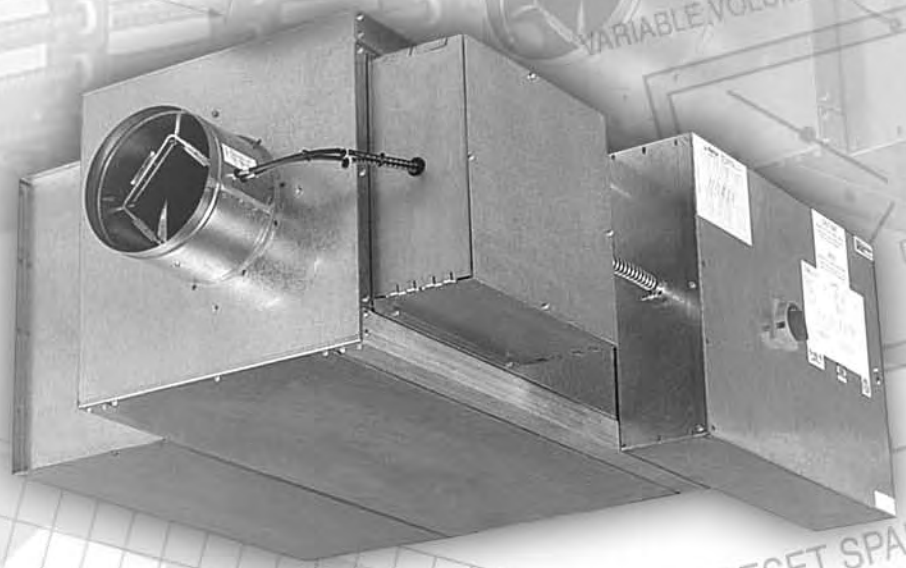
FAN POWERED TERMINALS



Nailor Industries Inc.

Contents

GENERAL PRODUCT OVERVIEW

Nailor is proud to provide the latest generation of fan powered terminal units – designed to lead the industry.

Providing products that incorporate the desires and requirements of the industry we serve has traditionally been a primary focus at Nailor.

We listened in-depth to the engineering and contracting community, asked a lot of questions and realized there was not a single line of fan powered terminals available that incorporated all the design features and performance criteria that satisfied their wishes.

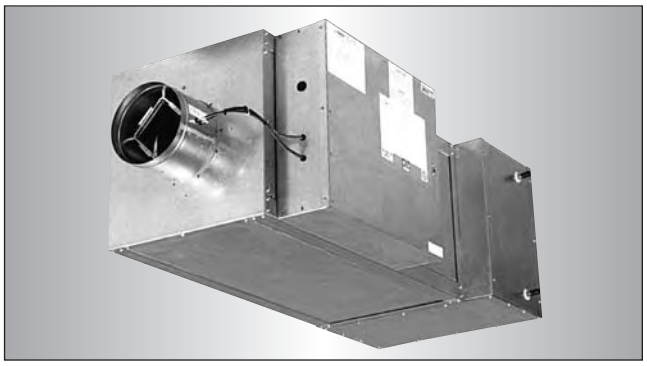
After an extensive and intense period of research, design and development, we have produced a line of fan powered terminals that satisfy the vast majority of requirements the HVAC industry demands.

On the next page, you can see at a glance some of the unique universal features that have been incorporated into this new generation of Nailor fan powered terminals, providing the benefits of high performance operation and many field-friendly features to aid installation.

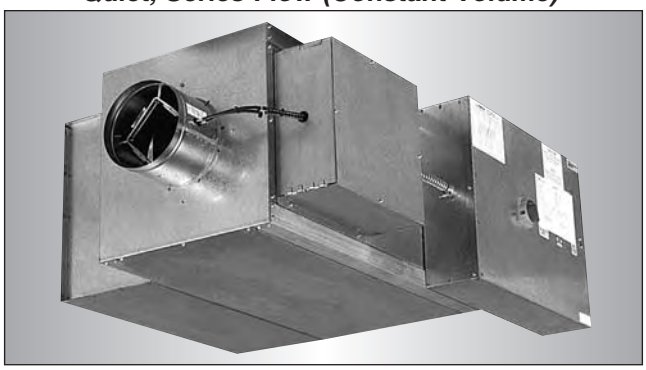
All Nailor terminals include the following additional features as standard:

- **Compatibility with pneumatic, analog electronic and digital controls.**
- **Factory supplied controls are tested and calibrated by Nailor.**
- **Fan motors and heaters are energized and dielectric tests are performed on every terminal to ensure correct operation prior to shipment.**
- **Custom fabricated motor/blower combinations are mounted on special 16 ga. angles and isolated from casing with rubber insulators.**
- **All motors incorporate an anti-backward rotation design to prevent backward rotation upon start-up.**
- **Units can be flipped in the field for right or left hand configuration.**

Following further development, Nailor has recently introduced some new specialty versions of the series flow fan powered terminal unit design for specific project applications. These include the "low profile" 37S and 37SST "Stealth™" model series, the "outside air inlet" 35STL and 35STLST "Stealth™" series and the "pressurization unit" 35SVM model. A full description of these models is contained in this catalog.

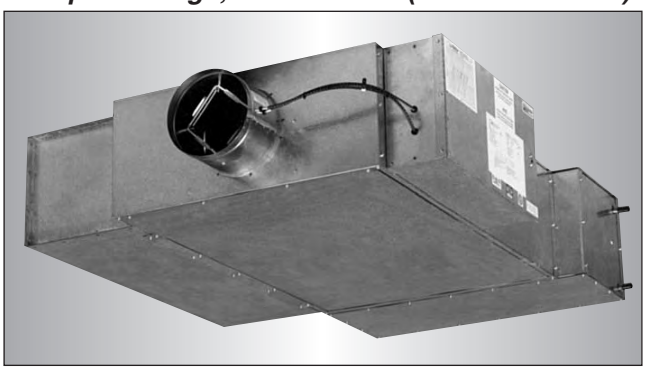


35S Model Series. Basic Unit
Quiet, Series Flow (Constant Volume)



35SST "Stealth™" Model Series
Super Quiet, Series Flow (Constant Volume)

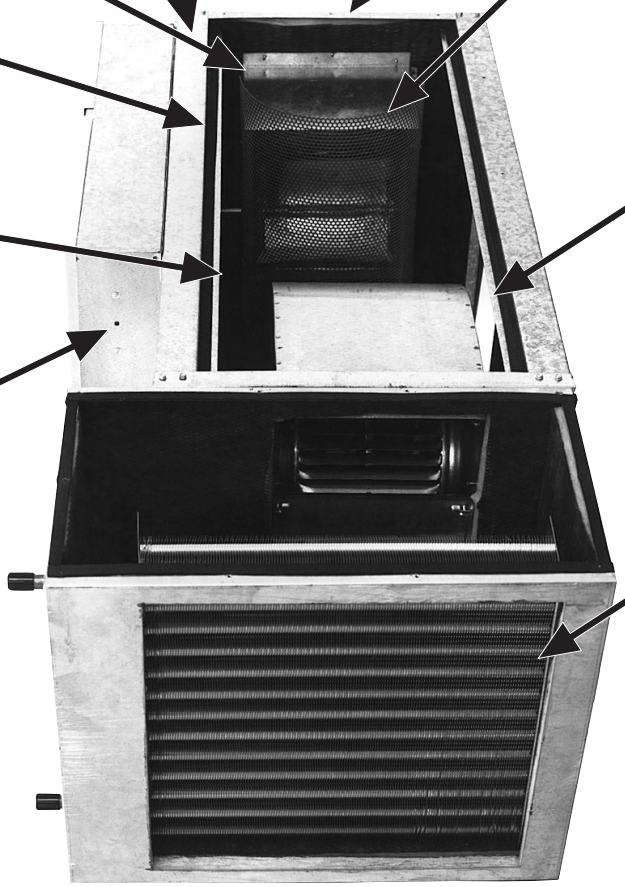
35N Model Series. Basic Unit
Compact Design, Parallel Flow (Variable Volume)



37SST "Stealth™" Model Series
Low Profile, Series Flow (Constant Volume)

Standard Features of the 35S

- **16 ga. channel space frame construction**. Provides an extremely rigid terminal.
- **Inclined Opposed Blade Primary Air Damper** minimizes noisy turbulence and ensures smooth accurate control.
- **20 ga. Removable Panels** on four sides provides access from above, beside or below.
- **3/4" (19) Dual Density Insulation** meets requirements of NFPA 90A and UL 181.
- **Solid State Fan Speed Controller** is custom designed by Nailor for each fan size and provides the widest turn-down available for maximum flexibility and accurate primary/induced air balancing.



- **'Diamond Flow' Multi-point Averaging Sensor** provides accurate primary air control.
- **Perforated Diffusion Baffle** optimizes mixing of primary and induced airflows and improves sound performance.
- **Energy efficient PSC Motors** are custom made to Nailor specifications and permanently lubricated ensuring quiet running and many years of reliable maintenance free operation.
- **Available Hot Water Coils** for supplementary heat are mounted in an insulated plenum section for improved energy savings and heat transfer. Maintenance access panels on top and bottom sides are standard.

- **Agency listings** provide **independent assurance of performance and safety**. All terminals are tested and performance data certified to ARI Standard 880. Certification requires ongoing check testing by ARI of actual production line units. All terminals and electrical components including electric heat coils are ETL listed to UL Standard 1995 and CSA C22.2 No. 236 as a complete assembly.

Design Characteristics and Application

Introduction

Fan Powered Terminal Units are an economical means of both cooling and periodically heating the perimeter zones of a building utilizing a single duct control system. In addition to inherent VAV economies, fan terminals utilize the free heat derived from lighting, people and other equipment and induce this warmer plenum air from the building core ceiling plenum space and re-circulate it to rooms calling for heating. If additional heating is required, optional supplementary heating coils may be activated. The need for a central source of warm air is eliminated.

During weekend or night-time operation, the central fans may be turned off. Heat, if required, may be provided by the terminal unit fan itself.

Fan Powered Terminal Units are the most popular design for office buildings because they provide performance benefits by way of lower first cost, (such as reduced central system fan HP and smaller ductwork), lower operating cost, the recovery of waste heat and the capacity for improved air circulation and diffuser performance.

Fan terminals are available in two basic configurations; series or parallel flow. Each contains a fan motor assembly and a variable air volume damper to modulate primary air.

In a series unit (Fig. 1), the fan sits in the primary airstream and runs constantly when the zone is occupied. In a parallel unit (Fig. 2), the fan sits outside the primary airstream and runs intermittently.

Although both terminals can provide central fan HP savings, each terminal has different inlet static pressure requirements. Series fan terminals boost both induced air and primary air, so the inlet static pressure need only overcome the loss across the damper (less than 0.05" w.g. with Nailor terminals). Parallel fan terminals require enough static pressure to overcome the losses across the damper, the downstream ductwork and diffusers (typically 0.25 - 0.5" w.g.).

Series Flow Terminals – (Constant Volume)

A series fan powered terminal unit mixes primary air with induced plenum air by using a continuously operating fan during the occupied mode. It provides a constant volume of air to the space regardless of load.

As the cooling load decreases, the zone thermostat throttles the primary air valve. The terminal fan makes up the difference by inducing more return air from the plenum. At low cooling loads, the primary air may close or go to a minimum ventilation setting. If the zone temperature drops still further, the thermostat can energize optional supplemental heat. The sequence reverses when the load is increased.

The series terminal is therefore a constant volume, variable temperature unit. (See Fig. 3).

Series units should only be used with pressure independent controls. Series fans must be adjusted to match the maximum cooling cfm, to ensure that the primary air does not exceed the fan cfm as this would result in the short-circuiting of primary air directly into the ceiling plenum and waste energy. A pressure independent controller and inlet flow sensor controls the primary air valve to compensate for changes in inlet static pressure and ensures design cfm is maintained.

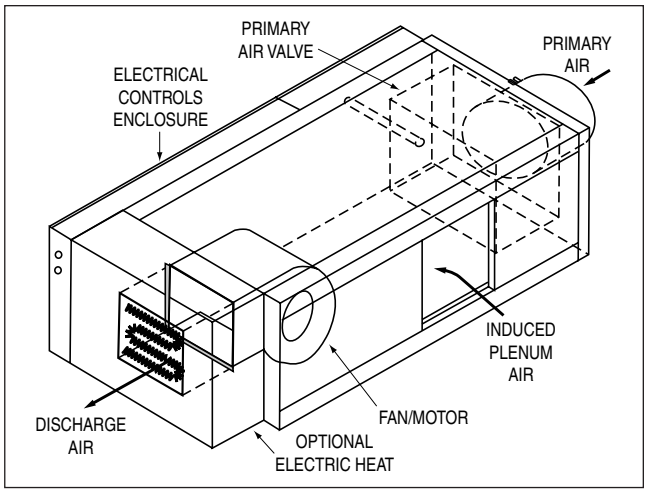


Figure 1. Series Fan Terminal

Parallel Flow Terminals – (Variable Volume)

Also called an intermittent fan terminal unit, a parallel unit modulates primary air in response to cooling demand and energizes the integral fan in sequence to deliver induced air to meet heating demand. The induction fan operating range should slightly overlap the range of the primary air valve. A backdraft damper ahead of the terminal fan prevents conditioned air from escaping into the return air plenum when the fan is off.

During full cooling demand, the thermostat positions the primary air valve for full airflow while the fan is de-energized. As the cooling load decreases, less primary air is delivered to the zone as the thermostat modulates the valve (functioning as a single duct VAV terminal).

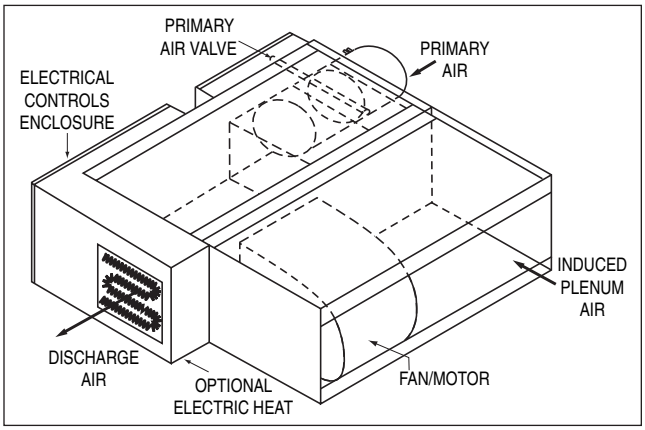


Figure 2. Parallel Fan Terminal

Design Characteristics and Application (con't).

The primary air damper may be set to a minimum position, (to ensure continuous ventilation), or zero (closed). At a reduced demand for cooling, the fan becomes energized. The fan has an adjustable starting point and may alternatively be set to energize at the point that the primary air valve reaches its minimum position or before it reaches its minimum setting. Overlapping the fan start point and primary air valve minimizes the likelihood of air stagnation in the conditioned space and the noticeable air surge when the fan energizes.

With the fan energized, the delivered air temperature approaches that of the ceiling plenum. If the zone temperature continues to drop, the thermostat automatically energizes optional supplemental electric or hot water heat, thereby raising discharge air temperature. Increasing the cooling load reverses the sequence. The parallel terminal unit is therefore variable volume constant temperature on the cooling cycle and essentially constant volume variable temperature on the heating cycle. (See Fig. 4).

Application

Fan terminals are installed in the ceiling return air plenum and take return air from the plenum or have the induction port(s) ducted to the space. For maximum heat pick-up and minimum sound radiation, the assembly should ideally be located in the ceiling cavity, preferably over a corridor, toward the building core.

Careful consideration should be given to both overall sound level and change in sound level in the space. With series terminals the sound remains virtually constant as the fan runs continuously. With parallel units, the intermittent fan operation will cause a change in sound levels in the occupied space. This change may be more noticeable than a constant sound, even if the constant sound is at a higher level (i.e., a series unit), especially in the fall and spring when fan cycling occurs frequently.

When properly applied, the relatively long distance between the fan terminal discharge outlet and the conditioned space it serves minimizes any concern about discharge sounds in the space due to the terminal, and only the radiated sound, below the space where it is located, need be considered.

Both the primary air damper and fan act as sound sources in both units and each generates discharged and radiated sound.

Series units will have the fan sized for the full airflow and downstream resistance. Parallel fans with a reduced air volume heating load should be sized for a reduced resistance downstream of the terminal. While series fans deliver the total design cooling air volume, parallel units generally deliver 50 to 75% of that amount. Therefore, series units usually require a larger fan or the same fan run at a higher speed.

Fan Powered Induction Systems combine the energy saving diversity of single duct VAV shut-off systems with the additional benefits of heat reclamation. In most climates, fan powered systems are a lower operating cost alternative. Plenum air heating eliminates the inefficiencies inherent in reheating cold primary air. Utilizing warmer plenum air allows for recovery of heat from lighting and other heat sources in the building.

Fan Powered Terminals move more air through a room at low cooling loads and during heating compared to single duct VAV reheat systems, thereby providing improved air circulation.

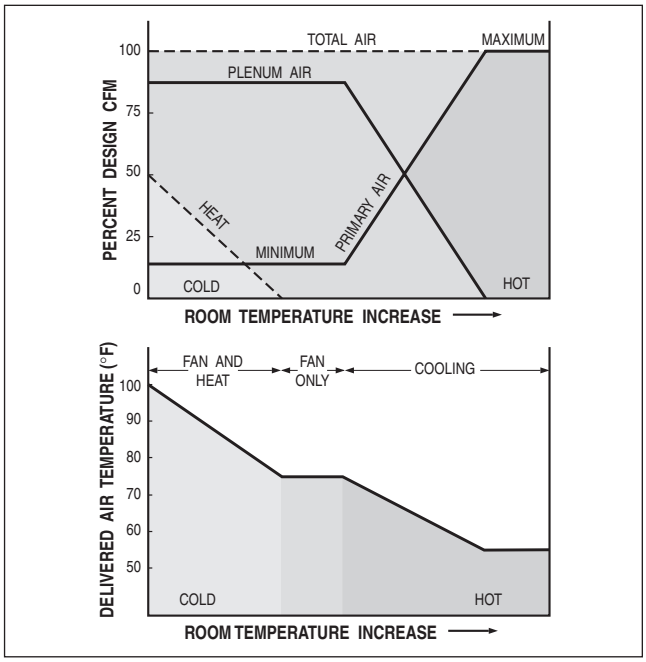


Figure 3. Series Operation

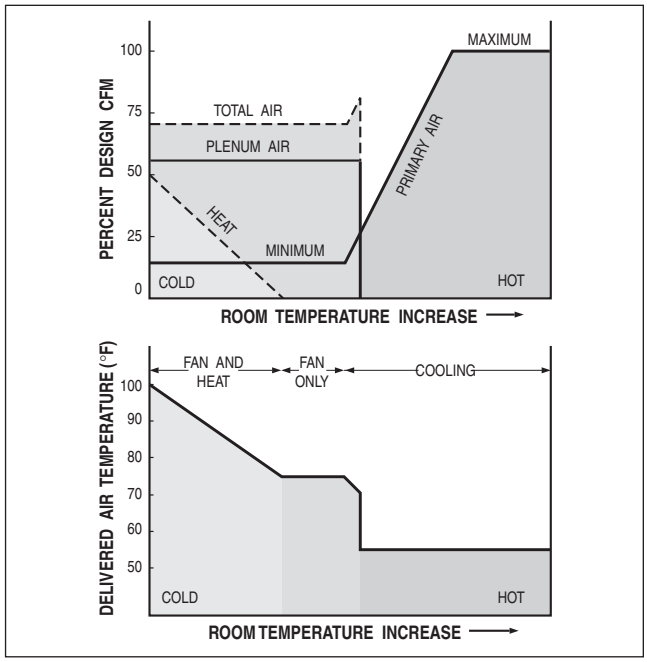


Figure 4. Parallel Operation

Design Characteristics and Application (con't).

Typical Application of Series Units

Series flow terminals are rapidly becoming the terminal of choice for their superior characteristics of constant volume delivery, temperature blending and constant sound levels as compared to parallel flow terminals.

Some applications may demand constant air volume delivery regardless of load, e.g., conference rooms, lobbies and large open office areas. Because the series unit supplies the downstream external static pressure and reduces the central system pressure requirement, office buildings can take advantage of this design feature and downsize central air handling equipment and associated ductwork. Series terminals are ideally suited for use in low temperature (ice storage) air systems to temper cold (40 – 48°F, 4.4 – 9.0°C) air with warm plenum air before delivering it to the zone.

Typical Application of Parallel Units

Parallel units may be used in perimeter zones of buildings where loads vary during occupied hours and core zones maintain a constant cooling requirement utilizing single duct shut-off type terminal units. Variable volume airflow to the zone is acceptable in these applications and low installation and operating costs are desired.

Energy Consumption and Installed Cost

Dependent upon location, loading, operating hours and ventilation requirements, either type of fan terminal may be more advantageous. For an equivalent zone size, series terminals may be a little higher in first cost as the fan is sized for total airflow whereas a parallel terminal fan is sized for the reduced heating airflow only. When fan size is the same however, installed cost is approximately equal.

Series terminals however unlike parallel, reduce the operating pressure requirement at the central AHU and provide energy savings.

Summary of Fan Powered Terminal Units

	Series Flow	Parallel Flow
Configuration	Fan located in the primary airstream (in series).	Fan sits outside the primary airstream (in parallel).
Fan Operation	Continuous operation during the occupied mode whether heating or cooling. Intermittent operation (night cycle) available during the unoccupied mode.	Intermittent operation during occupied and unoccupied (night cycle) periods. Fan cycles only under heating and minimum cooling loads.
Operating Sequence	Constant volume, variable temperature at all times. Primary and plenum air are mixed in varying amounts; supplemental heat raises temperature still further in stages. Delivers design airflow regardless of load.	Variable volume, constant temperature during cooling. Constant volume, variable temperature during heating. Fan and supplementary heat raise temperature in stages.
Fan Energization	Interlocked with central system fan to prevent air from spilling out of induction ports and into ceiling-plenum. Anti-backward rotation design feature built in.	Based upon zone temperature deviation from thermostat set point. No interlock with central system fan required. Anti-backward rotation design feature built-in.
Terminal Fan Sizing	Fan sizing should meet the greater of design cooling or heating airflow to the zone (usually 100% of cooling) at required downstream static pressure.	Size for design heating load (typically 40 to 75% of design primary cooling airflow) at reduced downstream static pressure.
Primary Air Valve Sizing and Minimum Pressure for Central Fan Sizing	Size for design cooling flow with sufficient inlet pressure (lower 0.05" w.g. to 0.20" w.g.) to overcome primary air valve pressure loss only. Terminal fan provides static pressure for downstream losses. Requires lower horsepower central fan.	Size for design cooling flow with sufficient inlet pressure (higher 0.3" w.g. to 0.6" w.g.) to overcome terminal unit, heating coil, downstream duct and diffuser pressure losses. Requires higher horsepower central fan.
Acoustics	Continuous fan operation produces slightly higher (for a given volume), but constant sound pressure levels in the occupied space. This constant sound level may be less noticeable than an intermittent fan operation.	Fan does not run under cooling loads, offering acoustic performance similar to single duct VAV terminal with attenuator. Under heating loads, the fan cycles intermittently which changes sound pressure levels in the occupied space.
Ventilation Rates	Constant – High ventilation rates and room air movement helps ensure superior occupant comfort.	Variable – Possibility of air stagnation at reduced air volumes, particularly in larger zones with partitioned office space.

Common Fan Terminal Components

In addition to the **'Diamond Flow' multi-point averaging sensor** and **opposed blade damper configuration of the primary air valve** that are described in detail on page A9 in this catalog, all Nailor fan powered terminals incorporate the following features and benefits.

The Diamond sensor is standard on all Nailor VAV terminal units that are equipped with pressure independent controls.

Single Speed PSC Induction Motors

All Nailor fan powered terminal units are currently equipped with single speed, direct drive, fractional horsepower, high efficiency, psc motors as standard. These motors are manufactured to specifications developed by Nailor specifically for the fan powered terminal unit market. Some of the more important features are listed and explained below.

- **No Corona Effect**

  Motors not only provide power, but act as transformers and generators. Under certain conditions, this causes the unused speed taps in multiple speed motors to have large potential or static charges present. While these charges are not doing any work, they will create damage to the windings if their potential voltages are greater than the winding insulating quality. This is often the case, and lifetimes are shortened. Nailor fan powered terminal units do not suffer from this malady. All motors are single speed.

- **Wide Operating Ranges**

  Nailor motors are designed to operate at rotational speeds lower than those of our competitors. This requires special stator wire sizing, special capacitor sizing and special bearings. These items are covered in our specifications. This assures you of high end performance equal to or better than any of our competitors and low end ranges below any of our competitors.

  Low end performance is often ignored. Many times, this is because the range is not great enough to allow much difference, or because the low end performance is achieved by artificial means such as manual dampers to lower the airflows. Manual dampers lower airflows, but they increase rpms. Increased rpms put back all the noise generation in the fan powered terminal unit as if it were still operating at full airflow. This is due to the noise caused by tip speed and vibration within the unit. High rpm, regardless of airflow, will generate high noise.

  Nailor solves this problem through low rpms for low airflows. Typically, the motors in Nailor fan powered terminal units can rotate as low as 350 rpm's at low end, shedding as many as 14 to 20 decibels in the second and third octave bands depending on which unit is being selected. This means real sound level selections, units that can produce NC's of 30 and 35 when applied correctly and wider operating ranges on individual units for greater flexibility in the zone.

- **Permanently Lubricated Motors**

  Nailor fan powered terminal units are equipped with permanently lubricated motors. The motors are equipped with oilers, but the oilers are not necessary as long as the units are operated in typical ambient temperature conditions. The specifications call for the oil reservoirs to have at least 50% of the original oil still in the reservoir after 50,000 hours of use under normal conditions.

- **Permanent Split Capacitor Design**

  All Nailor fan powered terminal units have PSC motors. The capacitors are sized to provide ample starting torque, even when turned down to the low minimums allowed on Nailor fan powered terminal units.

- **High Efficiency**

  All Nailor PSC motors are the highest efficiency available in the market today. This too, is controlled by the Nailor motor specifications. Higher efficiency means lower operating expenses.

Fan Speed Controllers

Nailor designed its own solid state fan speed controllers. They are designed to operate with the specific motor and blower combinations as used in Nailor fan powered terminal units. They provide smooth and infinite adjustment of motor speed from maximum to the lowest preset low end limits found in the industry.

The speed controllers are largely responsible for the operating ranges of the motors. High quality standards allow very accurate low end stops. This assures Nailor customers of sound levels and performance as cataloged.

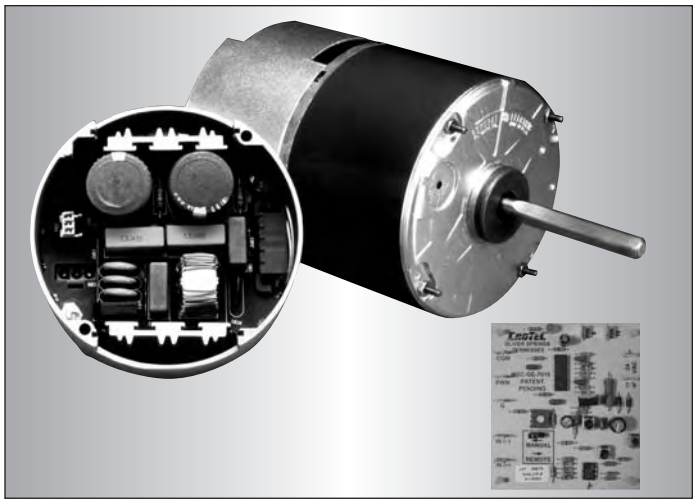
The matching of the motors and speed controllers allows Nailor fan powered terminal units lower watt consumption as motor rpms are reduced. High efficiency is maintained from high end performance to low end performance. Very few of our competitors can make a similar claim.

Low Noise Levels – ARI Certified

In addition to those items listed above, Nailor holds down noise levels in the occupied space with heavy gauge metal casings, dual density insulation and multiple isolation points between motors and casings. Nailor is as quiet as any and far quieter than most of our competitors when controlling similar airflows on competitive equipment. Check out the sound data in this catalog. Notice there is no fine print covering the conditions under which the data does not apply. Notice that the minimum static requirement on series fan powered terminal units is 0.05" w.g. (12 Pa). Then notice the correspondingly low inlet static pressures on the parallel units. Notice that Nailor sound data is ARI certified and independently certified by Energistics Laboratory, Houston. Compare that to the competition.

EPIC™/ECM MOTOR 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 turn down ratios mean more flexibility for tenant changes**



Since 1985, equipment manufacturers have used GE 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 was first to introduce the GE ECM™ motor to the commercial HVAC market (ASHRAE Journal, April 1997) as an option for use in series 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 series fan powered terminal units until now, has been their low fan motor efficiency. The widely used single speed fractional horsepower permanent split capacitor (PSC) induction motor in combination with 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™/ECM motor technology allows Nailor 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 series terminals employing GE ECM™ motors 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

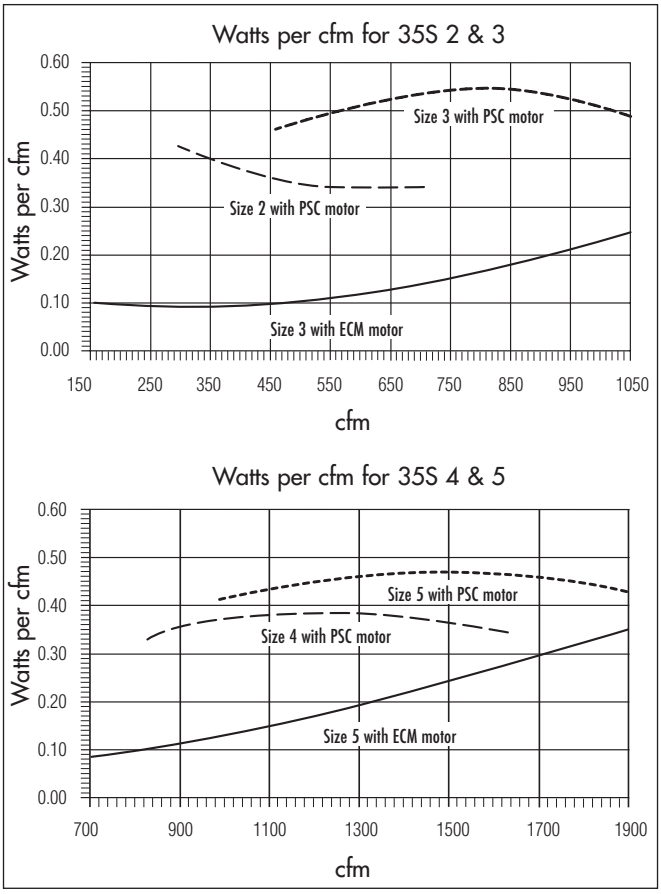


Table 1. Power consumption comparison of GE ECM™ versus PSC motors.

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 when tenants change, 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 – 150°F).

EPIC™/ECM MOTOR TECHNOLOGY

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 25 years for a typical series fan powered terminal unit. In addition to these standard features are two primary benefits, energy savings and the ability to pre-set the fan airflow volume at the factory.

HOW DO YOU PRE-SET FAN AIRFLOW?

Pre-setting the fan airflow (cfm) has always been a problem for fan powered terminal manufacturers for two major reasons. First is that AC motors are not synchronous machines and second 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 will not produce the same volume of air as it did at the factory without the duct work. 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.

Nailor series fan powered terminal units incorporate our own custom EPIC™ fan controller. An electronic PWM volume control device that allows adjustment of airflow volume. This value can be pre-set on the assembly line. It is field adjustable either manually using a screwdriver and voltmeter locally at the terminal or more conveniently, 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 that the balancer never has to go into the ceiling to adjust the fan. This relieves the balancer of most of his work per zone on fan powered terminal units and related headaches. 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 controls contractor, the mechanical contractor and the ceiling contractor.

ENERGY SAVINGS

The following graphs show the energy savings of units with GE ECM™ motors compared to using units with Nailor engineered PSC motors. It is important to note that the PSC motors in Nailor fan powered terminal units are more efficient than those used by most of our competitors. The PSC motors used by Nailor are built specifically for Nailor fan powered terminal units. A couple of our competitors use motors that approach the efficiency of Nailor motors but none are as efficient. The comparison shows Nailor units with GE ECM™ motors versus Nailor units with PSC motors.

Comparison using Nailor units with ECM motors and a competitor's units with PSC motors would show even greater savings.

The typical range of operation for the size 3 would be 200 to about 900 cfm. The typical range of operation for the size 5 unit would be 700 to 1700 cfm.

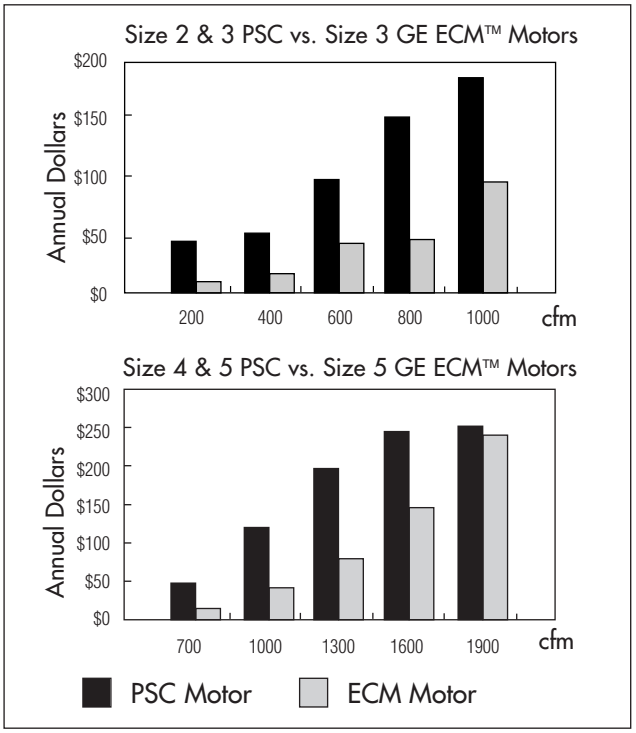
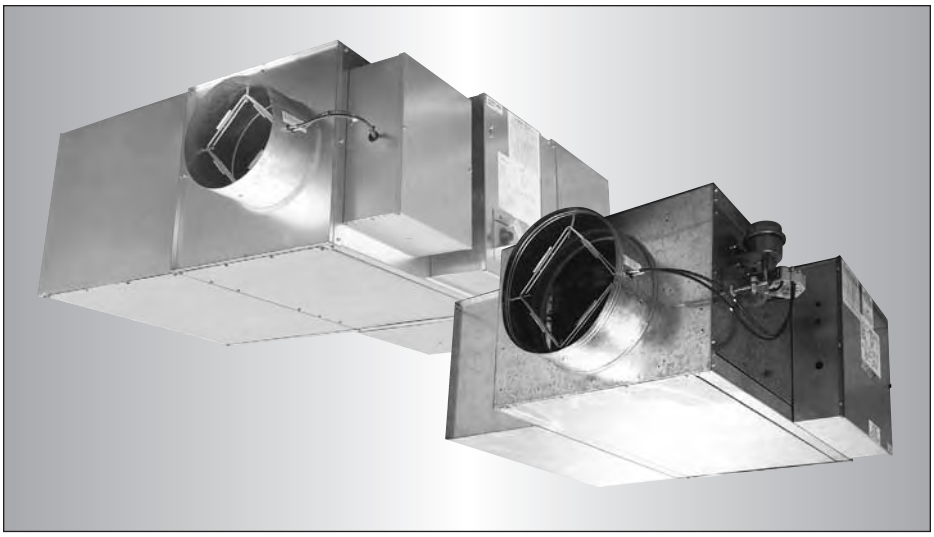


Table 2. Typical operating cost comparison.

