level - State of the art Digital and Analog VAV controls.

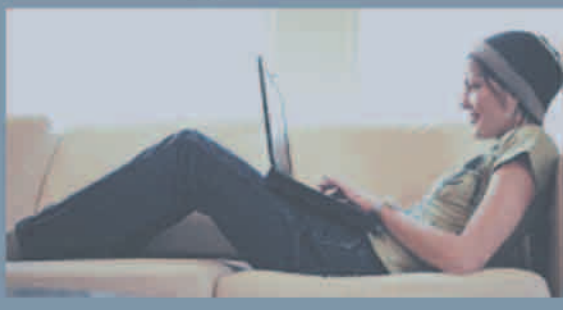
Lowest noise levels - Using VAV as opposed to fixed fan speed control.

Lowest IAQ potential - Constant discharge temperature control minimizes the risk of mold growth. A UVGI light option is additionally available.

The most standard features and benefits - other options also available.

To learn more, contact your Engineered Comfort Representative.

Engineered Comfort
by Nailor Industries Inc.



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Catalog August 2007. Printed in U.S.A.

Nailor International Inc.

Today, most people involved in the HVAC industry around the world are familiar with the Nailor International Group of manufacturing companies:

However, many may not know that the group had humble beginnings. The company commenced operations at a small facility in Toronto, Canada manufacturing a single air control device. Michael T. Nailor (President and CEO) started with the founding principle that the company would be customer focused and service orientated, dedicated to fulfilling the need for high quality, competitively priced products, delivered to our customers on schedule.

Nailor management has maintained strict adherence to the 'Superior Customer Service' philosophy for more than 35 years and as a result, the company has been rewarded with a continually increasing demand for our products. More recently Nailor has taken a technical leadership role, with both active participation on several ASHRAE Technical Committees and by pioneering the development of new products that exceed industry standard design and performance specifications. One example is the introduction of the ECM motor for use in fan powered terminal units in 1995, which has now become an industry standard for energy savings and improved comfort.

Nailor Industries Inc.

Commercial Air Terminal and Fan Coil Units, Air Distribution and Air Control Products (Worldwide).

www.nailor.com

THERMAL CORPORATION

Quality Custom Air Handling Equipment Since 1945 (North America).

www.thermal-corp.com

Manufactured Air Products™

Grilles, Registers, Diffusers and Dampers for the commercial HVAC wholesale market (North America).

www.map-hvac.com

Advanced Air

Commercial Air Terminal and Fan Coil Units, Air Distribution and Air Control Products (United Kingdom and Europe).

www.advancedair.co.uk

Nailor is now proud to introduce a new complete line of innovative commercial fan coil units, the first available with EPIC Fan Technology® and ECM motors. We felt the significance of this new development should also herald a new brand name – Engineered Comfort. We are confident that Engineered Comfort will also significantly contribute to improving the building environment and provide substantial energy savings.

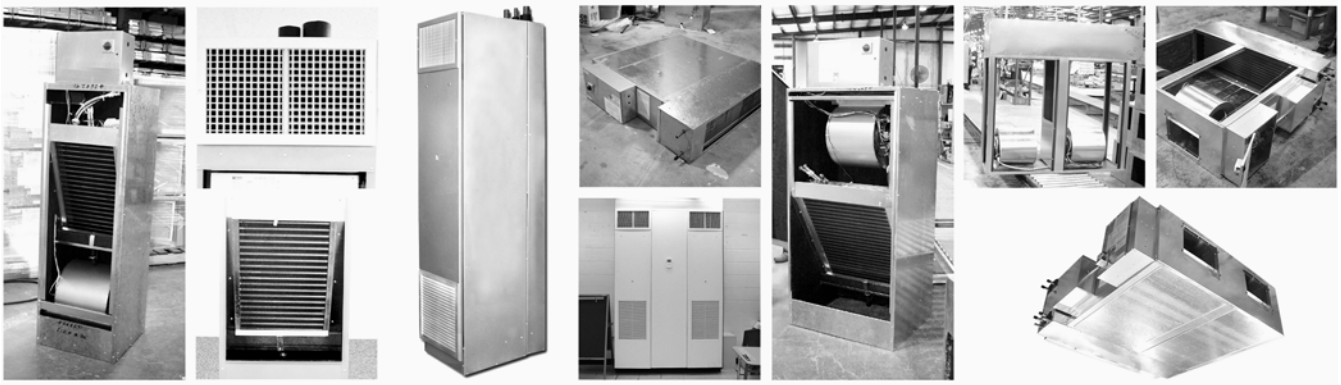
Today, Nailor International Inc. is still a privately held company with Group Headquarters in Houston, Texas. The company has ten manufacturing plants totaling over 700,000 square feet strategically located in three countries with an international distribution network of representatives working together to not only meet, but exceed the expectations of clients, engineers and customers around the world.

"Complete Air Control and Distribution Solutions."

Engineered Comfort by Nailor Industries Inc.

www.engineered-comfort.com

FAN COIL UNIT OVERVIEW



Vertical Hi-Rise Units • 39VH Series

Designed as a modular unit with integral risers to allow units to be "stacked" one on top of the other in a vertical column rising floor to floor up the building. This allows the use of one set of common risers, significantly reducing the installed cost compared to other fan coil systems.

- Standard 88" (2235) high unit design.
- 200-2100 cfm (94-991 l/s). The largest range in the industry.
- High efficiency PSC motor standard in nine unit sizes (nine motor/blower combinations in four footprint sizes).
- Ultra-high efficiency ECM motor available in four unit sizes.
- Industry leading Variable Air Volume (VAV) EPIC Fan Technology® available with ECM motor for performance leading energy savings, quietness and comfort.
- Up to five rows of cooling/heating coils are available.
- Risers (where provided) are factory installed as standard but may be optionally shipped loose upfront to facilitate field installation.
- UV light option.
- Primary applications include hotels, condominiums and apartment buildings.

Type C Concealed Unit

Type C Concealed Unit

Designed for stand-alone concealed applications in corners or along room walls. Drywall may be directly attached or the unit framed in. After completion of the finished room walls, only the supply grille and return panel are visible.

Type E Exposed Unit

Designed for exposed stand-alone applications on both new and renovation projects where concealed installation is not possible or practical. Units feature an integral riser chase as standard and a full height flush mount removable face panel with supply and return grilles. An optional ceiling shroud extension is available to take the unit casing the full height of the room. The entire unit features an attractive baked enamel paint finish.

Type E
Exposed Unit

Type M/S Master Slave Unit

Designed for those applications where building design prohibits the use of a Paired unit. The units are a pair but the slave is installed remote from the master. Units still share a common set of risers (supplied on the Type M Master unit when provided) but each unit is shipped separately for a field piping connection.

Type A/B Paired
"Side-by-side" Unit

Type A/B Paired Unit

Designed for installation in the separation wall between two rooms. Paired units are a pair, available in a "piggyback" or "side-by-side" arrangement. They share a single set of common risers (attached to the A unit) but each has its own set of water valves and controls for independent operations. Paired units are shipped completely assembled direct from the factory for additional cost savings and are available with a one-hour fire-rated option.

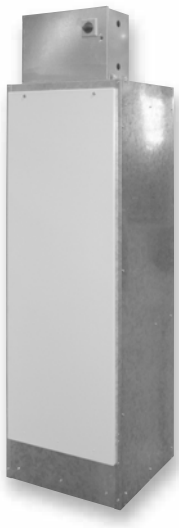
Type A/B Paired
"Piggyback" Unit

FAN COIL UNIT OVERVIEW

Low Profile Vertical Hi-Rise Units • 39L Series

All the same design unit sizes features and options as the standard 39VH series model, but in a reduced height casing for easier installation where floor to floor height is restricted.

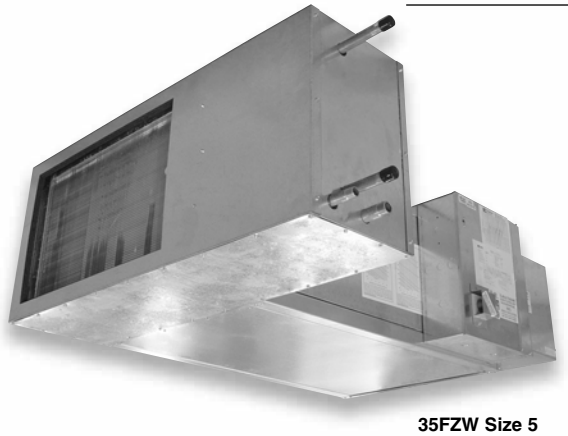
- Low profile 80" (2032) high unit design
- Available in Type C Concealed, Type A/B Paired and Type M/S Master Slave arrangements.



Low Boy Vertical Hideaway Units 39MU and 39MD Series

Design for platform or floor mounted, vertical ducted applications. Units are normally located in closets, utility rooms or other concealed locations.

- Compact unit design
- 200 – 2100 cfm (94 – 991 l/s)
- High efficiency PSC motor standard in nine unit sizes (motor / blower combinations in four footprint sizes).
- Ultra-high efficiency ECM motor available in four unit sizes.
- Industry leading Variable Air Volume EPIC Fan Technology® available for performance leading energy savings, quietness and comfort.



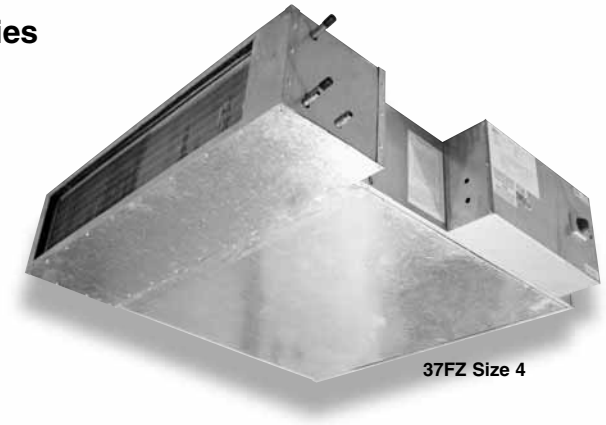
35FZW Size 5

High Capacity Hideaway Horizontal Units 35F Series

- 200 – 2600 cfm (94 – 1227 l/s) capacity in three unit sizes.
- Designed for concealed ceiling applications.
- Ultra-high efficiency ECM motor standard.
- Industry leading Variable Air Volume EPIC Fan Technology® available for performance leading energy savings, quietness and comfort.
- Fully isolated direct drive blower/motor assembly.
- Insulated inlet casing reduces radiated sound.
- Easy full panel access to all components.
- Sloped drain pan externally insulated.
- Up to six rows of cooling / heating coils available.
- Various IAQ linings available.
- UV light option.

Low Profile Hideaway Horizontal Units • 37F Series

- 90 – 1350 cfm (43 – 637 l/s) capacity in three unit sizes.
- Only 11" (279) in height for tight ceiling applications.
- Ultra-high efficiency ECM motor standard.
- Industry leading Variable Air Volume EPIC Fan Technology® available for performance leading energy savings, quietness and comfort.
- Fully isolated direct drive blower/motor assembly.
- Insulated inlet casing reduces radiated sound.
- Easy full panel access to all components.
- Sloped drain pan externally insulated.
- Up to six rows of cooling / heating coils available.
- Various IAQ linings available.
- UV light option.



37FZ Size 4

Ultraviolet Lights for Fan Coil Unit Applications

Engineered Comfort is proud to provide a new optional feature for its fan coils; Ultraviolet Germicidal Irradiation or UVGI. UVGI has been used for about 100 years to disinfect water, surfaces and air, but traditionally, it has not been used in A/C systems, especially ductless fan coils. UVC energy can “escape” fan coil return and/or supply air openings to potentially do harm to eyes and skin. Our system is uniquely designed to prevent this, making UVC use in ductless systems safe. We are first to accomplish this design goal. UVC kills or inactivates microorganisms, and degrades most organic material to eliminate the mold, mildew, and slime along with their nutrients that accumulate on coils and in drain pans. This so-called bio-film binds (surface attachment) airborne contaminants to a coils surface through a complex aggregation of microbes and their excretion of a protective and adhesive type of matrix material. Degrading the matrix allows it to wash away with condensate runoff and residual drain pan water. This results in higher operating efficiencies through optimum heat exchange efficiency, reduced coil pressure drop and fewer clogged drains. What’s more, health benefits have been claimed as UVC reduces space specific concentrations of airborne virus and other infectious agents that circulate through any air conveyance system.

What is Ultraviolet (UV) Light?

UV energy can be found in the electromagnetic spectrum emitted by the sun, between visible light and x-rays, and it’s invisible to the human eye. The most germicidal frequency is approximately 260 nm. Man made germicidal UV is extremely close at 254 nm and is referred to as UVC. It’s a safe, well tested technology produced by lamps that are similar to fluorescent lights. To kill bacteria, virus and mold spores, UVC energy only needs to penetrate the microbe’s outer cell membrane to reach the DNA, where it severely damages this genetic material. It’s very easy for UVC and the best part is that no chemicals or any other residual materials need be used. The microbe is killed or is unable to reproduce so when UVC is combined with the right filter, the two become the optimal strategy for cost effective recirculation of the same air, over and over again.

Improved Indoor Air Quality

Typically, A/C systems are damp, dark and full of nutrients; the perfect breeding ground for mold and bacteria. As they run, these inherent materials along with airborne infectious particles (virus) are circulated throughout the space. Research shows that occupants exposed to these contaminants can develop various health issues, including sinus congestion, headaches, allergies and asthma, as well as upper respiratory ailments, colds and flu. According to the World Health Organization, these ailments account for a substantial portion of absences from school and work, leading to lower productivity. As a result, UVC energy is required by the GSA for any government facility it funds. Other agencies and organizations recommending its use are the CDC, ASHRAE, Homeland Security and the DOE and more! UVGI can destroy several contaminants in HVAC systems to protect the coil, air distribution system, and occupant space and technicians alike.

Lower Operating Costs

The cooling coil is the most critical part of an A/C system. Because of moisture and dirt, coils can act as a "Petri dish" growing a myriad of microbes. These contaminate (allergens) like fungi, molds and bacteria also reduce a coils mechanical efficiency. It then either costs more to run or it simply no longer gets the job done. This common occurrence forms the basis of coil cleaning, a routinely “required” safeguard. But it’s costly, only effective for a short term and requires the use of chemicals. For fan coil units, coil access may not even be possible; just another reason why Engineered Comfort includes UVC. UVC can play a critical role in keeping coils clean. Our calculated intensity and positioning of UVC lamps allows us to deliver what’s needed, to all but eliminate traditional coil cleaning. System performance is maintained, harmful chemicals are not used and occupants and technicians alike are more comfortable, productive and safe.

At Engineered Comfort, we’re about total comfort through secure and productive environments.

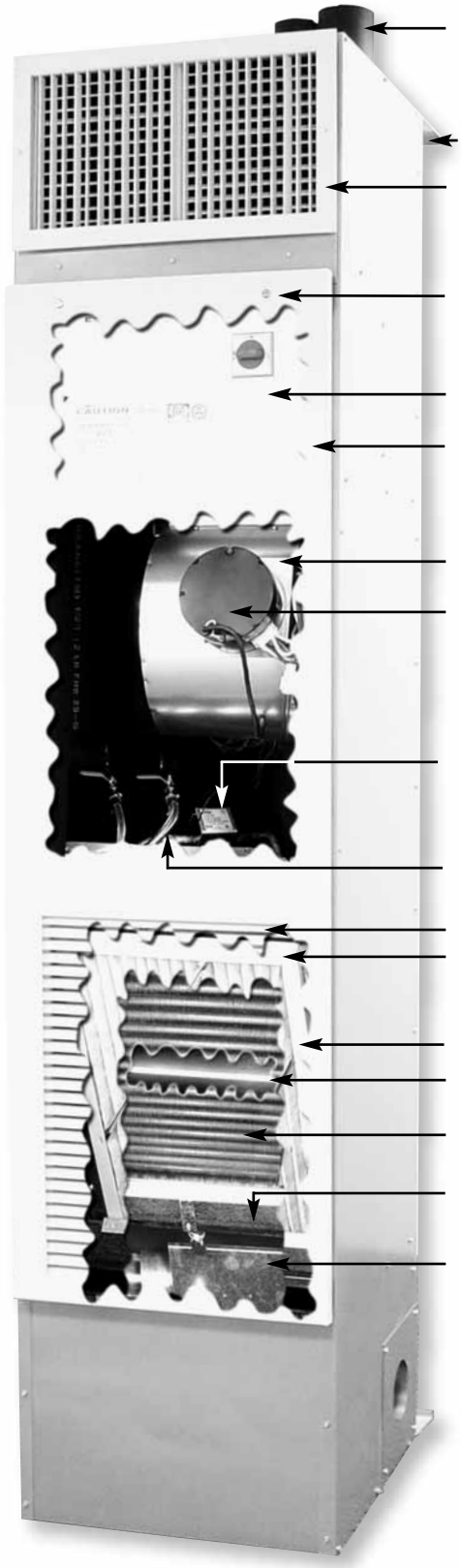

VERTICAL HI-RISE
FAN COIL UNITS

Model Series 39VH Vertical Hi-Rise Fan Coil Units with EPIC Fan Technology® / ECM Motor – a new level of efficiency and comfort

FEATURES AND BENEFITS OF ENGINEERED COMFORT FAN COIL UNITS

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 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. 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 ARI and listed by ETL and display the ARI 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 Engineered Comfort, stand-alone Analog 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 (optional).
- All 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**
- **Riser Support Plate**
- **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**
- **ECM Motor with variable air volume Nailor EPIC Fan Technology® (optional)**
- **Factory mounted Control Valves and Piping Packages**
- **Stainless Steel Flex Hoses with Full Port Ball Valves**
- **Commercial Grade Return Grille**
- **Filter - 1" Throwaway Glass Media type standard. (MERV 7 Pleated Filters are available)**
- **Filter Rack**
- **UV Light (Optional)**
- **Coils are ARI 410 listed and labeled**
- **Insulated Galvanized Drain Pan (Stainless Steel available)**
- **Outside Air Damper (Optional)**

Not Shown:

- Electric Heat (Optional)
- Low & High Voltage "J" Box (Optional)
- Fan Access Panel
- DDC Controller (Optional)
- Electrical Knockout
- P-Trap
- Sub-Base (Optional)
- Fire Rated Green Board (Optional)
- Adjustable Shroud (Optional)
- 120 VAC Outlet (Optional)
- Thermostat (On unit or remote mounting)

Vertical Hi-Rise Fan Coil Units (Standard 88" high)
Model Series: 39VH

MODELS:

39VHZ Chilled Water.
39VHZW Chilled and Hot Water.
39VHZE Chilled Water plus Electric Heat.
39VHZWE Chilled and Hot Water plus Electric Heat.

TYPES:

C Concealed (stand-alone) **E** Exposed **S** Slave
A/B Paired **M** Master

DESCRIPTION:

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.

COIL OPTIONS:

2 Pipe System:
- 3 Row coil.
- 4 Row coil.
- 5 Row coil.

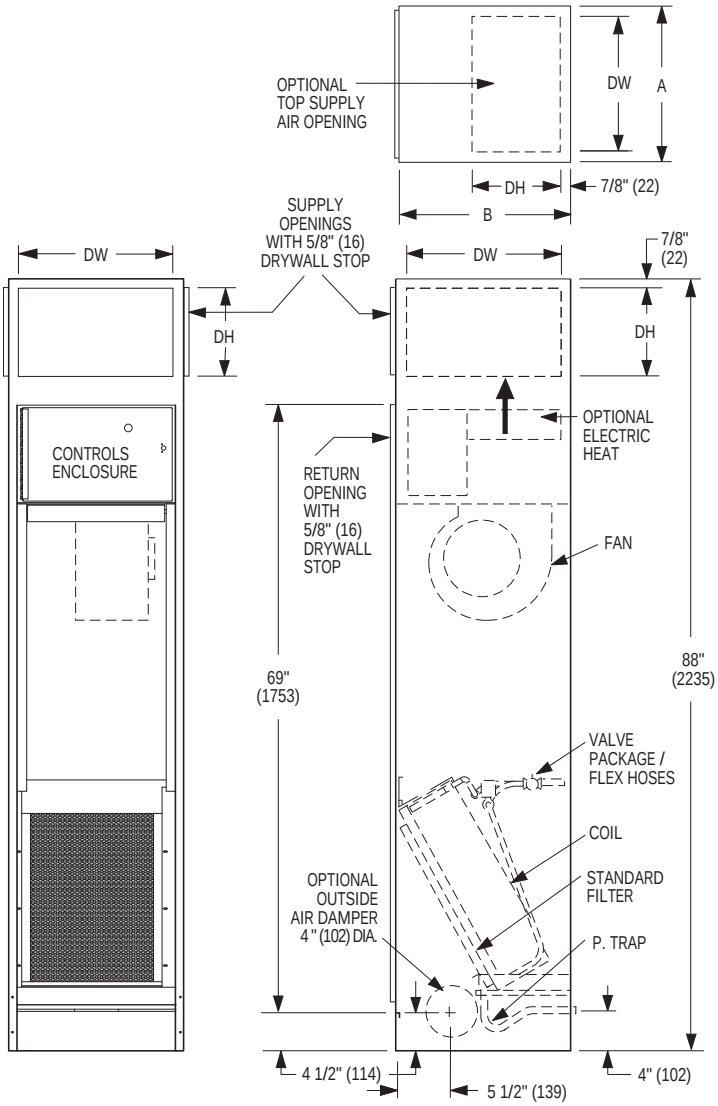
4 Pipe System:
- 4 Row - 3 ChW, 1 HW coil.
- 5 Row - 3 ChW, 2 HW coil.
- 5 Row - 4 ChW, 1 HW coil.

STANDARD FEATURES INCLUDE:

- Nine unit sizes ranging from 300-2100 cfm (142-991 l/s).
- Outer casing constructed of 20 gauge (1.0) 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 fiberglass media filter.
- AW Appliance White powder coat baked enamel finish on supply grille(s) and return air panel.

ECM MOTOR / EPIC OPTION:

- 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. Imperial Units (inches)

Unit Size	Footprint A x B	Supply Grille Nominal DW x DH	Standard Filter Size
3, 5, 6	18 x 18	16 x 10	13 1/8 x 16 3/4
8, 10	20 x 20	18 x 10	15 1/2 x 24
12, 15	24 x 24	22 x 10	18 1/2 x 29
19, 21	30 x 24	28 x 10	24 1/2 x 29

Dimensional Data. Metric Units (mm)

Unit Size	Footprint A x B	Supply Grille Nominal DW x DH	Standard Filter Size
3, 5, 6	457 x 457	406 x 254	333 x 425
8, 10	508 x 508	457 x 254	394 x 610
12, 15	610 x 610	559 x 254	470 x 737
19, 21	762 x 610	711 x 254	622 x 737

Low Profile Vertical Hi-Rise Fan Coil Units (80" high)

Model Series: 39L

MODELS:

39LZ	Chilled Water.
39LZW	Chilled and Hot Water.
39LZE	Chilled Water plus Electric Heat.
39LZWE	Chilled and Hot Water plus Electric Heat.

TYPES:

C Concealed (Stand-alone) **E** Exposed
A/B Paired **M** Master **S** Slave

DESCRIPTION:

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

COIL OPTIONS:

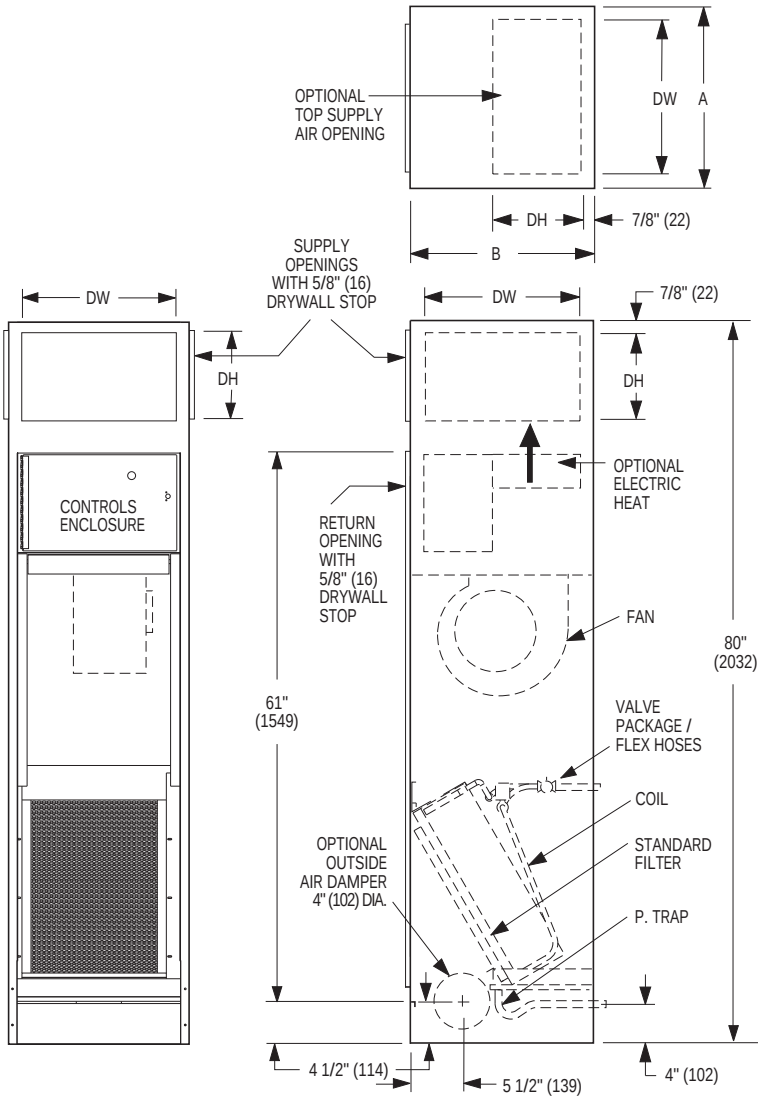
2 Pipe System:	4 Pipe System:
• 3 Row coil.	• 4 Row - 3 ChW, 1 HW coil.
• 4 Row coil.	• 5 Row - 3 ChW, 2 HW coil.
• 5 Row coil.	• 5 Row - 4 ChW, 1 HW coil.

STANDARD FEATURES INCLUDE:

- 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 fiberglass media filter.
- AW Appliance White powder coat baked enamel finish on supply grille(s) and return air panel.

ECM MOTOR / EPIC OPTION:

- 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. Imperial Units (inches)

Unit Size	Footprint A x B	Supply Grille Nominal DW x DH	Standard Filter Size
3, 5, 6	18 x 18	16 x 10	13 1/8 x 16 3/4
8, 10	20 x 20	18 x 10	15 1/2 x 24
12, 15	24 x 24	22 x 10	18 1/2 x 29
19, 21	30 x 24	28 x 10	24 1/2 x 29

Dimensional Data. Metric Units (mm)

Unit Size	Footprint A x B	Supply Grille Nominal DW x DH	Standard Filter Size
3, 5, 6	457 x 457	406 x 254	333 x 425
8, 10	508 x 508	457 x 254	394 x 610
12, 15	610 x 610	559 x 254	470 x 737
19, 21	762 x 610	711 x 254	622 x 737

Vertical Hi-Rise Standard and Optional Features

Standard Features

CONSTRUCTION:
- 20 ga. (1.0) G60 galvanized steel casing.
- 1/2" (13) thick, 2 lb/cu. ft. density fiberglass insulation with water repellent facing.
- Integral filter rack with 1" (25) throwaway filter.
- ARI 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, 4 or 5 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 vents.
- ARI 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).

ELECTRICAL 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.

ARI PERFORMANCE CERTIFIED ™ ARI Standard 440 Room Fan-Coil Unit www.aridirectory.org

INTERTEK ETL LISTED C US

Options

CONSTRUCTION:
- 18 ga. (1.3) G60 galvanized steel casing.
- 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 7 pleated disposable 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 EPIC Fan Technology®.

COILS:
- Automatic air vents.
- Stainless steel coil casings.
- 0.025" (0.635) tube wall thickness.
- 0.0075" (0.191) aluminum fins.

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.
- Silent solid state fan relays.
- Toggle disconnect switch.
- Drain pan overflow float switch.
- Dust tight enclosure.
- Sump pump.
- UV lights.
- Main fusing.

CONTROLS:
- Digital or Analog VAV sequences.
- 3-speed fan electric sequences with analog, LCD digital display or programmable thermostats
- Unit or wall mounted thermostats.

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.

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 • 220V* • 240V • 277V
• 347V* • 380V* • 480V • 600V

Three phase, 60Hz (delta):

• 208V • 240V

Three phase, 60Hz (4 wire wye):

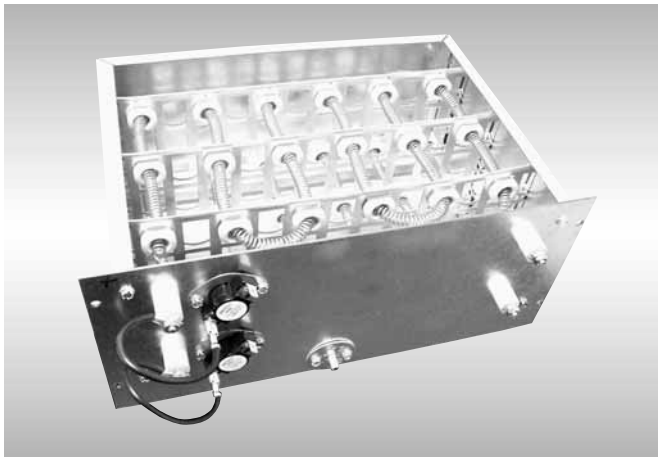
• 380V* • 480V • 600V

* Outside of the U.S.A.

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

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.
- Nickel-chrome heating elements.
- Magnetic contactors per stage on fan coils with DDC or analog electronic controls.
- Fan interlock relay.
- Control voltage transformer (Class 2) for DDC or analog electronic fan coils.
- Fan coil unit with electric heat is ETL Listed as an assembly.



Optional Accessories:

- Toggle disconnect switch.
- Door interlocking disconnect switch.
- Quiet contactors.
- Mercury contactors.
- Power circuit fusing.
- Dust tight control enclosure.
- Class 'A' 80/20 nickel/chrome element wire.
- Manual reset secondary high limit.
- Airflow safety switch.

Tested and approved to the following standards:
ANSI/UL 1995, 1st. ed.
CSA C22.2 No. 155-M1986.

Recommended Selection:

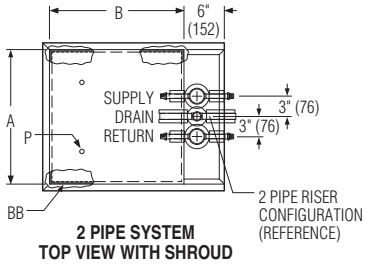
The table below is a quick reference guide, to illustrate the relationship between electrical power supply, heater capacity in kilowatts and fan coil unit size that are available.

- Fan coils are available with 1 or 2 stages of heat. 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 120°F (49°C).

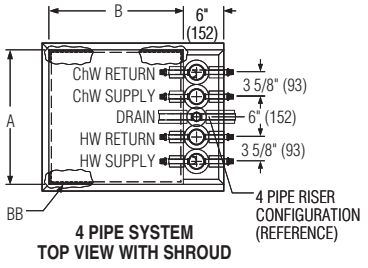
Model	Unit Size	Electric Heat Maximum Kilowatts												
		120V 1 Ph	208/220/240V 1 Ph	277V 1 Ph	347V 1Ph	480V 1 PH	600V 1Ph (120V Fan)	600V 1Ph (240/277V Fan)	208V 3Ph	220/240V 3Ph	380V 3Ph	480V 3Ph	600V (120V Fan)	600V (240/277V Fan)
39	3,5,6	5	8/8/8	8	8	8	8	8	8	8	8	8	8	8
	8, 10	5	8/9/10	10	13	13	13	13	9	9.5	8	10	12	13
	12,15	4	8/9/10	10	13	18	17	18	9	9.5	8	10	12	13
	19, 21	3.8	8/8/9	10	13	18	18	18	9	9.5	8	10	12	13

39VH Series • 2 or 4 Pipe System with Full Face Cover

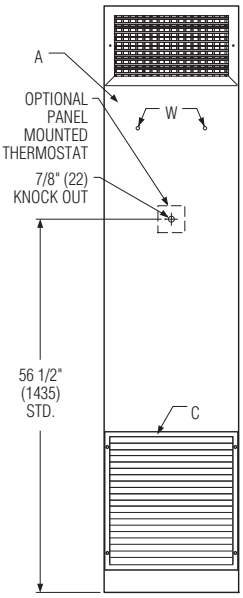
A Front Panel
B Supply Grille
C Return Air Grille
D Alternate Side Grille Location
E Fan Assembly
F ChW/HW Coil
G Drip Pan
H Filter
H-1 Filter Rack
J Power & Control Conns.
K Fan Access Panel
L Controls Enclosure
L-1 Electric Heat (Opt.)
M DDC Controller (Opt.)
N Risers (Opt.)
P Electrical Knock-out
R Control Valve
S Flex Hose with Shut-off Valve
T P-Trap
W Quarter Turn Latches
X Pipe Chase (Opt.)
Y Sub-Base (Opt.)
Z Adjustable Ceiling Shroud for exposed units (Opt.)
AA 120 VAC Outlet (Opt.)
BB 1/2" X 2 lb Insulation



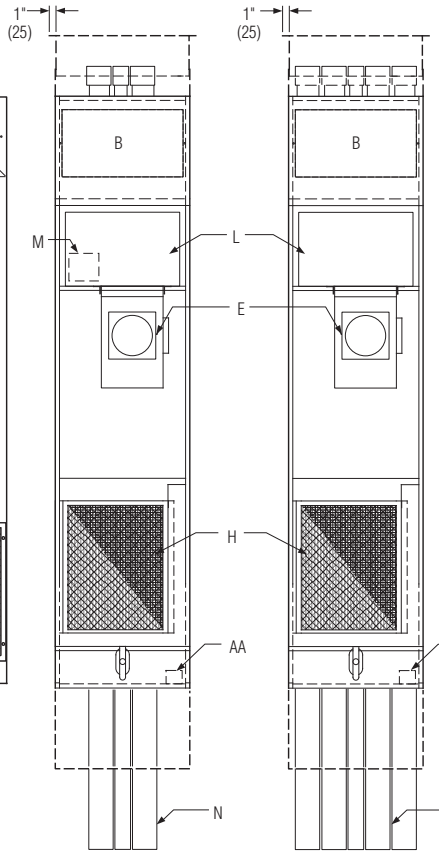
2 PIPE SYSTEM TOP VIEW WITH SHROUD



4 PIPE SYSTEM TOP VIEW WITH SHROUD

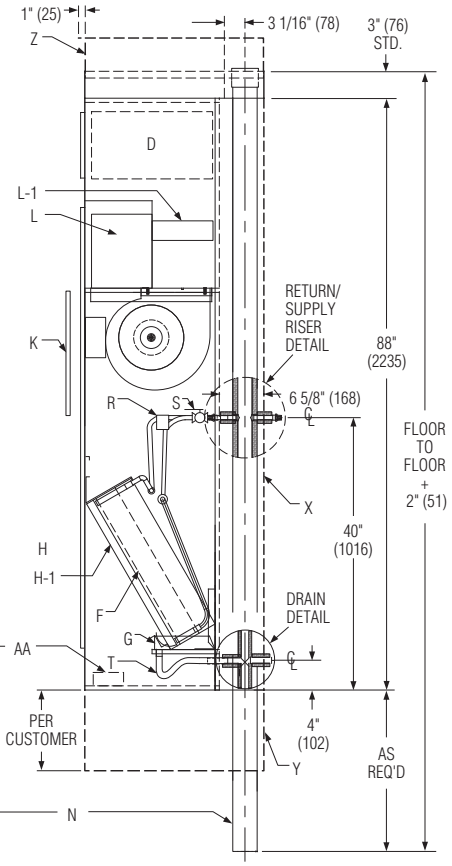


FRONT PANEL



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 AxB 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)

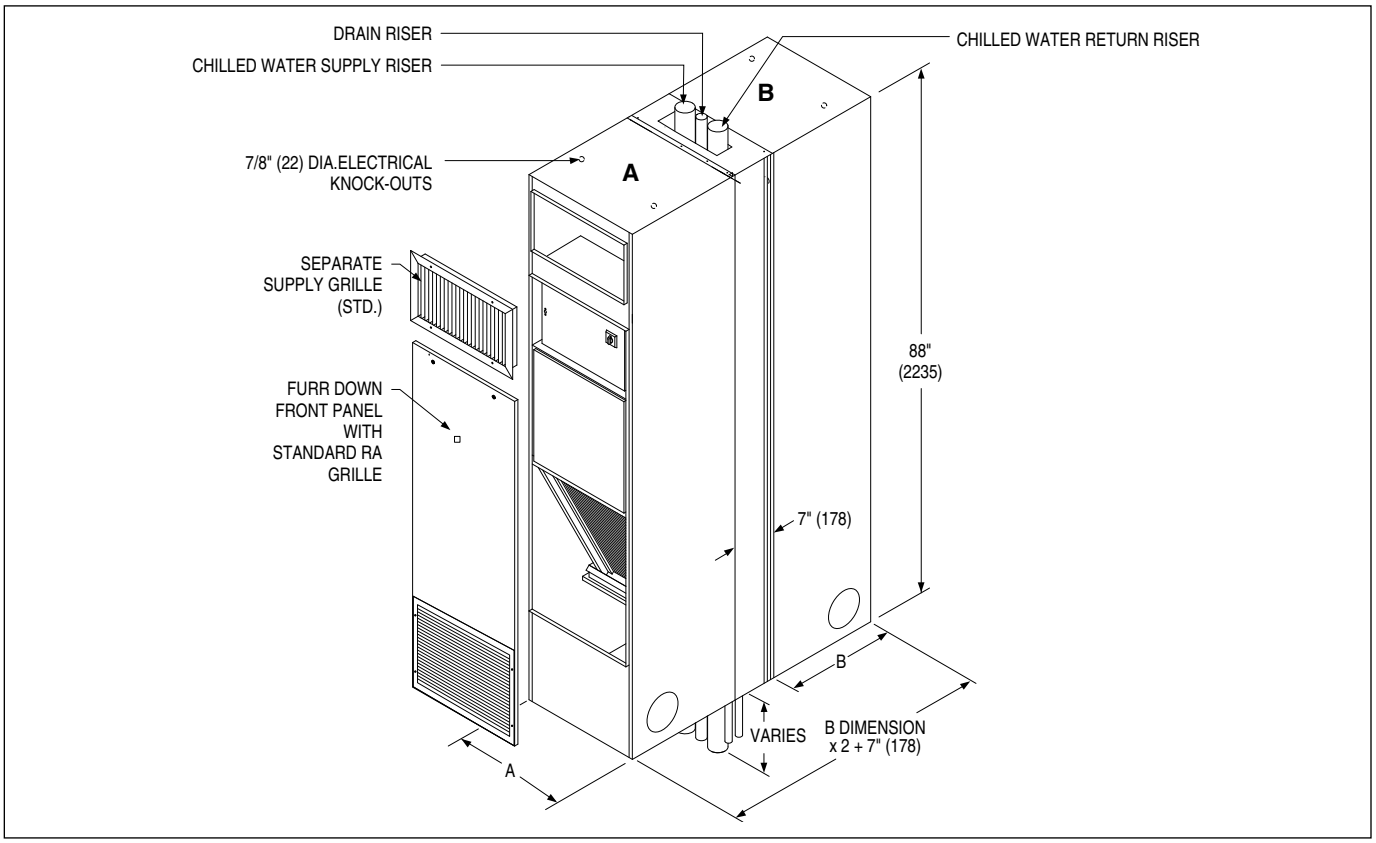
Notes:

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.

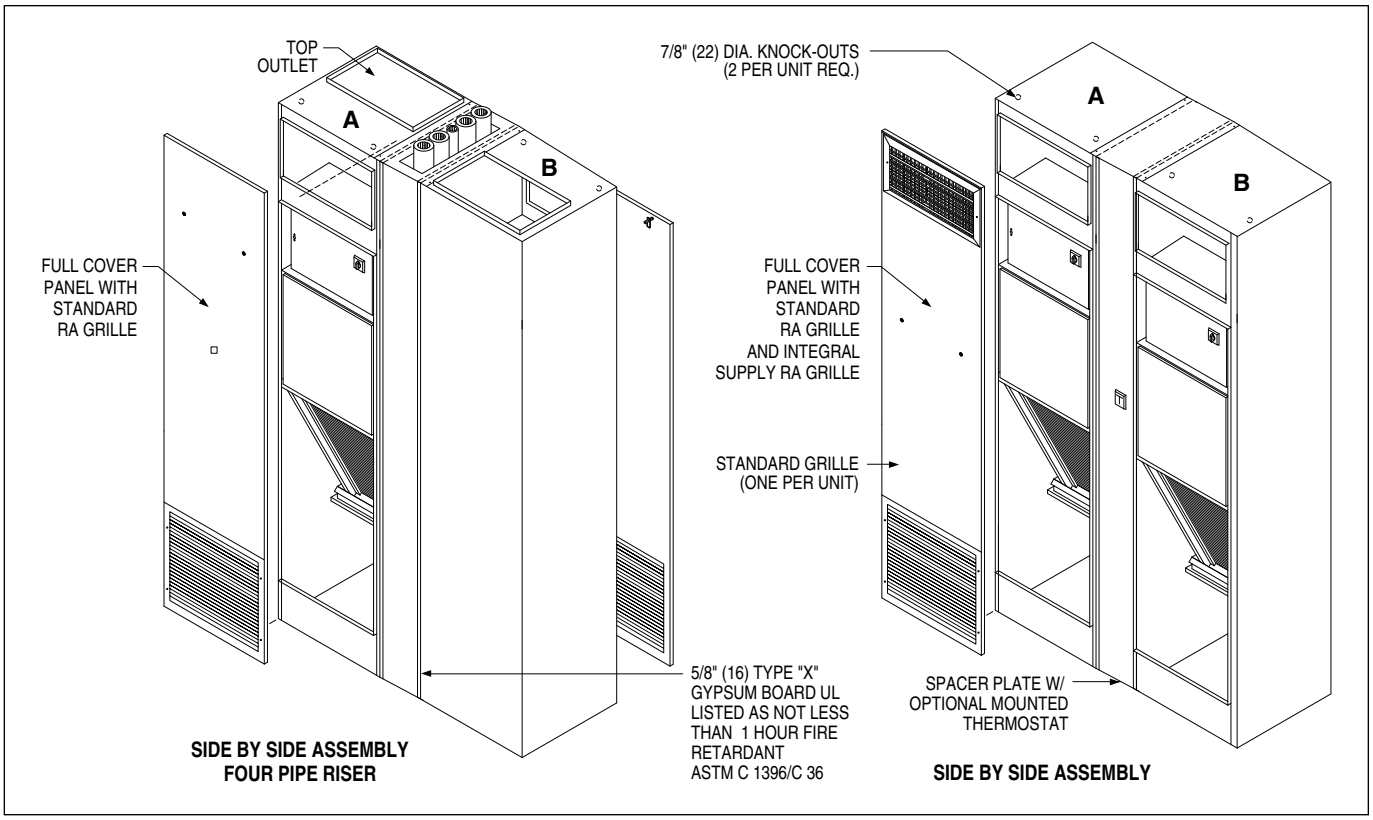
All 39VH and 39L models can be configured in a Stand-alone, Paired (Back to Back or Side by Side), Master/Slave or Exposed arrangement.

Dimensions are in inches (mm).

39VH Series Type A/B Paired Unit • Piggyback Assembly

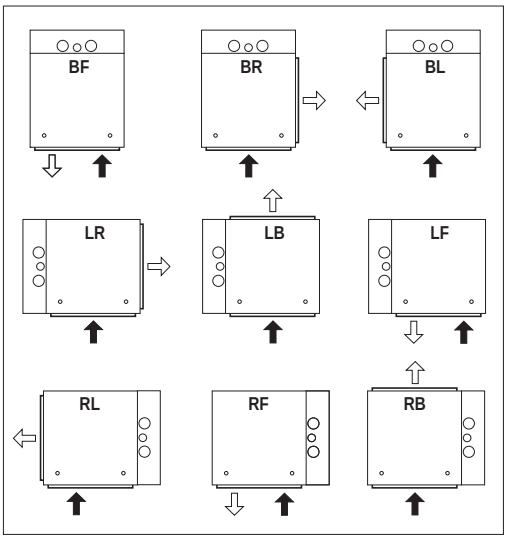


39VH Series Type A/B Paired Unit • Side-by-Side Assembly

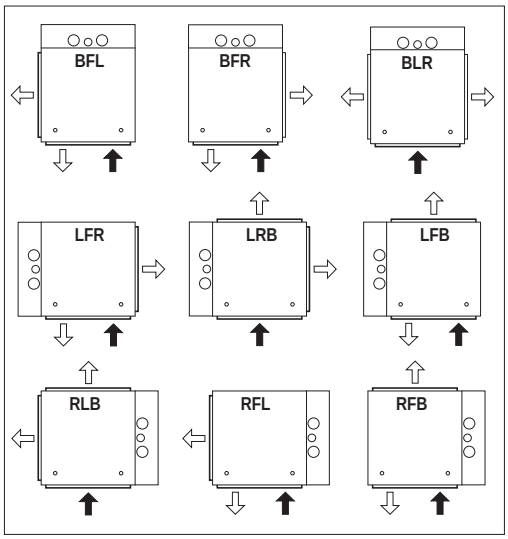


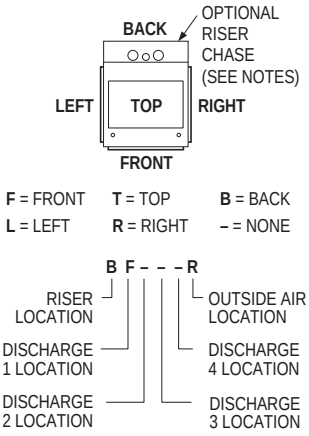
Model Series: 39VH and 39L • Unit Configurations for Riser Location and Discharge Grille Arrangement

SINGLE SIDE SUPPLY

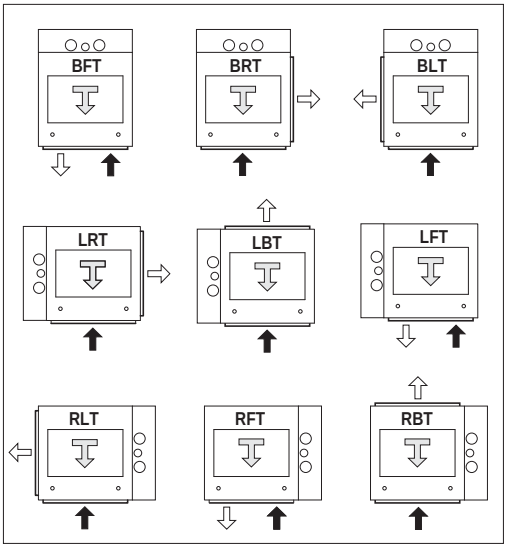


DOUBLE SIDE SUPPLY

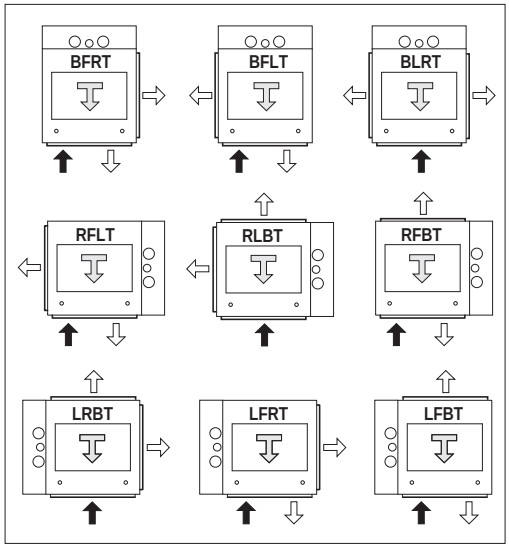




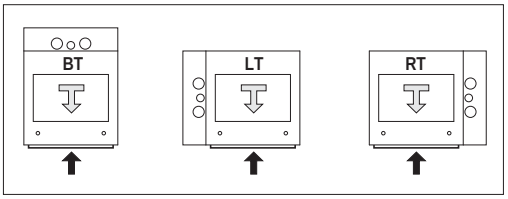
TOP AND SINGLE SIDE SUPPLY



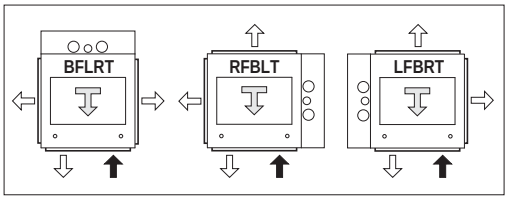
TOP AND DOUBLE SIDE SUPPLY



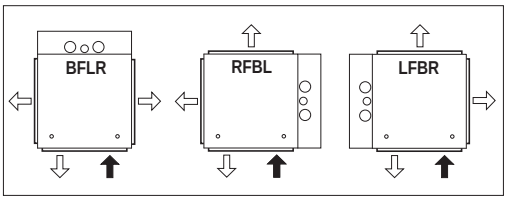
TOP ONLY SUPPLY



TOP AND TRIPLE SIDE SUPPLY



TRIPLE SIDE SUPPLY



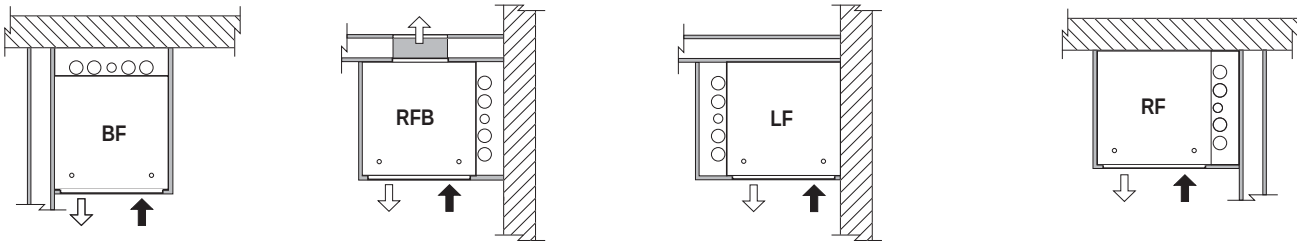
NOTES:

1. Return air panel and unit access are always on front of unit.
2. A sight and sound baffle are provided on double side supply units with a directly opposite grille location.
3. Opposed blade damper on one supply grille for units with double supply outlets.
4. Last (6th) optional character refers to 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 BF arrangement only.

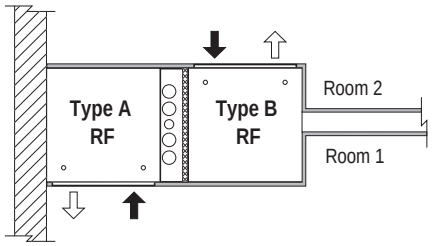
Model Series: 39VH and 39L

Typical Stand-alone and Paired Unit Configurations

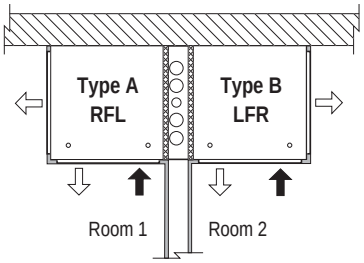
TYPE C - CONCEALED (STAND-ALONE):



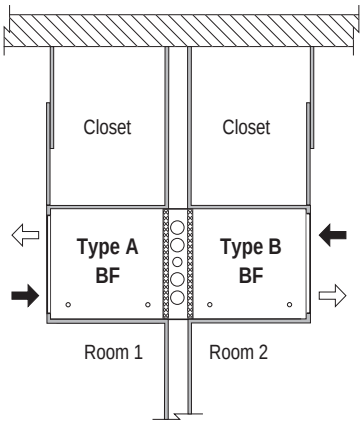
TYPE A/B - PAIRED:



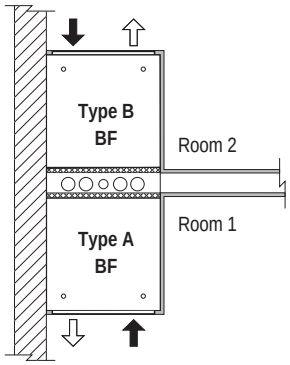
"Side-By-Side"



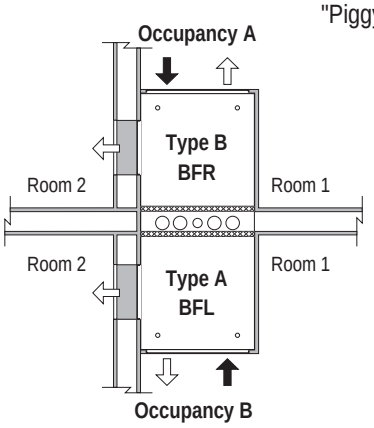
"Piggyback" *



"Piggyback" *

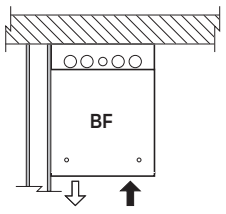


"Piggyback" *

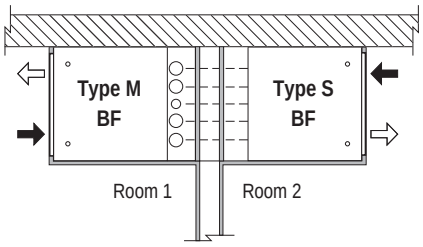


"Piggyback" *

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 (w/risers)
B Slave Unit (w/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) Fire-rated is an option (double "Type X" wallboard).

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.

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. The allowable riser lengths between system expansion loops chart displays the expansion characteristics of risers compared to water temperature difference. 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.

Pressure Ratings

The following C_V factors table is used to determine the pressure drop of various factory furnished piping package components and accessories.

C_V FACTORS FOR 39 SERIES VALVE PACKAGE COMPONENTS					
PORT DIAMETER	BALL VALVE	2-WAY VALVE	3-WAY VALVE	FLOW CONTROL (FIXED OR AUTO)	STRAINER
1/2"	21	2.5	2.5	2.12	9.13

NOTES:

1. C_V factors are based on Engineered Comfort standard valve package components.
2. Flow control C_V at full open position.

Example:

Find the pressure drop in feet of head (ft-H_2O) for a size 36 unit at 7.5 GPM with the following:

4 Row Coil, Two – 1/2" ball valves, One – 1/2" strainer, One – 2-way valve

- (GPM ÷ C_V 1/2" ball valve)^2 x 2 + (GPM ÷ C_V Strainer)^2 +(GPM ÷ Cv 2-way valve)^2 = PD (PSI)
- (0.13 x 2) + 0.67 + 9.00 = 9.80 PSI
- 9.80 PSI x 2.31 ft./PSI = 22.64 ft-H_2O
- 22.64 ft - H_2O + 11.7 ft-H_2O (from coil data) = 34.34 ft - H_2O

Answer is 34.34 ft - H_2O

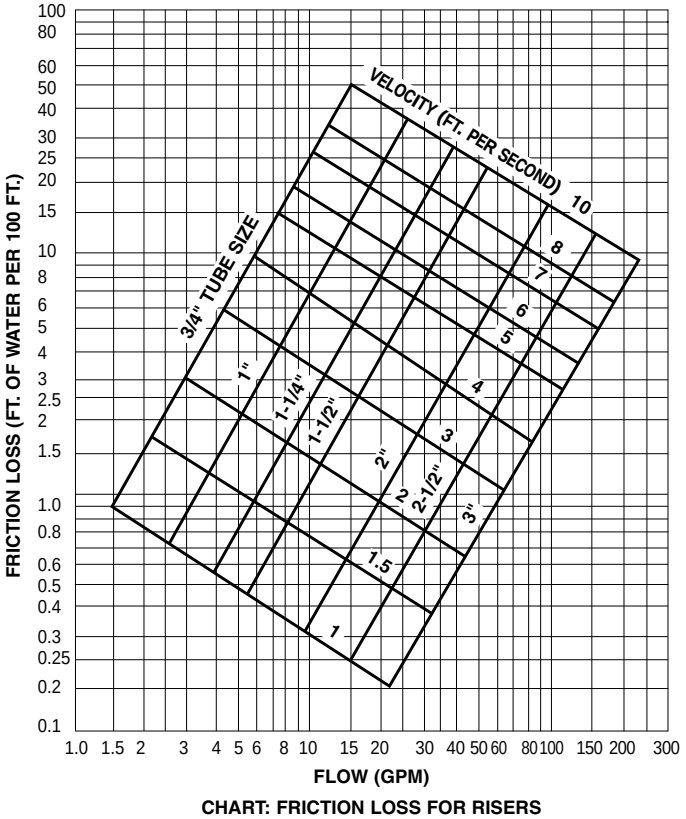


CHART: FRICTION LOSS FOR RISERS

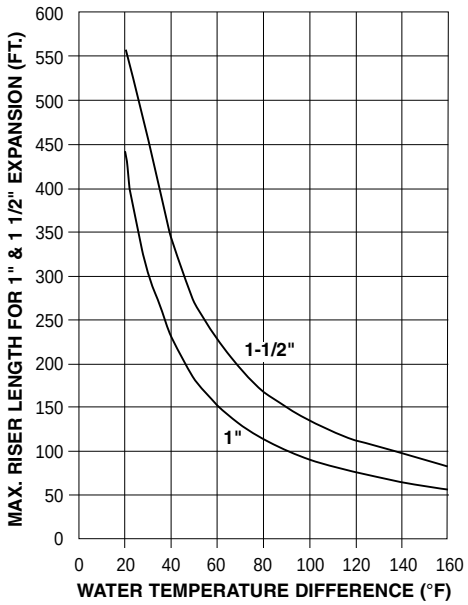
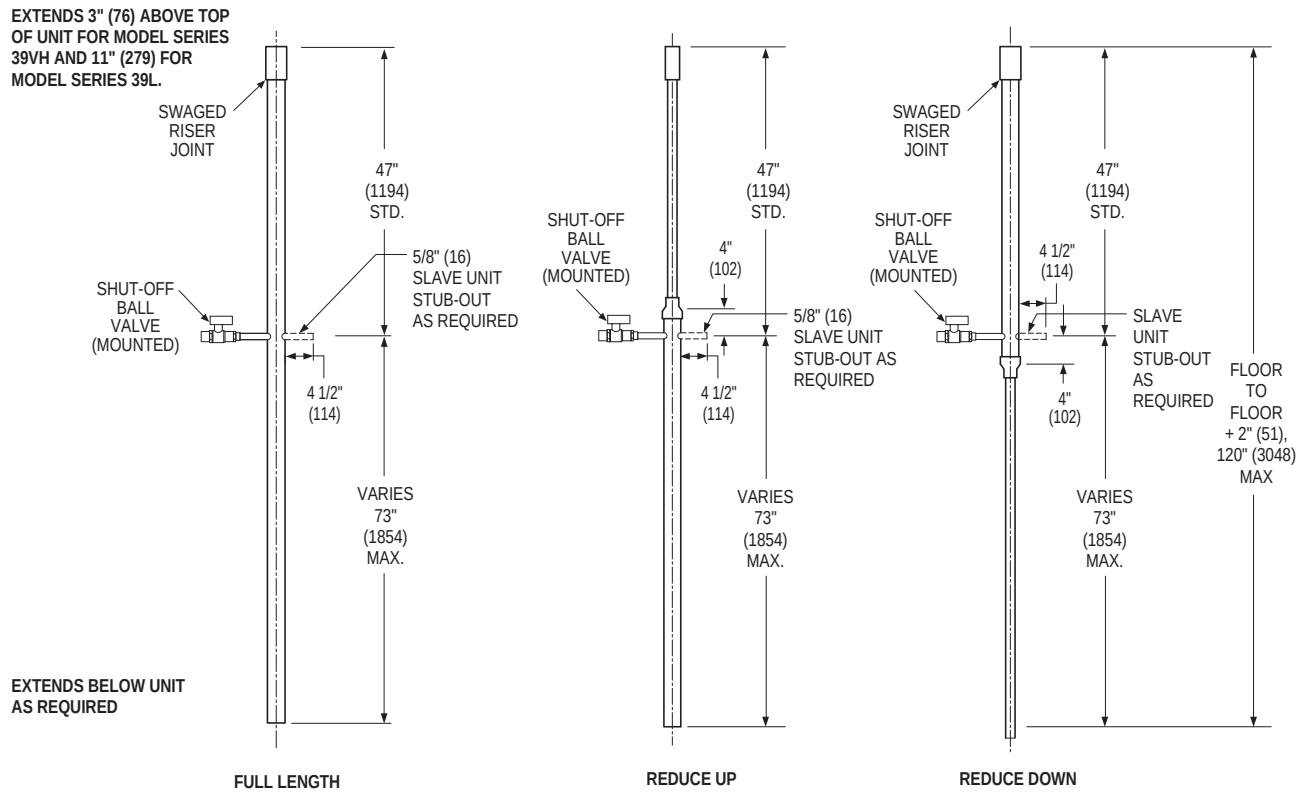
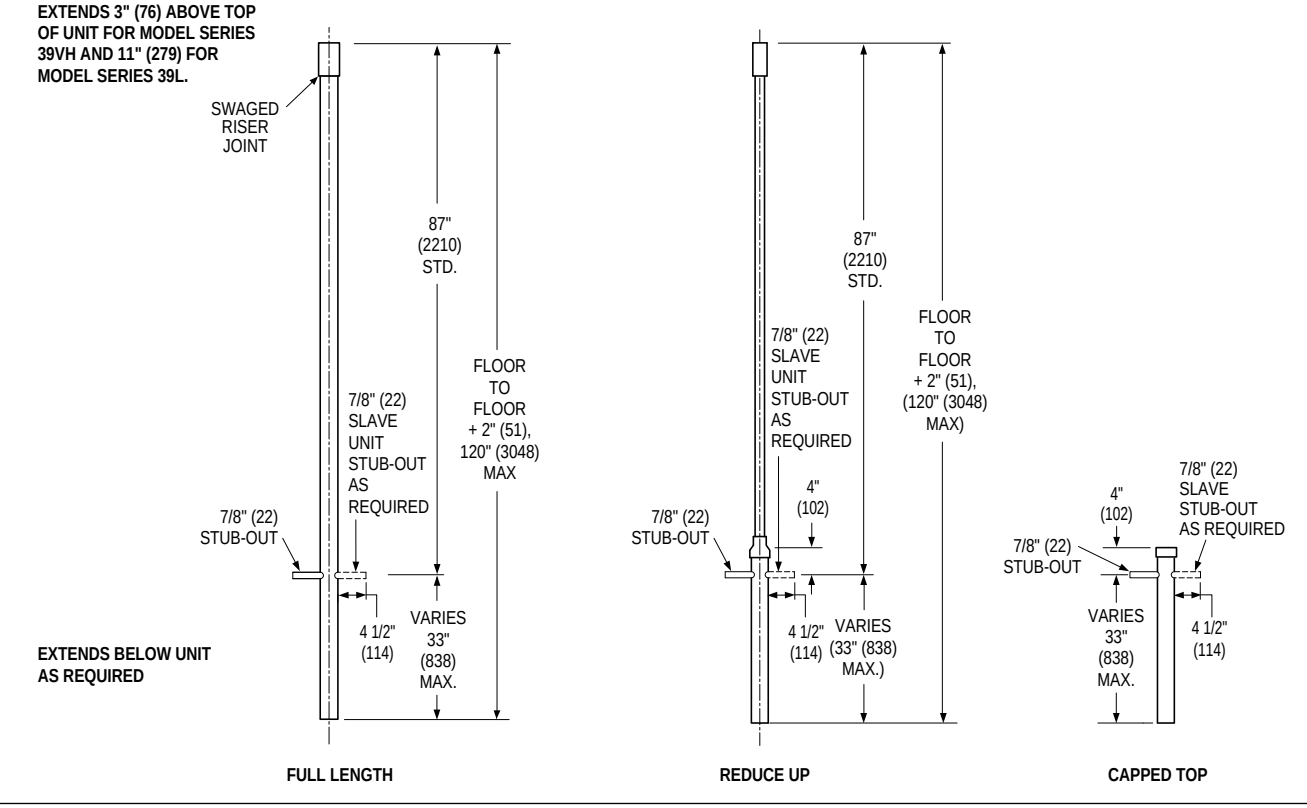


CHART: ALLOWABLE RISER LENGTHS BETWEEN SYSTEM EXPANSION LOOPS

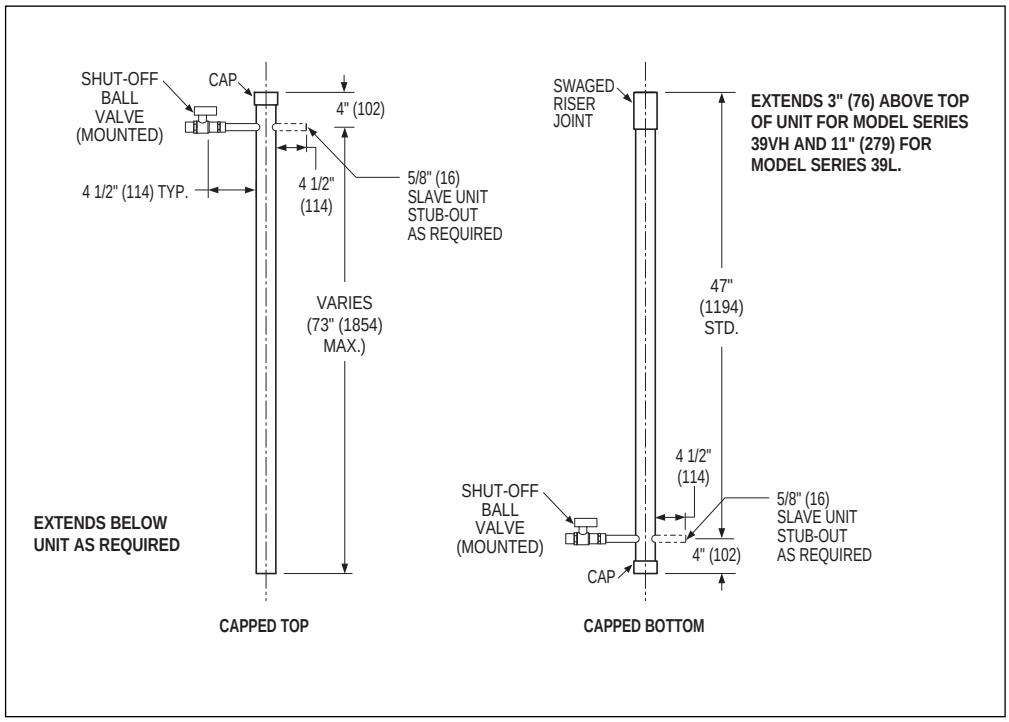
Standard Supply / Return Risers • Full Length and Reducing



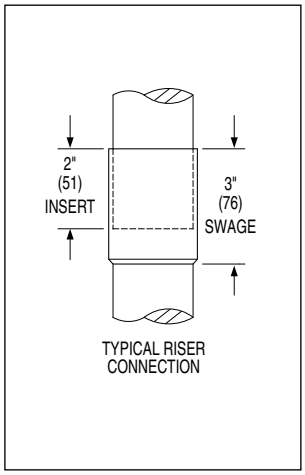
Standard Drain Risers • Full Length, Reducing and Capped



Standard Capped Supply / Return Risers



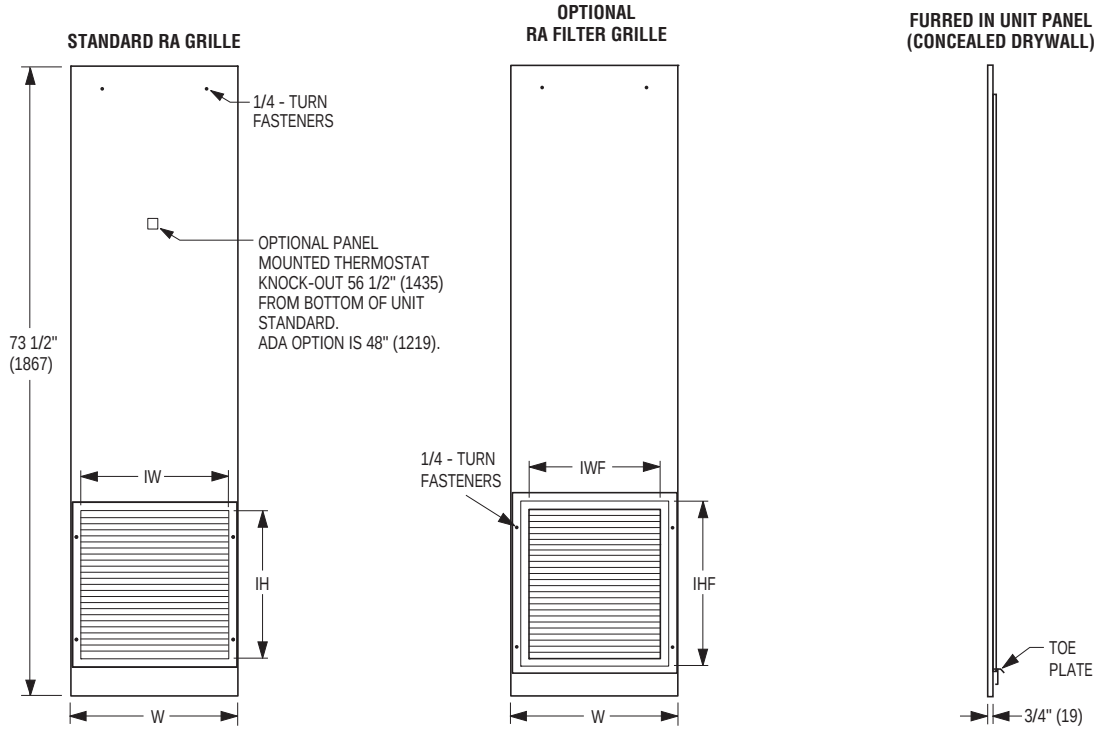
Swaged Riser Joint Detail



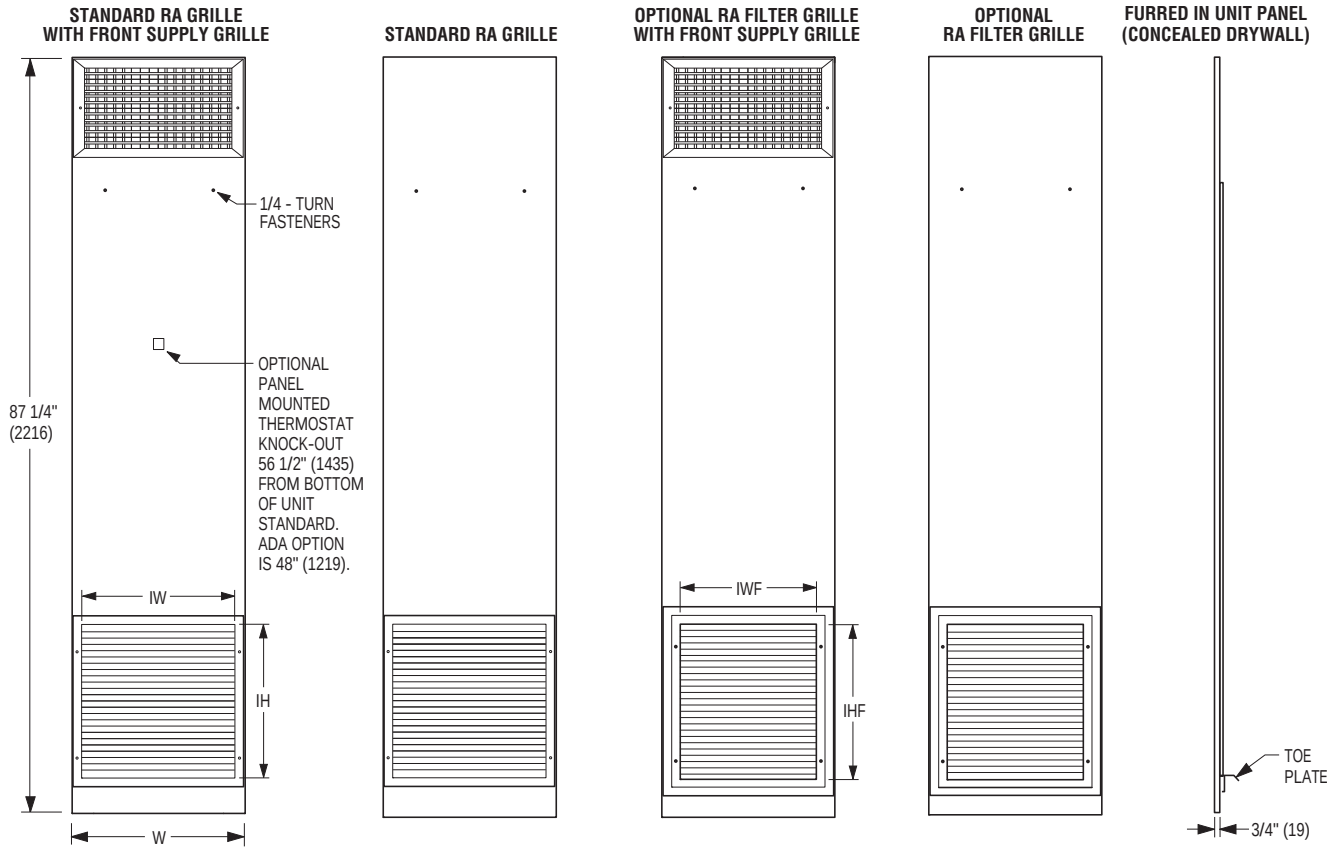
NOTES:

1. Risers are available from 3/4" (19) to 3" (76) diameter with 1/2" (13) thick insulation and 3/4" (19) to 2 1/2" (64) diameter with 3/4" (19) insulation.
2. The 39VH Series - 88" (2235) tall unit risers extend 3" (76) above the top of the unit as standard. The 39L Series - 80" (2032) tall unit risers extend 11" (279) 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.
3. Risers are ordered by specifying the exact overall length. The required overall length = floor to floor height + 2" (51).
4. 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.
5. Factory mounted risers are standard. Risers may be also be ordered and shipped in advance of unit to facilitate field installation.

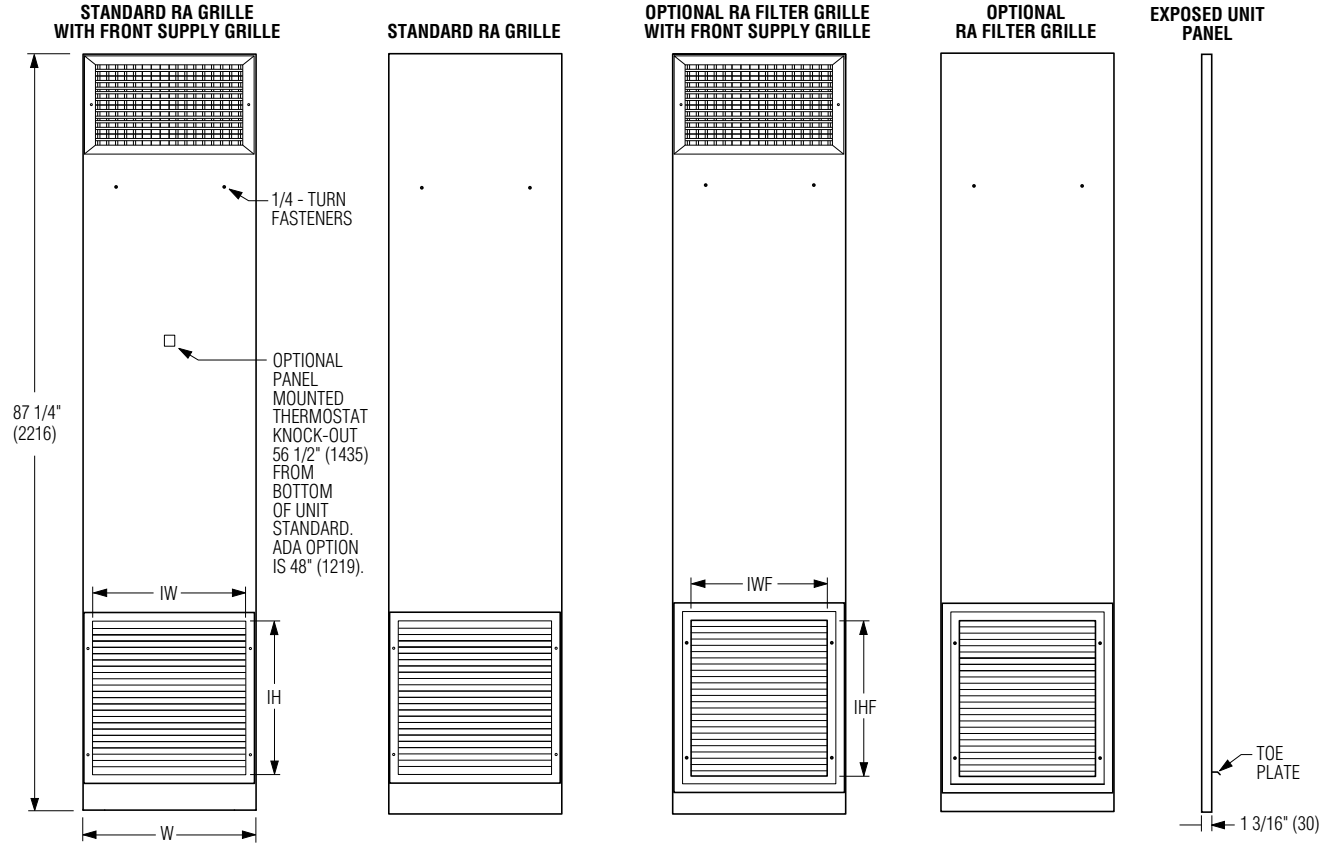
Model Series 39VH Vertical Hi-Rise Door Panels
Standard Front Return Air Panel for Concealed Units • Separate Supply Grille



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



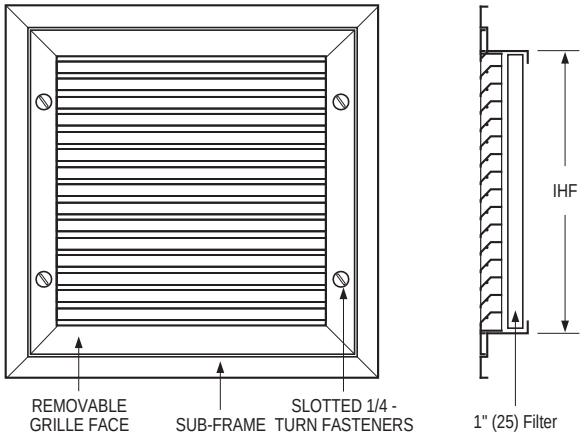
Standard Front Return Air Panels for Exposed Units
Extended Full Length Cover (with integral front supply grille where specified)



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:

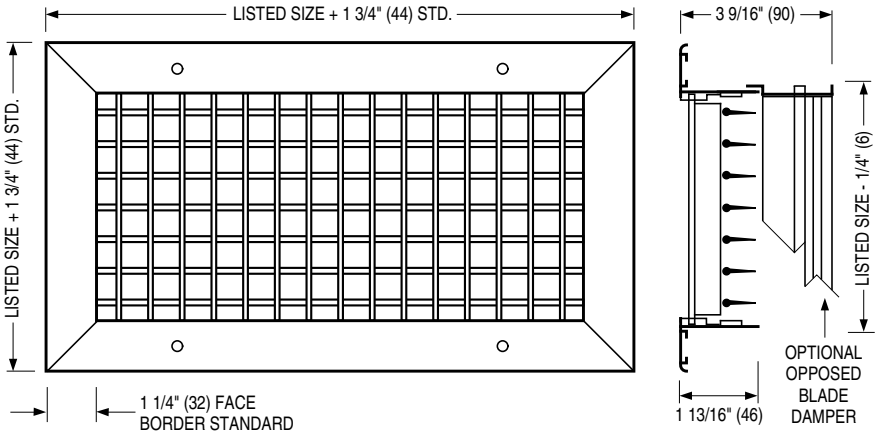
1. All front panels feature a high free area louvered return grille.
2. A removable face filter return grille is available. This option eliminates having to remove the front panel for easier filter replacement.
3. The standard reduced height front panels are designed for (furred-in) unit installation 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.

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 optional opposed blade damper is required on one supply grille for units with double 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 to 914) to suit airflow capacity and performance requirements.

• AW Appliance White powder coat baked enamel finish is standard. Other finishes are available.

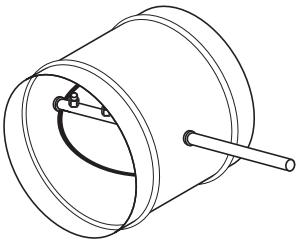
Performance Data

Unit	Nominal	Single Supply			Double Supply			Triple Supply		
Size	CFM	W x H	Throw	NC	W x H	Throw	NC	W x H	Throw	NC
3	360	16 x 10 (406 x 254)	10-16-30	<20	16 x 10 (406 x 254)	–	–	–	–	–
5	550		18-27-38	<20		8-12-24	<20	–	–	–
6	600		20-29-40	<20		9-15-29	<20	–	–	–
8	900	18 x 10 (457 x 254)	27-33-46	27	18 x 10 (457 x 254)	14-20-33	<20	–	–	–
10	1000		28-34-48	30		15-22-34	<20	–	–	–
12	1250	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		37-45-64	37		22-31-45	<20		13-21-37	<20
19	1900	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		43-53-75	41		26-38-52	<20		17-26-43	<20

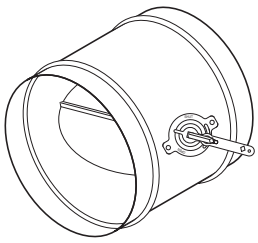
NOTES:

1. Performance data is based on double deflection grille without optional opposed blade damper. Date 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 1/2º + 2 NC, 45º + 7 NC.
   With damper: 22 1/2º + 6 NC, 45º + 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 0º deflection
5. Throw corrections for blade deflection:
   22 1/2º Multiply listed throw values by x 0.80
   45º Multiply listed throw values by x 0.50
6. Data derived from tests conducted in accordance with ASHRAE Standard 70-2006.

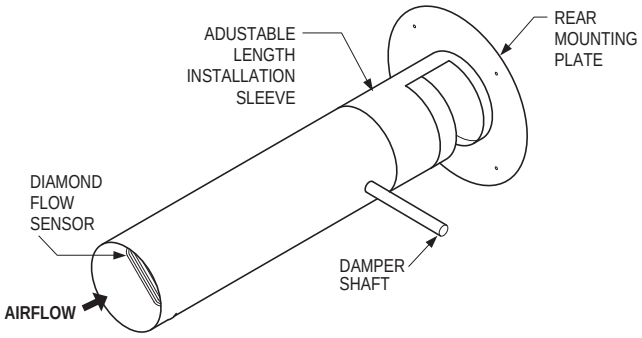
Outside Air (IAQ) Inlet Dampers



MOTORIZED DAMPER
WITH 2-POSITION
OPEN/CLOSED ACTUATOR
4" (102) DIA. NOMINAL



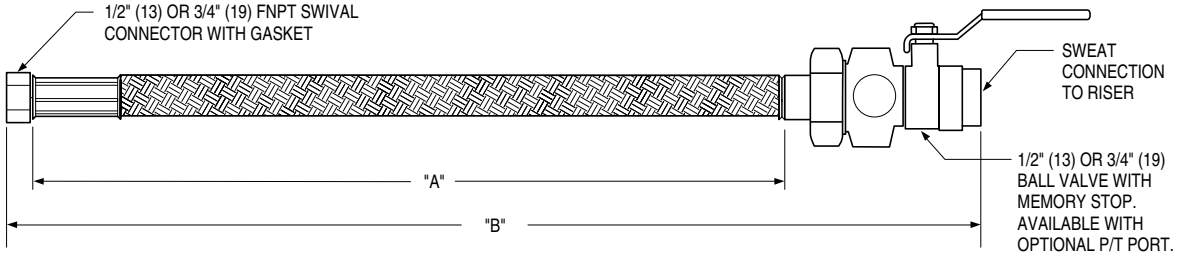
MANUAL BALANCING DAMPER
4" (102) DIA. NOMINAL



PRESSURE INDEPENDENT DAMPER
WITH FLOW SENSOR AND MODULATING
ACTUATOR
4" (102) DIA. NOMINAL

NOTES:
1. Three types of damper are available as described above.
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 maintainance.

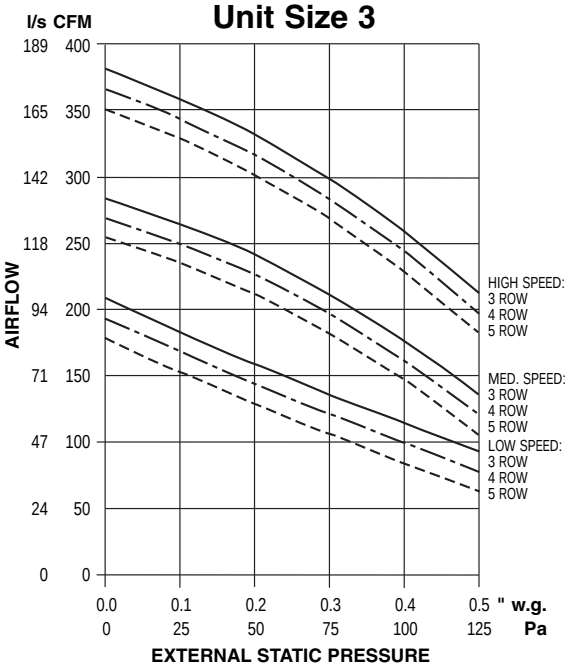
- Flexible hoses allow for easy field configuration of left hand, right hand and back riser connections without the need for thermal cutting and joining of piping, saving time and money.
- Permit looping the pipe lines and bypassing the coil in order to flush the system for debris prior to operation.
- 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 @ 250ºF (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)

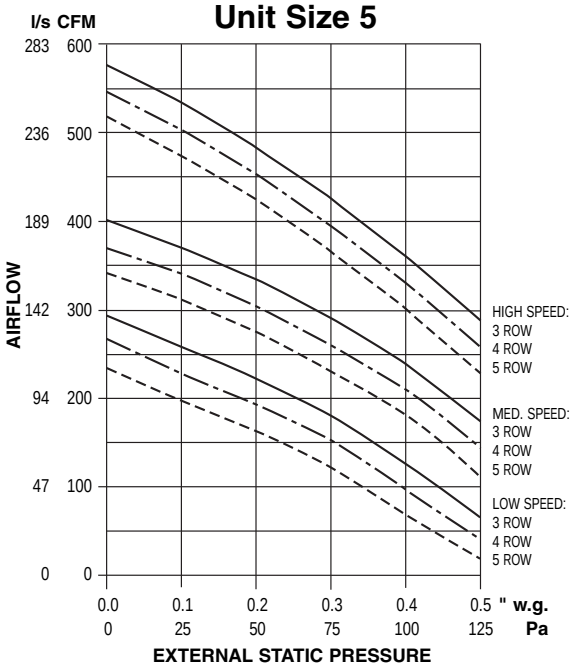
Model Series: 39 • PSC Motor Fan Performance Curves

Airflow vs. Downstream Static Pressure

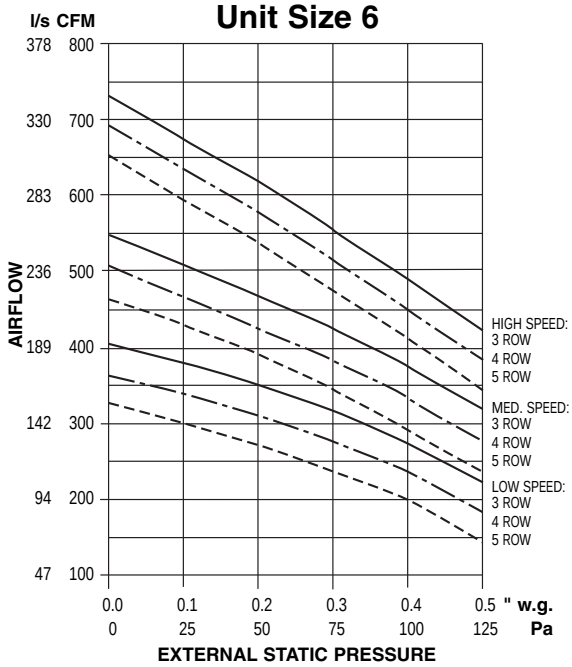
Unit Size 3



Unit Size 5



Unit Size 6



Electrical Motor Data

Unit Size	Motor H.P.	PSC Motor FLA		
		120/1/60	208-230/1/60	277/1/60
3	1/10	1.78	0.7	0.60
5	1/10	1.89	0.7	0.60
6	1/6	2.69	1.1	0.85

FLA = Full load amperage (nameplate data)

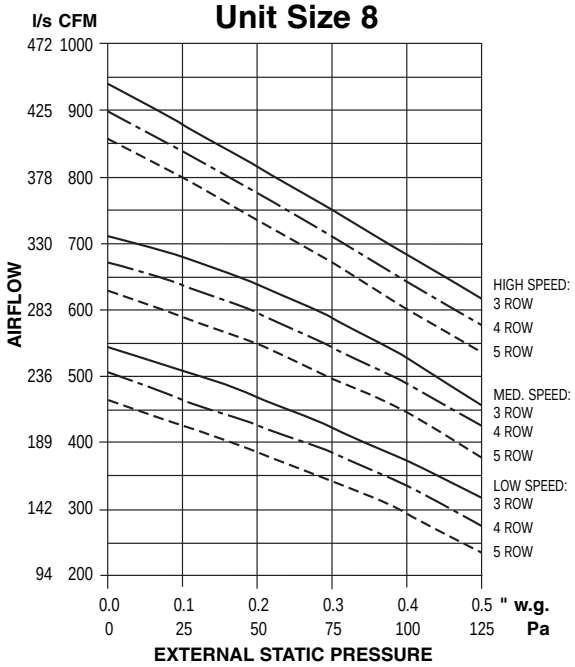
PSC MOTOR FAN NOTES:

1. Nailor 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.
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.

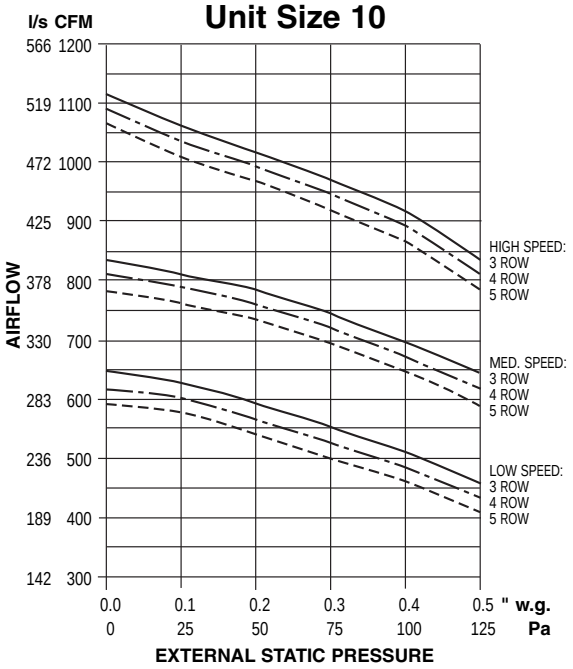
Model Series: 39 • PSC Motor Fan Performance Curves

Airflow vs. Downstream Static Pressure

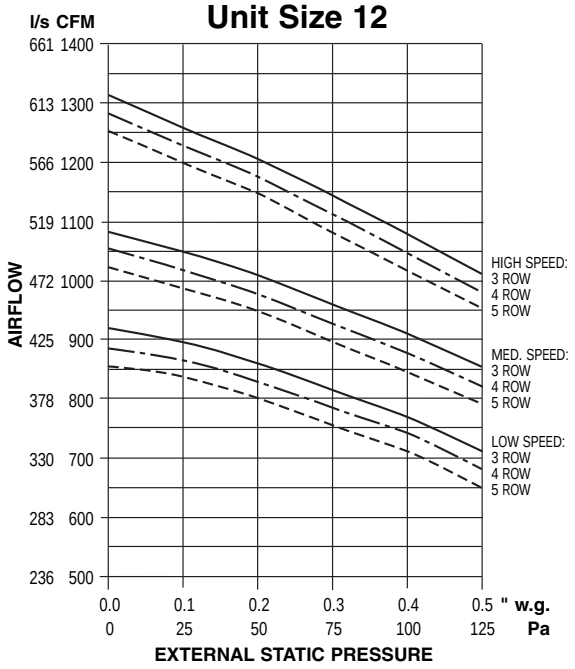
Unit Size 8



Unit Size 10



Unit Size 12



Electrical Motor Data

Unit Size	Motor H.P.	PSC Motor FLA		
		120/1/60	208-230/1/60	277/1/60
8	1/6	2.7	1.1	0.85
10	1/3	4.73	2.0	1.75
12	1/3	5.52	2.63	2.13

FLA = Full load amperage (nameplate data)

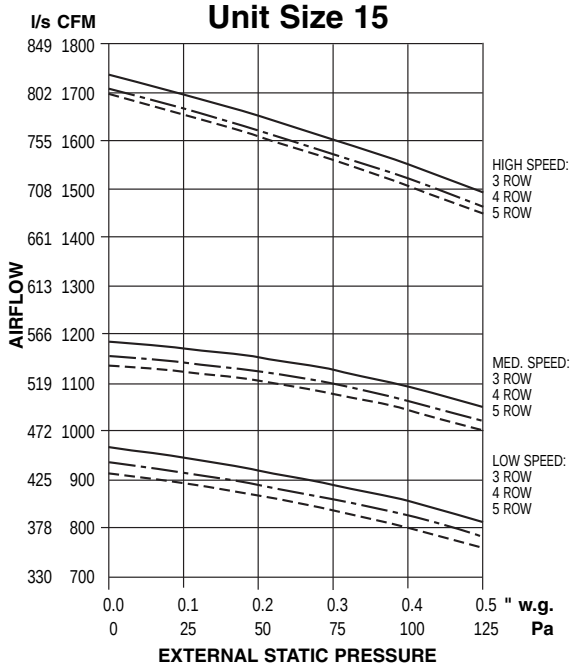
PSC MOTOR FAN NOTES:

1. Nailor 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.
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.

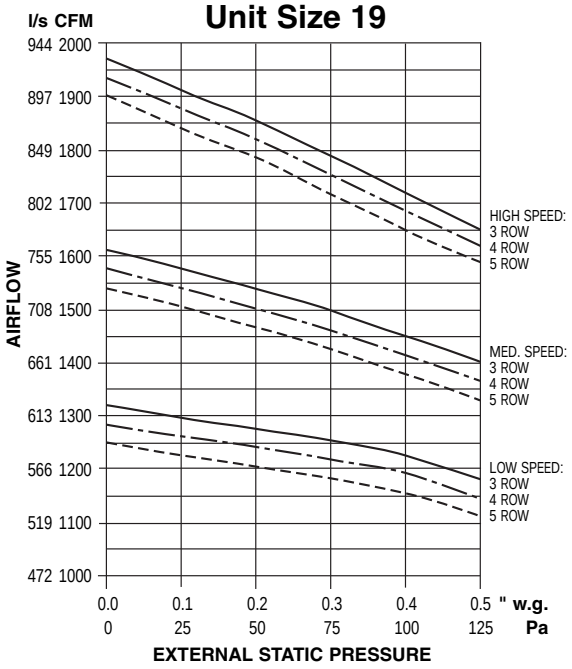
Model Series: 39 • PSC Motor Fan Performance Curves

Airflow vs. Downstream Static Pressure

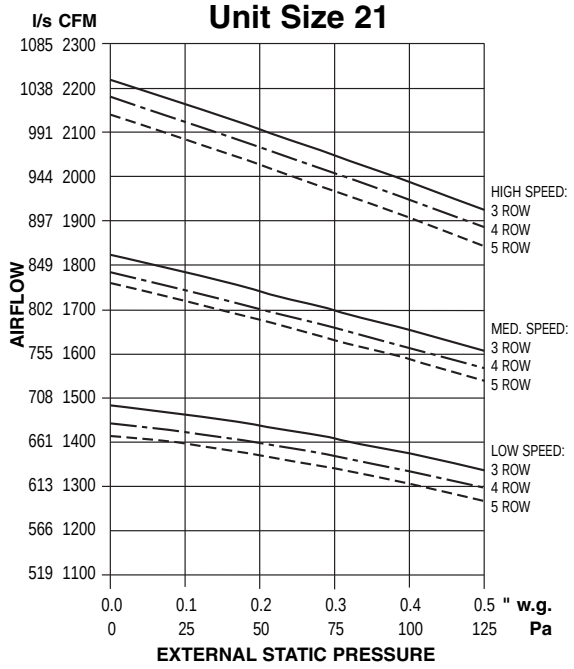
Unit Size 15



Unit Size 19



Unit Size 21



Electrical Motor Data

Unit Size	Motor H.P.	PSC Motor FLA		
		120/1/60	208-230/1/60	277/1/60
15	1/2	3.49	3.80	2.80
19	3/4	4.28	5.1	4.1
21	3/4	4.20	5.1	4.1

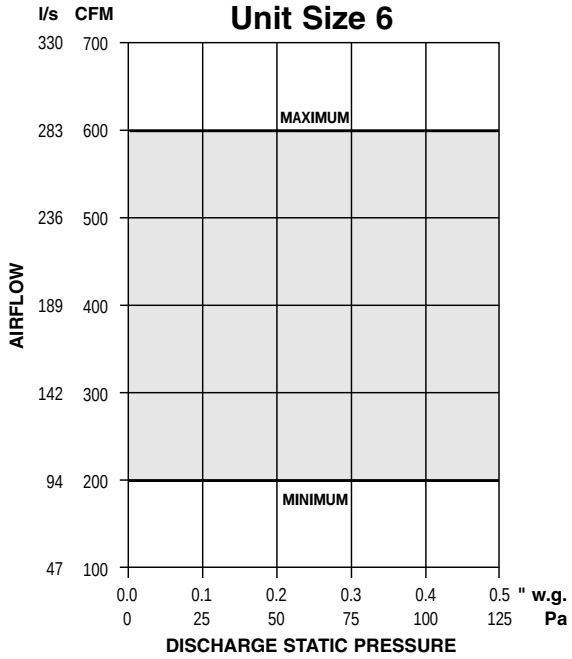
FLA = Full load amperage (nameplate data)

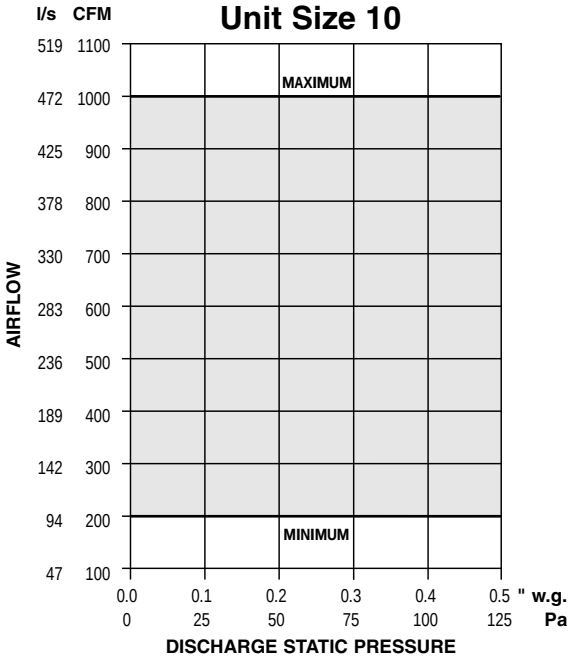
PSC MOTOR FAN NOTES:

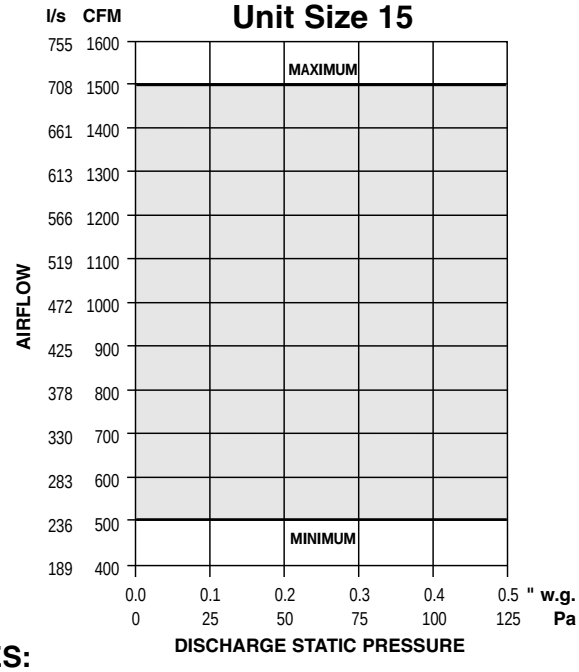
1. Nailor fan coil units equipped with permanent split capacitor (PSC) motors are of the three speed type with separate taps (High, Medium and Low) which provide variable horsepower outputs. Commonly, units are selected and sized on a conservative basis and actual airflow requirements are lower than 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.
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.

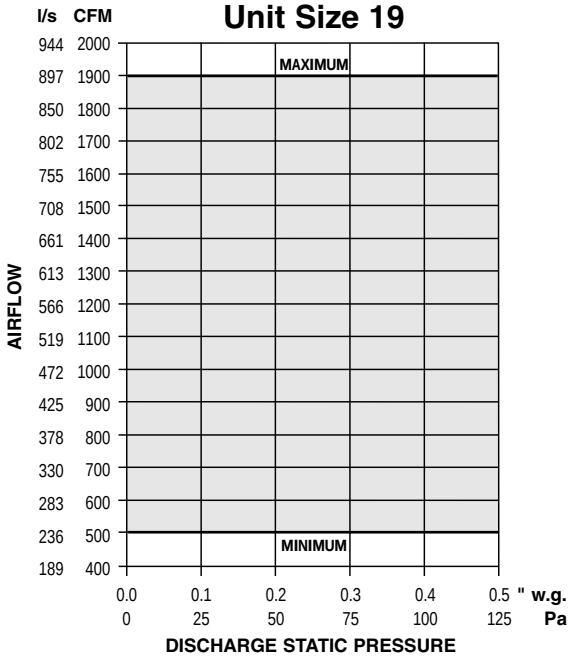
Model Series: 39 • ECM Motor Fan Performance Curves

Airflow vs. External Static Pressure









NOTES:

- The fan curves for the ECM motor are unlike those for traditional PSC motors. The ECM motor is a pressure independents constant volume device at set point and airflow does not vary with changing static pressure conditions. 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).
- Airflow can be set to operate on horizontal performance line at any point within shaded area using the solid state volume controller provided.
- Engineered Comfort Fan Coil units featuring the optional ECM motor have considerably wider turndown ratios than conventional PSC motors. Hence, a reduced number of unit sizes are required in order to 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 and installation and reduces inventory of field service parts.

Electrical Data

Unit Size	Watts	ECM Motor FLA			
		120V	208V	240V	277V
6	180	2.55	1.58	1.11	1.38
10	370	5.12	2.92	2.02	2.48
15	900	10.7	7.11	5.19	6.05
19	1385	16.2	8.10	8.10	7.50

FLA = Full load amperage
All ECM motors are single phase, 50/60 Hz.

- Fan curves shown are applicable to 120/208/240 and 277 volt, single phase ECM motors. Although DC in operation, they include a built-in inverter.

Performance Data • Model Series 39 • Vertical Hi-Rise Fan Coil

Sound Power Performance Per ARI 350

Tested Per ARI 350 - 2000 –– Reverberation Room											
Unit Size	Airflow		Octave Bands / Frequency (Hz) / Sound Power (Lwn)							LWA*	LWAT^
	cfm	l/s	2	3	4	5	6	7	8		
			125	250	500	1k	2k	4k	8k		
6	110	52	—	—	24	19	—	—	—	24	28
	200	94	50	38	35	29	—	—	—	37	38
	300	142	50	48	42	34	30	27	—	43	44
	400	189	57	52	47	40	34	30	—	48	48
	600	283	62	57	52	46	41	36	27	54	54
10	300	142	48	47	40	31	25	18	—	41	42
	500	236	59	56	50	43	35	29	20	51	52
	600	283	63	60	53	46	39	32	26	54	55
	800	378	69	66	58	53	47	41	33	61	61
	900	425	72	69	61	56	51	46	37	64	64
	1000	472	74	71	64	59	54	50	42	66	66
15	600	283	58	52	47	39	32	—	—	48	49
	800	378	63	58	52	46	41	35	—	54	55
	1000	472	68	63	57	52	46	41	31	60	60
	1200	566	72	68	60	56	52	48	39	64	64
	1300	613	74	69	61	58	54	50	41	65	65
	1500	708	78	74	66	63	59	56	48	70	70
19	500	236	52	49	42	36	34	34	38	46	46
	700	330	57	54	49	42	37	34	38	50	51
	1000	472	64	59	56	50	46	39	38	57	58
	1300	613	71	65	62	57	53	48	41	63	64
	1600	755	75	71	65	63	59	55	47	69	69
	1900	897	79	75	69	67	64	61	54	73	74

* A_Weighted Sound Power Level

^ Tone Adjusted Weighted Sound Power Level

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. All sound data listed by octave bands are raw data without any corrections for room absorption or duct attenuation.
4. Data derived from independent tests conducted in accordance with latest version of ARI Standard 350.

ARI Standard Ratings

Unit Size	Coil			Airflow cfm (Dry Flow)	Cooling Capacity		Water		Power Input (Watts)
	Row	FPI	CIRC		QT (BTUH)	QS (BTUH)	Flow Rate (GPM)	WPD ft-wg	
6	3	14	2	600	18800	13900	3.8	7.9	120
	4				23500	16100	4.7	15.9	122
10	3	14	2	1000	34700	24500	6.9	40.0	285
	4		4		37600	26300	7.5	11.7	290
15	3	14	6	1500	45800	34400	9.1	4.5	345
	4				57300	39800	11.4	9.0	348
19	3	14	6	1950	63600	45800	12.6	10.0	480
	4				77900	52600	15.5	19.1	485

ARI PERFORMANCE CERTIFIED ™ ARI Standard 440 Room Fan-Coil Unit www.aridirectory.org

NOTE: Based on 80°F DB and 67°F WB EAT, 45°F EWT 10° temperature rise, maximum fan speed. Motor type is ECM and motor voltage is 115/1/60. Airflow under dry coil conditions. All models tested at 0.0" external static pressure.

Independent Laboratory Certification

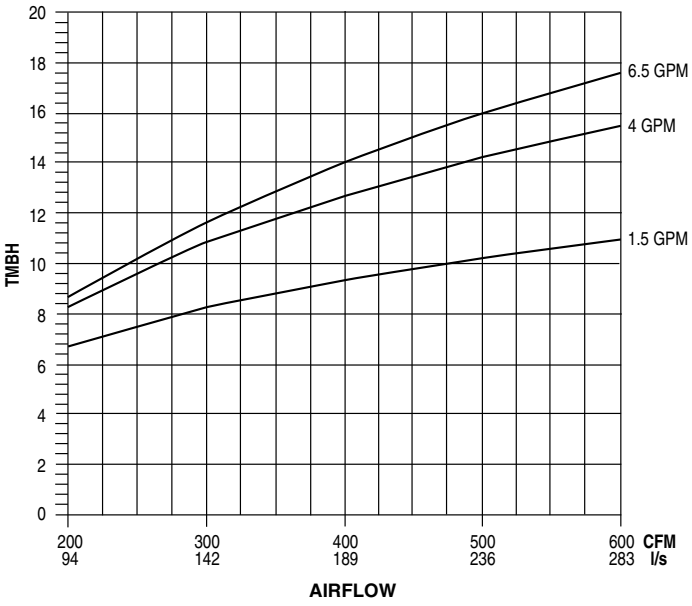
Although ARI Certification, as explained above, provides some assurance of product performance, the program does not require a standard rating condition (certification rating point) for each unit size. No sound certification is required to comply with ARI 440.

In order to provide assurance and complete credibility to the engineering community, Engineered Comfort has taken the unprecedented step of conducting 100% of its sound power level testing at an independent laboratory – Energistics Laboratory. Compare that to the competition!

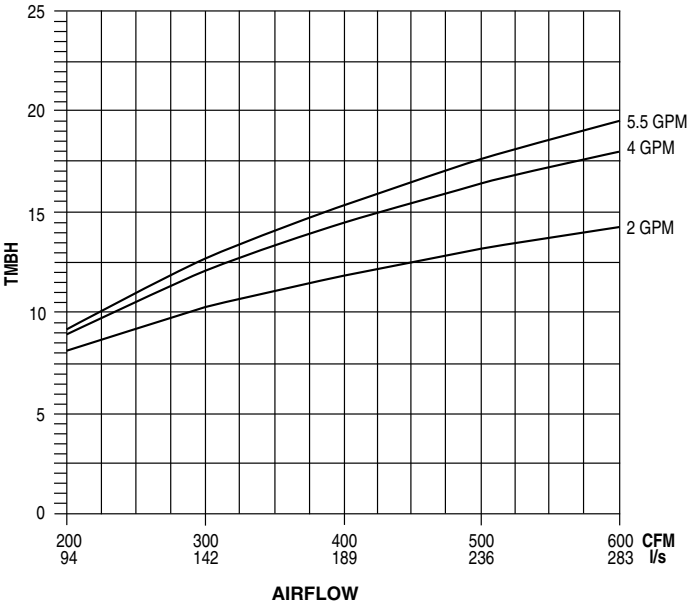
Chilled Water Coil Performance Data • Model Series 39 • Unit Sizes 3, 5 and 6

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

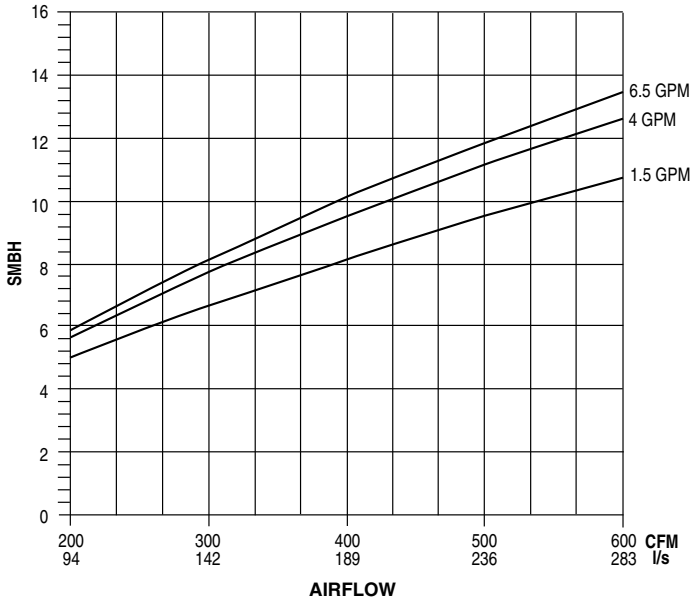
3 Row (Total MBH)



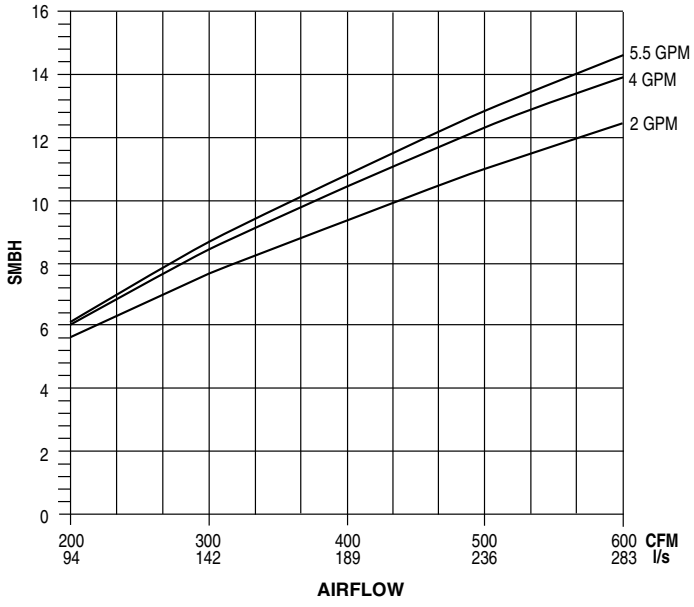
4 Row (Total MBH)



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

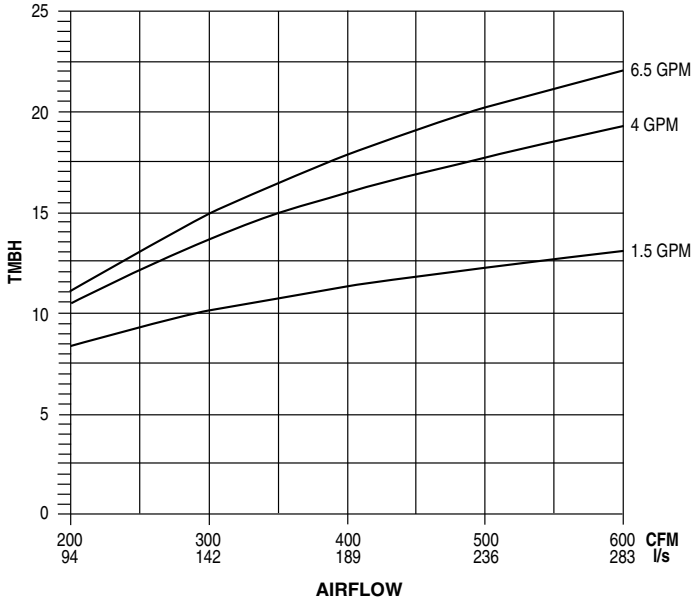
Notes:

1. Coil connections: 3 and 4 Row, 5/8" (15.9) O.D. male solder.
2. 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.

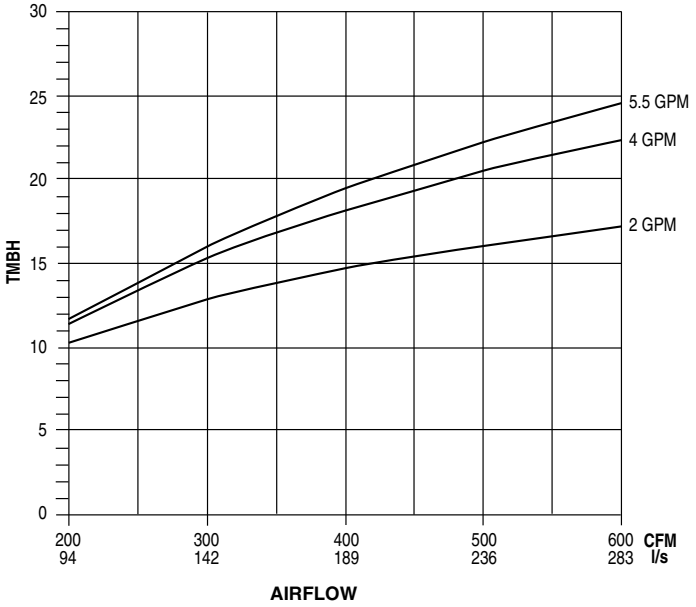
Chilled Water Coil Performance Data • Model Series 39 • Unit Sizes 3, 5 and 6

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

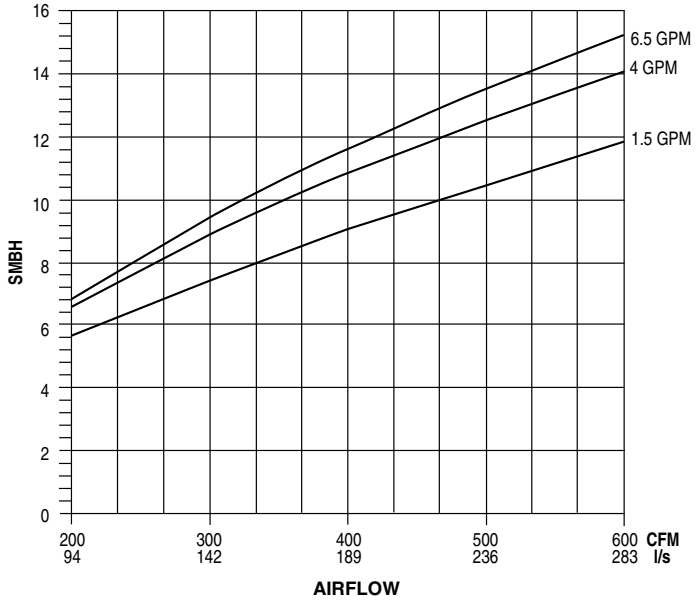
3 Row (Total MBH)



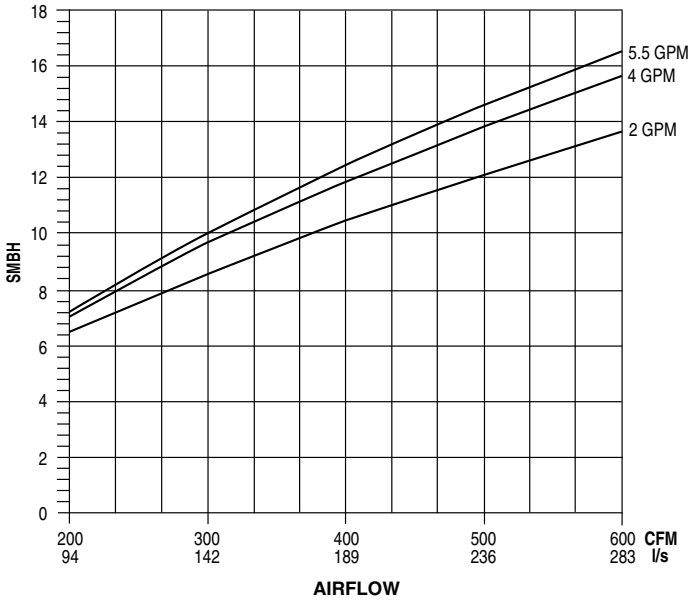
4 Row (Total MBH)



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

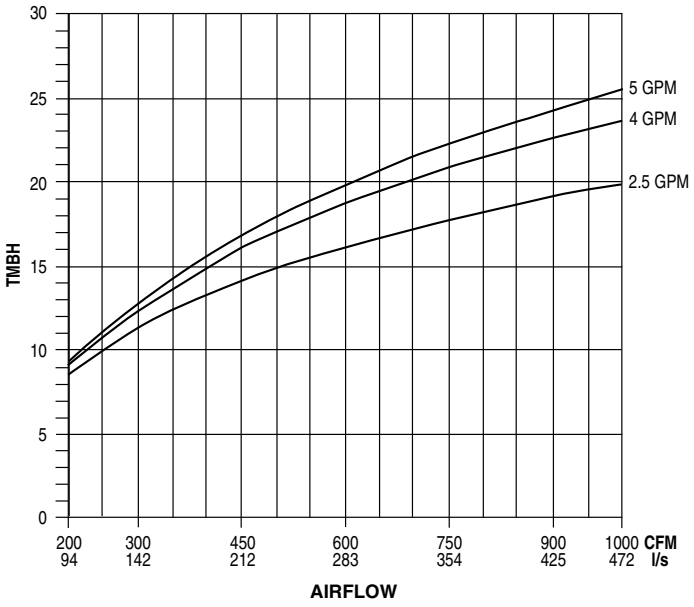
Notes:

1. Coil connections: 3 and 4 Row, 5/8" (15.9) O.D. male solder.
2. 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.

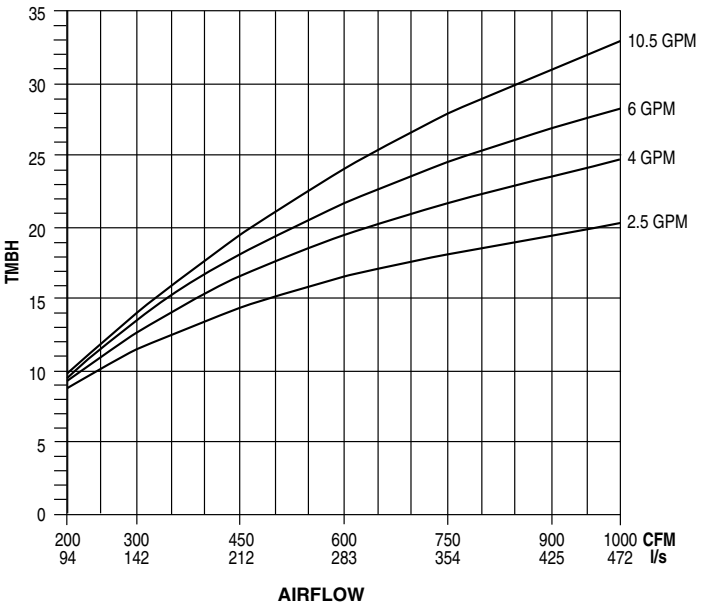
Chilled Water Coil Performance Data • Model Series 39 • Unit Sizes 8 and 10

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

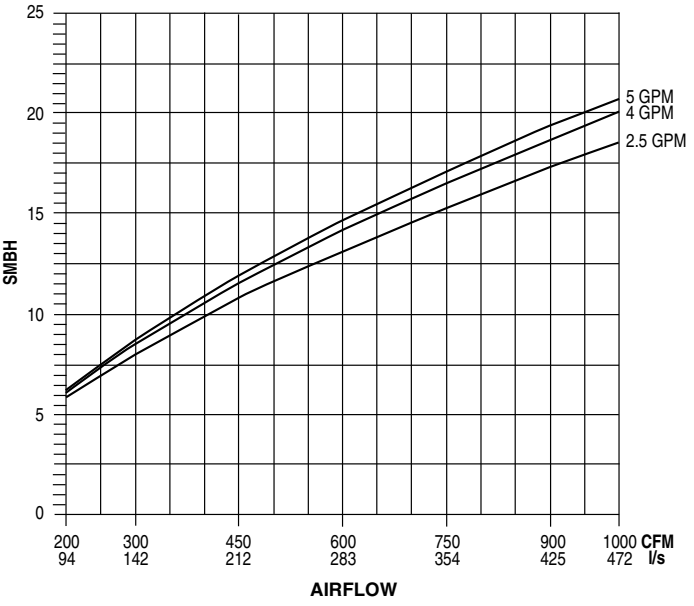
3 Row (Total MBH)



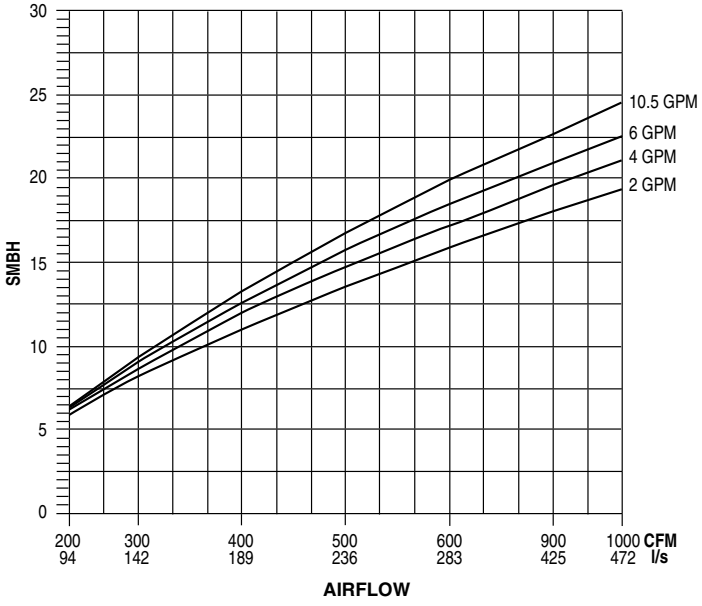
4 Row (Total MBH)



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

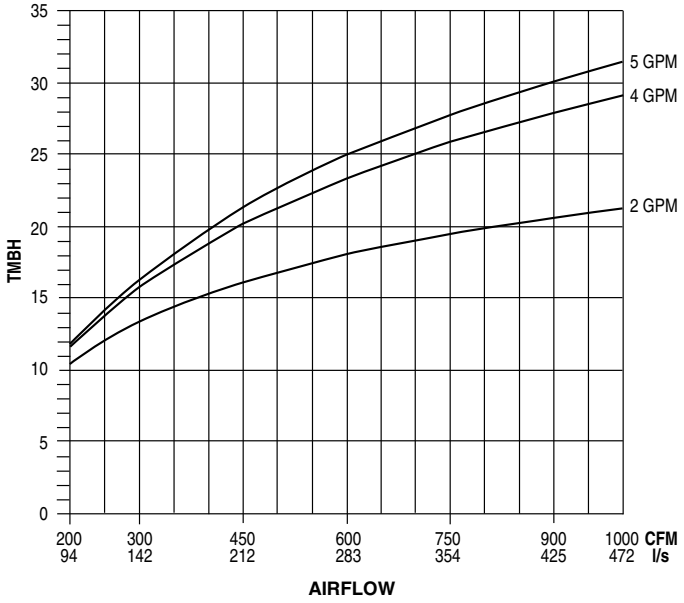
Notes:

1. Coil connections: 3 and 4 Row, 5/8" (15.9) O.D. male solder.
2. 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.

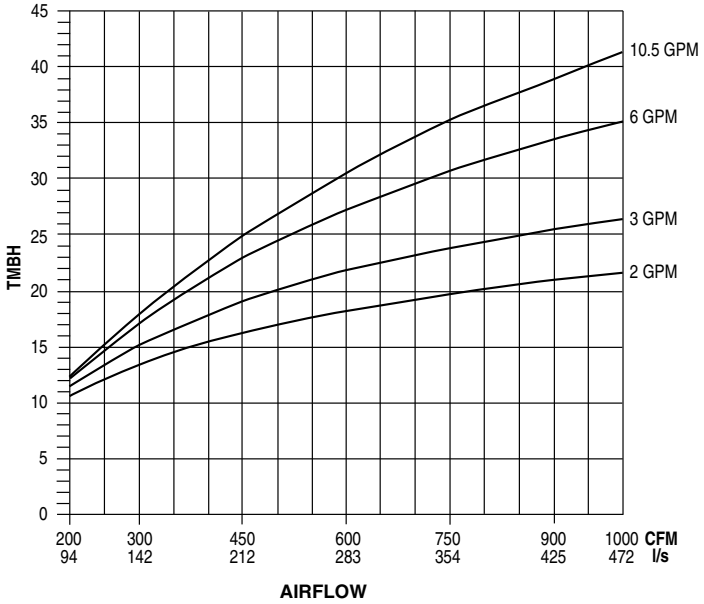
Chilled Water Coil Performance Data • Model Series 39 • Unit Sizes 8 and 10

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

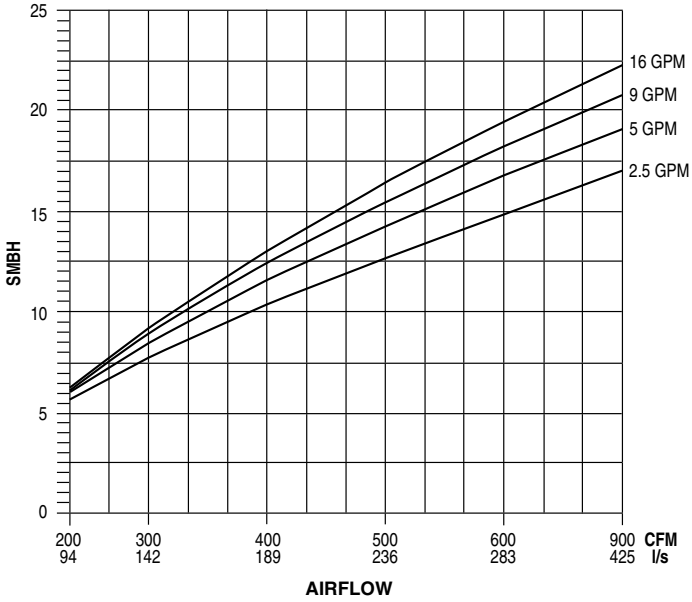
3 Row (Total MBH)



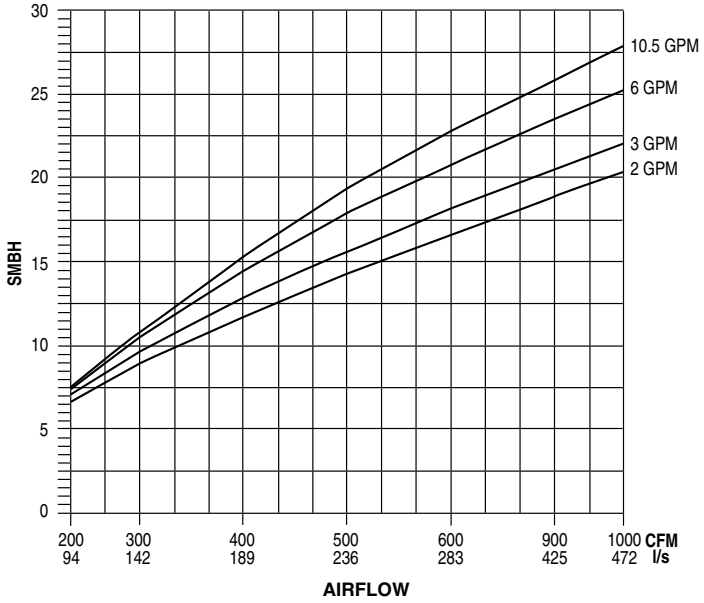
4 Row (Total MBH)



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

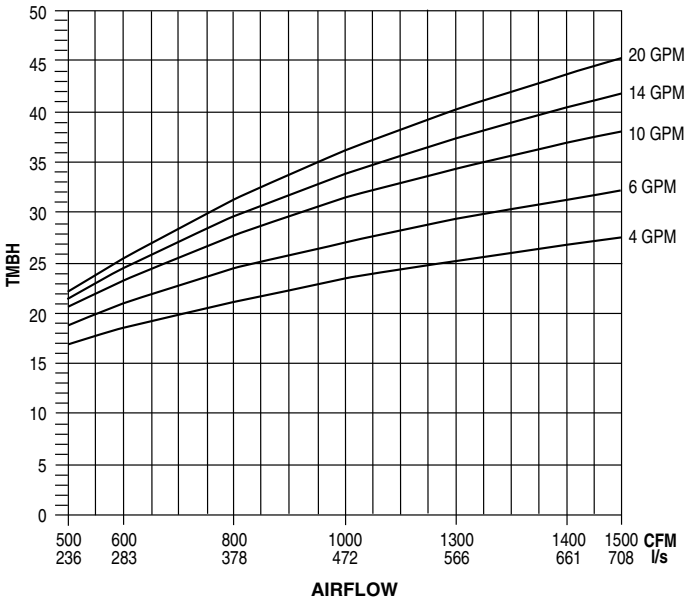
Notes:

1. Coil connections: 3 and 4 Row, 5/8" (15.9) O.D. male solder.
2. 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.

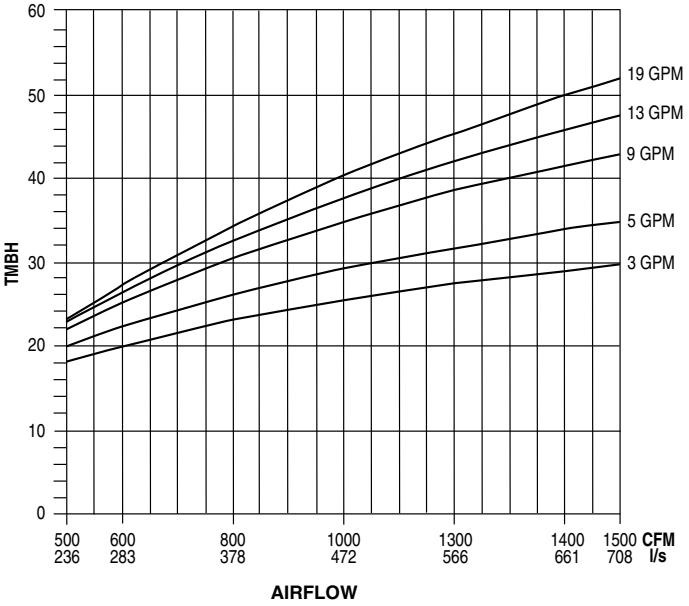
Chilled Water Coil Performance Data • Model Series 39 • Unit Sizes 12 and 15

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

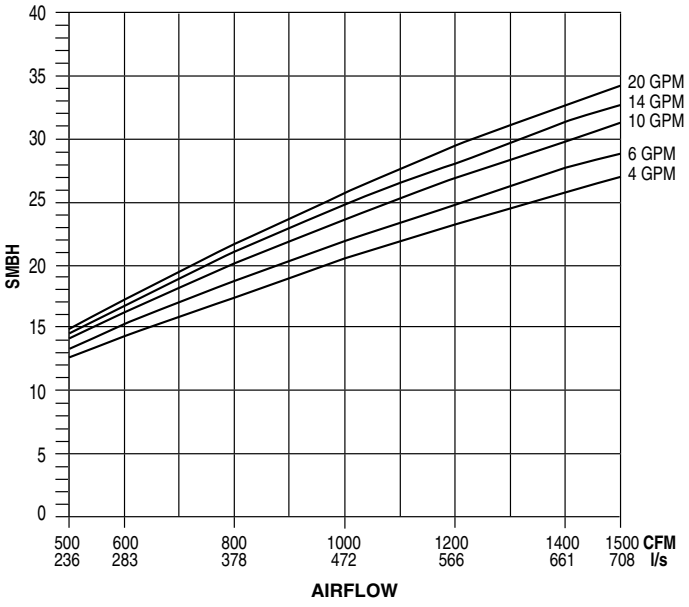
3 Row (Total MBH)



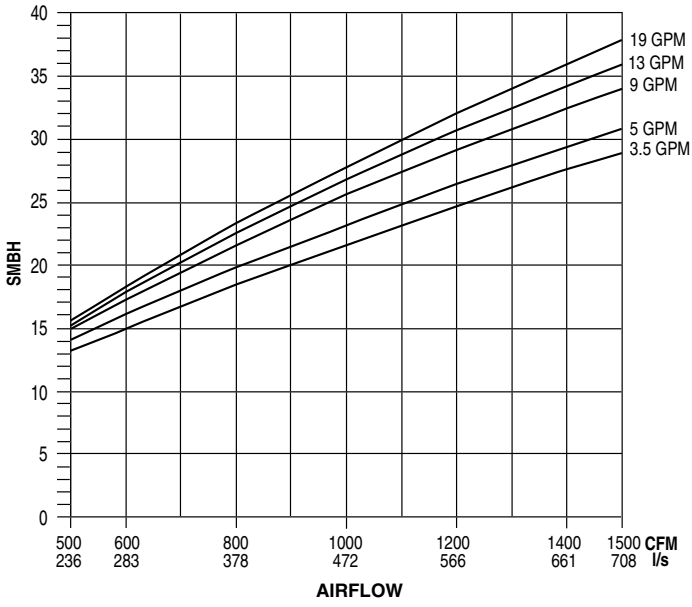
4 Row (Total MBH)



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

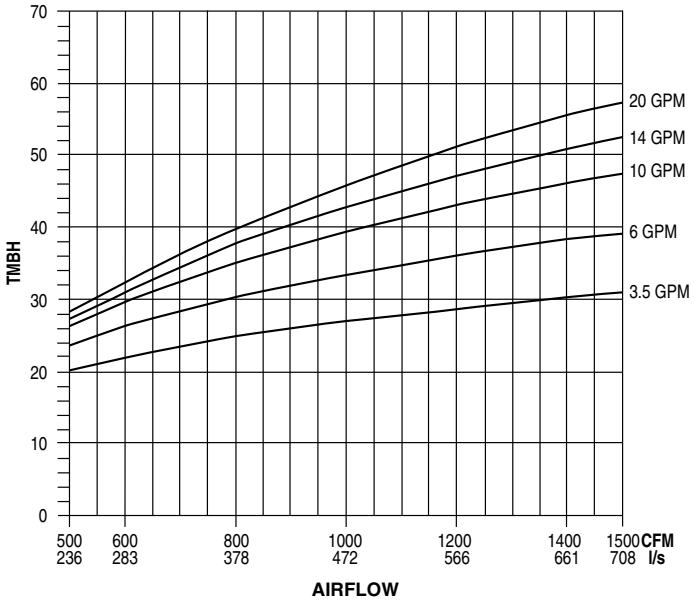
Notes:

1. Coil connections: 3 and 4 Row, 7/8" (22.2) O.D. male solder.
2. 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.

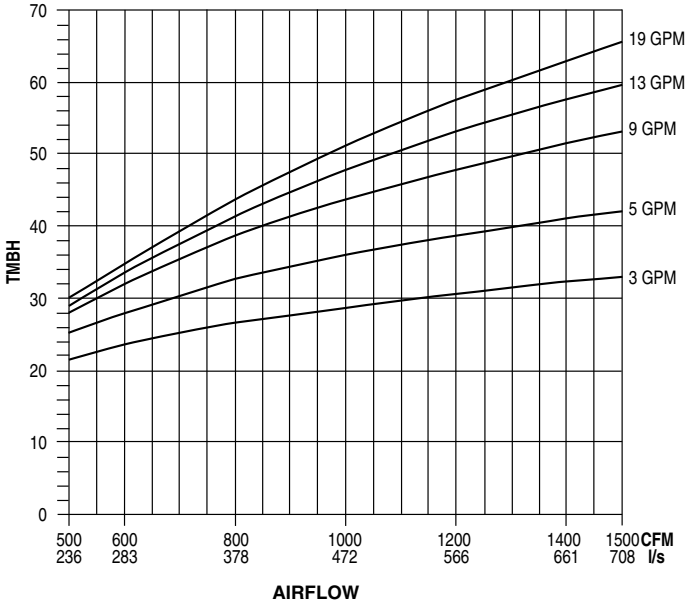
Chilled Water Coil Performance Data • Model Series 39 • Unit Sizes 12 and 15

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

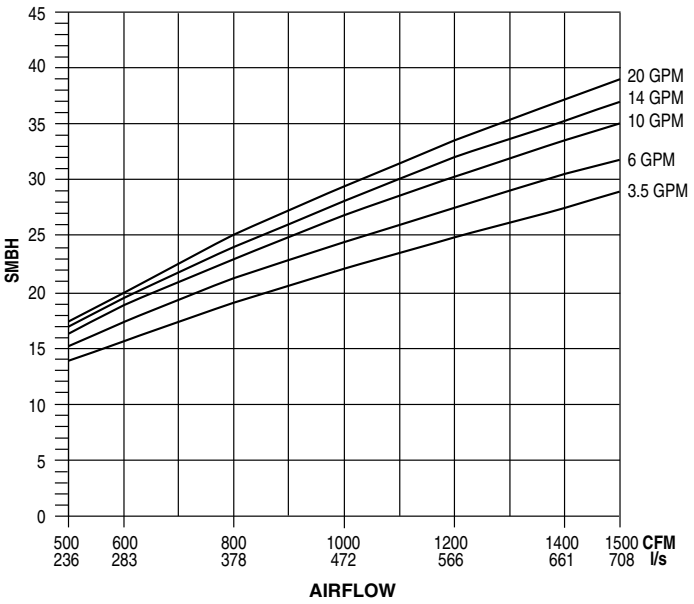
3 Row (Total MBH)



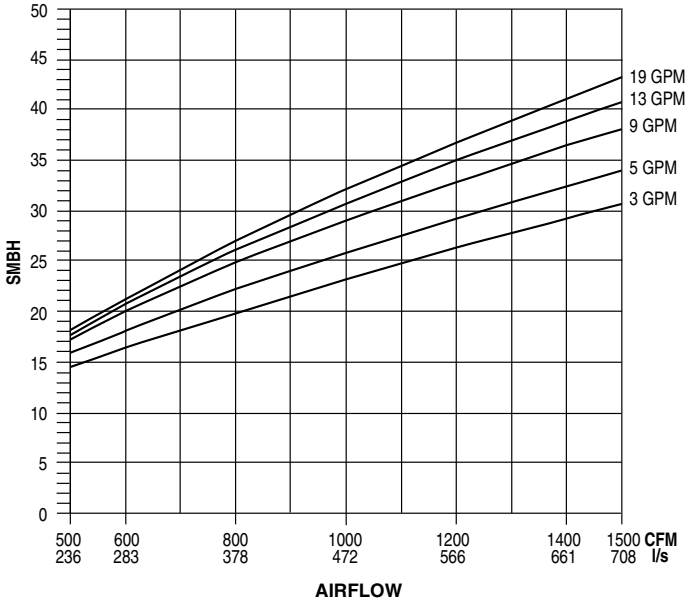
4 Row (Total MBH)



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

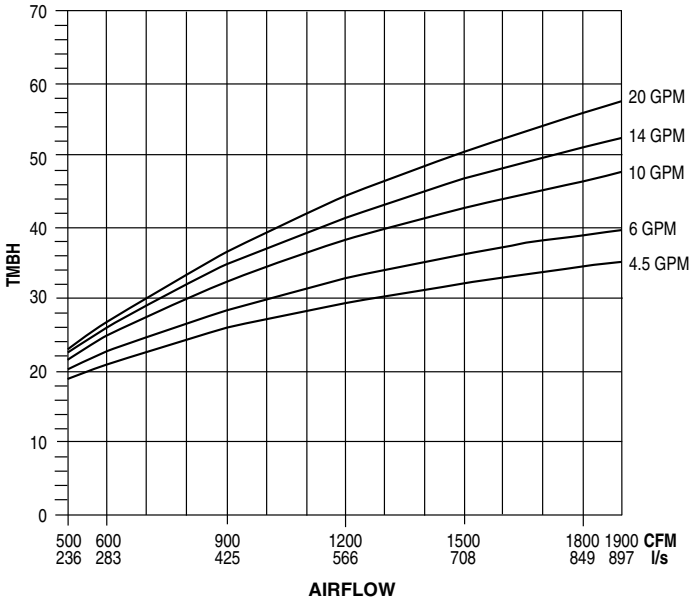
Notes:

1. Coil connections: 3 and 4 Row, 7/8" (22.2) O.D. male solder.
2. 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.