WHAT IS THE PAYBACK PERIOD ON ECM MOTORS?

The payback period varies. It depends on which unit you use, where you set the cfm, how much you run the equipment and what you are paying for electricity. The graphs above are calculated assuming 66 hours per week operations and $ .10 per kWh. If you run the equipment longer in your building or if you pay more for electricity, the payback will change proportionally. Considering the pre-set capability of the motor, there should be an up-front savings on balancing. That should be rebated to the owner and should be considered as part of the payback from the motor. Typically, with the balancing rebate and the operating expenses as shown above, the payback period should be anywhere from 6 to 18 months.

Recommended Primary Valve Airflow Ranges For All Fan Powered Terminal Units



The recommended primary air inlet airflow ranges below are for terminal units with pressure independent controls and are based upon controller sensitivity limits as shown for each control type. For a given inlet size, the minimum and the maximum flow settings must be within the range limits to ensure pressure independent operation, accuracy and repeatability. The high end of the tabulated Total Airflow Range represents the Diamond Flow Sensor's differential pressure reading at 1" w.g. (250 Pa). This is a common high limit for many VAV controllers, whether pneumatic or analog/DDC transducers. For these reasons, factory settings will not be made outside these ranges. A minimum setting of zero (shut-off) is also available.

ARI Standard 880 "Air Terminal Units" is the method of test for the certification program. The "standard rating condition" (certification rating point) airflow volumes for primary air valves are tabulated below. These air volumes equate to an approximate inlet velocity of 2000 fpm (10.2 m/s). When digital or other controls are mounted by Nailor, but supplied by others, these values are a guideline only, based upon experience with the majority of controls currently available. Controls supplied by others for factory mounting are configured and calibrated in the field.

For a detailed analysis of fan powered terminal selection procedures with working examples, consult the engineering section of this catalog.

Imperial Units, Cubic Feet per Minute

Inlet Size	Total Airflow Range cfm	Airflow at 2000 fpm Inlet Velocity (nom.) cfm	Range of Minimum and Maximum Settings, cfm		
			Pneumatic 3000 Controller	Analog Electronic Controls	Digital Controls
			Min. – Max.	Min. – Max.	Min. – Max.
4	0 – 215	150	30 – 215	25 – 215	25 – 215
5	0 – 310	250	55 – 310	45 – 310	45 – 310
6	0 – 500	400	85 – 500	70 – 500	70 – 500
8	0 – 1000	700	180 – 1000	150 – 1000	150 – 1000
10	0 – 1435	1100	250 – 1435	205 – 1435	205 – 1435
12	0 – 2150	1600	395 – 2150	325 – 2150	325 – 2150
14	0 – 3060	2100	495 – 3060	400 – 3060	400 – 3060
16	0 – 4050	2800	760 – 4050	625 – 4050	625 – 4050
18	0 – 4985	3500	935 – 4985	770 – 4985	770 – 4985
14 x 10	0 – 2560	1900	450 – 2560	365 – 2560	365 – 2560

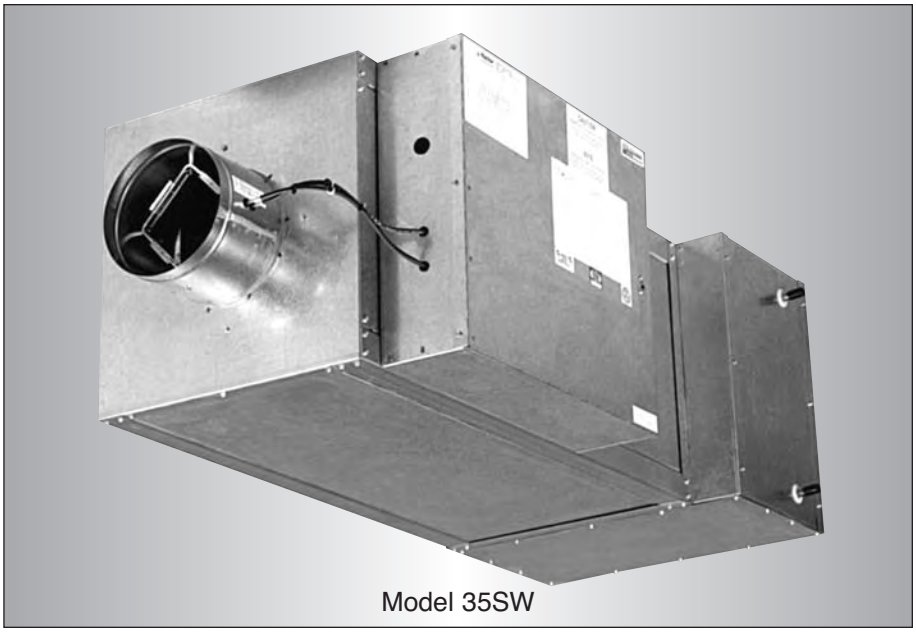
Metric Units, Liters per Second

Inlet Size	Total Airflow Range l/s	Airflow at 10.2 m/s Inlet Velocity l/s	Range of Minimum and Maximum Settings, l/s		
			Pneumatic 3000 Controller	Analog Electronic Controls	Digital Controls
			Min. – Max.	Min. – Max.	Min. – Max.
4	0 – 101	71	14 – 101	12 – 101	12 – 101
5	0 – 146	118	26 – 146	21 – 146	21 – 146
6	0 – 236	189	40 – 236	33 – 236	33 – 236
8	0 – 472	330	85 – 472	71 – 472	71 – 472
10	0 – 677	519	118 – 677	97 – 677	97 – 677
12	0 – 1015	755	186 – 1015	153 – 1015	153 – 1015
14	0 – 1444	991	234 – 1444	189 – 1444	189 – 1444
16	0 – 1912	1322	359 – 1912	295 – 1912	295 – 1912
18	0 – 2353	1652	441 – 2353	363 – 2353	363 – 2353
14 x 10	0 – 1208	897	212 – 1208	172 – 1208	172 – 1208

SERIES FLOW CONSTANT VOLUME

35S SERIES

- QUIET OPERATION



Model 35SW

Models:

35S	**No Heat**
35SE	**Electric Heat**
35SW	**Hot Water Heat**

The **35S Series** provides many standard design features and superior sound performance when compared with other basic model designs. The **35S** offers a compact and economical design well suited to the majority of applications.

FEATURES:

- Unique 16 ga. (1.6) galvanized steel channel space frame construction provides extreme rigidity and 20 ga. (1.0) casing components.
- 16 ga. (1.6) galvanized steel inclined opposed blade primary air damper. 45° rotation, CW to close. 1/2" (13) dia. plated steel drive shaft. An indicator mark on the end of the shaft shows damper-position. Leakage is less than 2% of nominal flow at 3" w.g. (750 Pa).
- Perforated baffle on primary air discharge optimizes mixing with induced air for rapid and effective temperature equalization. The baffle also converts low frequency primary air valve generated sound into more readily attenuated higher frequencies.
- Pressure independent primary airflow control.
- Multi-point averaging flow sensor.
- Terminal may be field installed either way up, providing the additional flexibility of right or left field connections.
- Universal access panels on all four sides of terminal for ease of maintenance and service.
- Energy efficient PSC fan motor with thermal overload protection.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Adjustable solid state fan speed controller with minimum voltage stop.
- Hinged door on fan controls enclosure.
- 3/4" (19), dual density insulation. Exposed edges coated to prevent air erosion. Meets requirements of NFPA 90A and UL 181.
- Available with electric or hot water supplementary heat.
- All controls are mounted on exterior of terminal providing ready access for field adjustment.
- Each terminal factory tested prior to shipment.
- Single point electrical and/or pneumatic main air connection.
- Discharge opening designed for flanged duct connection.
- Full primary air valve low voltage enclosure for factory mounted DDC and analog electronic controls.

Controls:

- Pneumatic and analog electronic controls. Factory supplied, mounted and calibrated.
- Digital controls. Factory mounting and wiring of DDC controls supplied by BMS Controls Contractor.

Options and Accesories:

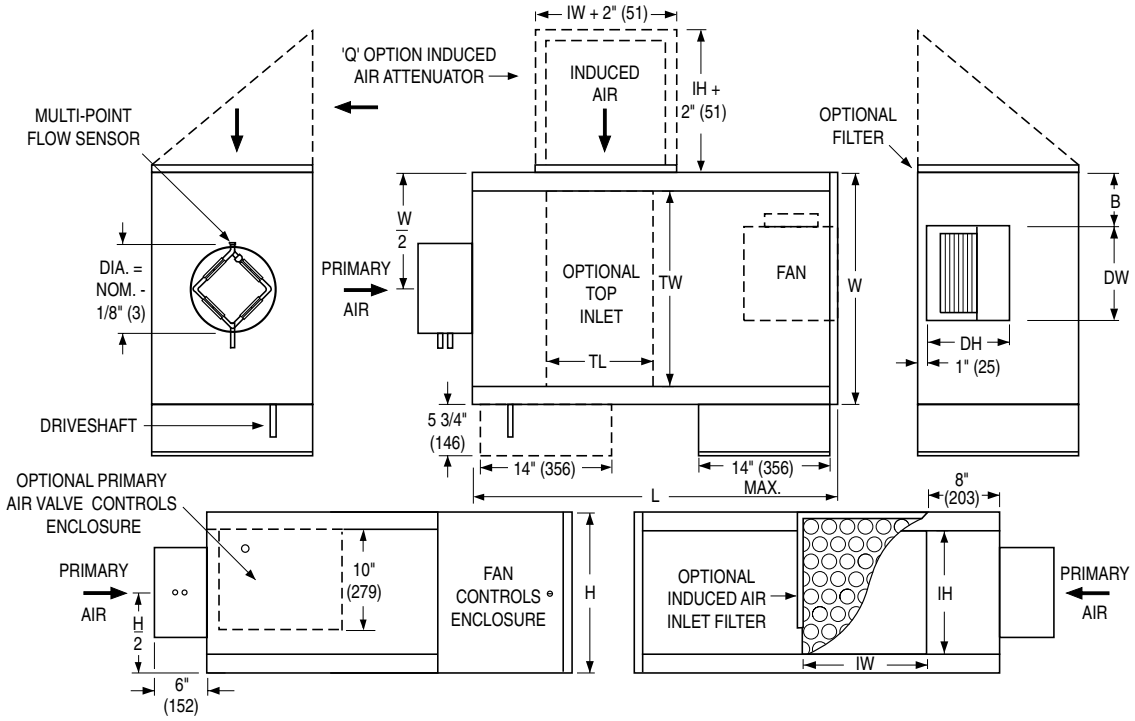
- EPIC™/ECM Motor.
- Primary air valve enclosure for field mounted controls.
- Induced air filter, 1" (25) thick, disposable type.
- Toggle disconnect switch (except units with electric heat, when disconnect is an electric heat option and includes fan).
- Various 'IAQ' linings are available.
- Fan airflow or P.E. switch for night shutdown (pneumatic controls).
- Fan airflow switch for night shutdown (analog electronic controls).
- Night setback fan/heat cycle (pneumatic and analog).
- Fan unit fusing.
- Hanger brackets.
- 'Q' option induced air attenuator.
- Top entry induced air inlet.
- FN2 90° Line Voltage enclosure.
- Low temperature construction (ice storage systems).

ARI PERFORMANCE CERTIFIED
ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

INTERTEK ETL LISTED C US

Dimensions

Model Series 35S • Series Flow • Unit Sizes 2 – 6



Dimensional Data. Imperial Units (inches)

Unit Size	Inlet Size	W	H	L	B	Induced Air Inlet		Outlet Discharge DW x DH	Filter Size	
						Side (std.) IW x IH	Top (opt.) TL x TW		Side Inlet (std.)	Top Inlet (opt.)
2	6, 8	18	14	36	3 ½	8 x 10	10 x 14	9 ¼ x 10 ½	10 x 12	14 x 16
3	6, 8, 10, 12	18	18	36	3 ½	12 x 14	14 x 14	9 ¼ x 10 ½	14 x 16	16 x 16
4	8, 10, 12, 14	26	18	41	6	14 x 14	12 x 22	12 x 10 ½	16 x 16	16 x 25
5	10, 12, 14	26	18	41	5	14 x 14	12 x 22	13 ¼ x 11 ½	16 x 16	16 x 25
6	12, 14, 16	30	19	44	6	16 x 15	14 x 26	13 ¼ x 11 ½	17 x 18	18 x 28

Dimensional Data. Metric Units (mm)

Unit Size	Inlet Size	W	H	L	B	Induced Air Inlet		Outlet Discharge DW x DH	Filter Size	
						Side (std.) IW x IH	Top (opt.) TL x TW		Side Inlet (std.)	Top Inlet (opt.)
2	152, 203	457	356	914	89	203 x 254	254 x 356	235 x 267	254 x 305	356 x 406
3	152, 203, 254, 305	457	457	914	89	305 x 356	356 x 356	235 x 267	356 x 406	406 x 406
4	203, 254, 305, 356	660	457	1041	152	356 x 356	305 x 559	305 x 267	406 x 406	406 x 635
5	254, 305, 356	660	457	1041	127	356 x 356	305 x 559	337 x 292	406 x 406	406 x 635
6	305, 356, 406	762	483	1118	152	406 x 381	356 x 660	337 x 292	432 x 457	457 x 711

Model 35SW

'Q' Option – Induced Air Inlet Attenuator

This acoustically lined accessory is designed to deflect radiated sound upward and away from the ceiling, eliminating any direct sound path from the terminal to the occupied space. Radiated sound is diffused within the ceiling cavity and the decay that occurs as a result due to the ceiling plenum effect allows up to an additional 5 dB to be taken from radiated sound power levels.

A minimum clearance of 6" (152) must be provided above the unit, so that induced airflow is not impeded.

Dimensions

Model Series 35S • Series Flow • Unit Sizes 2 – 6

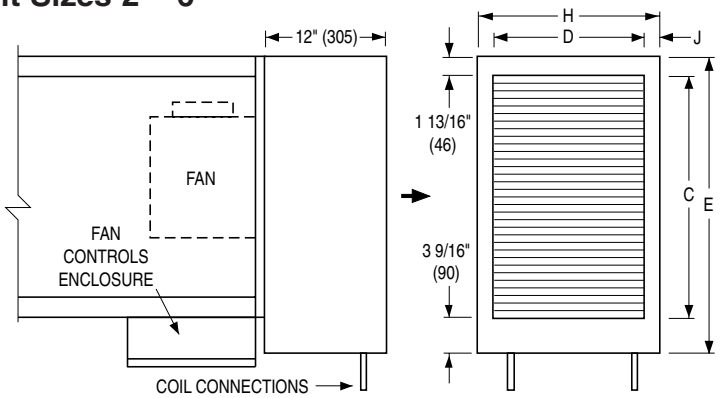
Hot Water Coil Section

Model 35SW

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 1/2" (13) or 7/8" (22) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size C x D	E	H	J	Outlet Duct Size C x D	E	H	J
2	16 x 12 1/8	21 3/8	14	15/16	406 x 308	543	356	24
3	16 x 14 7/8	21 3/8	18	1 9/16	406 x 378	543	457	40
4, 5	24 x 14 7/8	29 3/8	18	1 9/16	610 x 378	746	457	40
6	28 x 17 1/8	33 3/8	19	15/16	711 x 435	848	483	24

Electric Coil Section

Model 35SE

Standard Features:

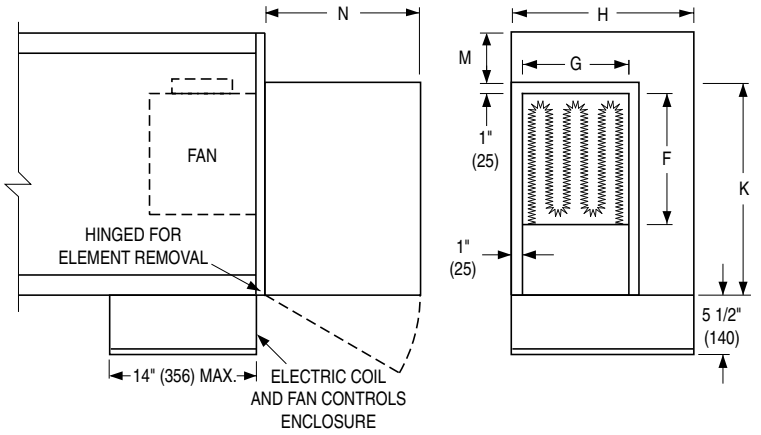
- Unique hinged heater design permits easy access, removal and replacement of heater element without disturbing ductwork.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is 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 elevation will therefore change.

Standard Supply Voltage (60 Hz):

- 208, 240 and 277V, single phase.
- 208, 480 (4 wire wye) and 600V three phase.

Options:

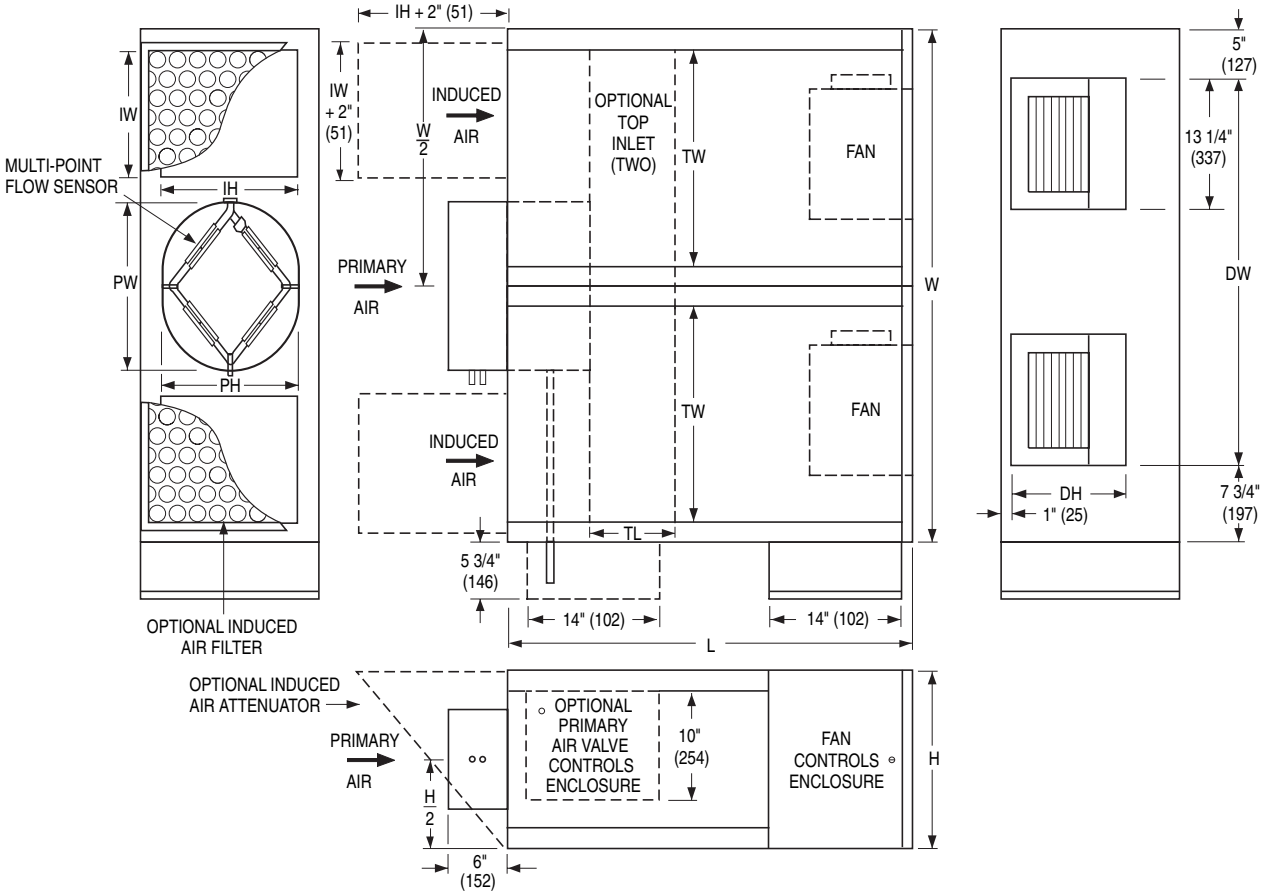
- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.



Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size F x G	K	H	M	N	Outlet Duct Size F x G	K	H	M	N
2	10 1/4 x 10 1/2	15 1/2	14	2 1/2	12 1/2	260 x 267	394	356	64	318
3	10 1/4 x 10 1/2	15 1/2	18	2 1/2	15 1/4	260 x 267	394	457	64	387
4	13 x 10 1/2	21	18	5	15 1/4	330 x 267	533	457	127	387
5	14 1/4 x 11 3/4	22	18	4	15 1/4	362 x 298	559	457	102	387
6	14 1/4 x 11 3/4	25	19	5	15 1/4	362 x 298	635	483	127	387

Dimensions

Model Series 35S • Unit Size 7

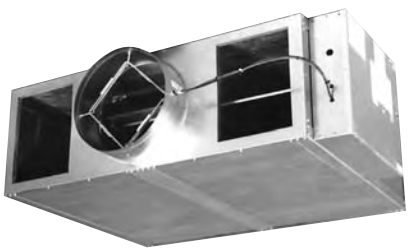


Dimensional Data. Imperial Units (inches)

Unit Size	Inlet		W	H	L	Induced Air Inlet		Outlet Discharge DW x DH	Filter Size	
	Size	PW x PH				Side (std.) IW x IH	Top (opt.) TL x TW		Side Inlet (std.)	Top Inlet (opt.)
7	14 rnd. 16 rnd. 18 oval	13 7/8 15 7/8 20 3/16 x 13 7/8	52	18	41	12 x 14 (2)	8 1/2 x 20 (2)	39 1/4 x 11 1/2	14 x 16 (2)	16 x 25 (2)

Dimensional Data. Metric Units (mm)

Unit Size	Inlet		W	H	L	Induced Air Inlet		Outlet Discharge DW x DH	Filter Size	
	Size	PW x PH				Side (std.) IW x IH	Top (opt.) TL x TW		Side Inlet (std.)	Top Inlet (opt.)
7	356 rnd. 406 rnd. 457 oval	352 403 513 x 352	1321	457	1041	305 x 356 (2)	216 x 508 (2)	997 x 292	356 x 406 (2)	406 x 635 (2)



'Q' Option – Induced Air Inlet Attenuator

This acoustically lined accessory is designed to deflect radiated sound upward and away from the ceiling, eliminating any direct sound path from the terminal to the occupied space. Radiated sound is diffused within the ceiling cavity and the decay that occurs as a result due to the ceiling plenum effect allows up to an additional 5 dB to be taken from radiated sound power levels.

A minimum clearance of 6" (152) must be provided above the unit, so that induced airflow is not impeded. Shipped loose for field mounting.

Dimensions

Model Series 35S • Unit Size 7

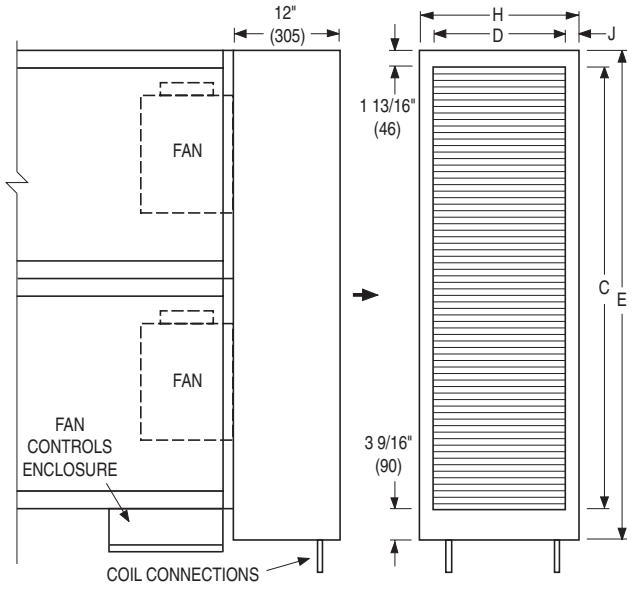
Hot Water Coil Section

Model 35SW

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted).

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 7/8" (22) or 1 3/8" (35) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size C x D	E	H	J	Outlet Duct Size C x D	E	H	J
7	50 x 14 7/8	55 3/8	18	1 9/16	1270 x 378	1407	457	40

Electric Coil Section

Model 35SE

Standard Features:

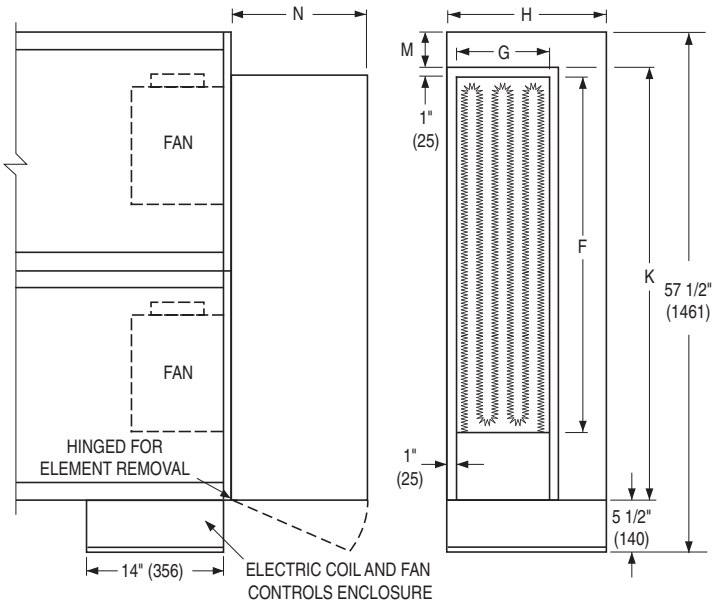
- Unique hinged heater design permits easy access, removal and replacement of heater element without disturbing ductwork.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is 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 elevation will therefore change.

Standard Supply Voltage (60 Hz):

- 208, 240, and 277V single phase.
- 208, 480 (4 wire wye) and 600V three phase.

Options:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.



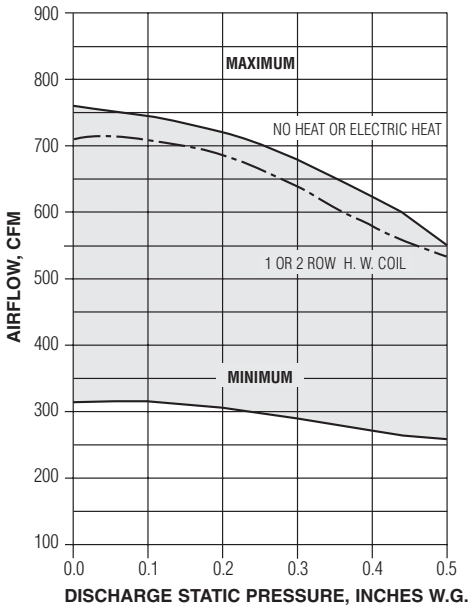
Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size F x G	K	H	M	N	Outlet Duct Size F x G	K	H	M	N
7	40 1/4 x 11 3/4	48	18	4	15 1/4	1022 x 298	1219	457	102	387

Performance Data

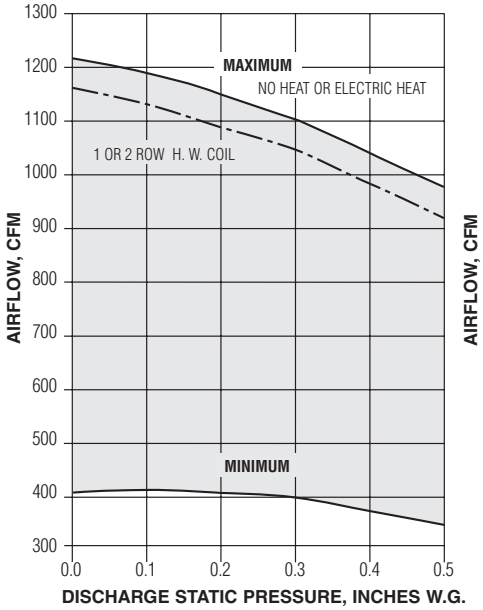
PSC Motor Fan Curves – Airflow vs. Downstream Static Pressure

35S Series • Series Flow

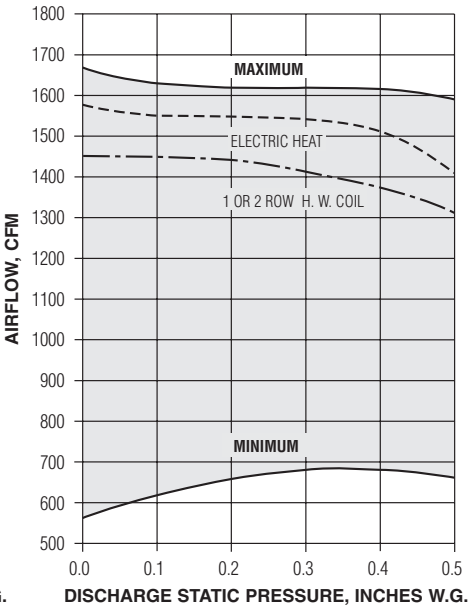
Unit Size 2



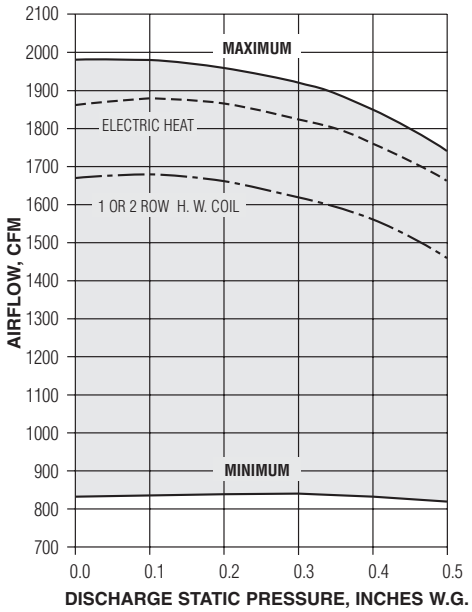
Unit Size 3



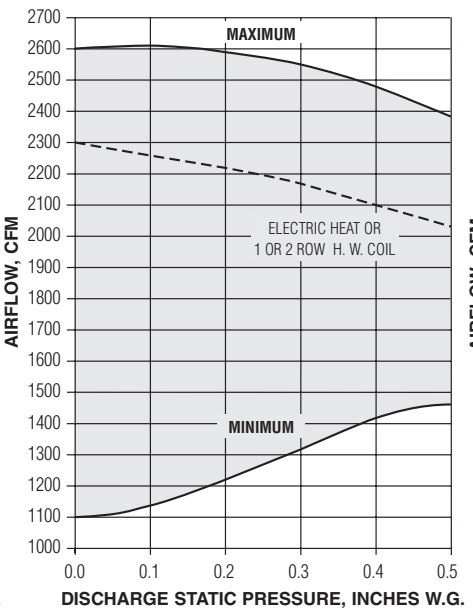
Unit Size 4



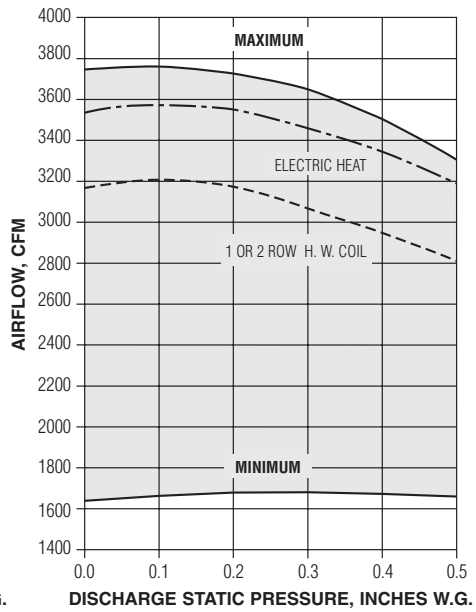
Unit Size 5



Unit Size 6



Unit Size 7



- Fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase PSC motors.

Electrical Motor Data

Unit Size	Motor H.P.	PSC Motor FLA		
		120/1/60	208/1/60	277/1/60
2	1/10	3.3	2.0	1.0
3	1/4	5.8	3.6	1.8
4	1/3	6.2	4.1	2.0
5	1/2	10.1	6.5	3.3
6	3/4	13.4	8.4	4.5
7	2@1/2	20.2	13.0	6.6

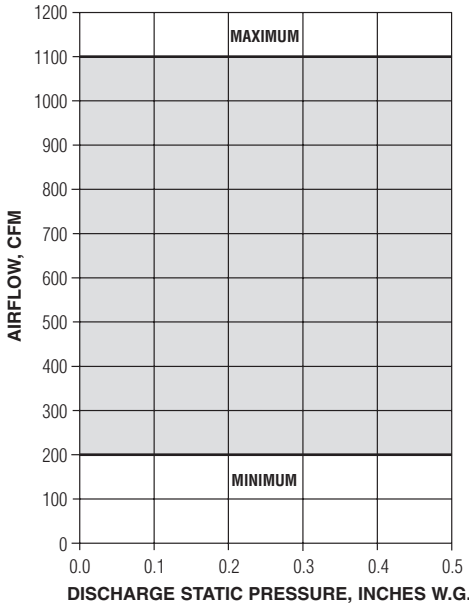
FLA = Full load amperage

Performance Data

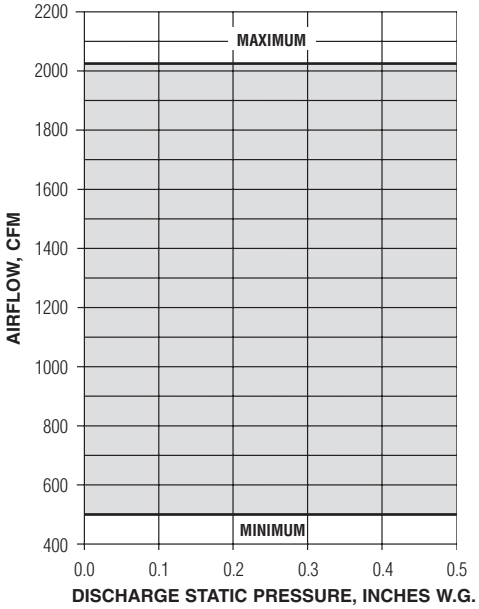
ECM Motor Option Fan Curves – Airflow vs. Downstream Static Pressure

35S Series • Series Flow

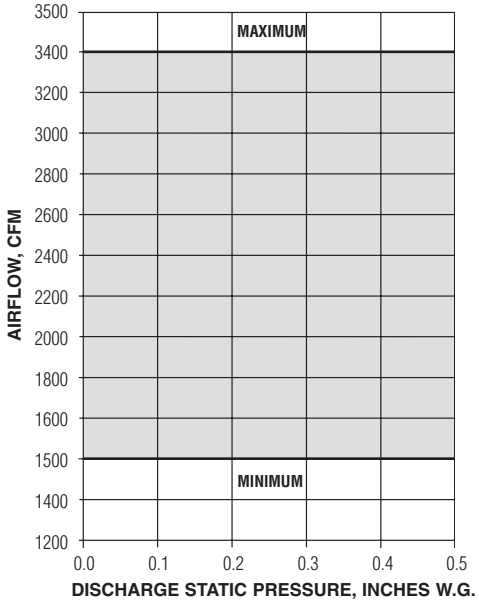
Unit Size 3



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 constant volume at factory or field set point and airflow does not vary with changing static pressure conditions. The motor compensates for any changes in external static pressure or induced air conditions such as filter loading.
- Airflow can be set to operate on horizontal performance line at any point within shaded area using the solid state volume controller provided.
- Fan powered terminal units featuring the optional ECM motor have considerably wider turn-down ratios than conventional PSC motors. Hence, only three unit sizes are required in order to provide the same fan airflow range that would require six terminal unit/fan sizes when equipped with PSC motors. A reduction in the number of different terminal 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 120/240 and 277 volt, single phase ECM motors. ECM motors, although DC in operation, include a built-in inverter.

Electrical Data

Unit Size	Motor H.P.	ECM Motor FLA	
		120/1/60	277/1/60
3	1/2	7.9	3.5
5	3/4	12.6	5.5
7	2 @ 3/4	25.2	10.9

FLA = Full load amperage

Performance Data Explanation

Sound Power Levels vs. NC Levels

The **Nailor 35S, 37S and 35N Series** fan powered terminal unit performance data is presented in two forms.

The laboratory obtained discharge and radiated sound power levels in octave bands 2 through 7 (125 through 4000 Hz) center frequency for each unit size at various flow rates and inlet static pressures is presented. This data is derived in accordance with ANSI/ASHRAE Standard 130-1996 and ARI Standard 880-98. This data is "raw" with no attenuation deductions and includes ARI Certification standard rating points.

Nailor also provides an "NC Level" table as an application aid in terminal selection, which include attenuation allowances as explained below. The suggested attenuation allowances are typical and are not representative of specific job site conditions. It is recommended that the sound power level data be used and a detailed NC calculation be performed using the procedures outlined in ARI 885-98 for accurate space sound levels.

Explanation of NC Levels

Tabulated NC levels are based on attenuation values as outlined in ARI Standard 885-98 "Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets". ARI Standard 885-98, Appendix E provides typical sound attenuation values for air terminal discharge sound and air terminal radiated sound.

As stated in ARI-885-98, Appendix E, "These values can be used as a quick method of estimating space sound levels when a detailed evaluation is not available. The typical attenuation values are recommended for use by manufacturers to estimate application sound levels. In product catalogs, the end use environments are not known and the following factors are provided as typical attenuation values. Use of these values will allow better comparison between manufacturers and give the end user a value which will be expected to be applicable for many types of space."

Please refer to the Performance Data Caveat on page A17 of this catalog.

Radiated Sound

Table E1 of Appendix E provides typical radiated sound attenuation values for three types of ceiling: Type 1 – Glass Fiber; Type 2 – Mineral Fiber; Type 3 – Solid Gypsum Board.

Since Mineral Fiber tile ceilings are the most common construction used in commercial buildings, these values have been used to tabulate Radiated NC levels.

The following table provides the calculation method for the radiated sound total attenuation values based on ARI Standard 885-98.

	Octave Band					
	2	**3**	**4**	**5**	**6**	**7**
Environmental Effect	2	1	0	0	0	0
Ceiling/Space Effect	16	18	20	26	31	36
Total Attenuation Deduction	**18**	**19**	**20**	**26**	**31**	**36**

The ceiling/space effect assumes the following conditions:

1. 5/8" (16) tile, 20 lb/ft^3 (313 kg/m^3) density.
2. The plenum is at least 3 feet (914) deep.
3. The plenum space is either wide (over 30 feet [9 m]) or lined with insulation.
4. The ceiling has no significant penetration directly under the unit.

Discharge Sound

Table E1 of Appendix E provides typical discharge sound attenuation values for three sizes of terminal unit.

1. Small box; Less than 300 cfm (142 l/s) (Discharge Duct 8" x 8" [203 x 203]).
2. Medium box; 300 – 700 cfm (142 – 330 l/s) (Discharge Duct 12" x 12" [305 x 305]).
3. Large box; Greater than 700 cfm (330 l/s) (Discharge Duct 15" x 15" [381 x 381]).

These attenuation values have been used to tabulate Discharge NC levels applied against the terminal airflow volume and not terminal unit size.

The following tables provide the calculation method for the discharge sound total attenuation values based on ARI Standard 885-98.

Small Box	Octave Band					
< 300 cfm	**2**	**3**	**4**	**5**	**6**	**7**
Environmental Effect	2	1	0	0	0	0
5 ft. (1.5 m) 1" (25) Duct Lining	2	6	12	25	29	18
Branch Power Division (1 outlet)	0	0	0	0	0	0
5 ft. (1.5 m), 8 in. dia. (200) Flex Duct	6	10	18	20	21	12
End Reflection	9	5	2	0	0	0
Space Effect	5	6	7	8	9	10
Total Attenuation Deduction	**24**	**28**	**39**	**53**	**59**	**40**

Medium Box	Octave Band					
300 – 700 cfm	**2**	**3**	**4**	**5**	**6**	**7**
Environmental Effect	2	1	0	0	0	0
5 ft. (1.5 m) 1" (25) Duct Lining	2	4	10	20	20	14
Branch Power Division (2 outlets)	3	3	3	3	3	3
5 ft. (1.5 m), 8 in. dia. (200) Flex Duct	6	10	18	20	21	12
End Reflection	9	5	2	0	0	0
Space Effect	5	6	7	8	9	10
Total Attenuation Deduction	**27**	**29**	**40**	**51**	**53**	**39**

Large Box	Octave Band					
>700 cfm	**2**	**3**	**4**	**5**	**6**	**7**
Environmental Effect	2	1	0	0	0	0
5 ft. (1.5 m) 1" (25) Duct Lining	2	3	9	18	17	12
Branch Power Division (3 outlets)	5	5	5	5	5	5
5 ft. (1.5 m), 8 in. dia. (200) Flex Duct	6	10	18	20	21	12
End Reflection	9	5	2	0	0	0
Space Effect	5	6	7	8	9	10
Total Attenuation Deduction	**29**	**30**	**41**	**51**	**52**	**39**

1. Flexible duct is non-metallic with 1" (25) insulation.
2. Space effect (room size and receiver location) 2500 ft.^{3} (69 m^3) and 5 ft. (1.5 m) distance from source.

For a complete explanation of the attenuation factors and the procedures for calculating room NC levels, please refer to the acoustical engineering guidelines at the back of this catalog and ARI Standard 885-98.

Performance Data • NC Level Application Guide

35S Series • Series Flow

Unit Size	Unit Size	Airflow cfm	Airflow l/s	Min inlet ΔPs w.g.	Min inlet ΔPs Pa	NC Levels @ Inlet pressure (ΔPs) shown											
						DISCHARGE						RADIATED					
						Fan Only	Min. ΔPs	0.5" w.g. (125 Pa)	1.0" w.g. (250 Pa)	1.5" w.g. (375 Pa)	2.0" w.g. (500 Pa)	Fan Only	Min. ΔPs	0.5" w.g. (125 Pa)	1.0" w.g. (250 Pa)	1.5" w.g. (375 Pa)	2.0" w.g. (500 Pa)
2	8	670	316	0.05	12	27	27	29	29	27	30	30	30	33	35	38	40
		550	260	0.05	12	20	21	21	20	21	22	25	25	30	34	35	38
		450	212	0.05	12	-	-	-	-	-	-	20	20	26	30	33	35
		300	142	0.05	12	-	-	-	-	-	-	-	-	22	25	30	32
3	8	700	330	0.05	12	-	-	-	-	-	-	25	25	29	32	35	36
		600	283	0.05	12	-	-	-	-	-	-	25	25	28	30	34	35
		450	212	0.05	12	-	-	-	-	-	-	23	22	25	27	30	33
	10	1200	566	0.05	12	25	25	25	25	25	25	32	32	34	35	39	40
		900	425	0.05	12	20	-	20	20	22	23	30	29	30	35	36	38
		700	330	0.05	12	-	-	-	-	-	-	25	24	28	30	34	35
		450	212	0.05	12	-	-	-	-	-	-	22	22	23	28	30	32
4	10	1100	519	0.05	12	22	22	22	24	23	25	32	32	35	38	39	41
		1000	472	0.05	12	20	20	20	21	22	25	28	30	34	35	39	40
		850	401	0.05	12	-	-	-	-	-	20	26	26	30	34	35	38
	12	1500	708	0.05	12	31	30	31	32	31	32	40	36	39	41	42	45
		1300	614	0.05	12	27	26	27	29	29	29	37	34	35	38	40	42
		1100	519	0.05	12	22	21	21	21	20	25	32	30	33	35	39	40
		850	401	0.05	12	-	-	-	-	-	-	26	25	29	33	35	37
5	12	1600	755	0.05	12	28	26	28	29	28	29	41	39	40	40	42	45
		1400	661	0.05	12	25	25	25	25	25	25	39	35	38	39	40	44
		1200	566	0.05	12	22	20	22	20	20	22	36	32	32	35	35	40
		1050	495	0.05	12	-	-	-	-	-	-	32	28	30	34	36	40
	14	1925	909	0.05	12	34	34	34	35	35	35	42	41	42	44	45	48
		1700	802	0.05	12	30	29	30	30	30	30	39	37	40	41	42	44
		1400	661	0.05	12	26	25	25	25	25	25	35	34	36	38	39	40
		1050	496	0.05	12	-	-	-	-	-	-	32	25	30	33	35	37
6	14	2300	1086	0.05	12	37	37	37	38	38	39	42	45	46	47	48	50
		2000	944	0.05	12	34	32	34	34	35	35	40	40	42	44	45	47
		1700	802	0.05	12	29	27	29	29	28	30	37	36	39	40	40	44
		1400	661	0.05	12	25	22	24	24	25	30	34	31	35	36	39	40
		1100	519	0.05	12	-	-	-	-	-	20	29	25	29	34	36	39
7	16	3050	1440	0.18	45	31	29	31	33	31	32	45	42	44	44	49	52
		2700	1274	0.14	35	28	27	28	28	29	29	42	39	41	42	45	47
		2300	1080	0.10	25	25	25	25	25	25	26	40	36	35	39	42	45
		2000	944	0.07	17	20	20	20	20	20	22	36	32	34	37	40	44
	18	3650	1723	0.05	12	36	36	36	37	37	38	46	45	46	47	49	51
		3250	1534	0.05	12	34	32	34	34	34	34	43	41	44	45	46	48
		2600	1227	0.05	12	29	27	28	28	28	29	40	38	40	41	42	45
		2000	944	0.05	12	20	20	21	20	20	22	36	30	34	36	38	40

Performance Notes:

1. NC levels are calculated from the published raw data and based on procedures outlined in Appendix E, ARI 885-98.
2. 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. Min. inlet ΔPs is the minimum static pressure required to achieve rated airflow (damper full open).
5. Dash (–) in space denotes an NC level of less than 20.
6. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases.
7. For a complete explanation and details on NC calculations, refer to page D19 and the engineering section of this catalog.

Performance Data • Discharge Sound Power Levels

Model Series 35S • Series Flow (Constant Volume)

A Participating Corporation in the ARI 880 Certification program.

ARI PERFORMANCE CERTIFIED ARI Standard 880

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. inlet ΔPs " w.g.	Min. inlet ΔPs Pa	Fan Only 2	3	4	5	6	7	Fan and 100% Primary Air – Sound Power Octave Bands @ Inlet pressure shown: Minimum ΔPs 2	3	4	5	6	7	0.5" wg (125Pa)ΔPs 2	3	4	5	6	7	1.0" wg (250Pa)ΔPs 2	3	4	5	6	7	1.5" wg (375Pa)ΔPs 2	3	4	5	6	7	2.0" wg (500Pa)ΔPs 2	3	4	5	6	7
2	8	670	316	.05	12	65	68	66	64	61	60	65	68	66	64	61	59	65	69	67	64	61	60	66	69	66	64	62	60	67	68	67	64	62	60	67	70	67	65	62	61
		550	260	.05	12	58	62	62	58	56	54	58	63	63	58	56	54	61	63	63	59	57	55	60	62	62	59	56	55	61	63	62	59	57	55	62	64	63	59	57	55
		450	212	.05	12	53	57	59	53	51	48	53	56	60	53	50	47	55	57	60	54	51	48	57	59	58	54	52	49	58	58	58	55	52	50	59	61	59	55	52	50
		300	142	.05	12	51	53	54	49	46	42	51	52	51	48	45	40	53	54	54	50	47	42	54	56	54	50	47	43	55	56	55	50	47	44	55	57	56	51	48	44
3	8	700	330	.05	12	56	56	59	56	52	48	57	56	59	55	51	48	58	58	60	56	52	48	59	59	60	56	52	48	61	61	60	56	52	48	61	61	61	58	52	48
		600	283	.05	12	56	55	58	55	51	46	56	55	58	54	50	45	57	57	59	55	51	46	58	58	59	55	51	46	59	58	59	55	51	46	59	60	59	55	49	46
		450	212	.05	12	55	52	54	50	46	38	55	52	54	50	45	37	56	53	55	50	45	38	57	54	55	50	45	38	57	55	55	49	44	38	57	55	55	49	44	38
	10	1200	566	.05	12	62	64	68	65	62	61	61	64	68	64	61	60	65	67	68	64	63	61	66	67	69	66	64	62	67	67	69	67	64	62	68	68	69	67	64	62
		900	425	.05	12	60	61	64	61	58	56	59	61	63	60	57	55	61	63	65	62	59	56	63	64	65	63	60	57	64	64	65	63	60	58	64	65	65	63	60	58
		700	330	.05	12	57	58	59	55	52	48	57	58	58	55	51	48	59	59	60	57	53	49	60	60	60	57	54	50	60	59	60	57	53	50	61	61	60	57	53	50
		450	212	.05	12	57	56	54	50	46	38	56	56	54	50	45	38	57	56	55	51	46	39	58	57	55	50	46	39	58	57	55	50	46	39	59	57	55	50	45	40
4	10	1100	519	.05	12	63	65	65	64	60	57	64	65	65	64	60	58	64	65	65	64	60	58	65	66	65	64	61	59	67	65	66	64	61	59	67	67	66	64	61	59
		1000	472	.05	12	62	63	63	61	58	55	62	63	63	61	58	55	63	63	63	62	58	56	64	64	64	62	58	56	65	65	63	62	58	56	66	66	64	62	58	56
		850	401	.05	12	59	61	61	58	54	50	59	60	60	58	54	51	60	61	61	59	55	51	62	61	61	59	55	51	63	61	61	58	55	52	64	63	61	59	55	52
	12	1500	708	.05	12	70	72	71	72	68	67	68	71	71	71	68	67	70	72	72	72	69	68	71	73	72	72	69	68	71	72	72	72	69	68	72	73	72	72	69	68
		1300	614	.05	12	67	69	69	68	65	63	66	68	69	67	64	63	68	69	69	68	65	64	68	70	69	68	65	64	69	70	69	68	65	64	69	70	69	68	65	64
		1100	519	.05	12	63	65	65	64	60	57	62	64	66	62	59	56	64	64	66	63	59	57	64	64	66	62	59	57	65	63	66	62	59	57	66	66	66	62	59	57
		850	401	.05	12	59	60	60	58	54	51	58	59	60	58	54	50	60	61	60	58	54	51	61	60	60	58	54	50	62	61	60	57	54	50	62	61	60	58	54	51
5	12	1600	755	.05	12	67	68	69	69	66	65	67	67	68	67	64	63	69	69	69	68	65	65	70	70	69	68	65	65	71	69	69	68	65	65	71	70	69	68	64	64
		1400	661	.05	12	66	66	67	66	63	62	64	64	65	64	61	61	67	66	66	64	62	62	68	67	66	65	62	62	68	67	66	64	61	61	69	67	67	65	62	61
		1200	566	.05	12	62	62	63	62	59	58	60	61	62	60	57	57	63	63	62	61	58	58	64	63	63	61	58	57	65	62	63	61	57	57	66	65	63	61	57	57
		1050	495	.05	12	60	59	59	58	55	53	58	58	59	57	53	53	60	59	59	58	54	53	62	60	59	57	54	53	63	61	60	57	54	53	64	62	60	57	54	53
	14	1925	909	.05	12	73	74	73	74	71	70	73	74	73	73	70	70	73	74	74	73	70	70	74	75	74	73	71	70	74	75	74	73	71	70	75	75	74	73	70	70
		1700	802	.05	12	71	71	70	70	67	67	69	69	70	69	66	66	71	71	71	70	67	66	72	71	71	70	67	66	72	71	70	69	66	66	72	71	70	69	66	66
		1400	661	.05	12	67	67	67	67	63	63	64	64	66	62	61	61	67	67	66	65	62	62	68	66	66	65	62	62	68	65	66	65	61	61	68	67	66	65	61	62
		1050	496	.05	12	60	60	61	60	56	54	59	59	59	58	54	53	60	60	60	58	55	54	61	60	60	58	54	54	63	61	60	58	54	54	64	62	60	58	55	54
6	14	2300	1086	.05	12	76	78	76	77	74	73	74	78	77	78	75	74	76	78	77	78	75	74	76	79	78	78	75	74	77	78	78	78	75	75	78	79	78	79	76	75
		2000	944	.05	12	73	74	73	73	70	69	70	73	73	72	69	69	72	74	74	73	70	69	73	74	74	73	70	70	74	75	74	74	70	70	74	75	74	74	71	70
		1700	802	.05	12	70	70	68	69	66	65	67	68	69	68	64	64	69	70	70	68	65	65	70	70	70	69	66	65	70	69	71	69	66	66	71	71	71	69	66	65
		1400	661	.05	12	66	66	67	65	61	60	63	64	65	63	60	58	65	66	65	64	60	59	66	66	66	64	61	60	67	66	66	64	61	60	67	66	66	64	60	59
		1100	519	.05	12	61	62	62	60	56	54	59	60	61	59	55	52	61	62	62	60	56	54	62	62	62	60	56	54	63	62	62	60	56	54	64	63	62	60	56	54
7	16	3050	1440	.18	45	70	71	72	72	69	68	70	70	71	70	67	66	72	72	72	71	68	68	73	73	72	71	68	68	74	72	72	71	68	68	74	73	72	71	67	67
		2700	1274	.14	35	69	69	70	69	66	65	67	67	68	67	64	64	70	69	69	67	65	65	71	70	69	68	65	65	71	70	69	67	64	64	72	70	70	68	65	64
		2300	1080	.10	25	65	65	66	65	62	61	63	64	65	63	60	60	66	66	65	64	61	61	67	66	66	64	61	60	67	66	66	64	61	60	69	68	66	64	60	60
		2000	944	.07	17	63	62	62	61	58	56	61	61	62	60	56	56	63	62	62	61	57	56	65	63	62	60	57	56	65	63	62	60	57	56	67	65	63	60	57	56
	18	3650	1723	.05	12	76	77	76	77	74	73	76	77	76	76	73	73	76	77	77	76	73	73	77	78	77	76	74	73	77	78	77	76	74	73	78	78	77	76	73	73
		3250	1534	.05	12	74	74	73	73	70	70	72	72	73	72	69	69	74	74	74	73	70	69	75	74	74	73	70	69	75	74	74	73	70	69	75	74	73	72	69	69
		2600	1227	.05	12	70	70	70	70	66	66	67	67	69	65	64	64	70	70	69	68	65	65	71	69	69	68	65	65	71	69	69	68	65	65	71	70	69	68	64	65
		2000	944	.05	12	63	63	64	63	59	57	62	62	62	61	57	56	63	63	63	61	58	57	64	63	63	61	57	57	64	63	63	61	57	57	67	65	63	61	58	57

ARI Certification Rating Points

Unit Size	Inlet Size	Fan cfm	Fan† Watts	Fan Only * 2	3	4	5	6	7
2	8	670	230	65	68	66	64	61	60
3	10	1200	450	62	64	68	65	62	61
4	12	1500	580	70	72	71	72	68	67
5	14	1900	850	73	74	73	74	71	70
6	14	2300	1175	76	78	76	77	74	73
7	18	3650	1700	76	77	76	77	74	73

† PSC Motor

* Primary air valve is closed and therefore primary cfm is zero.

Performance Notes:

1. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from terminal discharge to the room.
2. Discharge sound power is the noise emitted from the unit discharge into the downstream duct.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Std. 130-1996 and ARI Standard 880-98.

Performance Data • Radiated Sound Power Levels

Model Series 35S • Series Flow (Constant Volume)

A Participating Corporation in the ARI 880 Certification program.

ARI PERFORMANCE CERTIFIED ARI Standard 880

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. inlet ΔPs " w.g.	Min. inlet ΔPs Pa	Fan Only 2	3	4	5	6	7	Fan and 100% Primary Air – Sound Power Octave Bands @ Inlet pressure shown: Minimum ΔPs 2	3	4	5	6	7	0.5" wg (125Pa)ΔPs 2	3	4	5	6	7	1.0" wg (250Pa)ΔPs 2	3	4	5	6	7	1.5" wg (375Pa)ΔPs 2	3	4	5	6	7	2.0" wg (500Pa)ΔPs 2	3	4	5	6	7
2	8	670	316	.05	12	63	58	55	49	43	41	64	59	56	50	44	42	66	62	58	54	53	52	69	65	61	57	57	58	70	66	63	59	60	62	71	69	64	61	61	64
		550	260	.05	12	61	55	52	45	39	37	61	55	52	45	40	37	63	59	55	51	51	49	66	63	58	55	55	55	67	65	60	57	58	59	68	67	62	59	60	62
		450	212	.05	12	58	51	47	40	34	31	59	51	44	39	34	31	61	56	52	49	49	46	63	60	55	52	53	53	64	61	58	55	56	57	65	64	60	57	58	59
		300	142	.05	12	57	49	45	37	31	28	57	43	44	35	30	27	56	52	48	45	45	42	59	56	52	49	49	47	60	58	55	53	53	51	61	59	57	56	56	54
3	8	700	330	.05	12	62	52	52	46	43	39	63	53	52	46	44	39	65	56	54	52	52	50	66	59	57	55	58	59	68	61	60	58	61	64	69	65	62	60	64	67
		600	283	.05	12	61	51	51	44	42	37	61	52	51	45	41	37	63	55	53	50	52	50	65	58	56	54	58	58	66	61	59	57	61	63	67	63	60	59	63	65
		450	212	.05	12	55	43	49	40	37	31	57	48	48	40	36	30	59	51	50	48	49	48	60	54	53	51	55	54	63	57	56	56	60	60	63	59	58	58	61	61
	10	1200	566	.05	12	68	59	57	52	51	47	67	60	57	52	51	47	69	62	59	56	57	55	71	65	61	58	61	61	72	65	64	61	64	65	68	68	65	63	66	68
		900	425	.05	12	66	55	54	49	46	42	64	56	54	48	46	42	66	58	56	53	54	52	68	60	59	56	60	60	70	64	62	60	63	64	68	66	63	61	65	67
		700	330	.05	12	60	52	51	44	41	36	58	51	50	43	40	36	61	55	53	50	51	48	64	59	56	54	57	57	65	60	59	57	61	62	66	62	60	59	64	66
		450	212	.05	12	54	48	48	39	35	28	55	47	48	39	34	27	56	50	49	46	48	45	58	55	53	51	56	55	59	56	55	54	59	60	62	58	57	59	61	62
4	10	1100	519	.05	12	68	60	54	50	47	43	68	60	54	50	48	45	70	63	57	54	58	58	72	67	61	57	62	65	73	68	64	60	64	69	74	71	65	61	65	71
		1000	472	.05	12	65	56	51	49	44	40	66	58	53	49	46	42	69	61	56	53	57	57	70	65	59	55	61	63	72	68	62	58	61	68	73	70	65	61	65	71
		850	401	.05	12	64	54	50	46	41	37	64	55	51	46	42	37	66	59	53	51	55	55	68	63	58	55	60	63	70	65	61	57	62	67	70	67	63	59	64	70
	12	1500	708	.05	12	74	65	58	56	54	51	71	65	59	55	54	52	73	67	61	57	58	56	75	69	64	60	61	63	76	71	66	62	64	67	76	73	68	64	65	70
		1300	614	.05	12	72	63	58	53	51	47	69	63	57	53	50	48	70	65	59	55	56	55	72	67	63	58	61	62	73	69	65	61	63	67	74	71	67	63	65	69
		1100	519	.05	12	68	60	54	50	47	43	66	59	54	49	46	43	68	62	57	53	55	54	70	65	61	57	60	61	71	66	64	60	62	66	72	69	65	61	64	68
		850	401	.05	12	64	55	50	45	41	36	62	54	50	44	40	35	64	58	54	50	53	51	66	62	58	54	59	60	68	65	61	57	61	64	68	66	63	59	63	66
5	12	1600	755	.05	12	75	66	58	53	51	48	73	65	58	52	50	48	74	67	63	56	58	57	74	69	64	59	62	64	75	70	67	63	64	68	76	73	69	65	66	71
		1400	661	.05	12	73	62	55	50	47	44	70	61	55	48	46	44	72	65	60	54	56	55	73	67	63	58	61	63	73	70	66	61	64	68	74	72	68	64	65	70
		1200	566	.05	12	71	60	53	47	45	41	68	58	52	46	43	40	67	62	57	52	55	54	70	65	61	58	60	62	71	67	64	60	63	66	72	70	66	62	64	69
		1050	495	.05	12	68	56	50	44	41	37	65	55	50	43	39	36	66	60	55	50	54	53	67	63	59	56	60	61	70	66	62	58	62	65	71	69	65	61	64	68
	14	1925	909	.05	12	76	71	61	57	56	53	75	69	62	58	55	53	76	71	64	59	61	61	77	72	66	61	64	66	77	73	67	63	66	70	78	75	69	65	67	73
		1700	802	.05	12	73	67	59	54	52	50	72	65	59	53	51	49	74	68	61	56	59	59	75	70	64	59	63	66	75	71	65	61	64	69	76	72	67	63	66	71
		1400	661	.05	12	71	64	56	50	48	46	69	61	55	49	46	44	71	65	58	54	57	57	72	67	61	57	62	64	73	67	63	59	64	68	73	70	64	61	65	70
		1050	496	.05	12	68	57	50	44	41	37	63	55	50	43	40	37	66	59	53	50	55	53	68	62	57	54	60	62	69	64	59	56	62	65	69	66	62	59	64	69
6	14	2300	1086	.05	12	76	71	64	61	59	56	77	73	65	62	59	57	77	74	67	63	64	65	79	75	68	64	66	69	79	75	69	65	67	71	80	77	71	67	69	73
		2000	944	.05	12	74	68	61	58	55	52	74	70	62	58	55	52	75	71	64	60	61	62	76	72	65	62	64	67	77	73	67	64	66	70	77	75	69	65	68	73
		1700	802	.05	12	72	65	59	55	52	48	70	65	59	54	50	47	72	68	61	57	59	59	73	69	63	59	63	66	74	70	65	62	65	69	75	72	67	63	67	72
		1400	661	.05	12	69	62	56	51	47	43	67	61	56	50	46	42	69	63	58	54	57	56	70	66	61	57	62	64	71	68	63	60	64	68	72	70	65	61	66	71
		1100	519	.05	12	65	57	53	47	42	39	63	57	52	46	41	36	65	59	54	51	56	54	67	63	58	55	61	63	69	66	61	58	63	67	69	68	63	59	65	69
7	16	3050	1440	.18	45	78	69	61	56	54	51	76	68	61	55	53	51	77	70	66	59	61	60	77	72	67	62	65	67	81	76	73	69	70	74	82	79	75	71	72	77
		2700	1274	.14	35	76	65	58	53	50	47	73	64	58	51	49	47	75	68	63	57	59	58	76	70	66	61	64	66	76	73	69	64	67	71	77	75	71	67	68	73
		2300	1080	.10	25	74	63	56	50	48	44	71	61	55	49	46	43	70	65	60	55	58	57	73	68	64	61	63	65	74	70	67	63	66	69	75	73	69	65	67	72
		2000	948	.07	17	71	59	53	47	44	40	68	58	53	46	42	39	69	63	58	53	57	56	70	66	62	59	63	64	73	69	65	61	65	68	74	72	68	64	67	71
	18	3650	1723	.05	12	79	74	64	60	59	56	78	72	65	61	58	56	79	74	67	62	64	64	80	75	69	64	67	69	80	76	70	66	69	73	81	78	72	68	70	76
		3250	1534	.05	12	76	70	62	57	55	53	75	68	62	56	54	52	77	71	64	59	62	62	78	73	67	62	66	69	78	74	68	64	67	72	79	75	70	66	69	74
		2600	1227	.05	12	74	67	59	53	51	49	72	64	58	52	49	47	74	68	61	57	60	60	75	70	64	60	65	67	76	70	66	62	67	71	76	73	67	64	68	73
		2000	944	.05	12	71	60	53	47	44	40	66	58	53	46	43	40	69	62	56	53	58	56	71	65	60	57	63	65	72	67	62	59	65	68	72	69	65	62	67	72

ARI Certification Rating Points

Unit Size	Inlet Size	Pri. cfm	Fan cfm	Fan† Watts	Min. ΔPs	Fan Only * 2	3	4	5	6	7	Fan and Primary cfm shown @ 1.5" wg ΔPs 2	3	4	5	6	7
2	8	670	670	230	.05	63	58	55	49	43	41	70	66	63	59	60	62
3	10	1100	1200	450	.05	68	59	57	52	51	47	72	65	64	61	64	65
4	12	1500	1500	580	.05	74	65	58	56	54	51	76	71	66	62	64	67
5	14	1900	1925	850	.05	76	71	61	57	56	53	77	73	67	63	66	70
6	14	2100	2300	1175	.05	76	71	64	61	59	56	79	75	69	65	67	71
7	18	3500	3650	1700	.05	79	74	64	60	59	56	80	76	70	66	69	73

† PSC Motor.

* Primary air valve is closed and therefore primary cfm is zero.

Performance Notes:

1. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from terminal discharge to the room.
2. Radiated sound power is the breakout noise transmitted through the unit casing walls.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Std. 130-1996 and ARI Standard 880-98.

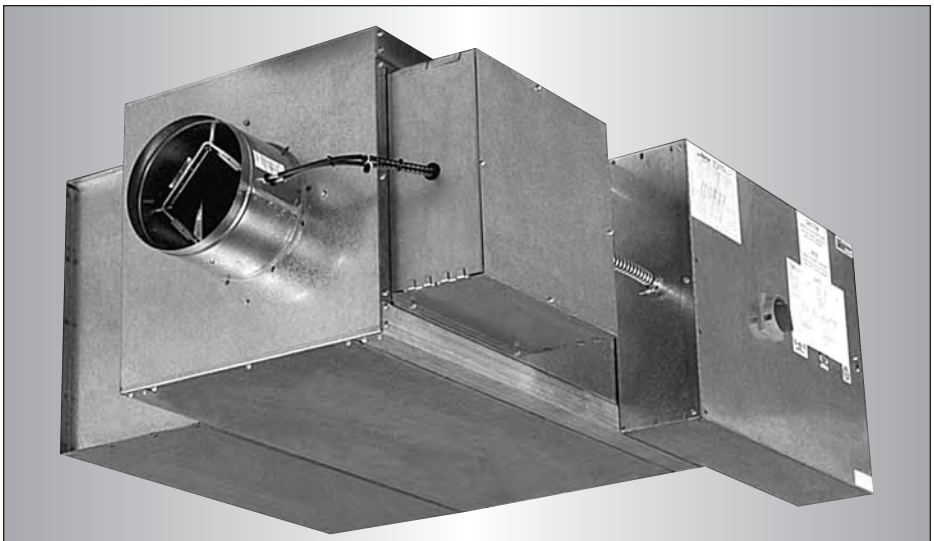
SERIES FLOW CONSTANT VOLUME

35SST "STEALTH™" SERIES

- SUPER QUIET OPERATION

Models:

35SST	**No Heat**
35SEST	**Electric Heat**
35SWST	**Hot Water Heat**



Model 35SEST

The **35SST "Stealth™" Series** has been especially designed for the most demanding applications where premium quality design and performance characteristics are desired. Utilizing "Stealth™" design technology, this terminal unit has low sound levels that lead the industry.