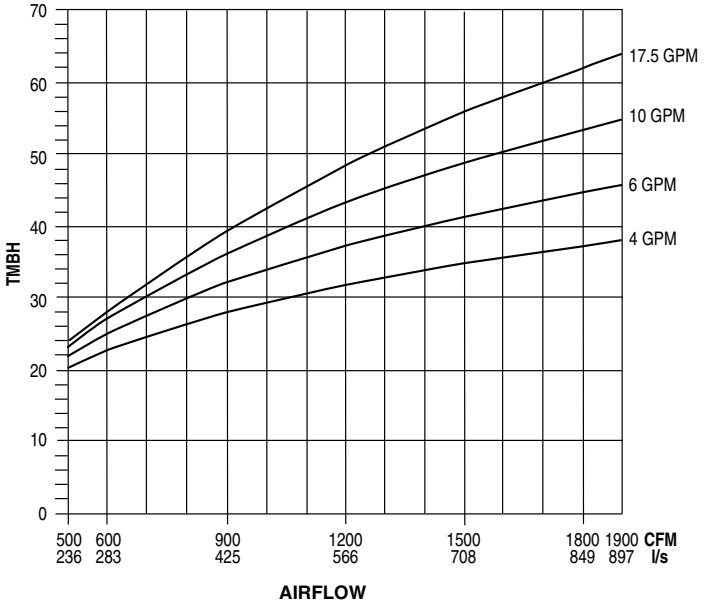
Chilled Water Coil Performance Data • Model Series 39 • Unit Sizes 19 and 21

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

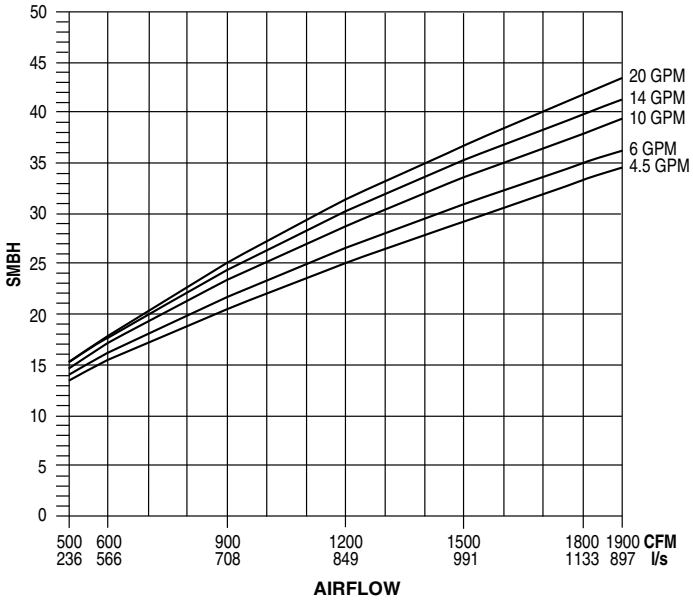
3 Row (Total MBH)



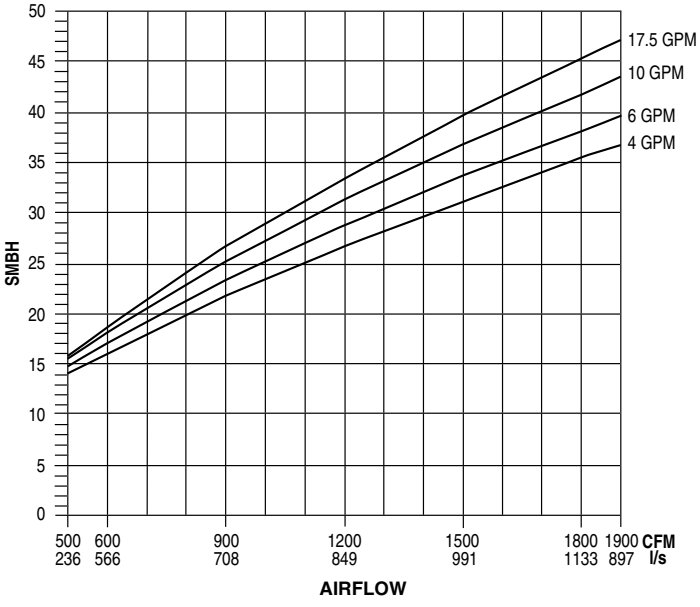
4 Row (Total MBH)



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

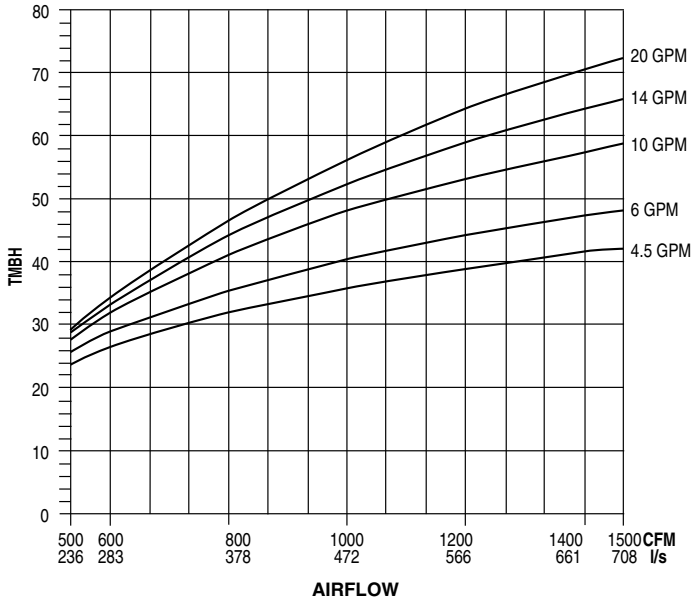
Notes:

1. Coil connections: 3 and 4 Row, 7/8" (22.2) O.D. male solder.
2. 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.

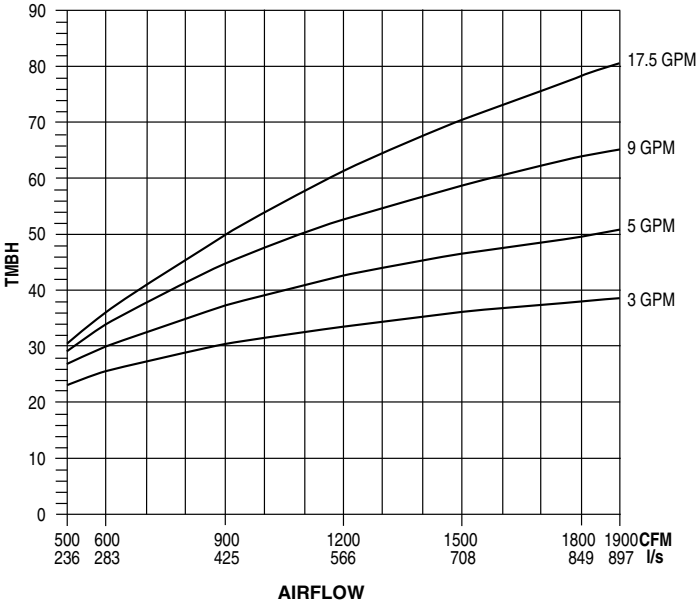
Chilled Water Coil Performance Data • Model Series 39 • Unit Sizes 19 and 21

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

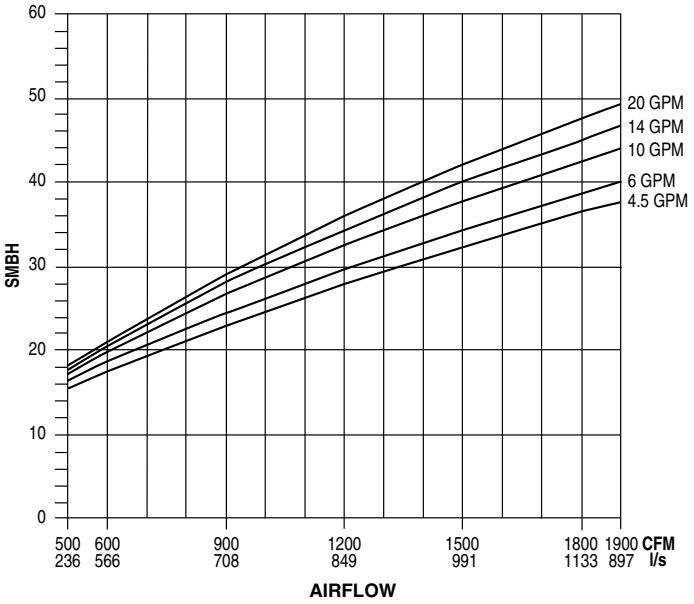
3 Row (Total MBH)



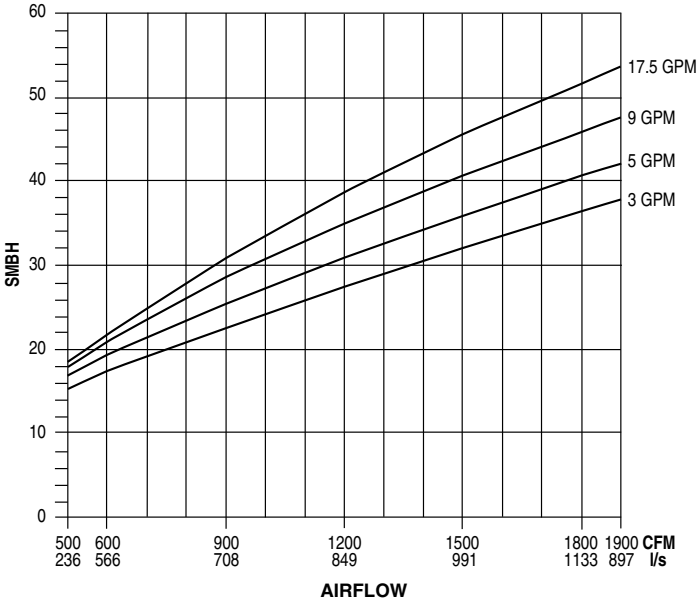
4 Row (Total MBH)



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

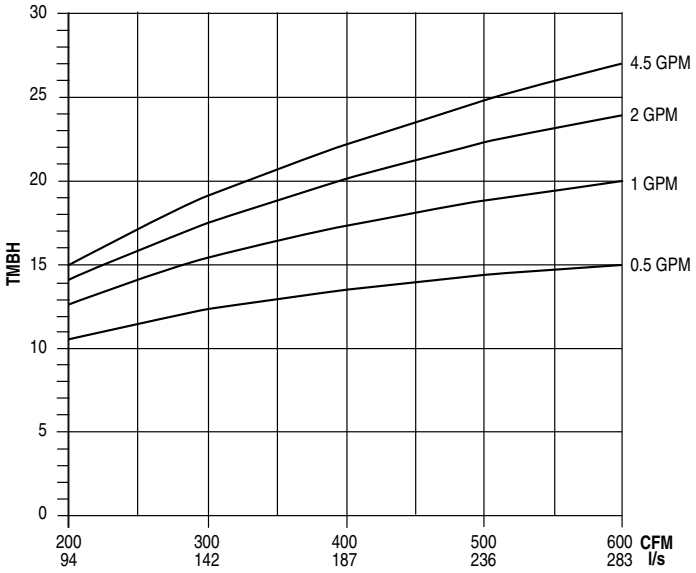
Notes:

1. Coil connections: 3 and 4 Row, 7/8" (22.2) O.D. male solder.
2. 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.

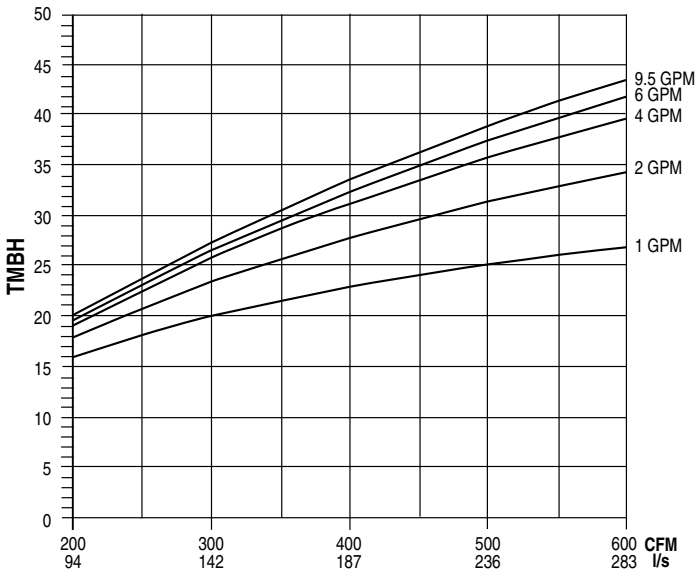
Hot Water Coil Performance Data • Model Series 39 • Unit Sizes 3, 5 and 6

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

1 Row (Total MBH)

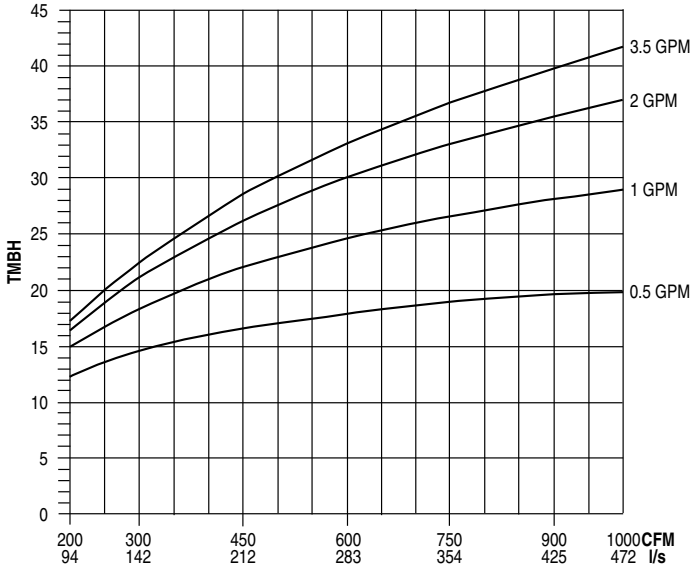


2 Row (Total MBH)

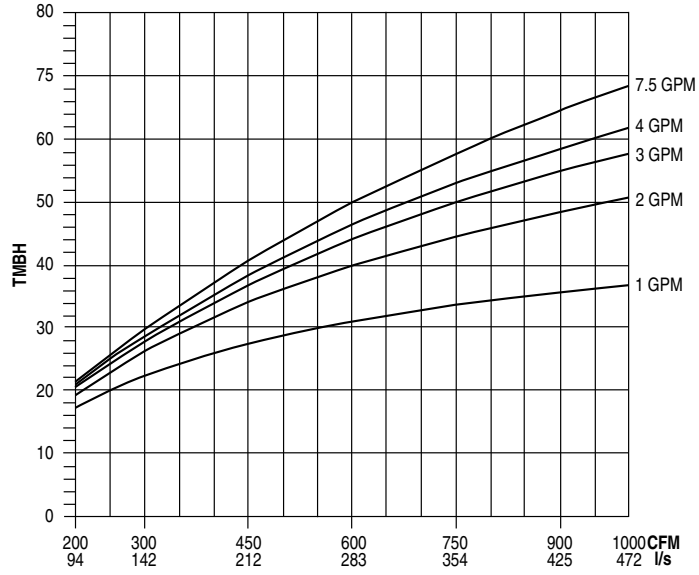


Unit Sizes 8 and 10

1 Row (Total MBH)



2 Row (Total MBH)



Notes:

1. Capacities are in Mbh (thousands of Btu per hour).
2. Mbh values are based on a ΔT (temperature difference) of 110°F between entering air and entering water. For other ΔT's; multiply the Mbh values by the factors below.
3. Air Temperature Rise. ATR = 927 x $\frac{\text{Mbh}}{\text{CFM}}$
4. Water Temp. Drop. WTD = 2.04 x $\frac{\text{Mbh}}{\text{GPM}}$
5. Connections: 1 and 2 Row 5/8" (15.9); O.D. male solder.

Correction factors at other entering conditions:

ΔT °F	50	60	70	80	90	100	110	120	130	140	150
Factor	.455	.545	.636	.727	.818	.909	1.00	1.09	1.18	1.27	1.36

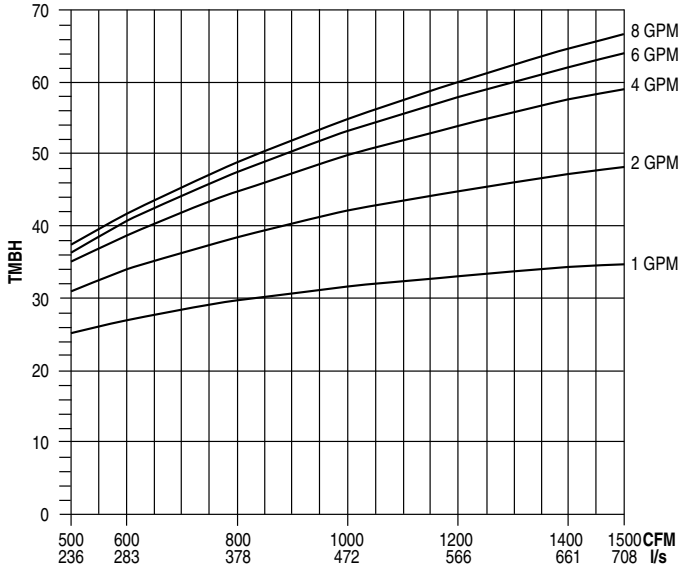
Altitude Correction Factors:

Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

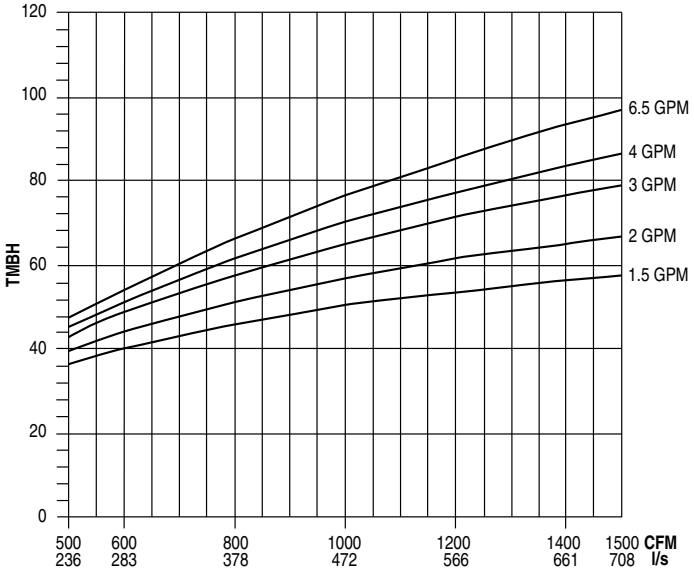
Hot Water Coil Performance Data • Model Series 39 • Unit Sizes 12 and 15

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

1 Row (Total MBH)

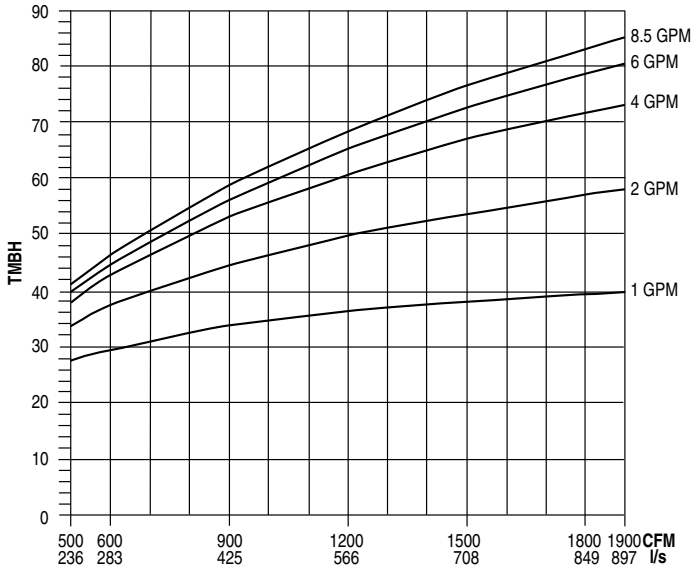


2 Row (Total MBH)

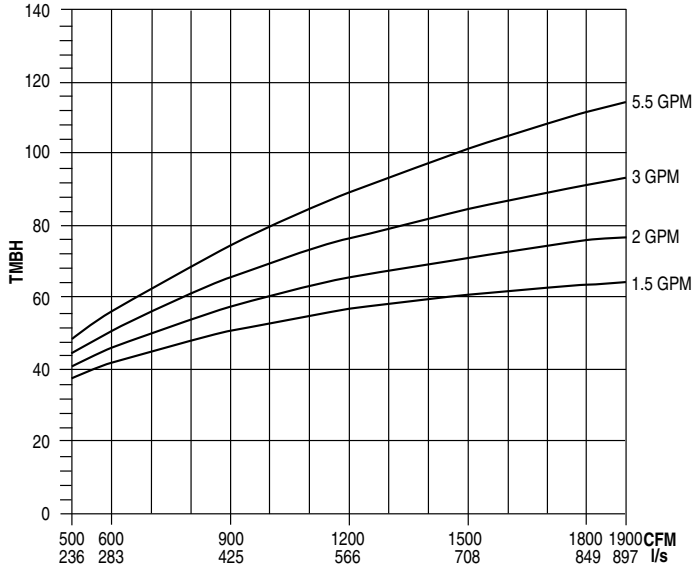


Unit Sizes 19 and 21

1 Row (Total MBH)



2 Row (Total MBH)



Notes:

1. Capacities are in Mbh (thousands of Btu per hour).
2. Mbh values are based on a ΔT (temperature difference) of 110°F between entering air and entering water. For other ΔT's; multiply the Mbh values by the factors below.
3. Air Temperature Rise. ATR = $927 \times \frac{\text{Mbh}}{\text{CFM}}$
4. Water Temp. Drop. WTD = $2.04 \times \frac{\text{Mbh}}{\text{GPM}}$
5. Connections: 1 and 2 Row 5/8" (15.9); O.D. male solder.

Correction factors at other entering conditions:

ΔT °F	50	60	70	80	90	100	110	120	130	140	150
Factor	.455	.545	.636	.727	.818	.909	1.00	1.09	1.18	1.27	1.36

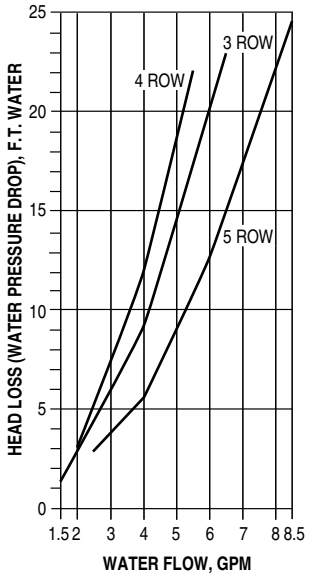
Altitude Correction Factors:

Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

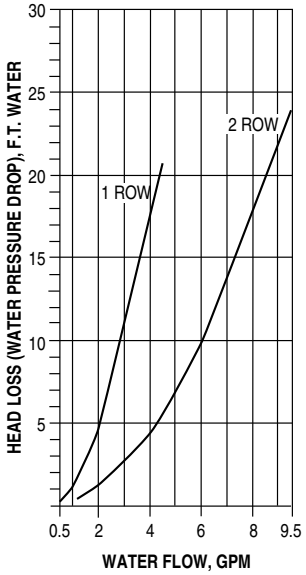
Coil Performance Data • Pressure Drop • Model Series 39

Unit Sizes 3, 5 and 6

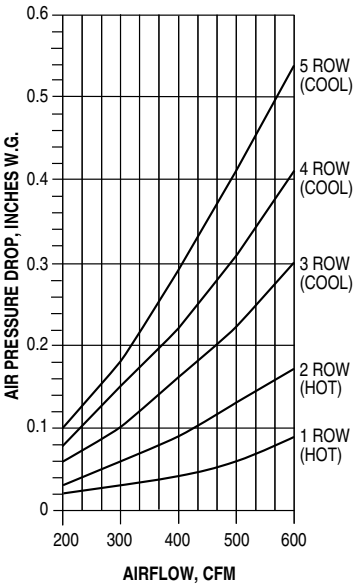
Chilled Water Pressure Drop



Hot Water Pressure Drop

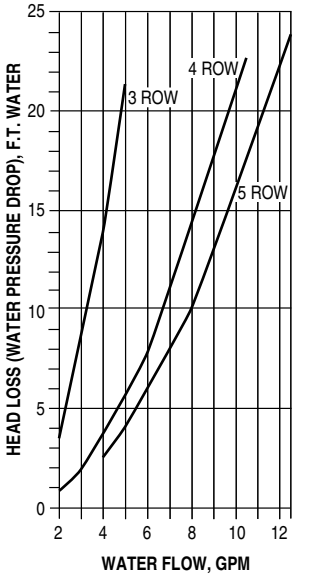


Chilled and Hot Water Air Pressure Drop

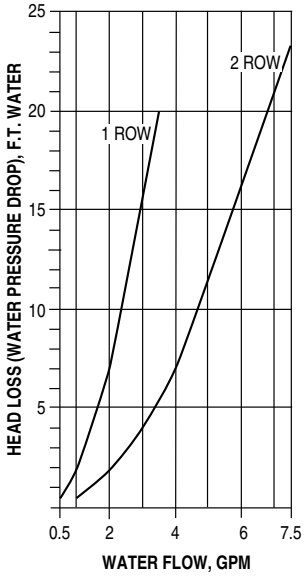


Unit Sizes 8 and 10

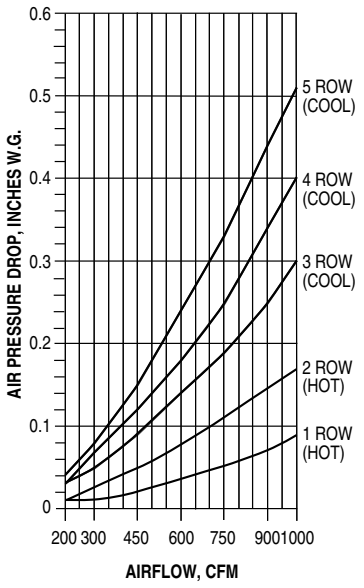
Chilled Water Pressure Drop



Hot Water Pressure Drop



Chilled and Hot Water Air Pressure Drop



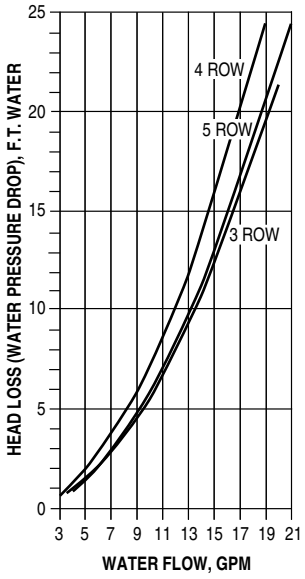
Metric Conversion Factors:

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.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$

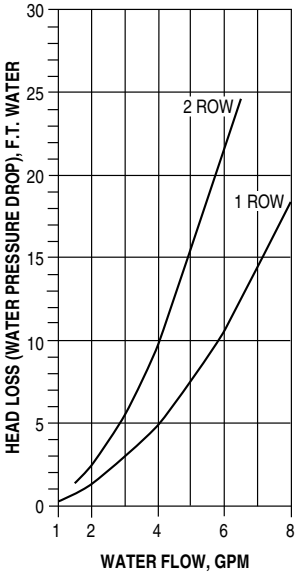
Coil Performance Data • Pressure Drop • Model Series 39

Unit Sizes 12 and 15

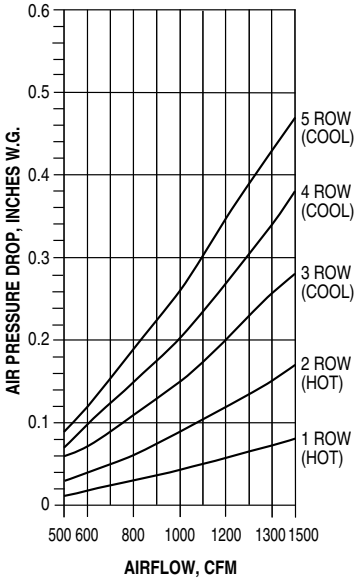
Chilled Water Pressure Drop



Hot Water Pressure Drop

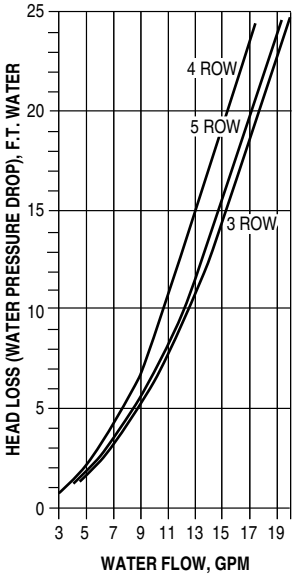


Chilled and Hot Water Air Pressure Drop

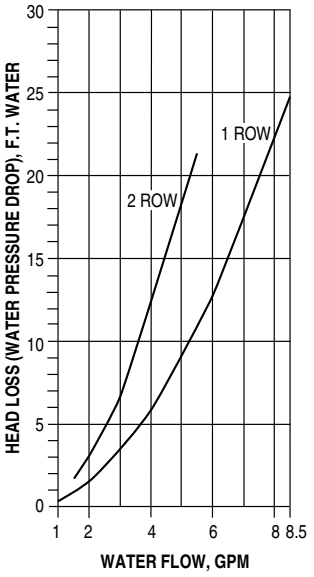


Unit Sizes 19 and 21

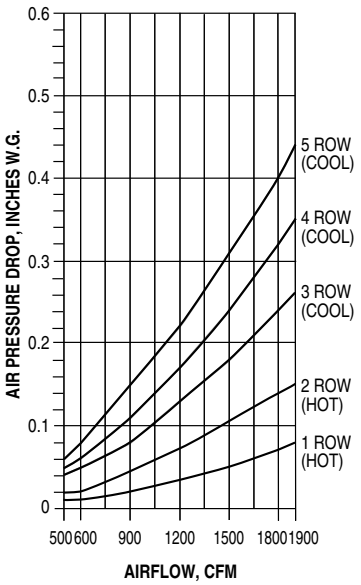
Chilled Water Pressure Drop



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.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$

Low Boy Vertical Fan Coil Units • Updraft Design
Model Series: 39MU

MODELS:

39MUZ Chilled Water.
39MUZW Chilled and Hot Water.
39MUZE Chilled Water and Electric Heat.
39MUZWE Chilled and Hot Water + Electric Heat.

DESCRIPTION:

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 maintainance 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.

COIL OPTIONS:

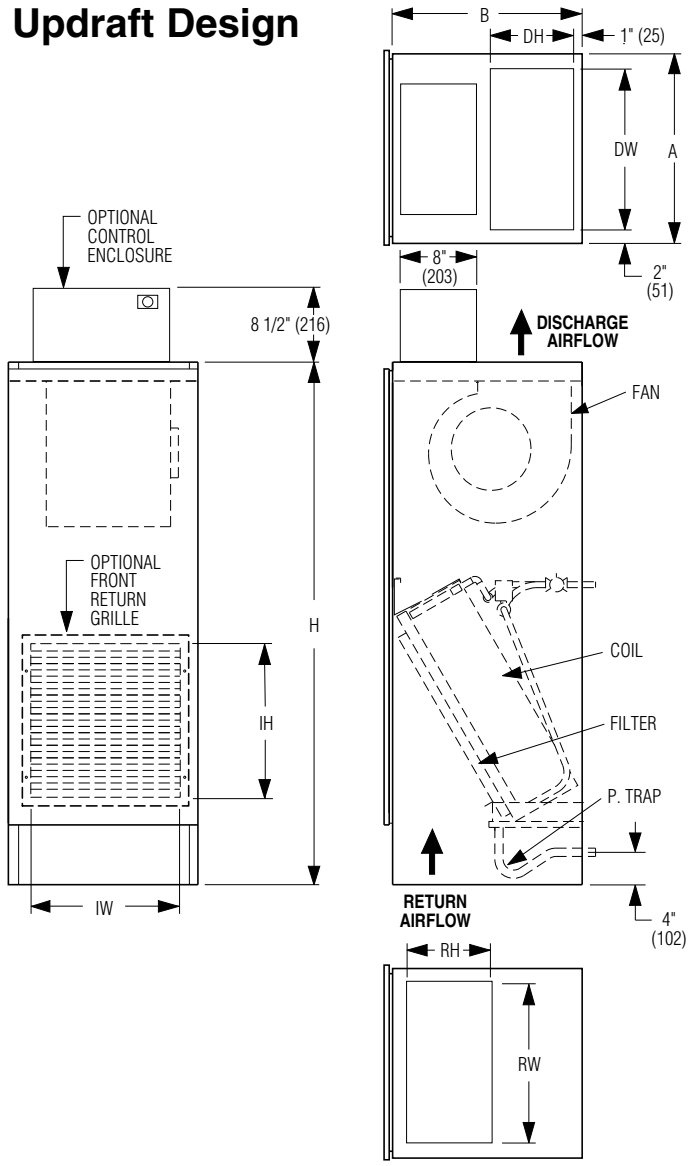
2 Pipe System:	4 Pipe System:
• 3 Row coil.	• 4 Row - 3 ChW, 1 HW coil.
• 4 Row coil.	• 5 Row - 3 ChW, 2 HW coil.
• 5 Row coil.	• 5 Row - 4 ChW, 1 HW coil.

STANDARD FEATURES:

- 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 fiberglass media filter.

ECM MOTOR / EPIC OPTION:

Available on unit sizes: 6, 10, 15 and 19.



Dimensional Data. Imperial Units (inches)

Unit Size	Footprint A x B	Height H	Discharge Opening DW x DH	Return Opening RW X RH	Opt. Return Grille Nom. IW x IH	Filter Size
3, 5, 6	18 x 18	55	16 x 10	15 x 8	16 x 12	13 1/8 x 16 3/4
8, 10	20 x 20	55	18 x 10	17 x 9	18 x 18	15 1/2 x 24
12, 15	24 x 24	60	22 x 10	21 x 12	22 x 23	19 1/2 x 29
19, 21	30 x 24	60	28 x 10	27 x 12	28 x 23	25 1/2 x 29

Dimensional Data. Metric Units (mm)

Unit Size	Footprint A x B	Height H	Discharge Opening DW x DH	Return Opening RW X RH	Opt. Return Grille Nom. IW x IH	Filter Size
3, 5, 6	457 x 457	1397	406 x 254	381 x 203	406 x 305	333 x 425
8, 10	508 x 508	1397	457 x 254	432 x 229	457 x 457	394 x 610
12, 15	610 x 610	1524	559 x 254	533 x 305	559 x 584	495 x 737
19, 21	762 x 610	1524	711 x 254	686 x 305	711 x 584	648 x 737

Low Boy Vertical Fan Coil Units • Downdraft Design
Model Series: 39MD

MODELS:

39MDZ Chilled Water.

39MDZW Chilled and Hot Water.

39MDZE Chilled Water plus Electric Heat.

39MDZWE Chilled and Hot Water plus Electric Heat.

DESCRIPTION:

The 39MD Low Boy Vertical Fan Coil Unit product line is a compact design for concealed stand-alone applications (such as in a closet). The standard Downdraft model features top return air entry and is raised off the floor by mounting on a platform. The bottom discharge is designed for ducting to an air distribution plenum or for ducted connection to a remote grille(s).

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

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

COIL OPTIONS:

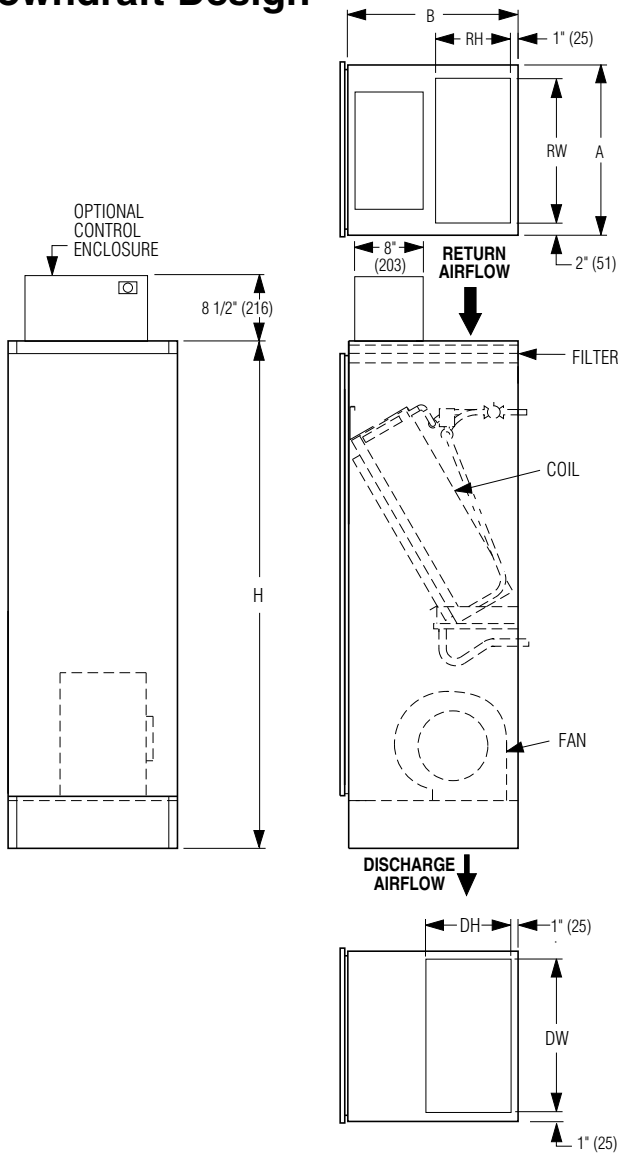
2 Pipe System:	4 Pipe System:
• 3 Row coil.	• 4 Row - 3 ChW, 1 HW coil.
• 4 Row coil.	• 5 Row - 3 ChW, 2 HW coil.
• 5 Row coil.	• 5 Row - 4 ChW, 1 HW coil.

STANDARD FEATURES:

- 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 fiberglass media filter.

ECM MOTOR / EPIC OPTION:

Available on unit sizes: 6, 10, 15 and 19.



Dimensional Data. Imperial Units (inches)

Unit Size	Footprint A x B	Height H	Discharge Opening DW x DH	Return Opening RW x RH	Top Filter Size
3, 5, 6	18 x 18	55	16 x 10	15 x 8	16 x 18
8, 10	20 x 20	55	18 x 10	17 x 9	18 x 20
12, 15	24 x 24	60	22 x 10	21 x 12	22 x 24
19, 21	30 x 24	60	28 x 10	27 x 12	28 x 24

Dimensional Data. Metric Units (mm)

Unit Size	Footprint A x B	Height H	Discharge Opening DW x DH	Return Opening RW x RH	Top Filter Size
3, 5, 6	457 x 457	1397	406 x 254	381 x 203	406 x 457
8, 10	508 x 508	1397	457 x 254	432 x 229	457 x 508
12, 15	610 x 610	1524	559 x 254	533 x 305	559 x 610
19, 21	762 x 610	1524	711 x 254	686 x 305	711 x 610

Low Boy Vertical Fan Coil Unit Options
Model Series: 39MU (Updraft) and 39MD (Downdraft)

POWER SUPPLY VOLTAGE:
(Units without electric heat)

Single Phase (60 Hz):
• 120, 208, 220*, 240 and 277V.

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

OTHER OPTIONS:
- 1" (25) MERV 7 pleated disposable filter.
- Remote mounted thermostat.
- 120V Outlet.
- Custom build sub-base.

ELECTRIC HEAT SECTION

Power Supply Voltage:

Single Phase, 60Hz:
• 120V • 208V • 220V* • 240V • 277V
• 347V* • 380V* • 480V • 600V

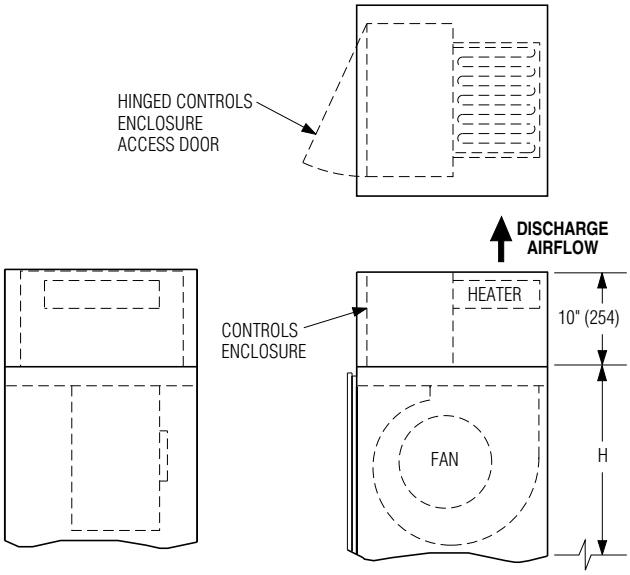
Three phase, 60Hz (delta):
• 208V • 240V

Three phase, 60Hz (4 wire wye):
• 380V* • 480V • 600V
* Outside of the U.S.A.

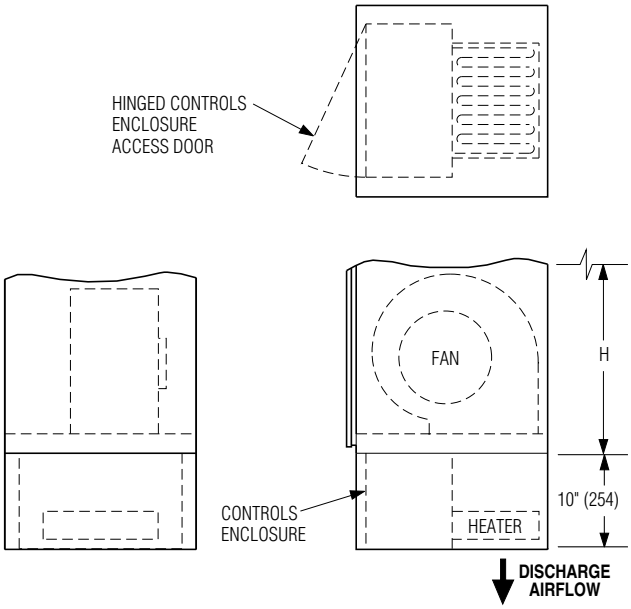
Note:
Incompatible heater/motor voltage selections require either a dual point power connection or a step-down transformer (consult Nailor).

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 and bottom mounted on downdraft unit.
- 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.

Options:
- Dust tight construction.
- Quiet contactors.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Cr. Wire.
- Toggle disconnect switch.
- Door interlock disconnect switch.
- Manual reset secondary thermal cut-out.
- Airflow safety switch.



39MU UPDRAFT HEATER SECTION



39MD DOWNDRAFT HEATER SECTION

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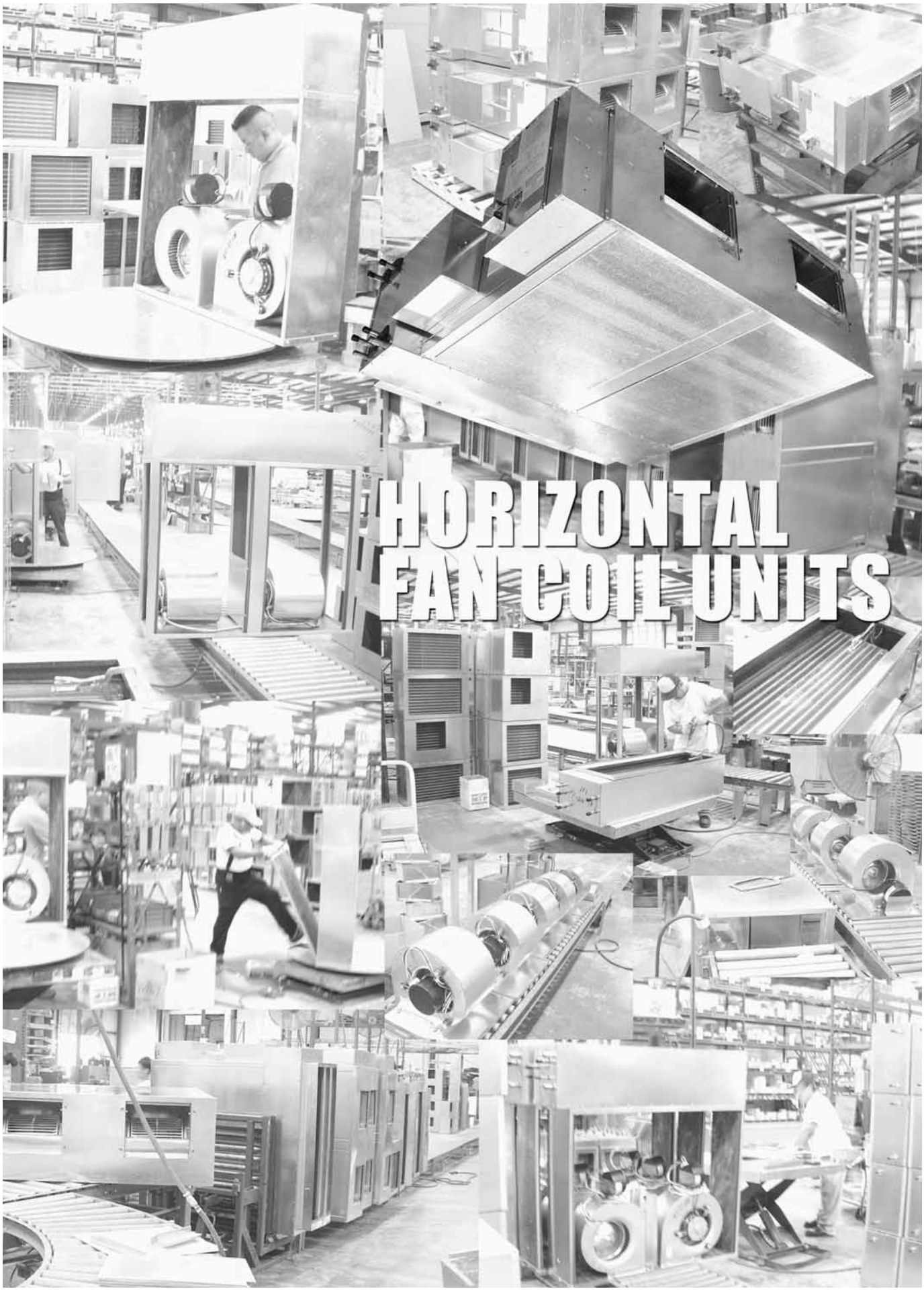
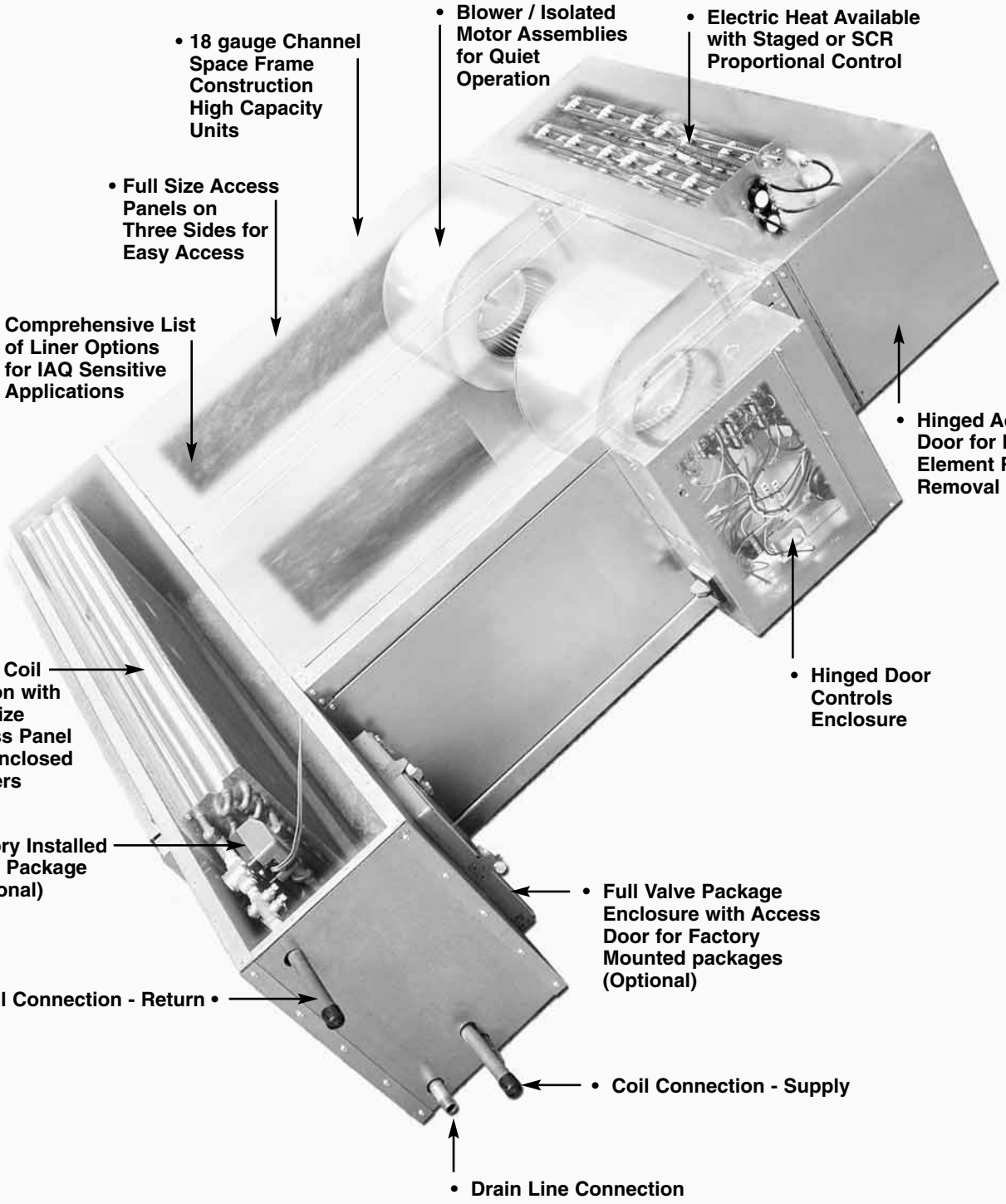


HORIZONTAL FAN COIL UNITS

Horizontal Fan Coil Units

Variable Air Volume EPIC Technology®

ECM Motor Energy Savings



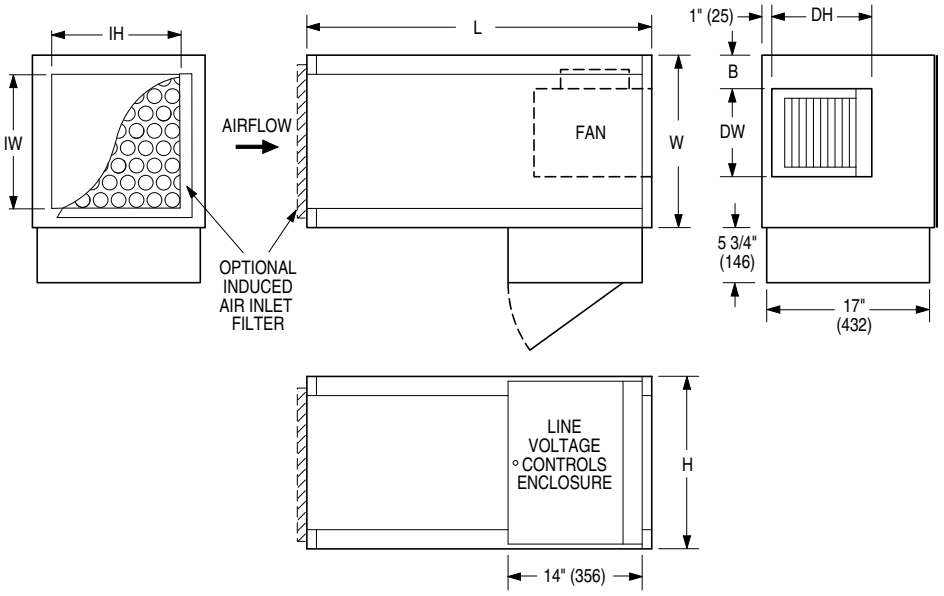
High Capacity Fan Booster Unit • ECM Motor
Model: 35F • Unit Sizes 3 and 5

STANDARD FEATURES:

- 18 ga. (1.3) Galvanized steel channel frame with 20 ga. (1.0) casing components.
- 3/4" (19) dual density insulation, exposed edges coated to prevent air erosion. Meets the requirements of NFPA 90A and UL 181.
- Top and bottom full size access panels for ease of maintainance and service.
- Ultra-energy efficient ECM fan motor with overload protection. Solid state EPIC fan volume controller.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Single point electrical connection.
- Discharge opening designed for flanged duct connection.
- Extended insulated plenum casing reduces radiated sound levels.
- Controls mounted as standard on RH side as shown. Terminals ordered with left hand controls (optional) are inverted and discharge duct hanging location will therefore change.

OPTIONS:

- Nailor Direct Digital Controller (BACnet compliant).
- Nailor Analog Electronic Controls.
- 1" (25) throwaway fiberglass media filter.
- 1" (25) MERV 7 pleated disposable filter.
- Toggle disconnect switch.
- Fiber-free liner.
- Perforated metal liner.
- Steri-liner.
- Solid metal liner.
- Hanger brackets.
- Left-hand controls location / configuration.



Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	B	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
3	18	18	36	3 1/2	14 x 14	9 1/4 x 10 1/2	16 x 16
5	26	18	41	5	22 x 14	13 1/4 x 11 1/2	24 x 15 1/2

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	B	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
3	457	457	914	89	356 x 356	235 x 267	406 x 406
5	660	457	1041	127	559 x 356	337 x 292	610 x 394

Electrical Data

Unit Size	ECM Motor FLA			
	Voltage	120V	208/240V	277V
3	Watts	532	500	433
	FLA	7	3.6	3.1
5	Watts	820	796	690
	FLA	10	5.9	5.1

All ECM motors are single phase, 50/60 Hz.

FLA = Full load amperage

ARI PERFORMANCE CERTIFIED ™ ARI Standard 440 Room Fan-Coil Unit www.aridirectory.org

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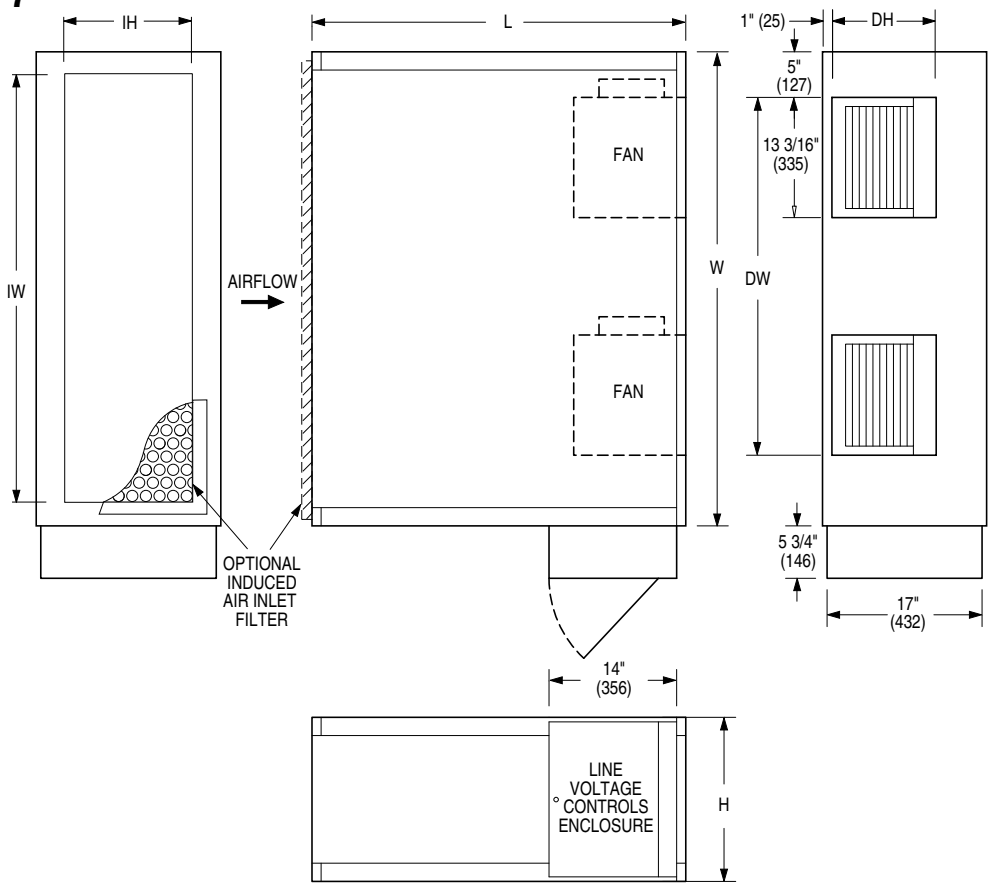
High Capacity Fan Booster Unit • ECM Motor
Model: 35F • Unit Size 7

STANDARD FEATURES:

- 18 ga. (1.3) Galvanized steel channel Frame with 20 ga. (1.0) casing components.
- 3/4" (19) dual density insulation, exposed edges coated to prevent air erosion. Meets the requirements of NFPA 90A and UL 181.
- Top and bottom full size access panels for ease of maintainance and service.
- Ultra-energy efficient ECM fan motor with overload protection. Solid state EPIC fan volume controller.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Single point electrical connection.
- Discharge opening designed for flanged duct connection.
- Extended insulated plenum casing reduces radiated sound levels.
- Controls mounted as standard on RH side as shown. Terminals ordered with left hand controls (optional) are inverted and discharge duct hanging location will therefore change.

OPTIONS:

- Nailor Direct Digital Controller (BACnet compliant).
- Nailor Analog Electronic Controls.
- 1" (25) throwaway fiberglass media filter.
- 1" (25) MERV 7 pleated disposable filter.
- Toggle disconnect switch.
- Fiber-free liner.
- Perforated metal liner.
- Steri-liner.
- Solid metal liner.
- Hanger brackets.
- Left-hand controls location / configuration.



Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
7	52	18	41	48 x 14	39 1/4 x 11 1/2	50 x 16

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
7	1321	457	1041	1219 x 356	997 x 292	1270 x 406

Electrical Data

Unit Size	ECM Motor			
	Voltage	120V	208/240V	277V
7	Watts	1585	1477	1280
	FLA	15.7	10.7	9.2

All ECM motors are single phase, 50/60 Hz.
FLA = Full load amperage

ARI PERFORMANCE CERTIFIED ™ ARI Standard 440 Room Fan-Coil Unit www.ahridirectory.org

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High Capacity Fan Coil Unit • ECM Motor

Models: 35FZ, 35FW and 35FZW • Unit Sizes 3 and 5

MODELS:

35FZ Chilled water
35FW Hot water
35FZW Chilled and hot water

STANDARD FEATURES:

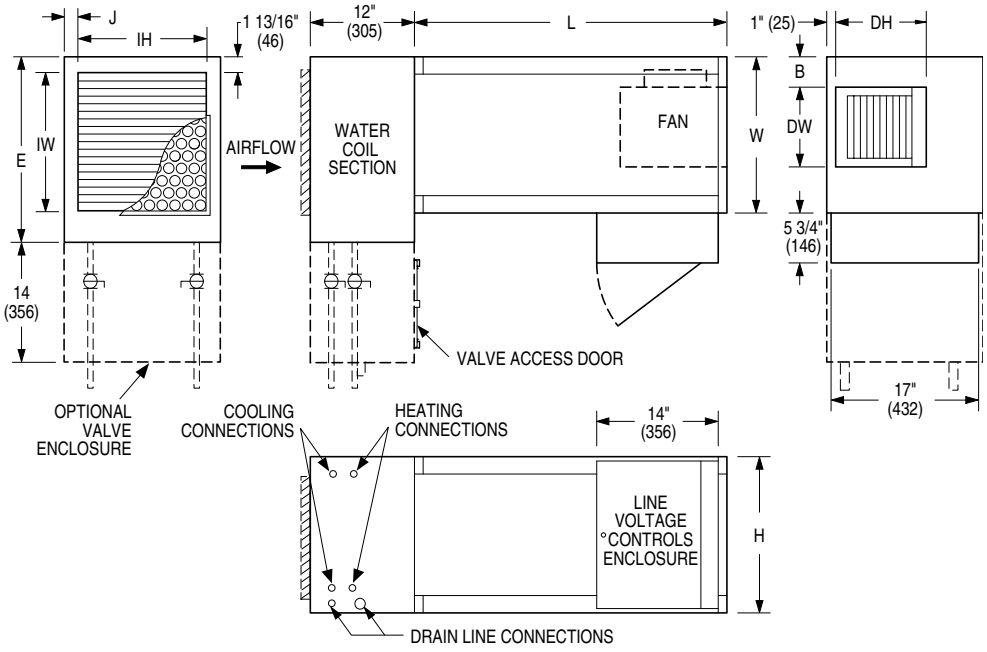
- 18 ga. (1.3) galvanized steel channel frame with 20 ga. (1.0) casing components.
- 3/4" (19) dual density insulation, exposed edges coated to prevent air erosion. Meets the requirements of NFPA 90A and UL 181.
- Top and bottom full size access panels for ease of maintainance and service.
- Ultra-energy efficient ECM fan motor with overload protection. Solid state EPIC fan volume controller.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Single point electrical connection.
- Discharge opening designed for flanged duct connection.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted and discharge duct hanging location will therefore change.

WATER COIL SECTION:

- Installed on inlet as a draw through design.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes with aluminum ripple fins.
- Cooling coils include an insulated, stainless steel drain pan with 3/4" (19) male NPT primary drain connection and 1/2" (13) male NPT secondary drain connection.
- Top and bottom access panels for inspection and coil cleaning.
- Right hand coil connection (looking in direction of airflow) is standard. Left hand is optional.
- Sweat Connections:
  One Row 1/2" (13) O.D. male solder. Two, Three, four and five Row 7/8" (22.2) O.D. male solder.

Coil Options:

- Cooling - 3 to 6 row chilled water.
- Heating - 1 or 2 row hot water.
- 6 total rows of cooling and heating coils maximum.



Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	B	E	J	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
3	18	18	36	3 1/2	21 3/8	1 9/16	16 x 14 7/8	9 1/4 x 10 1/2	16 x 16
5	26	18	41	5	36 3/8	1 9/16	31 x 14 7/8	13 1/4 x 11 1/2	24 x 15 1/2

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	B	E	J	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
3	457	457	914	89	543	40	406 x 378	235 x 267	406 x 406
5	660	457	1041	127	924	40	787 x 378	337 x 292	610 x 394

Electrical Data

Unit Size	ECM Motor			
	Voltage	120V	208/240V	277V
3	Watts	532	500	433
	FLA	7	3.6	3.1
5	Watts	820	796	690
	FLA	10	5.9	5.1

FLA = Full load amperage
All ECM motors are single phase, 50/60 Hz.

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OPTIONS:

- Nailor Direct Digital Controller (BACnet compliant).
- Nailor Analog Electronic Controls.
- 1" (25) throwaway fiberglass media filter.
- 1" (25) MERV 7 pleated disposable filter.
- Factory assembled valve piping package, mounted in full protective enclosure.
- Ultraviolet light package.
- Fiber-free liner.
- Perforated metal liner.
- Steri-liner.
- Solid metal liner.
- Hanger brackets.
- Left-hand controls location/ configuration.
- Safety overflow float switch.
- Toggle disconnect switch.

High Capacity Fan Coil Unit • ECM Motor
Models: 35FZ, 35FW and 35FZW • Unit Size 7

MODELS:

35FZ Chilled water only.
35FW Hot water only.
35FZW Chilled and hot water

STANDARD FEATURES:

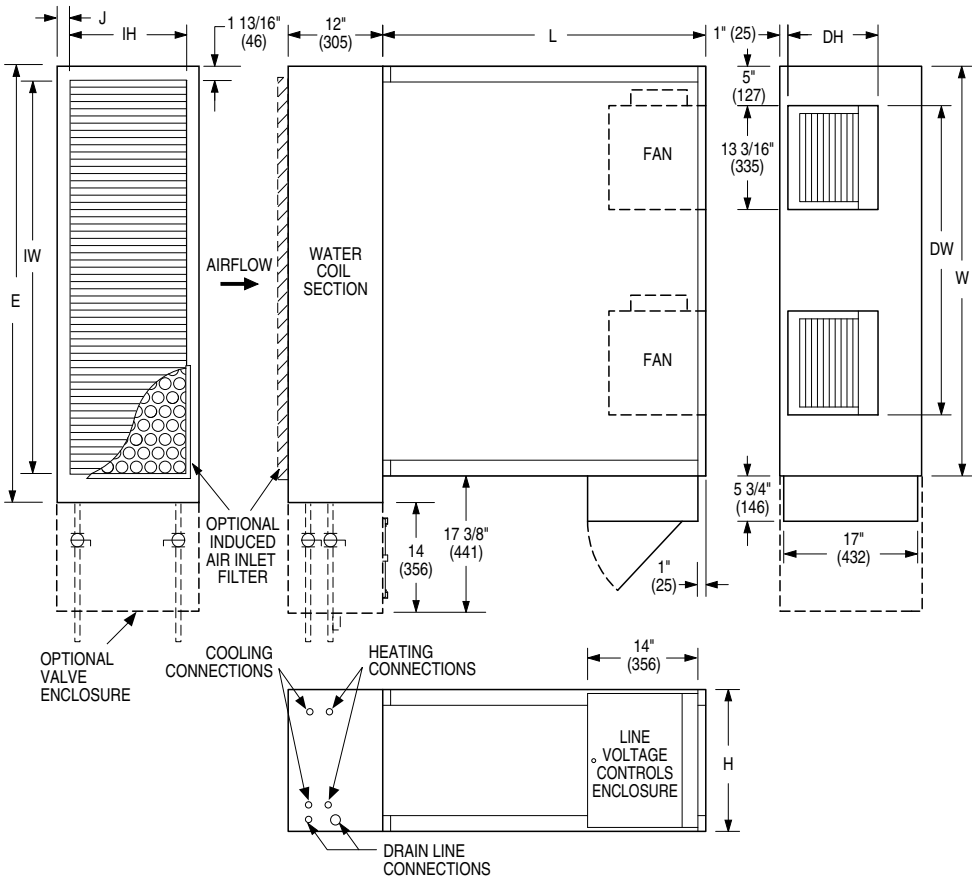
- 18 ga. (1.3) galvanized steel channel frame with 20 ga. (1.0) casing components.
- 3/4" (19) dual density insulation, exposed edges coated to prevent air erosion. Meets the requirements of NFPA 90A and UL 181.
- Top and bottom full size access panels for ease of maintainance and service.
- Ultra-energy efficient ECM fan motor with overload protection. Solid state EPIC fan volume controller.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Single point electrical connection.
- Discharge opening designed for flanged duct connection.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted and discharge duct hanging location will therefore change.

WATER COIL SECTION:

- Installed on inlet as a draw through design.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes with aluminum ripple fins.
- Cooling coils include an insulated, stainless steel drain pan with 3/4" (19) male NPT primary drain connection and 1/2" (13) male NPT secondary drain connection.
- Top and bottom access panels for inspection and coil cleaning.
- Right hand coil connection (looking in direction of airflow) is standard. Left hand is optional.
- Sweat Connections:
  One Row 1/2" (13) O.D. male solder. Two, Three, four and five Row 7/8" (22.2) O.D. male solder.

Coil Options:

- Cooling - 3 to 6 row chilled water.
- Heating - 1 or 2 row hot water.
- 6 total rows of cooling and heating coils maximum.



Dimensional Data. Imperial Units (inches)

Unit Size	W	H	L	E	J	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
7	52	18	41	55 3/8	1 9/16	50 x 14 7/8	39 1/4 x 11 1/2	50 x16

Dimensional Data. Metric Units (mm)

Unit Size	W	H	L	E	J	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
7	1320	457	1041	1407	40	1270 x 378	997 x 292	1270 x 406

Electrical Data

Unit Size	ECM Motor			
	Voltage	120V	208/240V	277V
7	Watts	1585	1477	1280
	FLA	15.7	10.7	9.2

FLA = Full load amperage
All ECM motors are single phase, 50/60 Hz.

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OPTIONS:

- Nailor Direct Digital Controller (BACnet compliant).
- Nailor Analog Electrical Controls.
- 1" (25) throwaway fiberglass media filter.
- 1" (25) MERV 7 pleated disposable filter.
- Factory assembled valve piping package, mounted in full protective enclosure.
- Left-hand controls location.
- Safety overflow float switch.
- Toggle disconnect switch.
- Ultraviolet light package.
- Hanger brackets.
- Fiber-free liner.
- Perforated metal liner.
- Steri-liner.
- Solid metal liner.

High Capacity Fan Booster and Fan Coil Units with Electric Heat Option
Electric Coil Section
Models: 35FE and 35FZE • Unit Sizes 3 and 5

MODELS:

35FE Electric heat

35FZE Chilled water and electric heat

See Models 35F or 35FZ Sizes 3 and 5 for base unit construction, features and water coil information.

STANDARD FEATURES:

- Unique hinged heater design permits easy access, removal and replacement of heater element without disturbing ductwork.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire unit.
- Airflow safety switch.
- Flanged outlet duct connection.
- ETL listed as an assembly.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted and discharge duct hanging location will therefore change.

Standard Supply Voltage (60 Hz):

Single phase: • 120V • 208V • 220V* • 240V • 277V • 347V • 380V* • 480V • 600V

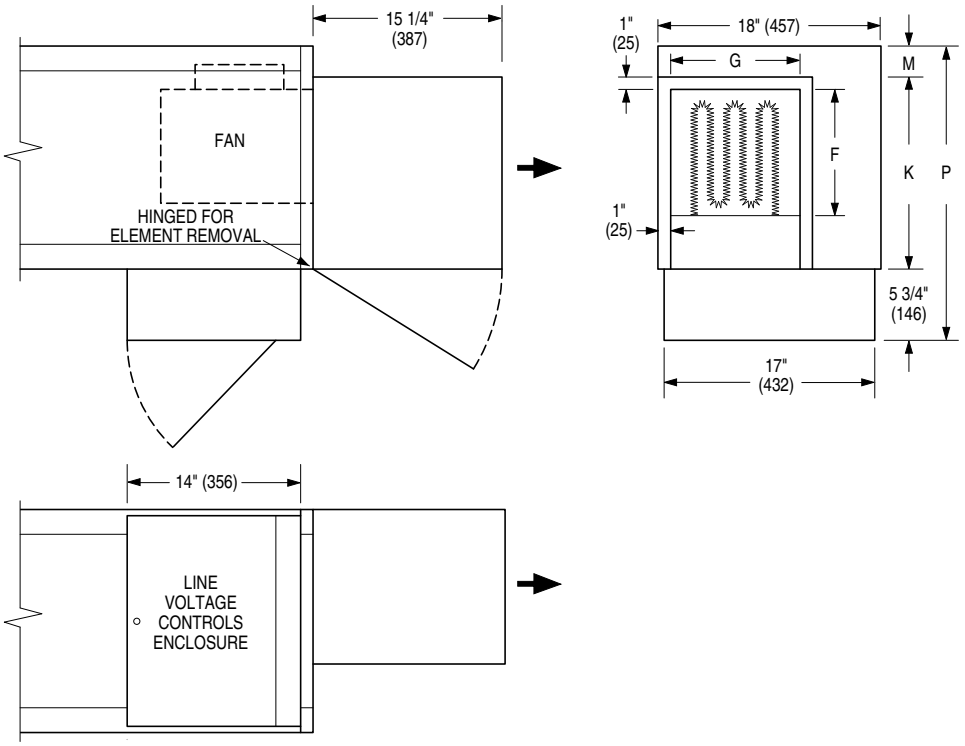
Three phase - (delta): • 208V • 220V* • 240V

Three phase - (4 wire wye): • 380V* • 480V • 600V

* Outside of the U.S.A.

OPTIONS:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- SCR Controls
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Cr. Wire.
- Dust tight construction.
- Left hand configuration.
- Manual reset secondary thermal cut-outs.



Dimensional Data

Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size F x G	K	P	M	Outlet Duct Size F x G	K	P	M
3	10 1/4 x 10 1/2	15 1/2	23 3/4	2 1/2	260 x 267	394	602	64
5	14 1/4 x 11 3/4	22	31 3/4	4	362 x 298	559	806	102

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High Capacity Fan Booster and Fan Coil Units with Electric Heat Option
Electric Coil Section
Models: 35FE and 35FZE • Unit Size 7

MODELS:

35FE Electric heat

35FZE Chilled water and electric heat

See Models 35F or 35FZ Size 7 for base unit construction, features and water coil information.

STANDARD FEATURES:

- Unique hinged heater design permits easy access, removal and replacement of heater element without disturbing ductwork.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electric connection for entire unit.
- Airflow safety switch.
- Flanged outlet duct connection.
- ETL listed as an assembly.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted and discharge duct hanging location will therefore change.

Standard Supply Voltage (60 Hz):

Single phase: • 120V • 208V • 220V* • 240V • 277V • 347V • 380V* • 480V • 600V

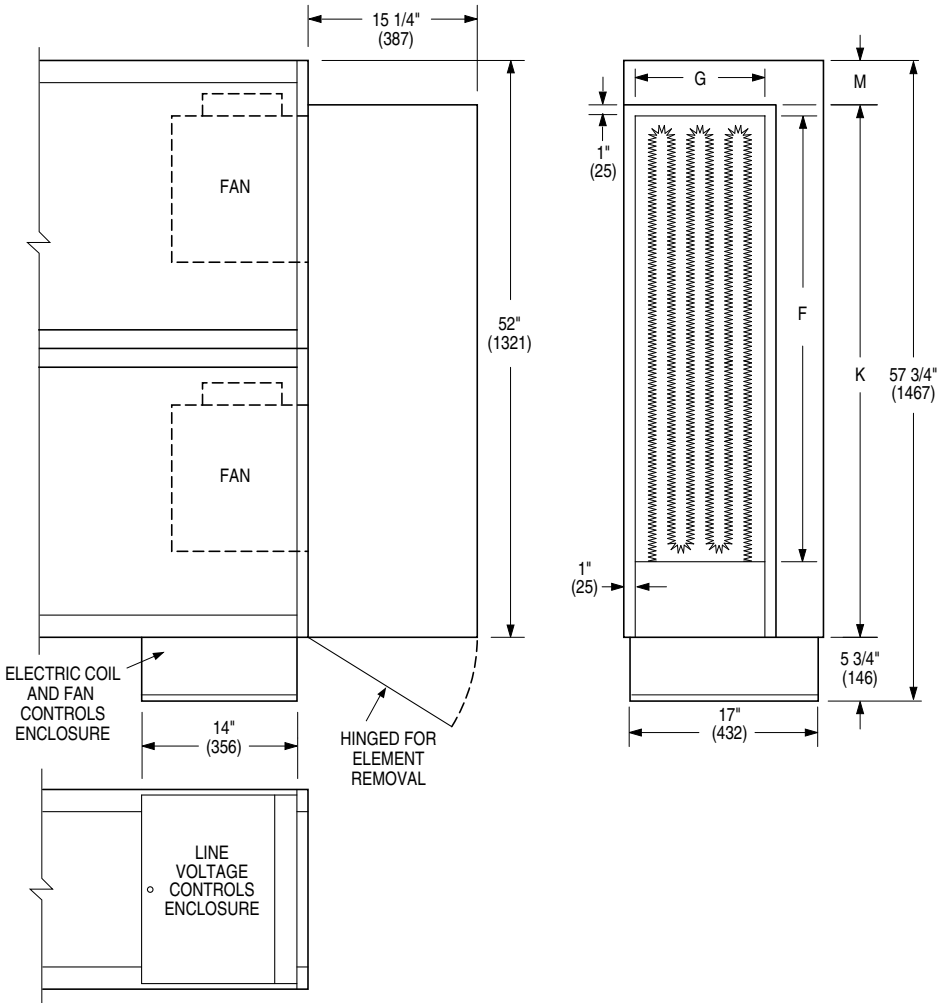
Three phase - (delta): • 208V • 220V* • 240V

Three phase - (4 wire wye): • 380V* • 480V • 600V

* Outside of the U.S.A.

OPTIONS:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- SCR Controls
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Cr. Wire.
- Dust tight construction.
- Left hand configuration.
- Manual reset secondary thermal cut-outs.



Dimensional Data

Unit Size	Imperial Units (inches)			Metric Units (mm)		
	Outlet Duct Size F x G	K	M	Outlet Duct Size F x G	K	M
7	40 1/4 x 11 3/4	48	4	1022 x 298	1219	102

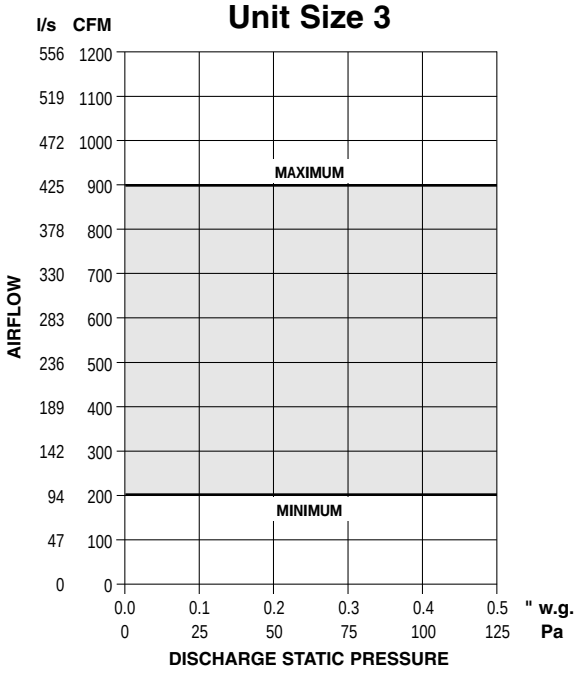
ARI PERFORMANCE CERTIFIED ™ ARI Standard 440 Room Fan-Coil Unit www.ariidirectory.org

INTERTEK ETL LISTED C US

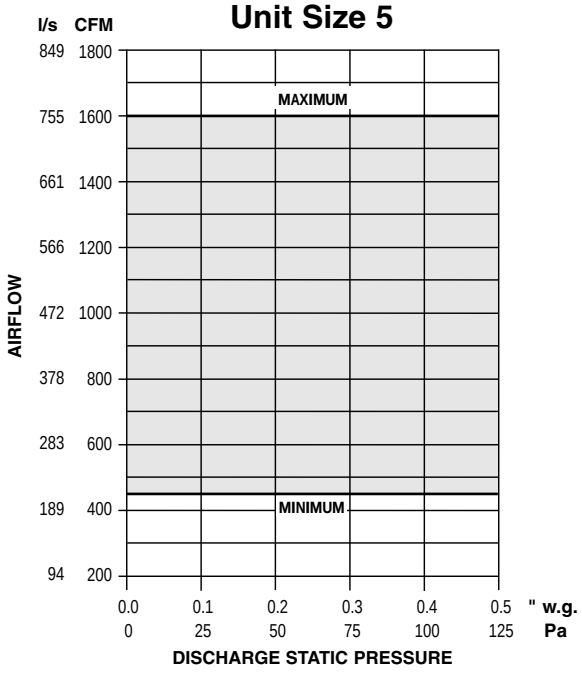
Model Series 35F • ECM Motor Fan Performance Curves

Airflow vs. Downstream Static Pressure

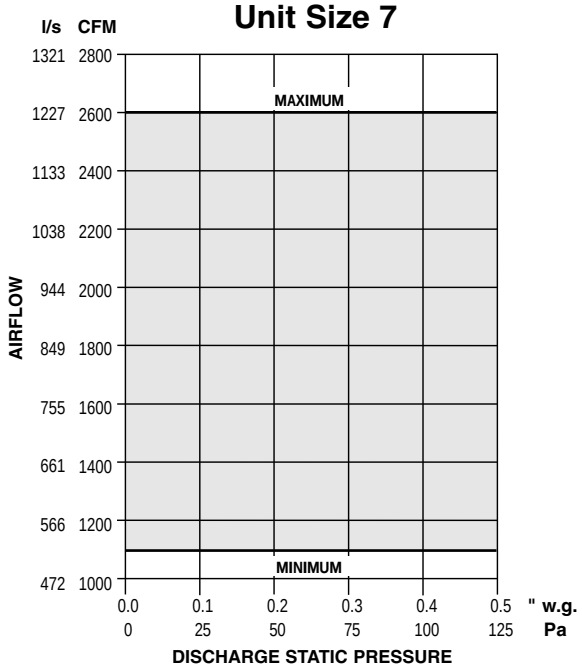
Unit Size 3



Unit Size 5



Unit Size 7



NOTES:

- The fan curves for the ECM motor are unlike those for traditional PSC motors. The ECM motor is a pressure independents constant volume device at set point and airflow does not vary with changing static pressure conditions. 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).
- Airflow can be set to operate on horizontal performance line at any point within shaded area using the solid state volume controller provided.
- Engineered Comfort Fan Coil units featuring the optional ECM motor have considerably wider turndown ratios than conventional PSC motors. Hence, a reduced number of unit sizes are required in order to 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 and installation and reduces inventory of field service parts.
- Fan curves shown are applicable to 120/208/240 and 277 volt, single phase ECM motors. Although DC in operation, they include a built-in innverter.

Electrical Data

Unit Size	ECM Motor			
	Voltage	120V	208/240V	277V
3	Watts	532	500	433
	FLA	7	3.6	3.1
5	Watts	820	796	690
	FLA	10	5.9	5.1
7	Watts	1585	1477	1280
	FLA	15.7	10.7	9.2

FLA = Full load amperage
All ECM motors are single phase, 50/60 Hz.

Model Series 35F • High Capacity • Performance Data

NC Level Application Guide

Unit Size	Airflow cfm	Airflow l/s	NC Levels Discharge	NC Levels Radiated
3	900	425	—	30
	800	378	—	28
	700	330	—	27
	500	236	—	23
	300	142	—	21
5	1600	775	28	40
	1400	661	25	38
	1200	566	21	35
	1000	472	—	33
	800	378	—	29
	600	283	—	25
7	2600	1227	30	44
	2400	1133	28	43
	2100	991	24	40
	1800	849	20	38
	1500	708	—	35
	1200	566	—	31

Performance Notes:

1. NC levels are calculated from the published raw data and based on procedures outlined in Appendix E, ARI Standard 885-98.

2. Fan discharge sound attenuation deductions are based on environmental effect, duct lining, branch power division, insulated flexible duct, end reflection and space effect and are as follows:

Discharge attenuation	Octave Band 2	3	4	5	6	7
< 300 cfm	24	28	39	53	58	40
300 – 700 cfm	27	29	40	51	53	39
> 700 cfm	29	30	41	51	52	39

3. Radiated sound attenuation deductions are based on a mineral tile ceiling and environmental effect and are as follows:

Radiated attenuation	Octave Band 2	3	4	5	6	7
Total dB reduction	18	19	20	26	31	36

4. Dash (–) in space denotes an NC level of less than 20.

5. Fan discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases.

Sound Power Levels

Unit Size	Airflow cfm	Airflow l/s	Discharge Sound Power Octave Bands 2	3	4	5	6	7	Radiated Sound Power Octave Bands 2	3	4	5	6	7
3	900	425	59	61	64	61	58	55	66	59	55	49	47	43
	800	378	59	59	62	59	55	52	64	56	53	47	45	40
	700	330	58	58	60	57	53	48	62	54	52	45	43	38
	500	236	56	54	55	51	47	40	57	48	49	41	38	32
	300	142	53	49	48	44	40	31	50	42	47	36	32	24
5	1600	755	67	68	69	69	66	65	74	66	58	53	51	48
	1400	661	66	66	67	66	63	6	72	63	55	50	48	45
	1200	566	63	62	63	62	59	57	70	59	53	47	44	40
	1000	472	59	58	59	58	55	53	68	55	49	43	40	36
	800	378	55	54	55	54	50	47	65	51	46	39	36	31
	600	283	50	49	50	48	45	42	62	46	41	35	31	26
7	2600	1227	70	70	71	70	67	66	77	67	59	54	52	49
	2400	1133	69	69	69	68	65	64	76	66	58	53	50	47
	2100	991	66	66	66	65	62	60	74	63	56	50	47	43
	1800	849	63	62	63	62	58	56	72	60	53	47	44	40
	1500	708	60	59	60	58	55	52	70	56	50	44	41	36
	1200	566	56	55	56	54	50	47	67	52	47	40	37	32

Performance Notes:

1. Fan discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from fan coil unit discharge to the room.

2. Discharge sound power is the noise emitted from the unit discharge into the downstream duct.

3. Radiated sound power is the breakout noise transmitted through the unit casing walls.

4. Sound power levels are in decibels, dB re 10^{-12} watts.

5. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.

6. Data derived from independent tests conducted in accordance with ARI Standard 880-98.

ARI Standard Ratings

Unit Size	COIL Row	COIL FPI	COIL CIRC	AIRFLOW CFM (DRY BLOW)	COOLING CAPACITY QT (BTUH)	COOLING CAPACITY QS (BTUH)	WATER FLOW RATE (GPM)	WATER WPD ft-wg	POWER INPUT (WATTS)
3	3	12	2	800	17744	14473	3.5	2	120
	4		4		23196	17420	4.6	4.9	122
5	3	12	3	1250	30337	23510	6	8	270
	4		4		36793	27370	7.3	6.9	274
7	3	12	6	2500	62332	47790	12.4	8.1	345
	4				79241	57042	15.7	15.2	348

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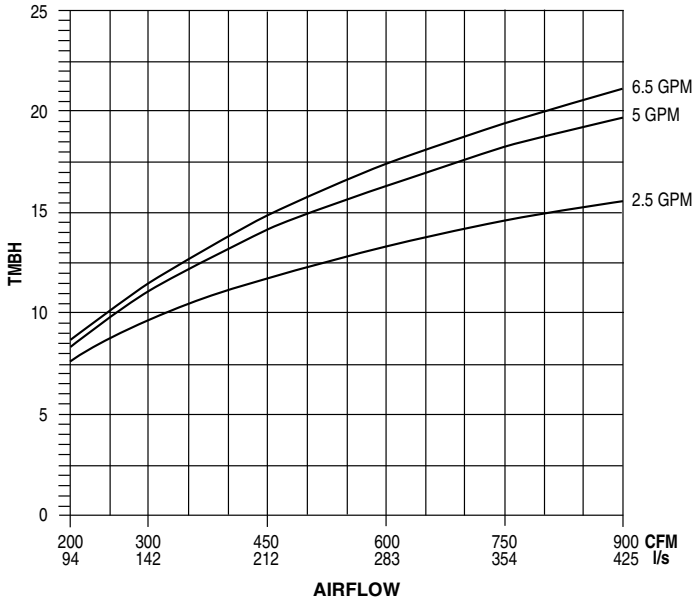
NOTE: Based on 80°F DB and 67°F WB EAT, 45°F EWT 10° temperature rise, maximum fan speed. Motor type is ECM and motor voltage is 115/1/60. Airflow under dry coil conditions. All models tested at 0.0" external static pressure.

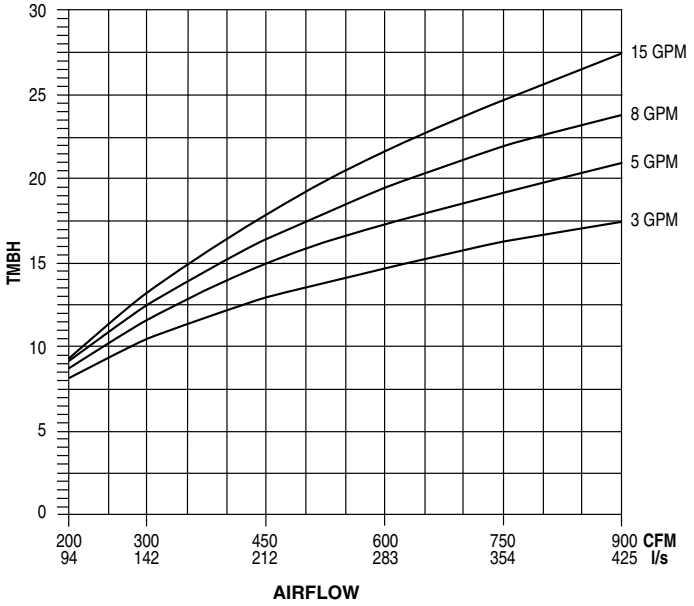
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 3

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

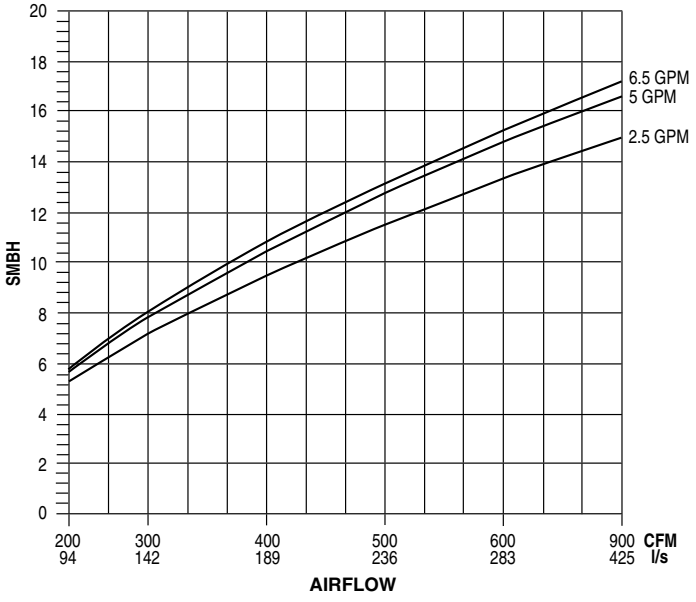
3 Row (Total MBH)



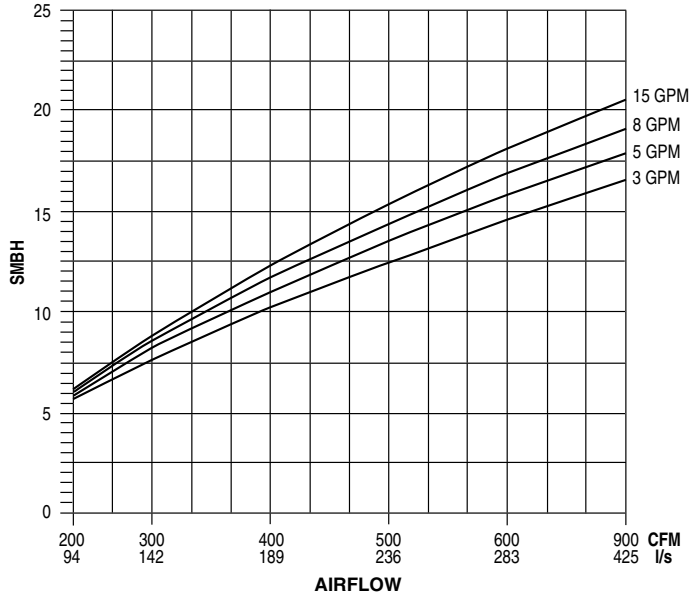
4 Row (Total MBH)



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

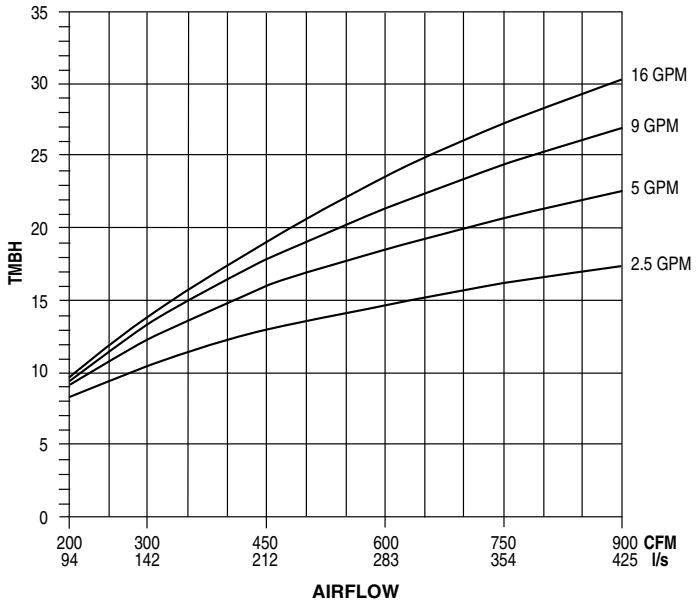
Notes:

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.

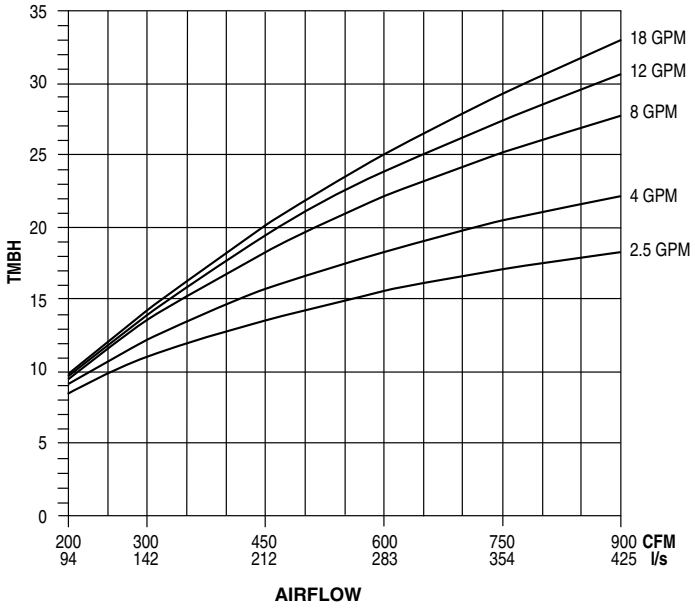
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 3

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

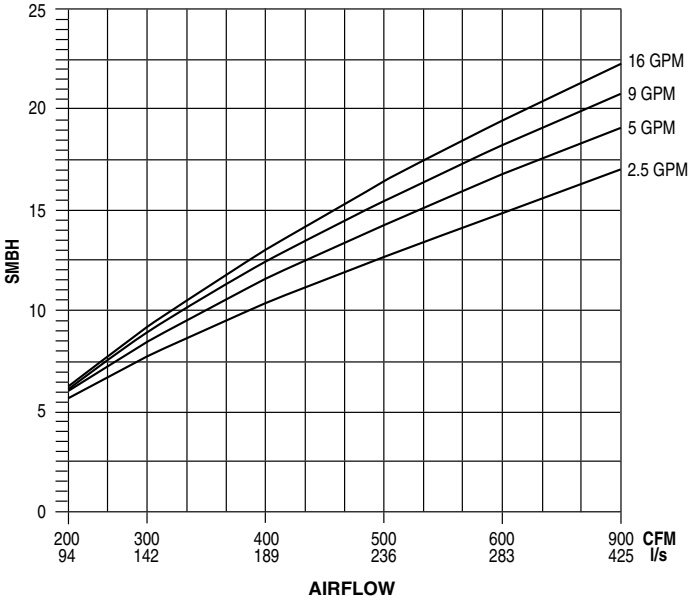
5 Row (Total MBH)



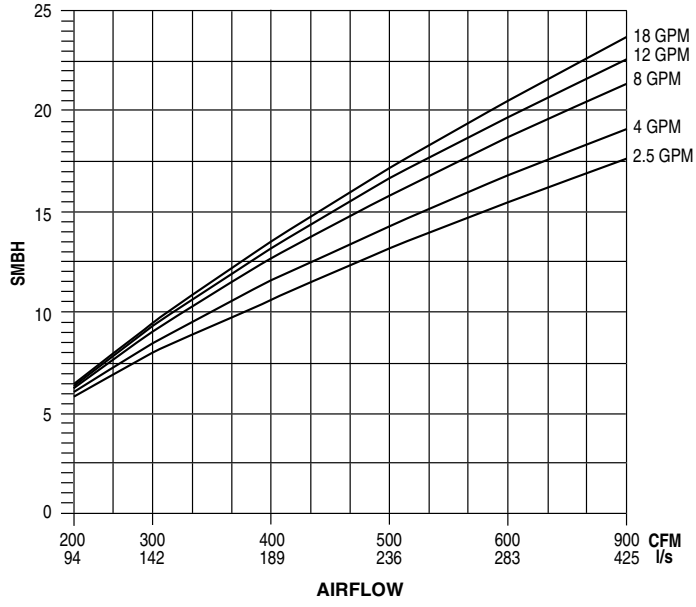
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

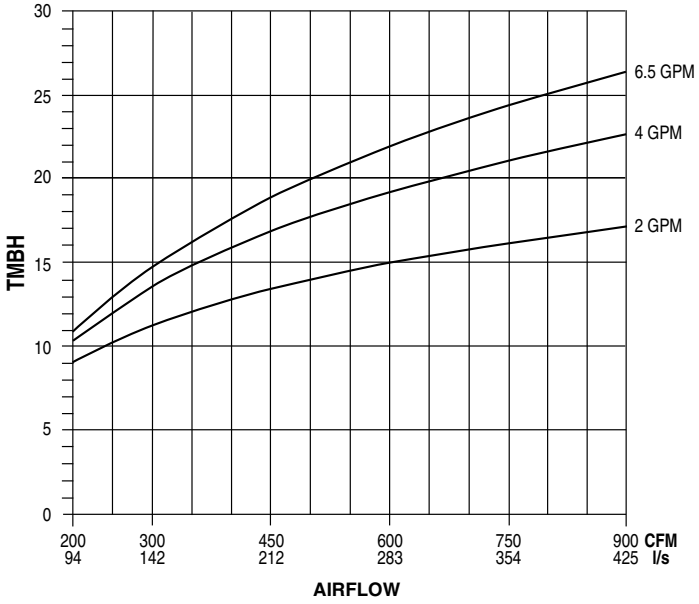
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

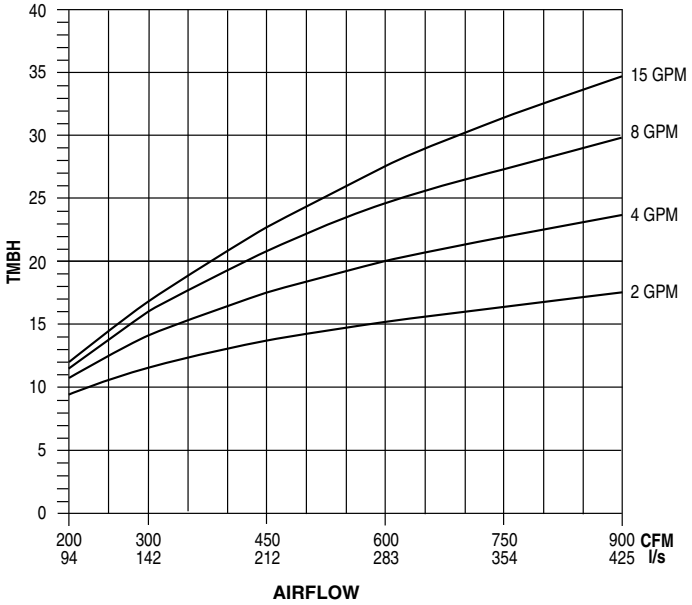
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 3

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

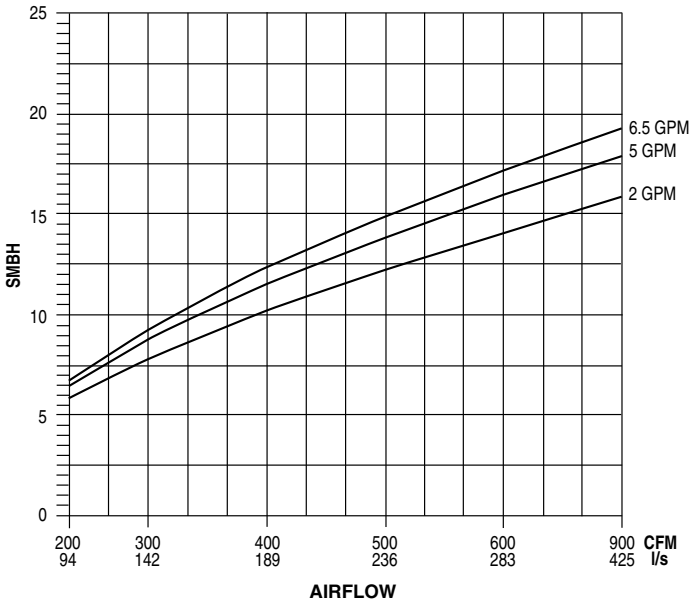
3 Row (Total MBH)



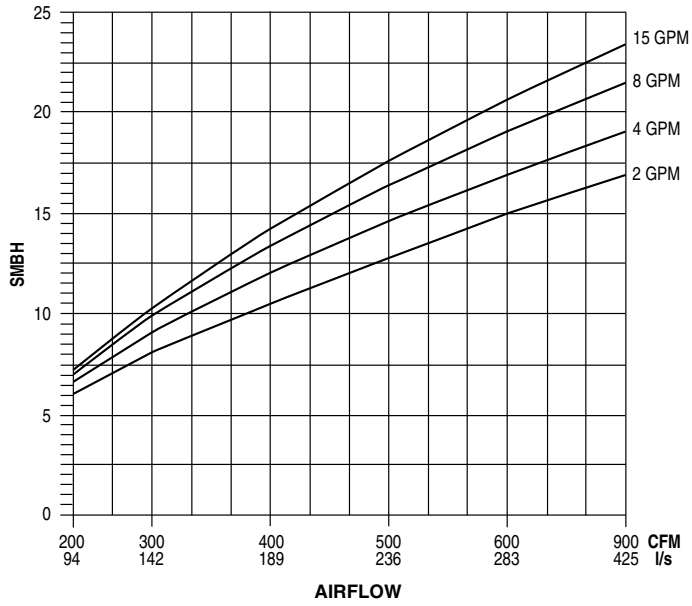
4 Row (Total MBH)



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

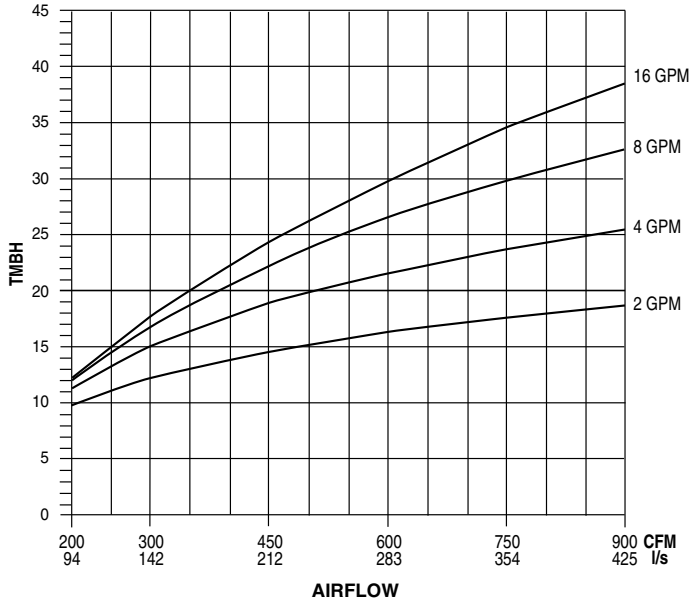
Notes:

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.

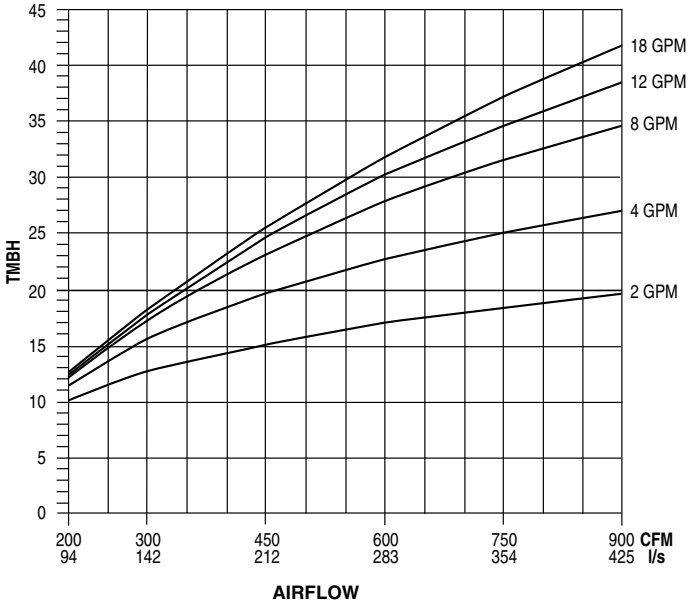
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 3

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

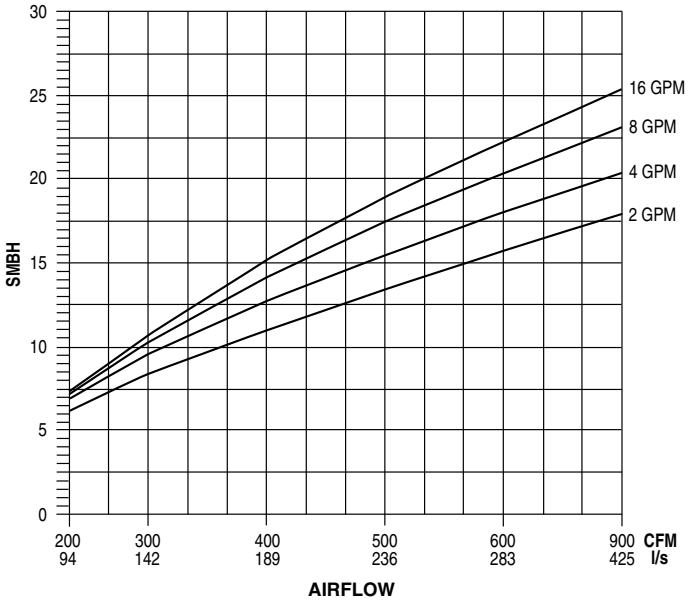
5 Row (Total MBH)



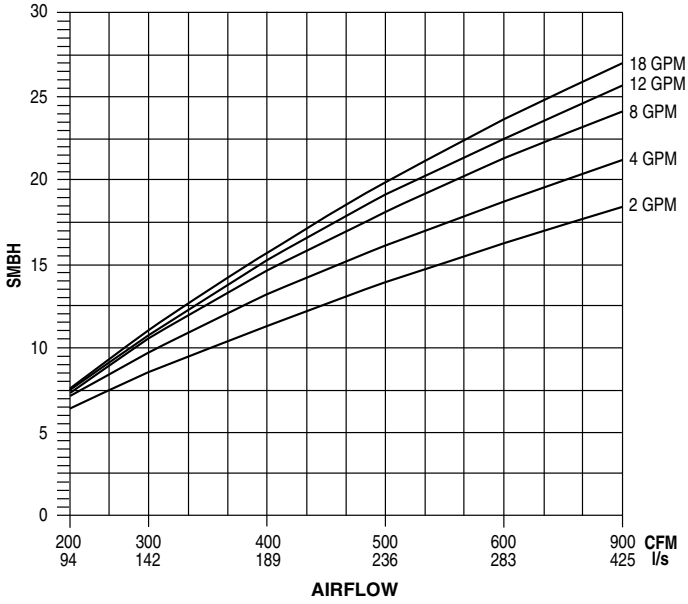
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

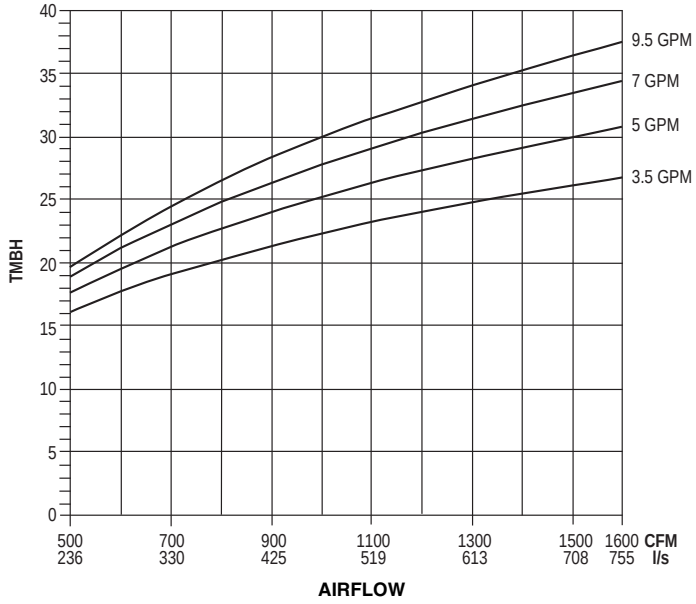
Notes:

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.

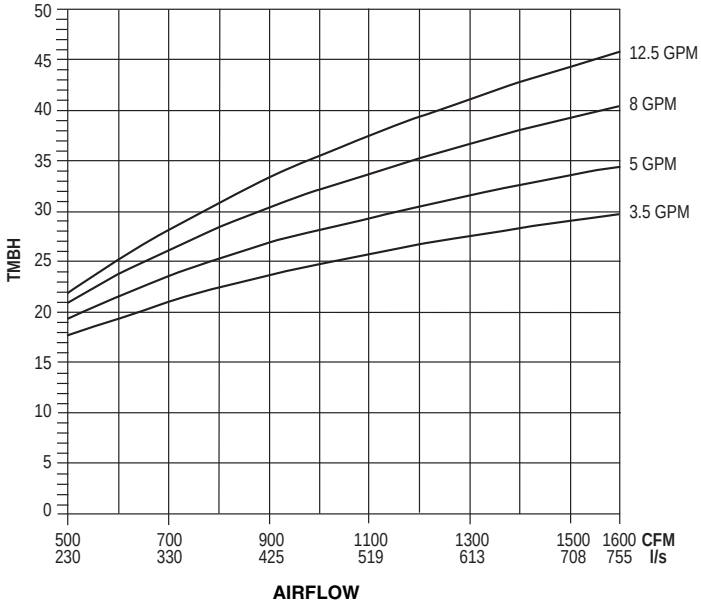
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 5

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

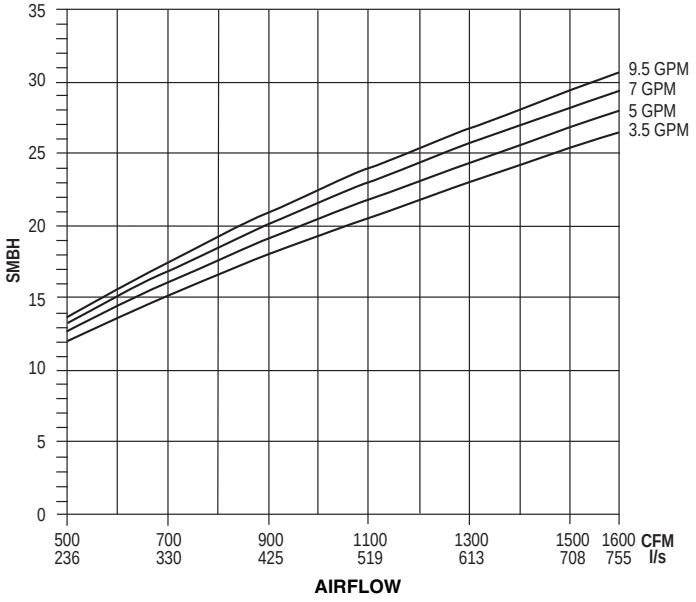
3 Row (Total MBH)



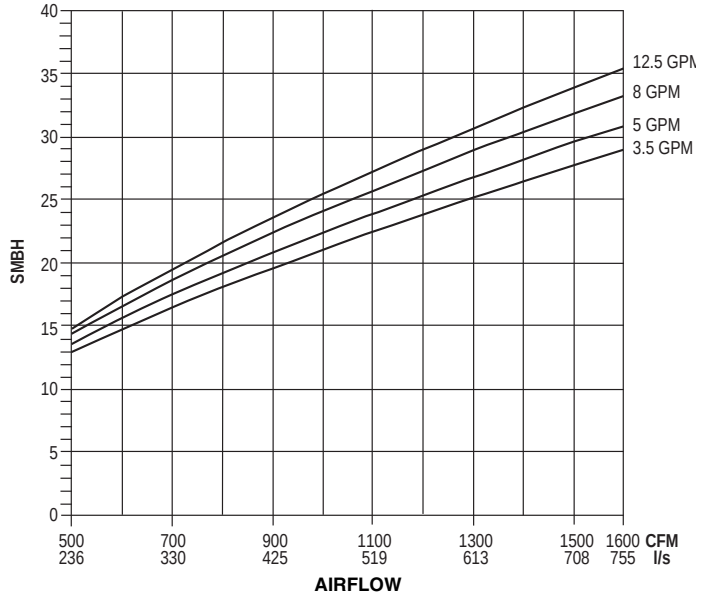
4 Row (Total MBH)



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

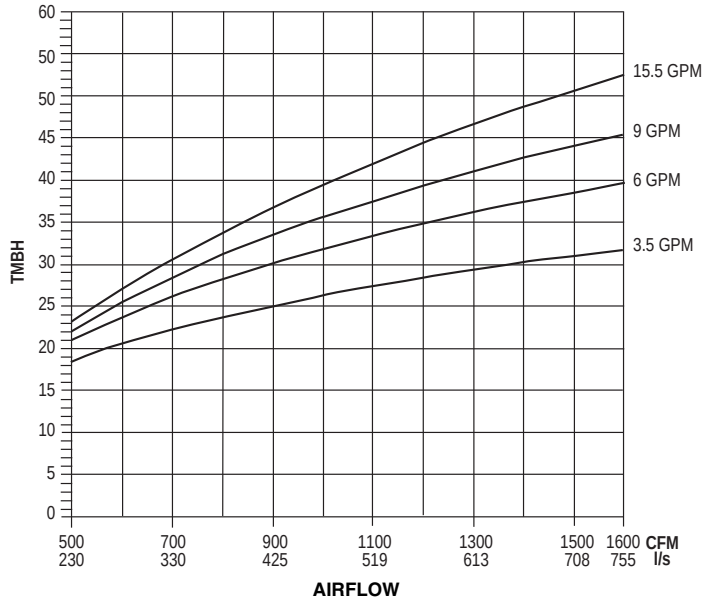
Notes:

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.

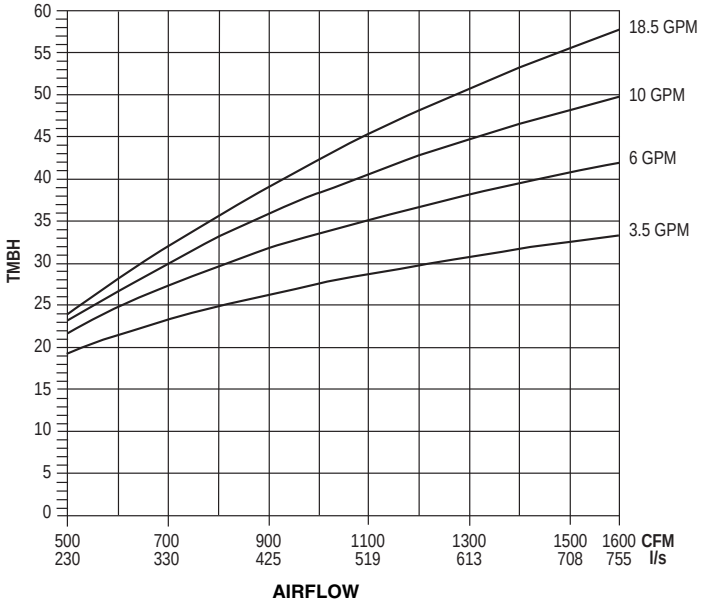
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 5

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

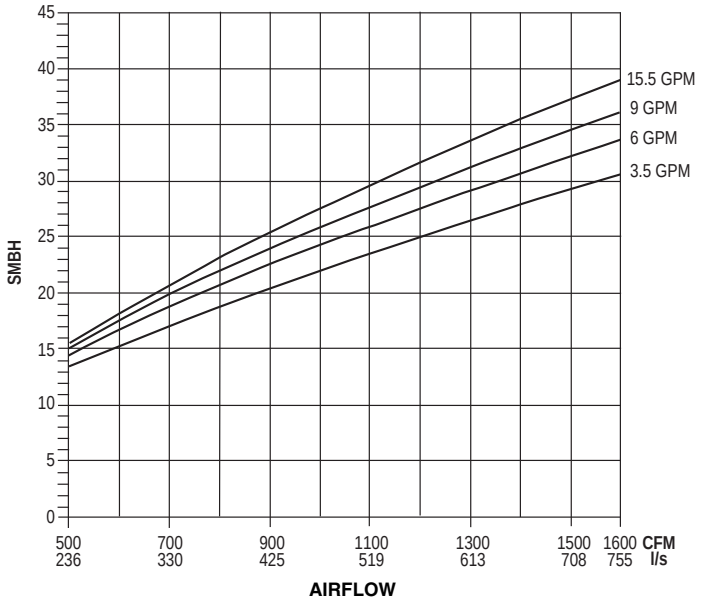
5 Row (Total MBH)



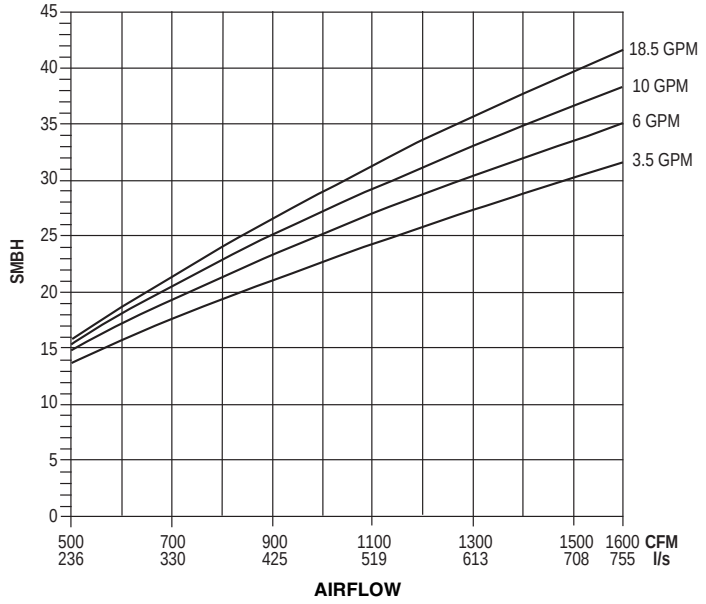
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

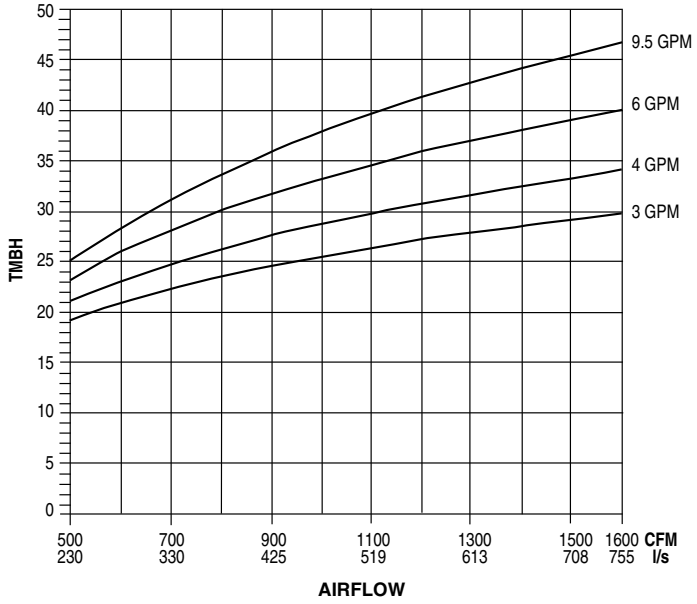
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

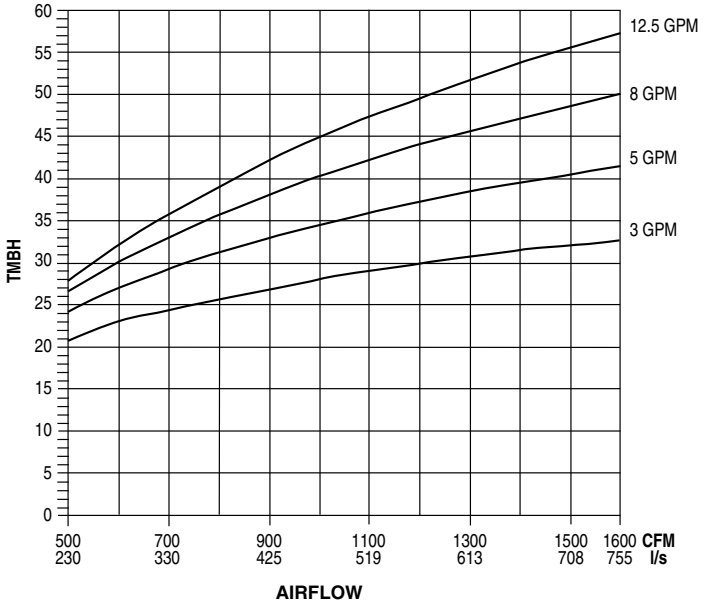
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 5

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

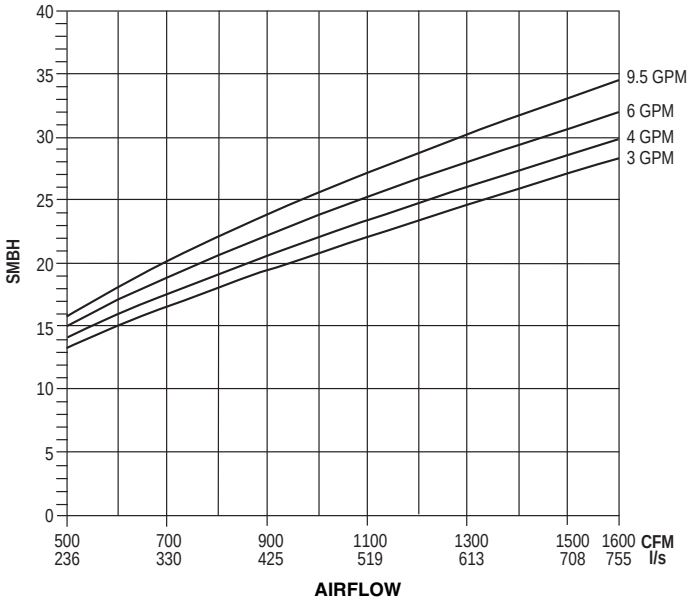
3 Row (Total MBH)



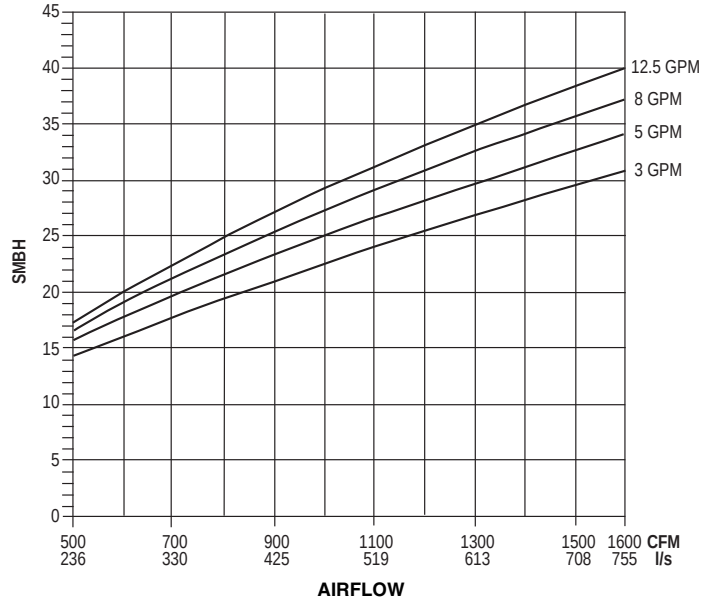
4 Row (Total MBH)



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

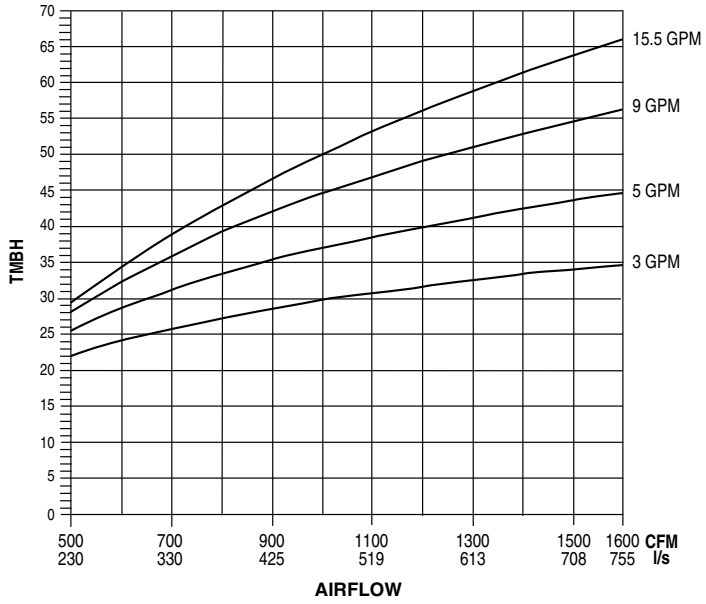
Notes:

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.

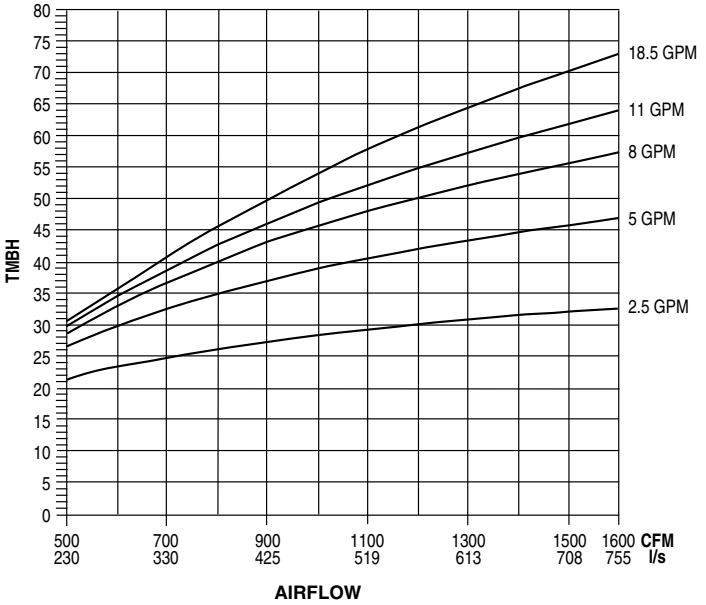
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 5

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

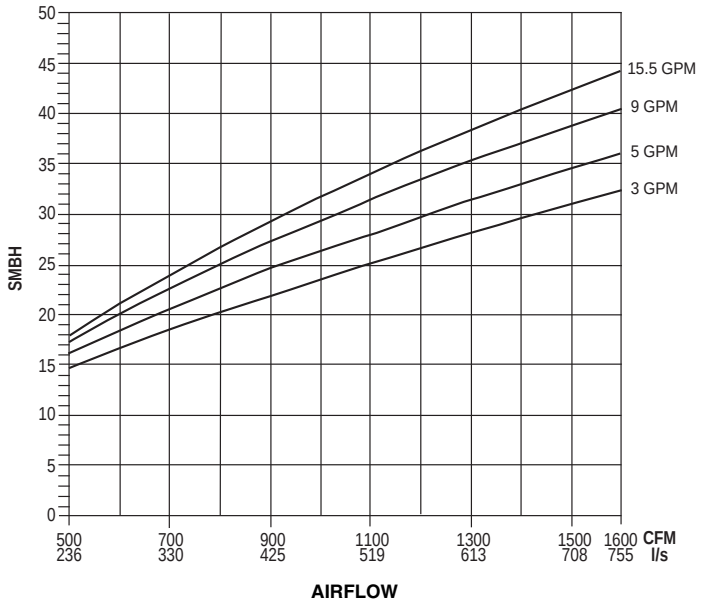
5 Row (Total MBH)



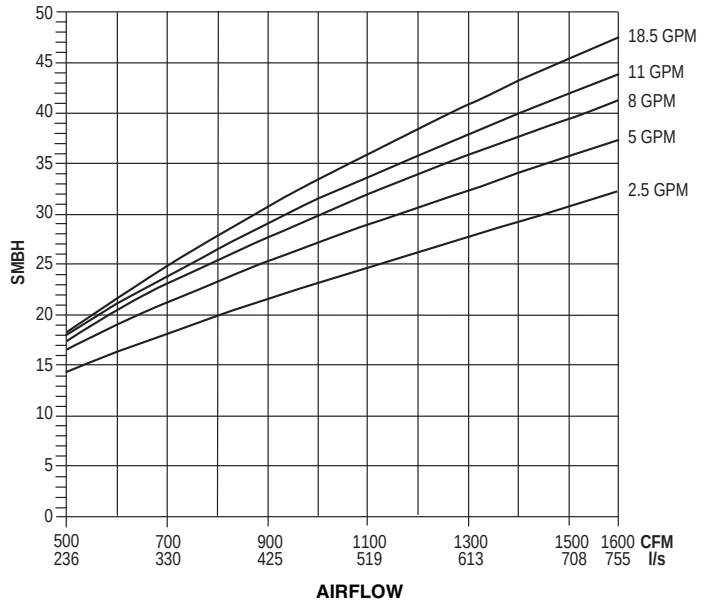
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

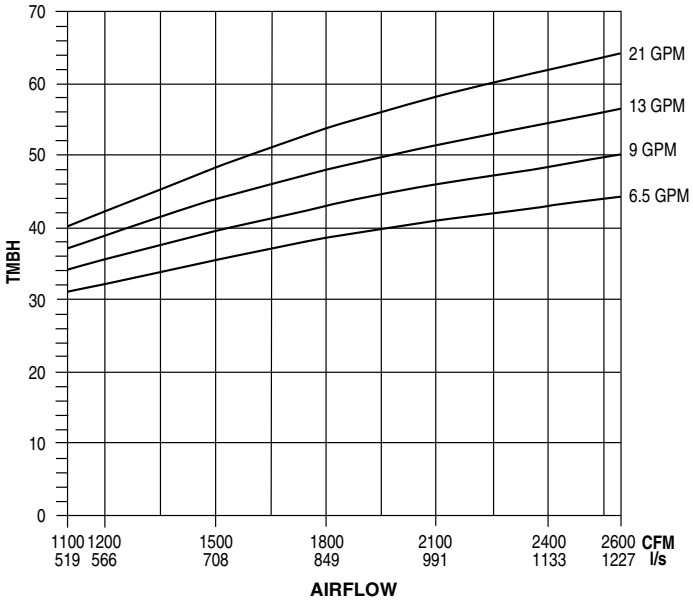
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

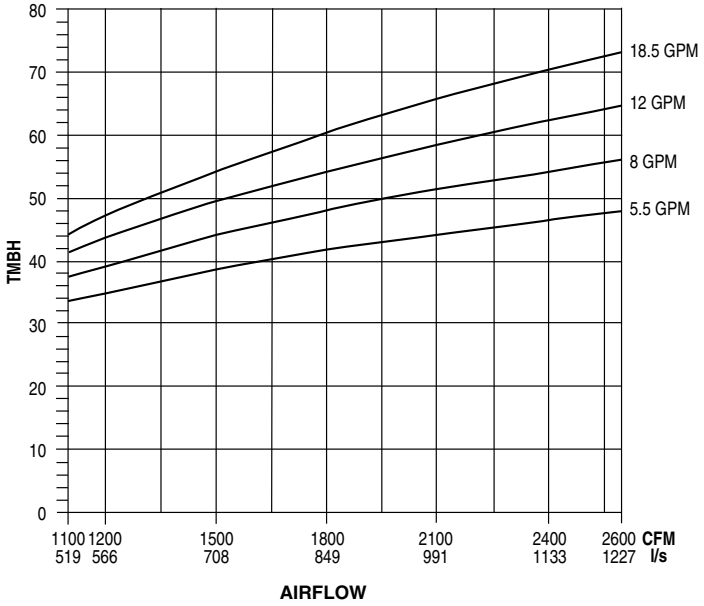
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 7

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

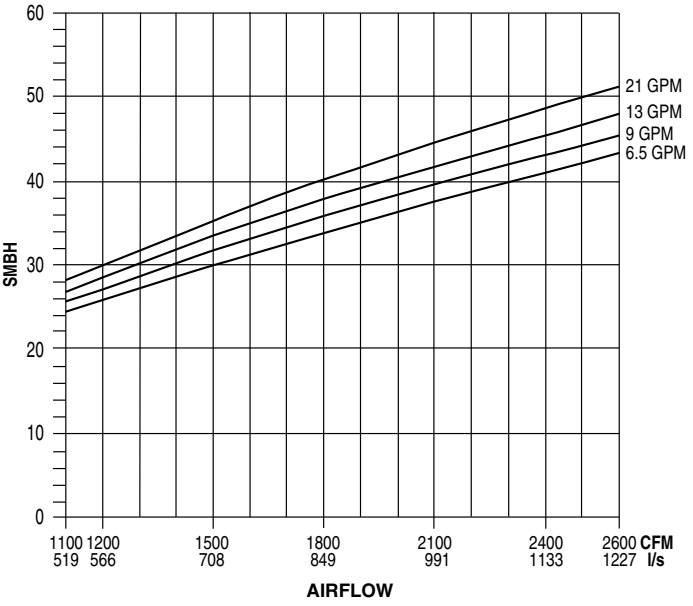
3 Row (Total MBH)



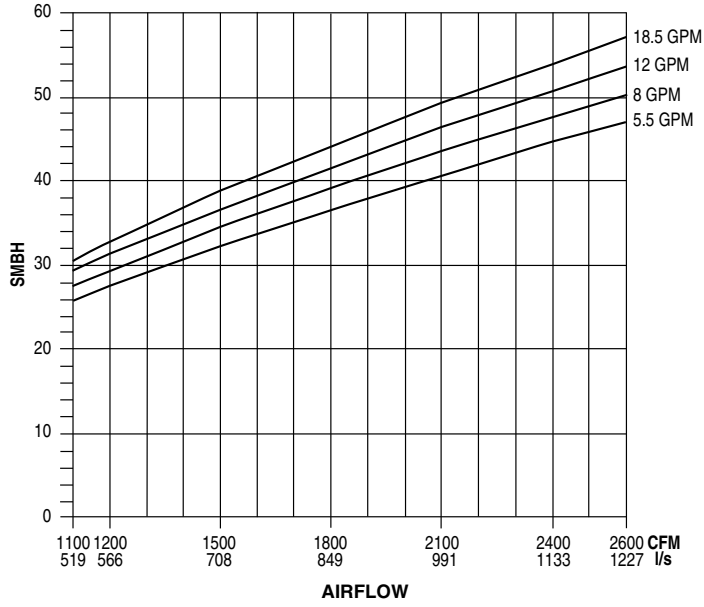
4 Row (Total MBH)



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

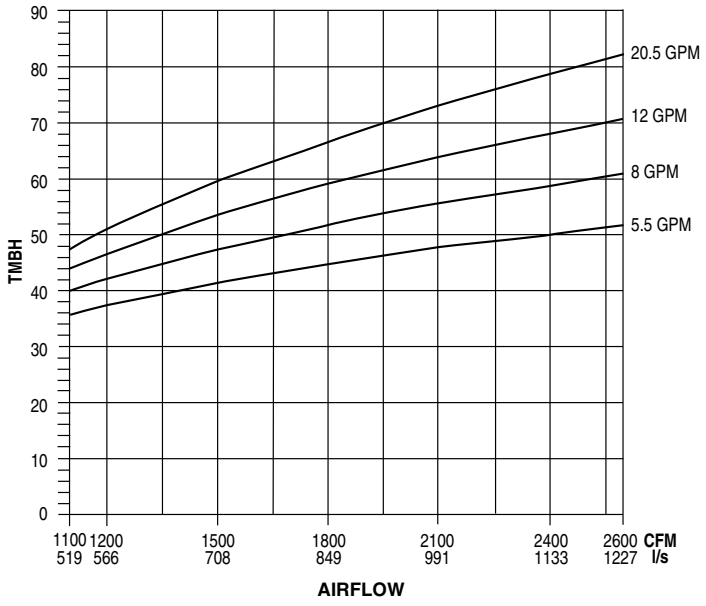
Notes:

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.