FEATURES:

- Unique 16 ga. (1.6) galvanized steel channel space frame construction provides extreme rigidity and 20 ga. (1.0) casing components.
- 16 ga. (1.6) galvanized steel inclined opposed blade primary air damper. 45° rotation, CW to close. 1/2" (13) dia. plated steel drive shaft. An indicator mark on the end of the shaft shows damper position. Leakage is less than 2% of nominal flow at 3" w.g. (750 Pa).
- "Stealth™" design technology provides significant reductions in radiated sound levels.
- Perforated baffle on primary air discharge optimizes mixing with induced air for rapid and effective temperature equalization. The baffle also converts low frequency primary air valve generated sound into more readily attenuated higher frequencies.
- Pressure independent primary airflow control.
- Multi-point averaging flow sensor.
- Terminal may be field installed either way up, providing the additional flexibility of right or left field connections.
- Universal access panels on all four sides of terminal for ease of maintenance and service.
- Energy efficient PSC fan motor with thermal overload protection.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Adjustable solid state fan speed controller with minimum voltage stop.
- Hinged door on fan controls enclosure.
- 3/4" (19), dual density insulation. exposed edges coated to prevent air erosion. Meets requirements of NFPA 90A and UL 181.
- Available with electric or hot water supplementary heat.
- All controls are mounted on exterior of terminal providing ready access for field adjustment.
- Each terminal factory tested prior to shipment.
- Single point electrical and/or pneumatic main air connection.
- Discharge opening designed for flanged duct connection.
- Full primary air valve low voltage enclosure for factory mounted DDC and analog electronic controls.

Controls:

- Pneumatic and analog electronic controls. Factory supplied, mounted and calibrated.
- Digital controls. Factory mounting and wiring of DDC controls supplied by BMS Controls Contractor.

Options and Accesories:

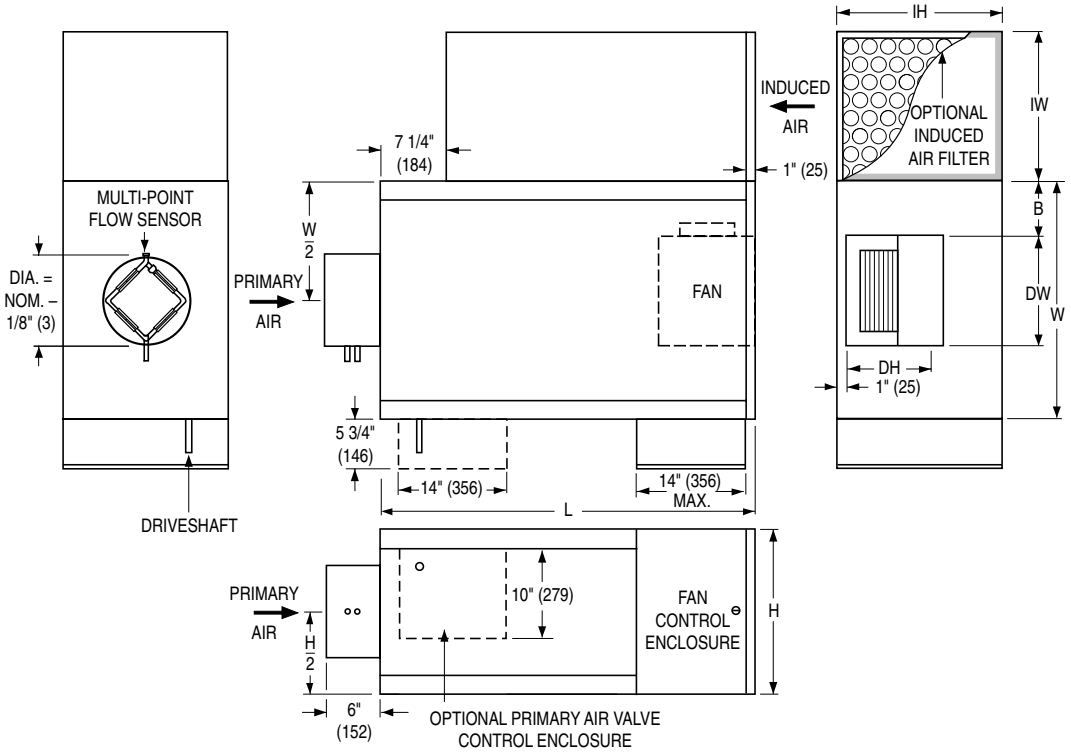
- EPIC™/ECM Motor.
- Primary air valve enclosure for field mounted controls.
- Induced air filter, 1" (25) thick, disposable type.
- Toggle disconnect switch (except units with electric heat, when disconnect is an electric heat option and includes fan).
- Various 'IAQ' linings are available.
- Fan airflow or P.E. switch for night shutdown (pneumatic controls).
- Fan airflow switch for night shutdown (analog electronic controls).
- Night setback fan/heat cycle (pneumatic and analog).
- Fan unit fusing.
- Hanger brackets.
- FN2 90° Line Voltage enclosure.
- Low temperature construction (ice storage systems).

ARI PERFORMANCE CERTIFIED
ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

INTERTEK ETL LISTED C US

Dimensions

Model Series 35SST "Stealth™" • Series Flow • Unit Sizes 2 – 6

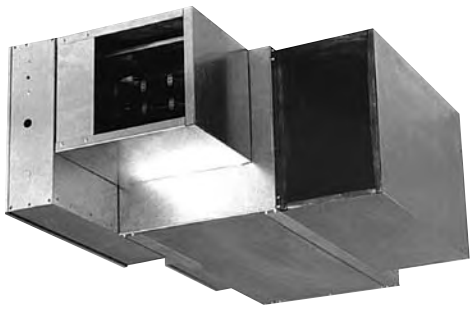


Dimensional Data. Imperial Units (inches)

Unit Size	Inlet Size	W	H	L	B	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
2	6, 8	18	14	36	3 1/2	9 x 14	9 1/4 x 10 1/2	10 x 14
3	6, 8, 10, 12	18	18	36	3 1/2	11 x 18	9 1/4 x 10 1/2	12 x 18
4	8, 10, 12, 14	26	18	41	6	15 3/4 x 14	12 x 10 1/2	16 x 14
5	10, 12, 14	26	18	41	5	14 1/2 x 18	13 1/4 x 11 1/2	14 x 18
6	12, 14, 16	30	19	44	6	17 1/2 x 19	13 1/4 x 11 1/2	18 x 19

Dimensional Data. Metric Units (mm)

Unit Size	Inlet Size	W	H	L	B	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
2	152, 203	457	356	914	89	229 x 356	235 x 267	254 x 356
3	152, 203, 254, 305	457	457	914	89	279 x 457	235 x 267	305 x 457
4	203, 254, 305, 356	661	457	1041	152	400 x 356	305 x 267	406 x 356
5	254, 305, 356	661	457	1041	127	368 x 457	337 x 292	356 x 457
6	305, 356, 406	762	483	1118	152	444 x 483	337 x 292	457 x 483



Model 35SEST

Dimensions

Model Series 35SST "Stealth™" • Series Flow • Unit Sizes 2 – 6

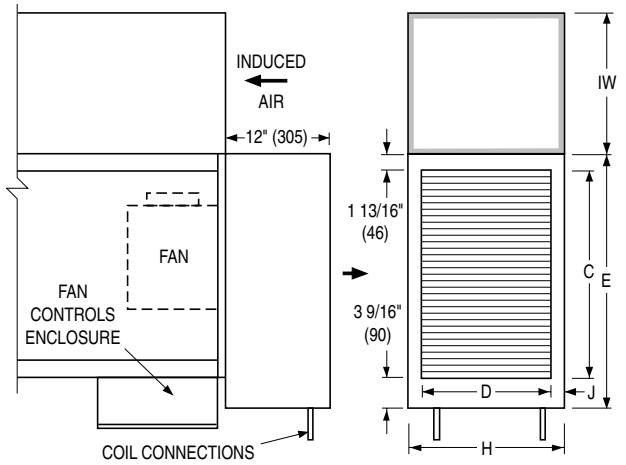
Hot Water Coil Section

Model 35SWST

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 1/2" (13) or 7/8" (22) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



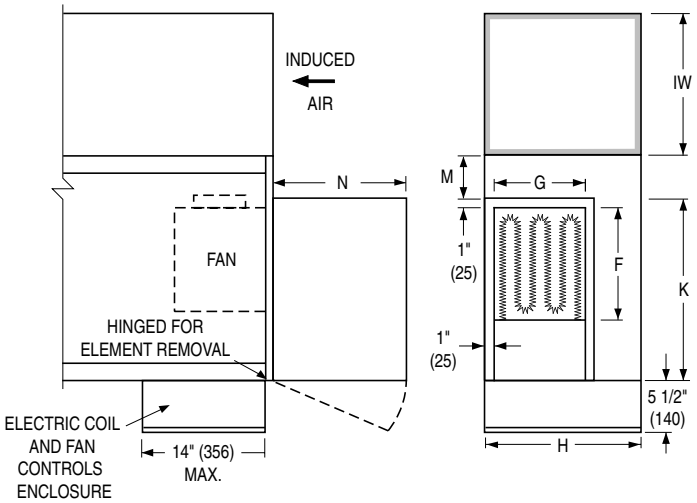
Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size C x D	E	H	J	Outlet Duct Size C x D	E	H	J
2	16 x 12 1/8	21 3/8	14	15/16	406 x 308	543	356	24
3	16 x 14 7/8	21 3/8	18	1 9/16	406 x 378	543	457	40
4, 5	24 x 14 7/8	29 3/8	18	1 9/16	610 x 378	746	457	40
6	28 x 17 1/8	33 3/8	19	15/16	711 x 435	848	483	24

Electric Coil Section

Model 35SEST

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 terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is 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 elevation will therefore change.



Standard Supply Voltage (60 Hz):

- 208, 240 and 277V single phase.
- 208, 480 (4 wire wye) and 600V three phase.

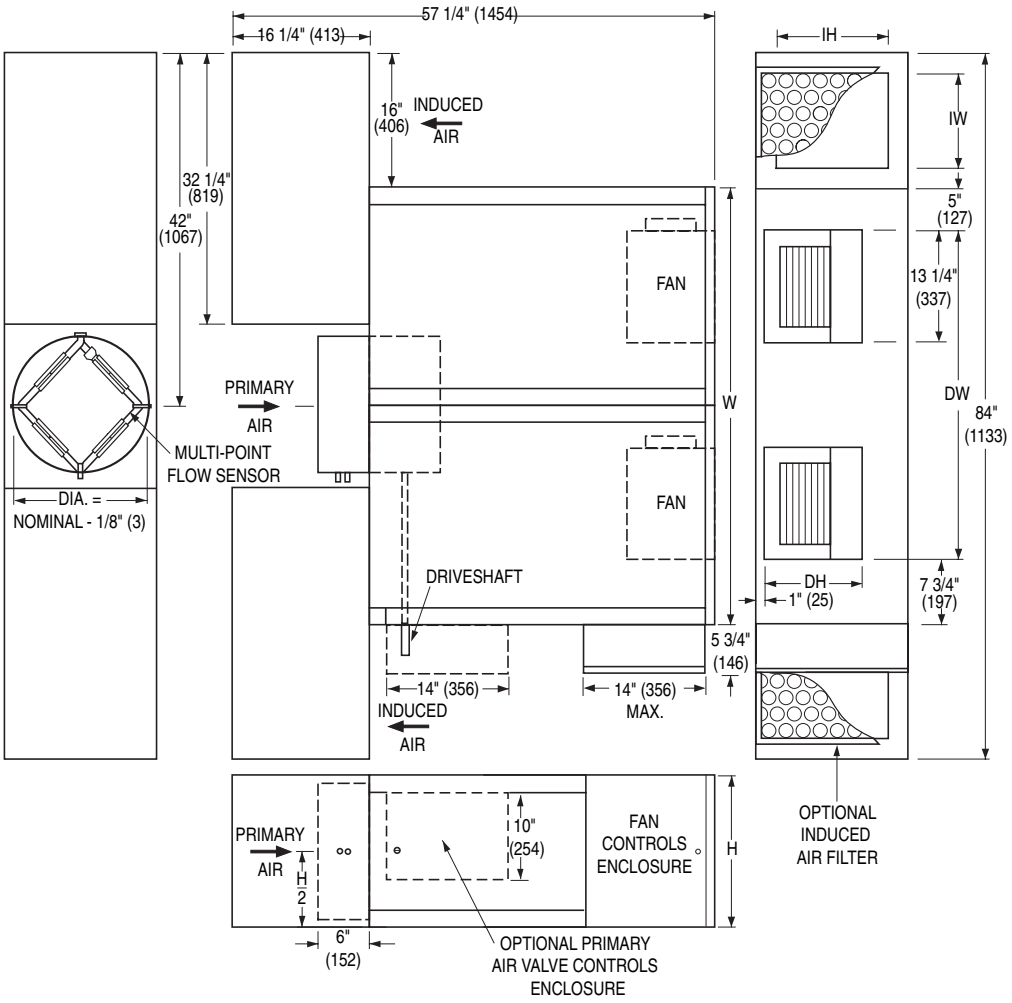
Options:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.

Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size F x G	K	H	M	N	Outlet Duct Size F x G	K	H	M	N
2	10 1/4 x 10 1/2	15 1/2	14	2 1/2	12 1/2	260 x 267	394	356	64	318
3	10 1/4 x 10 1/2	15 1/2	18	2 1/2	15 1/4	260 x 267	394	457	64	387
4	13 x 10 1/2	21	18	5	15 1/4	330 x 267	533	457	127	387
5	14 1/4 x 11 3/4	22	18	4	15 1/4	362 x 298	559	457	102	387
6	14 1/4 x 11 3/4	25	19	5	15 1/4	362 x 298	635	483	127	387

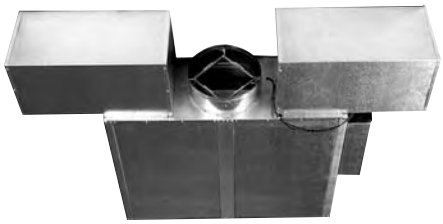
Dimensions

Model Series 35SST "Stealth™" • Series Flow • Unit Size 7



Dimensional Data. Imperial Units (inches)

Unit Size	Inlet Size	W	H	L	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
7	14, 16	52	18	41	11 1/4 x 13 1/4 (2)	39 1/4 x 11 1/2	14 x 14 (2)



Dimensional Data. Metric Units (mm)

Unit Size	Inlet Size	W	H	L	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
7	356, 406	1321	457	1041	286 x 337 (2)	997 x 292	356 x 356 (2)

Dimensions

Model Series 35SST "Stealth™" • Series Flow • Unit Size 7

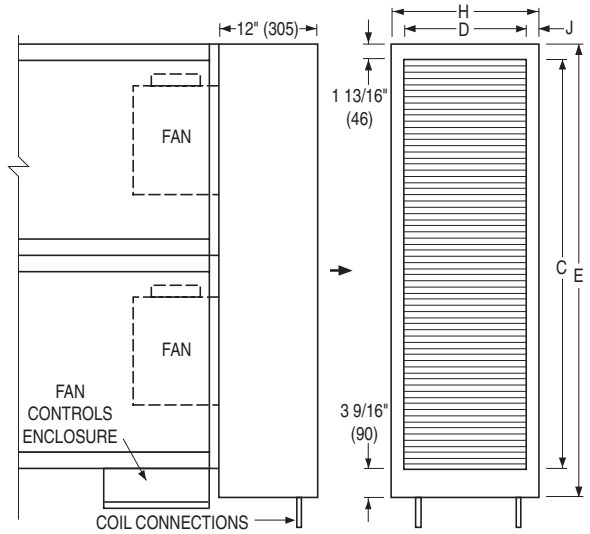
Hot Water Coil Section

Model 35SWST

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 7/8" (22) or 1 3/8" (35) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size C x D	E	H	J	Outlet Duct Size C x D	E	H	J
7	50 x 14 7/8	55 3/8	18	1 9/16	1270 x 378	1407	457	40

Electric Coil Section

Model 35SEST

Standard Features:

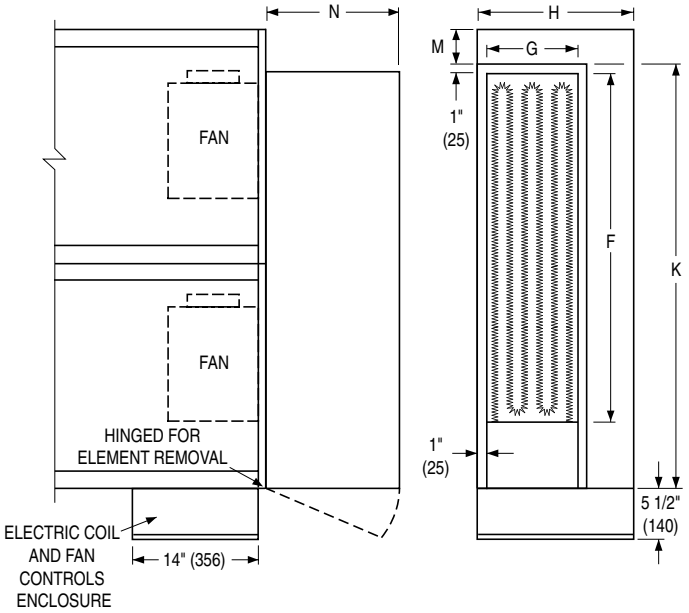
- Unique hinged heater design permits easy access, removal and replacement of heater element without disturbing ductwork.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is 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 elevation will therefore change.

Standard Supply Voltage (60 Hz):

- 208, 240 and 277V single phase.
- 208, 480 (4 wire wye) and 600V three phase.

Options:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.



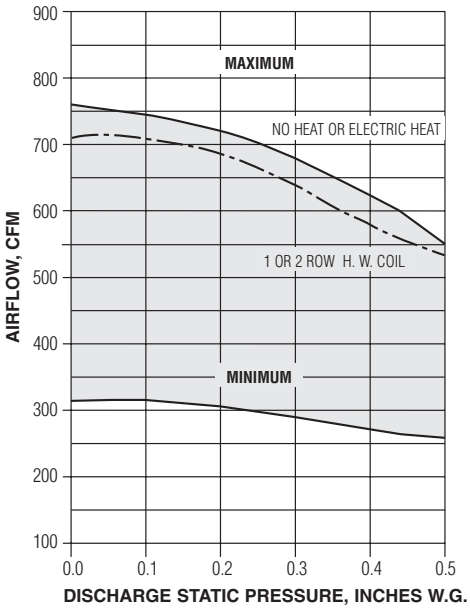
Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size F x G	K	H	M	N	Outlet Duct Size F x G	K	H	M	N
7	40 1/4 x 11 3/4	48	18	4	15 1/4	1022 x 298	1219	457	102	387

Performance Data

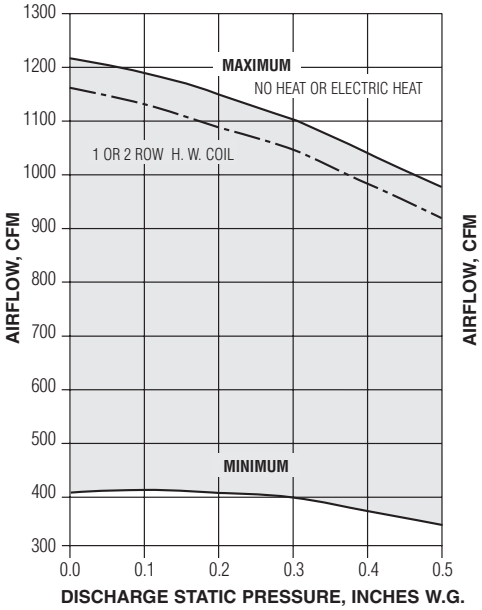
PSC Motor Fan Curves – Airflow vs. Downstream Static Pressure

35SST "Stealth™" • Series Flow

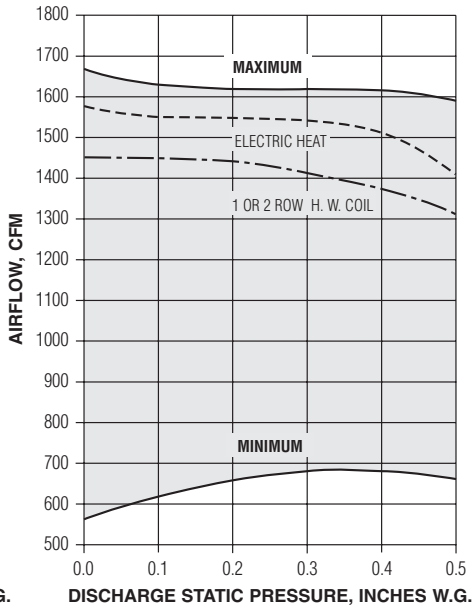
Unit Size 2



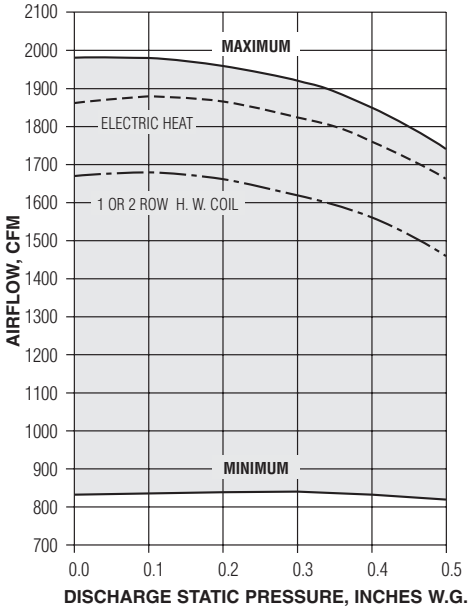
Unit Size 3



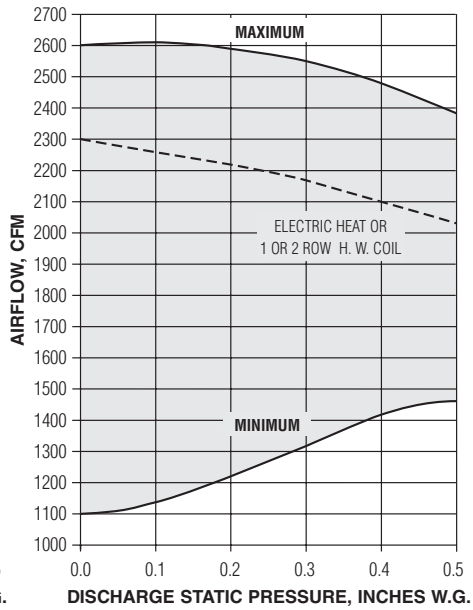
Unit Size 4



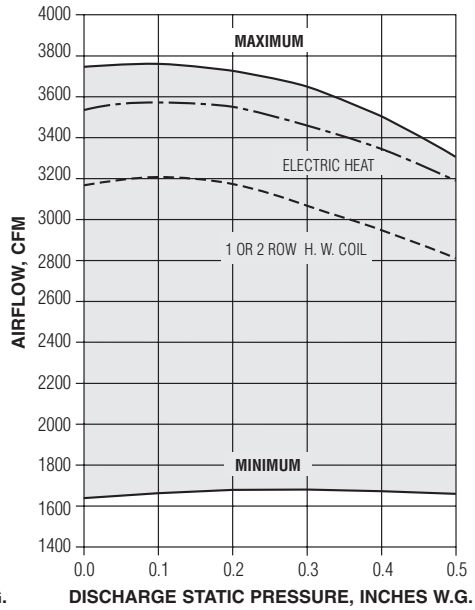
Unit Size 5



Unit Size 6



Unit Size 7



- Fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase PSC motors.

Electrical Motor Data

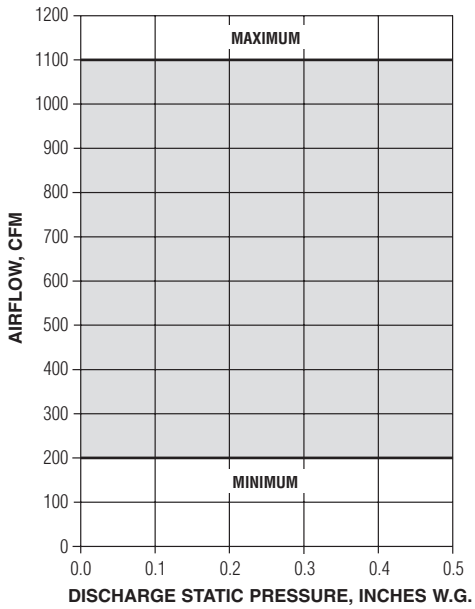
Unit Size	Motor H.P.	PSC Motor FLA		
		120/1/60	208/1/60	277/1/60
2	1/10	3.3	2.0	1.0
3	1/4	5.8	3.6	1.8
4	1/3	6.2	4.1	2.0
5	1/2	10.1	6.5	3.3
6	3/4	13.4	8.4	4.5
7	2@1/2	20.2	13.0	6.6

FLA = Full load amperage

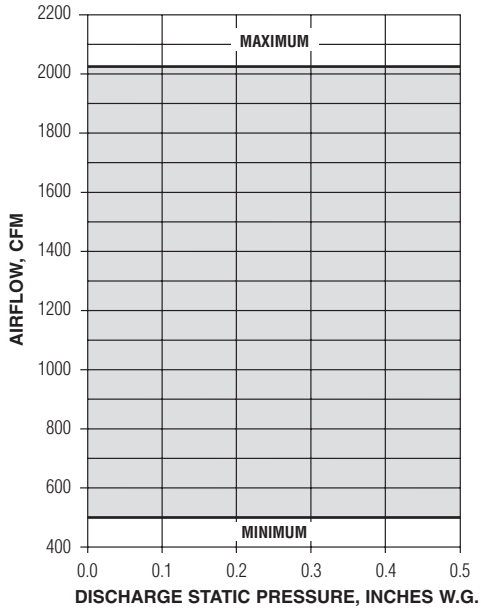
Performance Data

ECM Motor Option Fan Curves – Airflow vs. Downstream Static Pressure
35SST "Stealth™" Series • Series Flow

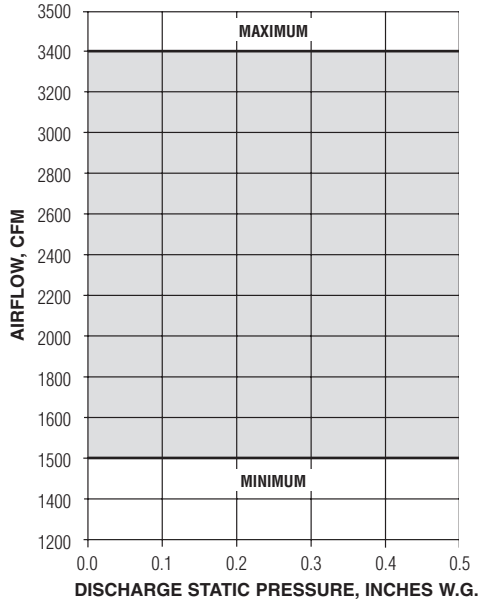
Unit Size 3



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 constant volume at factory or field set point and airflow does not vary with changing static pressure conditions. The motor compensates for any changes in external static pressure or induced air conditions such as filter loading.
- Airflow can be set to operate on horizontal performance line at any point within shaded area using the solid state volume controller provided.
- Fan powered terminal units featuring the optional ECM motor have considerably wider turn-down ratios than conventional PSC motors. Hence, only three unit sizes are required in order to provide the same fan airflow range that would require six terminal unit/fan sizes when equipped with PSC motors. A reduction in the number of different terminal 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 120/240 and 277 volt, single phase ECM motors. ECM motors, although DC in operation, include a built-in inverter.

Electrical Data

Unit Size	Motor H.P.	ECM Motor FLA	
		120/1/60	277/1/60
3	1/2	7.9	3.5
5	3/4	12.6	5.5
7	2 @ 3/4	25.2	10.9

FLA = Full load amperage

Performance Data • NC Level Application Guide

35SST "Stealth™" Series • Series Flow

Unit Size	Unit Size	Airflow cfm	Airflow l/s	Min inlet ΔPs " w.g.	Min inlet ΔPs Pa	NC Levels @ Inlet pressure (ΔPs) shown: DISCHARGE Fan Only	DISCHARGE Min. ΔPs	DISCHARGE 0.5" wg (125 Pa)	DISCHARGE 1.0" wg (250 Pa)	DISCHARGE 1.5" wg (375 Pa)	DISCHARGE 2.0" wg (500 Pa)	RADIATED Fan Only	RADIATED Min. ΔPs	RADIATED 0.5" wg (125 Pa)	RADIATED 1.0" wg (250 Pa)	RADIATED 1.5" wg (375 Pa)	RADIATED 2.0" wg (500 Pa)
2	8	670	316	0.05	12	27	27	29	29	27	30	25	30	32	36	36	40
		550	260	0.05	12	20	21	21	20	21	22	24	24	29	34	35	36
		450	212	0.05	12	-	-	-	-	-	-	-	-	25	30	30	35
		300	142	0.05	12	-	-	-	-	-	-	-	-	-	24	26	27
3	8	700	330	0.05	12	-	-	-	-	-	-	20	-	25	28	30	35
		600	283	0.05	12	-	-	-	-	-	-	-	-	24	25	30	34
		450	212	0.05	12	-	-	-	-	-	-	-	-	-	23	25	29
	10	1200	566	0.05	12	25	25	25	25	25	25	27	27	32	35	35	39
		900	425	0.05	12	20	-	20	20	22	23	24	23	29	31	34	36
		700	330	0.05	12	-	-	-	-	-	-	-	-	24	27	29	34
		450	212	0.05	12	-	-	-	-	-	-	-	-	-	24	25	30
4	10	1100	519	0.05	12	22	22	22	24	23	25	25	26	29	33	35	38
		1000	472	0.05	12	20	20	20	21	22	25	21	24	29	30	35	36
		850	401	0.05	12	-	-	-	-	-	20	20	21	24	29	31	34
	12	1500	708	0.05	12	31	30	31	32	31	32	33	31	34	35	35	35
		1300	614	0.05	12	27	26	27	29	29	29	30	28	31	34	35	39
		1100	519	0.05	12	22	21	21	21	20	25	25	24	26	30	33	36
		850	401	0.05	12	-	-	-	-	-	-	20	-	22	27	31	33
5	12	1600	755	0.05	12	28	26	28	29	28	29	36	34	34	35	36	40
		1400	661	0.05	12	25	25	25	25	25	25	33	30	33	34	36	39
		1200	566	0.05	12	22	20	22	20	20	22	28	26	25	31	34	36
		1050	495	0.05	12	-	-	-	-	-	-	23	23	25	30	34	36
	14	1925	909	0.05	12	34	34	34	35	35	35	36	35	37	39	39	40
		1700	802	0.05	12	30	29	30	30	30	30	34	32	35	37	38	40
		1400	661	0.05	12	26	25	25	25	25	25	30	28	31	34	34	36
		1050	496	0.05	12	-	-	-	-	-	-	23	20	24	29	31	34
6	14	2300	1086	0.05	12	37	37	37	38	38	39	39	39	41	42	44	43
		2000	944	0.05	12	34	32	34	34	35	35	36	35	38	39	39	40
		1700	802	0.05	12	29	27	29	29	28	30	34	31	33	34	35	37
		1400	661	0.05	12	25	22	24	24	25	30	28	25	29	31	34	35
		1100	519	0.05	12	-	-	-	-	-	20	21	20	24	29	30	34
7	16	3500	1652	0.24	60	39	32	34	35	35	35	42	40	41	44	46	49
		3000	1416	0.17	42	33	29	29	30	32	33	39	36	39	41	44	46
		2500	1180	0.12	30	26	23	24	25	27	30	34	33	35	39	41	44
		2000	944	0.07	17	20	-	-	22	25	26	29	25	30	36	39	41
		1500	708	0.05	12	-	-	-	-	22	25	23	20	25	32	36	38

Performance Notes:

1. NC levels are calculated from the published raw data and based on procedures outlined in Appendix E, ARI 885-98.
2. 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. Min. inlet ΔPs is the minimum static pressure required to achieve rated airflow (damper full open).
5. Dash (–) in space denotes an NC level of less than 20.
6. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases.
7. For a complete explanation and details on NC calculations, refer to page D19 and the engineering section of this catalog.