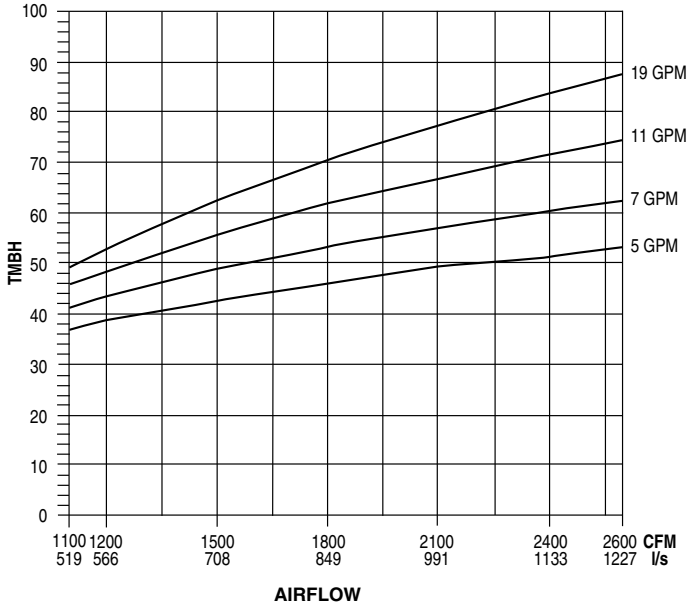
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 7

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

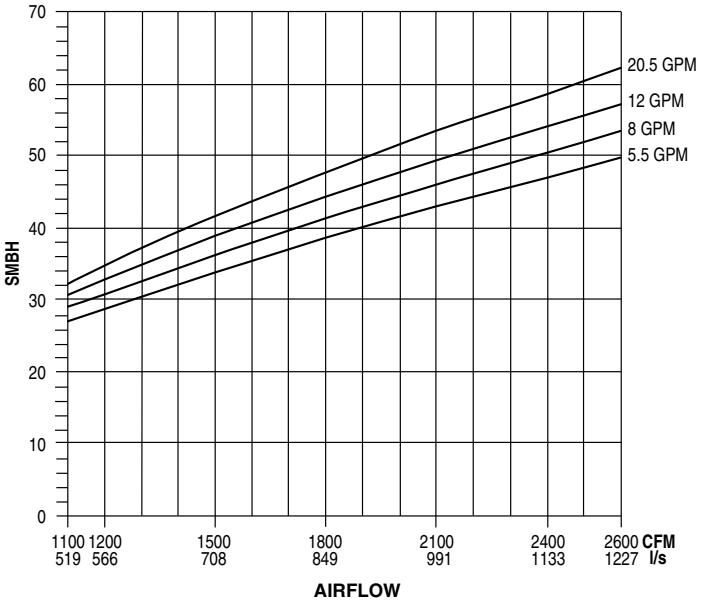
5 Row (Total MBH)



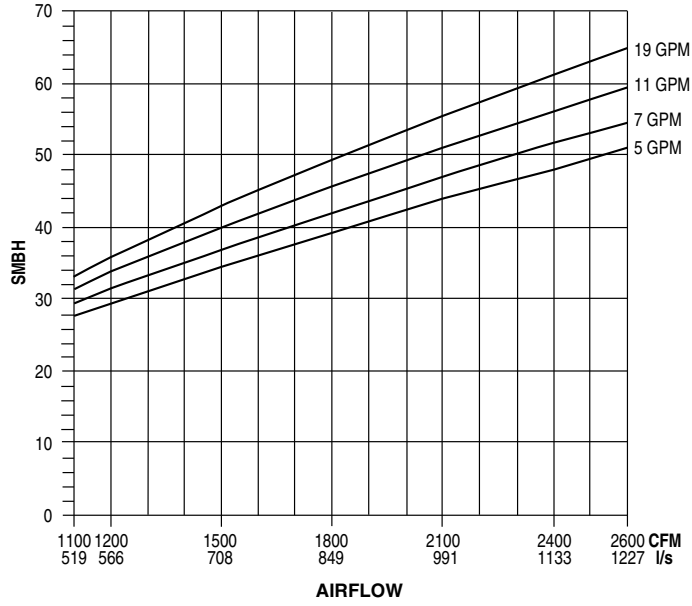
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

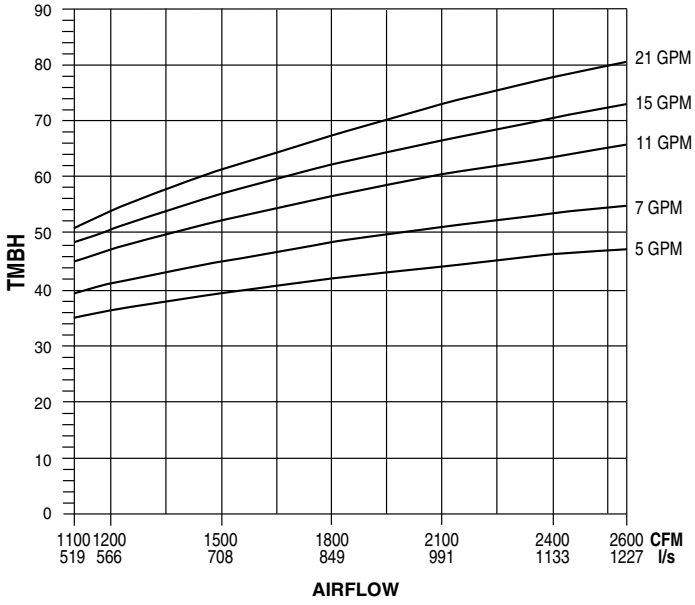
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

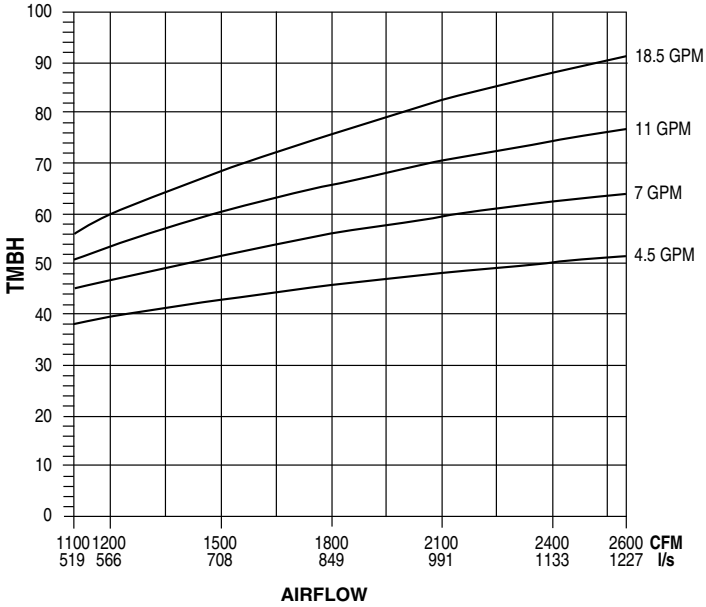
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 7

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

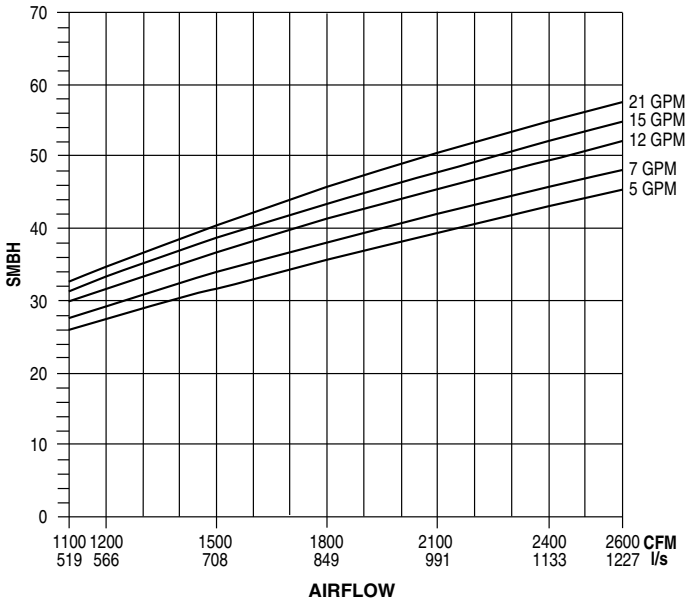
3 Row (Total MBH)



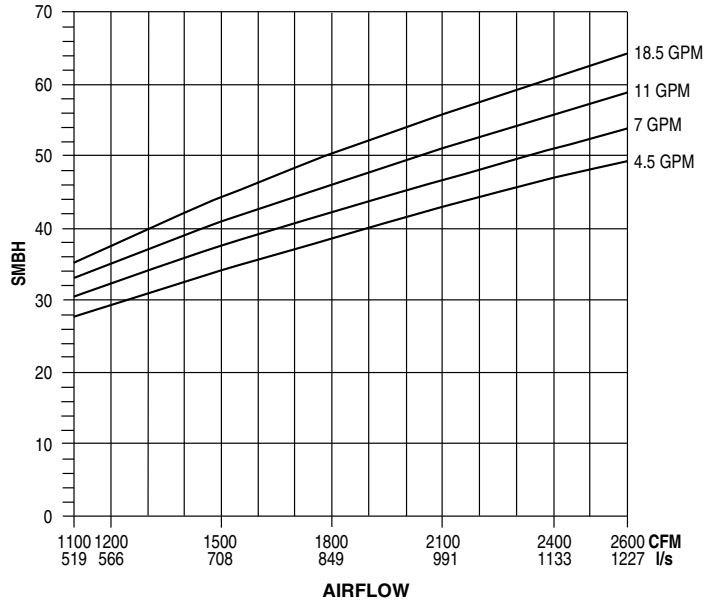
4 Row (Total MBH)



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

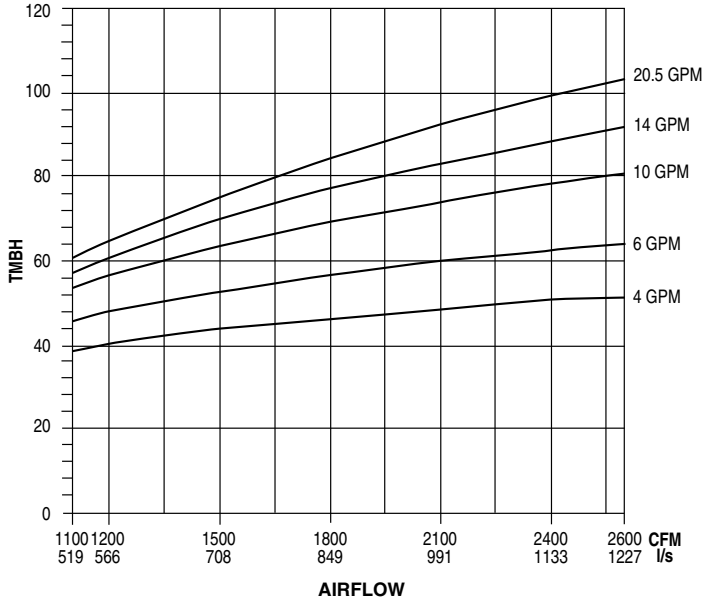
Notes:

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.

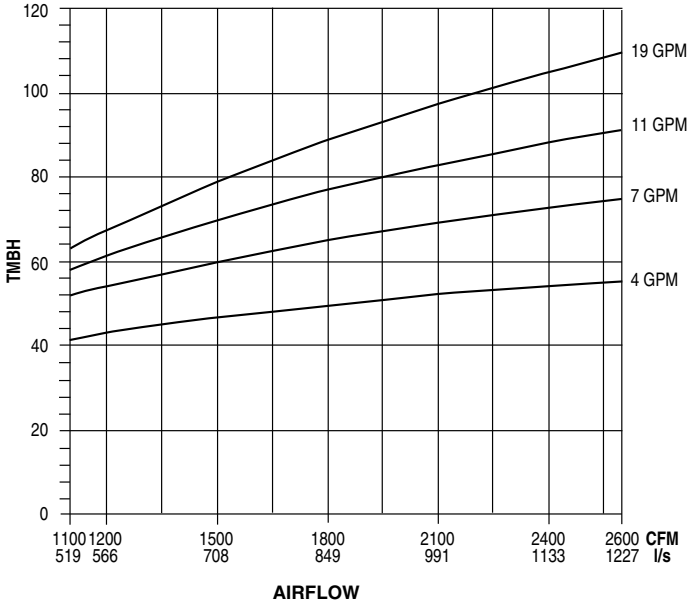
Chilled Water Coil Performance Data • Model Series 35F • Unit Size 7

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

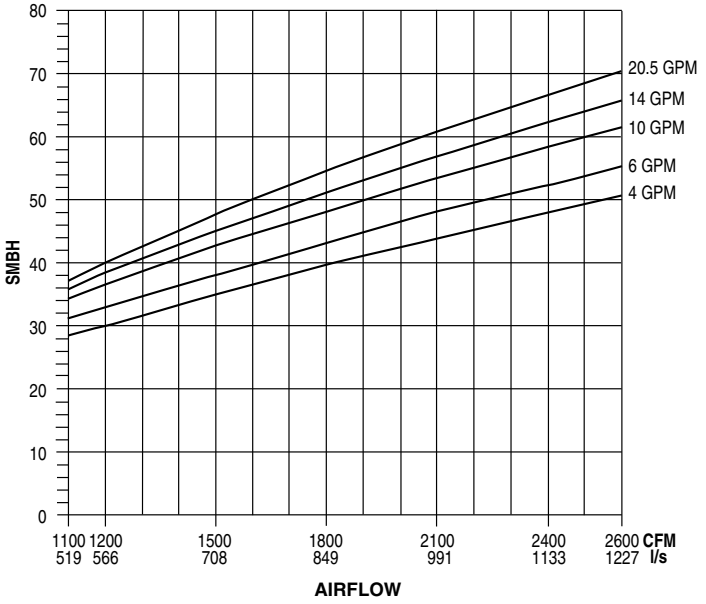
5 Row (Total MBH)



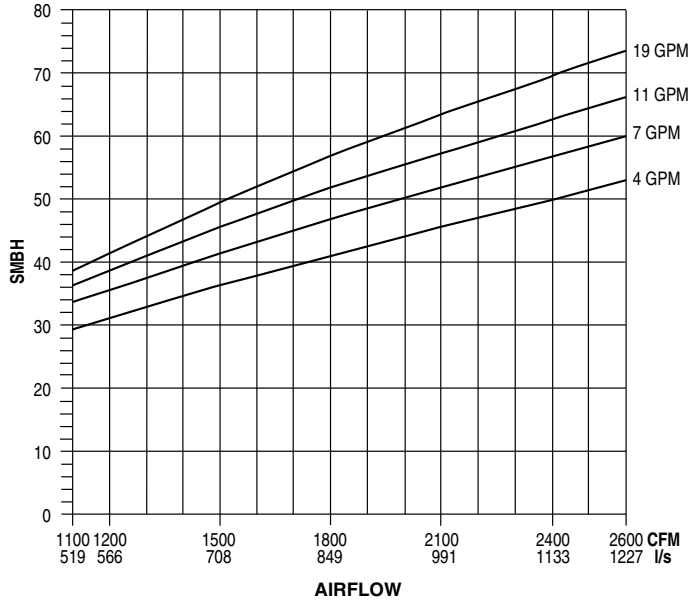
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

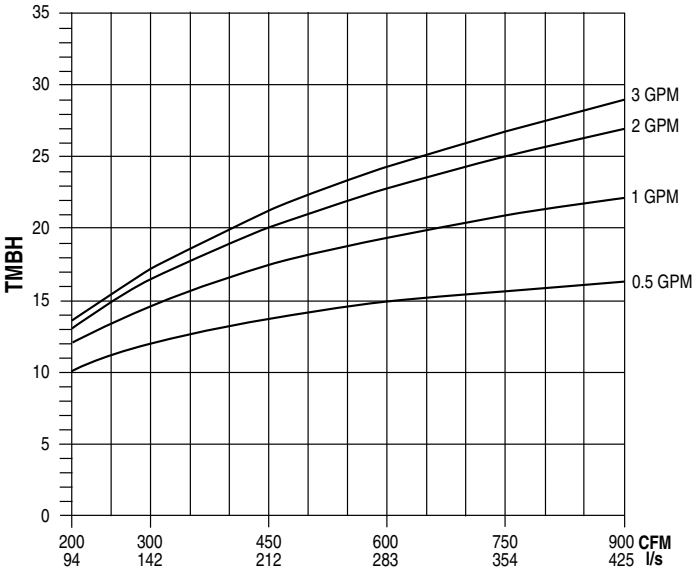
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

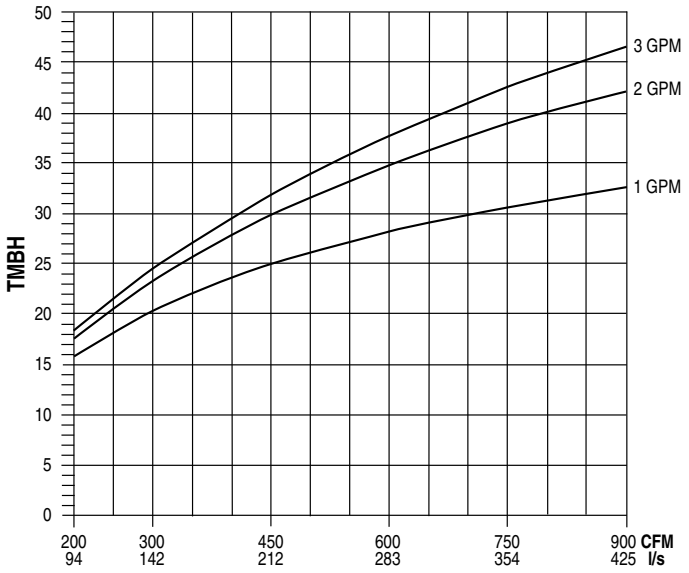
Hot Water Coil Performance Data • Model Series 35F • Unit Size 3

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

1 Row (Total MBH)

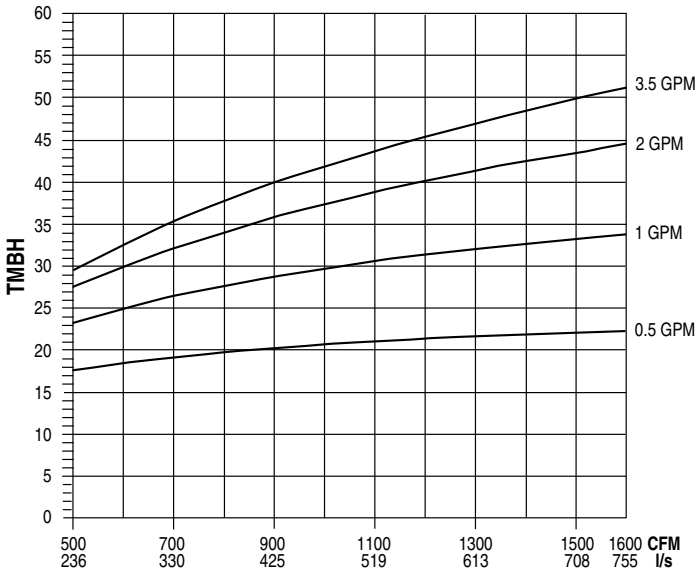


2 Row (Total MBH)

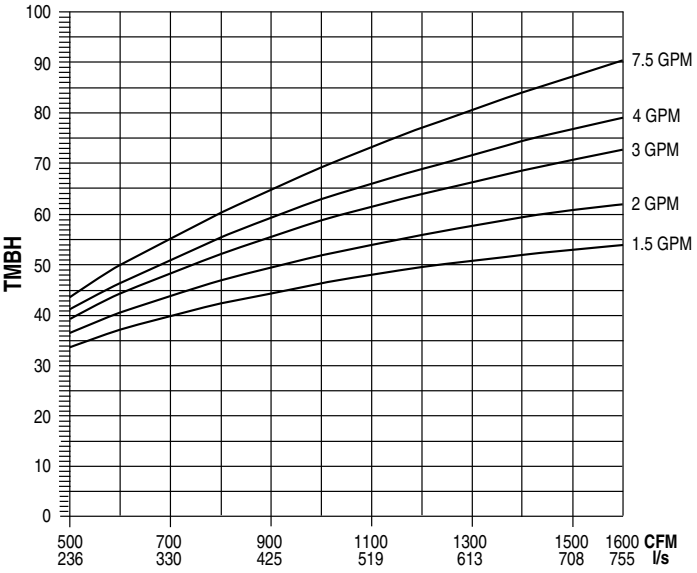


Unit Size 5

1 Row (Total MBH)



2 Row (Total MBH)



Notes:

1. Capacities are in Mbh (thousands of Btu per hour).
2. Mbh values are based on a ΔT (temperature difference) of 110°F between entering air and entering water. For other ΔT's; multiply the Mbh values by the factors below.
3. Air Temperature Rise. ATR = 927 x $\frac{\text{Mbh}}{\text{CFM}}$
4. Water Temp. Drop. WTD = 2.04 x $\frac{\text{Mbh}}{\text{GPM}}$
5. Connections: 1 and 2 Row 7/8" (22.2); O.D. male solder.

Correction factors at other entering conditions:

ΔT °F	50	60	70	80	90	100	110	120	130	140	150
Factor	.455	.545	.636	.727	.818	.909	1.00	1.09	1.18	1.27	1.36

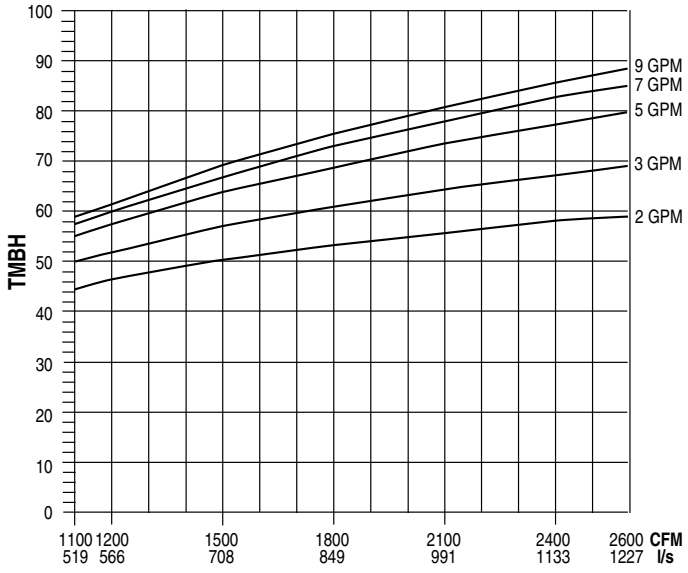
Altitude Correction Factors:

Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

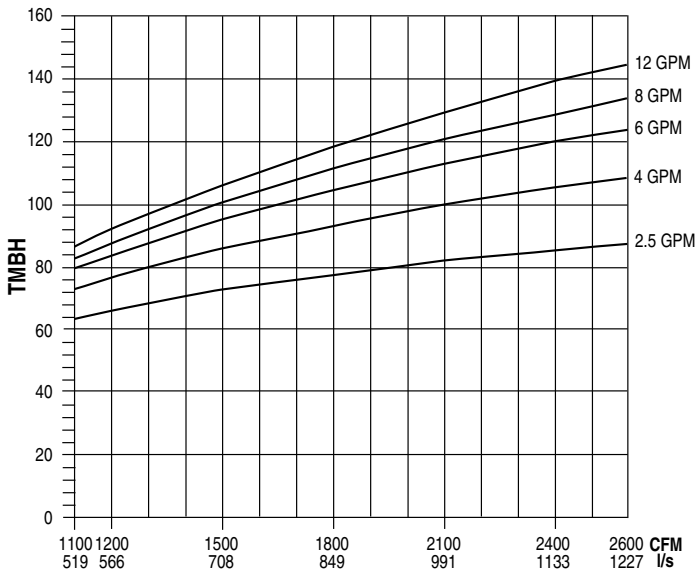
Hot Water Coil Performance Data • Model Series 35F • Unit Size 7

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

1 Row (Total MBH)



2 Row (Total MBH)



Notes:

1. Capacities are in Mbh (thousands of Btu per hour).
2. Mbh values are based on a ΔT (temperature difference) of 110°F between entering air and entering water. For other ΔT's; multiply the Mbh values by the factors below.
3. Air Temperature Rise. ATR = 927 x $\frac{\text{Mbh}}{\text{CFM}}$
4. Water Temp. Drop. WTD = 2.04 x $\frac{\text{Mbh}}{\text{GPM}}$
5. Connections: 1 and 2 Row 7/8" (22.2); O.D. male solder.

Correction factors at other entering conditions:

ΔT °F	50	60	70	80	90	100	110	120	130	140	150
Factor	.455	.545	.636	.727	.818	.909	1.00	1.09	1.18	1.27	1.36

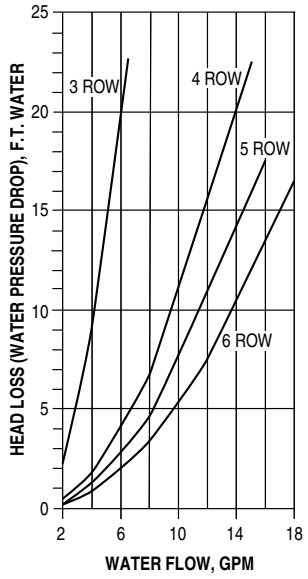
Altitude Correction Factors:

Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

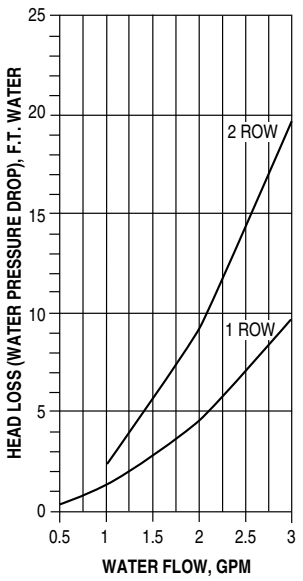
Coil Performance Data • Pressure Drop • Model Series 35F

Unit Size 3

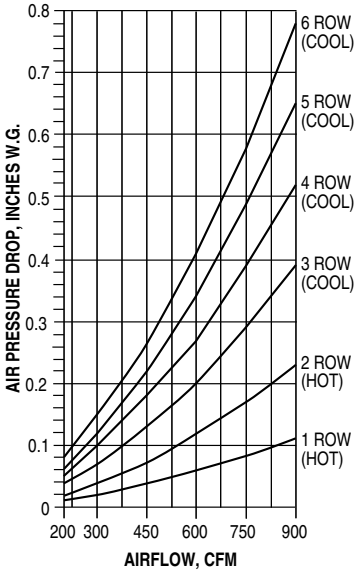
Chilled Water Pressure Drop



Hot Water Pressure Drop

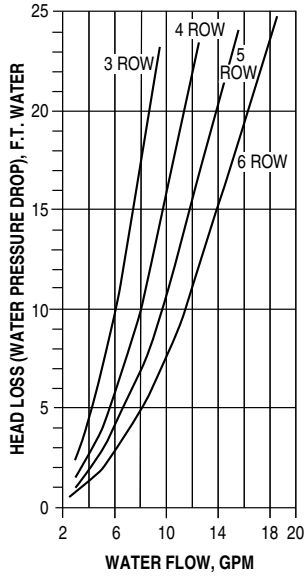


Chilled and Hot Water Air Pressure Drop

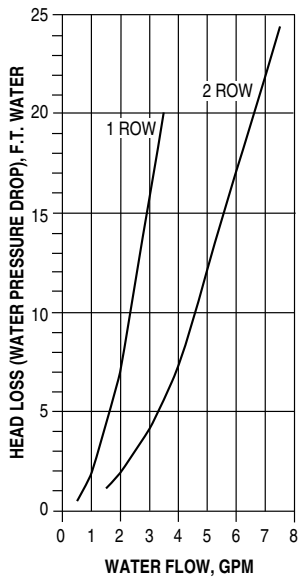


Unit Size 5

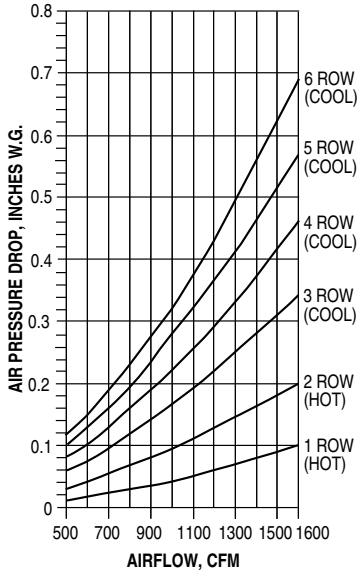
Chilled Water Pressure Drop



Hot Water Pressure Drop



Chilled and Hot Water Air Pressure Drop



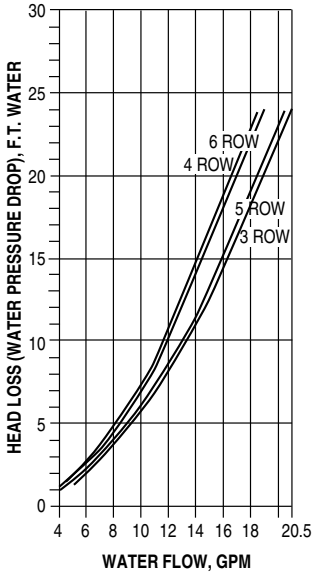
Metric Conversion Factors:

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.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$

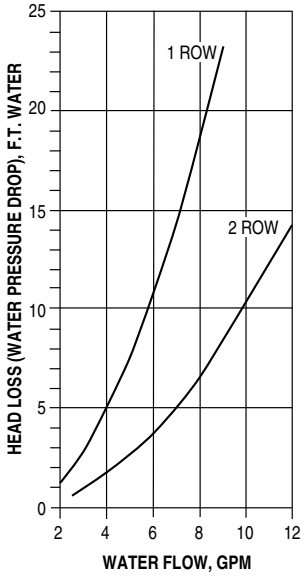
Coil Performance Data • Pressure Drop • Model Series 35F

Unit Size 7

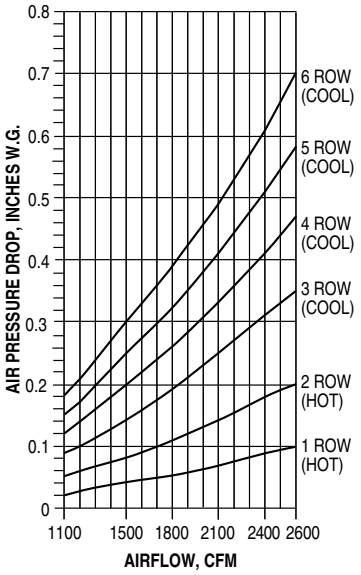
Chilled Water Pressure Drop



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
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   kW = Mbh x 0.293
6. Air Temperature Rise.
   $ATR = 927 \times \frac{Mbh}{CFM}$
7. Water Temp. Drop.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$

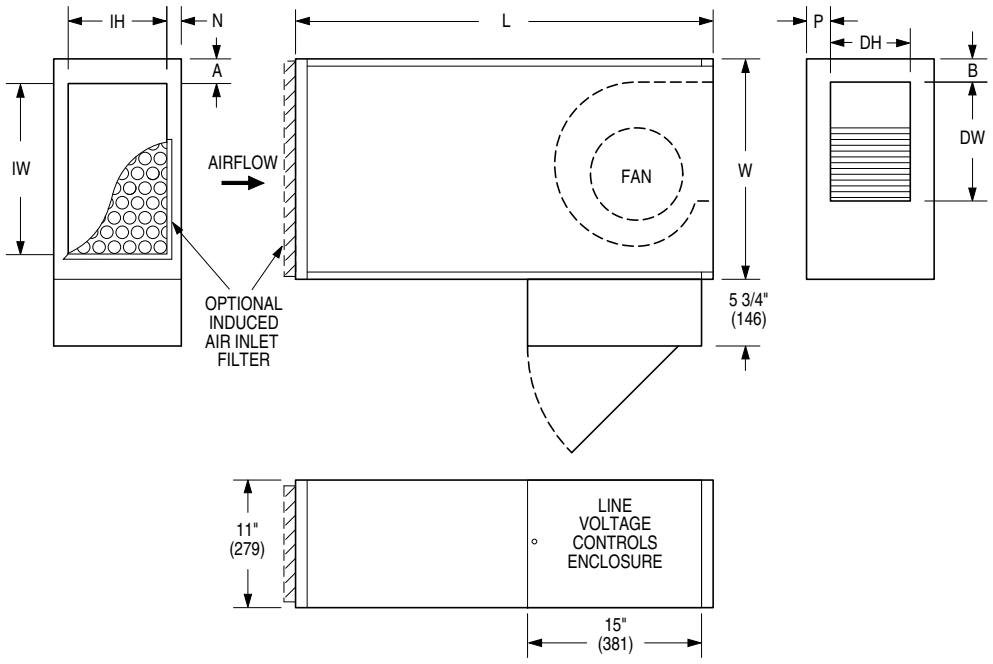
Low Profile Fan Booster Unit • ECM Motor
Model: 37F • Unit Sizes 1 and 3

STANDARD FEATURES:

- 20 ga. (1.0) galvanized steel casing components.
- 1/2" (19) dual density insulation, exposed edges coated to prevent air erosion. Meets the requirements of NFPA 90A and UL181.
- Unit measures 11" (279) in height.
- Top and Bottom access panels.
- Ultra–Energy efficient ECM fan motor with overload protection. Solid State Nailor EPIC fan volume controller.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Single point electrical connection
- Side Access hinged door on the line voltage/fan controls enclosure.
- Discharge opening designed for flanged duct connection.
- Each terminal factory tested prior to shipment.
- Extended insulated plenum casing reduces radiated sound.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted and discharge duct hanging location will therefore change.

OPTIONS:

- Nailor Direct Digital Controller (BACnet compliant).
- Nailor Analog Electronic Controls.
- 1" (25) throwaway fiberglass media filter.
- 1" (25) MERV 7 pleated disposable filter.
- Toggle disconnect switch.
- Fiber-free liner.
- Perforated metal liner.
- Steri-liner.
- Solid metal liner.
- Hanger brackets.
- Left-hand controls location / configuration.



Dimensional Data. Imperial Units (inches)

Unit Size	W	L	B	P	A	N	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	19	36	2	1 1/16	2 1/8	1 1/4	14 3/4 x 8 1/2	10 1/4 x 6 7/8	18 x 10
3	26 1/2	40 1/4	4 3/8	1 1/2	2	1 1/2	22 1/4 x 8	12 1/4 x 8	26 x 10

Dimensional Data. Metric Units (mm)

Unit Size	W	L	B	P	A	N	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	483	914	51	27	54	32	375 x 216	260 x 175	457 x 254
3	673	1022	111	38	51	38	565 x 203	311 x 203	660 x 254

Electrical Data

Unit Size	ECM Motor			
	Voltage	120V	208/240V	277V
1	Watts	142	150	200
	FLA	1.9	1.0	1.0
3	Watts	410	450	450
	FLA	5.2	3.1	3.1

FLA = Full load amperage
All ECM motors are single phase, 50/60 Hz.

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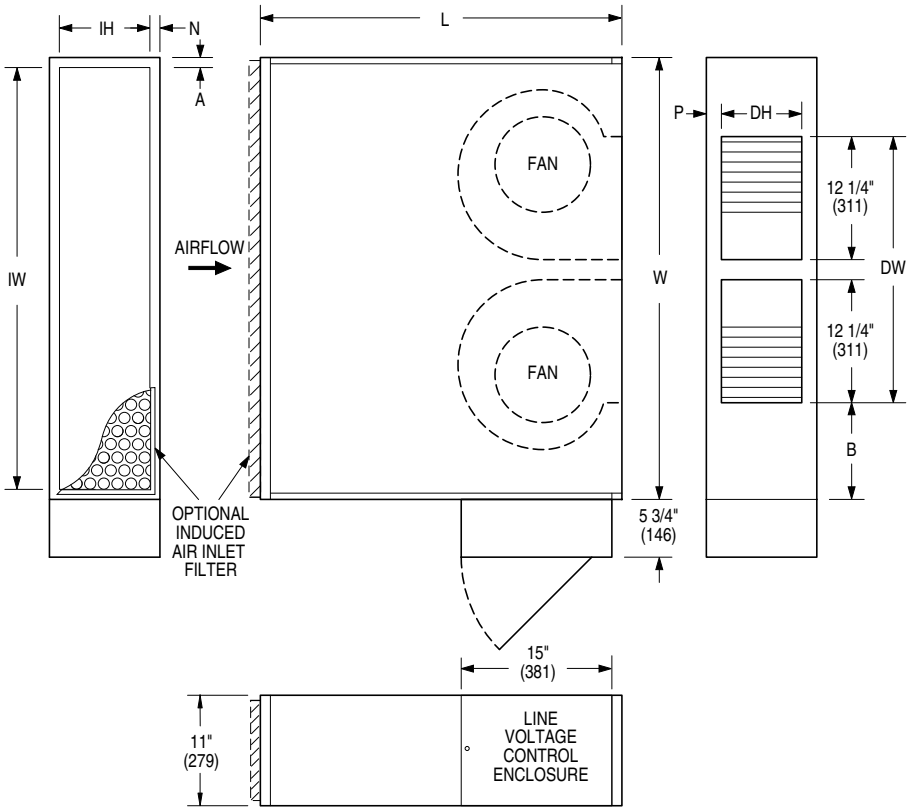
Low Profile Fan Booster Unit • ECM Motor
Model: 37F • Unit Size 4

STANDARD FEATURES:

- 20 ga. (1.0) galvanized steel casing components.
- 1/2" (19) dual density insulation, exposed edges coated to prevent air erosion. Meets the requirements of NFPA 90A and UL181.
- Unit measures 11" (279) in height.
- Top and Bottom access panels.
- Ultra–Energy efficient ECM fan motor with overload protection. Solid State Nailor EPIC fan volume controller.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Single point electrical connection
- Side Access hinged door on the line voltage/fan controls enclosure.
- Discharge opening designed for flanged duct connection.
- Each terminal factory tested prior to shipment.
- Extended insulated plenum casing reduces radiated sound.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted and discharge duct hanging location will therefore change.

OPTIONS:

- Nailor Direct Digital Controller (BACnet compliant).
- Nailor Analog Electronic Controls.
- 1" (25) throwaway fiberglass media filter.
- 1" (25) MERV 7 pleated disposable filter.
- Toggle disconnect switch.
- Fiber-free liner.
- Perforated metal liner.
- Steri-liner.
- Solid metal liner.
- Hanger brackets.
- Left-hand controls location / configuration.



Dimensional Data. Imperial Units (inches)

Unit Size	W	L	B	P	A	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
4	44	36 1/2	9 5/8	2 1/16	1 3/4	40 1/2 x 9	26 1/2 x 8	42 x 10

Dimensional Data. Metric Units (mm)

Unit Size	W	L	B	P	A	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
4	1118	927	244	52	44	1029 x 229	673 x 203	1067 x 254

Electrical Data

Unit Size	ECM Motor			
	Voltage	120V	208/240V	277V
4	Watts	942	980	980
	FLA	10.5	7.1	6.9

FLA = Full load amperage
All ECM motors are single phase, 50/60 Hz.

ARI PERFORMANCE CERTIFIED ™ ARI Standard 440 Room Fan-Coil Unit www.aridirectory.org

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Low Profile Fan Coil Unit • ECM Motor
Models: 37FZ, 37FW and 37FZW • Unit Sizes 1 and 3

MODELS:
37FZ Chilled water
37FW Hot water
37FZW Chilled and hot water

STANDARD FEATURES:

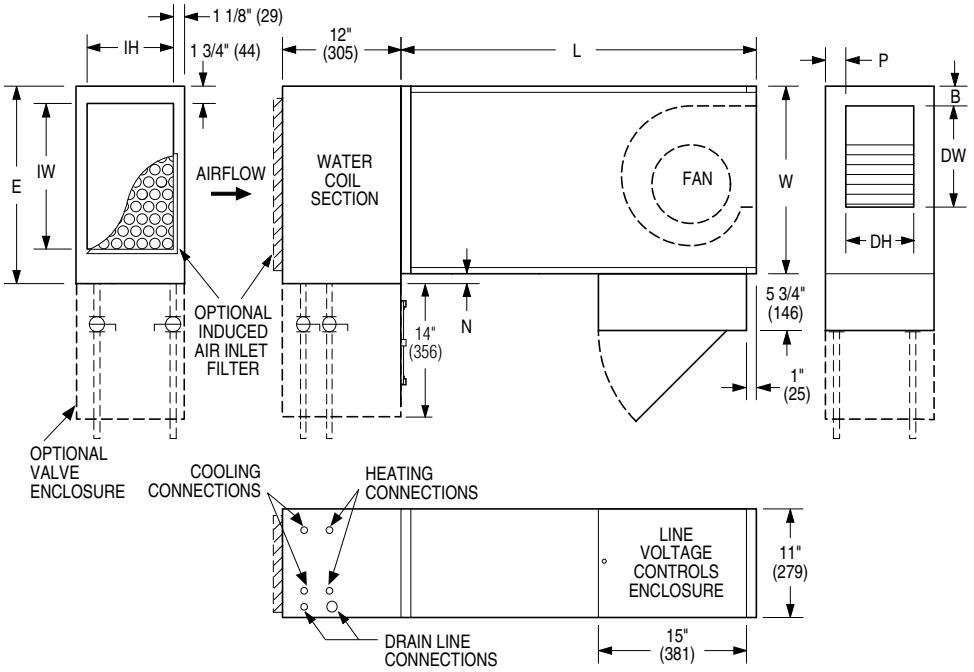
- 20 ga. (1.0) galvanized steel casing components.
- 1/2" (13) dual density insulation, exposed edges coated to prevent air erosion. Meets the requirements of NFPA 90A and UL181.
- Top and bottom full size access panels for ease of maintainance and service.
- Ultra-energy efficient ECM fan motor with overload protection. Solid state EPIC fan volume controller.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Single point electrical connection.
- Discharge opening designed for flanged duct connection.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted and discharge duct hanging location will therefore change.

WATER COIL SECTION:

- Installed on inlet as a draw through design.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes with aluminum ripple fins.
- Cooling coils include an insulated, stainless steel drain pan with 3/4" (19) male NPT primary drain connection and 1/2" (13) male NPT secondary drain connection.
- Top and bottom access panels for inspection and coil cleaning.
- Right hand coil connection (looking in direction of airflow) is standard. Left hand is optional.
- Sweat Connections:
  One Row 1/2" (13) O.D. male solder. Two, Three, four and five Row 7/8" (22.2) O.D. male solder.

Coil Options:

- Cooling - 3 to 6 row chilled water.
- Heating - 1 or 2 row hot water.
- 6 total rows of cooling and heating coils maximum.



Dimensional Data. Imperial Units (inches)

Unit Size	W	L	B	P	E	N	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	19	36	2	2 1/16	20	1	14 3/4 x 8 3/4	10 1/4 x 6 7/8	18 x 10
3	26 1/2	40 1/4	4 3/8	1 1/2	29 1/8	2 5/8	23 7/8 x 8 3/4	12 1/4 x 8	26 x 10

Dimensional Data. Metric Units (mm)

Unit Size	W	L	B	P	E	N	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	483	914	51	52	508	25	375 x 222	260 x 175	457 x 254
3	673	1022	111	38	740	67	606 x 222	311 x 203	660 x 254

Electrical Data

Unit Size	ECM Motor			
	Voltage	120V	208/240V	277V
1	Watts	142	150	200
	FLA	1.9	1.0	1.0
3	Watts	410	450	450
	FLA	5.2	3.1	3.1

FLA = Full load amperage
All ECM motors are single phase, 50/60 Hz.

OPTIONS:

- Nailor Direct Digital Controller (BACnet compliant).
- Nailor Analog Electronic Controls.
- 1" (25) throwaway fiberglass media filter.
- 1" (25) MERV 7 pleated disposable filter.
- Factory assembled valve piping package, mounted in full protective enclosure.
- Ultraviolet light package.
- Fiber-free liner.
- Perforated metal liner.
- Steri-liner.
- Solid metal liner.
- Hanger brackets.
- Left-hand controls location/ configuration.
- Safety overflow float switch.
- Toggle disconnect switch.

Low Profile Fan Coil Units • ECM Motor

Models: 37FZ, 37FW and 37FZW • Unit Size 4

MODELS:

37FZ Chilled water
37FW Hot water
37FZW Chilled and hot water

STANDARD FEATURES:

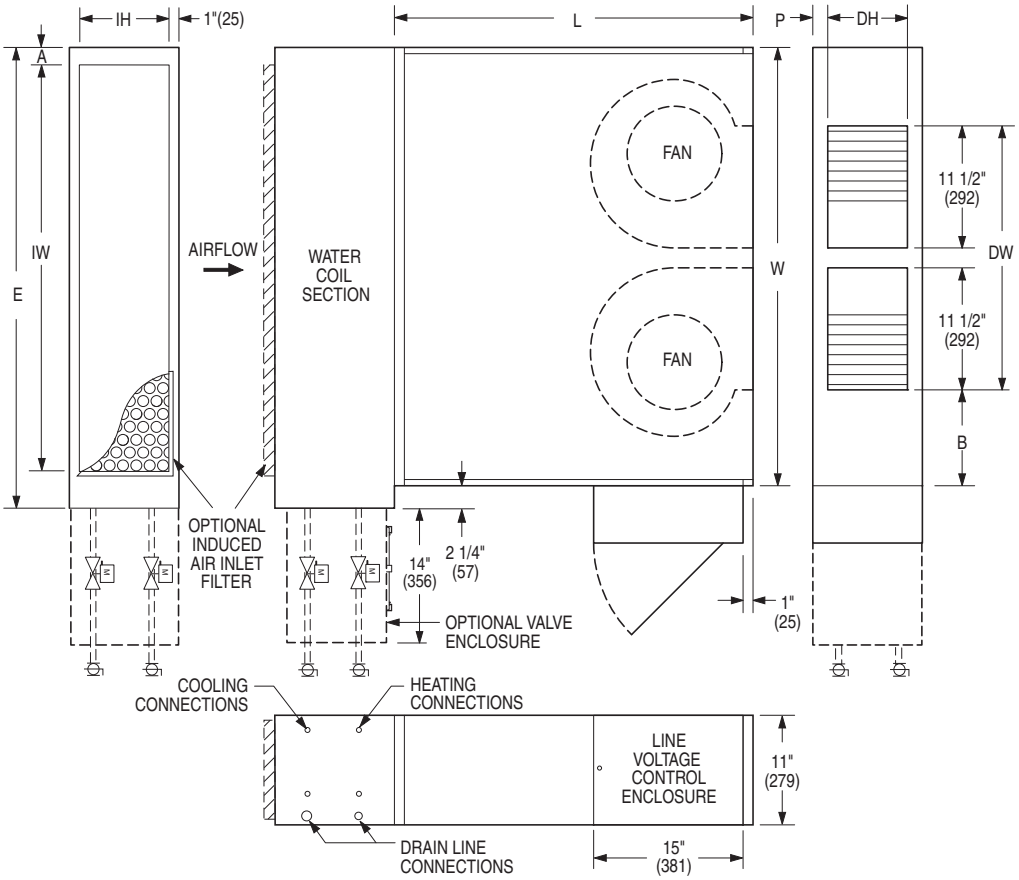
- 20 ga. (1.0) galvanized steel casing components.
- 1/2" (13) dual density insulation, exposed edges coated to prevent air erosion. Meets the requirements to NFPA 90A and UL181.
- Top and bottom full size access panels for ease of maintainance and service.
- Ultra-energy efficient ECM fan motor with overload protection. Solid state EPIC fan volume controller.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Single point electrical connection.
- Discharge opening designed for flanged duct connection.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted and discharge duct hanging location will therefore change.

WATER COIL SECTION:

- Installed on inlet as a draw through design.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes with aluminum ripple fins.
- Cooling coils include an insulated, stainless steel drain pan with 3/4" (19) male NPT primary drain connection and 1/2" (13) male NPT secondary drain connection.
- Top and bottom access panels for inspection and coil cleaning.
- Right hand coil connection (looking in direction of airflow) is standard. Left hand is optional.
- Sweat Connections:
  One Row 1/2" (13) O.D. male solder. Two, Three, four and five Row 7/8" (22.2) O.D. male solder.

Coil Options:

- Cooling - 3 to 6 row chilled water.
- Heating - 1 or 2 row hot water.
- 6 total rows of cooling and heating coils maximum.



Dimensional Data. Imperial Units (inches)

Unit Size	W	L	B	P	A	E	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
4	44	36 1/2	9 5/8	2	1 3/4	47	40 x 9	25 x 7	42 x 10

Dimensional Data. Metric Units (mm)

Unit Size	W	L	B	P	A	E	Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
4	1118	927	244	51	44	1194	1016 X 229	635 X 178	1067 X 254

Electrical Data

Unit Size	Motor H.P.	ECM Motor			
		Voltage	120/1/60	208/240/1/60	277/1/60
4	2@1/3	Watts	942	980	980
		FLA	10.5	7.1	6.9

All ECM motors are single phase, 50/60 Hz.
FLA = Full load amperage

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OPTIONS:

- Nailor Direct Digital Controller (BACnet compliant).
- Nailor Analog Electronic Controls.
- 1" (25) throwaway fiberglass media filter.
- 1" (25) MERV 7 pleated disposable filter.
- Factory assembled valve piping package, mounted in full protective enclosure.
- Left-hand controls location.
- Safety overflow float switch.
- Toggle disconnect switch.
- Ultraviolet light package.
- Hanger brackets.
- Fiber-free liner.
- Perforated metal liner.
- Steri-liner.
- Solid metal liner.

Low Profile Fan Booster and Fan Coil Units with Electric Heat Option Electric Coil Section

Models: 37FE and 37FZE • Unit Sizes 1 and 3

MODELS:

37FE Electric heat only.

37FZE Chilled water and electric heat.

See Models 37F and 37FZ Sizes 1 and 3 for base unit construction, features and water coil information.

STANDARD FEATURES:

- Controls enclosure incorporates a hinged access door opening upstream that helps ensure NEC clearance requirements and reduces foot print (FN2 90º design is standard).
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire unit.
- Airflow safety switch.
- Flanged outlet duct connection.
- ETL listed as an assembly.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted and discharge duct hanging location will therefore change.

Standard Supply Voltage (60 Hz):

Single phase: • 120V • 208V • 220V* • 240V • 277V • 347V • 380V* • 480V • 600V

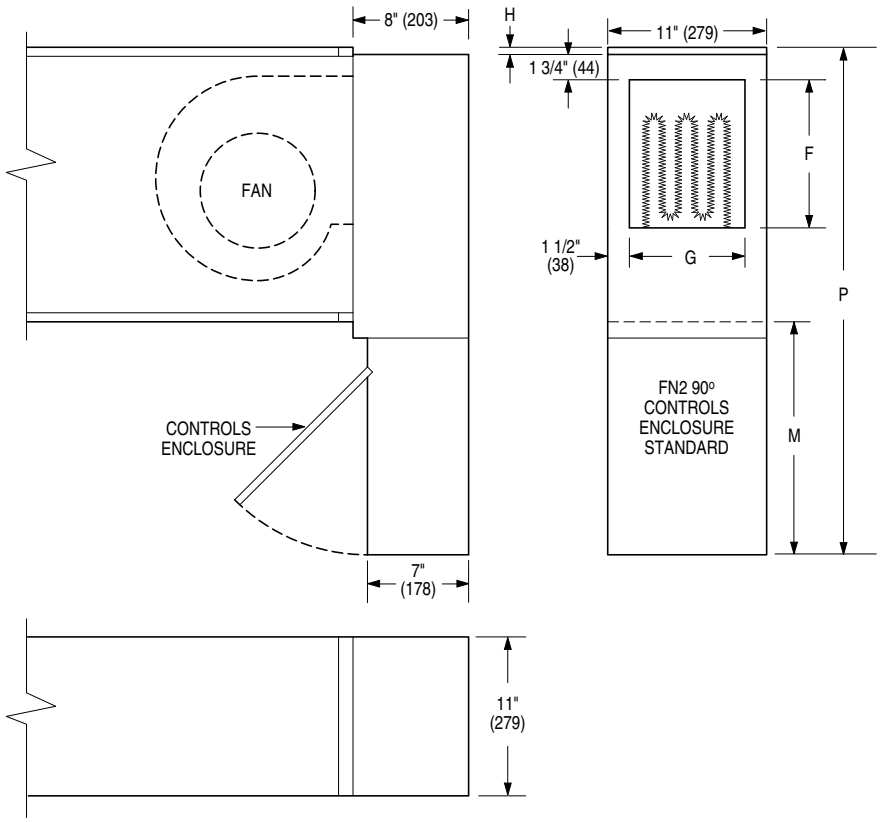
Three phase - (delta): • 208V • 220V* • 240V

Three phase - (4 wire wye): • 380V* • 480V • 600V

* Outside of the U.S.A.

OPTIONS:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- SCR Controls
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Cr. Wire.
- Dust tight construction.
- Left hand configuration.
- Manual reset secondary thermal cut-outs.



Dimensional Data

Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size F x G	P	M	H	Outlet Duct Size F x G	P	M	H
3	10 1/4 x 8	35 1/8	16 1/8	1/2	260 x 203	892	410	12
5	12 1/4 x 8	43 1/2	17	3 1/2	311 x 203	1105	432	89

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Low Profile Fan Booster and Fan Coil Unit with Electric Heat Option Electric Coil Section

Models: 37FE and 37FZE • Unit Size 4

MODELS:

37FE Electric heat
37FZE Chilled water and electric heat

See Model 37FZ Size 4 for base unit construction, features water coil information.

STANDARD FEATURES:

- Controls enclosure incorporates a hinged access door opening upstream that helps ensure NEC clearance requirements and reduces foot print (FN2 90º design is standard).
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electric connection for entire unit.
- Airflow safety switch.
- Flanged outlet duct connection.
- ETL listed as an assembly.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted and discharge duct hanging location will therefore change.

Standard Supply Voltage (60 Hz):

Single phase: • 120V • 208V • 220V* • 240V • 277V • 347V • 380V* • 480V • 600V

Three phase - (delta):

• 208V • 220V* • 240V

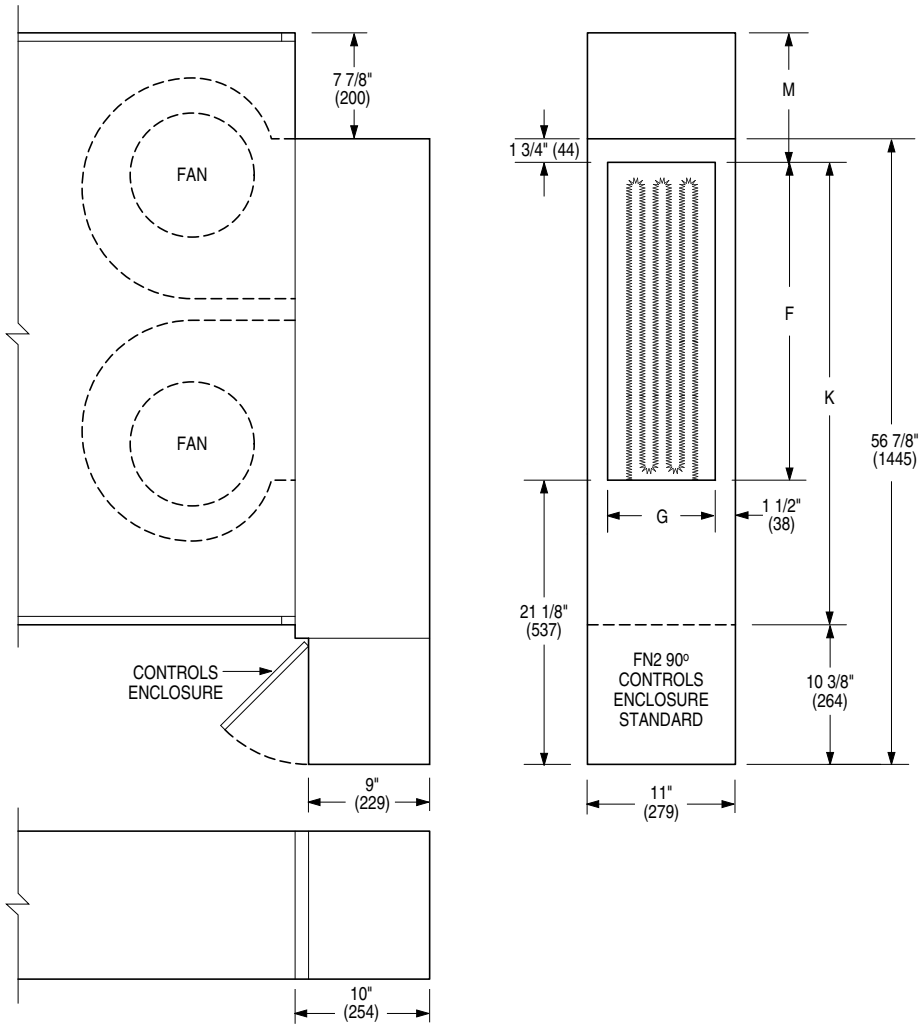
Three phase - (4 wire wye):

• 380V* • 480V • 600V

* Outside of the U.S.A.

OPTIONS:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- SCR Controls
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Cr. Wire.
- Dust tight construction.
- Left hand configuration.
- Manual reset secondary thermal cut-outs.



Dimensional Data

Unit Size	Imperial Units (inches)			Metric Units (mm)		
	Outlet Duct Size F x G	K	M	Outlet Duct Size F x G	K	M
4	23 5/8 x 8	34 3/8	9 5/8	600 x 203	873	244

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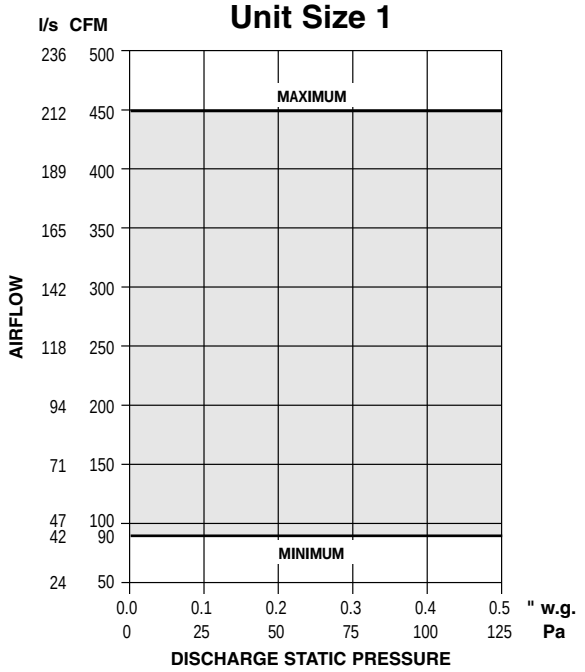
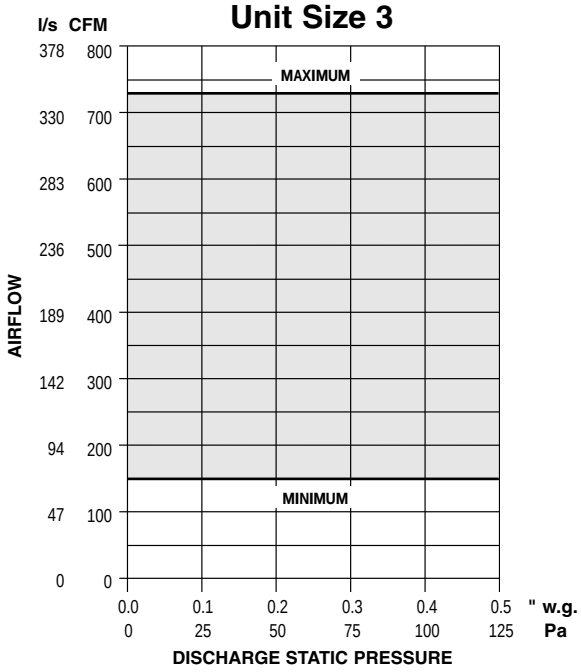
Model Series 37F • ECM Motor Fan Performance Curves

Airflow vs. Downstream Static Pressure

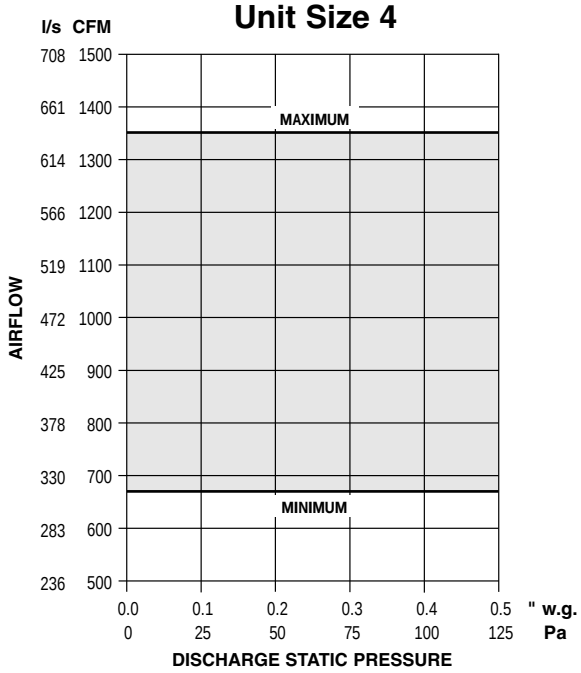
Unit Size 1



Unit Size 3



Unit Size 4



NOTES:

- The fan curves for the ECM motor are unlike those for traditional PSC motors. The ECM motor is a pressure independents constant volume device at set point and airflow does not vary with changing static pressure conditions. 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).
- Airflow can be set to operate on horizontal performance line at any point within shaded area using the solid state volume controller provided.
- Engineered Comfort Fan Coil units featuring the optional ECM motor have considerably wider turn-down ratios than conventional PSC motors. Hence, a reduced number of unit sizes are required in order to 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 and installation and reduces inventory of field service parts.
- Fan curves shown are applicable to 120/208/240 and 277 volt, single phase ECM motors. Although DC in operation, they include a built-in innverter.

Electrical Data

Unit Size	ECM Motor			
	Voltage	120V	208/240V	277V
1	Watts	142	150	200
	FLA	1.9	1.0	1.0
3	Watts	410	450	450
	FLA	5.2	3.1	3.1
4	Watts	942	980	980
	FLA	10.5	7.1	6.9

FLA = Full load amperage
All ECM motors are single phase, 50/60 Hz.

Model Series 37F • Low Profile Design • Performance Data

NC Level Application Guide

Unit Size	Airflow cfm	Airflow l/s	NC Levels Discharge	NC Levels Radiated
1	450	212	21	27
	350	165	—	23
	259	118	—	22
	200	94	—	20
3	700	330	25	30
	600	283	—	28
	500	236	—	25
	400	189	—	25
	350	165	—	21
4	1350	637	23	37
	1100	519	20	34
	950	448	—	31
	800	378	—	29

Performance Notes:

1. NC levels are calculated from the published raw data and based on procedures outlined in Appendix E, ARI Standard 885-98.

2. Fan discharge sound attenuation deductions are based on environmental effect, duct lining, branch power division, insulated flex duct, end reflection and space effect and are as follows:

Discharge attenuation	Octave Band 2	3	4	5	6	7
< 300 cfm	24	28	39	53	58	40
300 – 700 cfm	27	29	40	51	53	39
> 700 cfm	29	30	41	51	52	39

3. Radiated sound attenuation deductions are based on a mineral tile ceiling and environmental effect and are as follows:

Radiated attenuation	Octave Band 2	3	4	5	6	7
Total dB reduction	18	19	20	26	31	36

4. Dash (–) in space denotes an NC level of less than 20.

5. Fan discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases.

Sound Power Levels

Unit Size	Airflow cfm	Airflow l/s	Discharge Sound Power Octave Bands 2	3	4	5	6	7	Radiated Sound Power Octave Bands 2	3	4	5	6	7
1	450	212	59	63	63	62	61	53	62	53	53	50	43	36
	350	165	54	58	61	60	56	53	58	49	49	46	38	34
	250	118	49	52	55	53	48	42	57	47	48	44	35	30
	200	94	47	50	53	50	45	39	56	46	47	42	32	25
3	700	330	61	65	64	64	60	58	66	56	55	52	43	33
	600	283	57	61	61	60	56	53	63	53	53	50	40	30
	500	236	53	57	58	56	52	48	60	51	52	48	38	28
	400	189	48	53	55	53	48	43	57	49	50	46	36	25
	350	165	46	51	53	51	46	40	51	46	48	43	33	26
4	1350	637	62	65	65	64	61	59	72	65	62	58	49	47
	1100	519	58	61	63	62	58	56	67	62	59	54	43	34
	950	448	56	58	61	59	56	52	63	59	57	51	40	30
	800	378	53	56	59	57	53	48	58	55	54	48	37	27

Performance Notes:

1. Fan discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from fan coil unit discharge to the room.

2. Discharge sound power is the noise emitted from the unit discharge into the downstream duct.

3. Radiated sound power is the breakout noise transmitted through the unit casing walls.

4. Sound power levels are in decibels, dB re 10^{-12} watts.

5. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.

6. Data derived from independent tests conducted in accordance with ARI Standard 880-98.

ARI Standard Ratings

Unit Size	COIL Row	COIL FPI	COIL CIRC	AIRFLOW CFM (DRY BLOW)	COOLING CAPACITY QT (BTUH)	COOLING CAPACITY QS (BTUH)	WATER FLOW RATE (GPM)	WATER WPD ft-wg	POWER INPUT (WATTS)
1	3	12	2	400	8835	7283	1.8	1	120
	4		2		10089	8191	2	0.6	122
3	3	12	2	700	14993	12468	3	1.2	270
	4		4		19673	15006	3.9	2.7	274
4	3	12	2	1200	29610	22816	5.9	6.6	345
	4		4		35755	26492	7.1	5.7	348

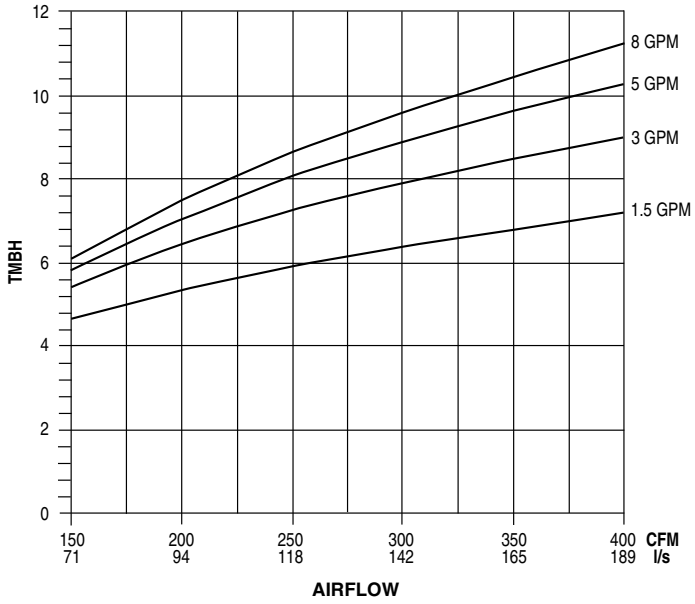
ARI PERFORMANCE CERTIFIED ™ ARI Standard 440 Room Fan-Coil Unit www.aridirectory.org

NOTE: Based on 80°F DB and 67°F WB EAT, 45°F EWT 10° temperature rise, maximum fan speed. Motor type is ECM and motor voltage is 115/1/60. Airflow under dry coil conditions. All models tested at 0.0" external static pressure.

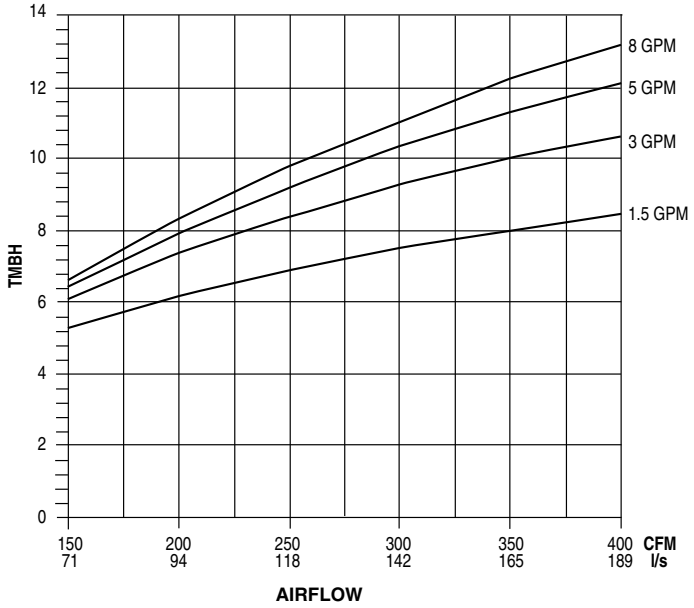
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 1

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

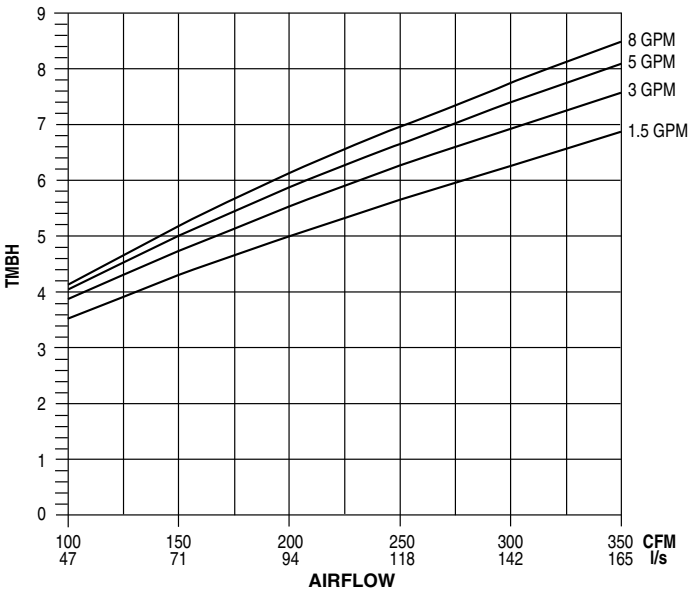
3 Row (Total MBH)



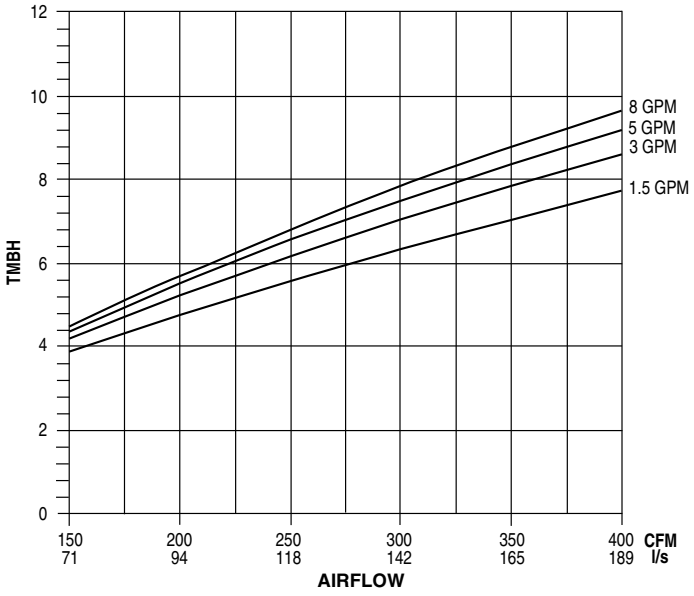
4 Row (Total MBH)



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

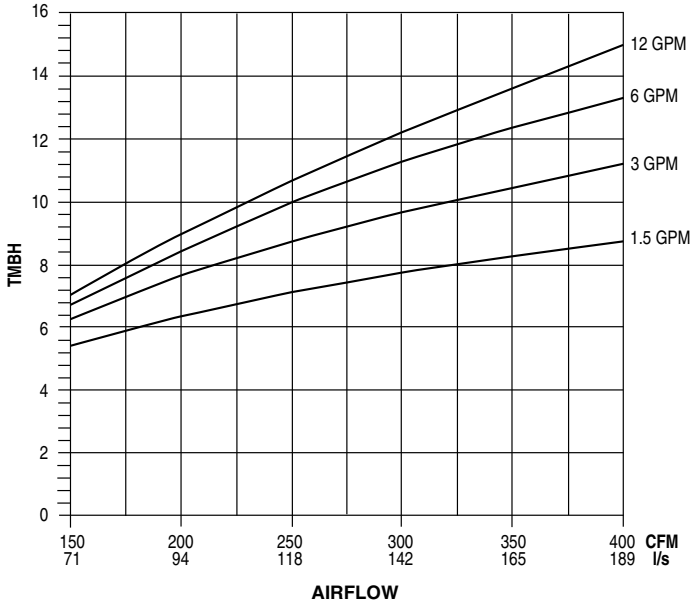
Notes:

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.

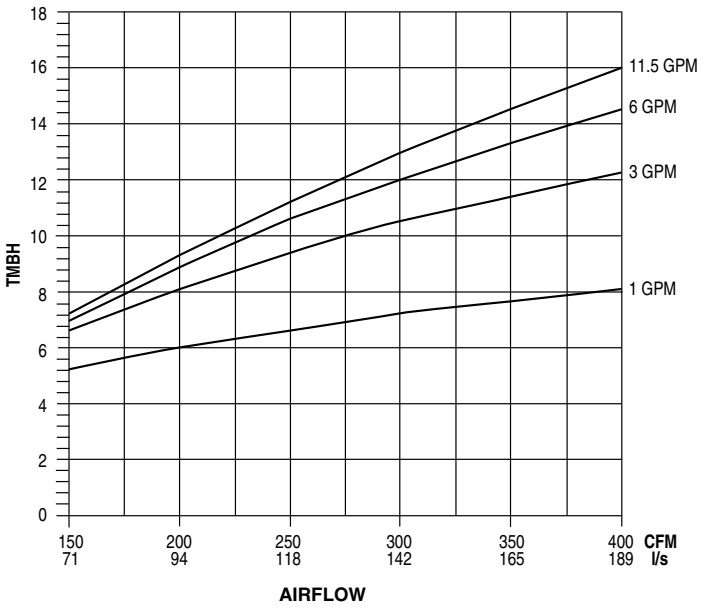
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 1

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

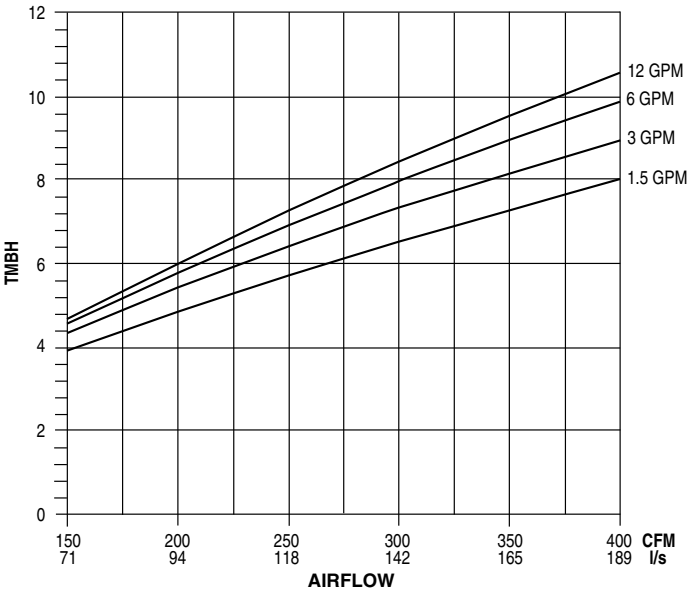
5 Row (Total MBH)



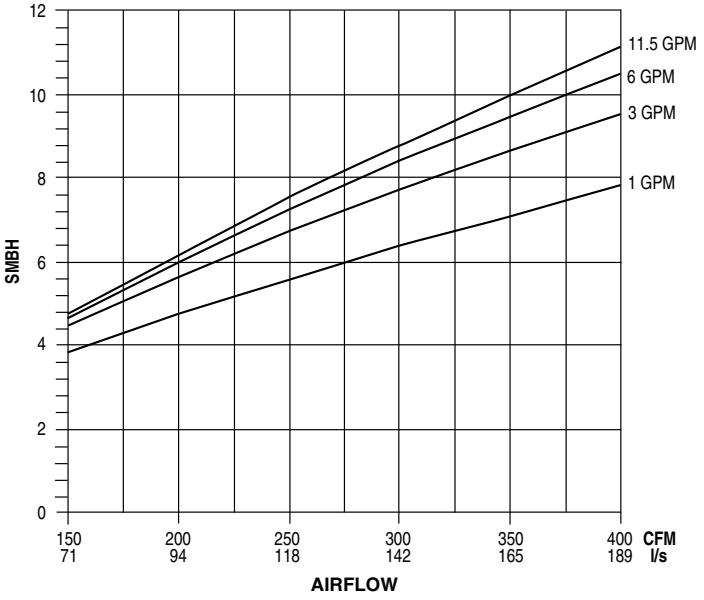
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

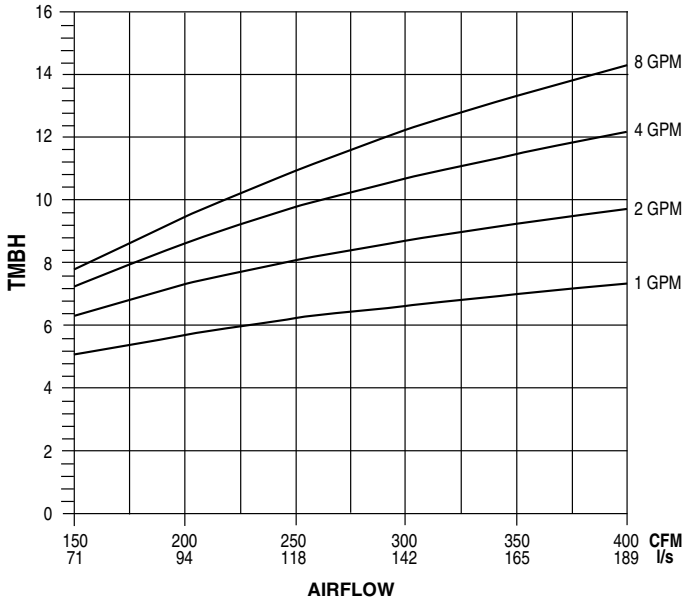
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

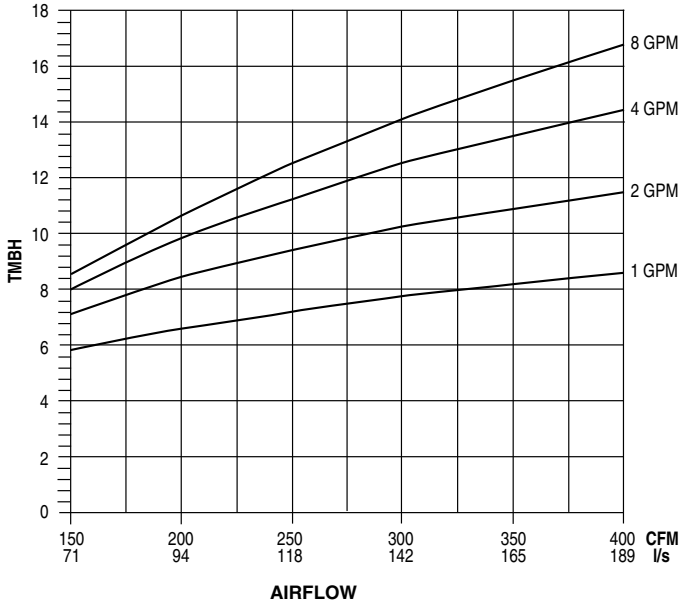
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 1

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

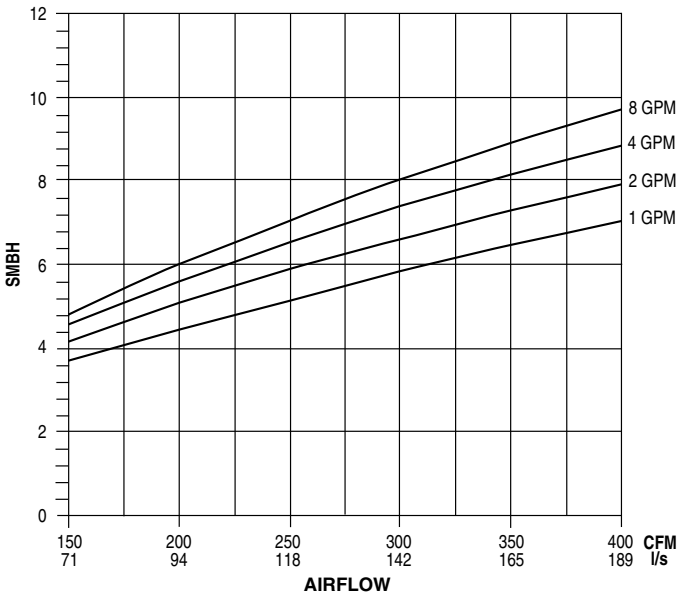
3 Row (Total MBH)



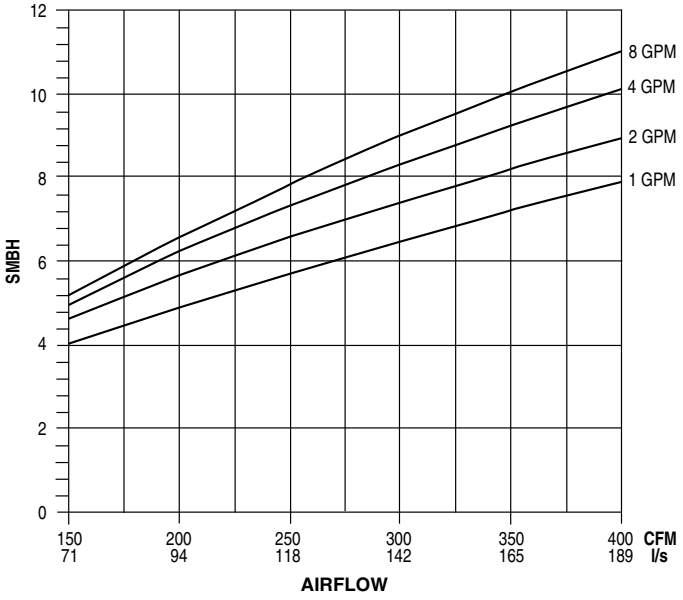
4 Row (Total MBH)



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

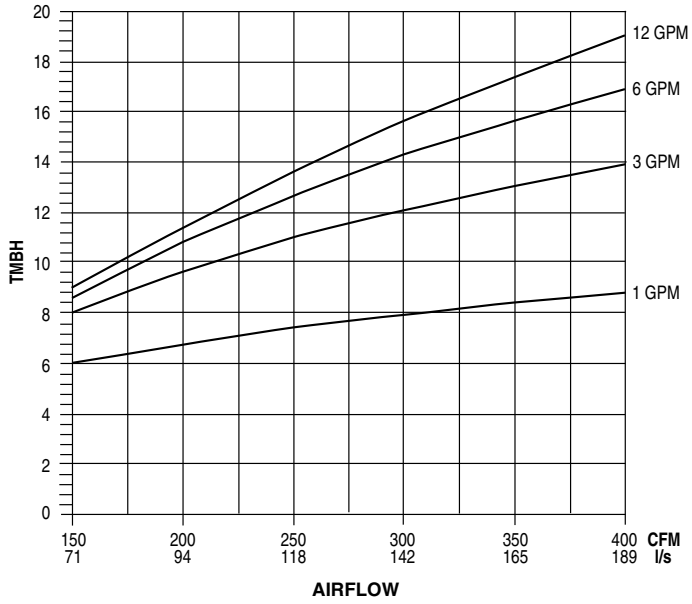
Notes:

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.

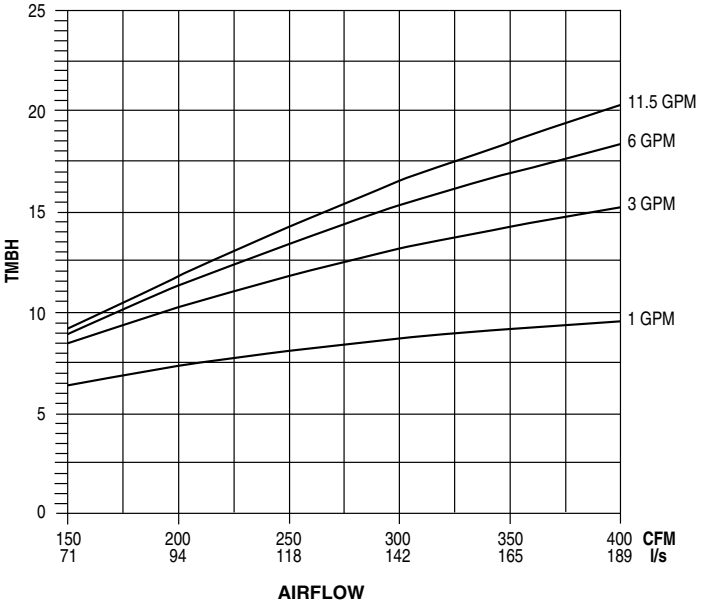
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 1

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

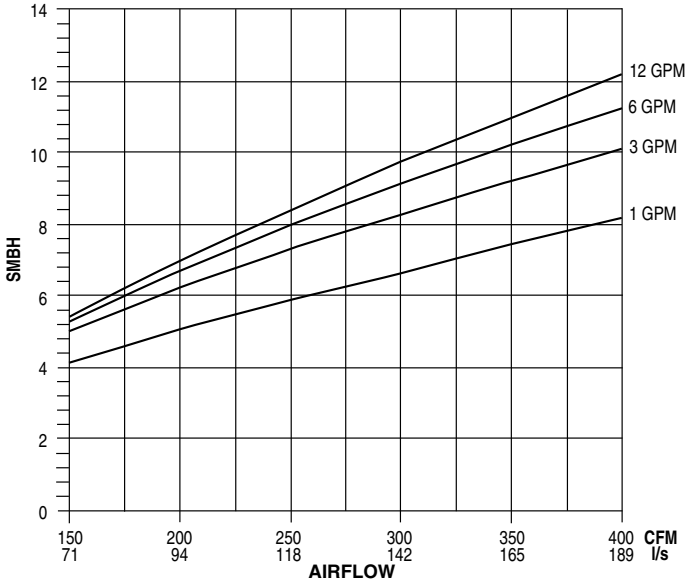
5 Row (Total MBH)



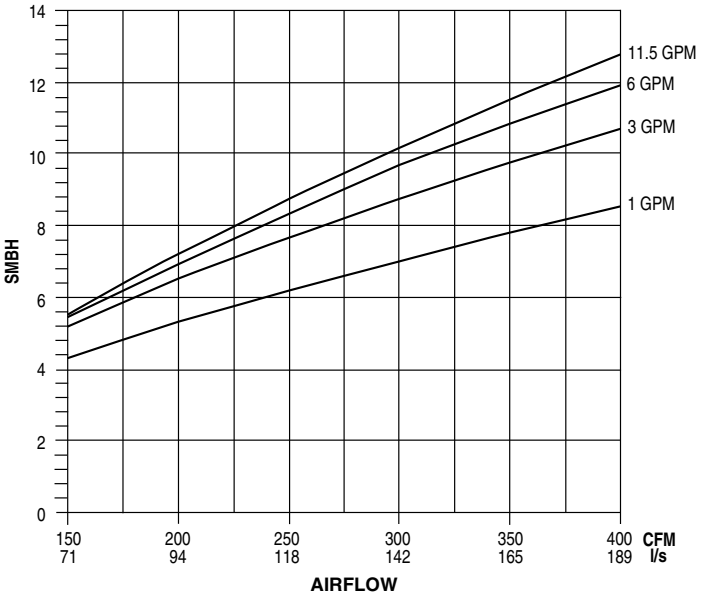
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

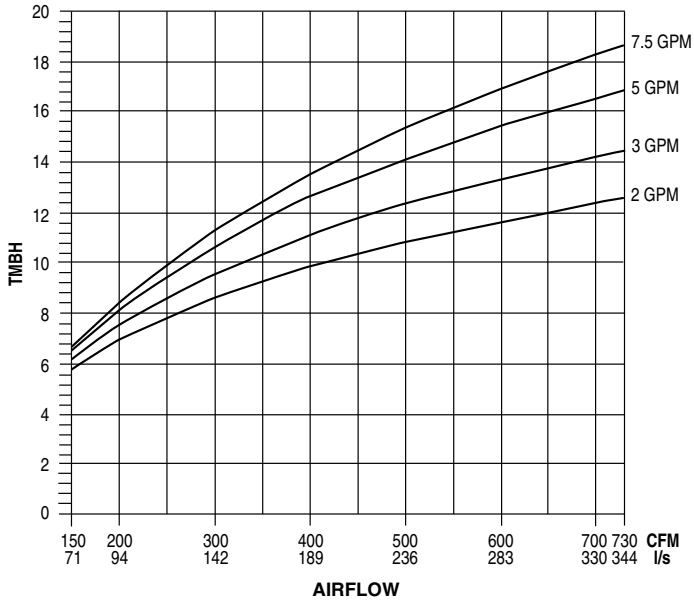
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

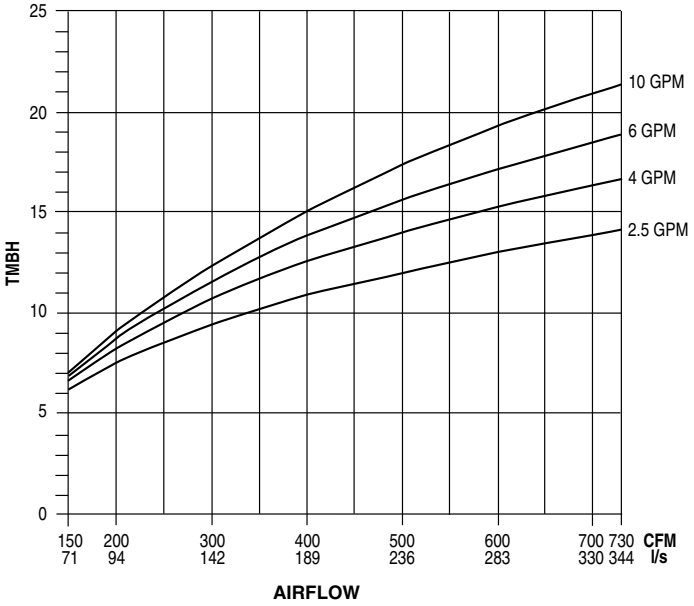
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 3

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

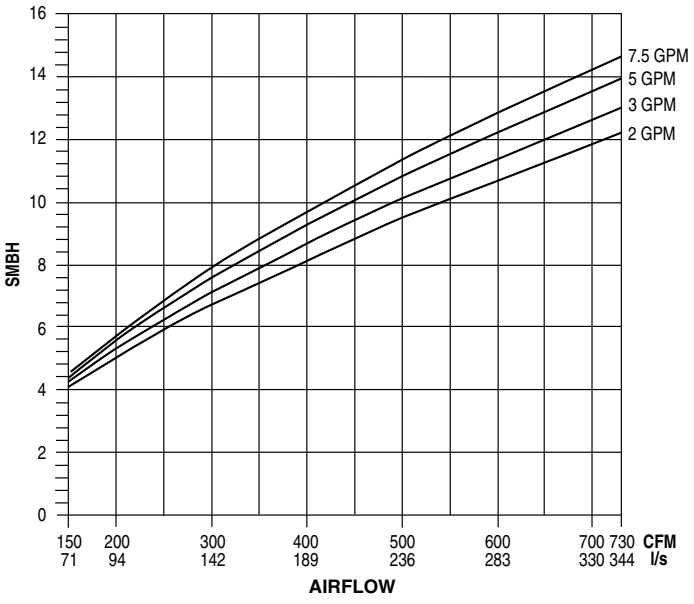
3 Row (Total MBH)



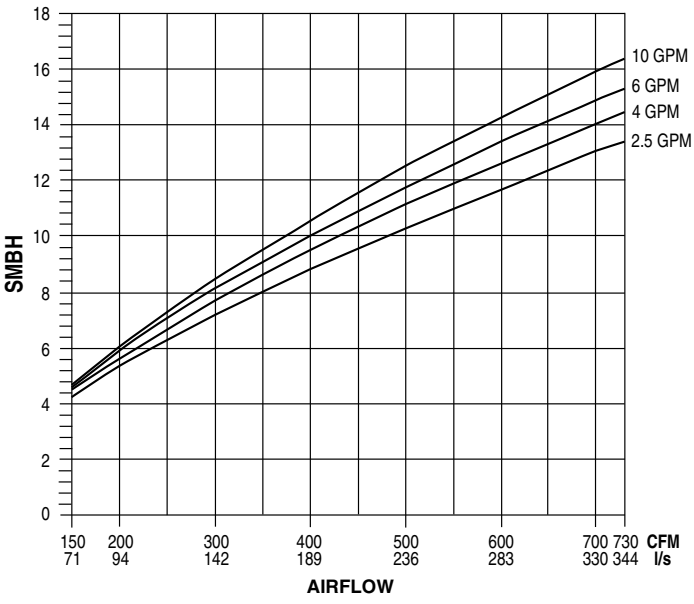
4 Row (Total MBH)



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

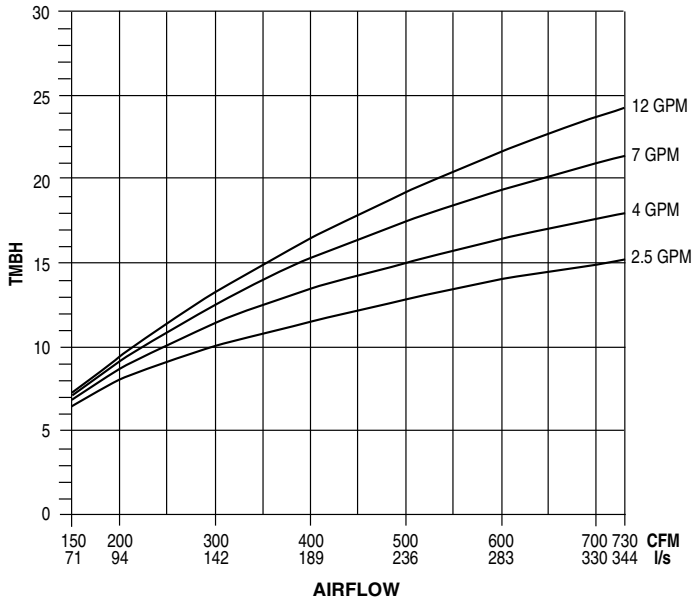
Notes:

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.

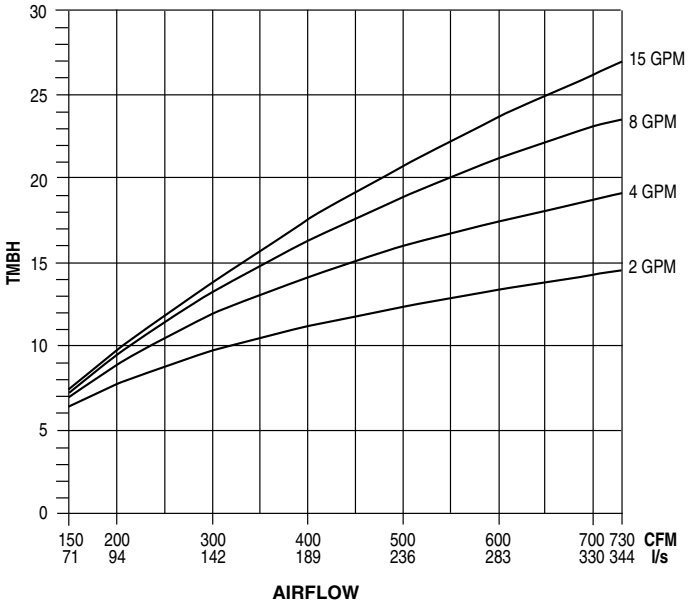
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 3

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

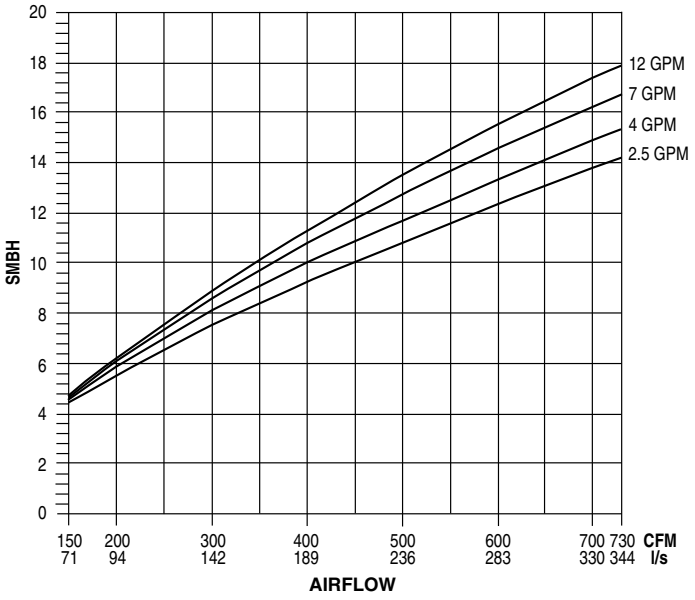
5 Row (Total MBH)



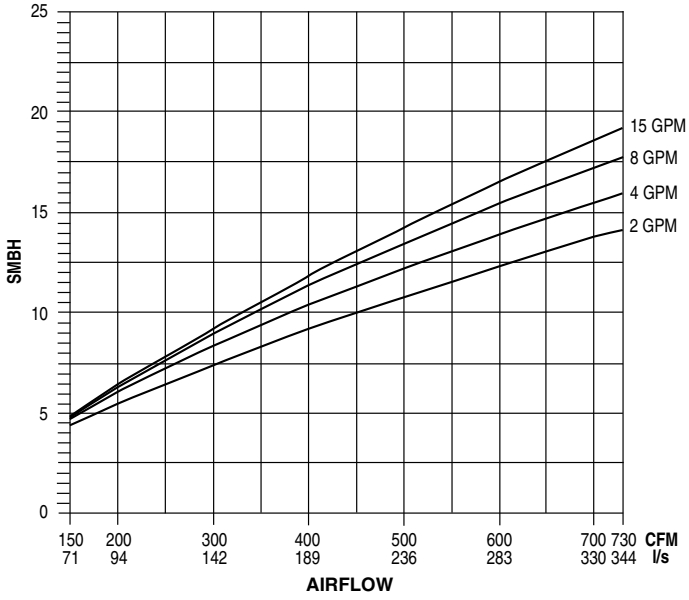
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

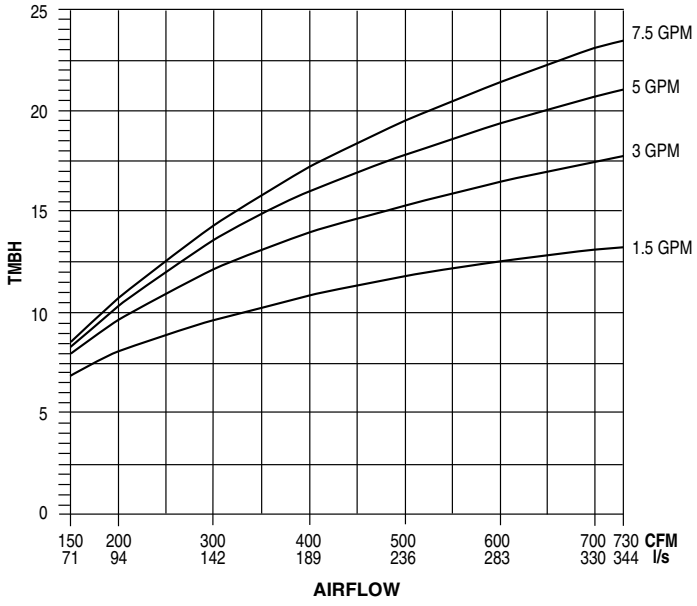
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

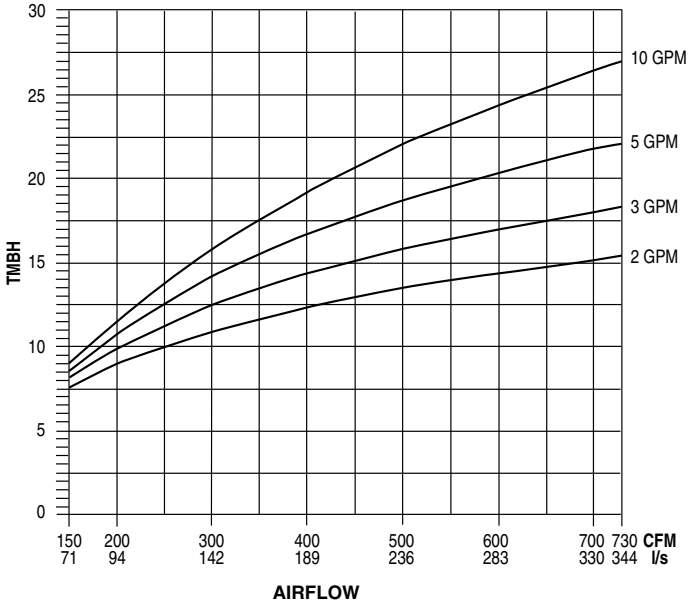
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 3

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

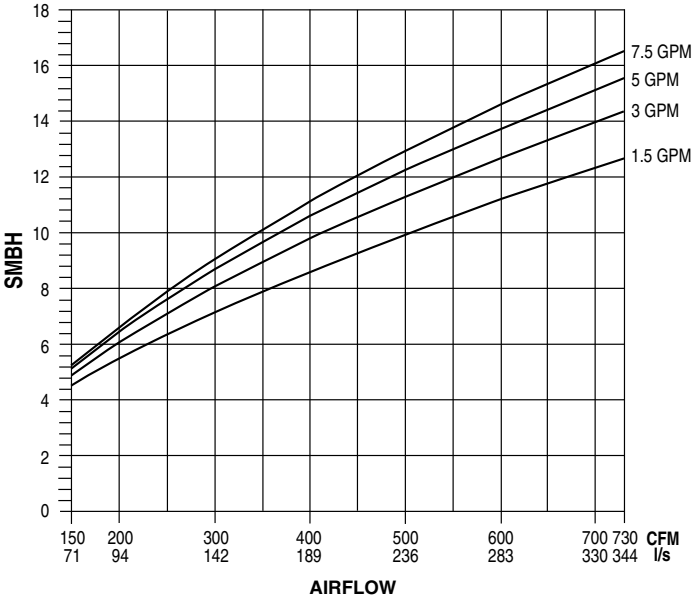
3 Row (Total MBH)



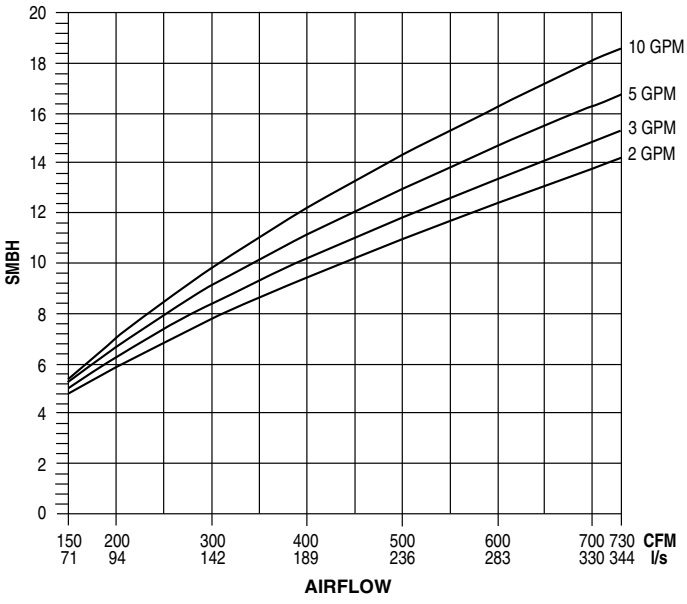
4 Row (Total MBH)



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

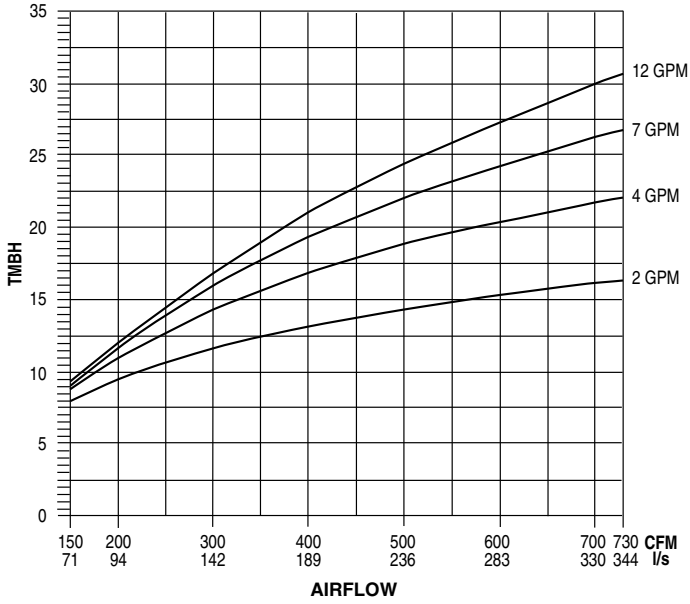
Notes:

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.

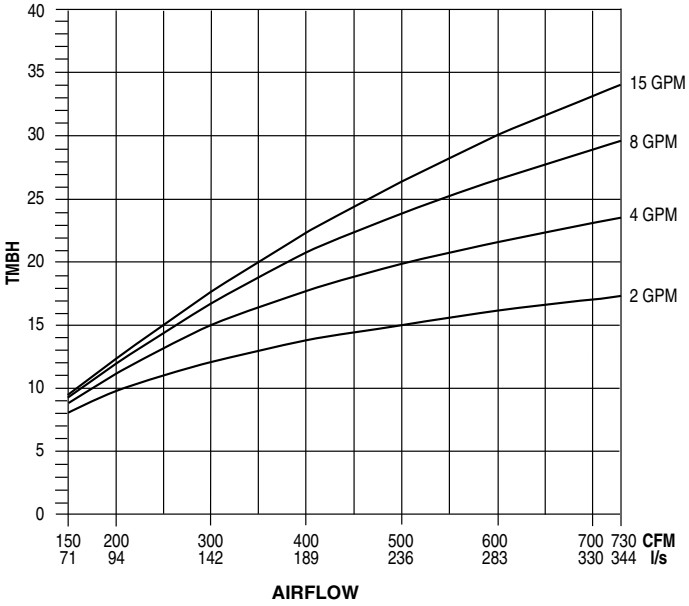
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 3

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

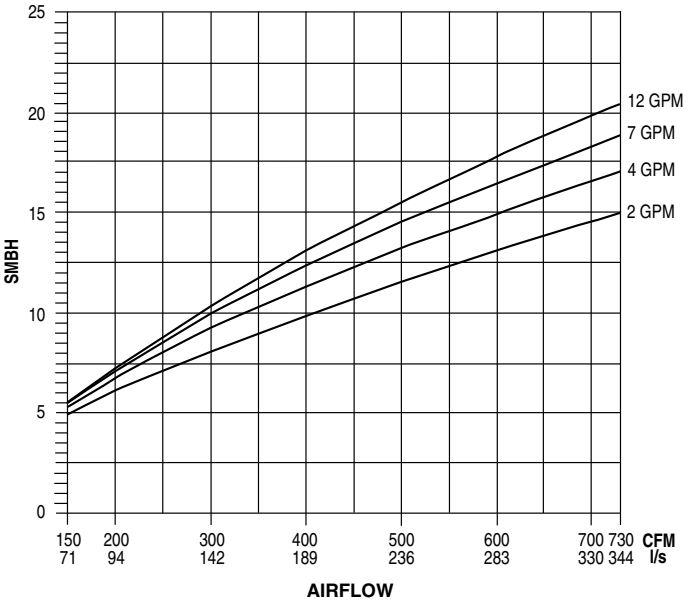
5 Row (Total MBH)



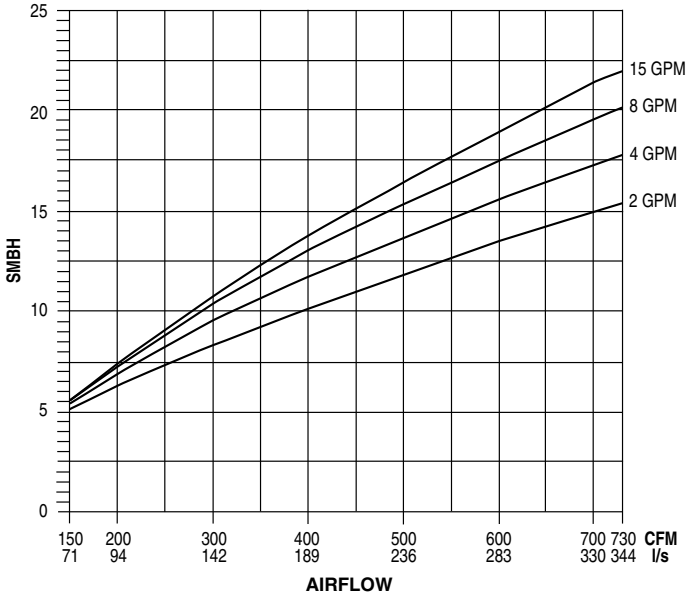
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

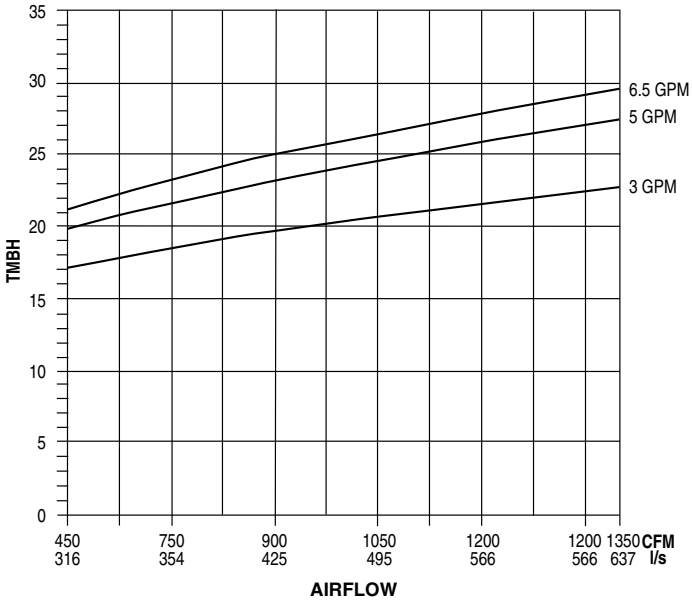
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

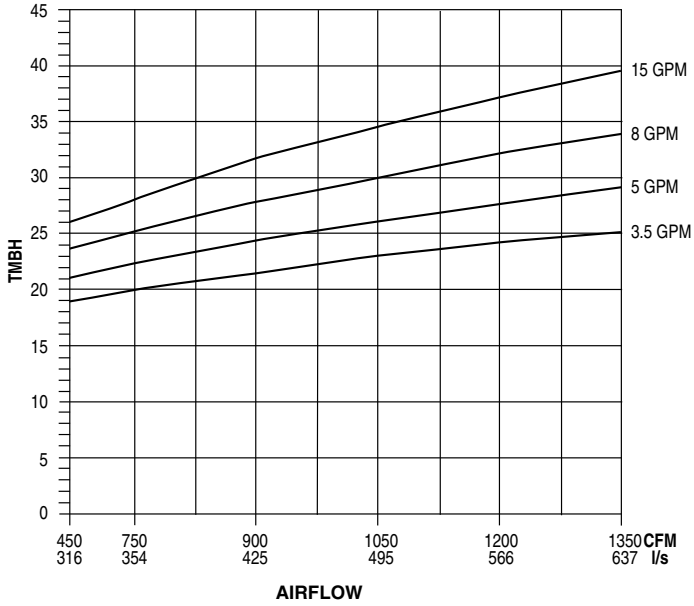
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 4

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

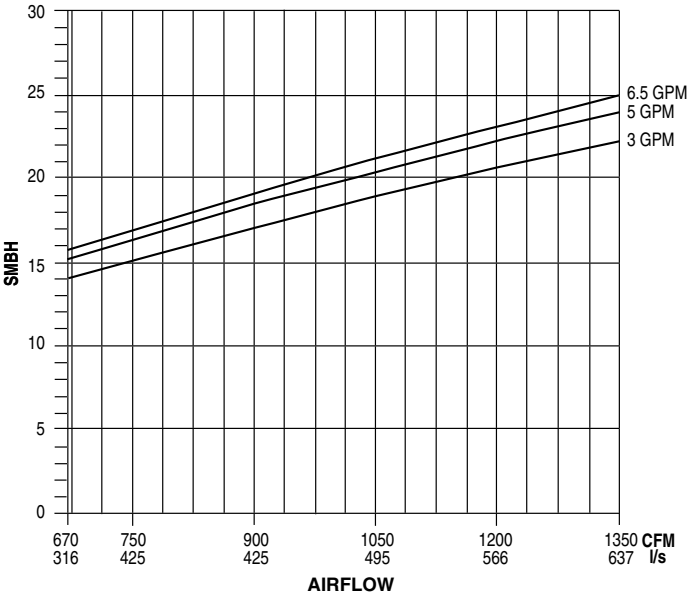
3 Row (Total MBH)



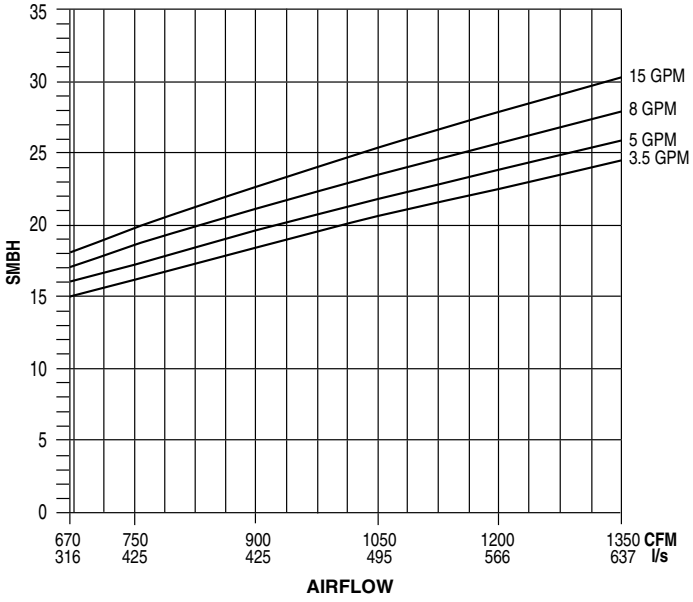
4 Row (Total MBH)



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

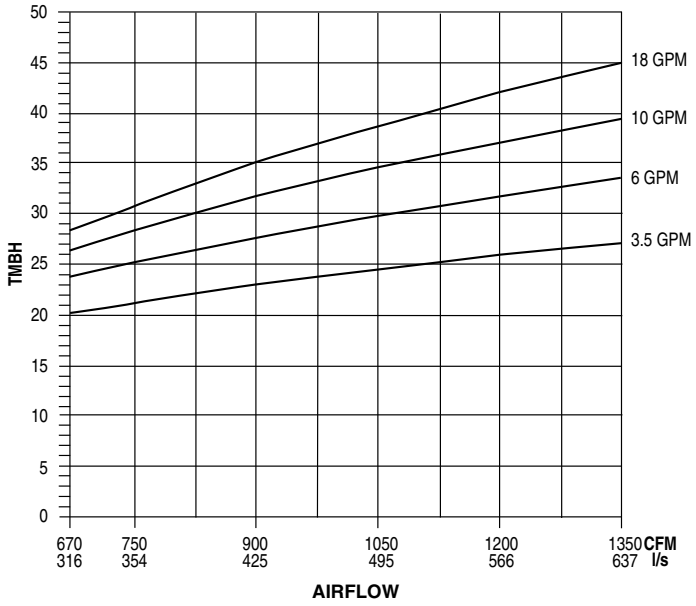
Notes:

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.

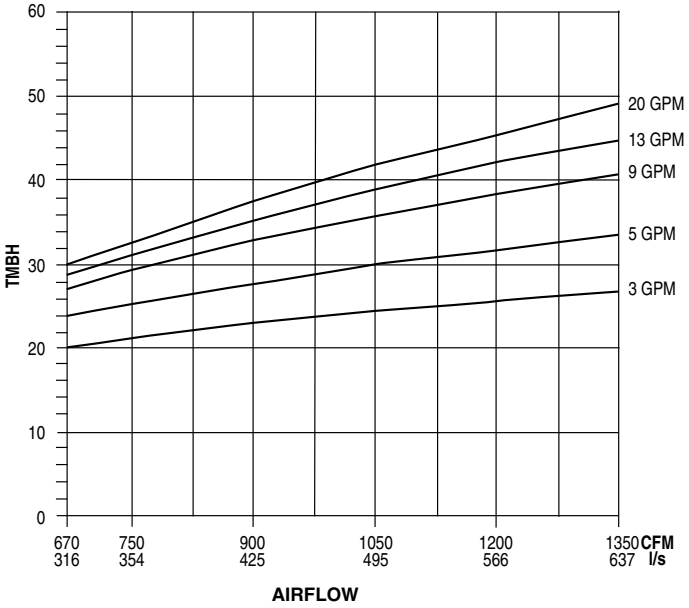
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 4

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

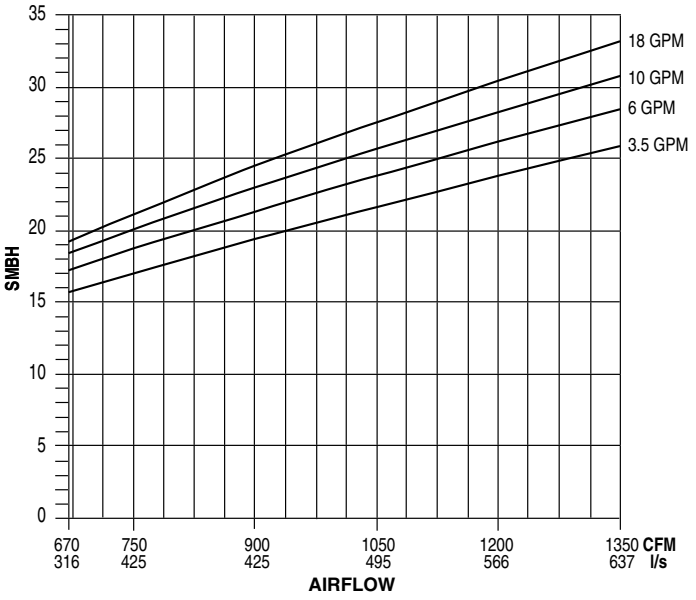
5 Row (Total MBH)



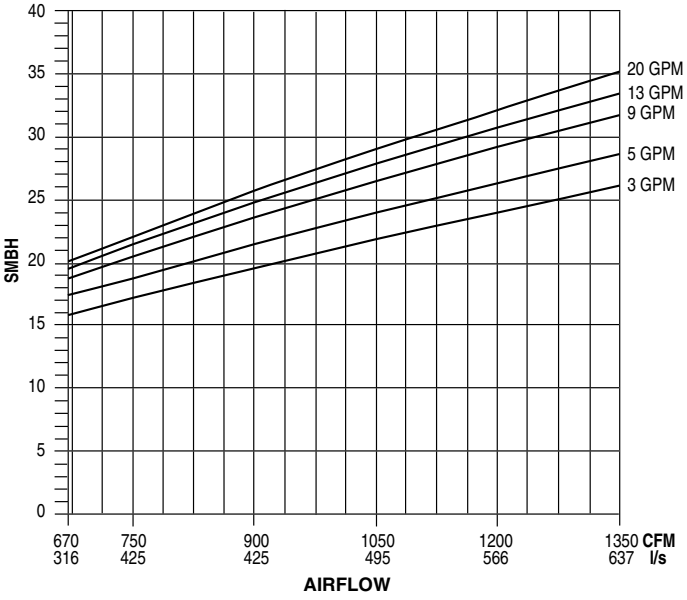
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

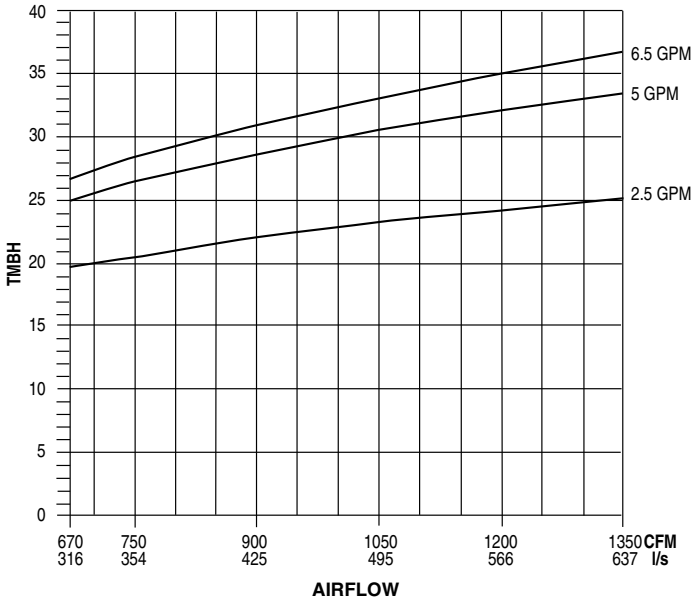
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

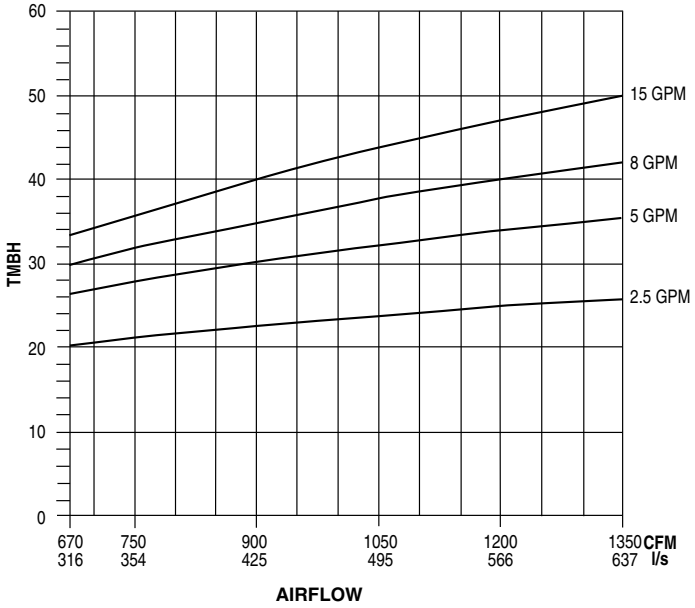
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 4

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

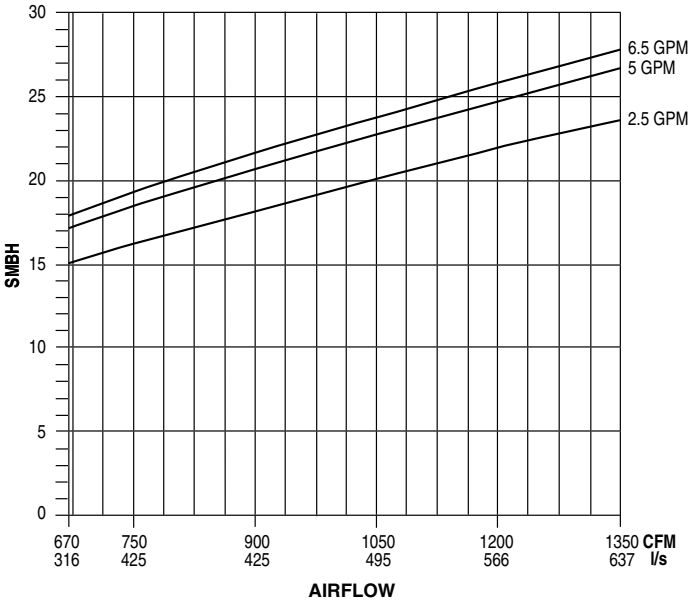
3 Row (Total MBH)



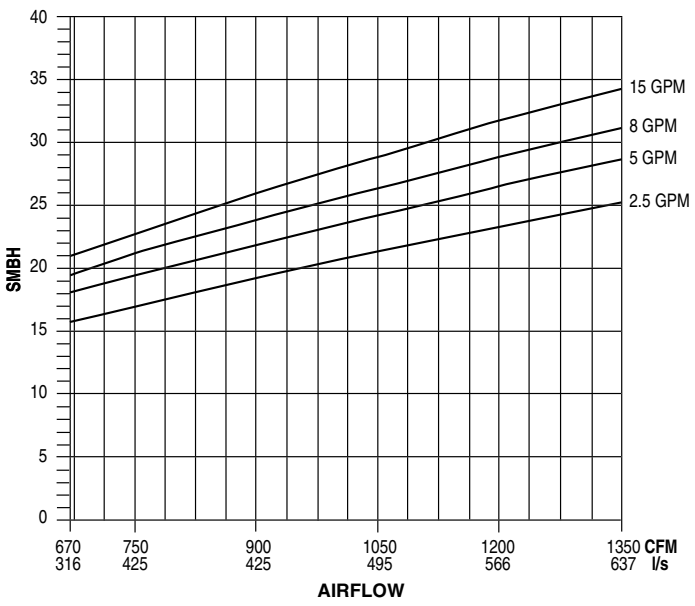
4 Row (Total MBH)



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

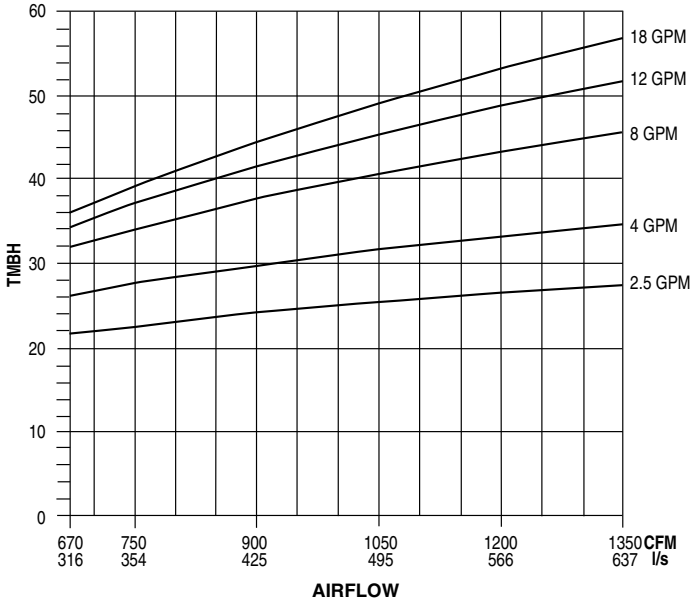
Notes:

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.

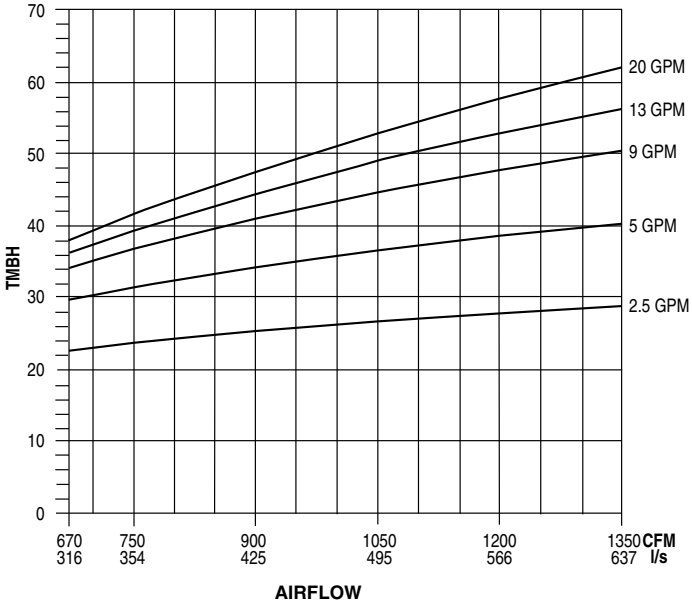
Chilled Water Coil Performance Data • Model Series 37F • Unit Size 4

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

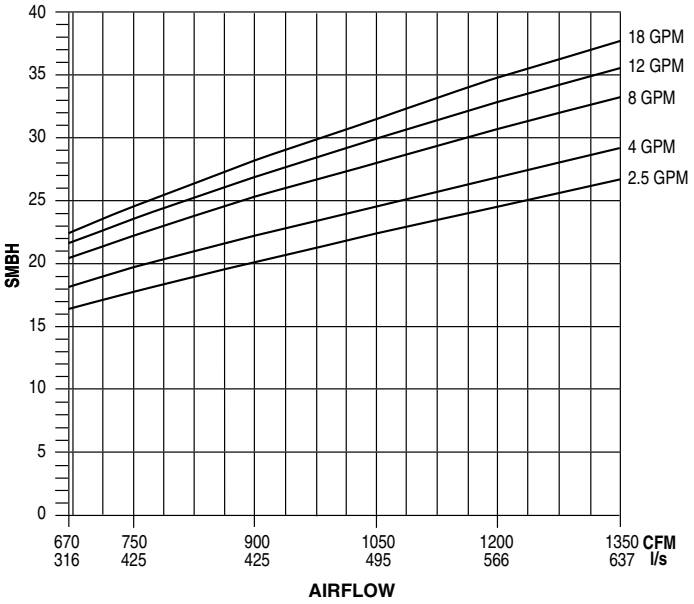
5 Row (Total MBH)



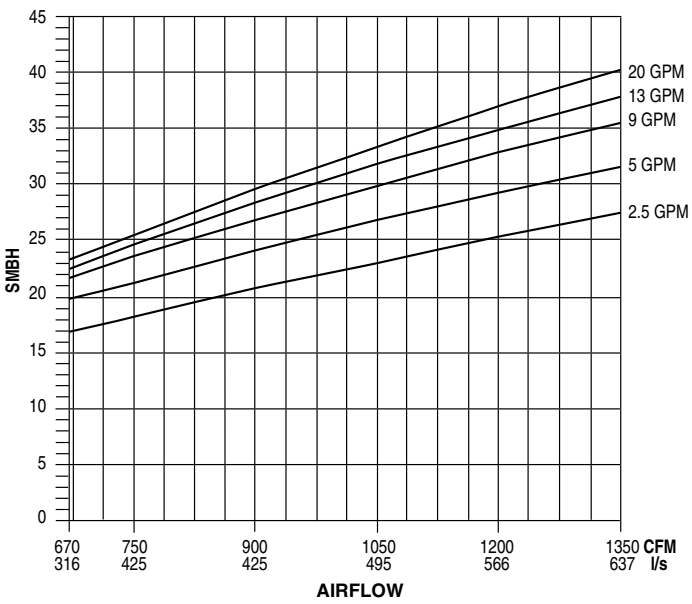
6 Row (Total MBH)



5 Row (Sensible MBH)



6 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

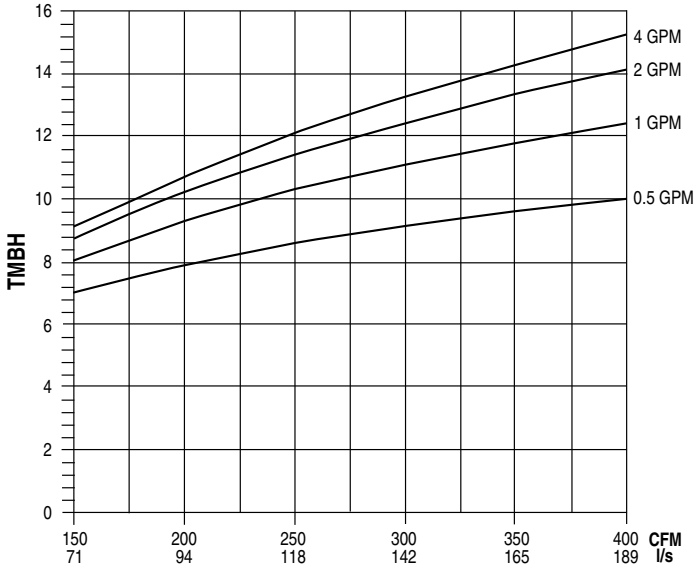
Notes:

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: 5 and 6 Row 7/8" (22.2) O.D. male solder.

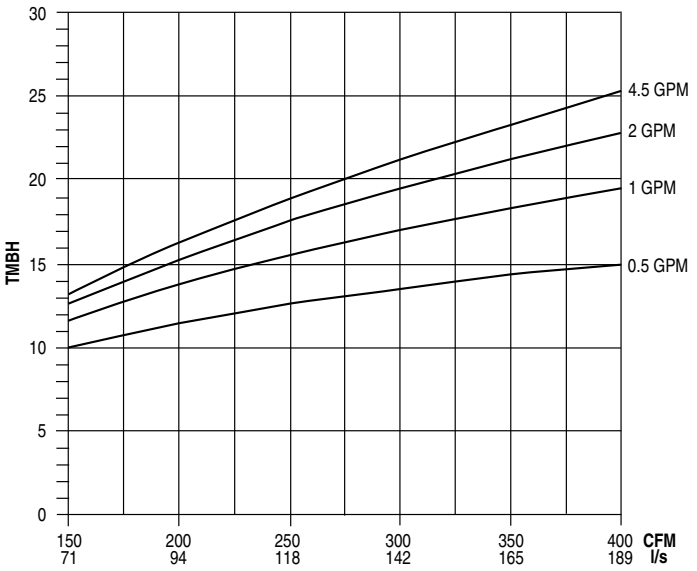
Hot Water Coil Performance Data • Model Series 37F • Unit Size 1

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

1 Row (Total MBH)

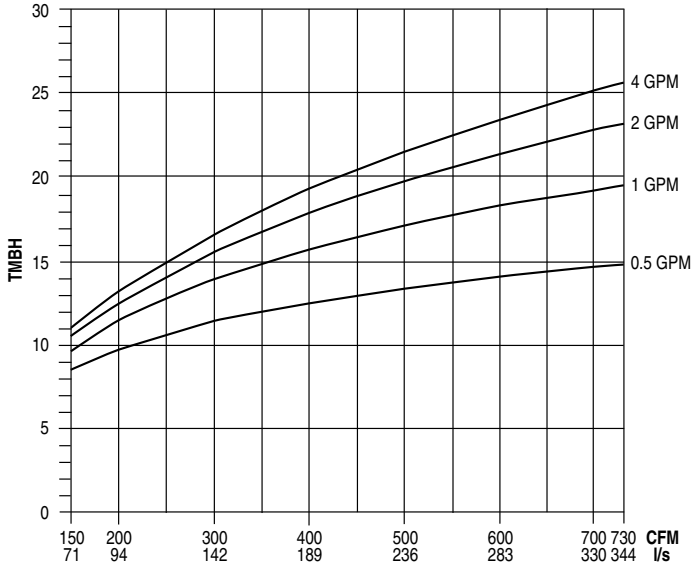


2 Row (Total MBH)

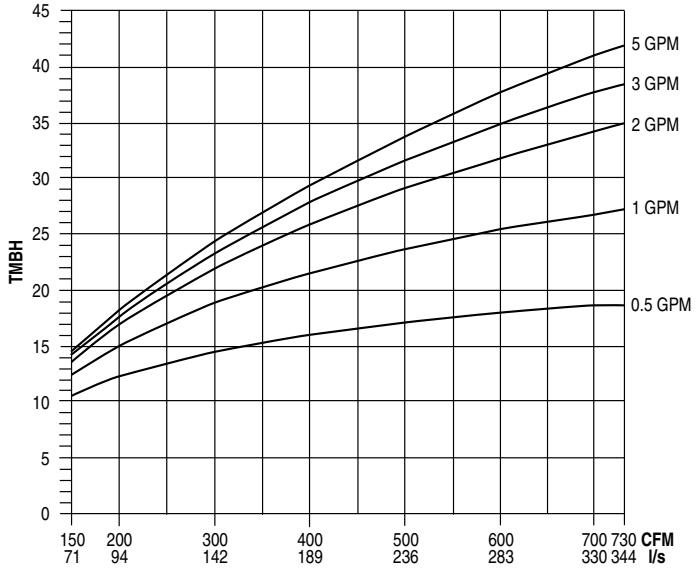


Unit Size 3

1 Row (Total MBH)



2 Row (Total MBH)



Notes:

1. Capacities are in Mbh (thousands of Btu per hour).
2. Mbh values are based on a ΔT (temperature difference) of 110°F between entering air and entering water. For other ΔT's; multiply the Mbh values by the factors below.
3. Air Temperature Rise. ATR = 927 x $\frac{\text{Mbh}}{\text{CFM}}$
4. Water Temp. Drop. WTD = 2.04 x $\frac{\text{Mbh}}{\text{GPM}}$
5. Connections: Size 1, one and two row and size 3 one row 1/2" (12.7); Size 3 two row 7/8" (22.2) O.D. male solder.

Correction factors at other entering conditions:

ΔT °F	50	60	70	80	90	100	110	120	130	140	150
Factor	.455	.545	.636	.727	.818	.909	1.00	1.09	1.18	1.27	1.36

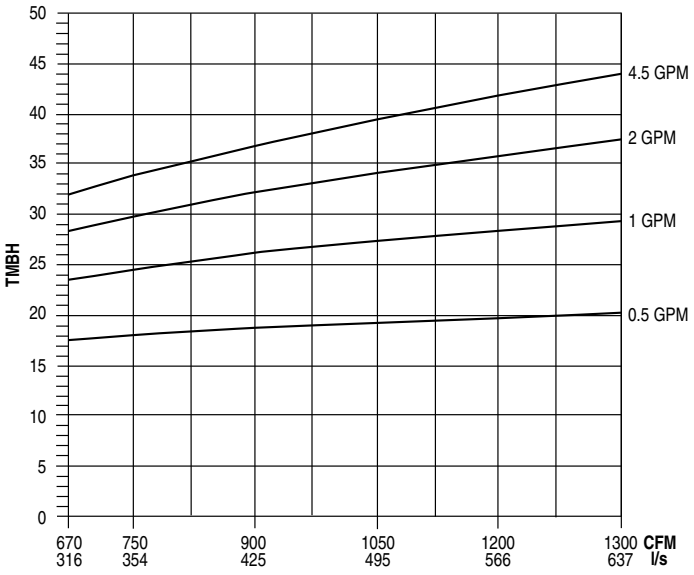
Altitude Correction Factors:

Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

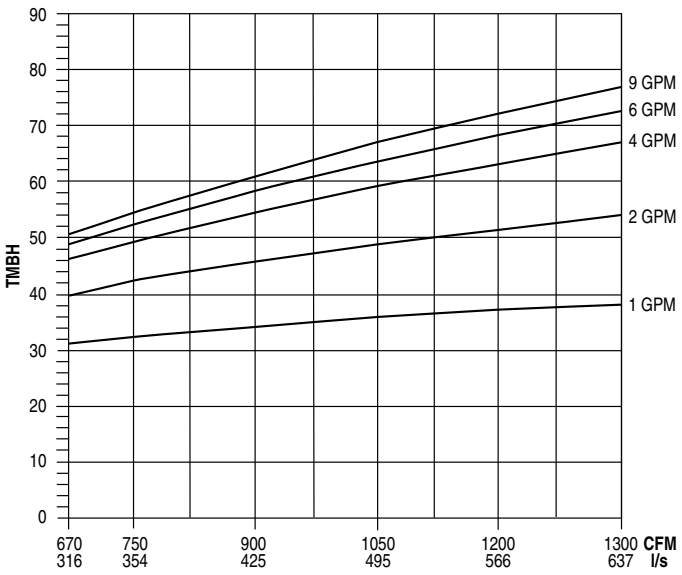
Hot Water Coil Performance Data • Model Series 37F • Unit Size 4

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

1 Row (Total MBH)



2 Row (Total MBH)



Notes:

1. Capacities are in Mbh (thousands of Btu per hour).
2. Mbh values are based on a ΔT (temperature difference) of 110°F between entering air and entering water. For other ΔT's; multiply the Mbh values by the factors below.
3. Air Temperature Rise. ATR = 927 x $\frac{\text{Mbh}}{\text{CFM}}$
4. Water Temp. Drop. WTD = 2.04 x $\frac{\text{Mbh}}{\text{GPM}}$
5. Connections: 1 row 1/2" (12.7) and 2 row 7/8" (22.2); O.D. male solder.

Correction factors at other entering conditions:

ΔT °F	50	60	70	80	90	100	110	120	130	140	150
Factor	.455	.545	.636	.727	.818	.909	1.00	1.09	1.18	1.27	1.36

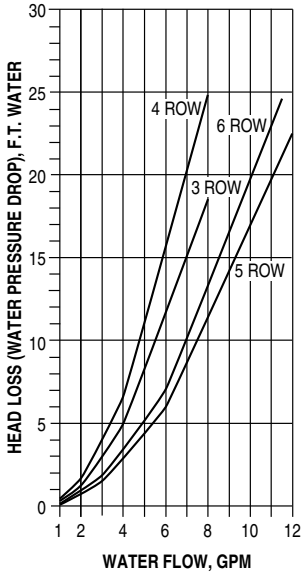
Altitude Correction Factors:

Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

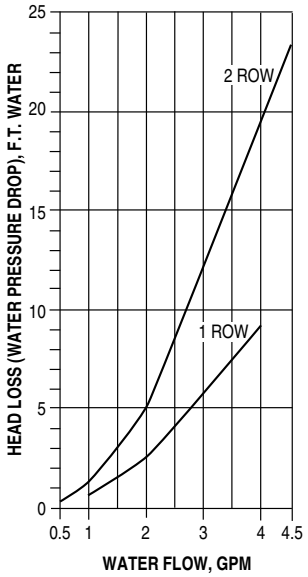
Coil Performance Data • Pressure Drop • Model Series 37F

Unit Size 1

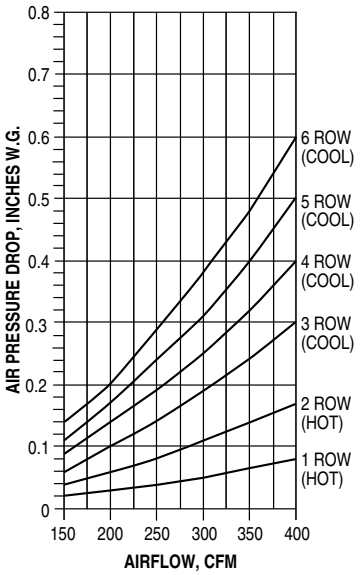
Chilled Water Pressure Drop



Hot Water Pressure Drop

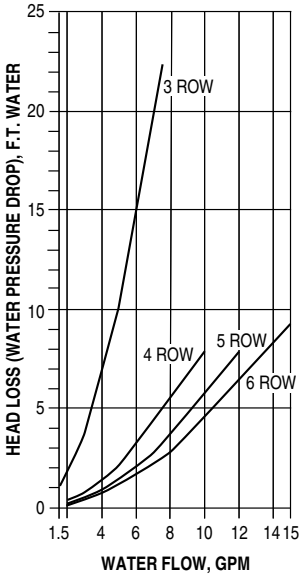


Chilled and Hot Water Air Pressure Drop

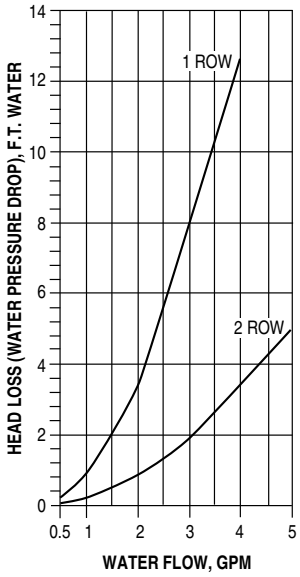


Unit Size 3

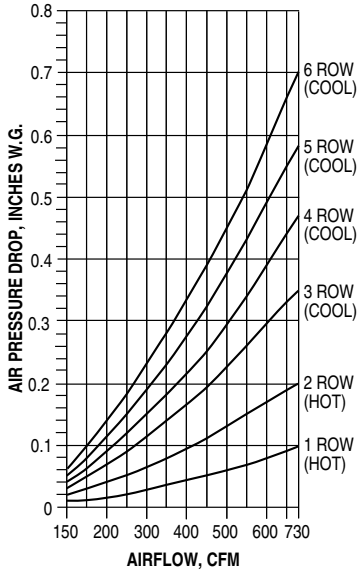
Chilled Water Pressure Drop



Hot Water Pressure Drop



Chilled and Hot Water Air Pressure Drop



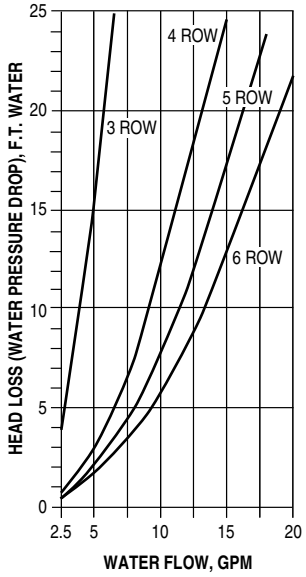
Metric Conversion Factors:

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.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$

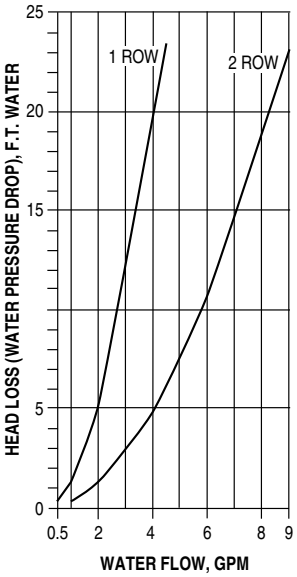
Coil Performance Data • Pressure Drop • Model Series 37F

Unit Size 4

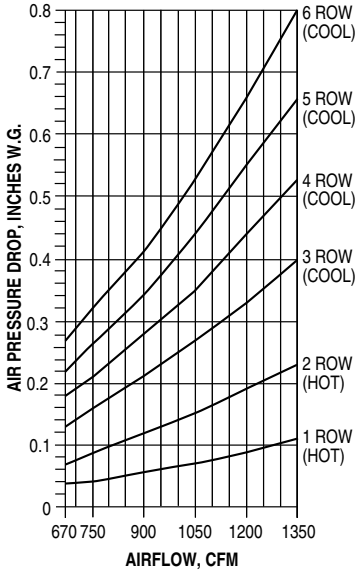
Chilled Water Pressure Drop



Hot Water Pressure Drop



Chilled and Hot Water Air Pressure Drop



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   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.
   $WTD = 2.04 \times \frac{Mbh}{GPM}$

Electric Heating Coils • Construction Features, Selection and Capacities

Nailor Electric Coils are tested with the fan terminal 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 a total package. All controls are enclosed in a NEMA 1 electrical enclosure on the side of the fan package 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.