Performance Data • Discharge Sound Power Levels

Model Series 35SST "Stealth™" • Series Flow (Constant Volume)

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. inlet ΔPs " w.g.	Min. inlet ΔPs Pa	Fan Only 2	3	4	5	6	7	Fan and 100% Primary Air – Sound Power Octave Bands @ Inlet pressure shown: Minimum ΔPs 2	3	4	5	6	7	0.5" wg (125Pa)ΔPs 2	3	4	5	6	7	1.0" wg (250Pa)ΔPs 2	3	4	5	6	7	1.5" wg (375Pa)ΔPs 2	3	4	5	6	7	2.0" wg (500Pa)ΔPs 2	3	4	5	6	7
2	8	670	316	.05	12	65	74	66	70	68	67	65	68	66	64	61	59	65	69	67	64	61	60	66	69	66	64	62	60	67	68	67	64	62	60	67	70	67	65	62	61
		550	260	.05	12	58	62	62	58	56	54	58	63	63	58	56	54	61	63	63	59	57	55	60	62	62	59	56	55	61	63	62	59	57	55	62	64	63	59	57	55
		450	212	.05	12	53	57	59	53	51	48	53	56	60	53	50	47	55	57	60	54	51	48	57	59	58	54	52	49	58	58	58	55	52	50	59	61	59	55	52	50
		300	142	.05	12	51	53	54	49	46	42	51	52	51	48	45	40	53	54	54	50	47	42	54	56	54	50	47	43	55	56	55	50	47	44	55	57	56	51	48	44
3	8	700	330	.05	12	56	56	59	56	52	48	57	56	59	55	51	48	58	58	60	56	52	48	59	59	60	56	52	48	61	61	60	56	52	48	61	61	61	58	52	48
		600	283	.05	12	56	55	58	55	51	46	56	55	58	54	50	45	57	57	59	55	51	46	58	58	59	55	51	46	59	58	59	55	51	46	59	60	59	55	49	46
		450	212	.05	12	55	52	54	50	46	38	55	52	54	50	45	37	56	53	55	50	45	38	57	54	55	50	45	38	57	55	55	49	44	38	57	55	55	49	44	38
	10	1200	566	.05	12	62	64	68	65	62	61	61	64	68	64	61	60	65	67	68	64	63	61	66	67	69	66	64	62	67	67	69	67	64	62	68	68	69	67	64	62
		900	425	.05	12	60	61	64	61	58	56	59	61	63	60	57	55	61	63	65	62	59	56	63	64	65	63	60	57	64	64	65	63	60	58	64	65	65	63	60	58
		700	330	.05	12	57	58	59	55	52	48	57	58	58	55	51	48	59	59	60	57	53	49	60	60	60	57	54	50	60	59	60	57	53	50	61	61	60	57	53	50
		450	212	.05	12	57	56	54	50	46	38	56	56	54	50	45	38	57	56	55	51	46	39	58	57	55	50	46	39	58	57	55	50	46	39	59	57	55	50	45	40
4	10	1100	519	.05	12	63	65	65	64	60	57	64	65	65	64	60	58	64	65	65	64	60	58	65	66	65	64	61	59	67	65	66	64	61	59	67	67	66	64	61	59
		1000	472	.05	12	62	63	63	61	58	55	62	63	63	61	58	55	63	63	63	62	58	56	64	64	64	62	58	56	65	65	63	62	58	56	66	66	64	62	58	56
		850	401	.05	12	59	61	61	58	54	50	59	60	60	58	54	51	60	61	61	59	55	51	60	61	61	59	55	51	63	61	61	58	55	52	64	63	61	59	55	52
	12	1500	708	.05	12	70	78	71	78	75	74	68	71	71	71	68	67	70	72	72	72	69	68	71	73	72	72	69	68	71	72	72	72	69	68	72	73	72	72	69	68
		1300	614	.05	12	67	69	69	68	65	63	66	68	69	67	64	63	68	69	69	68	65	64	68	70	69	68	65	64	69	70	69	68	65	64	69	70	69	68	65	64
		1100	519	.05	12	63	65	65	64	60	57	62	64	66	62	59	56	64	64	66	63	59	57	64	64	66	62	59	57	65	63	66	62	59	57	66	66	66	62	59	57
		850	401	.05	12	59	60	60	58	54	51	58	59	60	58	54	50	60	61	60	58	54	51	61	60	60	58	54	50	62	61	60	57	54	50	62	61	60	58	54	51
5	12	1600	755	.05	12	67	68	69	69	66	65	67	67	68	67	64	63	69	69	69	68	65	65	70	70	69	68	65	65	71	69	69	68	65	65	71	70	69	68	64	64
		1400	661	.05	12	66	66	67	66	63	62	64	64	65	64	61	61	67	66	66	64	62	62	68	67	66	65	62	62	68	67	66	64	61	61	69	67	67	65	62	61
		1200	566	.05	12	62	62	63	62	59	58	60	61	62	60	57	57	63	63	62	61	58	58	64	63	63	61	58	57	65	62	63	61	57	57	66	65	63	61	57	57
		1050	495	.05	12	60	59	59	58	55	53	58	58	59	57	53	53	60	59	59	58	54	53	62	60	59	57	54	53	63	61	60	57	54	53	64	62	60	57	54	53
	14	1925	909	.05	12	73	74	73	74	71	70	73	74	73	73	70	70	73	74	74	73	70	70	74	75	74	73	71	70	74	75	74	73	71	70	75	75	74	73	70	70
		1700	802	.05	12	71	71	70	70	67	67	69	69	70	69	66	66	71	71	71	70	67	66	72	71	71	70	67	66	72	71	70	69	66	66	72	71	70	69	66	66
		1400	661	.05	12	67	67	67	67	63	63	64	64	66	62	61	61	67	67	66	65	62	62	68	66	66	65	62	62	68	65	66	65	61	61	68	67	66	65	61	62
		1050	496	.05	12	60	60	61	60	56	54	59	59	59	58	54	53	60	60	60	58	55	54	61	60	60	58	54	54	63	61	60	58	54	54	64	62	60	58	55	54
6	14	2300	1086	.05	12	76	78	76	77	74	73	74	78	77	78	75	74	76	78	77	78	75	74	76	79	78	78	75	74	77	78	78	78	75	75	78	79	78	79	76	75
		2000	944	.05	12	73	74	73	73	70	69	70	73	73	72	69	69	72	74	74	73	70	69	73	74	74	73	70	70	74	75	74	74	70	70	74	75	74	74	71	70
		1700	802	.05	12	70	70	68	69	66	65	67	68	69	68	64	64	69	70	70	68	65	65	70	70	70	69	66	65	70	69	71	69	66	66	71	71	71	69	66	65
		1400	661	.05	12	66	66	67	65	61	60	63	64	65	63	60	58	65	66	65	64	60	59	66	66	66	64	61	60	67	66	66	64	61	60	67	66	66	64	60	59
		1100	519	.05	12	61	62	62	60	56	54	59	60	61	59	55	52	61	62	62	60	56	54	62	62	62	60	56	54	63	62	62	60	56	54	64	63	62	60	56	54
7	16	3500	1652	.24	60	73	76	76	77	75	75	69	71	74	73	71	69	70	71	74	73	71	71	72	73	74	74	71	72	74	73	75	74	72	72	76	76	76	75	73	73
		3000	1416	.17	42	70	71	73	73	70	70	66	67	69	69	66	66	67	68	70	69	67	66	70	70	71	70	68	68	71	71	72	71	69	69	73	73	72	71	69	70
		2500	1180	.12	30	65	66	68	67	64	63	61	62	64	63	60	59	63	63	65	64	61	60	66	66	66	65	63	62	69	68	67	66	64	64	71	71	68	67	65	66
		2000	944	.07	17	59	60	63	61	57	56	55	56	58	57	53	51	59	59	60	58	56	53	63	62	61	60	59	58	65	65	63	61	61	61	67	68	64	63	63	63
		1500	708	.04	10	53	55	56	54	50	47	50	61	53	51	46	43	55	54	54	53	51	47	59	59	57	56	57	54	62	62	60	59	60	58	64	65	62	60	61	60

ARI Certification Rating Points

Unit Size	Inlet Size	Fan cfm	Fan† Watts	Fan Only* 2	3	4	5	6	7
2	8	670	230	65	74	66	70	68	67
3	10	1200	450	62	64	68	65	62	61
4	12	1500	580	70	78	71	78	75	74
5	14	1925	850	73	74	73	74	71	70
6	14	2300	1175	76	78	76	77	74	73
7	16	3500	1700	73	76	76	77	75	75

† PSC Motor

* Primary air valve is closed and therefore primary cfm is zero.

Performance Notes:

1. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from terminal discharge to the room.
2. Discharge sound power is the noise emitted from the unit discharge into the downstream duct.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Standard 130-1996 and ARI Standard 880-98.

ARI PERFORMANCE CERTIFIED
ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

D

FAN POWERED TERMINAL UNITS

Performance Data • Radiated Sound Power Levels

Model Series 35SST "Stealth™" • Series Flow (Constant Volume)

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. inlet ΔPs " w.g.	Min. inlet ΔPs Pa	Fan Only 2	3	4	5	6	7	Fan and 100% Primary Air – Sound Power Octave Bands @ Inlet pressure shown: Minimum ΔPs 2	3	4	5	6	7	0.5" wg (125Pa)ΔPs 2	3	4	5	6	7	1.0" wg (250Pa)ΔPs 2	3	4	5	6	7	1.5" wg (375Pa)ΔPs 2	3	4	5	6	7	2.0" wg (500Pa)ΔPs 2	3	4	5	6	7
2	8	670	316	.05	12	54	63	53	52	49	44	61	60	50	42	39	37	62	62	51	44	40	39	65	66	54	46	42	42	66	66	57	48	45	46	67	69	57	50	45	47
		550	260	.05	12	56	55	47	39	36	34	57	55	45	36	35	33	59	59	48	40	37	35	63	63	51	44	39	38	64	64	53	46	41	42	64	66	55	48	43	46
		450	212	.05	12	55	51	39	34	32	29	55	50	37	31	31	29	57	56	44	37	33	31	59	60	48	40	36	37	60	60	51	43	39	41	61	64	54	46	41	43
		300	142	.05	12	53	49	38	31	29	25	53	42	37	30	28	24	52	51	41	33	30	29	56	55	46	38	33	32	55	57	48	42	36	36	57	58	50	45	40	38
3	8	700	330	.05	12	55	51	46	38	33	30	57	51	45	38	33	28	61	56	47	42	36	35	62	58	51	45	41	42	65	60	53	47	43	46	66	65	57	50	45	48
		600	283	.05	12	55	50	45	37	33	29	55	50	44	37	31	27	59	55	46	40	35	35	62	57	49	44	41	41	64	60	52	46	43	45	64	63	55	48	44	47
		450	212	.05	12	51	42	42	33	30	24	50	46	40	32	28	22	57	51	44	39	34	34	58	54	46	40	37	36	63	57	50	45	42	42	60	59	52	45	43	44
	10	1200	566	.05	12	60	58	50	44	38	33	59	58	50	43	37	33	64	62	52	46	41	37	66	64	55	49	44	43	67	64	57	51	46	47	68	68	59	53	47	50
		900	425	.05	12	58	55	48	41	35	30	56	54	47	39	33	30	61	59	50	43	38	35	63	61	52	46	42	42	65	63	55	49	44	46	66	65	57	51	46	49
		700	330	.05	12	53	51	45	36	31	27	52	49	43	35	29	25	57	55	46	40	35	33	60	58	50	44	40	40	62	59	52	46	43	44	63	63	55	49	45	47
		450	212	.05	12	50	47	41	32	28	21	48	45	40	31	26	19	54	50	43	37	33	31	56	55	46	40	38	37	59	57	49	43	41	42	59	60	51	46	43	45
4	10	1100	519	.05	12	63	56	49	42	36	32	64	55	47	42	37	34	65	58	51	44	42	41	67	62	54	47	45	48	69	64	58	50	48	52	70	67	59	52	49	55
		1000	472	.05	12	60	52	46	41	33	30	62	53	47	41	35	33	65	56	50	43	41	40	66	60	53	45	44	46	68	64	55	48	45	51	69	66	59	51	49	55
		850	401	.05	12	59	51	45	39	32	30	60	51	45	38	33	30	62	55	47	41	39	39	64	59	52	45	43	46	66	61	54	47	46	50	66	63	57	49	48	54
	12	1500	708	.05	12	68	67	61	58	51	47	67	61	53	48	42	40	69	63	56	49	45	43	70	65	58	51	47	47	71	65	61	53	49	51	72	69	63	55	51	54
		1300	614	.05	12	66	59	52	46	39	36	65	58	51	45	39	37	67	61	53	46	42	40	68	63	57	49	45	46	69	65	59	52	47	50	70	68	61	53	49	53
		1100	519	.05	12	63	56	49	42	36	32	62	54	47	41	35	32	63	57	51	43	39	37	65	60	54	47	43	44	67	62	58	50	46	49	68	65	59	52	48	52
		850	401	.05	12	59	52	45	38	32	29	58	50	44	36	31	28	60	54	48	40	37	35	62	58	52	44	42	43	64	61	54	47	45	47	64	62	57	49	47	50
5	12	1600	755	.05	12	71	61	52	47	45	40	69	62	52	47	44	41	69	63	57	49	45	42	69	65	57	51	47	46	71	66	61	54	50	51	71	70	63	56	51	54
		1400	661	.05	12	68	57	49	45	41	37	66	57	49	42	40	37	68	60	54	45	42	39	68	63	56	49	45	45	68	66	59	52	48	50	70	68	63	55	50	53
		1200	566	.05	12	65	55	47	42	39	35	64	54	46	40	37	34	62	57	51	43	40	38	65	61	54	48	44	44	66	63	57	50	47	49	67	66	60	52	48	51
		1050	495	.05	12	61	52	45	39	35	32	61	52	43	37	33	30	61	56	49	41	38	37	62	60	52	46	43	43	64	63	56	48	46	48	66	66	58	50	48	50
	14	1925	909	.05	12	71	63	54	50	47	44	69	64	56	51	47	45	71	66	58	52	49	47	72	68	59	53	50	50	73	67	61	54	51	53	73	70	62	55	52	55
		1700	802	.05	12	69	62	53	48	46	42	68	62	53	48	45	42	69	64	55	49	46	44	70	66	57	51	48	48	71	67	59	52	50	52	71	69	61	54	51	54
		1400	661	.05	12	66	59	50	45	42	39	65	57	49	43	40	37	67	60	52	45	43	41	67	63	54	48	46	46	68	63	56	50	48	50	69	66	59	52	50	53
		1050	496	.05	12	61	53	45	39	35	32	59	52	43	37	34	31	61	55	47	41	39	37	63	59	50	44	43	44	63	61	53	46	46	48	64	63	55	48	48	51
6	14	2300	1086	.05	12	73	65	58	53	48	43	73	67	60	54	49	46	75	68	62	55	52	50	76	69	64	56	53	53	77	69	65	58	54	55	77	72	66	59	56	57
		2000	944	.05	12	71	63	56	50	45	40	70	63	57	50	45	41	72	65	59	51	48	46	73	66	60	53	50	50	73	68	62	55	52	53	74	70	64	56	54	56
		1700	802	.05	12	69	59	53	47	41	39	67	59	53	45	40	36	68	61	56	48	45	43	69	63	58	50	48	48	70	64	60	52	51	52	71	67	62	54	53	55
		1400	661	.05	12	65	55	50	42	37	36	63	55	49	41	35	32	65	57	52	44	42	40	67	61	55	47	46	47	68	63	57	50	49	51	69	65	59	52	51	53
		1100	519	.05	12	60	51	46	38	32	28	59	50	45	36	31	27	62	54	48	41	39	37	65	58	52	44	45	45	64	60	54	47	47	49	66	63	57	49	49	51
7	16	3500	1652	.24	60	76	71	63	56	53	50	74	68	62	54	48	46	75	68	62	54	48	47	77	69	63	55	50	50	79	69	65	57	52	53	81	72	67	58	54	56
		3000	1416	.17	42	73	67	62	52	47	44	71	65	58	51	44	42	73	65	59	51	45	43	75	66	61	52	48	47	77	68	63	55	50	52	79	70	65	57	53	54
		2500	1180	.12	30	69	63	57	49	45	41	68	61	56	45	39	37	70	61	56	47	42	40	73	64	59	50	47	47	75	64	61	52	49	50	77	68	63	55	51	53
		2000	944	.07	17	65	57	52	44	37	33	62	55	50	39	33	30	66	57	53	43	40	37	71	61	56	48	45	45	73	63	59	50	47	49	75	66	62	53	50	52
		1500	708	.04	10	61	53	48	37	32	28	59	51	46	35	29	25	63	54	50	40	37	34	68	58	54	45	43	43	71	61	57	48	46	47	72	63	60	51	48	50

ARI Certification Rating Points

Unit Size	Inlet Size	Pri. cfm	Fan cfm	Fan † Watts	Min. ΔPs	Fan Only * 2	3	4	5	6	7	Fan and Primary cfm shown @ 1.5" wg ΔPs 2	3	4	5	6	7
2	8	670	670	230	.05	54	63	53	52	49	44	66	66	57	48	45	46
3	10	1100	1200	450	.05	60	58	50	44	38	33	67	64	57	51	46	47
4	12	1500	1500	580	.05	68	67	61	58	51	47	71	65	61	53	49	51
5	14	1925	1925	850	.05	71	63	54	50	47	44	73	67	61	54	51	53
6	14	2100	2300	1175	.05	73	65	58	53	48	43	77	69	65	58	54	55
7	16	2800	3500	1700	.15	76	71	63	56	53	50	79	69	65	57	52	53

† PSC Motor.

* Primary air valve is closed and therefore primary cfm is zero.

Performance Notes:

1. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from terminal discharge to the room.
2. Radiated sound power is the breakout noise transmitted through the unit casing walls.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Standard 130-1996 and ARI Standard 880-98.

ARI PERFORMANCE CERTIFIED
ARI Standard 880

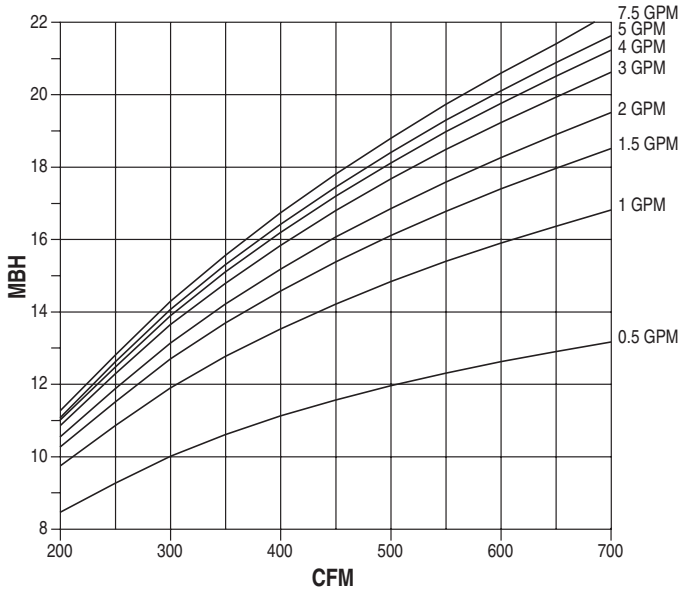
A Participating Corporation in the ARI 880 Certification program.

Performance Data • Hot Water Coil

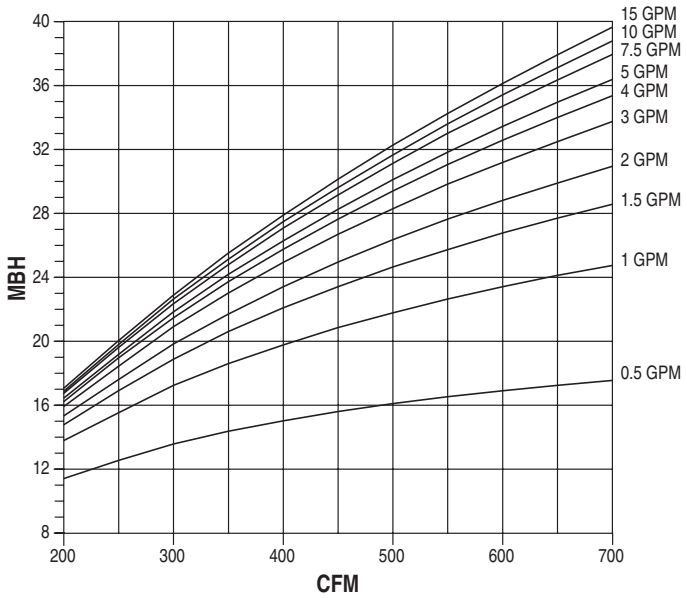
Models: 35SW and 35SWST • Series Flow

Unit Size 2

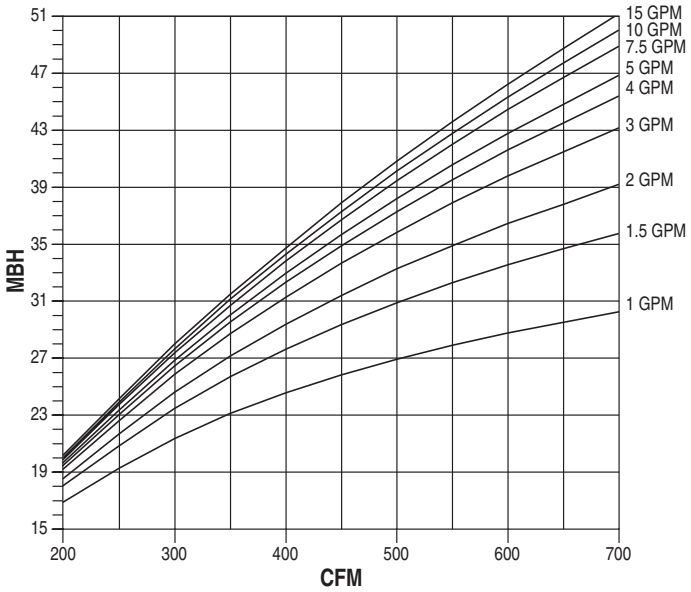
1 Row (single circuit)



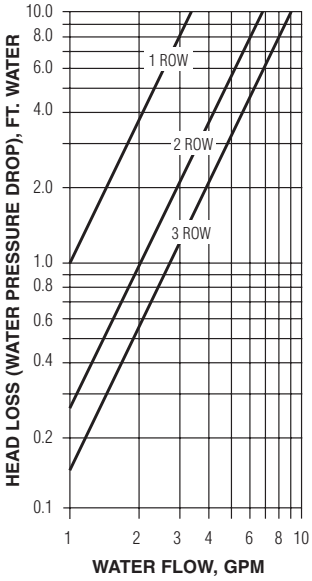
2 Row (multi-circuit)



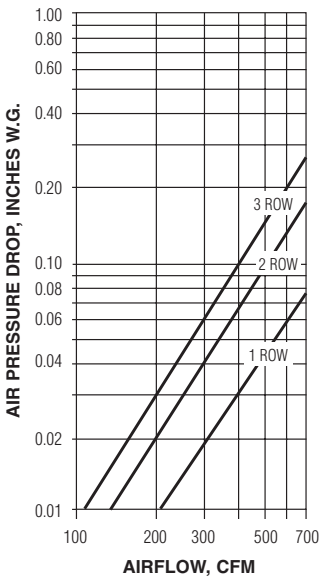
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



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" (13), 2 and 3 Row 7/8" (22); 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:

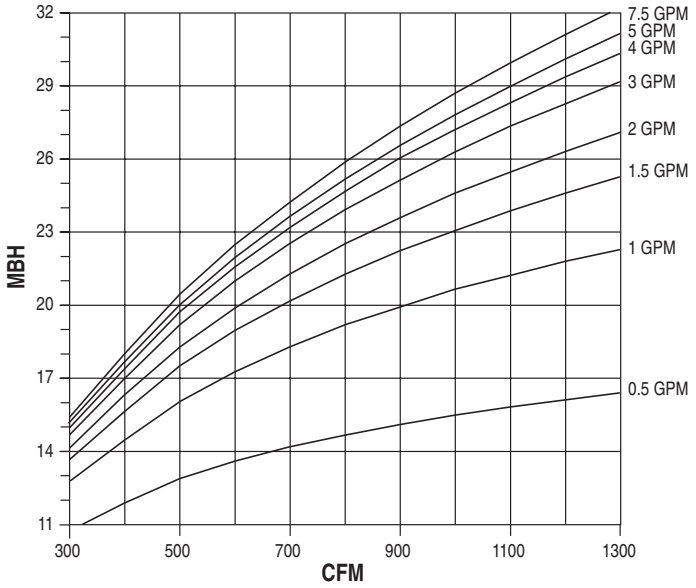
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Performance Data • Hot Water Coil

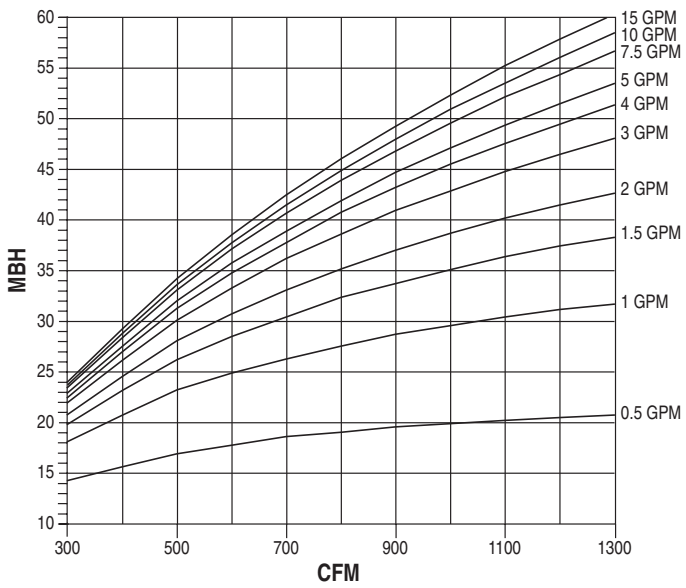
Models: 35SW and 35SWST • Series Flow

Unit Size 3

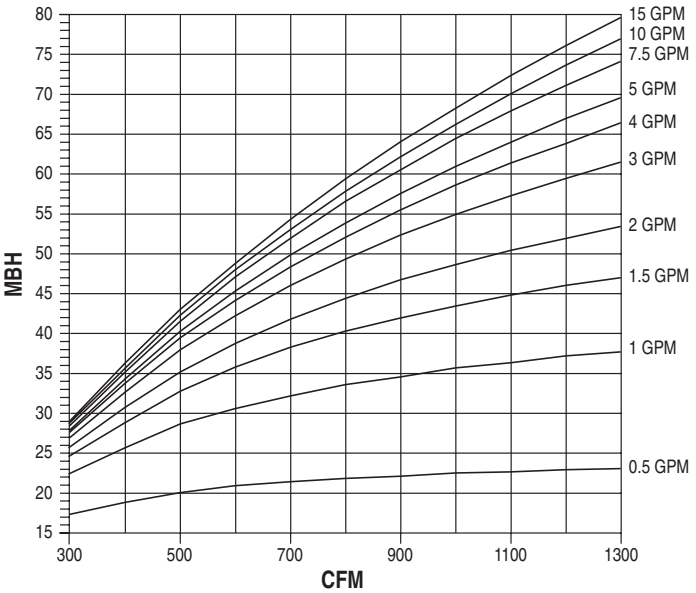
1 Row (single circuit)



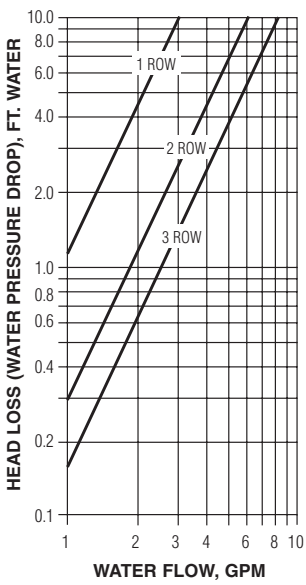
2 Row (multi-circuit)



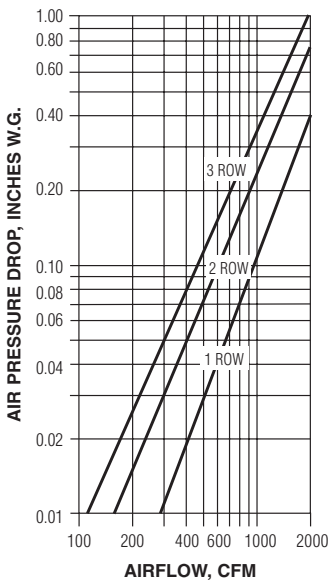
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



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" (13), 2 and 3 Row 7/8" (22); 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:

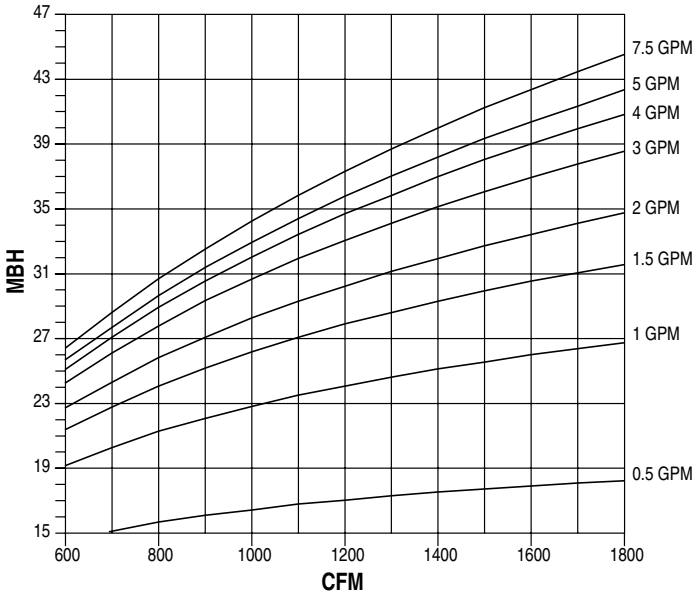
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Performance Data • Hot Water Coil

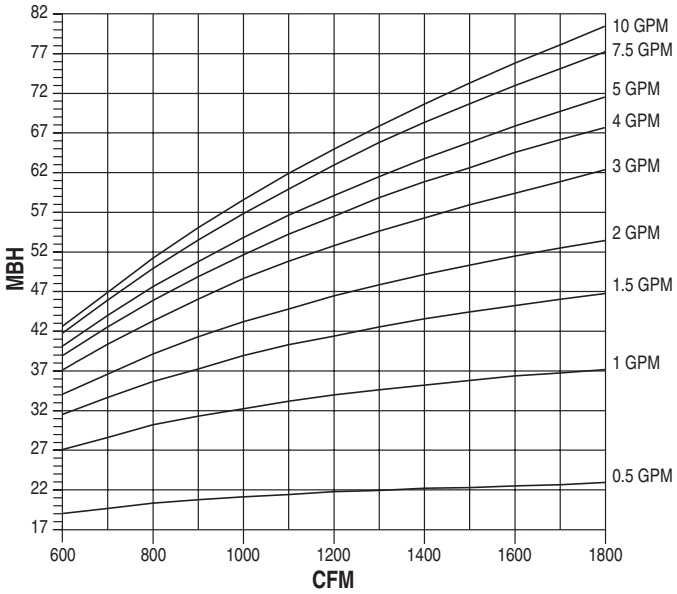
Models: 35SW and 35SWST • Series Flow

Unit Sizes 4 & 5

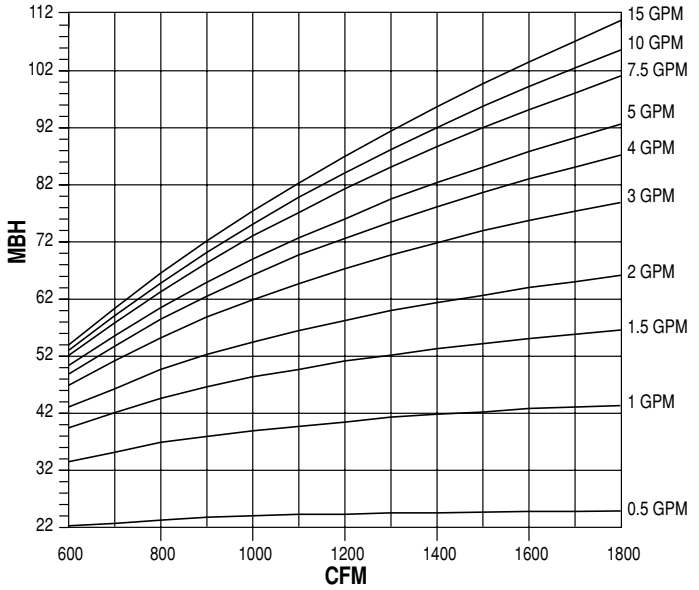
1 Row (multi-circuit)



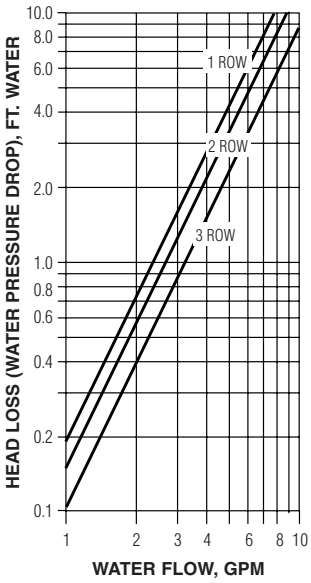
2 Row (multi-circuit)



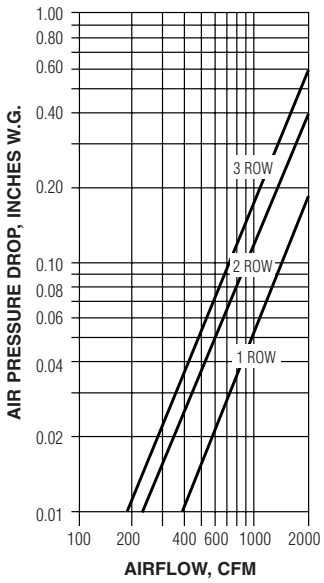
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



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, 2 and 3 Row 7/8" (22); 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:

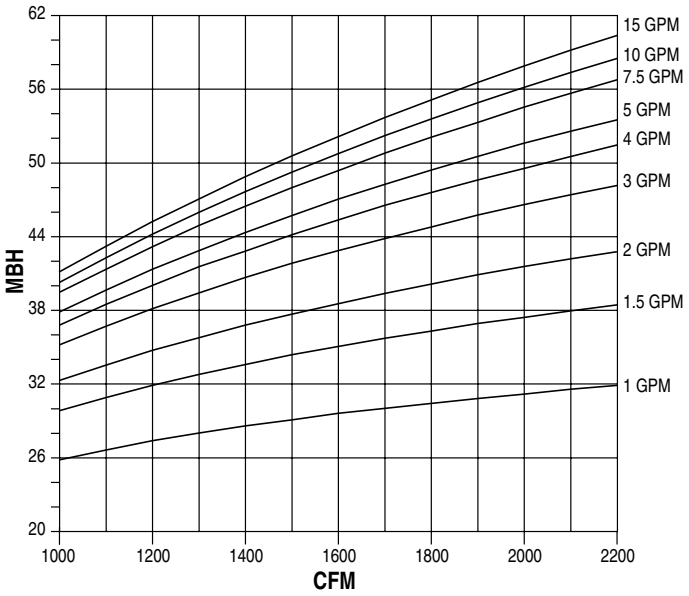
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Performance Data • Hot Water Coil

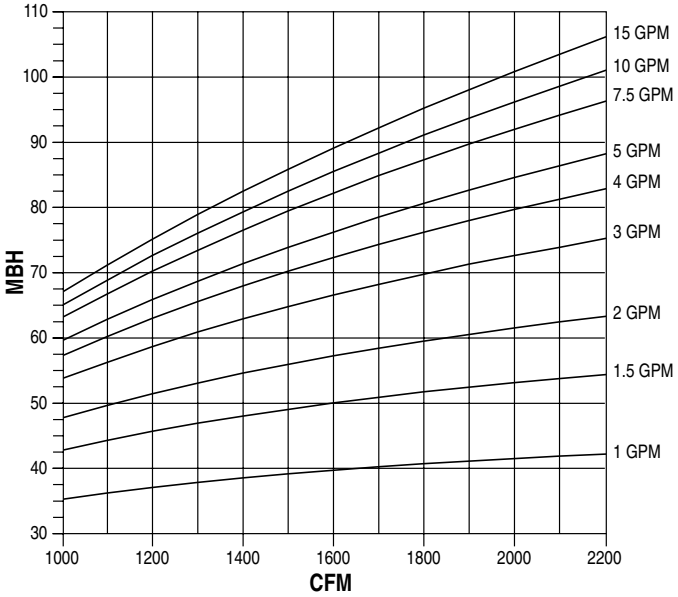
Models: 35SW and 35SWST • Series Flow

Unit Size 6

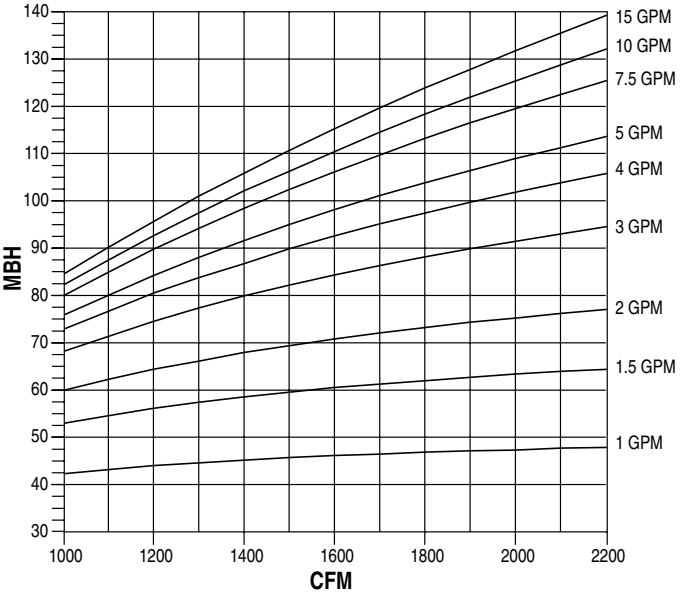
1 Row (multi-circuit)