Standard Features Include:

- Automatic reset high limit thermal cut-outs.
- Nickel-chrome heating elements.
- Magnetic contactors per stage on terminals with DDC or analog electronic controls.
- Airflow safety switch.
- Control voltage transformer (Class 2) for DDC or analog electronic fan coils.

Optional Accessories:

- Toggle disconnect switch.
- Door interlocking disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Dust tight control enclosure.
- Class 'A' 80/20 nickel/chrome element wire.
- Manual reset secondary high limit.
- SCR Control.

Tested and approved to the following standards:

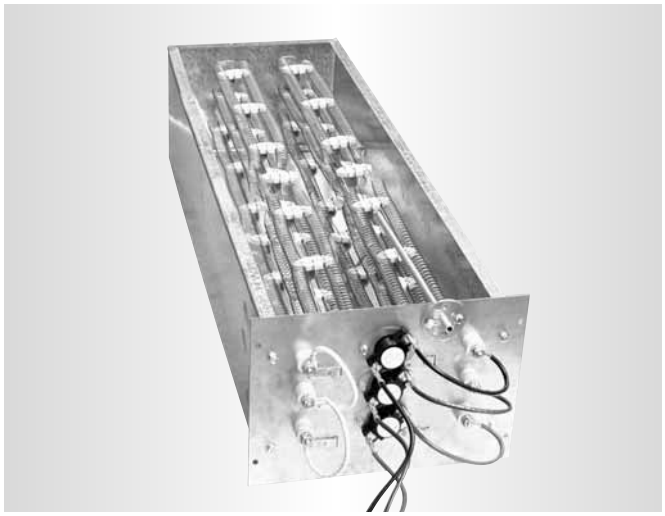
ANSI/UL 1996, 1st. ed.

CSA C22.2 No. 155-M1986.

UL 1995

SCR Control Option:

The SCR controller provides time proportional solid state heater control using a proportional analog input signal (0 – 10 Vdc or 4 – 20 mA). This option may be specified with all analog electronic or digital (DDC) controls.



Time proportional control of the electric heater provides superior comfort and energy savings. The SCR controller modulates the heater to supply the exact amount of heat based upon the zone requirement. Room set points are maintained more accurately, undershoot and overshoot as associated with staged heat are eliminated, reducing operation costs.

SCR controllers provide silent operation, as mechanical staged contactors are eliminated. Zero cross switching of the thyristor prevents electrical noise.

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 or 2 stages of heat. 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 coils in order to avoid possible nuisance tripping of the thermal cut-outs.

• Discharge air temperature should not exceed 120°F (49°C).

Model Series	Unit Size	Electric Heat Maximum Kilowatts												
		120V 1 Ph	208/220/240V 1 Ph	277V 1 Ph	347V 1Ph	480V 1 Ph	600V 1Ph (120V Fan)	600V 1Ph (240/277V Fan)	208V 3Ph	220/240V 3Ph	380V 3Ph	480V 3Ph	600V (120V Fan)	600V (240/277V Fan)
35F	3	4.8	8	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	5	4.2	8	11.5	14	18	18	18	14	14	16	18	18	18
	7	2.7	8	11.5	14	18	13	17	14	14	24	30	23	32
37F	1	4.8	6.5	6.5	6.5	6.5	6.5	6.5	—	—	—	—	—	—
	3	4.8	8	10.5	10.5	10.5	10.5	10.5	9	9	8	10	10.5	10.5
	4	4.5	8	11.5	14	19	19	19	9	9	8	10	12	12

Useful Formulas:

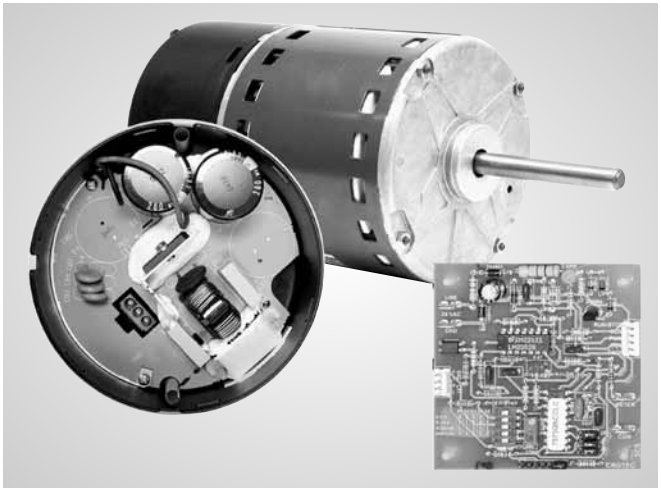
$$kW = \frac{CFM \times \Delta T}{3160}, \quad \Delta T = \frac{kW \times 3160}{CFM}, \quad CFM = \frac{kW \times 3160}{\Delta T}$$

NOTES:

CONTROLS & PIPING PACKAGES

ECM/EPIC™ FAN TECHNOLOGY®

- **Significant energy savings (67% average compared to PSC motors)**
- **Unique factory pre-set air volume capability (+/- 5%)**
- **Pressure independent fan operation**
- **LED for visual indication of air volume**
- **Field adjustable fan air volume controller**
- **Remote fan air volume adjustment capability from BAS**
- **Larger turndown ratios mean more flexibility for tenant changes**



Since 1985, equipment manufacturers have used ECM motors in residential air conditioners and furnaces. These motors have made it possible to achieve SEER ratings of 12 and higher. Until more recently though, they were only manufactured in 120 and 240 VAC, which precluded their use in commercial applications. Following two years of research and development and the availability of a new 277 VAC version, Nailor Industries was first to introduce the ECM motor to the commercial HVAC market (Ashrae Journal, April 1997) as an option for use in commercial fan powered terminal unit applications.

WHAT IS AN ECM MOTOR?

The ECM (Electronically Commutated Motor) is an ultra high efficiency programmable brushless DC motor utilizing a permanent magnet motor and a built-in inverter. DC motors are significantly more energy efficient than AC motors and much easier to control. The major weakness of commercial fan coil units until now, has been their low fan motor efficiency. The widely used three speed fractional horsepower shaded pole and permanent split capacitor (PSC) induction motor in combination with a 3 speed switch or an electronic SCR speed controller is extremely inefficient at typical operating conditions. Due to acoustical considerations, the fan motor is usually adjusted to operate at considerably less than full load (where PSC motor efficiencies may be as high as 62%). PSC motor efficiency drops off dramatically when turned down; typically by at least half. Installed PSC motor efficiencies are therefore typically in the range of only 12 – 45%. ECM motors in contrast, maintain a high efficiency of 65 – 72% at all speeds.

In addition to lower operating costs, EPIC Fan Technology® allows Engineered Comfort to pre-set the fan airflow volume at the factory.

The graphs below show the lower watts per cfm (translating into lower operating costs as shown on the next page) and wider operating ranges of commercial fan coils employing EPIC Fan Technology® versus PSC induction motors.

FEATURES AND BENEFITS

Soft starts and slewed speed ramps are programmed into the ECM motor eliminating stress transmitted to the mounting bracket or hardware. They incorporate ball bearings providing permanent lubrication unlike sleeve bearings requiring a minimum rpm operation for oiling. The wider operating range of the ECM motor allows each model to actually replace two models using induction motors. This feature alone provides several benefits: a simpler product line to choose from, little or no equipment changes necessary, more similar sized units on the job, decreased spare parts inventory and increased contractor flexibility. The low operating temperature of the ECM motor (essentially ambient) requires very little energy to offset the heat gain from the motor versus PSC motors which run hot, typically around 90 – 150ºF (32 – 66ºC).

These features also extend the life of the ECM motor, which are expected to provide an average 90,000 hours of operation (versus 50,000 hours for a typical PSC motor). This translates into about 10 years for a typical fan coil as opposed to 7 for one using a PSC motor.

EPIC FAN TECHNOLOGY®

In addition to the above standard features, Nailor Industries pioneered and developed EPIC Fan Technology® in order to provide the following primary benefits – Maximized Energy Savings, Variable Air Volume (VAV) control and factory pre-set fan airflow.

Why and how do you pre-set fan airflow?

Pre-setting the fan airflow (cfm) has not been an issue with fan coil manufacturers because these units were either on at full load or off in normal operating conditions. With EPIC Fan Technology®, the fan coils can now be run as a VAV device with all of the requisite savings that VAV brings to other commercial applications. (See control sequence for further explanation.)

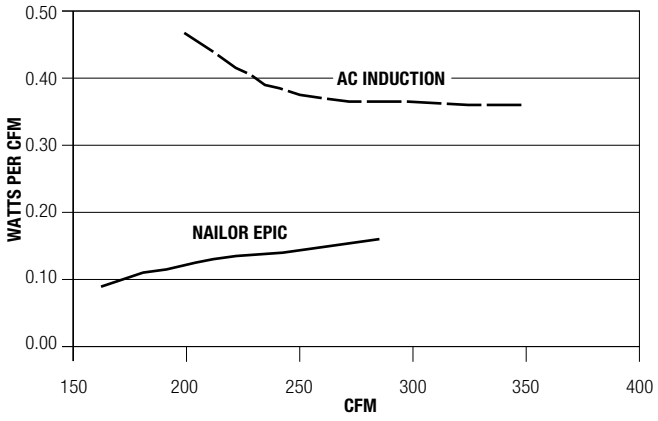
AC motors are not synchronous machines and the rpm, and consequently the unit cfm, changes when static pressure changes. The difficulty in pre-setting the fan lies in estimating the motor workload required at the job site in actual working conditions. The fan operated by an AC motor will not produce the same volume of air as it did at the factory without the duct work or loaded filter. Because there is no way to accurately predict the downstream static pressure as it would exist at the job site, it was impossible to pre-set the fan cfm. The ECM motors are DC and inherently synchronous machines. The motors are programmed to calculate the work they are doing and then compare the work accomplished to the cfm requirement. The integral microprocessor based controller

automatically adjusts the speed and torque in response to system pressure changes and pressure independent constant airflow operation is achieved without the need for an external flow sensor feedback loop. Engineered Comfort fan coil units incorporate our own custom EPIC fan controller, an electronic PWM volume control device that allows adjustment of airflow volume. Minimum and Maximum airflow can be pre-set at the factory. It is field adjustable either manually using a screwdriver and voltmeter locally at the fan coil or with the Engineered Comfort thermostat and controller or remotely using a 0 – 10 VDC analog output from a digital controller via the BAS. A fan volume versus DC volts calibration chart is provided. The importance of this feature is the energy that is saved due to controlling the fan airflow as well as the large reduction in noise generation. This also removes the uncertainty of diffuser flow measurement with hoods. Laboratory tests show the fan cfm to be accurate within +/- 5% of the factory set point. This is a huge benefit to the owner, the occupant, the controls contractor, and the mechanical contractor.

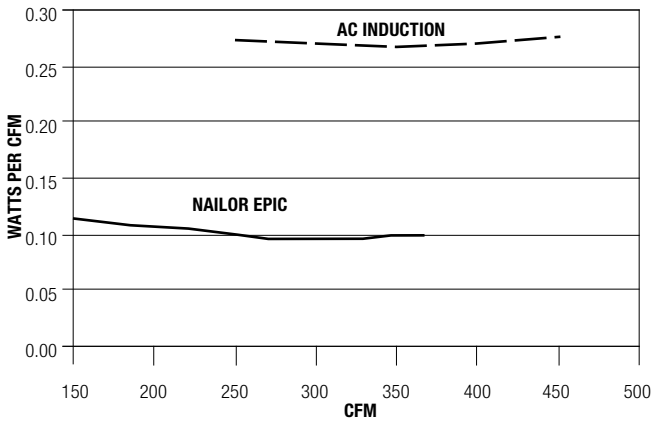
ENERGY SAVINGS

The following graphs show the energy savings of units with EPIC Fan Technology® compared to units with PSC motors. The Engineered Comfort airflows are shown at relatively lower set points (81%) due to a lower discharge air temperature (See control sequence for further explanation).

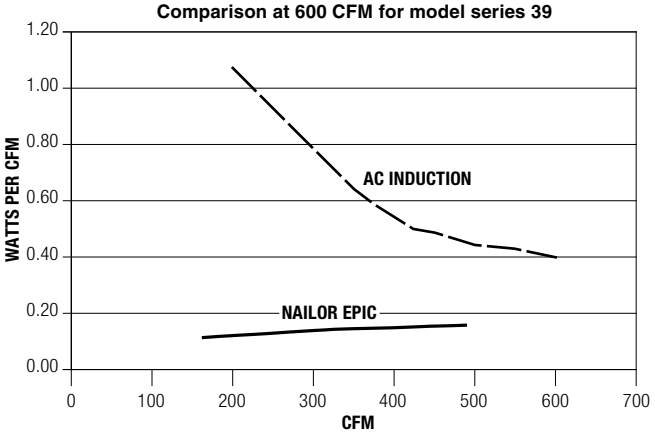
Comparison at 350 CFM for model series 39



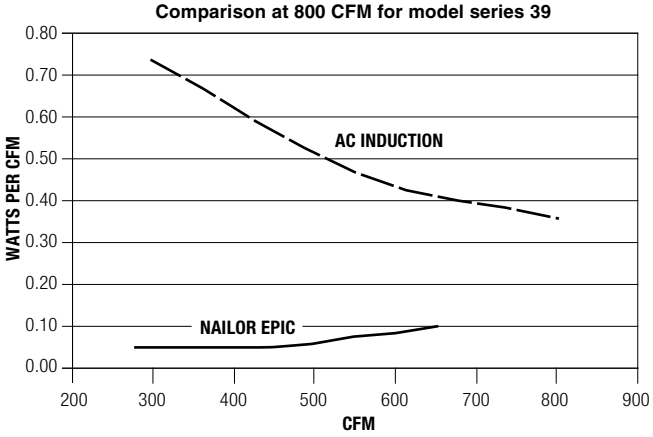
Comparison at 400 CFM for model series 39



Comparison at 600 CFM for model series 39



Comparison at 800 CFM for model series 39



WHAT IS THE PAYBACK PERIOD WITH EPIC FAN TECHNOLOGY® ?

The payback period varies. It depends on which unit you use, where you set the airflow, how much you run the equipment and what you are paying for electricity. The charts below are calculated assuming 24/7 operation of the Nailor unit vs. 80% run time on a competitive unit and $ 0.10 per kWh. If you run the equipment longer in your building or if you pay more for electricity, the payback will change proportionally. The charts consider only operating costs of the fan, other savings at the chiller and at the higher room set points can double the savings cutting the payback in half. On tall buildings, reduced riser sizes may offset the fan costs at the time of construction. Typically, you can run anywhere from 3 to 11 Engineered Comfort units for the same price as one of the competitions making the payback period as short as 6 months to as long as 36 months.

HIGH SPEED AIR FLOW (CFM)	COST TO RUN AC INDUCTION FAN 1 YEAR	COST TO RUN ENGINEERED COMFORT FAN 1 YEAR	NO. OF ENGINEERED COMFORT UNITS THAT CAN BE RUN FOR THE COST OF ONE COMPETITOR'S UNIT
350	$79.19	$15.77	5.02
400	$84.32	$17.04	4.95
600	$161.32	$21.81	7.40
800	$188.52	$16.51	11.42

Variable Air Volume EPIC Fan Technology® Fan Coil Operation with Constant Discharge Air Temperature

THE PROBLEM

High humidity at part load conditions has always been a problem with traditional fan coil unit operation and will become a greater factor in the selection of equipment by design engineers in the future. Too much humidity and comfort zone temperatures decrease to the point that occupants feel chilled or clammy. This may also create favorable conditions for mold and mildew growth.

As air moves across a cooling coil, the temperature of the coil is normally below the dew point of the return air. This causes the water in the air to condense on the coil surface where it is gathered in a drain pan and disposed of through drain lines. The air leaving a coil is typically about 55 to 60ºF. Since the temperature of the coil is usually below the dew point of the entering air, water has been condensed from the air and the air is very nearly saturated. This nearly saturated air warms slightly as it moves through the duct to the diffusers. By the time it exits into the room, it has risen a degree or two in a typical system. It then mixes with the room air and is again warmed, typically to about 74 – 78ºF (23 – 26ºC). Both air temperature and water content are increased in the room; however, relative humidity levels decrease because the warmer air is capable of holding more water. The percentage compared to saturated air at the higher temperature has decreased. See line A-B on the attached psychometric chart.

THE SOLUTION

The attached sequence of operation (See Figure 2) and psychometric chart (Figure 3), illustrate how the EPIC control sequence utilizes variable air volume control, chilled water valve modulation and constant discharge air temperature to control a typical space using our unique controls. Engineered Comfort has chosen 52ºF (11ºC) as the optimum discharge air temperature for fan coil operation.

By lowering the discharge air temperature slightly, the humidity levels in the room can be lowered. See line C-D on the attached psychometric chart. This causes the occupants to feel more comfortable at a slightly higher temperature. The room temperature required to maintain acceptable comfort can be raised by as much as 4ºF (2.5ºC). Most occupants will be more comfortable at the increased temperature. This accomplishes five very important results in addition to the energy and reheat savings already provided by the ECM motor.

1. Lower relative humidity:

If the air volume and water to the coil are modulated to maintain the discharge air temperature at all room conditions as described in the EPIC control sequence, room relative humidity levels decrease by 10 to 20%, and there is less chance for wall sweating, which in turn lowers the chances of mold growth. See line A-B vs. C-D on the attached psychometric chart.

2. Higher comfort level temperature Setpoint:

The lowered relative humidity allows the occupant to reset the room temperature higher by 1 – 4ºF (0.5 – 2.5ºC), while maintaining acceptable comfort levels. This in turn saves energy due to higher room set points. (See Figure 1 printed from ASHRAE Handbook, Fundamentals 2005, Chapter 8, page 8.12)

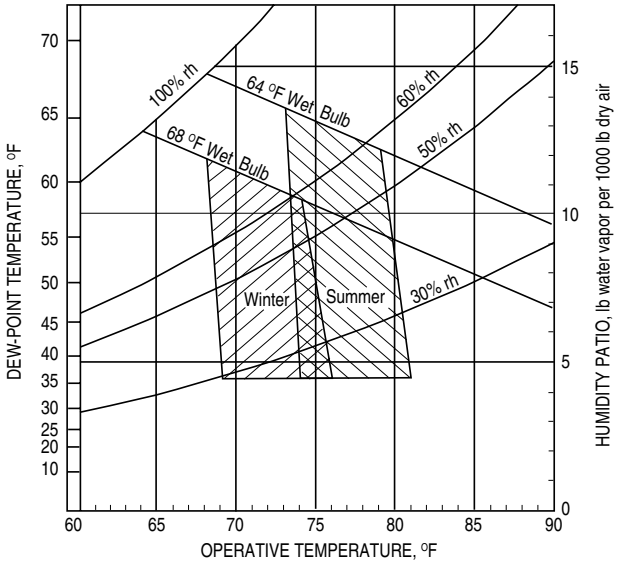


Figure 1: ASHRAE Summer and Winter Comfort Zones
(Acceptable ranges of operative temperature and humidity for people in typical summer and winter clothing during primarily sedentary activity.)

3. Increased chiller efficiency:

If the air volume and water to the coil are modulated to lower flow during part load conditions, fan energy and pumping energy is saved by taking advantage of room to room building diversity on both the water and air sides of the unit. Additionally, this holds the water and air in contact longer at the coil allowing greater heat transfer from the air to the water. This increases the return water temperature to the chiller and decreases the required pumping energy while increasing the efficiency of the chiller operation. Consequently, the pipe sizes needed for the risers and any duct run outs may be reduced. These reductions may offset any additional first cost of the equipment.

4. Lower airflow and reduced fan energy cost:

If the supply air temperature is lowered using the EPIC control sequence, less air from the fan coil is needed to satisfy the room demand. The reduction in airflow can be calculated as follows:

$$CFM_1 \times \Delta T_1 = CFM_2 \times \Delta T_2$$

Where: CFM_1 = Airflow and ΔT_1 = EAT – LAT for Std. FCU

CFM_2 = Airflow and ΔT_2 = EAT – LAT for EPIC FCU

Therefore: $$CFM_2 = CFM_1 \times \left(\frac{\Delta T_1}{\Delta T_2}\right)$$

Example 1:

$\Delta T_1 = 74 - 55 = 19 \quad \Delta T_2 = 76 - 52 = 24$

$CFM_2 = CFM_1 \times 0.79(\frac{19}{24})$

Example 2:

$\Delta T_1 = 78 - 55 = 23 \quad \Delta T_2 = 79 - 52 = 27$

$CFM_2 = CFM_1 \times 0.85(\frac{23}{27})$

$\text{Average} = \frac{0.79 + 0.85}{2} = 0.82$

$\text{Average } CFM_2 = CFM_1 \times 0.82\ (\frac{0.72 + 0.85}{2})$

Std. FCU (CFM_1) =	300	400	600	800	1000	1200
EPIC FCU (CFM_2) =	246	328	492	656	820	984

Table 1. Airflow Reduction Comparisons

Airflow can be lowered by approximately 18%, reducing the fan energy consumption by 20 to 50%, depending on setpoint, in addition to the input savings. (See Table 1.)

5. Lower humidity levels at part load conditions:
If the air volume is modulated to maintain the discharge air temperature at all room conditions, the perceived comfort level in the space stays constant and the noise levels decrease. Also, the relative humidity is greatly decreased when compared to what happens without modulated air at part load conditions. See line AB' on the psychrometric chart. Under part load conditions, without controlled discharge air temperature, the relative humidity levels in the space can rise to as much as 70% because of reduced run time or lowered discharge air temperatures on the dehumidifying equipment. This would cause the room set points to be greatly reduced to satisfy occupant comfort, which increases operating costs at part load conditions. At these reduced set points, the room will feel clammy and mold growth potential increases.

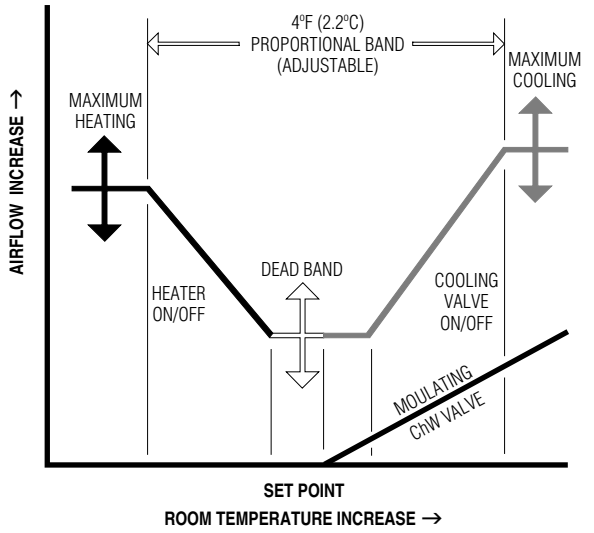


Figure 2. EPIC Fan Coil Unit Sequence of Operation

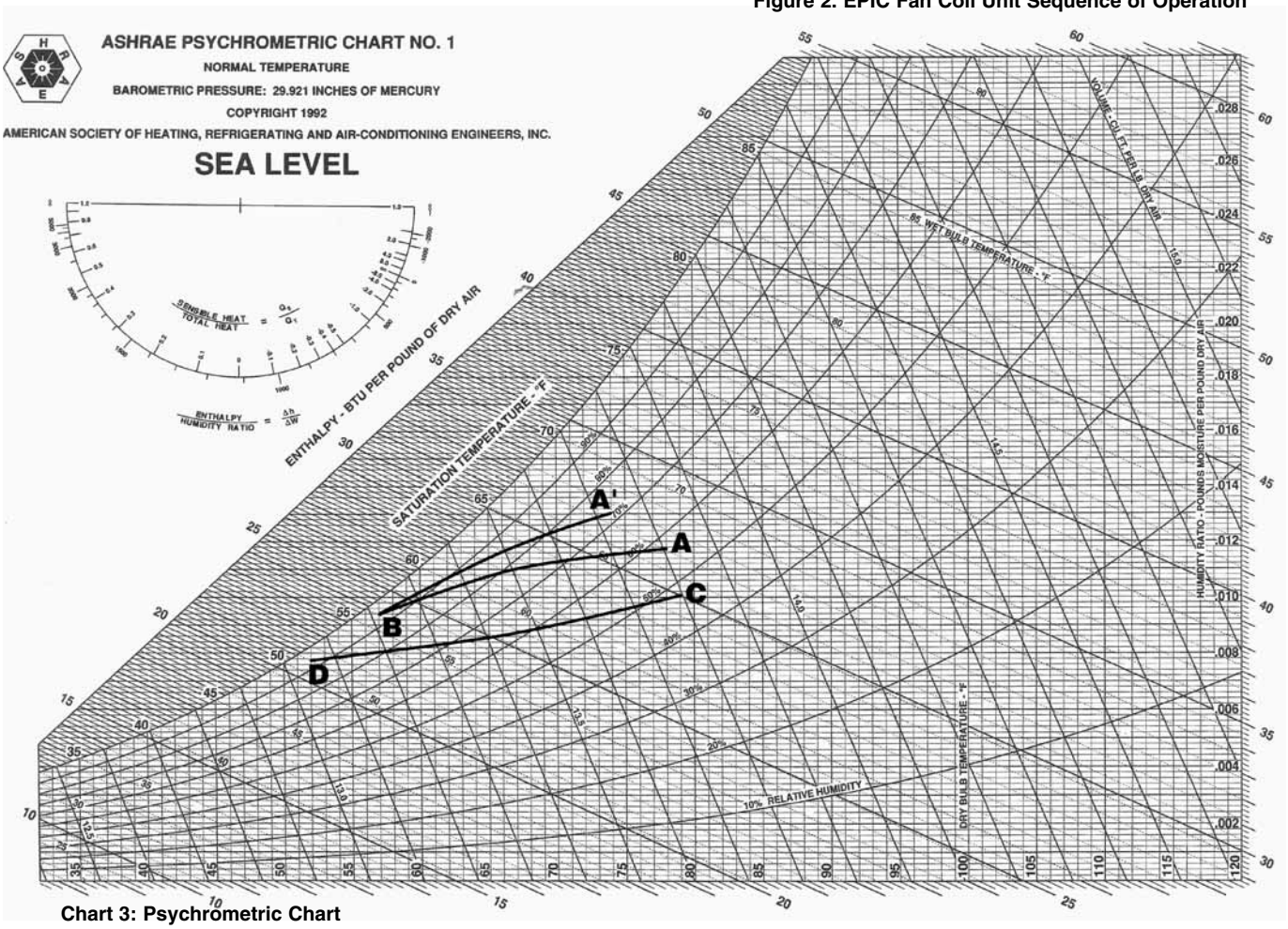


Chart 3: Psychrometric Chart

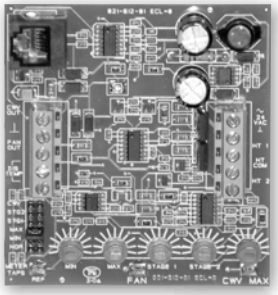
Analog Electronic Controls

Variable Air Volume • EPIC Fan Technology® • ECM Motor

FEATURES:

- Proportional + Integral control action provides precise flow and temperature control.
- Standalone operation.
- Pressure Independent fan operation ensures airflow settings remain constant.
- Factory calibrated controls simplify field installation and eliminate field balancing.
- Less costly than digital controls with no software programming requirement.
- Suitable for all types and sizes of residential and commercial building applications.
- Modern ergonomic, easy to use thermostat with large LCD display for live temperature read-out and nine function keys.
- Nine programmable functions for Set-point. Maximum Airflow, Minimum (deadband) Airflow, °F/°C mode, Two Unoccupied Modes (off and deadband mode), Proportional Band, Integration Time and Temperature Offset adjustment.

CTE-5201W36 Analog LCD thermostat



CEE-5201 Analog controller

Standard Control Sequence ACN • Cooling and 1 or 2 Stage Heating

Cooling Operation:

On a call for cooling, the chilled water valve will begin to modulate open. As the cooling demand increases, the valve will continue to open until the discharge air temperature reaches 52ºF (11ºC). On a continued call for cooling, the fan will begin to modulate toward the maximum cooling fan airflow as the chilled water valve continues to modulate open maintaining a 52ºF (11ºC) discharge air temperature. This process will continue until the fan reaches the cooling maximum airflow.

Deadband Operation:

With no demand in the space, there will be no call for heating or cooling. The fan will be at minimum airflow. The chilled water valve will be off. The hot water valve on the electric heat will also be off.

Heating Operation:

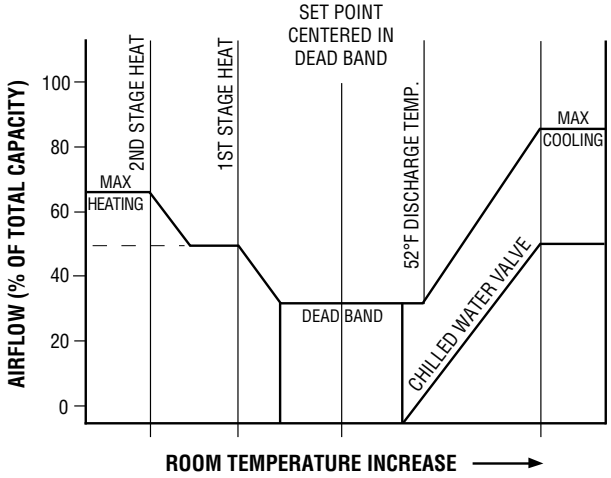
On a call for heating, the fan will ramp up to the fan heating setting and the first stage of heat will be energized. This may be either an on/off hot water valve or a stage of electric heat. Units with electric heat have an optional second stage available. The fan may also be set to operate at a second higher heating airflow setting. In the case of single stage heating, it can be energized at either output. On a decrease in heating demand, the sequence will reverse.

Off Unoccupied Mode:

The fan coil unit will be off. The heating set point will default to 50ºF (10ºC).

Deadband Unoccupied Mode:

In the unoccupied mode the fan will run at the preset minimum fan set point. The room temperature set point will default to 70ºF (21ºC), the heating set point will default to 60ºF and the cooling set point will default to 80ºF (27ºC).



Analog Control Thermostat and Controller

LCD Analog Thermostat

MODEL: CTE-5201W36

The CTE-5201W36 single output with limits and PI function thermostat is designed to be used with the CEE-5201 Fan Coil Unit controller. The thermostat comes with the following factory default settings:

Set Point (Default): 70°F (21.1ºC)
F/C Mode: Degrees F
MAX: 100%
MIN: 20%
PROP: 4ºF (2.2ºC)
UNOCC Mode: OFF
INT: 30 Minutes

Operation and Adjustment

To change any one of these values, except the F/C Mode, first push the button to display the value to be changed. Use the Up / Down buttons to change the value. Then hold down the corresponding button for approximately 10 seconds until the display begins to flash. The new value has now been written into memory.

To change to degrees C mode simply press and hold the F/C button down for 10 seconds until the display begins to flash. To change back to degrees F repeat the procedure.

Set Point (Normal)

The set point range is 60 – 85°F (15.6 – 29.4°C). To change the set point, push the SET POINT button to display the current value. Use the Up / Down buttons to change the value. The display will time out and revert back to displaying the room temperature and the thermostat will control to the new set point.

Set Point (Default)

If power is lost, when the unit is powered back up, the set point will revert to the default value of 70°F (21.1 C). This default value can be changed to any value in the set point range. This default set point is also used in the dead band unoccupied mode.

MAX

This is the maximum value that the output can attain. It is adjustable up to 100% (10 volts) and down to the MIN setting.

MIN

This is the min. value that the output can attain. It is adjustable down to 0% (0 volts) and up to whatever the MAX is set for.

F/C Mode

The F/C button toggles the display between °F and °C. Room temperature, set point, proportional band, dead band, and offset will be displayed in the desired units.

UNOCC

Momentarily pressing this button will put the unit into the unoccupied mode. It will stay in this mode until either the Set Point or Up / Down buttons are pushed. There are two unoccupied modes, OFF or DEADBAND.

OFF UNOCC Mode

The output voltage is forced to 0 volts (0%). A safety override will bring the output up to 2 volts placing the unit in heating if the room temperature falls below 50°F (10ºC). The output will return to 0 volts when the room temperature reaches 55°F (12.8ºC).

DEADBAND UNOCC Mode

In this mode the set point is set to 70°F (21.1ºC), the integral action is disabled, and a dead band of +/- 10°F (5.5ºC) is set around the set point. As long as the room temperature is within the dead band the fan will run at MIN conditions.

PROP

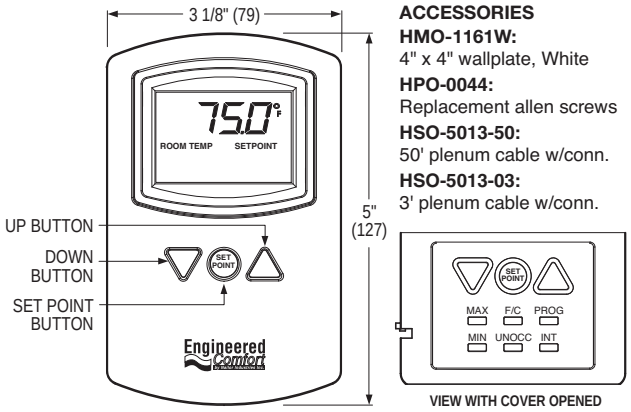
The proportional band is the temperature band around the set point over which the output will vary from MIN to MAX due to the proportional action alone. The proportional band is adjustable from 2 – 6°F (1.1 – 3.3°C).

INT

As long as there is a difference between room temperature and set point, the integral action will cause the output to integrate up or down. The integral time is the time it takes the integral action to repeat the effect of the proportional action. The integral time is adjustable from 15 to 30 minutes. Setting the integral time to 0 will disable the integral action.

Temperature Offset

By pressing both MIN and INT together it is possible to offset the internal temperature sensor by +/- 2°F (-16.7 – -18.9°C). After using the Up / Down buttons to change the offset both the MIN and INT buttons must be held down together for 10 seconds until the display begins to flash in order to write the new offset into memory



ACCESSORIES
HMO-1161W:
4" x 4" wallplate, White
HPO-0044:
Replacement allen screws
HSO-5013-50:
50' plenum cable w/conn.
HSO-5013-03:
3' plenum cable w/conn.

Figure 1: Model CTE-5201W36 Analog Thermostat

Thermostat Specifications:

Supply Voltage: 14 -19 VDC
Set Point Range: 60 – 85°F (15.6 – 29.4°C)
(Power On Default: 70°F (21.1°C)
Temperature Sensor Type: Thermistor
Accuracy: +/- 0.36ºF (0.2°C)
Display Degrees F or C: Selectable (Factory Setting: Degrees F)
Direct Acting Output: 0 – 10 VDC
MIN / MAX Limits: Adjustable 0 – 100%
(Factory Settings: MIN=20, MAX=100)
Proportional Band: 2 – 6°F (1.1 – 3.3°C) (Factory Setting: 4°F)
Integration Time: 15 – 60 Minutes (0=OFF)
(Factory Setting: 30)
Unoccupied Setpoint Modes: OFF or Deadband
(Factory Setting: OFF)
OFF Mode: Output Voltage = 0.0 Volts (Safety Override: Output Cycles 0.0 Volts to 2.0 Volts. To Maintain 50°F to 55°F (10 to 12.8ºC)
Deadband Mode: Integral Action Disabled & Set Point. Set to Default +/- 10°F (5.5ºC) Deadband. Deadband Output Midway between Max & Min.
Temperature Offset: Adjustable +/-2°F (1.1°C)
(Press MIN & INT together)
Operating Ambient: 34 – 125°F (1.1 – 51.6°C)
Shipping Ambient: -40 – 140°F (-40 – 60°C)
Humidity: 0 – 95% Non Condensing
Case Material: White ABS.
UL Frame Class 94HB.
RJ-11 Female Connector.
PIN1 NC PIN2 COM PIN3 SUPPLY
PIN4 OUT PIN5 COM PIN6 NC

Analog Fan Coil Unit Controller

MODEL: CEE-5201

The Engineered Comfort CEE-5201 controller is mounted inside the controls enclosure on the fan coil unit and is factory wired. Engineered Comfort fan coil units with analog controls provide extremely accurate variable air volume control. They are factory calibrated for each unit permitting quick and easy start-up with no field settings required, but may be simply and easily field adjusted if necessary to suit changing requirements.

Control Parameters:

- Maximum fan cooling airflow.
- Minimum fan cooling airflow.
- Modulating Chilled Water Valve Actuator.
- Stage 1 Heating with aux. fan airflow setting (on / off hot water valve or one stage electric heat).
- Stage 2 Heating with aux. fan airflow setting (on / off hot water valve or two stage electric heat).

Five potentiometers on the controller permit simple adjustment of flow settings with a 0 – 10 Vdc voltmeter. Meter taps are provided. A calibration chart is provided inside the controls enclosure for each unit.

Nailor Industries Inc. **ECM MOTOR FAN CALIBRATION TABLE**
CFM vs VDC (Imperial Units)
MODEL SERIES: 39VHFC UNIT SIZE 10 - 1/2 H.P. 120/240/277 VAC.
VERTICAL HI-RISE FAN COIL UNIT

CFM	0-10 VDC REF.	CFM	0-10 VDC REF.	CFM	0-10 VDC REF.	CFM	0-10 VDC REF.
0	*0.00*	364	2.74	708	5.19	982	7.65
217	*0.36*	373	2.81	718	5.27	989	7.72
219	*0.43*	382	2.89	727	5.34	997	7.79
221	*0.51*	392	2.96	736	5.41	1004	7.86
223	*0.58*	401	3.03	745	5.48	1012	7.94
225	*0.65*	411	3.10	755	5.56	1019	8.01
227	*0.72*	421	3.17	764	5.63	1027	8.08
229	*0.79*	431	3.25	772	5.70	1035	8.15
231	*0.87*	441	3.32	781	5.77	1043	8.23
233	*0.94*	452	3.39	790	5.84	1051	8.30
235	*1.01*	462	3.46	798	5.92	1059	8.37
237	*1.08*	472	3.54	807	5.99	1068	8.44
240	1.15	483	3.61	815	6.06	1076	8.51
241	1.23	493	3.68	823	6.13	*1085*	*8.59*
243	1.30	504	3.75	832	6.20	*1094*	*8.66*
245	1.37	514	3.82	840	6.28	*1103*	*8.73*
247	1.44	525	3.90	848	6.35	*1112*	*8.80*
250	1.52	535	3.97	856	6.42	*1122*	*8.87*
254	1.59	546	4.04	863	6.49	*1132*	*8.95*
258	1.66	556	4.11	871	6.57	*1142*	*9.02*
263	1.73	567	4.18	879	6.64	*1153*	*9.09*
268	1.80	577	4.26	886	6.71	*1164*	*9.16*
273	1.88	588	4.33	894	6.78	*1175*	*9.24*
279	1.95	598	4.40	901	6.85	*1186*	*9.31*
285	2.02	609	4.47	909	6.93	*1198*	*9.38*
292	2.09	619	4.55	916	7.00	*1211*	*9.45*
298	2.16	629	4.62	924	7.07	*1223*	*9.52*
306	2.24	639	4.69	931	7.14	*1236*	*9.60*
313	2.31	649	4.76	938	7.22	*1250*	*9.67*
321	2.38	659	4.83	945	7.29	*1264*	*9.74*
329	2.45	669	4.91	953	7.36	*1279*	*9.81*
337	2.53	679	4.98	960	7.43	*1293*	*9.88*
346	2.60	689	5.05	967	7.50	*1308*	*9.96*
355	2.67	699	5.12	975	7.58	*1317*	*10.00*

THIS UNIT HAS BEEN FACTORY SET AT _____ CFM.
RE-CALIBRATION IS NOT REQUIRED UNLESS THE ZONE DESIGN AIRFLOW REQUIRMENT HAS CHANGED.
FOR CALIBRATION INSTRUCTIONS, REFER TO BULLETIN WWECM. CAUTION IF CALIBRATING IN SHADED AREA.
AT LOW VOLUMES, VARIATIONS IN FLOW FROM COOLING TO HEATING MAY BE GREATER THAN 5%. AT HIGH VOLUMES, NOISE MAY BE EXCESSIVE.
SUBJECT TO CHANGE WITHOUT NOTICE

Figure 2. Typical Calibration Chart.

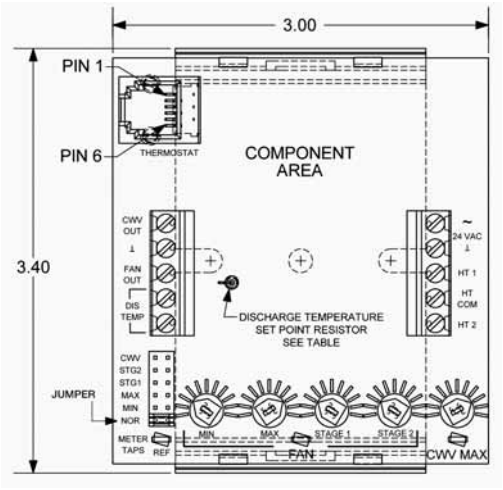


Figure 1. CEE-5201 Analog Fan Coil Unit Controller.

Specifications:

Supply Voltage: 24 VAC +20/-15% 50/50Hz
Supply Power: 1 VA plus output loads
Discharge Temp Input: 10K OHM@25ºC, NTC 4.37% / ºC
Fan Output: Min. Adjustable 0 – 10 VDC
Stage 1 Max adjustable from Min. to 10 VDC
Stage 2 Max adjustable from stage 1 Max to 10VDC
Cooling Max adjustable from Min. to 10 VDC
CWV Output: Max adjustable from 0 to 10 VDC
Heat Stage 1 & 2 Outputs: Triac outputs 10VA Max @ 24VAC
Thermostat connector: PIN 1 NC
PIN 2 DC COM
PIN 3 Supply Output 16 VDC +/-10% 10mA
PIN 4 T in 1-10 VDC 100 KOHM
PIN 5 DC COM
PIN 6 NC
Connections: Plated screw terminals 14 to 22 AWG Cu
RJ-11 thermostat jack
Ambient Limits: Operating 0 to 120ºF (-18 to 49ºC)
Shipping -40 to 140ºF (-40 to 60ºC)
Mounting: Open Board / Snaptrack supplied

Direct Digital Controls

Variable Air Volume • EPIC Fan Technology® • ECM Motor

Engineered Comfort has developed the first native BACnet, fully programmable controller designed specifically for fan coil units.

FEATURES:

- PID control action for ultimate flow and temperature control.
- Suitable for stand-alone operation or may be networked to other BACnet devices (MS/TP compliant).
- As part of a complete facilities management system, they provide precise monitoring and control of connected points.
- Fully programmed for standard sequence of operation.
- Custom control programming available for options such as humidifier control, baseboard heating and modulating outside air damper.
- Real 7-day programmable time clock.
- Easy to use wall or unit mounted thermostat with LCD display for live temperature read-out and time of day (Humidity optional).
- Nine function keys, six of which are programmable for set-point, time, day, stop, start and temperature set-back.

KMD-1164W36 Digital Thermostat (Net Sensor)

BAC-7303C Digital Controller

Standard Control Sequence DN7 • Cooling and 1 or 2 Stage Heating

Cooling Operation:

On a call for cooling, the chilled water valve will begin to modulate open. As the cooling demand increases, the valve will continue to open until the discharge air temperature reaches 52°F (11.1°C). On continued call for cooling, the fan will begin to modulate toward the maximum cooling fan airflow as the chilled water valve continues to modulate open maintaining a 52°F (11.1°C) discharge air temperature. This process will continue until the fan reaches the cooling maximum airflow.

Deadband Operation:

With no demand in the space, there will be no call for heating or cooling. The fan will be at minimum airflow. The chilled water valve will be off. The hot water valve or the electric heat relay will also be off.

Heating Operation:

On a call for heating, the fan will ramp up to the fan heating setting and the first stage of heat will be energized. This may be either an on/off hot water valve or a stage of electric heat. Units with electric heat have an optional second stage available. The fan may also be set to operate at a second higher heating airflow setting. In the case of single stage heating, it can be energized at either output. On a decrease in heating demand, the sequence will reverse.

Setback Options (Time of day, day of week):

The setback operation stops any heating or cooling action until the room temperature exceeds the set-point by 10°F (5.5°C). There are four setback options:

1. **Off** In this mode there is no setback and room temperature control is by a PID routine.
2. **Option 1** Setback M-F only during the scheduled time period.
3. **Option 2** Setback continuous everyday.
4. **Option 3** Setback M-F during scheduled time period and continuous during the weekend. During setback the integral action is disabled and the room temperature must exceed the energy dead band before any heating or cooling will take place. The dead band is adjustable up to 20°F (11°C) though a PC interface or through a network.

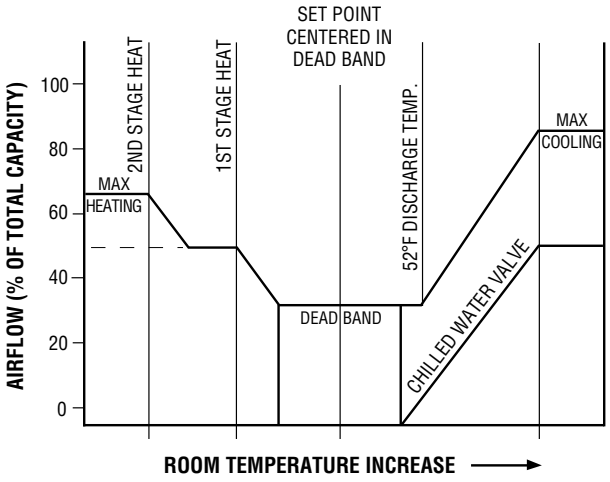


Figure 1: Control Sequence DN7

Direct Digital Controls

Optional Control Sequences

All Engineered Comfort digital control sequences utilize the same basic mode of operation as the standard DN7 control sequence previously described. The following options are also available in addition to the basic cooling / heating sequence.

DN7H Cooling with 1 or 2 stage heating plus humidifier control

On a call for cooling, the humidifier is disabled. The humidifier is enable when relative humidity (RH) falls below set point and the system is in heating or deadband mode. Standard RH setting is 50% (adjustable).

The KMD-1184W36 digital thermostat included, features Relative Humidity live read-out.

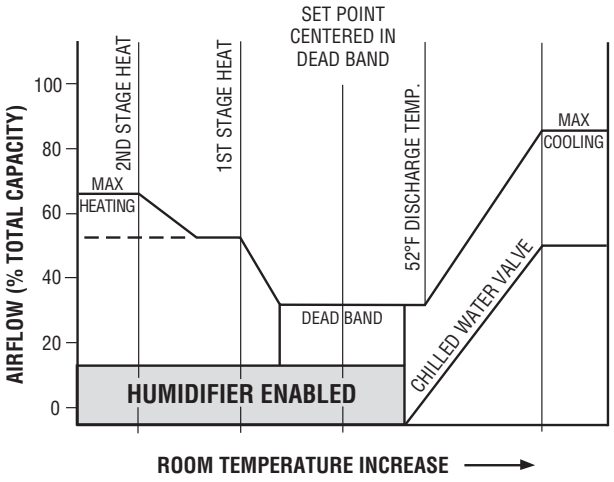


Figure 2: Control Sequence DN7H

DN7B Cooling with 1 stage heating plus 2nd stage on/off perimeter (baseboard) heat

The first stage heating output is used to control either on/off hot water heat or a single stage of electric heat. The second stage output is used to control a remote heater, such as a perimeter baseboard heater.

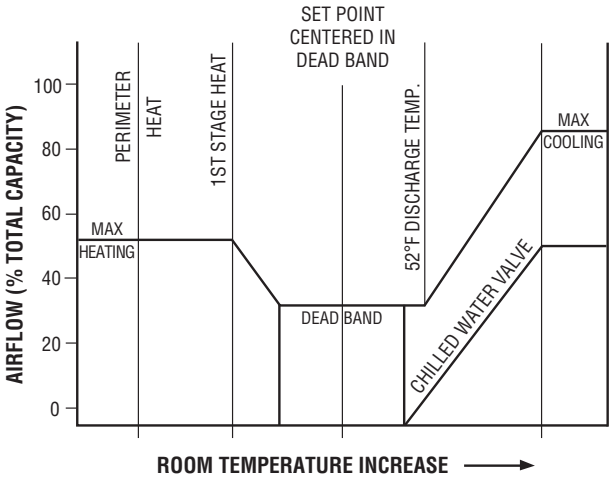


Figure 3: Control Sequence DN7B

Custom Control Sequences

The standard Engineered Comfort KMD-7303(C) digital controller features 4 outputs. 2 universal outputs are programmed as 0 – 10 Vdc analog outputs to control the variable air volume ECM motor and modulating Chilled Water valve. There are also 2 triac outputs. One is a dual-staged triac to control 1 or 2 stages of heat. The other spare triac output is available for an optional on / off application such as a humidifier (see Figure 2: Control Sequence DN7H).

Engineered Comfort can also configure a larger optional BAC-5801 digital controller for more complex applications. This controller features 8 universal outputs. Each output may be configured as an analog or binary object. Output override boards are plugged in to the controller and are used to convert the universal output to a relay contact or triac output as required.

Applications include, but are not limited to pressure independent modulating outside air damper control, modulating hot water valves, SCR controlled electric heat and multiple remote baseboard heat with remote zone sensing. Contact your Engineered Comfort Sales Representative for more information.

BAC-8501

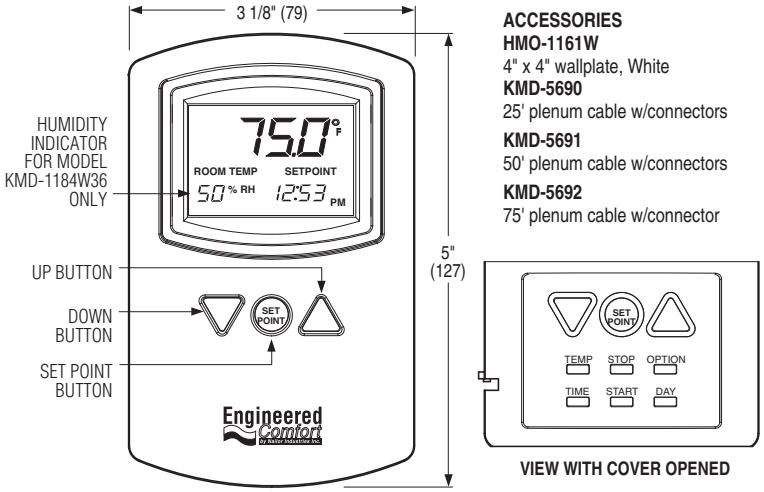
Digital Control Thermostat

Models: KMD-1164W36
KMD-1184W36

The KMD-1164W36 and KMD-1184W36 thermostats are a wall mounted, temperature programmable user interface for use with a Nailor direct digital controls (DDC) fan coil unit controller. The model KMD-1184W36 also includes a humidity sensor and readout display and is used when controlling an optional humidifier.

FEATURES

- Large four character LCD display for live temperature read-out.
- Smaller LCD display for time (and humidity on model KMD-1184W36).
- Nine function keys, six of which are programmable for set-point, time, day, stop, start and temperature set-back.
- Four-pin EIA-485 (formerly RS-485) data port on the underside for easy temporary computer connection to the controller.
- White finish



ACCESSORIES

HMO-1161W
4" x 4" wallplate, White

KMD-5690
25' plenum cable w/connectors

KMD-5691
50' plenum cable w/connectors

KMD-5692
75' plenum cable w/connector

OPERATION AND ADJUSTMENT

1. The Thermostat displays "ROOM TEMPERATURE" in "°F or °C" and current "TIME" with AM or PM format.
2. Three function buttons are visible and operate with the door closed.
   a. Triangular "down" button
   b. Round SET POINT button
   c. Triangular "up" button

   Pushing the "SET POINT" button will display the currently selected room temperature set-point for 10 seconds. The "SETPOINT" icon will also be displayed. Pushing the "down" button, while the "SETPOINT" is displayed, will decrease the room temperature set-point. Pushing the "up" button will increase the room temperature set-point. Releasing the "down" or "up" pushbutton at the new desired room temperature set-point will lock in the new set-point after 10 seconds.
3. Opening the door will display six additional push buttons;
   a. "TEMP", "TIME", "STOP", "START", "OPTION", and "DAY". "TEMP"; pushing the "TEMP" button will immediately display the "ROOM TEMPERATURE", overriding any other previously selected display parameter.
   b. "TIME"; pushing the "TIME" button will display the currently set time for 10 seconds. Pushing the "down" button will decrease the time setting and pushing the "up" button will increase the time. Releasing the "down" or "up" pushbutton at the new desired time setting will lock in the new time after 10 seconds.
   c. "STOP"; pushing the "STOP" button will display the currently set stop time for 10 seconds. Pushing the "down" button will decrease the stop time setting and pushing the "up" button will increase the stop time. Releasing the "down" or "up" pushbutton at the new desired stop time setting will lock in the new stop time after 10 seconds.
   d. "START"; pushing the "START" button will display the currently set start time for 10 seconds. Pushing the "down" button will decrease the start time setting and pushing the "up" button will increase the start time. Releasing the "down" or "up" pushbutton at the new desired start time setting will lock in the new start time after 10 seconds.
   e. "OPTION"; pushing the "OPTION" button will display the currently set setback option for 10 seconds. The setback operation stops any heating or cooling action until the room temperature exceeds the set-point by 10°F. There are four possible setback options:
      i) "OFF"; there is no setback and room temperature control is controlled at the room temperature set-point.
      ii) "1"; Setback the room temperature set-point during the scheduled time period (Start Time to Stop Time) on Monday through Friday (Day 2 though Day 6) only.
      iii) "2"; Setback the room temperature set-point continuously everyday regardless of Start/Stop Times.
      iv) "3"; Setback the room temperature set-point during the scheduled time period (Start Time to Stop Time) on Monday through Friday (Day 2 though Day 6) and continuously on the weekend (Day 1 and Day7) regardless of Start/Stop Times.
   f. "DAY"; pushing the "DAY" button will display the currently set day for 10 seconds. Pushing the "down" button will decrease the day setting and pushing the "up" button will increase the day setting. Releasing the "down" or "up" pushbutton at the new desired day setting will lock in the new day after 10 seconds.

      Day "1"; Sunday
      Day "2"; Monday
      Day "3"; Tuesday
      Day "4"; Wednesday
      Day "5"; Thursday
      Day "6"; Friday
      Day "7"; Saturday

GENERAL NOTES:

1. Nailor only recommends chilled water valve control for Nailor Digital and Analog VAV control sequences where a constant discharge temperature is maintained and humidity is therefore controlled. Modulating cooling valve control with fixed fan speed electric controls can increase relative humidity in the space at part load conditions. Modulating heat valve control may result in low leaving air temperatures while the valves reduce flow as setpoint is approached. Nailor does not recommend their use with standard controls for either application.
2. All 39 Series Hi-Rise Units include two flexible stainless steel briefed hoses and full port ball isolation valves per coil. This hose/valve combination provides a “union” type connection to allow coil removal. Hi-Rise Units require a Nailor supplied piping package which is factory assembled, installed and wired.
3. 35F and 37F Horizontal Units with Nailor Digital and Analog VAV Controls require a Nailor supplied piping package. This package (less optional ball valve) is factory assembled, installed and wired in a full protective enclosure with access door. Ball valves when selected as part of the package ship loose for field connection.
4. All standard piping packages and components described in this catalog are for chilled and hot water applications. They may be also used with up to 50% ethylene and propylene glycol solutions.
5. Control valve actuators are removable and may be serviced or replaced without removal of the valve body. All control valves are piped on the return side of the coil (3-way control valves are mixing).
6. 2-position (spring return) chilled and hot water valve / actuators are piped normally closed to the coil as standard. For hot water coils, control valves are available normally open as an option. This must be stated clearly on schedule/order.
7. All ball isolation valves on the return line are furnished with an adjustable memory stop feature (when no other flow control device is selected) and may be used as a balancing valve.
8. Pressure/Temperature (P/T) ports when selected are supplied on the ball valves as standard. If it is required that P/T ports be located to monitor the pressure and temperature directly across the coil only, select PTO (other location) option.
9. Automatic fixed flow controls (FC, FCC) are available in the following flow (GPM) ratings. Individual coil GPM requirements must be specified on schedule/order.

   1/2" (13) valve: 0.5 to 4.0 GPM in 0.5 GPM increments. 5 to 9 GPM in 1 GPM increments.

   3/4" (19) valve: 3.0 to 4.0 GPM in 0.5 GPM increments. 5 to 12 GPM in 1 GPM increments.
10. 2-pipe system cooling and heating auto changeover systems using a 2-way control valve include a 1/4" (6.3) bleed line to assure proper changeover thermostat (Aquastat) operation.
11. The valve package piping and component details in the catalog are for standard valves and components. Performance ratings such as Cv, max. close-off pressure, operating temperature and pressure are shown in component specifications. Suitability for use must be based on individual application requirements determined by others. Nailor assumes no responsibility for selection and/or application of valve package and components.

Basic System Types and Application:

All types may use a 2-way or 3-way motorized control valve

2-Pipe System (One Valve Package)

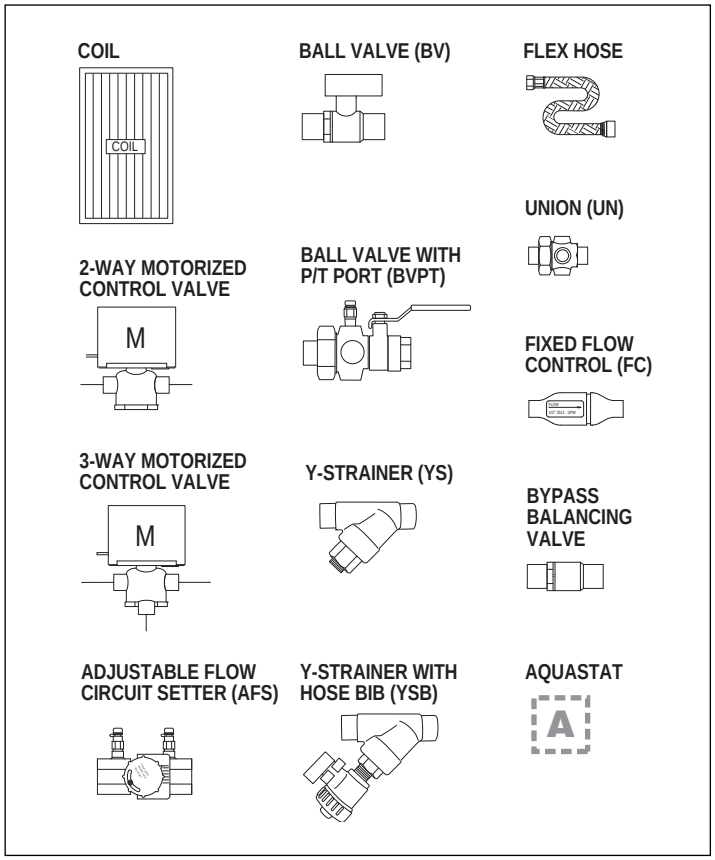
A) Hydronic Cooling Only
B) Hydronic Heating Only
C) Hydronic Cooling and Heating (Aquastat required)
D) Hydronic Cooling with Total Electric Heat
E) Hydronic Cooling and Heating with Auxiliary Electric Heat (Aquastat required)

4-Pipe System (Two Valve Packages)

A) Hydronic Cooling and Heating

Legend:

BV Ball Valves (2). Memory stop where required.
BVPT Ball Valves (2) with Pressure/Temperature (P/T) Port. Memory stop where required.
FC Fixed Flow Control
FCC Fixed Cartridge Flow Control
AFS Adjustable Flow Circuit Setter
YS Y Strainer
YSB Y Strainer w/hose bib valve
PTO P/T Ports (other location)
BPV Bypass Balancing Valve



Model Series: 39VH and 39L Vertical Hi-Rise Units • 2-Way Valves

2-Way Chilled / Hot Water Valve						
Basic Package Code		Components				
2-Position Actuator	Modulating Actuator	BV	BVPT	FC	FCC	AFS
202	402	•				
203	403		•			
210	410	•		•		
211	411		•	•		
212	412	•			•	
213	413		•		•	
214	414	•				•

Options			
Options Package Code	Components		
	YS	YSB	PTO
01	•		
02		•	
03			•
04	•		•
05		•	•

Notes:

1. Select a Basic Package for each valve and an Options Package if required.
2. Nailor Electric Controls (PSC motor) require a 2-position actuator selection for both chilled water and hot water valves.
3. Nailor Digital and Analog VAV Controls (ECM motor) require a modulating chilled water valve actuator and a 2-position hot water valve actuator selection for 4-pipe systems.
4. A 1/4" (6.3) bleed line and Aquastat is furnished on 2-pipe cooling and heating auto changeover systems.
5. All Vertical Hi-Rise Units include two flexible hoses.

Legend:

BV Ball Valves (2). Memory stop where required.

BVPT Ball Valves (2) with Pressure/Temperature (P/T) Ports. Memory stop where required.

FC Fixed Flow Control

FCC Fixed Cartridge Flow Control

AFS Adjustable Flow Circuit Setter

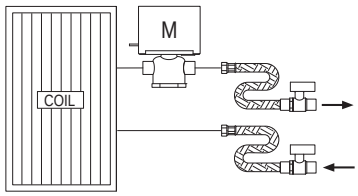
YS Y Strainer

YSB Y Strainer w/hose bib valve

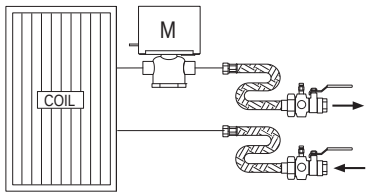
PTO P/T Ports (other location)

Examples:

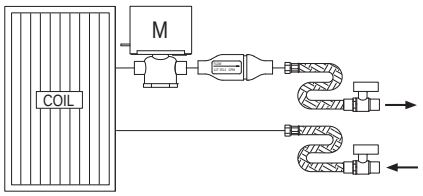
CODE: 202/402
BALL VALVES



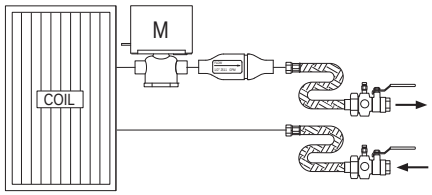
CODE: 203/403
BALL VALVES WITH P/T PORTS



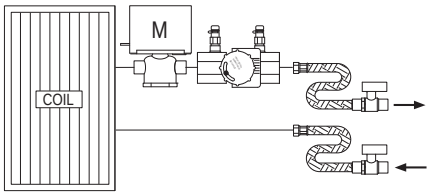
CODE: 210/410
BALL VALVES, FIXED FLOW CONTROL



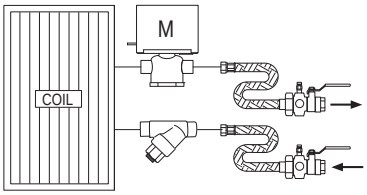
CODE: 211/411
BALL VALVES WITH P/T PORTS,
FIXED FLOW CONTROL



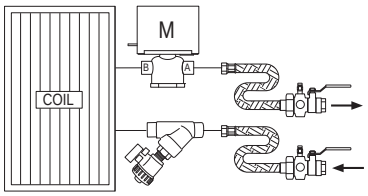
CODE: 214/414
BALL VALVES,
ADJUSTABLE FLOW CIRCUIT SETTER



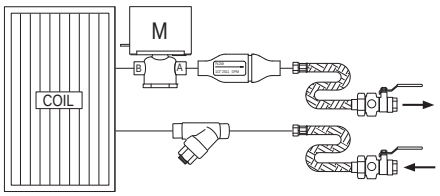
CODE: 203/403-01
BALL VALVES WITH P/T PORTS,
Y-STRAINER



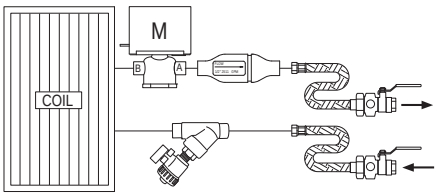
CODE: 203/403-02
BALL VALVES WITH P/T PORTS,
Y-STRAINER W/HOSE BIB



CODE: 211/411-01
BALL VALVES WITH P/T PORTS,
FIXED FLOW CONTROL, Y-STRAINER



CODE: 211/411-02
BALL VALVES WITH P/T PORTS, FIXED FOW
CONTROL, Y-STRAINER W/HOSE BIB



Model Series: 39VH and 39L Vertical Hi-Rise Units • 3-Way Valves

3-Way Chilled / Hot Water Valve						
Basic Package Code		**Components**				
2-Position Actuator	**Modulating Actuator**	**BV**	**BVPT**	**FC**	**FCC**	**AFS**
302	502	•				
303	503		•			
310	510	•		•		
311	511		•	•		
312	512	•			•	
313	513		•		•	
314	514	•				•

Options				
Options Package Code	**Components**			
	YS	**YSB**	**PTO**	**BPV**
01	•			
02		•		
03			•	
04	•		•	
05		•	•	
06				•
07	•			•
08		•		•
09	•		•	•
10		•	•	•

Notes:

1. Select a Basic Package for each valve and an Options Package if required.
2. Nailor Electric Controls (PSC motor) require a 2-position actuator selection for both chilled water and hot water valves.
3. Nailor Digital and Analog VAV Controls (ECM motor) require a modulating chilled water valve actuator and a 2-position hot water valve actuator selection for 4-pipe systems.
4. An Aquastat is furnished on 2-pipe cooling and heating auto changeover systems.
5. All Vertical Hi-Rise Units include two flexible hoses.

Legend:

BV Ball Valves (2). Memory stop where required.

BVPT Ball Valves (2) with Pressure/Temperature (P/T) Ports. Memory stop where required.

FC Fixed Flow Control

FCC Fixed Cartridge Flow Control

AFS Adjustable Flow Circuit Setter

YS Y Strainer

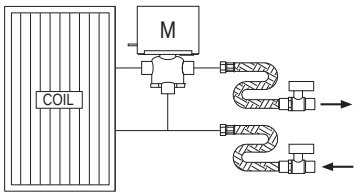
YSB Y Strainer w/hose bib valve

PTO P/T Ports (other location)

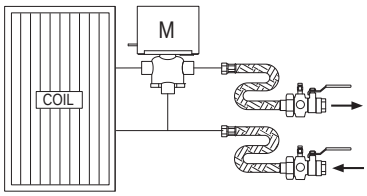
BPV Bypass Balancing Valve

Examples:

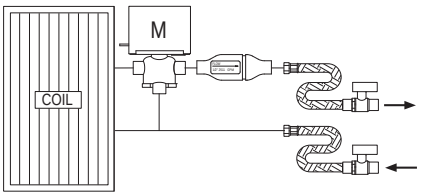
CODE: 302/502
BALL VALVES



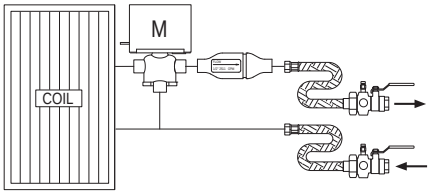
CODE: 303/503
BALL VALVES WITH P/T PORTS



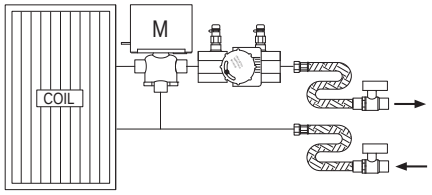
CODE: 310/510
BALL VALVES, FIXED FLOW CONTROL



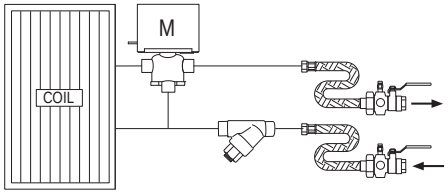
CODE: 311/511
BALL VALVES WITH P/T PORTS,
FIXED FLOW CONTROL



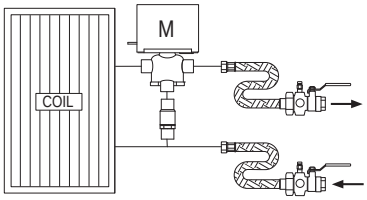
CODE: 314/514
BALL VALVES,
ADJUSTABLE FLOW CIRCUIT SETTER



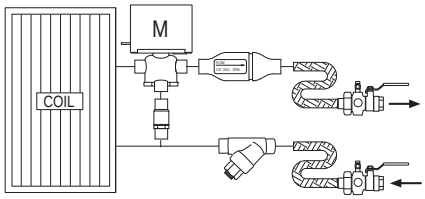
CODE: 303/503-01
BALL VALVES WITH P/T PORTS,
Y-STRAINER



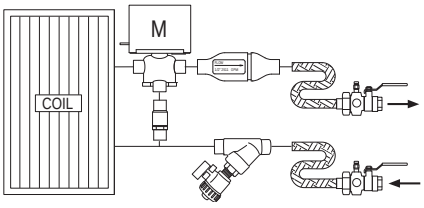
CODE: 303/503-06
BALL VALVES WITH P/T PORTS,
BYPASS BALANCING VALVE



CODE: 311/511-07
BALL VALVES W/ P/T PORTS, FIXED FLOW CONTROL,
Y-STRAINER, BYPASS BALANCING VALVE



CODE: 311/511-08
BALL VALVES WITH P/T PORTS, FIXED FLOW CONTROL,
Y-STRAINER W/HOSE BIB, BYPASS BALANCING VALVE



Model Series: 35F and 37F Horizontal Fan Coil Units • 2-Way Valves

2-Way Chilled / Hot Water Valve						
Basic Package Code		Components				
2-Position Actuator	Modulating Actuator	BV	BVPT	FC	FCC	AFS
201	401					
202	402	•				
203	403		•			
204	404			•		
205	405				•	
206	406					•
210	410	•		•		
211	411		•	•		
212	412	•			•	
213	413		•		•	
214	414	•				•

Options			
Options Package Code	Components		
	YS	YSB	PTO
01	•		
02		•	
03			•
04	•		•
05		•	•

Notes:

1. Select a Basic Package for each valve and an Options Package if required.
2. Nailor Electric Controls (PSC motor) require a 2-position actuator selection for both chilled water and hot water valves.
3. Nailor Digital and Analog VAV Controls (ECM motor) require a modulating chilled water valve actuator and a 2-position hot water valve actuator selection for 4-pipe systems.
4. A 1/4" (6.3) bleed line and Aquastat is furnished on 2-pipe cooling and heating auto changeover systems.

Legend:

BV Ball Valves (2). Memory stop where required.

BVPT Ball Valves (2) with Pressure/Temperature (P/T) Ports. Memory stop where required.

FC Fixed Flow Control

FCC Fixed Cartridge Flow Control

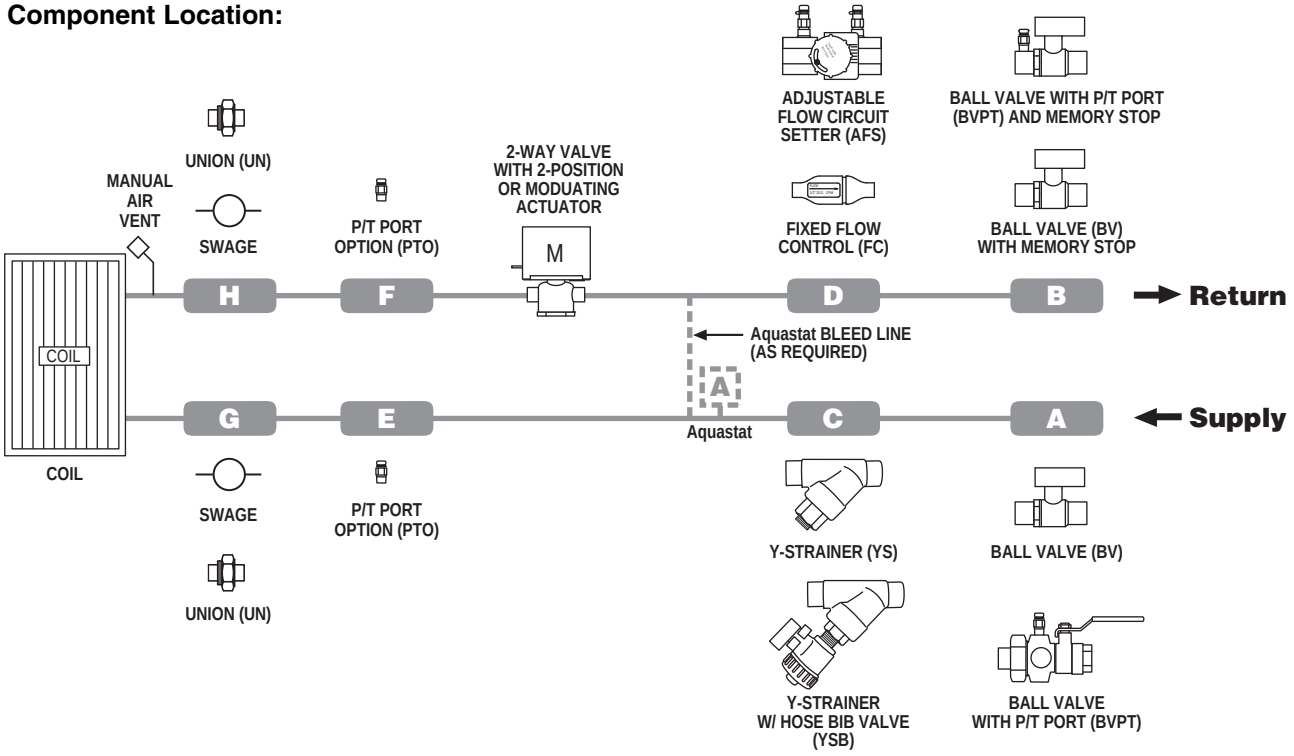
AFS Adjustable Flow Circuit Setter

YS Y Strainer

YSB Y Strainer w/hose bib valve

PTO P/T Ports (other location)

Component Location:



Model Series: 35F and 37F Horizontal Fan Coil Units • 3-Way Valves

3-Way Chilled / Hot Water Valve						
Basic Package Code		**Components**				
2-Position Actuator	**Modulating Actuator**	**BV**	**BVPT**	**FC**	**FCC**	**AFS**
301	501					
302	502	•				
303	503		•			
304	504			•		
305	505				•	
306	506					•
310	510	•		•		
311	511		•	•		
312	512	•			•	
313	513		•		•	
314	514	•				•

Options				
Options Package Code	**Components**			
	YS	**YSB**	**PTO**	**BPV**
01	•			
02		•		
03			•	
04	•		•	
05		•	•	
06				•
07	•			•
08		•		•
09	•		•	•
10		•	•	•

Notes:

1. Select a Basic Package for each valve and an Options Package if required.
2. Nailor Electric Controls (PSC motor) require a 2-position actuator selection for both chilled water and hot water valves.
3. Nailor Digital and Analog VAV Controls (ECM motor) require a modulating chilled water valve actuator and a 2-position hot water valve actuator selection for 4-pipe systems.
4. An Aquastat is furnished on 2-pipe cooling and heating auto changeover systems.

Legend:

BV Ball Valves (2). Memory stop where required.

BVPT Ball Valves (2) with Pressure/Temperature (P/T) Ports. Memory stop where required.

FC Fixed Flow Control

FCC Fixed Cartridge Flow Control

AFS Adjustable Flow Circuit Setter

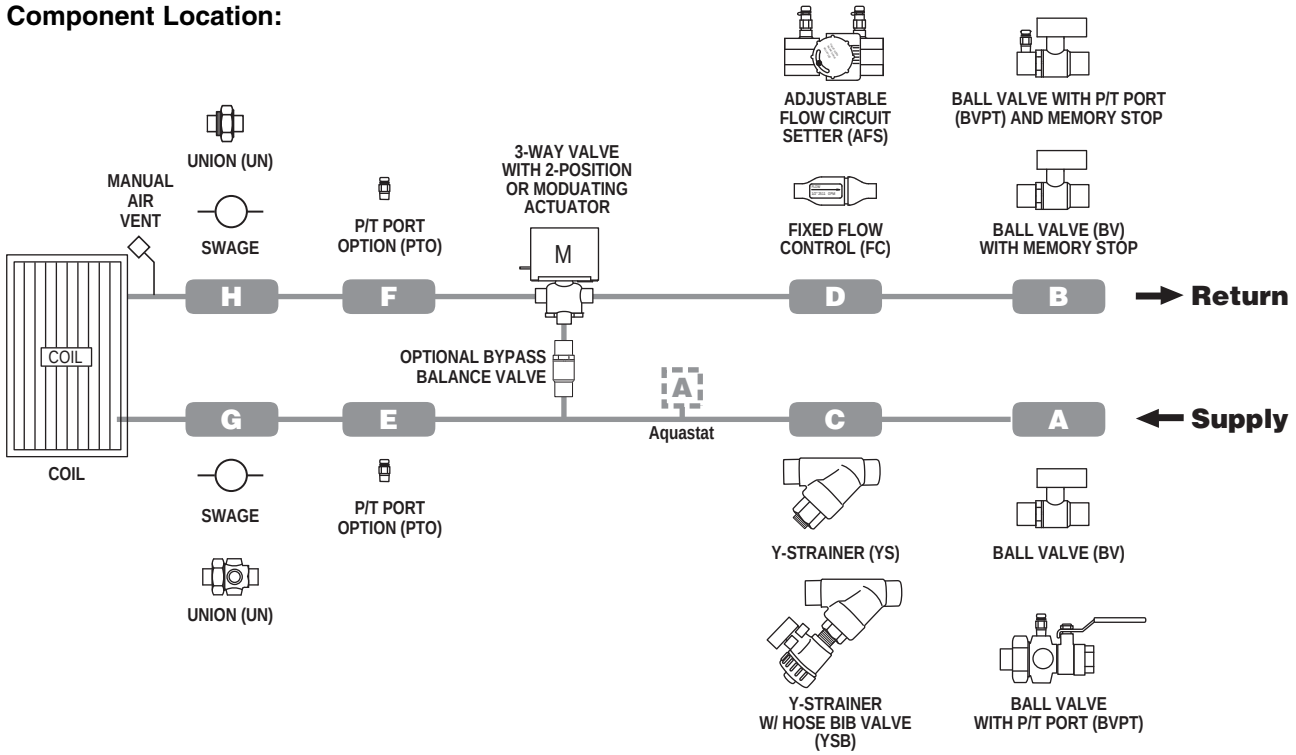
YS Y Strainer

YSB Y Strainer w/hose bib valve

PTO P/T Ports (other location)

BPV Bypass Balancing Valve

Component Location:



Components and Specifications

Engineered Comfort Vertical Hi-Rise fan coil units are supplied as standard with a factory supplied and installed valve package for the main cooling coil and optional heating coil. This assures all components are compatible with the application and install with the physical restrictions of the cabinet for ease of maintainance and service.

Engineered Comfort Horizontal fan coil units have standard valve packages available as a factory installed or “ship loose” option for field connection.

Valve packages consist of a variety of components and selection is dependent upon the application. The following section provides a detailed description of each of the components. Photos are for general representation purposes only. Vendors and models are subject to change without notice.

Manual Ball Valve with Memory Stop (BV)

Ball valves, also known as end valves, allow the unit to be cut off for servicing purposes. They are often used for water balancing. These full port ball valves have a compact handle that rotates 90 degrees. The return side valve is supplied with an adjustable memory stop position lever to limit travel of the on/off handle where required. This allows the ball valve to be closed and returned to the balance setting position without re-testing the system.

Nominal size: 1/2" or 3/4"
Body material: Forged brass
Ball: Chrome plated brass
Ball seal: Teflon
Shaft seals: Viton O-Rings
Temp. rating: 325ºF max.
Pressure rating: 600 psi max.
Cv: 17 (1/2"), 40 (3/4")

Manual Ball Valve with P/T Port (BVPT)

Same use as BV above except in addition, the supply and return side valve includes a Pressure / Temperature (PT) Port to allow testing of water pressure, different pressure or water temperature across the coil/valve package assembly. The return side valve is supplied with an adjustable memory stop where required for balancing.

Nominal size: 1/2" or 3/4"
Body material: Forged brass
Ball: Chrome plated brass
Ball seal: Teflon
Shaft seals: Viton O-Rings
Temp. rating: 325ºF max.
Pressure rating: 600 psi
Cv: 21 (1/2"), 42 (3/4")

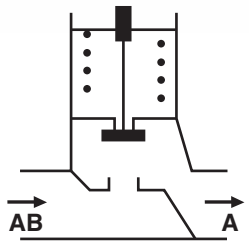


Figure 1. 2-way Valve
(Normally open to coil flow)

2-Way, 2-Position Control Valve / Actuator

All valves are piped on the return side of the coil. Figure 3 shows the valves in the open position or full flow position. The valve spring provides the necessary force to hold the stem in the raised or Normally Open (NO) position.

In the open position, water can flow through the coil to heat or cool the space. In the closed position, water cannot flow. Actuators are 2-position spring return operation. The Normally Open (NO) or Normally Closed (NC) valve position (relative to water flow through the coil) on power failure is determined by the actuator model selection. NO / NC action must be compatible with the thermostat / control package selection.

Actuator are available for line and 24 Vac low voltage applications.

Nominal size: 1/2" or 3/4"
Body material: Brass
Pressure rating: 125 psi max.
Temperature rating: 230ºF max.
Max. close off pressure: 44 psi
Cv: 2.5 (1/2"), 4.1 (3/4")
Actuator power consumption: 10 VA max.

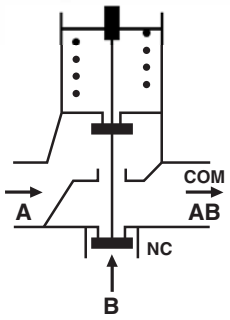


Figure 2. 3-way Valve
(Normally open to coil flow)

3-Way, 2-Position Control Valve / Actuator

3-Way valves are piped on the return side of the coil as mixing valves. In the open position, water can flow through the coil to heat or cool the space and the bypass port is closed. (Flow is A to AB). In the closed position, water cannot flow through the water coil and is diverted to flow through the bypass line (Flow is B to AB) maintaining full flow through the bypass port. Actuators are 2-position spring return operation. The NO / NC valve position on power failure (relative to water flow through the coil) is determined by the actuator model selection and must be compatible with the thermostat / control package selection.

Actuator are available for line and 24 Vac low voltage applications.

Nominal size: 1/2" or 3/4"
Body material: Brass
Pressure rating: 125 psi max.
Temperature rating: 230ºF max.
Max. close off pressure: 44 psi
Cv: 2.5 (1/2"), 4.1 (3/4")
Actuator power consumption: 10 VA max.

2-Way Modulating Control Valve / Actuator

Valve operation is described above. Actuators use a 0 – 10 Vdc control signal, are fail-in-place design (non-spring return) and provide proportional control from minimum to maximum water flow through the coil in response to room demand from a compatible controller. Modulating valves are standard on Nailor analog and digital EPIC control package chilled water valves.

Actuator are 3-wire 24 Vac only (2.5 VA).

3-Way Modulating Control Valve / Actuator

Valve operation is described above. Actuators use a 0 – 10 Vdc analog control signal, are fail-in-place design (non-spring return) and provide proportional control minimum to maximum water flow through the coil in response to room demand from a compatible controller. Modulating valves are standard on Nailor analog and digital EPIC control package chilled water valves.

Actuator are 3-wire 24 Vac only (2.5 VA).

Flexible Hose Kits (FH)

See full description elsewhere in catalog. Standard on all Vertical Hi-Rise Units.

Core: Fabric reinforced EPDM
Braid: Stainless Steel
Fiting: Brass OT58
Ferrule: Stainless Steel
Gasket Seal: Fiber / EDPM
Cv: 3.5 (1/2"), 12.8 (3/4")

Fixed Flow Control (FC)

A pressure compensated automatic fixed flow device, designed to limit the flow GPM through the coil. This inline version comes with a fixed flow rate in a tamperproof housing. Desired GPM must be specified.

Nominal size: 1/2" or 3/4"
Flow Range: 0.5 – 20.0 GPM options

Body material: Copper

Pressure differential range: 2 – 80 psid

Temperature rating: 220ºF max.

Cv: Variable with inlet pressure

Cartridge Fixed Flow Control (FCC)

A pressure compensated automatic fixed flow device, designed to limit the flow through the coil. This model features a changeable flow cartridge. Y-design allows changing the flow rate without dismantling the piping.

Nominal size: 1/2" or 3/4"

Body material: Forged brass

Flow Range: 0.5 – 8.0 GPM options
Pressure differential range: 2 – 80 psid

Temperature rating: 220ºF max.

Cv: Variable with inlet pressure

Adjustable Flow Circuit Setter (AFS)

A pressure dependent ball type flow control device, precisely calibrated for use as a presettable balance valve, variable orifice flow meter and positive shut-off service valve. Furnished with a calibrated nameplate and memory stop indicator and built in P/T ports.

Nominal size: 1/2" or 3/4"

Pressure rating: 200 psig max.

Temp. rating: 250ºF max.

Body material: Brass

Ball: Brass

Cv: Variable

Y Strainer (YS)

An inline fitting designed to allow water to flow through a built in removable screen to filter debris or contaminates. With the water system isolated, the plug can be removed from the blowdown leg and the captured debris removed from the screen.

Nominal size: 1/2" or 3/4"
Pressure rating: 600 psig max.
Body: Forged brass
Temperature rating: 325ºF max.
Screen: 20 mesh, 304 stainless steel
Cv: 5.5 (1/2"), 9.0 (3/4")
(Valve with the clean filter)

Y Strainer with Hose Bib Valve (YSB)

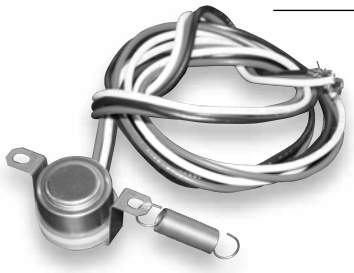
A Y-Strainer with the addition of a manual ball valve installed on the blowdown leg. The valve has a standard 3/4" garden hose connection and cap to allow fluid to be piped to a container.

Unions (UN)

An optional fitting used to provide a mechanical connection between the coil and valve package on horizontal fan coil units (not available on Hi-Rise units). Can be connected and disconnected without the need to cut piping or unsolder a joint.

Bypass Balancing Valve (BPV)

A ball valve used to balance the water flow through the bypass circuit of a 3-way control valve. Manual adjustment is required. No calibration is provided at the valve.



Aquastat (AQ)

The Aquastat, also called a summer-winter changeover switch or aqua thermostat, is a switch designed to automatically change a room thermostat from heating to cooling and back in a 2-pipe system to be used for both heating and cooling. The switch is attached to the incoming water pipe with a spring and senses water temperature.

Switch action: Bimetal snap acting disc SPDT
Setpoint: 75ºF (24ºC) approx, fixed
Differential: 15ºF (8ºC) fixed
Switch rating: 120 Vac, 5.8 FLA, 34.8 LRA (inductive) Pilot duty 125 VA.
Wiring: White (common). Black-White close on temp. rise (82ºF).
Blue-white close on temp. drop (67ºF)

Optional Pressure / Temperature Test Ports Location (PTO)

P/T ports allow testing of water pressure, differential pressure and water temperature without interrupting the waterside operation of the fan coil unit. P/T Ports when specified are located on the ball valves as standard (see BVPT). When P/T ports are required in another location, such as directly across the coil, this PTO option should be specified.

Nominal size: 1/4"
Connection: 1/4" MNPT
Body material: Brass
Pressure rating: 1000 psig max.
Temp. rating: 325ºF max.

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:

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

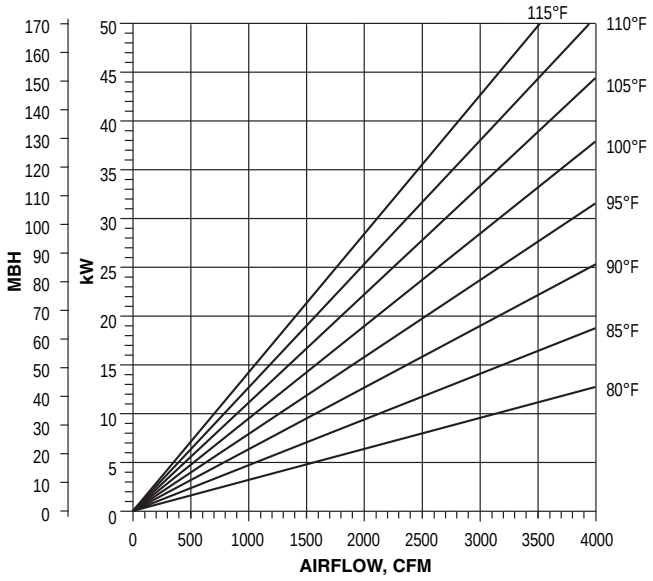
Assuming 70°F (21°C) supply air temperature to the heater, the room airflow can be selected directly from the chart. Start at the left at the design kW. Move horizontally to the desired discharge air temperature. Then, move vertically down to the cfm at the bottom of the chart.

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.

Suggested Specifications

Factory-Built Fan Coil Units • Section 15 – – –

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The requirements of the General Conditions, Supplementary Conditions and the following Specification sections apply to all Work herein:

1. (List related documents here)

1.02 SUMMARY

A. Furnish and install all factory-built fan coil units herein specified and as indicated on the Drawings.

1.03 REFERENCE STANDARDS

A. All factory-built fan coil units and accessories shall be designed, manufactured and tested in accordance with the latest applicable industry standards including the following:

1. ASTM B-88-72 H23.1-59, E84, C423-90a and E795-83
2. ASTM Standards C-665 and G-21
3. NFPA 90A, 90B and 255
4. UL 723
5. ARI Standard 410, 440 and 350

B. All equipment and material to be furnished and installed on this Project shall be UL or ETL listed, in accordance with the requirements of the authorities having jurisdiction and suitable for its intended use on this Project.

1.04 SUBMITTALS AND PROPOSALS

A. The following submittal data shall be furnished according to the General Conditions and Section 15 – – – and shall include, but not be limited to:

1. Vertical Hi-Rise Stack Fan Coil Units* complete with fan and coil selection data, calculations, physical dimensions, horsepower, starting requirements, motor details, etc. Shop Drawings shall indicate specifically that the construction, fabrication, etc., of the units to be furnished complies with these Specifications.

2. Horizontal Ceiling Concealed Fan Coil Units* complete with fan and coil selection data, calculations, physical dimensions, horsepower, starting requirements, motor details, etc. Shop Drawings shall indicate specifically that the construction, fabrication, etc., of the units to be furnished complies with these Specifications.

3. Underfloor Fan Coil Units* complete with fan and coil selection data, calculations, physical dimensions, horsepower, starting requirements, motor details, etc. Shop Drawings shall indicate specifically that the construction, fabrication, etc., of the units to be furnished complies with these Specifications.

B. The factory-built fan coil unit manufacturer shall include a specification Compliance Review report as described in Section 15 – – – with his bid proposal. The Compliance Review will be a paragraph-by-paragraph review of the specifications with the following designations "C", "D", "E" or "N/A" marked in the right hand margin beside each paragraph.

C. All items or equipment listed above with asterisks (*) shall be certified by the manufacturer using Manufacturer Certification "MCA" as set forth in Section 15 – – –. See Section 15 – – – for certification requirements.

1.05 WARRANTY

A. Comply with the requirements of the General Conditions and Section 15 – – –.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. If it complies with these Specifications, factory-built vertical high rise variable speed fan coil units manufactured by one of the following manufacturers will be acceptable:

1. Nailor Industries

B. If it complies with these Specifications, factory-built ceiling concealed variable speed fan coil units manufactured by one of the following manufacturers will be acceptable:

1. Nailor Industries

C. If it complies with these Specifications, factory-built underfloor variable speed fan coil units manufactured by one of the following manufacturers will be acceptable:

1. Nailor Industries

D. If it complies with these Specifications, water coils manufactured by one of the following manufacturers will be acceptable:

1. Great American Coil Co
2. Heatcraft
3. Nailor Industries

E. If it complies with these Specifications, electric heating coils manufactured by one of the following manufacturers will be acceptable:

1. Nailor Industries

2.02 FACTORY-BUILT VERTICAL HIGH RISE VARIABLE VOLUME FAN COIL UNITS

A. Factory-built vertical high rise fan coil units shall be as indicated on the Mechanical and Architectural Drawings and shall meet the capacity and acoustical performance requirements specified and indicated in the schedules on the Contract Documents. All vertical fan coil units shall be tested in accordance with the latest version of ARI Standard 440. All vertical fan coil units shall be UL or ETL listed as a complete factory wired assembly.

B. All unit chassis shall be fabricated of 18 gauge, G-60 galvanized steel panels able to meet 125 hour salt spray test per ASTM B-117. All exterior panels shall be insulated with 1/2" thick, 2lb. per cubic foot Certain Teed ToughGard insulation with a max velocity of 6000 f.p.m. and tested to 9600 f.p.m. Insulation shall conform to UL 181 for erosion and NFPA 90A and NFPA 90B, for fire and smoke, and carry no more than a 25/50 Flame Spread and Smoke Developed Rating, per ASTM E-84 and UL 723. In addition it shall also meet ASTM Standards C-665 and G-21 for biological growth in insulation and has a water repellency rating of- ≥4 (INDA IST 80.6-92). Fan deck shall be minimum 16 gauge galvanized steel. The fan coil unit cabinets shall be designed to have the gypsum wall board applied directly to the fan coil unit surface and all openings for registers, grilles and openings shall have standard 1/2" drywall flanges. Exposed metal surfaces shall be powder coat painted over electro-galvanized sheet steel. Paint shall be TGIC-Polyester powder with adhesion rating of 5B. Pencil hardness shall be H to 2H and shall have salt-spray resistance per ASTM B-117. No field installed framing around the cabinet openings shall be required. After the completed field installation, only the fan coil unit controls device, supply registers and return air grille and front cover shall be visible. All units that have decorator front panels shall be fabricated of not less than 18 gauge G60 galvanized steel. The front panel shall include a commercial style louver return air grille and be attached with quarter turn quick open fasteners to allow for easy removal and access for service.

C. The welded cooling coil condensate drain pan shall have 1" sides and be fabricated of 20 gauge, 304 stainless steel and internally sloped to drain completely dry upon fan coil unit shutdown. The drain

Suggested Specifications

Factory-Built Fan Coil Units • Section 15– – – (continued)

pan shall be externally insulated with minimum 1/4" thick elastomer foam fire retardant insulation similar to Armstrong Type AT Armaflex. 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. Insulation shall be adhered to the stainless steel drain pan with a full coat of waterproof adhesive. Fan coil units shall have a factory piped and insulated condensate drain and p-traps suitable for field connection to the condensate riser indicated on the Drawings. Drain pan and p-trap shall be removable without disturbing the coil.

D. All coils shall be ARI 410 certified and tagged with an ARI 410 label. All cooling and heating coils shall have the minimum rows required to meet the specified capacity. Coils shall have 1/2" O.D. seamless copper tubes, and collared and corrugated aluminum fins. All tubes shall be mechanically expanded to provide an efficient, permanent bond between the tube and fin. Coil frames shall be constructed of minimum G-90 galvanized steel. All coils shall be pressure tested under water at 1.5 times the working pressure classification indicated in the Contract Documents, but the test pressure in no case shall be less than 300 psig. Heating coils shall be furnished in the reheat position as standard. All water coils shall be provided with a manual air vent fitting to allow for coil venting. Water velocity in the tubes shall not exceed eight (8) feet per second and the coil face velocity shall not exceed 500 fpm. The coils shall be factory piped with Type (K, L, or M) copper pipe with wrought copper fittings and brazed joints. The factory piped assembly shall include: manual air vent, two (2) position quiet actuation electric control valve assemblies as specified, extended handle supply and return ball valves, temperature and pressure test ports in the supply and return lines similar to "Petes Plugs". The ball valve on the balancing return piping shall be equipped with a memory stop and locking feature. Control valves shall be piped normally closed to the coil unless modulating valves are used then the 0-10volt signal will set the valve opening. Maximum entering water temperature on the control valve shall be 200°F, and maximum close-off pressure differential of 25 PSIG. Maximum operating pressure shall be 300 PSIG. 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 solid brass FNPT swivels and/or ball valves. The hoses shall be rated for a minimum 450 PSIG working pressure at 250°F, and carry no more than a 25/50 Flame Spread and Smoke Developed Rating, per ASTM E-84 and UL 723. Piping packages shall be completely factory assembled, including interconnecting pipe, and mounted inside the unit in a serviceable location over the primary drain pan. Refer to Specification Section 15– – – titled, "Pipes, Valves, Fittings and Accessories" for ball valve and pipe fabrication specifications. Refer to Specification Section 15– – – titled "Vibration Isolation".

E. Each unit shall be supplied with Ultraviolet Disinfection for HVAC Mold, Bacteria & Odor Control.

1. Fixturing shall consist of a lamp, lamp clasps, UVC resistant wiring harness, power supply and power supply housing.

2. Each lamp shall contain no more than 5 milligrams of mercury. Lamp output shall be the same as that used in the modeling software. Lamp life shall be 9000 hours with no more than a 20% output loss at the end of the lamps life. Lamps shall be constructed with UVC proof metal bases and shall not produce ozone. When used for surface irradiation, the lamp assembly selected shall be equal to or no less than a minimum of 90% of the surfaces width.

3. Fixtureless lamps are to be installed in sufficient quantity and in such a manner so as to provide an equal distribution of UVC energy. When installed, the UVC energy produced shall be of the lowest possible reflected and shadowed losses. Note: the applied energy and its distribution shall be verified using third party algorithms and that verification shall be included with the submittal.

4. The minimal UVC energy striking a surface shall be sufficient to continuously destroy a monolayer of mold and bacteria in less than six hours when at 55-135°F. The third party modeling shall include the destruction time for at least four of the most common fan coil surface microbes.

5. Lamp Clasps may be permanently or magnetically affixed to the irradiated cavity. They shall be constructed of high memory, plated steel for maximum holding power and corrosion resistance.

6. Lamp Harness shall be of sufficient length to facilitate lamp connection to remotely located ballast. It shall include a grommet to facilitate safe passage through sheet metal and into the ballast housing. Lamps shall be capable of being mounted anywhere in the system and/or as shown on the plans.

7. Power supplies shall be of the high efficiency electronic type, matched to the lamp and designed to maximize UVC photon production and reliability. They shall be UL Listed and labeled for use in air-streams of 55-135°F. They shall be capable of producing the specified output and organism destruction as listed under Irradiation and Intensity above at no more than 13 Watts of power consumption for each square foot of treated, cross sectional plane.

8. Fixturing shall be electrically terminated to within factory supplied ballast housings to meet NEC and local codes. Lamps shall be mounted to irradiate the intended surface(s) as well as all of the available line of sight airstream by proper placement and incident angle reflection. Proper lamp placement shall be consistent with the third party Irradiation and Intensity calculations provided in the submittal if such placement is absent on the plans.

9. To protect maintenance personnel, all access panels and doors to the UVC assembly and/or within view of the UVC assembly must include mechanical interlock switch(es) to insure that the UVC assembly will be de-energized when any of these accesses are opened.

10. For complete safety, the UVGI equipment shall have been tested, Listed and labeled as an integral part of the fan coil unit by the fan coil manufacturer, no exceptions.

F. Vertical Fan Coil Unit Electric Heating Coils:

1. Furnish an electric resistance heating assembly as an integral part of the fan coil unit, with the heating capacity, voltage, and kilowatts scheduled. Electric heating coils shall consist of open coils of highest grade 80% nickel and 20% chromium resistance wire or nichrome elements and insulated with ceramic, phenolic or lava insulators in aluminized steel, galvanized steel or stainless steel brackets, supported in heavy gauge aluminized or galvanized steel frames. Each unit employing an electric heating coil shall be constructed and installed in accordance with the requirements of the local authorities and shall be UL or ETL listed specifically with the heater as a component of the fan coil unit device.

2. 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 terminal secured with corrosion resistant hardware. The element support brackets shall be spaced no greater than 3-1/2" on center.

3. Coils shall have the capacities indicated in Contract Documents. Coils shall be single or three phase, 60 hertz with voltage requirements as indicated in the Contract Documents Electric heating coils up to and including 3kW shall be single stage. Electric coils above 3kW shall be two (2) stages.

4. Terminal bolts, nuts and washers shall be of corrosion resistant materials. Coils shall be constructed so the installation may be

Suggested Specifications

Factory-Built Fan Coil Units · Section 15– – – (continued)

accomplished in accordance with the provisions of the National Electrical Code, for zero (0) clearance. Coils shall be given a 2000 Volt dielectric test at the factory.

5. Automatic reset thermal cut-outs and an airflow switch or CT relay shall be furnished for heater protection. The airflow switch or relay shall prove adequate fan airflow before the electric heater can be energized. Both devices shall be serviceable through fan coil unit without removing heating element from the unit.

6. Heating coils shall have a terminal box and cover, with either SCR controls or quiet type built-in mercury step controlled contactors for each circuit, branch circuit fusing for each circuit in excess of 48 amps per the NEC and a static pressure or air flow safety interlock switch for installation in the heater control enclosure. Provide a separate control power transformer in accordance with NEC requirements and the local authorities having jurisdiction.

7. All wiring of built-in devices shall be brought to clearly marked terminal strips. A complete wiring diagram shall be permanently attached to the heating coil panel cover.

8. Shop Drawings shall be submitted for review as specified in Section 15– – –. These Shop Drawings shall indicate specifically the exact construction, materials, internal wiring, NEC working clearances, etc., of the fan coil units and electric heating coils to be furnished under these Specifications.

G. Centrifugal fan blower wheels shall be forward curved type, double width, double inlet direct drive type selected for maximum efficiency and an acoustical performance in accordance with the Project acoustical criteria specified in the Contract Documents. Unit fan shall be constructed of zinc coated galvanized steel for corrosion resistance. The fan assembly shall be removed and serviced through the front of the unit. The entire assembly shall be able to come out of the unit easily by removing four lock nuts and unplugging the motor.

H. Fan motors shall be ECM or Nailor EPIC variable speed DC brushless motors specifically designed for use with a single phase, (120, 208, 240, 277) Volt, 60 hertz electrical input. Motor shall be complete with and operated by a single phase integrated controller/inverter that operates the wound stator and senses rotor position to electrically commutate the stator. All motors shall be designed for synchronous rotation. Motor rotor shall be permanent magnet type with near zero (0) rotor losses. Motor shall have built-in soft start and slowed speed change ramps. Motor shall be permanently lubricated with ball bearings. Motor shall be direct coupled to the blower. Motor shall maintain a minimum of sixty-five (65%) percent efficiency over its entire operating range. Provide isolation between fan motor assembly and unit casing in at least four (4) locations to eliminate any vibration from the fan to the terminal unit casing. Provide isolation between the motor and blower as well as between the blower and casing.

I. If factory furnished piping risers are indicated on the Contract Documents, they shall be in Type "(K, L, M)" seamless copper and include a 3" long up-sized or swaged section at the top to accept the riser from above without requiring a coupling. This swaged section is designed for a 2" insertion length to assure field joint integrity. Risers shall be integral to the unit. Slip couplings may be used on pipe that cannot be swaged. All risers, including the drain, shall be insulated with (1/2, 3/4, 1)" 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. This insulation covers the full riser length and does not require field furnished insulation at the field joints.

J. One (1) piece risers are available in lengths up to 115" in 1" increments. The fan coil unit installing contractor shall provide integral expansion compensators in the riser piping at least every five (5) floors. The fan coil unit manufacturer shall perform a piping stress riser and expansion/contraction analysis. The stress analysis shall be provided to the Engineer for review. Floor-to-floor lengths over 113" will normally have 104" unit risers and separate between-the-floor riser extensions. Standard unit construction will accommodate a maximum of a 3-1/8" diameter chilled water supply and return, 3-1/8" diameter hot water supply and return and 1-1/4" diameter condensate

K. The vertical fan coil unit manufacturer shall furnish a wall mounted control package shipped loose for field installation. The wall mounted sensor controller shall be provided with quick connect plugs. The control package shall provide automatic changeover from heating to cooling. The fan coil unit manufacturer shall furnish and install a dynamic fan volume control system to automatically vary the fan airflow in response to heating and cooling load. The wall mounted control device in the room shall allow automatic fan modulation based on room load demand. The fan speed shall change slowly. No manual speed selection will be required at the wall mounted control device. Provide an add alternate **(M _____)** to provide the DDC sensor/controller with the capability to be incorporated into the Division 17 Building Management and Control System or "Smart Room" technology to start and stop the unit, remotely reset the space temperature and control the outside air (on-off) to the room. The fan coil unit manufacturer shall demonstrate the performance of the vertical fan coil unit dynamic volume control sequence, the associated two (2) position heating control valve and the modulating cooling control valve with the DDC controller in an independent testing laboratory. The acceptability of the independent testing laboratory is subject to review by the Owner and Engineer. The vertical fan coil unit manufacturer shall submit complete test details, brochures, instrumentation, etc., for review. If the vertical fan coil unit manufacturer has conducted the herein specified dynamic volume control performance tests and has demonstrated to the Engineer and Owner compliance with the specified criteria, the previous testing will be accepted and will not need to be repeated. See Section 15– – – titled "Design Conditions". The fan coil unit shall be capable of operation as described herein with discharge static pressure of 0 to 0.5" w.g. (120 Pa) at full airflow. (See SEQUENCE OF OPERATION for further information.)

L. The entire vertical fan coil unit assembly shall be factory wired to a single point connection. All power and control wiring shall conform to National Electric Code Standards and local requirements of the authorities having jurisdiction. The fan coil unit assembly shall include all required devices, including but not limited to, service switch, relay, control power transformers and control packages, low voltage remote shutdown relays, etc.

M. The vertical fan coil unit manufacturer shall furnish a aluminum double deflection supply diffuser with 3/4" bar spacing similar to Nailor Model 51DV-O and a aluminum return air grille similar to Nailor Model 5145H-OA. Opposed blade volume dampers are not required. The fan coil unit shall be equipped with a return air access panel with frame, which incorporates the steel return air grille, as required for complete access to the fan, blower, coil and piping assembly. The access panel shall be fastened with quarter-turn type fasteners. If required, the fan coil shall be equipped with an outside air damper integral to the unit. The damper shall be capable of pressure independent operation with DDC controller or pressure dependent operation with manual quadrant. If the damper is controlled by DDC controls, see controls specification for controls requirements.

N. The fan coil unit manufacturer shall furnish the unit with 1" thick pleated MERV 7 throw-away type media air filters. Refer to Specification Section 15– – – titled "Air Filtering" for requirements.

O. The vertical fan coil unit and acoustical treatment shall limit the noise in the room 3' away from any discharge and return air opening to an amount that will not produce more than the NC sound curve specified in Section 15– – – titled "Design Conditions".

Suggested Specifications

Factory-Built Fan Coil Units • Section 15 – – – (continued)

P. Each size of the vertical fan coil unit installed on this Project shall be completely acoustically tested in the Owner's room mock-up or an independent laboratory for air performance and acoustics. The acceptability of the independent testing laboratory is subject to review by the Owner, Project Acoustical Consultant, and the Engineer. The fan coil unit manufacturer shall submit complete test details, brochures, instrumentation information, etc., for review. The air volume listed on the Drawings or in the schedules for the fan coil units shall be tested. If the fan coil unit manufacturer has conducted the hereinbefore specified air performance and acoustical tests and has demonstrated to the Engineer and Owner compliance with the specified Project criteria, the previous testing will be accepted and will not need to be repeated. See Section 15– – – titled "Design Conditions". Base sound power data shall be provided as tested according to the latest version of ARI Standard 350. This data is for guideline purposes only, the mock up described above is the qualifying test.

Q. The vertical fan coil unit manufacturer shall submit six (6) certified copies of the field performance and acoustical performance test results to the Engineer and the Project Acoustical Consultant. See Section 15– – – titled "General Requirements" for additional submittal and certification requirements.

R. The vertical fan coil manufacturer shall verify at the manufacturer's factory the operation of each fan coil before shipment. Testing shall include at least the following:

1. Apply electric power to the unit.
2. Start the fan and verify fan rotates properly.
3. Energize the electric two (2) position and modulating control valves and verify satisfactory performance.

4. Provide a written inspection report for each unit signed and dated by the factory test technician verifying all fan coil unit wiring and testing has been performed per the manufacturer's testing and quality assurance requirements.

5. The vertical fan coil unit manufacturer shall factory set the brushless "ECM" motor and associated controller/inverter to the maximum discharge airflow for heating and cooling and minimum deadband airflow specified and indicated in the Contract Documents.

2.03 FACTORY-BUILT CEILING CONCEALED HORIZONTAL VARIABLE VOLUME FAN COIL UNITS

A. Factory-built concealed horizontal fan coil units shall be as indicated on the Mechanical and Architectural Drawings and shall meet the capacity and acoustical performance requirements specified and indicated in the schedules on the Contract Documents. All horizontal fan coil units shall be tested in accordance with the latest version of ARI Standard 440. All horizontal fan coil units shall be UL or ETL listed as a complete factory wired assembly.

B. All unit chassis shall be fabricated of 20 gauge, G-60 galvanized steel panels able to meet 125 hour salt spray test per ASTM B-117. All exterior panels shall be insulated with 1/2" thick, 2lb. per cubic foot Certain Teed ToughGard insulation with a max velocity of 6000 f.p.m. and tested to 9600 f.p.m. Insulation shall conform to UL 181 for erosion and NFPA 90A and NFPA 90B, for fire and smoke, and carry no more than a 25/50 Flame Spread and Smoke Developed Rating, per ASTM E-84 and UL 723. In addition it shall also meet ASTM Standards C-665 and G-21 for biological growth in insulation and has a water repellency rating of- ≥4 (INDA IST 80.6-92). Fan deck shall be minimum 20 gauge galvanized steel. The fan coil unit shall have a flat discharge panel to facilitate a flanged duct connection being screwed directly to the unit. The unit face shall be free and clear of obstructions for the sheet metal screw penetrations. Units that are designed for exposed mounting shall have smooth discharge openings for mounting grilles directly to the unit face.

C. The welded cooling coil condensate drain pan shall have 1" sides and be fabricated of 20 gauge, 304 stainless steel. The unit shall be designed to be installed sloped to drain completely dry upon fan coil unit shutdown. The drain pan shall be externally insulated with minimum 1/4" thick elastomer foam fire retardant insulation similar to Armstrong Type AT Armaflex. 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. Insulation shall be adhered to the stainless steel drain pan with a full coat of waterproof adhesive.

D. All coils shall be ARI 410 certified and tagged with an ARI 410 label. All cooling and heating coils shall have the minimum rows required to meet the specified capacity. Coils shall have 1/2" O.D. seamless copper tubes, and collared and corrugated aluminum fins. All tubes shall be mechanically expanded to provide an efficient, permanent bond between the tube and fin. Coil frames shall be constructed of minimum G-90 galvanized steel. All coils shall be pressure tested under water at 1.5 times the working pressure classification indicated in the Contract Documents, but the test pressure in no case shall be less than 300 psig. Heating coils shall be furnished in the reheat position as standard. All water coils shall be provided with a manual air vent fitting to allow for coil venting. Water velocity in the tubes shall not exceed eight (8) feet per second and the coil face velocity shall not exceed 500 fpm. The coils shall be factory piped with Type (K, L, or M) copper pipe with wrought copper fittings and brazed joints. The factory piped assembly shall include: manual air vent, two (2) position quiet actuation electric control valve assemblies as specified, extended handle supply and return ball valves, temperature and pressure test ports in the supply and return lines similar to "Petes Plugs". The ball valve on the balancing return piping shall be equipped with a memory stop and locking feature. Control valves shall be piped normally closed to the coil unless modulating valves are used then the 0-10volt signal will set the valve opening. Maximum entering water temperature on the control valve shall be 200°F, and maximum close-off pressure differential of 25 PSIG. Maximum operating pressure shall be 300 PSIG. Piping packages shall be completely factory assembled, including interconnecting pipe, and mounted inside the unit in a serviceable location over the primary or secondary drain pan. Refer to Specification Section 15– – – titled, "Pipes, Valves, Fittings and Accessories" for ball valve and pipe fabrication specifications. Refer to Specification Section 15– – – titled "Vibration Isolation".

E. Each unit shall be supplied with Ultraviolet Disinfection for HVAC Mold, Bacteria & Odor Control.

1. Fixturing shall consist of a lamp, lamp clasps, UVC resistant wiring harness, power supply and power supply housing.

2. Each lamp shall contain no more than 5 milligrams of mercury. Lamp output shall be the same as that used in the modeling software. Lamp life shall be 9000 hours with no more than a 20% output loss at the end of the lamps life. Lamps shall be constructed with UVC proof metal bases and shall not produce ozone. When used for surface irradiation, the lamp assembly selected shall be equal to or no less than a minimum of 90% of the surfaces width.

3. Fixtureless lamps are to be installed in sufficient quantity and in such a manner so as to provide an equal distribution of UVC energy. When installed, the UVC energy produced shall be of the lowest possible reflected and shadowed losses. Note: the applied energy and its distribution shall be verified using third party algorithms and that verification shall be included with the submittal.

4. The minimal UVC energy striking a surface shall be sufficient to continuously destroy a monolayer of mold and bacteria in less than six hours when at 55-135°F. The third party modeling shall include the destruction time for at least four of the most common fan coil surface microbes.

Suggested Specifications

Factory-Built Fan Coil Units • Section 15 – – – (continued)

5. Lamp Clasps may be permanently or magnetically affixed to the irradiated cavity. They shall be constructed of high memory, plated steel for maximum holding power and corrosion resistance.

6. Lamp Harness shall be of sufficient length to facilitate lamp connection to remotely located ballast. It shall include a grommet to facilitate safe passage through sheet metal and into the ballast housing. Lamps shall be capable of being mounted anywhere in the system and/or as shown on the plans.

7. Power supplies shall be of the high efficiency electronic type, matched to the lamp and designed to maximize UVC photon production and reliability. They shall be UL Listed and labeled for use in air-streams of 55-135°F. They shall be capable of producing the specified output and organism destruction as listed under Irradiation and Intensity above at no more than 13 Watts of power consumption for each square foot of treated, cross sectional plane.

8. Fixturing shall be electrically terminated to within factory supplied ballast housings to meet NEC and local codes. Lamps shall be mounted to irradiate the intended surface(s) as well as all of the available line of sight airstream by proper placement and incident angle reflection. Proper lamp placement shall be consistent with the third party Irradiation and Intensity calculations provided in the submittal if such placement is absent on the plans.

9. To protect maintenance personnel, all access panels and doors to the UVC assembly and/or within view of the UVC assembly must include mechanical interlock switch(es) to insure that the UVC assembly will be de-energized when any of these accesses are opened.

10. For complete safety, the UVGI equipment shall have been tested, Listed and labeled as an integral part of the fan coil unit by the fan coil manufacturer, no exceptions.

F. Electric Heating Coils:

Furnish an electric resistance heating assembly as an integral part of the fan coil unit, with the heating capacity, voltage, and kilowatts scheduled. Each unit employing an electric heating coil shall be constructed and installed in accordance with the requirements of the local authorities and shall be UL or ETL listed specifically with the heater as a component of the fan coil unit device.

1. 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 terminal secured with corrosion resistant hardware. The element support brackets shall be spaced no greater than 3-1/2" on center.

2. Coils shall have the capacities indicated in Contract Documents. Coils shall be single or three phase, 60 hertz with voltage requirements as indicated in the Contract Documents. Electric heating coils up to and including 3kW shall be single stage. Electric coils above 3kW shall be two (2) stages.

3. Terminal bolts, nuts and washers shall be of corrosion resistant materials. Coils shall be constructed so the installation may be accomplished in accordance with the provisions of the National Electrical Code, for zero (0) clearance. Coils shall be given a 2000 Volt dielectric test at the factory.

4. Automatic reset thermal cut-outs and an airflow switch shall be furnished for heater protection. The airflow switch shall prove adequate fan airflow before the electric heater can be energized. Both devices shall be serviceable through fan coil unit without removing heating element from the unit.

5. Heating coils shall have a terminal box and cover, with either SCR controls or quiet type built-in mercury step controlled contactors for each circuit, branch circuit fusing for each circuit in excess of 48 amps per the NEC and a static pressure or air flow safety interlock switch for installation in the heater control enclosure. Provide a separate control power transformer in accordance with NEC requirements and the local authorities having jurisdiction.

6. All wiring of built-in devices shall be brought to clearly marked terminal strips. A complete wiring diagram shall be permanently attached to the heating coil panel cover.

7. Shop Drawings shall be submitted for review as specified in Section 15– – –. These Shop Drawings shall indicate specifically the exact construction, materials, internal wiring, NEC working clearances, etc., of the fan coil units and electric heating coils to be furnished under these Specifications.

G. Centrifugal fan blower wheels shall be forward curved type, double width, double inlet direct drive type selected for maximum efficiency and an acoustical performance in accordance with the Project acoustical criteria specified in the Contract Documents. Unit fan shall be constructed of zinc coated galvanized steel for corrosion resistance. The fan assembly shall be easily removable for service.

H. Fan motors shall be ECM or Nailor EPIC variable speed DC brushless motors specifically designed for use with a single phase, (120, 208, 240, 277) Volt, 60 hertz electrical input. Motor shall be complete with and operated by a single phase integrated controller/inverter that operates the wound stator and senses rotor position to electrically commutate the stator. All motors shall be designed for synchronous rotation. Motor rotor shall be permanent magnet type with near zero (0) rotor losses. Motor shall have built-in soft start and slowed speed change ramps. Motor shall be permanently lubricated with ball bearings. Motor shall be direct coupled to the blower. Motor shall maintain a minimum of sixty-five (65%) percent efficiency over its entire operating range. Provide isolation between fan motor assembly and unit casing in at least four (4) locations to eliminate any vibration from the fan to the terminal unit casing. Provide isolation between the motor and blower as well as between the blower and casing.

K. The fan coil unit manufacturer shall furnish a wall mounted control package shipped loose for field installation. The wall mounted sensor controller shall be provided with quick connect plugs. The control package shall provide automatic changeover from heating to cooling. The fan coil unit manufacturer shall furnish and install a dynamic fan volume control system to automatically vary the fan airflow in response to heating and cooling load. The wall mounted control device in the room shall allow automatic fan modulation based on room load demand. The fan speed shall change slowly. No manual speed selection will be required at the wall mounted control device. Provide an add alternate **(M_____)** to provide the DDC sensor/controller with the capability to be incorporated into the Division 17 Building Management and Control System or "Smart Room" technology to start and stop the unit, remotely reset the space temperature and control the outside air (on-off) to the room. The fan coil unit manufacturer shall demonstrate the performance of the fan coil unit dynamic volume control sequence, the associated two (2) position heating control valve and the modulating cooling control valve with the DDC controller in an independent testing laboratory. The acceptability of the independent testing laboratory is subject to review by the Owner and Engineer The fan coil unit manufacturer shall submit complete test details, brochures, instrumentation, etc., for review. If the fan coil unit manufacturer has conducted the herein specified dynamic volume control performance tests and has demonstrated to the Engineer and Owner compliance with the specified criteria, the previous testing will be accepted and will not need to be repeated. See Section 15– – – titled "Design Conditions". The fan coil unit shall be capable of operation as described herein with discharge static pressure of 0 to 0.5" w.g. (120 Pa) at full airflow. (See SEQUENCE OF OPERATION for further information.)

Suggested Specifications

Factory-Built Fan Coil Units • Section 15– – – (continued)

L. The entire fan coil unit assembly shall be factory wired to a single point connection. All power and control wiring shall conform to National Electric Code Standards and local requirements of the authorities having jurisdiction. The fan coil unit assembly shall include all required devices, including but not limited to, service switch, relay, control power transformers and control packages, low voltage remote shutdown relays, etc.

M. If required, the fan coil shall be equipped with an outside air damper integral to the unit. The damper shall be capable of pressure independent operation with DDC controller or pressure dependent operation with manual quadrant. If the damper is controlled by DDC controls, see controls specification for controls requirements.

N. The fan coil unit manufacturer shall furnish the unit with 1" thick pleated MERV 7 throw-away type media air filters. Refer to Specification Section 15– – – titled "Air Filtering" for requirements.

O. The fan coil unit and acoustical treatment shall limit the noise in the room 3' away from any discharge and return air opening to an amount that will not produce more than the NC sound curve specified in Section 15– – – titled "Design Conditions".

P. Each size of fan coil unit installed on this Project shall be completely acoustically tested in the Owner's room mock-up or an independent laboratory for air performance and acoustics. The acceptability of the independent testing laboratory is subject to review by the Owner, Project Acoustical Consultant, and the Engineer. The fan coil unit manufacturer shall submit complete test details, brochures, instrumentation information, etc., for review. The air volume listed on the Drawings or in the schedules for the fan coil units shall be tested. If the fan coil unit manufacturer has conducted the hereinbefore specified air performance and acoustical tests and has demonstrated to the Engineer and Owner compliance with the specified Project criteria, the previous testing will be accepted and will not need to be repeated. See Section 15– – – titled "Design Conditions". Base sound power data shall be provided as tested according to the latest version of ARI Standard 350. This data is for guideline purposes only, the mock up described above is the qualifying test.

Q. The fan coil unit manufacturer shall submit six (6) certified copies of the field performance and acoustical performance test results to the Engineer and the Project Acoustical Consultant. See Section 15– – – titled "General Requirements" for additional submittal and certification requirements.

R. The fan coil manufacturer shall verify at the manufacturer's factory the operation of each fan coil before shipment. Testing shall include at least the following:

1. Apply electric power to the unit.
2. Start the fan and verify fan rotates properly.
3. Energize the electric two (2) position and modulating control valves and verify satisfactory performance.
4. Provide a written inspection report for each unit signed and dated by the factory test technician verifying all fan coil unit wiring and testing has been performed per the manufacturer's testing and quality assurance requirements.

S. The fan coil unit manufacturer shall factory set the brushless "ECM" motor and associated controller/inverter to the maximum discharge airflow for heating and cooling and minimum deadband airflow specified and indicated in the Contract Documents.

2.04 FACTORY-BUILT UNDERFLOOR HORIZONTAL VARIABLE VOLUME FAN COIL UNITS

A. Factory-built underfloor fan coil units shall be as indicated on the Mechanical and Architectural Drawings and shall meet the capacity and acoustical performance requirements specified and indicated in the schedules on the Contract Documents. All underfloor fan coil units shall be tested in accordance with the latest version of ARI Standard 440. All underfloor fan coil units shall be UL or ETL listed as a complete factory wired assembly.

B. Unit chassis shall be fabricated of 20 gauge, G-60 galvanized steel panels able to meet 125 hour salt spray test per ASTM B-117. Exterior panels, which are scheduled to be insulated, shall be insulated with 1/2" thick, 2lb. per cubic foot Certain Teed ToughGard insulation with a max velocity of 6000 f.p.m. and tested to 9600 f.p.m. Insulation shall conform to UL 181 for erosion and NFPA 90A and NFPA 90B, for fire and smoke, and carry no more than a 25/50 Flame Spread and Smoke Developed Rating, per ASTM E-84 and UL 723. In addition it shall also meet ASTM Standards C-665 and G-21 for biological growth in insulation and has a water repellency rating of- ≥4 (INDA IST 80.6-92). Fan deck shall be minimum 20 gauge galvanized steel. The fan coil unit shall have a flat discharge panel to facilitate a flanged duct connection being screwed directly to the unit. The unit face shall be free and clear of obstructions for the sheet metal screw penetrations.

C. The welded cooling coil condensate drain pan shall have 1" sides and be fabricated of 20 gauge, 304 stainless steel. The drain pan shall be externally insulated with minimum 1/4" thick elastomer foam fire retardant insulation similar to Armstrong Type AT Armaflex. 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. Insulation shall be adhered to the stainless steel drain pan with a full coat of waterproof adhesive.

D. All coils shall be ARI 410 certified and tagged with an ARI 410 label. All cooling and heating coils shall have the minimum rows required to meet the specified capacity. Coils shall have 1/2" O.D. seamless copper tubes, and collared and corrugated aluminum fins. All tubes shall be mechanically expanded to provide an efficient, permanent bond between the tube and fin. Coil frames shall be constructed of minimum G-90 galvanized steel. All coils shall be pressure tested under water at 1.5 times the working pressure classification indicated in the Contract Documents, but the test pressure in no case shall be less than 300 psig. Heating coils shall be furnished in the reheat position as standard. All water coils shall be provided with a manual air vent fitting to allow for coil venting. Water velocity in the tubes shall not exceed eight (8) feet per second and the cooling coil face velocity shall not exceed 500 fpm. The coils shall be factory piped with Type (K, L, or M) copper pipe with wrought copper fittings and brazed joints. The factory piped assembly shall include: manual air vent, two (2) position quiet actuation electric control valve assemblies as specified, extended handle supply and return ball valves, temperature and pressure test ports in the supply and return lines similar to "Petes Plugs". The ball valve on the balancing return piping shall be equipped with a memory stop and locking feature. Control valves shall be piped normally closed to the coil unless modulating valves are used then the 0-10volt signal will set the valve opening. Maximum entering water temperature on the control valve shall be 200°F, and maximum close-off pressure differential of 25 PSIG. Maximum operating pressure shall be 300 PSIG. Piping packages shall be completely factory assembled, including interconnecting pipe, and mounted inside the unit in a serviceable location over the primary or secondary drain pan. Refer to Specification Section 15– – – titled, "Pipes, Valves, Fittings and Accessories" for ball valve and pipe fabrication specifications. Refer to Specification Section 15– – – titled "Vibration Isolation".

E. Each unit shall be supplied with Ultraviolet Disinfection for HVAC Mold, Bacteria & Odor Control.

1, Fixturing shall consist of a lamp, lamp clasps, UVC resistant wiring harness, power supply and power supply housing.

9. Each lamp shall contain no more than 5 milligrams of mercury. Lamp output shall be the same as that used in the modeling software.

Suggested Specifications

Factory-Built Fan Coil Units • Section 15– – – (continued)

Lamp life shall be 9000 hours with no more than a 20% output loss at the end of the lamps life. Lamps shall be constructed with UVC proof metal bases and shall not produce ozone. When used for surface irradiation, the lamp assembly selected shall be equal to or no less than a minimum of 90% of the surfaces width.

10. Fixtureless lamps are to be installed in sufficient quantity and in such a manner so as to provide an equal distribution of UVC energy. When installed, the UVC energy produced shall be of the lowest possible reflected and shadowed losses. Note: the applied energy and its distribution shall be verified using third party algorithms and that verification shall be included with the submittal.

11. The minimal UVC energy striking a surface shall be sufficient to continuously destroy a monolayer of mold and bacteria in less than six hours when at 55-135°F. The third party modeling shall include the destruction time for at least four of the most common fan coil surface microbes.

12. Lamp Clasps may be permanently or magnetically affixed to the irradiated cavity. They shall be constructed of high memory, plated steel for maximum holding power and corrosion resistance.

13. Lamp Harness shall be of sufficient length to facilitate lamp connection to remotely located ballast. It shall include a grommet to facilitate safe passage through sheet metal and into the ballast housing. Lamps shall be capable of being mounted anywhere in the system and/or as shown on the plans.

14. Power supplies shall be of the high efficiency electronic type, matched to the lamp and designed to maximize UVC photon production and reliability. They shall be UL Listed and labeled for use in air-streams of 55-135°F. They shall be capable of producing the specified output and organism destruction as listed under Irradiation and Intensity above at no more than 13 Watts of power consumption for each square foot of treated, cross sectional plane.

15. Fixturing shall be electrically terminated to within factory supplied ballast housings to meet NEC and local codes. Lamps shall be mounted to irradiate the intended surface(s) as well as all of the available line of sight airstream by proper placement and incident angle reflection. Proper lamp placement shall be consistent with the third party Irradiation and Intensity calculations provided in the submittal if such placement is absent on the plans.

16. To protect maintenance personnel, all access panels and doors to the UVC assembly and/or within view of the UVC assembly must include mechanical interlock switch(es) to insure that the UVC assembly will be de-energized when any of these accesses are opened.

17. For complete safety, the UVGI equipment shall have been tested, Listed and labeled as an integral part of the fan coil unit by the fan coil manufacturer, no exceptions.

F. Electric Heating Coils:

Furnish an electric resistance heating assembly as an integral part of the fan coil unit, with the heating capacity, voltage, and kilowatts scheduled. Each unit employing an electric heating coil shall be constructed and installed in accordance with the requirements of the local authorities and shall be UL or ETL listed specifically with the heater as a component of the fan coil unit device.

1. 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 terminal secured with corrosion resistant hardware. The element support brackets shall be spaced no greater than 3-1/2" on center.

2. Coils shall have the capacities indicated in Contract Documents. Coils shall be single or three phase, 60 hertz with voltage requirements as indicated in the Contract Documents. Electric heating coils up to and including 3kW shall be single stage. Electric coils above 3kW shall be two (2) stages.

3. Terminal bolts, nuts and washers shall be of corrosion resistant materials. Coils shall be constructed so the installation may be accomplished in accordance with the provisions of the National Electrical Code, for zero (0) clearance. Coils shall be given a 2000 Volt dielectric test at the factory.

4. Automatic reset thermal cut-outs and an airflow switch shall be furnished for heater protection. The airflow switch shall prove adequate fan airflow before the electric heater can be energized. Both devices shall be serviceable through fan coil unit without removing heating element from the unit.

5. Heating coils shall have a terminal box and cover, with either SCR controls or quiet type built-in mercury step controlled contactors for each circuit, branch circuit fusing for each circuit in excess of 48 amps per the NEC and a static pressure or air flow safety interlock switch for installation in the heater control enclosure. Provide a separate control power transformer in accordance with NEC requirements and the local authorities having jurisdiction.

6. All wiring of built-in devices shall be brought to clearly marked terminal strips. A complete wiring diagram shall be permanently attached to the heating coil panel cover.

7. Shop Drawings shall be submitted for review as specified in Section 15– – –. These Shop Drawings shall indicate specifically the exact construction, materials, internal wiring, NEC working clearances, etc., of the fan coil units and electric heating coils to be furnished under these Specifications.

G. Centrifugal fan blower wheels shall be forward curved type, double width, double inlet direct drive type selected for maximum efficiency and an acoustical performance in accordance with the Project acoustical criteria specified in the Contract Documents. Unit fan shall be constructed of zinc coated galvanized steel for corrosion resistance. The fan assembly shall be easily removable for service.

H. Fan motors shall be ECM or Nailor EPIC variable speed DC brushless motors specifically designed for use with a single phase, (120, 208, 240, 277) Volt, 60 hertz electrical input. Motor shall be complete with and operated by a single phase integrated controller/inverter that operates the wound stator and senses rotor position to electrically commutate the stator. All motors shall be designed for synchronous rotation. Motor rotor shall be permanent magnet type with near zero (0) rotor losses. Motor shall have built-in soft start and slowed speed change ramps. Motor shall be permanently lubricated with ball bearings. Motor shall be direct coupled to the blower. Motor shall maintain a minimum of sixty-five (65%) percent efficiency over its entire operating range. Provide isolation between fan motor assembly and unit casing in at least four (4) locations to eliminate any vibration from the fan to the terminal unit casing. Provide isolation between the motor and blower as well as between the blower and casing.

K. The fan coil unit manufacturer shall furnish a wall mounted control package shipped loose for field installation. The wall mounted sensor controller shall be provided with quick connect plugs. The control package shall provide automatic changeover from heating to cooling. The fan coil unit manufacturer shall furnish and install a dynamic fan volume control system to automatically vary the fan airflow in response to heating and cooling load. The wall mounted control device in the room shall allow automatic fan modulation based on room load demand. The fan speed shall change slowly. No manual speed selection will be required at the wall mounted control device. Provide an add alternate **(M _____)** to provide the DDC sensor/controller with the capability to be incorporated into the Division 17 Building Management and Control System or "Smart Room" technology to start

Suggested Specifications

Factory-Built Fan Coil Units • Section 15– – – (continued)

and stop the unit, remotely reset the space temperature and control the outside air (on-off) to the room. The fan coil unit manufacturer shall demonstrate the performance of the fan coil unit dynamic volume control sequence, the associated two (2) position heating control valve and the modulating cooling control valve with the DDC controller in an independent testing laboratory. The acceptability of the independent testing laboratory is subject to review by the Owner and Engineer. The fan coil unit manufacturer shall submit complete test details, brochures, instrumentation, etc., for review. If the fan coil unit manufacturer has conducted the herein specified dynamic volume control performance tests and has demonstrated to the Engineer and Owner compliance with the specified criteria, the previous testing will be accepted and will not need to be repeated. See Section 15--- titled "Design Conditions". The fan coil unit shall be capable of operation as described herein with discharge static pressure of 0 to 0.5" w.g. (120 Pa) at full airflow. (See SEQUENCE OF OPERATION for further information.)

L. The entire fan coil unit assembly shall be factory wired to a single point connection. All power and control wiring shall conform to National Electric Code Standards and local requirements of the authorities having jurisdiction. The fan coil unit assembly shall include all required devices, including but not limited to, service switch, relay, control power transformers and control packages, low voltage remote shutdown relays, etc.

M. If required, the fan coil shall be equipped with an outside air damper integral to the unit. The damper shall be capable of pressure independent operation with DDC controller or pressure dependent operation with manual quadrant. If the damper is controlled by DDC controls, see controls specification for controls requirements.

N. The fan coil unit and acoustical treatment shall limit the noise in the room 5' away from any discharge and return air opening to an amount that will not produce more than the NC sound curve specified in Section 15– – – titled "Design Conditions".

O. Each size of fan coil unit installed on this Project shall be completely acoustically tested in the Owner's room mock-up or an independent laboratory for air performance and acoustics. The acceptability of the independent testing laboratory is subject to review by the Owner, Project Acoustical Consultant, and the Engineer. The fan coil unit manufacturer shall submit complete test details, brochures, instrumentation information, etc., for review. The air volume listed on the Drawings or in the schedules for the fan coil units shall be tested. If the fan coil unit manufacturer has conducted the hereinbefore specified air performance and acoustical tests and has demonstrated to the Engineer and Owner compliance with the specified Project criteria, the previous testing will be accepted and will not need to be repeated. See Section 15– – – titled "Design Conditions". Base sound power data shall be provided as tested according to the latest version of ARI Standard 350. This data is for guideline purposes only, the mock up described above is the qualifying test.

P. The fan coil unit manufacturer shall submit six (6) certified copies of the field performance and acoustical performance test results to the Engineer and the Project Acoustical Consultant. See Section 15– – – titled "General Requirements" for additional submittal and certification requirements.

Q. The fan coil manufacturer shall verify at the manufacturer's factory the operation of each fan coil before shipment. Testing shall include at least the following:

1. Apply electric power to the unit.
2. Start the fan and verify fan rotates properly.
3. Energize the electric two (2) position and modulating control valves and verify satisfactory performance.
4. Provide a written inspection report for each unit signed and dated by the factory test technician verifying all fan coil unit wiring and testing has been performed per the manufacturer's testing and quality assurance requirements.

R. The fan coil unit manufacturer shall factory set the brushless "ECM" motor and associated controller/inverter to the maximum discharge airflow for heating and cooling and minimum deadband airflow specified and indicated in the contract document.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All factory-built fan coil units shall be installed in accordance with the latest industry standards, per the manufacturer's recommendations and as indicated on the Drawings.

B. All factory-built fan coil units shall be installed to allow for proper cooling coil condensate drainage through the traps.

C. Prior to the installation of multiple fan coil units, the Contractor shall install one of each size of the fan coil units as mock-up conditions generally representative of the typical ceiling plenum installation. The mock-up condition shall be complete with piping, condensate piping ductwork, fan coil unit hangers, control, electrical connections and code clearances. The mock-up installations shall be located within one of the typical areas of the project. The Contractor shall advise the appropriate Local Code Field Inspector, Engineer, and Owner's representative after the mock-up is complete and ready for review and inspection. The Contractor shall arrange a time mutually agreeable to these parties so they can meet at the project site, review the mock-up installation, and determine any changes that need to be made for the installation to be acceptable to the Local Code Field Inspector. Issues regarding access and code NEC clearances plus obstructions and conflicts with other trades within the ceiling plenum will be discussed and mutually agreed upon. The mock-up condition, review of the mock-up condition by the appropriate parties, and the necessary modifications for the mock-up to become code compliant in the opinion of the Local Field Code Authority shall be completed prior to the installation of additional fan coil units. The Contractor shall account for this requirement in the schedule of construction so this procedure does not delay the construction progress. If multiple fan coil units are installed prior to the mock-up approval, the Contractor shall be responsible for the remedial work required to comply with the approved mock-up condition at no additional cost to the Owner. The Contractor shall provide advance notice to the appropriate parties of the fan coil unit's mock-up inspection a minimum of seven working days prior to the meeting. If additional or follow-up field inspections of the mock-up modifications are required to establish the approval of the Local Field Code Authority, the Contractor shall provide these modifications and additional follow-up field inspections as required without additional cost to the Owner.

3.02 FACTORY TESTING

A. All factory-built fan coil units shall be tested in accordance with the latest applicable industry standards as specified herein and be UL or ETL listed.

3.03 FIELD TESTING

A. Refer to Section 15990 for additional testing requirements for factory-built fan coil units.

END OF SECTION 15 – – –

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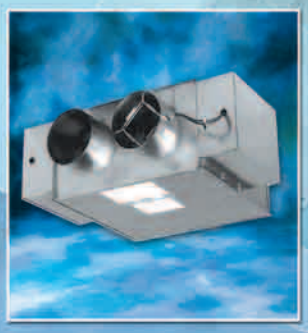

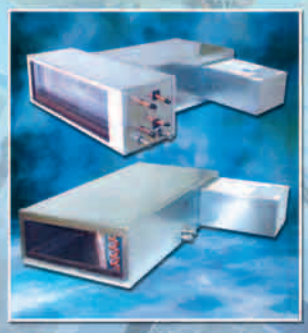

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