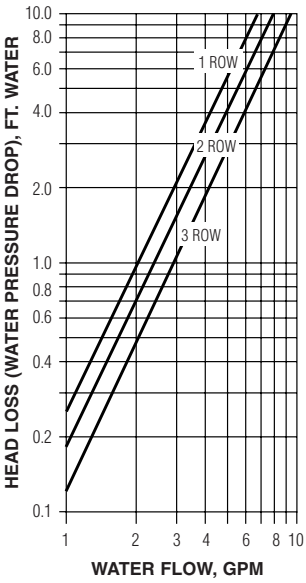
2 Row (multi-circuit)



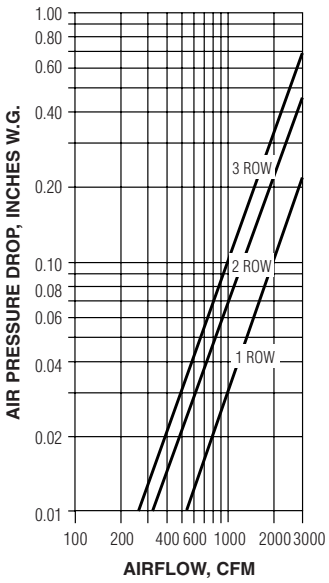
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



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, 2 and 3 Row 7/8" (22); 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:

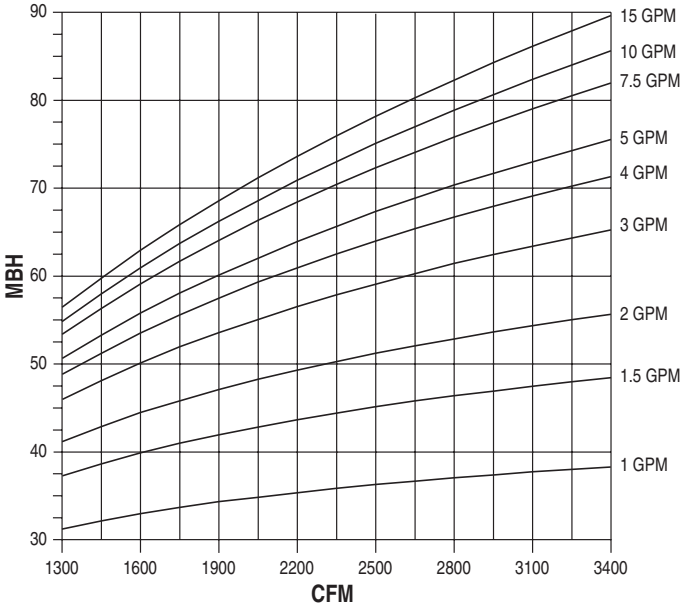
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Performance Data • Hot Water Coil

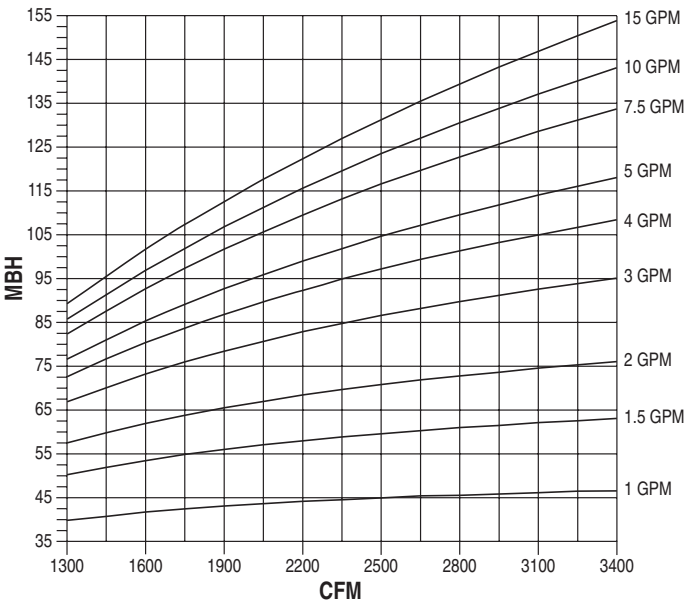
Models: 35SW and 35SWST • Series Flow

Unit Size 7

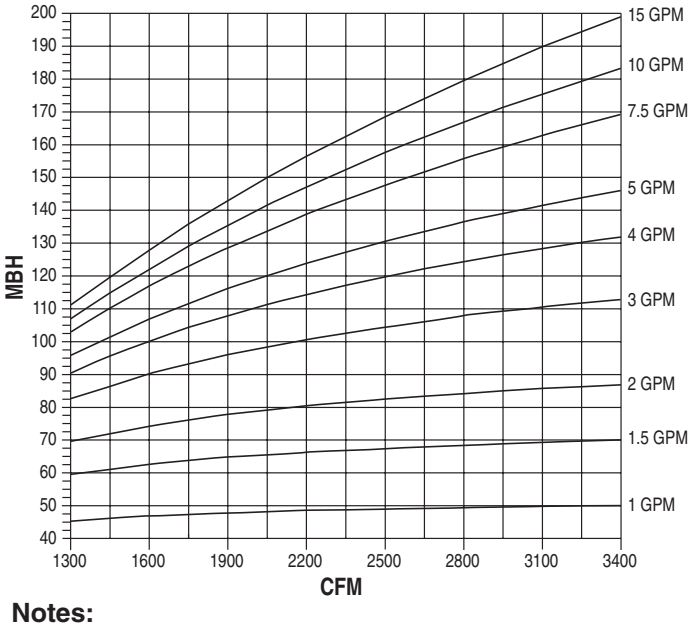
1 Row (multi-circuit)



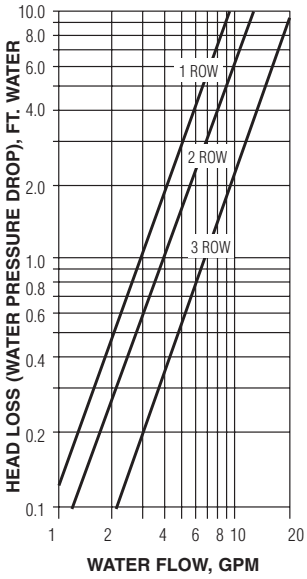
2 Row (multi-circuit)



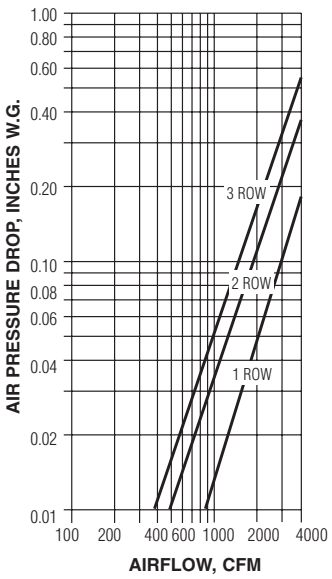
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



Notes:

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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 and 2 Row 7/8" (22), 3 Row 1 3/8" (35); 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

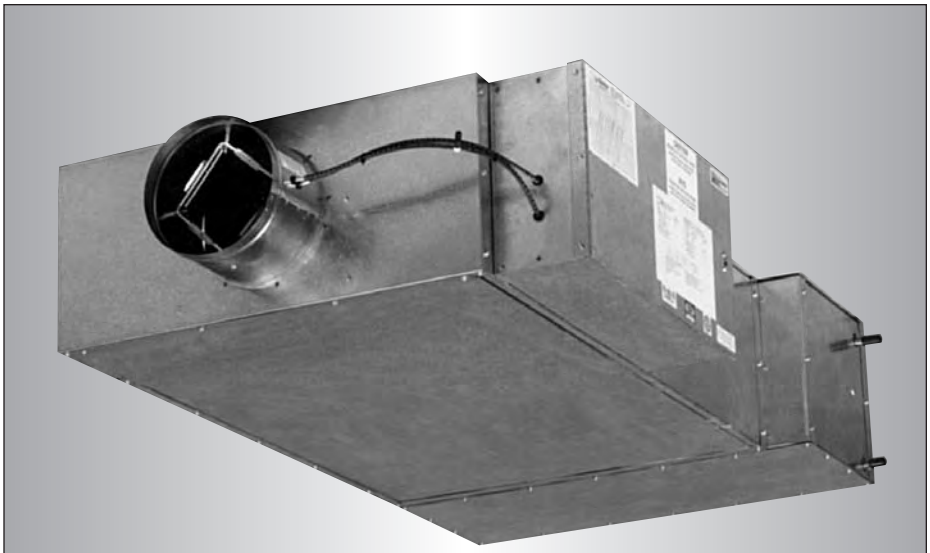
SERIES FLOW CONSTANT VOLUME

37S SERIES

- LOW PROFILE

Models:

37S	**No Heat**
37SE	**Electric Heat**
37SW	**Hot Water Heat**



Model 37SW

The **37S Series** Low Profile are only 11" (279) high and have been especially designed for shallow ceiling plenum applications, which are common where zoning requirements limit building height and the architect wishes to maximize the number of floors as well as on some retrofit projects.

FEATURES:

• 20 ga. (1.0) galvanized steel construction.

• 16 ga. (1.6) galvanized steel inclined opposed blade primary air damper. 45° rotation, CW to close. 1/2" (13) dia. plated steel drive shaft. An indicator mark on the end of the shaft shows damper-position. Leakage is less than 2% of nominal flow at 3" w.g. (750 Pa).

• Perforated baffle on primary air discharge optimizes mixing with induced air for rapid and effective temperature equalization. The baffle also converts low frequency primary air valve generated sound into more readily attenuated higher frequencies.

• Pressure independent primary airflow control.

• Multi-point averaging flow sensor.

• Terminal may be field installed either way up, providing the additional flexibility of right or left field connections.

• Access panels are full size on top and bottom of terminal for ease of maintenance and service.

• Energy efficient PSC fan motor with thermal overload protection.

• Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.

• Adjustable solid state fan speed controller with minimum voltage stop.

• Hinged door on fan controls enclosure.

• 1/2" (13), dual density insulation. Exposed edges coated to prevent air erosion. Meets requirements of NFPA 90A and UL 181.

• Available with electric or hot water supplementary heat.

• All controls are mounted on exterior of terminal providing ready access for field adjustment.

• Each terminal factory tested prior to shipment.

• Single point electrical and/or pneumatic main air connection.

• Discharge opening designed for flanged duct connection.

• Full primary air valve low voltage enclosure for factory mounted DDC and analog electronic controls.

Controls:

• Pneumatic and analog electronic controls. Factory supplied, mounted and calibrated.

• Digital controls. Factory mounting and wiring of DDC controls supplied by BMS Controls Contractor.

Options and Accessories:

• EPIC™/ECM Motor.

• Primary air valve enclosure for field mounted controls.

• Induced air filter, 1" (25) thick, disposable type.

• Toggle disconnect switch (except units with electric heat, when disconnect is an electric heat option and includes fan).

• Various 'IAQ' linings are available.

• Fan airflow or P.E. switch for night shutdown (pneumatic controls).

• Fan airflow switch for night shutdown (analog electronic controls).

• Night setback fan/heat cycle (pneumatic and analog).

• Fan unit fusing.

• Hanger brackets.

• FN2 90° Line Voltage controls enclosure on model 37S and 37SW (standard on 37SE).

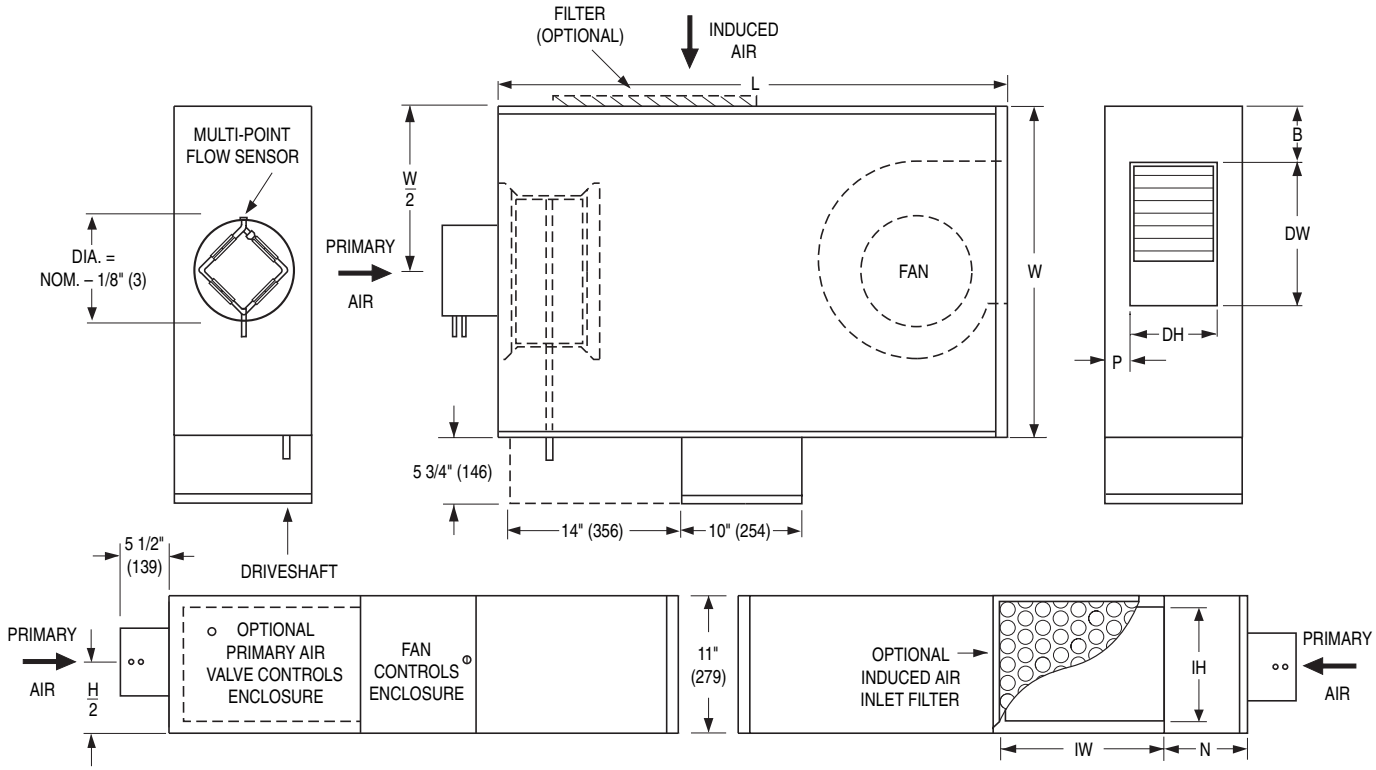
ARI PERFORMANCE CERTIFIED ARI Standard 880

A Participating Corporation in the ARI 880 Certification program.

INTERTEK ETL LISTED C US

Dimensions

Model Series 37S • Low Profile • Unit Sizes 1 – 3

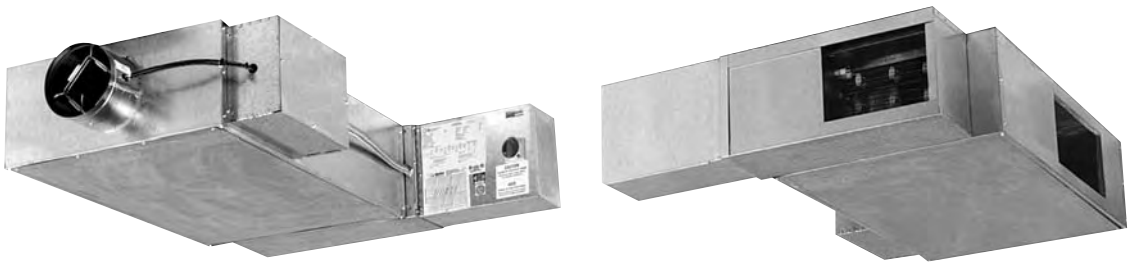


Dimensional Data. Imperial Units (inches)

Unit Size	Inlet Size	W	L	B	N	P	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	4, 5, 6, 8	19	36	2	9	2 1/16	6 x 8	10 1/4 x 6 7/8	8 x 10
2, 3	6, 8, 10	26 1/2	40 1/4	4 3/8	8	1 1/2	15 3/4 x 8	12 1/4 x 8	18 x 10

Dimensional Data. Metric Units (mm)

Unit Size	Inlet Size	W	L	B	N	P	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	102, 127, 152, 203	483	914	51	229	52	152 x 203	260 x 175	203 x 254
2, 3	152, 203, 254	673	1022	111	203	38	400 x 203	311 x 263	457 x 254



Model 37SE

Dimensions

Model Series 37S • Low Profile • Unit Sizes 1 – 3

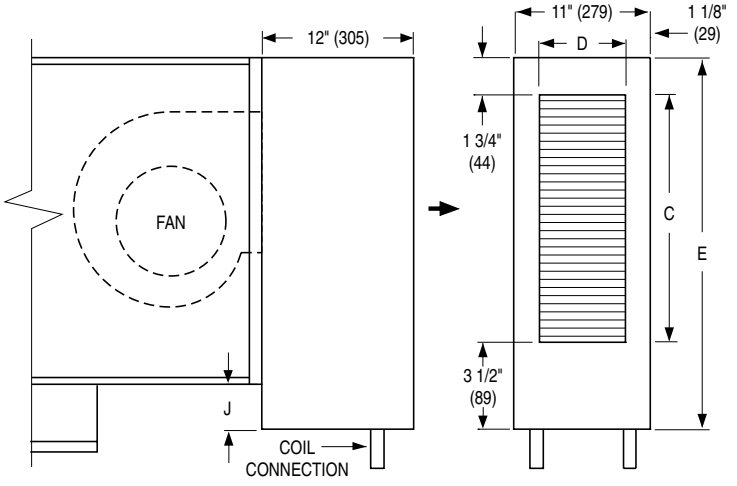
Hot Water Coil Section

Model 37SW

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 1/2" (13) or 7/8" (22) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)			Metric Units (mm)		
	Outlet Duct Size C x D	E	J	Outlet Duct Size C x D	E	J
1	14 3/4 x 8 3/4	20	1	375 x 222	508	25
2,3	23 7/8 x 8 3/4	29 1/8	2 5/8	606 x 222	740	73

Electric Coil Section

Model 37SE

Standard Features:

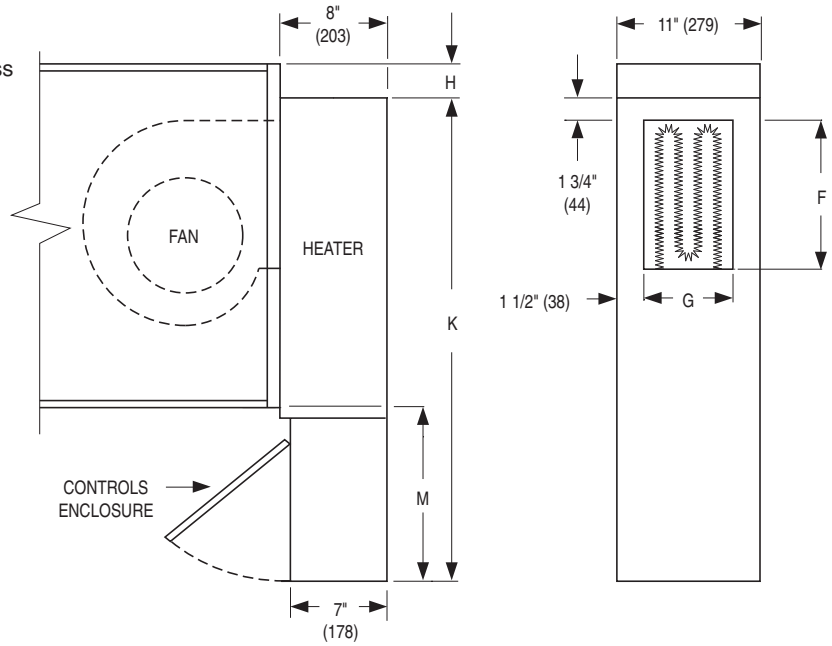
- Controls enclosure incorporates a hinged access door opening upstream that helps ensure NEC clearance requirements and reduces footprint.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is ETL Listed as an assembly.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted.

Standard Supply Voltage (60 Hz):

- 208, 240 and 277V single phase.
- 208, 480 (4 wire wye) and 600V three phase.

Options:

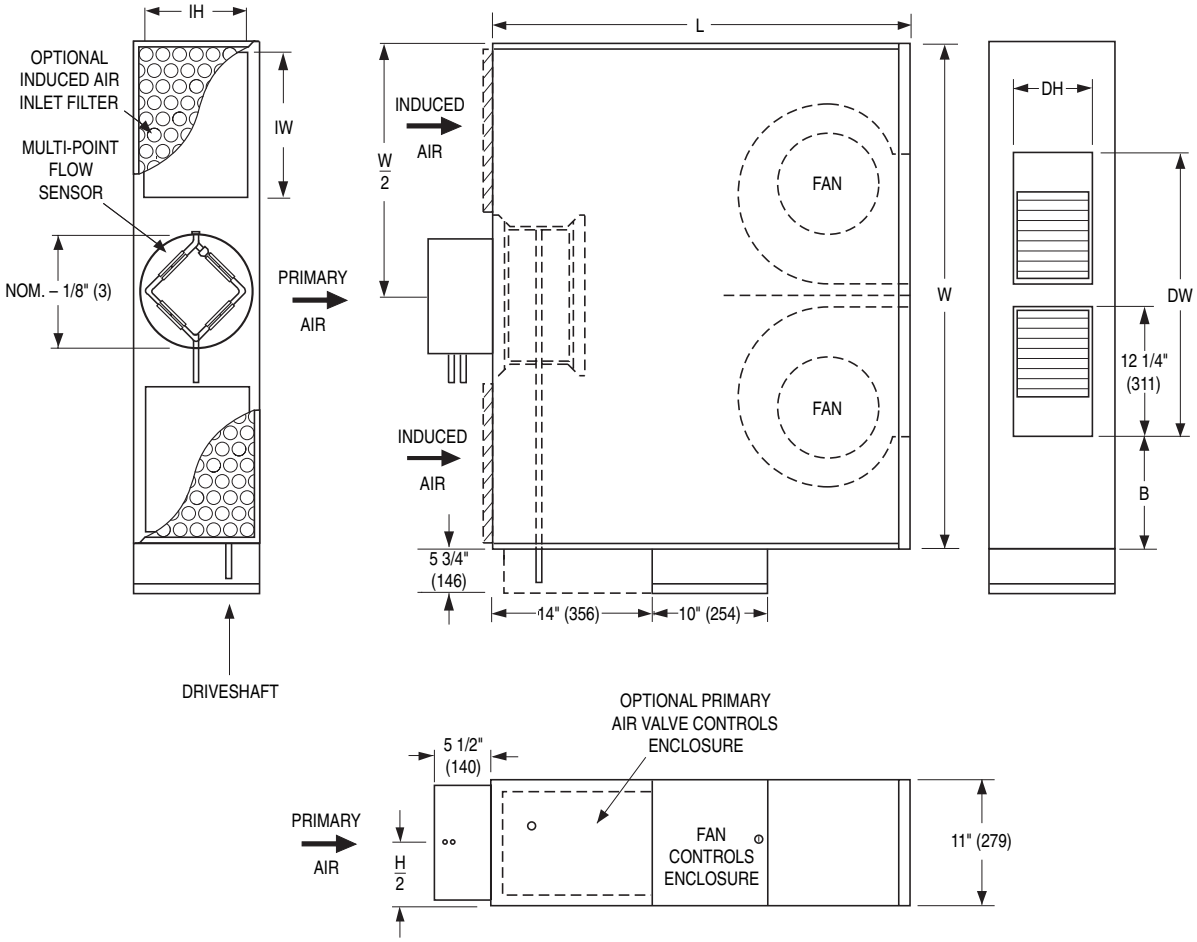
- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.



Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size F x G	H	M	K	Outlet Duct Size F x G	H	M	K
1	10 1/4 x 8	1/2	16 1/8	34 5/8	260 x 203	12	410	879
2,3	12 1/4 x 8	3 1/2	17	40	311 x 203	89	432	1016

Dimensions

Model Series 37S • Low Profile • Unit Size 4

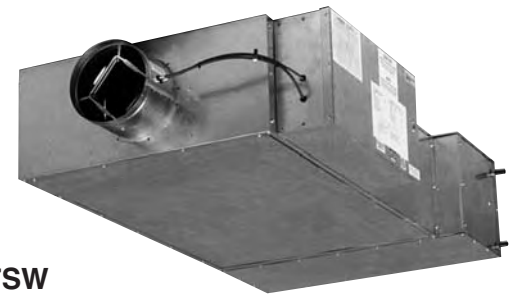


Dimensional Data. Imperial Units (inches)

Unit Size	Inlet Size	W	L	B	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
4	10 Rnd. 14 x 10 Rect.	44	36 1/2	9 5/8	12 x 9 (2)	26 1/2 x 8	14 x 10 (2)

Dimensional Data. Metric Units (mm)

Unit Size	Inlet Size	W	L	B	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
4	254 Rnd. 356 x 254 Rect.	1118	927	244	305 x 229 (2)	673 x 203	356 x 254 (2)



Model 37SW

Dimensions

Model Series 37S • Low Profile • Unit Size 4

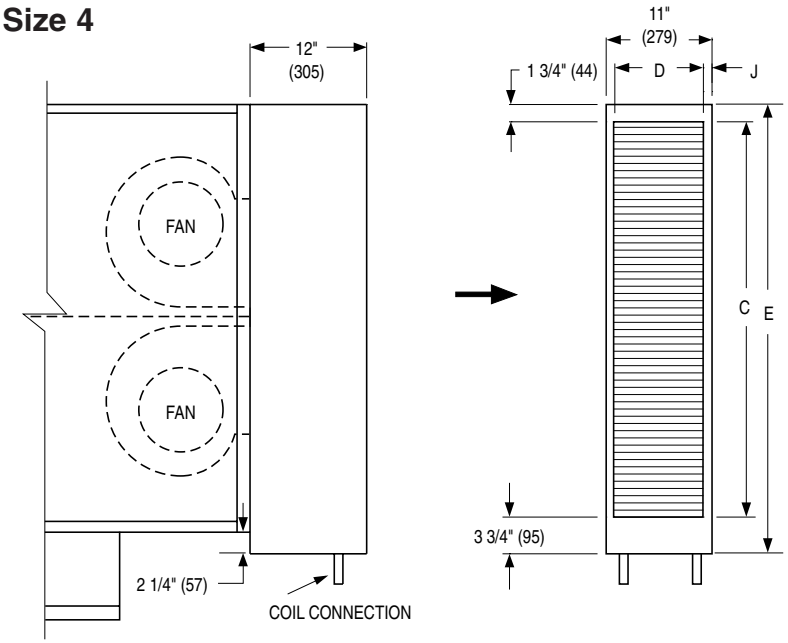
Hot Water Coil Section

Model 37SW

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 1/2" (13) or 7/8" (22) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)			Metric Units (mm)		
	Outlet Duct Size C x D	E	J	Outlet Duct Size C x D	E	J
4	40 3/4 x 9	46 1/4	1	1035 x 229	1175	25

Electric Coil Section

Model 37SE

Standard Features:

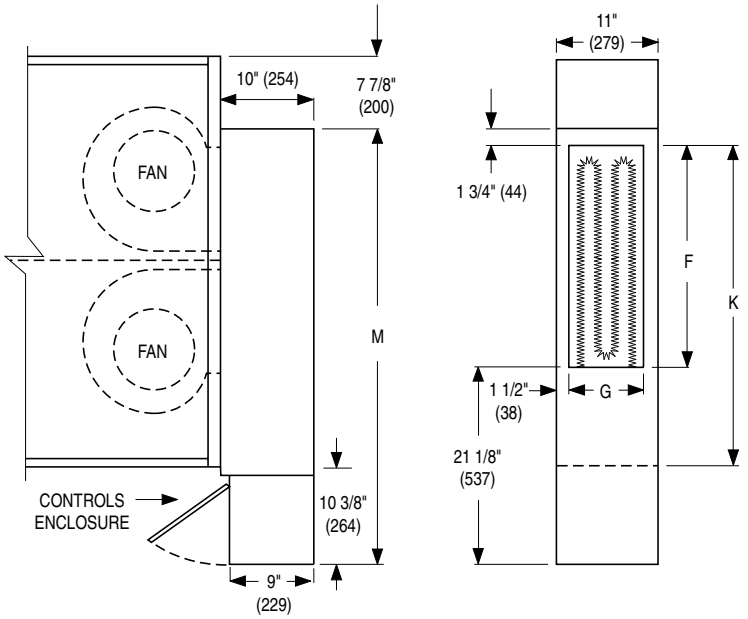
- Controls enclosure incorporates a hinged access door opening upstream that helps ensure NEC clearance requirements and reduces footprint.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is ETL Listed as an assembly.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted.

Standard Supply Voltage (60 Hz):

- 208, 240 and 277V, single phase.
- 208, 480, (4 wire wye) and 600V three phase.

Options:

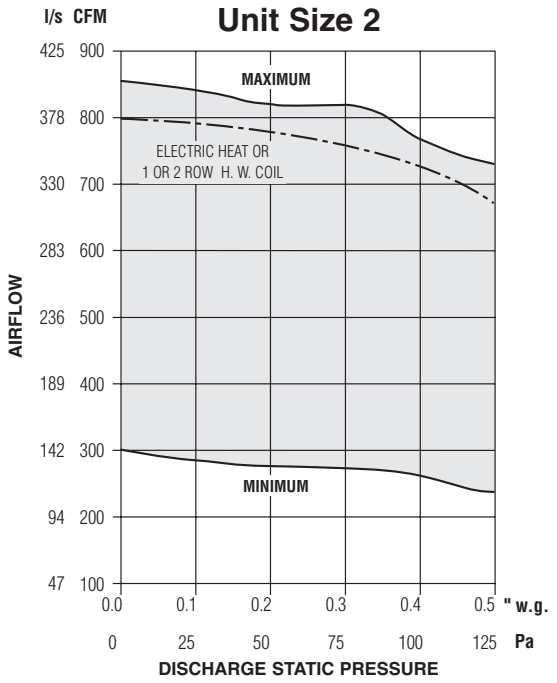
- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.

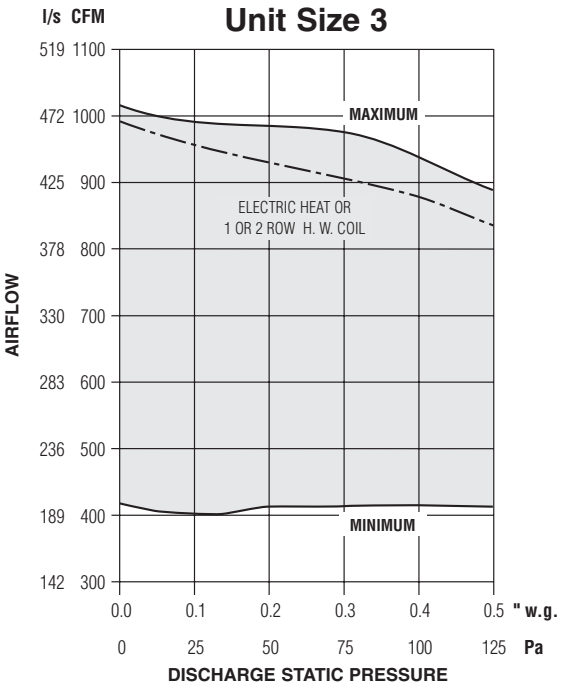


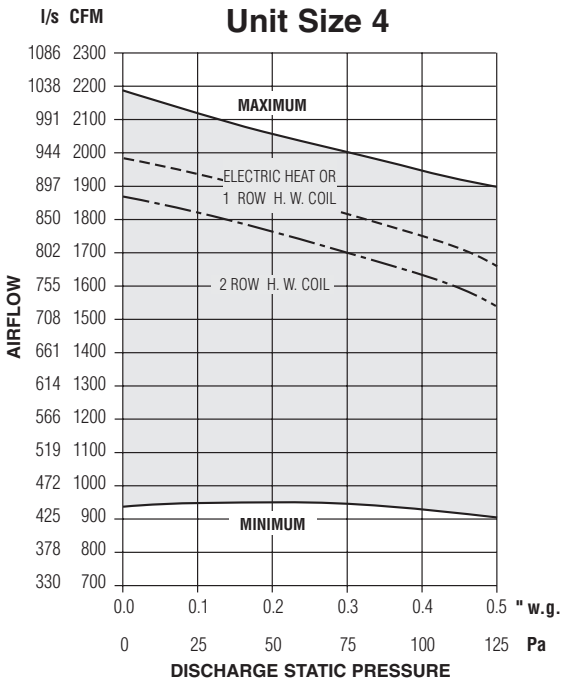
Unit Size	Imperial Units (inches)			Metric Units (mm)		
	Outlet Duct Size F x G	M	K	Outlet Duct Size F x G	M	K
4	23 5/8 x 8	46 1/2	34 3/8	600 x 203	1181	873

Performance Data

PSC Motor Fan Curves – Airflow vs. Downstream Static Pressure
37S Series • Low Profile Series Flow







Electrical Motor Data

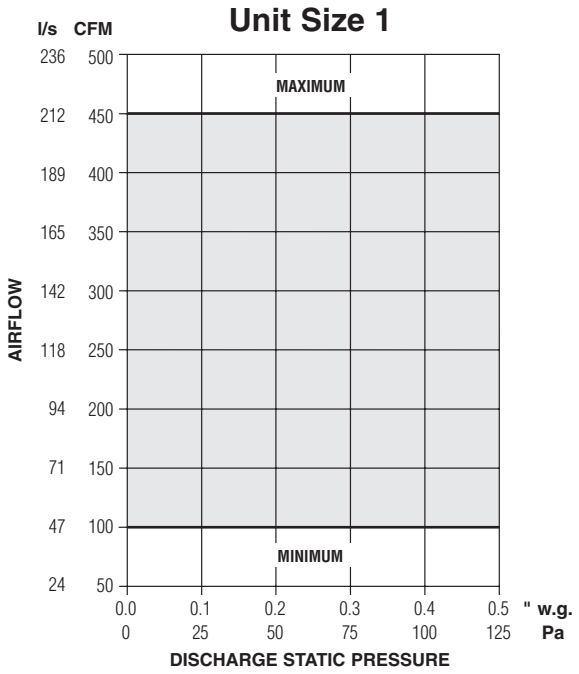
Unit Size	Motor H.P.	PSC Motor FLA		
		120/1/60	208/1/60	277/1/60
2	1/6	4.8	1.8	1.5
3	1/4	5.8	3.6	1.8
4	2@1/4	11.6	7.2	3.6

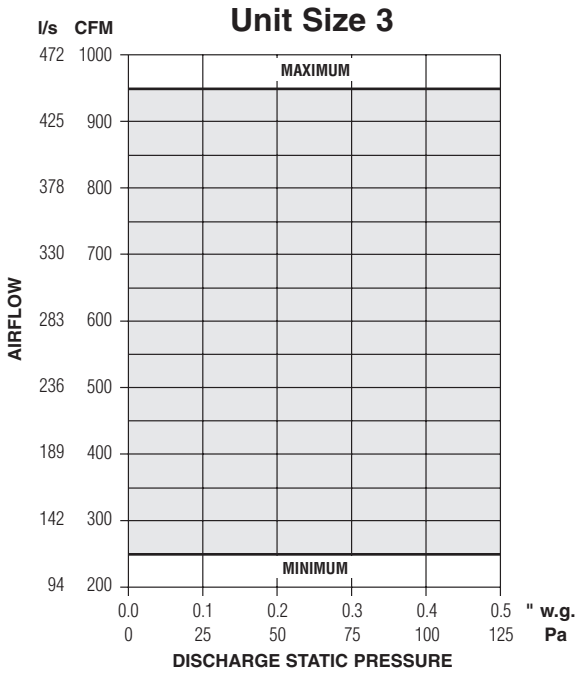
FLA = Full load amperage

- Fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase PSC motors.

Performance Data

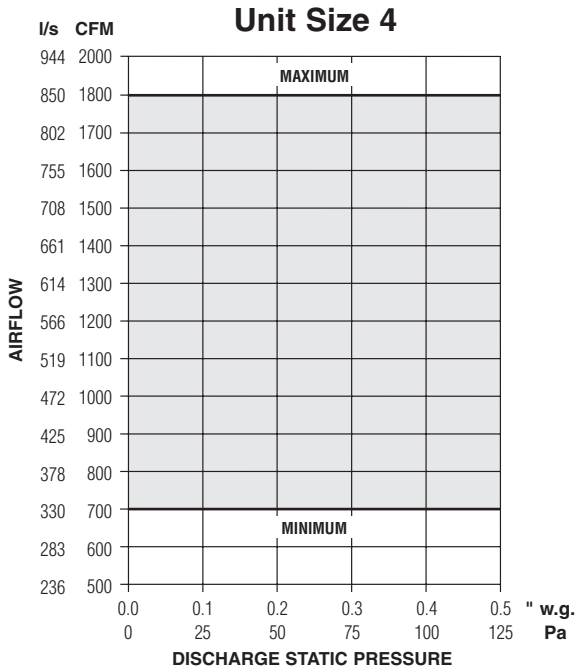
ECM Motor Option - Fan Curves – Airflow vs. Downstream Static Pressure
37S Series • Low Profile Series Flow





NOTES:

- The fan curves for the ECM motor are unlike those for traditional PSC motors. The ECM motor is constant volume at factory or field set point and airflow does not vary with changing static pressure conditions. The motor compensates for any changes in external static pressure or induced air conditions such as filter loading.
- Airflow can be set to operate on horizontal performance line at any point within shaded area using the solid state volume controller provided.
- Fan powered terminal 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 terminals equipped with PSC motors. A reduction in the number of different terminal 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 120/240 and 277 volt, single phase ECM motors. ECM motors, although DC in operation, include a built-in inverter.



Electrical Data

Unit Size	Motor H.P.	ECM Motor FLA	
		120/1/60	277/1/60
1	1/3	1.9	0.7
3	1/3	5.2	3.1
4	2@1/3	10.5	6.1

FLA = Full load amperage

Performance Data • NC Level Application Guide

37S Series • Series Flow • Low Profile

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min inlet ΔPs " w.g.	Min inlet ΔPs Pa	NC Levels @ Inlet pressure (ΔPs) shown											
						DISCHARGE						RADIATED					
						Fan Only	Min. ΔPs	0.5" w.g. (125 Pa)	1.0" w.g. (250 Pa)	1.5" w.g. (375 Pa)	2.0" w.g. (500 Pa)	Fan Only	Min. ΔPs	0.5" w.g. (125 Pa)	1.0" w.g. (250 Pa)	1.5" w.g. (375 Pa)	2.0" w.g. (500 Pa)
1	8	500	236	0.05	12	24	-	-	20	20	20	28	25	25	26	28	30
		350	165	0.05	12	-	-	-	-	-	-	23	21	22	23	25	26
		250	118	0.05	12	-	-	-	-	-	-	22	21	20	20	22	24
		200	94	0.05	12	-	-	-	-	-	-	20	21	21	22	23	22
2	8	700	330	0.08	20	25	23	23	24	25	23	30	30	30	33	35	35
		600	283	0.06	15	-	-	-	-	-	-	28	26	28	30	32	34
		500	236	0.05	12	-	-	-	-	-	-	25	25	25	28	30	32
		400	189	0.05	12	-	-	-	-	-	-	25	21	24	25	28	30
	10	800	378	0.06	15	28	27	27	28	25	28	32	33	33	34	35	36
		700	330	0.05	12	25	23	24	24	24	25	30	30	31	33	34	35
		550	260	0.05	12	-	-	-	-	-	-	25	25	26	24	30	33
		350	165	0.05	12	-	-	-	-	-	-	21	21	23	25	26	30
3	8	700	330	0.08	20	25	23	23	24	25	23	30	30	30	33	35	35
		600	283	0.06	15	-	-	-	-	-	-	28	26	28	30	32	34
		500	236	0.05	12	-	-	-	-	-	-	25	25	25	28	30	32
		400	189	0.05	12	-	-	-	-	-	-	25	21	24	25	28	30
	10	950	448	0.08	20	31	30	30	30	31	32	34	35	35	36	37	37
		800	378	0.06	15	28	27	27	28	25	28	32	33	33	34	35	36
		700	330	0.05	12	25	23	24	24	24	25	30	30	31	33	34	35
		550	260	0.05	12	-	-	-	-	-	-	25	25	26	24	30	33
		350	165	0.05	12	-	-	-	-	-	-	21	21	23	25	26	30
4	10	1100	519	0.12	30	20	-	20	20	20	22	34	30	32	35	36	38
		950	448	0.08	20	-	-	-	-	-	-	31	29	31	33	35	38
		800	378	0.06	16	-	-	-	-	-	-	29	27	30	31	35	37
	14 x 10	1900	897	0.28	70	32	32	33	35	35	35	43	43	44	44	45	45
		1600	755	0.19	47	27	28	30	30	31	30	40	39	40	41	43	43
		1350	637	0.14	35	23	22	24	26	27	27	37	35	36	38	40	39
		1100	519	0.09	22	-	-	20	23	25	25	35	34	35	36	36	38
		800	378	0.05	12	-	-	-	-	-	20	30	29	31	32	34	35

Performance Notes:

1. NC levels are calculated from the published raw data and based on procedures outlined in Appendix E, ARI 885-98.
2. 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. Min. inlet ΔPs is the minimum static pressure required to achieve rated airflow (damper full open).
5. Dash (–) in space denotes an NC level of less than 20.
6. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases.
7. For a complete explanation and details on NC calculations, refer to page D19 and the engineering section of this catalog.

Performance Data • Discharge Sound Power Levels

Model Series 37S • Low Profile Series Flow (Constant Volume)

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. inlet ΔPs " w.g.	Min. inlet ΔPs Pa	Fan Only 2	3	4	5	6	7	Fan and 100% Primary Air – Sound Power Octave Bands @ Inlet pressure shown: Minimum ΔPs 2	3	4	5	6	7	0.5" wg (125Pa)ΔPs 2	3	4	5	6	7	1.0" wg (250Pa)ΔPs 2	3	4	5	6	7	1.5" wg (375Pa)ΔPs 2	3	4	5	6	7	2.0" wg (500Pa)ΔPs 2	3	4	5	6	7
1	8	500	236	0.05	12	61	65	65	67	63	53	57	60	61	61	56	54	59	61	62	62	58	56	60	62	62	62	58	56	60	62	62	61	57	56	60	62	62	61	57	55
		350	165	0.05	12	54	58	61	60	56	53	49	51	54	52	47	42	51	52	55	53	47	43	52	54	55	52	48	43	52	55	55	52	48	43	53	56	56	53	48	43
		250	118	0.05	12	49	52	55	53	48	42	46	48	52	50	44	37	46	49	52	49	44	38	47	50	52	49	43	37	47	49	52	49	44	37	48	51	53	49	44	37
		200	94	0.05	12	47	50	53	50	45	39	45	48	51	48	42	35	46	48	50	47	41	35	46	49	50	47	41	34	46	49	51	47	41	34	46	49	51	47	41	35
2	8	700	330	0.08	20	61	65	64	64	60	58	60	64	63	63	59	57	61	65	64	63	60	58	62	65	64	63	60	58	62	65	65	64	60	58	62	64	64	63	59	57
		600	283	0.06	15	57	61	61	60	56	53	56	61	60	59	55	52	57	61	61	60	56	53	57	61	61	60	56	53	58	62	61	60	55	53	58	61	61	59	55	52
		500	236	0.05	12	53	57	58	56	52	48	52	57	57	56	51	48	53	57	58	56	52	48	53	57	58	56	52	48	55	58	58	56	51	48	55	58	58	56	51	47
		400	189	0.05	12	48	53	55	53	48	43	48	53	55	52	47	43	48	53	55	53	48	43	49	54	55	52	48	43	51	55	55	52	47	42	51	54	55	52	47	43
	10	800	378	0.06	15	65	70	68	68	64	62	65	69	67	67	63	62	65	69	67	67	64	63	65	69	68	68	64	63	65	67	67	67	64	42	66	70	68	68	64	63
		700	330	0.05	12	61	65	64	64	60	58	60	64	63	63	59	57	61	65	64	63	60	58	62	65	64	63	60	58	62	65	65	64	60	58	62	64	64	63	59	57
		550	260	0.05	12	55	59	60	58	54	51	54	59	59	57	53	50	55	59	59	58	54	51	55	59	59	58	54	50	57	60	60	58	53	50	56	59	60	57	53	50
		350	165	0.05	12	46	51	53	51	46	40	46	51	53	50	45	40	46	51	53	51	46	41	47	52	53	50	46	40	49	53	53	50	45	40	49	53	54	50	46	40
3	8	700	330	0.08	20	61	65	64	64	60	58	60	64	63	63	59	57	61	65	64	63	60	58	62	65	64	63	60	58	62	65	65	64	60	58	62	64	64	63	59	57
		600	283	0.06	15	57	61	61	60	56	53	56	61	60	59	55	52	57	61	61	60	56	53	57	61	61	60	56	53	58	62	61	60	55	53	58	61	61	59	55	52
		500	236	0.05	12	53	57	58	56	52	48	52	57	57	56	51	48	53	57	58	56	52	48	53	57	58	56	52	48	55	58	58	56	51	48	55	58	58	56	51	47
		400	189	0.05	12	48	53	55	53	48	43	48	53	55	52	47	43	48	53	55	53	48	43	49	54	55	52	48	43	51	55	55	52	47	42	51	54	55	52	47	43
	10	950	448	0.08	20	67	72	69	70	66	65	67	72	70	69	66	65	67	72	70	70	67	66	67	72	70	70	67	66	68	72	70	70	67	66	68	73	70	70	67	66
		800	378	0.06	15	65	70	68	68	64	62	65	69	67	67	63	62	65	69	67	67	64	63	65	69	68	68	64	63	65	67	67	67	64	42	66	70	68	68	64	63
		700	330	0.05	12	61	65	64	64	60	58	60	64	63	63	59	57	61	65	64	63	60	58	62	65	64	63	60	58	62	65	65	64	60	58	62	64	64	63	59	57
		550	260	0.05	12	55	59	60	58	54	51	54	59	59	57	53	50	55	59	59	58	54	51	55	59	59	58	54	50	57	60	60	58	53	50	56	59	60	57	53	50
		350	165	0.05	12	46	51	53	51	46	40	46	51	53	50	45	40	46	51	53	51	46	41	47	52	53	50	46	40	49	53	53	50	45	40	49	53	54	50	46	40
4	10	1100	519	0.12	30	58	61	63	62	58	56	58	61	62	60	56	54	61	63	64	62	58	56	61	64	64	63	59	57	62	62	65	63	60	57	62	65	66	64	60	58
		950	448	0.08	20	56	58	61	59	56	52	56	57	59	57	53	49	58	60	61	59	55	52	59	61	62	60	56	53	59	60	62	60	56	53	60	62	63	60	57	53
		800	378	0.06	15	53	56	59	57	53	48	54	53	57	54	50	44	56	57	59	57	52	48	57	58	60	57	53	49	57	58	60	57	53	49	58	59	60	57	53	49
	14	1900	897	0.28	70	69	73	71	71	68	59	69	73	71	71	68	67	69	73	72	71	69	67	70	75	73	73	70	68	71	75	74	73	71	69	71	75	74	74	72	70
		1600	755	0.19	47	66	69	68	68	65	63	66	70	68	68	65	63	66	71	70	69	66	64	67	71	70	70	67	65	68	72	71	71	69	67	68	71	71	71	69	67
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	10	1100	519	0.09	22	57	61	62	60	57	54	56	59	61	59	56	53	58	63	64	63	60	57	60	64	66	65	62	59	61	64	66	66	63	61	63	66	67	66	64	62
		800	378	0.05	12	50	55	58	55	50	45	50	55	57	53	49	44	53	57	60	58	54	50	56	60	62	60	57	53	56	60	62	60	57	55	57	61	62	61	58	57

ARI Certification Rating Points

Unit Size	Inlet Size	Fan cfm	Fan† Watts	Fan Only* 2	3	4	5	6	7
1	8	500	100	61	65	65	67	63	53
2	10	800	330	65	70	68	68	64	62
3	10	950	410	67	72	69	70	66	65
4	14 x 10	1900	700	69	73	71	71	68	59

ARI Standard 880

A Participating Corporation in the ARI 880 Certification program.

† PSC Motor Size 2,3,4. ECM Motor Size 1

* Primary air valve is closed and therefore primary cfm is zero.

Performance Notes:

1. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from terminal discharge to the room.
2. Discharge sound power is the noise emitted from the unit discharge into the downstream duct.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Standard 130-1996 and ARI Standard 880-98.

Performance Data • Radiated Sound Power Levels

Model Series 37S • Low Profile Series Flow (Constant Volume)

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. inlet ΔPs " w.g.	Min. inlet ΔPs Pa	Fan Only 2	3	4	5	6	7	Fan and 100% Primary Air – Sound Power Octave Bands @ Inlet pressure shown: Minimum ΔPs 2	3	4	5	6	7	0.5" wg (125Pa)ΔPs 2	3	4	5	6	7	1.0" wg (250Pa)ΔPs 2	3	4	5	6	7	1.5" wg (375Pa)ΔPs 2	3	4	5	6	7	2.0" wg (500Pa)ΔPs 2	3	4	5	6	7
1	8	500	236	0.05	12	64	55	53	52	45	37	58	50	50	47	38	30	59	52	51	49	44	41	60	55	52	51	50	51	61	57	54	53	53	56	61	58	55	54	55	59
		350	165	0.05	12	58	49	49	46	38	34	55	46	47	42	34	28	56	47	48	45	43	40	57	51	49	47	48	49	56	52	51	49	51	54	56	53	52	51	53	56
		250	118	0.05	12	57	47	48	44	35	30	54	45	47	41	33	27	54	46	46	43	41	36	55	47	47	44	46	45	54	46	48	47	49	50	55	49	50	49	51	54
		200	94	0.05	12	56	46	47	42	32	25	56	46	48	42	33	29	57	47	47	44	40	37	56	48	48	45	46	44	55	48	49	47	48	48	56	47	48	47	49	48
2	8	700	330	0.08	20	66	56	55	52	43	33	63	56	55	52	43	35	64	58	56	53	47	44	65	60	58	55	51	52	66	62	60	57	54	57	66	65	61	58	56	60
		600	283	0.06	15	63	53	53	50	40	30	60	53	52	49	39	25	61	55	54	50	45	43	62	58	56	53	50	51	63	60	58	55	52	56	63	63	59	56	55	59
		500	236	0.05	12	60	51	52	48	38	28	57	50	50	45	36	26	59	53	52	48	44	42	59	56	53	50	49	51	60	59	56	52	51	55	61	61	57	54	54	58
		400	189	0.05	12	57	49	50	46	36	25	54	47	48	42	33	26	56	50	49	45	42	41	57	54	51	48	48	50	58	57	54	50	49	54	59	58	56	52	54	57
	10	800	378	0.06	15	65	57	58	56	48	40	67	60	58	57	48	41	67	60	58	58	50	46	68	62	59	59	53	54	68	64	60	60	56	60	68	65	61	58	58	62
		700	330	0.05	12	61	54	55	53	44	36	62	55	55	54	44	37	63	58	57	55	48	45	65	59	58	56	53	54	65	60	59	58	55	59	65	63	61	59	57	62
		550	260	0.05	12	56	49	51	47	37	30	56	49	51	48	37	30	57	52	52	49	44	42	58	55	54	52	51	52	60	59	56	54	54	58	60	59	58	55	56	61
		350	165	0.05	12	51	46	48	43	33	26	51	46	48	43	33	27	52	48	48	45	43	41	53	52	50	48	50	51	53	53	52	50	53	55	54	54	54	53	55	59
3	8	700	330	0.08	20	66	56	55	52	43	33	63	56	55	52	43	35	64	58	56	53	47	44	65	60	58	55	51	52	66	62	60	57	54	57	66	65	61	58	56	60
		600	283	0.06	15	63	53	53	50	40	30	60	53	52	49	39	25	61	55	54	50	45	43	62	58	56	53	50	51	63	60	58	55	52	56	63	63	59	56	55	59
		500	236	0.05	12	60	51	52	48	38	28	57	50	50	45	36	26	59	53	52	48	44	42	59	56	53	50	49	51	60	59	56	52	51	55	61	61	57	54	54	58
		400	189	0.05	12	57	49	50	46	36	25	54	47	48	42	33	26	56	50	49	45	42	41	57	54	51	48	48	50	58	57	54	50	49	54	59	58	56	52	54	57
	10	950	448	0.08	20	66	61	59	58	51	43	70	64	60	60	52	45	70	64	60	60	53	49	70	65	61	61	55	55	71	66	62	62	57	60	71	67	63	63	58	63
		800	378	0.06	15	65	57	58	56	48	40	67	60	58	57	48	41	67	60	58	58	50	46	68	62	59	59	53	54	68	64	60	60	56	60	68	65	61	58	58	62
		700	330	0.05	12	61	54	55	53	44	36	62	55	55	54	44	37	63	58	57	55	48	45	65	59	58	56	53	54	65	60	59	58	55	59	65	63	61	59	57	62
		550	260	0.05	12	56	49	51	47	37	30	56	49	51	48	37	30	57	52	52	49	44	42	58	55	54	52	51	52	60	59	56	54	54	58	60	59	58	55	56	61
		350	165	0.05	12	51	46	48	43	33	26	51	46	48	43	33	27	52	48	48	45	43	41	53	52	50	48	50	51	53	53	52	50	53	55	54	54	54	53	55	59
4	10	1100	519	0.12	30	67	62	59	54	43	34	62	58	56	49	39	30	63	61	58	51	44	41	65	63	60	54	48	48	66	64	62	56	51	52	68	68	64	59	53	56
		950	448	0.08	20	63	59	57	51	40	30	58	56	54	48	37	27	61	59	56	50	42	39	62	62	58	52	46	46	65	64	60	54	50	52	67	67	63	56	53	55
		800	378	0.06	15	58	55	54	48	37	27	55	54	53	46	35	24	58	58	55	49	41	38	60	60	57	50	45	45	63	64	59	53	50	52	66	67	62	54	52	55
	14	1900	897	0.28	70	77	71	67	63	53	45	76	70	66	61	52	45	77	71	66	62	53	47	77	71	66	62	54	52	78	72	68	63	56	57	78	73	69	64	58	60
		1600	755	0.19	47	75	68	64	61	52	48	73	67	63	59	49	41	74	68	64	59	50	44	75	70	65	61	53	52	77	71	67	62	55	56	76	72	67	62	57	59
	x	1350	637	0.14	35	72	65	62	58	49	47	70	63	60	56	45	37	71	65	61	57	48	43	73	67	63	58	51	50	74	68	64	59	54	55	73	68	65	60	56	58
	10	1100	519	0.09	22	67	61	60	54	45	43	67	60	59	53	41	33	69	63	60	55	46	40	70	65	62	57	51	50	70	64	62	57	53	55	71	66	63	58	55	57
		800	378	0.05	12	59	55	55	50	43	43	59	55	54	48	39	30	61	57	56	51	45	40	62	59	57	53	49	49	63	61	58	54	51	53	64	61	59	55	55	57

ARI Certification Rating Points

Unit Size ΔPs	Inlet Size	Pri. cfm	Fan cfm	Fan† Watts	Min. ΔPs	Fan Only* 2	3	4	5	6	7	Fan and Primary cfm shown @ 1.5" w.g. 2	3	4	5	6	7
1	8	500	500	100	.05	64	55	53	52	45	37	61	57	54	53	53	56
2	10	800	800	330	.06	65	57	58	56	48	40	68	64	60	60	56	60
3	10	950	950	410	.08	66	61	59	58	51	43	71	66	62	62	57	60
4	14 x 10	1900	1900	700	.28	77	71	67	63	53	45	78	72	68	63	56	57

† PSC Motor Size 2,3,4. ECM Motor Size 1.

* Primary air valve is closed and therefore primary cfm is zero.

ARI PERFORMANCE CERTIFIED ARI Standard 880

A Participating Corporation in the ARI 880 Certification program.

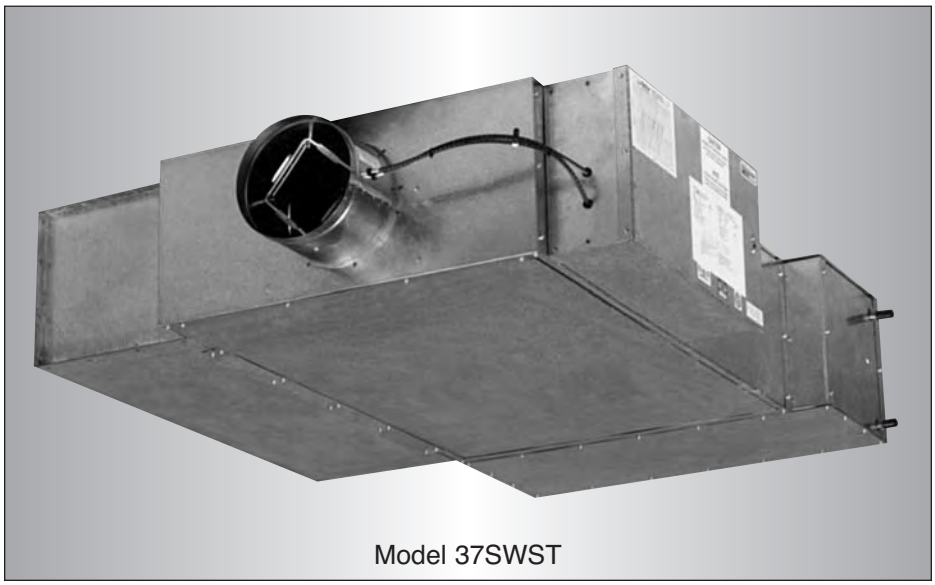
Performance Notes:

1. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from terminal discharge to the room.
2. Radiated sound power is the breakout noise transmitted through the unit casing walls.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Standard 130-1996 and ARI Standard 880-98 and certified to ARI.

SERIES FLOW CONSTANT VOLUME

37SST "STEALTH™" SERIES

- LOW PROFILE
- QUIET OPERATION



Model 37SWST

Models:

37SST	**No Heat**
37SEST	**Electric Heat**
37SWST	**Hot Water Heat**

The 37SST "Stealth™" Series are only 11" (279) high and have been especially designed for shallow ceiling plenum applications, which are common where zoning requirements limit building height and the architect wishes to maximize the number of floors as well as on some retrofit projects. Utilizing "Stealth™" design technology, this terminal has industry leading low sound levels.

FEATURES:

• 20 ga. (1.0) galvanized steel construction.

• 16 ga. (1.6) galvanized steel inclined opposed blade primary air damper. 45° rotation, CW to close. 1/2" (13) dia. plated steel drive shaft. An indicator mark on the end of the shaft shows damper-position. Leakage is less than 2% of nominal flow at 3" w.g. (750 Pa).

• "Stealth™" design technology provides significant reductions in radiated sound levels.

• Perforated baffle on primary air discharge optimizes mixing with induced air for rapid and effective temperature equalization. The baffle also converts low frequency primary air valve generated sound into more readily attenuated higher frequencies.

• Pressure independent primary airflow control.

• Multi-point averaging flow sensor.

• Terminal may be field installed either way up, providing the additional flexibility of right or left field connections.

• Access panels are full size on top and bottom of terminal for ease of maintenance and service.

• Energy efficient PSC fan motor with thermal overload protection.

• Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.

• Adjustable solid state fan speed controller with minimum voltage stop.

• Hinged door on fan controls enclosure.

• 1/2" (13), dual density insulation. Exposed edges coated to prevent air erosion. Meets requirements of NFPA 90A and UL 181.

• Available with electric or hot water supplementary heat.

• All controls are mounted on exterior of terminal providing ready access for field adjustment.

• Each terminal factory tested prior to shipment.

• Single point electrical and/or pneumatic main air connection.

• Discharge opening designed for flanged duct connection.

• Full primary air valve low voltage enclosure for factory mounted DDC and analog electronic controls.

Controls:

• Pneumatic and analog electronic controls. Factory supplied, mounted and calibrated.

• Digital controls. Factory mounting and wiring of DDC controls supplied by BMS Controls Contractor.

Options and Accessories:

• EPIC™/ECM Motor.

• Primary air valve controls enclosure for field mounted controls.

• Induced air filter, 1" (25) thick, disposable type.

• Toggle disconnect switch (except units with electric heat, when disconnect is an electric heat option and includes fan).

• Various 'IAQ' linings are available.

• Fan airflow or P.E. switch for night shutdown (pneumatic controls).

• Fan airflow switch for night shutdown (analog electronic controls).

• Night setback fan/heat cycle (pneumatic and analog).

• Fan unit fusing.

• Hanger brackets.

• FN2 90° Line Voltage controls enclosure on model 37SST and 37SWST (standard on 37SEST).

ARI PERFORMANCE CERTIFIED
ARI Standard 880
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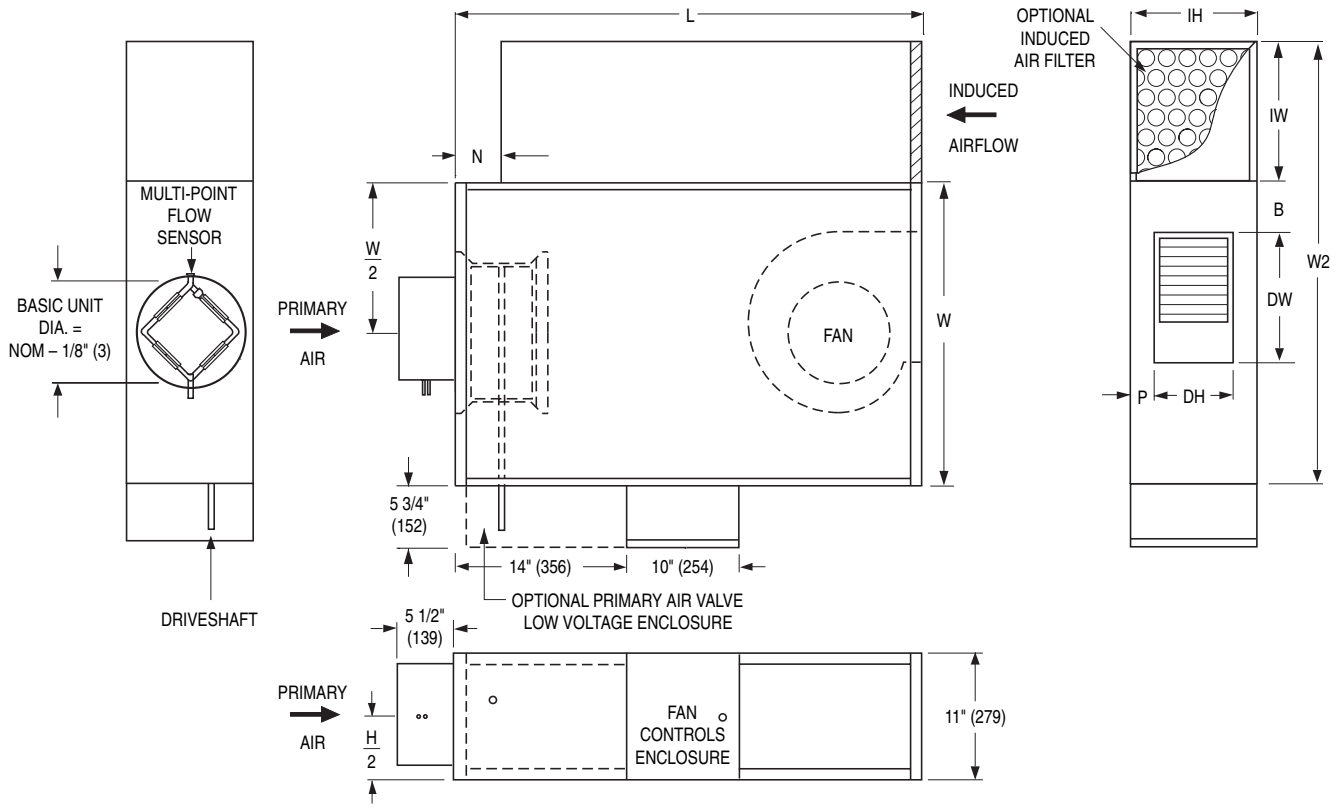
INTERTEK ETL LISTED C US

Dimensions

Model Series 37SST "Stealth™" • Low Profile • Unit Sizes 1 – 3

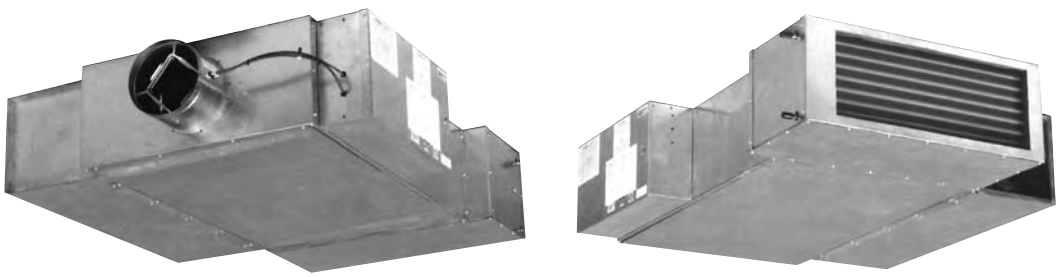


Dimensional Data. Imperial Units (inches)

Unit Size	Inlet Size	W	W2	L	B	N	P	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	4, 5, 6, 8	19	28	36	2	7	2 1/16	9 x 11	10 1/4 x 6 7/8	9 x 11
2, 3	6, 8,10	26 1/2	42 1/2	40 1/4	4 3/8	6 1/4	1 1/2	12 x 11	12 1/4 x 8	12 x 11

Dimensional Data. Metric Units (mm)

Unit Size	Inlet Size	W	W2	L	B	N	P	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
1	102, 127, 152, 203	483	711	914	51	178	52	229 x 279	260 x 175	229 x 279
2, 3	152, 203, 254	673	1080	1022	111	159	38	305 x 279	311 x 263	305 x 279



Model 37SWST

ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

Dimensions

Model Series 37SST "Stealth™" • Low Profile • Unit Sizes 1 – 3

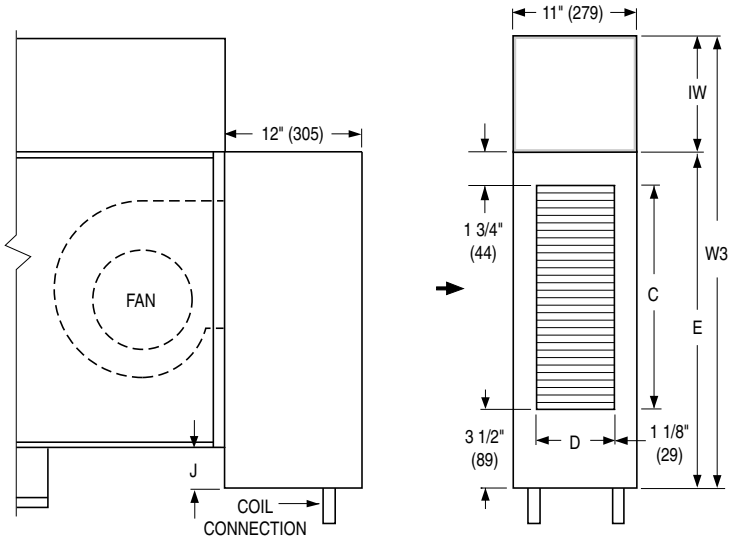
Hot Water Coil Section

Model 37SWST

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 1/2" (13) or 7/8" (22) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size C x D	W3	E	J	Outlet Duct Size C x D	W3	E	J
1	14 3/4 x 8 3/4	29	20	1	375 x 222	737	508	25
2, 3	23 7/8 x 8 3/4	45 1/8	29 1/8	2 5/8	606 x 222	146	740	73

Electric Coil Section

Model 37SEST

Standard Features:

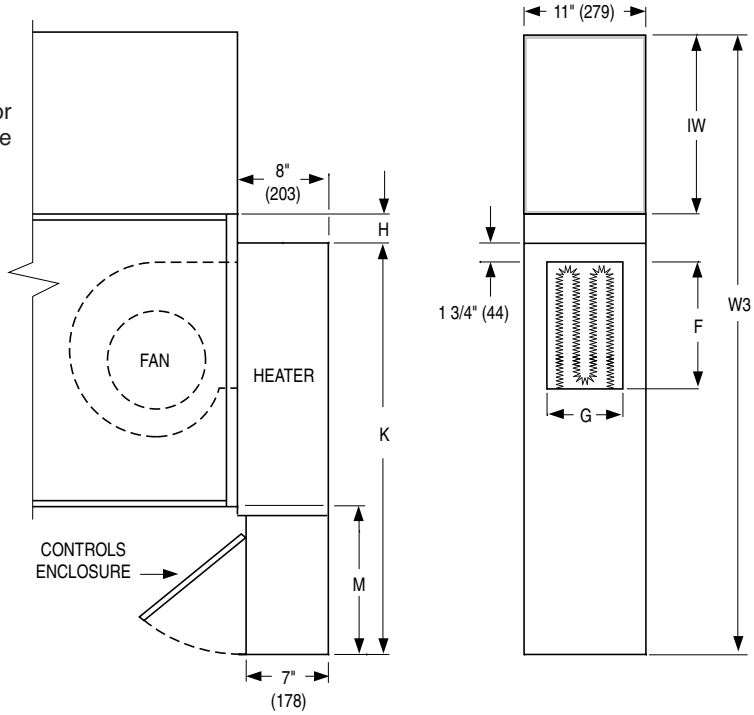
- Controls enclosure incorporates a hinged access door opening upstream that helps ensure NEC clearance requirements and reduces footprint.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is ETL Listed as an assembly.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted.

Standard Supply Voltage (60 Hz):

- 208, 240 and 277V single phase.
- 208, 480 (4 wire wye) and 600V three phase.

Options:

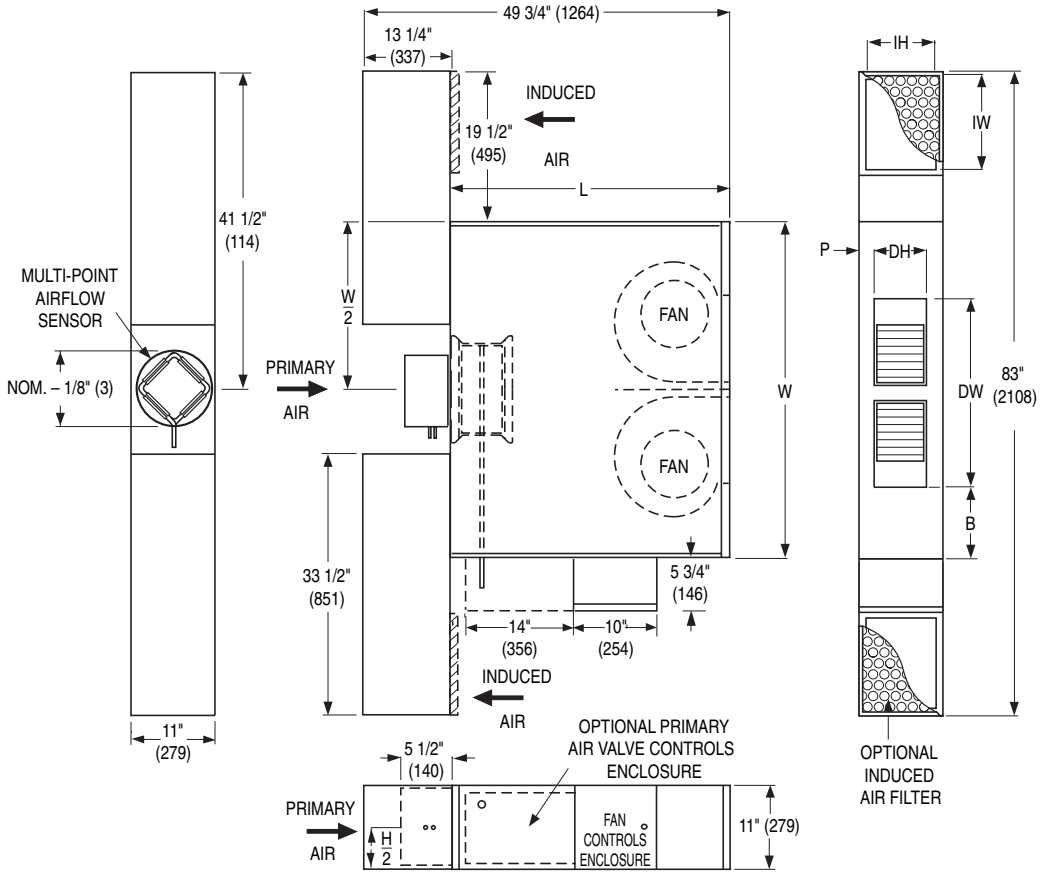
- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.



Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size F x G	W3	H	M	K	Outlet Duct Size F x G	W3	H	M	K
1	10 1/4 x 8	44 1/8	1/2	16 1/8	34 5/8	260 x 203	1121	12	410	879
2, 3	12 1/4 x 8	59 1/2	3 1/2	17	40	311 x 203	1511	89	432	1016

Dimensions

Model Series 37SST "Stealth™" • Low Profile • Unit Size 4



Dimensional Data. Imperial Units (inches)

Unit Size	Inlet Size	W	L	B	P	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
4	10 Rnd. 14 x 10 Rect.	44	36 1/2	9 5/8	1 1/2	12 x 9 (2)	26 1/2 x 8	14 x 10 (2)

Dimensional Data. Metric Units (mm)

Unit Size	Inlet Size	W	L	B	P	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
4	254 Rnd. 356 x 254 Rect.	1118	927	244	38	305 x 229 (2)	699 x 203	356 x 254 (2)

Dimensions

Model Series 37SST "Stealth™" • Low Profile • Unit Size 4

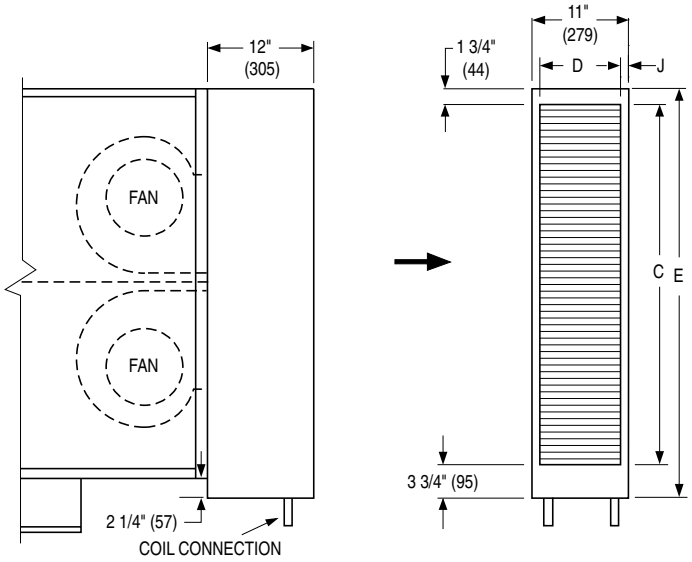
Hot Water Coil Section

Model 37SWST

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 1/2" (13) or 7/8" (22) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)			Metric Units (mm)		
	Outlet Duct Size C x D	E	J	Outlet Duct Size C x D	E	J
4	40 3/4 x 9	46 1/4	1	1035 x 229	1175	25

Electric Coil Section

Model 37SEST

Standard Features:

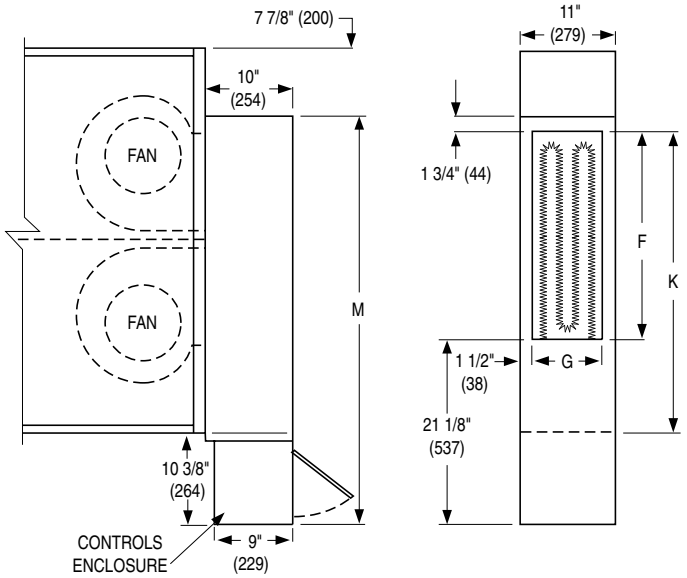
- Controls enclosure incorporates a hinged access door opening downstream that helps ensure NEC clearance requirements and reduces footprint.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is ETL Listed as an assembly.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are inverted.

Standard Supply Voltage (60 Hz):

- 208, 240 and 277V single phase.
- 208, 480 (4 wire wye) and 600V three phase.

Options:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.



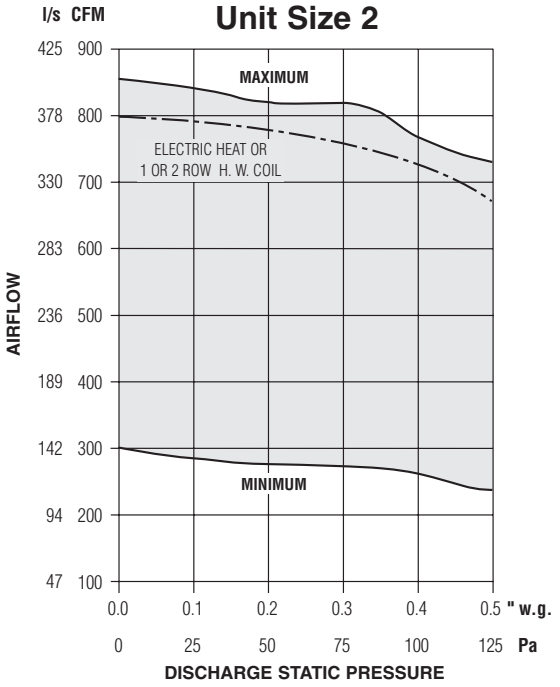
Unit Size	Imperial Units (inches)			Metric Units (mm)		
	Outlet Duct Size F x G	M	K	Outlet Duct Size F x G	M	K
4	23 5/8 x 8	46 1/2	34 3/8	600 x 203	1181	873

Performance Data

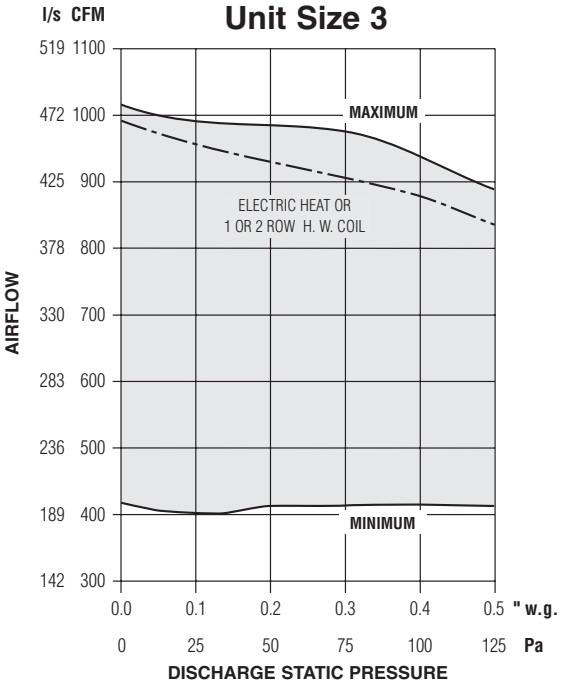
PSC Motor Fan Curves – Airflow vs. Downstream Static Pressure

37SST "Stealth™" Series • Low Profile Series Flow

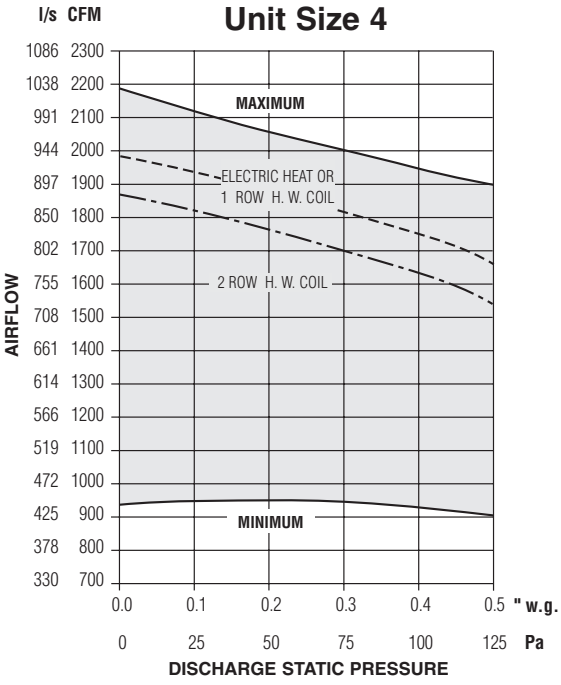
Unit Size 2



Unit Size 3



Unit Size 4



Electrical Motor Data

Unit Size	Motor H.P.	PSC Motor FLA		
		120/1/60	208/1/60	277/1/60
2	1/6	4.8	1.8	1.5
3	1/4	5.8	3.6	1.8
4	2@1/4	11.6	7.2	3.6

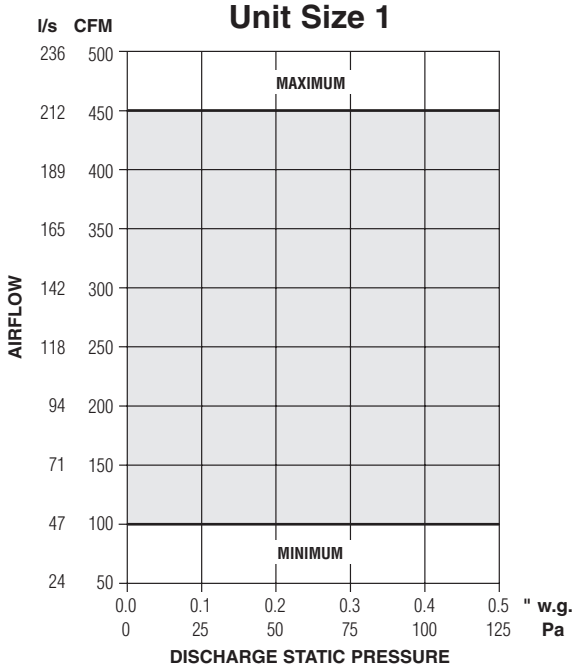
FLA = Full load amperage

- Fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase PSC motors.

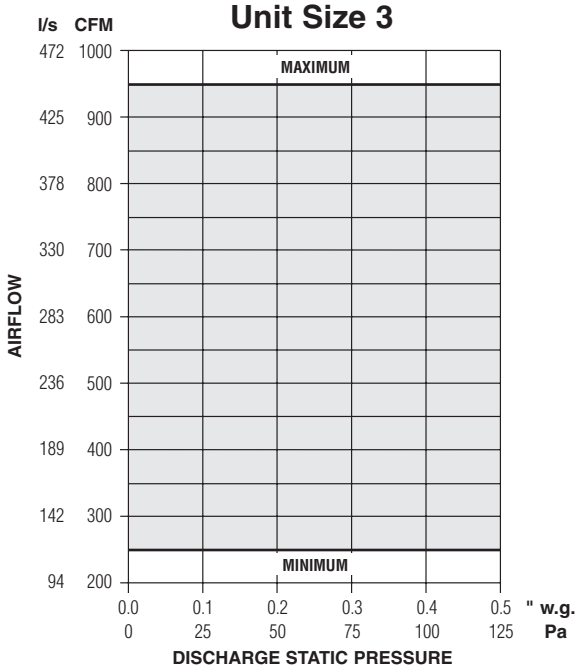
Performance Data

ECM Motor OptionFan Curves – Airflow vs. Downstream Static Pressure
37SST "Stealth™" Series • Low Profile Series Flow

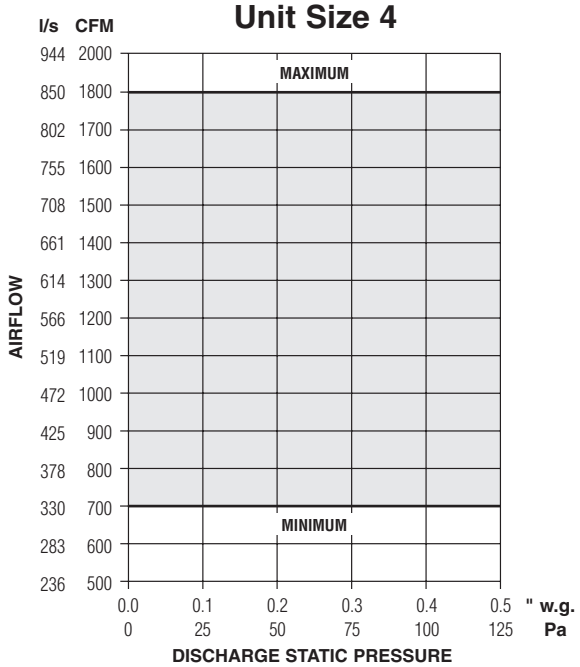
Unit Size 1



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 constant volume at factory or field set point and airflow does not vary with changing static pressure conditions. The motor compensates for any changes in external static pressure or induced air conditions such as filter loading.
- Airflow can be set to operate on horizontal performance line at any point within shaded area using the solid state volume controller provided.
- Fan powered terminal 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 terminals equipped with PSC motors. A reduction in the number of different terminal 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 120/240 and 277 volt, single phase ECM motors. ECM motors, although DC in operation, include a built-in inverter.

Electrical Data

Unit Size	Motor H.P.	ECM Motor FLA	
		120/1/60	277/1/60
1	1/3	1.9	0.7
3	1/3	5.2	3.1
4	2@1/3	10.5	6.1

FLA = Full load amperage

Performance Data • NC Level Application Guide

37SST "Stealth™" Series • Low Profile

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min inlet ΔPs " w.g.	Min inlet ΔPs Pa	NC Levels @ Inlet pressure (ΔPs) shown											
						DISCHARGE						RADIATED					
						Fan Only	Min. ΔPs	0.5" w.g. (125 Pa)	1.0" w.g. (250 Pa)	1.5" w.g. (375 Pa)	2.0" w.g. (500 Pa)	Fan Only	Min. ΔPs	0.5" w.g. (125 Pa)	1.0" w.g. (250 Pa)	1.5" w.g. (375 Pa)	2.0" w.g. (500 Pa)
1	8	500	236	0.05	12	24	-	-	20	20	20	25	-	20	23	26	28
		350	165	0.05	12	-	-	-	-	-	-		-	-	-	21	21
		250	118	0.05	12	-	-	-	-	-	-	-	-	-	-	-	-
		200	94	0.05	12	-	-	-	-	-	-	-	-	-	-	-	-
2	8	700	330	0.08	20	25	23	23	24	25	23	23	24	25	27	28	32
		600	283	0.06	15	-	-	-	-	-	-	20	20	21	25	26	30
		500	236	0.05	12	-	-	-	-	-	-	-	-	-	23	25	27
		400	189	0.05	12	-	-	-	-	-	-	-	-	-	20	24	25
	10	800	378	0.06	15	28	27	27	28	25	28	30	29	30	31	30	30
		700	330	0.05	12	25	23	24	24	24	25	25	26	25	27	29	29
		550	260	0.05	12	-	-	-	-	-	-	-	-	20	22	24	25
		350	165	0.05	12	-	-	-	-	-	-	-	-	-	-	20	22
3	8	700	330	0.08	20	25	23	23	24	25	23	23	24	25	27	28	32
		600	283	0.06	15	-	-	-	-	-	-	20	20	21	25	26	30
		500	236	0.05	12	-	-	-	-	-	-	-	-	-	23	25	27
		400	189	0.05	12	-	-	-	-	-	-	-	-	-	20	24	25
	10	950	448	0.05	12	31	30	30	30	31	32	33	32	33	34	33	34
		800	378	0.06	15	28	27	27	28	25	28	30	29	30	31	30	30
		700	330	0.05	12	25	23	24	24	24	25	25	26	25	27	29	29
		550	260	0.05	12	-	-	-	-	-	-	-	-	20	22	24	25
		350	165	0.05	12	-	-	-	-	-	-	-	-	-	-	20	22
4	10	1100	519	0.12	30	20	-	20	20	20	22	23	21	25	28	29	34
		950	448	0.08	20	-	-	-	-	-	-	21	-	22	25	28	31
		800	378	0.06	16	-	-	-	-	-	-	-	-	20	24	28	29
	14 x 10	1900	897	0.05	12	32	32	33	35	35	35	42	42	43	44	44	45
		1600	755	0.19	47	27	28	30	30	31	30	37	35	37	39	40	41
		1350	637	0.14	35	23	22	24	26	27	27	31	31	33	35	39	38
		1100	519	0.09	22	-	-	20	23	25	25	25	25	30	33	32	33
		800	378	0.05	12	-	-	-	-	-	20	20	-	20	23	25	25

Performance Notes:

1. NC levels are calculated from the published raw data and based on procedures outlined in Appendix E, ARI 885-98.
2. 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. Min. inlet ΔPs is the minimum static pressure required to achieve rated airflow (damper full open).
5. Dash (–) in space denotes an NC level of less than 20.
6. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases.
7. For a complete explanation and details on NC calculations, refer to page D19 and the engineering section of this catalog.

Performance Data • Discharge Sound Power Levels

Model Series 37SST "Stealth™" • Low Profile Series Flow (Constant Volume)

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. inlet ΔPs " w.g.	Min. inlet ΔPs Pa	Fan Only 2	3	4	5	6	7	Fan and 100% Primary Air – Sound Power Octave Bands @ Inlet pressure shown: Minimum ΔPs 2	3	4	5	6	7	0.5" wg (125Pa)ΔPs 2	3	4	5	6	7	1.0" wg (250Pa)ΔPs 2	3	4	5	6	7	1.5" wg (375Pa)ΔPs 2	3	4	5	6	7	2.0" wg (500Pa)ΔPs 2	3	4	5	6	7
1	8	500	236	0.05	12	61	65	65	67	63	53	57	60	61	61	56	54	59	61	62	62	58	56	60	62	62	62	58	56	60	62	62	61	57	56	60	62	62	61	57	55
		350	165	0.05	12	54	58	61	60	56	53	49	51	54	52	47	42	51	52	55	53	47	43	52	54	55	52	48	43	52	55	55	52	48	43	53	56	56	53	48	43
		250	118	0.05	12	49	52	55	53	48	42	46	48	52	50	44	37	46	49	52	49	44	38	47	50	52	49	43	37	47	49	52	49	44	37	48	51	53	49	44	37
		200	94	0.05	12	47	50	53	50	45	39	45	48	51	48	42	35	46	48	50	47	41	35	46	49	50	47	41	34	46	49	51	47	41	34	46	49	51	47	41	35
2	8	700	330	0.08	20	61	65	64	64	60	58	60	64	63	63	59	57	61	65	64	63	60	58	62	65	64	63	60	58	62	65	65	64	60	58	62	64	64	63	59	57
		600	283	0.06	15	57	61	61	60	56	53	56	61	60	59	55	52	57	61	61	60	56	53	57	61	61	60	56	53	58	62	61	60	55	53	58	61	61	59	55	52
		500	236	0.05	12	53	57	58	56	52	48	52	57	57	56	51	48	53	57	58	56	52	48	53	57	58	56	52	48	55	58	58	56	51	48	55	58	58	56	51	47
		400	189	0.05	12	48	53	55	53	48	43	48	53	55	52	47	43	48	53	55	53	48	43	49	54	55	52	48	43	51	55	55	52	47	42	51	54	55	52	47	43
	10	800	378	0.06	15	65	70	68	68	64	62	65	69	67	67	63	62	65	69	67	67	64	63	65	69	68	68	64	63	65	67	67	67	64	42	66	70	68	68	64	63
		700	330	0.05	12	61	65	64	64	60	58	60	64	63	63	59	57	61	65	64	63	60	58	62	65	64	63	60	58	62	65	65	64	60	58	62	64	64	63	59	57
		550	260	0.05	12	55	59	60	58	54	51	54	59	59	57	53	50	55	59	59	58	54	51	55	59	59	58	54	50	57	60	60	58	53	50	56	59	60	57	53	50
		350	165	0.05	12	46	51	53	51	46	40	46	51	53	50	45	40	46	51	53	51	46	41	47	52	53	50	46	40	49	53	53	50	45	40	49	53	54	50	46	40
3	8	700	330	0.08	20	61	65	64	64	60	58	60	64	63	63	59	57	61	65	64	63	60	58	62	65	64	63	60	58	62	65	65	64	60	58	62	64	64	63	59	57
		600	283	0.06	15	57	61	61	60	56	53	56	61	60	59	55	52	57	61	61	60	56	53	57	61	61	60	56	53	58	62	61	60	55	53	58	61	61	59	55	52
		500	236	0.05	12	53	57	58	56	52	48	52	57	57	56	51	48	53	57	58	56	52	48	53	57	58	56	52	48	55	58	58	56	51	48	55	58	58	56	51	47
		400	189	0.05	12	48	53	55	53	48	43	48	53	55	52	47	43	48	53	55	53	48	43	49	54	55	52	48	43	51	55	55	52	47	42	51	54	55	52	47	43
	10	950	448	0.08	12	67	72	69	70	66	65	67	72	70	69	66	65	67	72	70	70	67	66	67	72	70	70	67	66	68	72	70	70	67	66	68	73	70	70	67	66
		800	378	0.06	15	65	70	68	68	64	62	65	69	67	67	63	62	65	69	67	67	64	63	65	69	68	68	64	63	65	67	67	67	64	42	66	70	68	68	64	63
		700	330	0.05	12	61	65	64	64	60	58	60	64	63	63	59	57	61	65	64	63	60	58	62	65	64	63	60	58	62	65	65	64	60	58	62	64	64	63	59	57
		550	260	0.05	12	55	59	60	58	54	51	54	59	59	57	53	50	55	59	59	58	54	51	55	59	59	58	54	50	57	60	60	58	53	50	56	59	60	57	53	50
		350	165	0.05	12	46	51	53	51	46	40	46	51	53	50	45	40	46	51	53	51	46	41	47	52	53	50	46	40	49	53	53	50	45	40	49	53	54	50	46	40
4	10	1100	519	0.12	30	58	61	63	62	58	56	58	61	62	60	56	54	61	63	64	62	58	56	61	64	64	63	59	57	62	62	65	63	60	57	62	65	66	64	60	58
		950	448	0.08	20	56	58	61	59	56	52	56	57	59	57	53	49	58	60	61	59	55	52	59	61	62	60	56	53	59	60	62	60	56	53	60	62	63	60	57	53
		800	378	0.06	15	53	56	59	57	53	48	54	53	57	54	50	44	56	57	59	57	52	48	57	58	60	57	53	49	57	58	60	57	53	49	58	59	60	57	53	49
	14	1900	897	0.28	12	69	73	71	71	68	59	69	73	71	71	68	67	69	73	72	71	69	67	70	75	73	73	70	68	71	75	74	73	71	69	71	75	74	74	72	70
	X	1600	755	0.19	47	66	69	68	68	65	63	66	70	68	68	65	63	66	71	70	69	66	64	67	71	70	70	67	65	68	72	71	71	69	67	68	71	71	71	69	67
	10	1350	637	0.14	35	62	65	65	64	61	59	60	64	65	63	60	59	59	64	66	64	62	60	62	67	67	67	64	62	64	67	68	68	65	63	65	68	69	68	66	64
		1100	519	0.09	22	57	61	62	60	57	54	56	59	61	59	56	53	58	63	64	63	60	57	60	64	66	65	62	59	61	64	66	66	63	61	63	66	67	66	64	62
		800	378	0.05	12	50	55	58	55	50	45	50	55	57	53	49	44	53	57	60	58	54	50	56	60	62	60	57	53	56	60	62	60	57	55	57	61	62	61	58	57

ARI Certification Rating Points

Unit Size	Inlet Size	Fan cfm	Fan† Watts	Fan Only 2	3	4	5	6	7
1	8	500	100	61	65	65	67	63	53
2	10	800	330	65	70	68	68	64	62
3	10	950	410	67	72	69	70	66	65
4	14 x 10	1900	700	69	73	71	71	68	59

ARI Standard 880

A Participating Corporation in the ARI 880 Certification program.

† PSC Motor Size 2,3,4. ECM Motor Size 1

* Primary air valve is closed and therefore primary cfm is zero.

Performance Notes:

1. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from terminal discharge to the room.
2. Discharge sound power is the noise emitted from the unit discharge into the downstream duct.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Standard 130-1996 and ARI Standard 880-98.

Performance Data • Radiated Sound Power Levels

Model Series 37SST "Stealth™" • Low Profile Series Flow (Constant Volume)

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. inlet ΔPs " w.g.	Min. inlet ΔPs Pa	Fan Only 2	3	4	5	6	7	Fan and 100% Primary Air – Sound Power Octave Bands @ Inlet pressure shown: Minimum ΔPs 2	3	4	5	6	7	0.5" wg (125Pa)ΔPs 2	3	4	5	6	7	1.0" wg (250Pa)ΔPs 2	3	4	5	6	7	1.5" wg (375Pa)ΔPs 2	3	4	5	6	7	2.0" wg (500Pa)ΔPs 2	3	4	5	6	7
1	8	500	236	0.05	12	58	56	49	44	37	33	52	49	45	39	32	29	54	52	47	41	34	31	56	55	48	43	37	36	58	58	49	44	39	41	58	59	50	45	40	42
		350	165	0.05	12	52	50	45	39	32	29	46	43	40	34	29	23	49	47	41	35	31	29	52	51	43	38	34	34	53	53	45	41	37	38	52	54	46	42	38	40
		250	118	0.05	12	50	47	42	36	31	30	45	42	40	33	29	24	47	44	40	34	30	27	48	47	41	36	32	32	48	46	43	38	35	36	48	49	44	41	37	38
		200	94	0.05	12	48	45	41	34	30	30	47	43	41	34	30	26	48	45	40	34	30	27	48	46	40	35	32	32	49	46	42	38	34	35	49	46	42	38	36	37
2	8	700	330	0.08	20	59	54	50	43	36	33	57	53	50	43	35	32	58	55	50	44	37	34	59	58	52	46	38	37	61	59	53	47	40	41	62	62	54	48	41	44
		600	283	0.06	15	55	51	47	40	33	30	54	50	47	40	33	29	55	52	48	42	35	32	58	56	49	44	37	36	59	57	51	45	39	40	60	60	52	47	40	43
		500	236	0.05	12	52	48	44	38	31	27	50	46	44	37	31	27	52	50	45	39	33	31	56	54	47	42	35	36	57	56	49	43	37	39	58	58	51	45	39	42
		400	189	0.05	12	48	45	42	35	29	24	47	43	41	34	29	24	50	47	42	36	31	29	54	52	45	39	34	35	55	55	47	42	36	38	56	56	49	43	38	42
	10	800	378	0.06	15	66	59	53	47	40	34	65	58	53	48	40	35	66	59	53	48	40	36	67	60	54	49	41	39	66	60	55	50	42	42	66	61	56	51	43	46
		700	330	0.05	12	62	55	51	44	36	31	62	56	53	45	37	32	62	56	52	46	37	33	62	57	53	47	39	38	63	57	55	49	40	42	63	58	55	49	40	42
		550	260	0.05	12	56	49	45	39	31	26	55	48	46	39	30	27	55	50	46	40	32	30	58	53	48	44	36	36	59	55	50	46	38	41	60	56	52	47	40	44
		350	165	0.05	12	50	44	42	34	27	23	49	43	42	34	27	25	50	44	42	35	29	28	51	47	44	39	33	34	52	49	46	45	36	39	53	41	48	44	38	42
3	8	700	330	0.08	20	59	54	50	43	36	33	57	53	50	43	35	32	58	55	50	44	37	34	59	58	52	46	38	37	61	59	53	47	40	41	62	62	54	48	41	44
		600	283	0.06	15	55	51	47	40	33	30	54	50	47	40	33	29	55	52	48	42	35	32	58	56	49	44	37	36	59	57	51	45	39	40	60	60	52	47	40	43
		500	236	0.05	12	52	48	44	38	31	27	50	46	44	37	31	27	52	50	45	39	33	31	56	54	47	42	35	36	57	56	49	43	37	39	58	58	51	45	39	42
		400	189	0.05	12	48	45	42	35	29	24	47	43	41	34	29	24	50	47	42	36	31	29	54	52	45	39	34	35	55	55	47	42	36	38	56	56	49	43	38	42
	10	950	448	0.08	12	68	62	56	50	44	38	68	60	56	50	42	37	68	61	57	50	43	38	69	62	58	51	44	41	69	62	58	52	44	43	69	63	59	54	45	46
		800	378	0.06	15	66	59	53	47	40	34	65	58	53	48	40	35	66	59	53	48	40	36	67	60	54	49	41	39	66	60	55	50	42	42	66	61	56	51	43	46
		700	330	0.05	12	62	55	51	44	36	31	62	56	53	45	37	32	62	56	52	46	37	33	62	57	53	47	39	38	63	57	55	49	40	42	63	58	55	49	40	42
		550	260	0.05	12	56	49	45	39	31	26	55	48	46	39	30	27	55	50	46	40	32	30	58	53	48	44	36	36	59	55	50	46	38	41	60	56	52	47	40	44
		350	165	0.05	12	50	44	42	34	27	23	49	43	42	34	27	25	50	44	42	35	29	28	51	47	44	39	33	34	52	49	46	45	36	39	53	41	48	44	38	42
4		1100	519	0.12	30	59	55	49	43	33	29	58	52	48	40	31	27	60	56	49	42	33	30	63	58	51	45	36	34	65	59	53	47	38	38	67	63	55	49	40	41
	10	950	448	0.08	20	56	52	47	40	31	26	55	50	45	37	29	25	58	54	47	40	32	29	61	57	49	42	34	33	64	58	52	45	37	37	65	61	53	46	38	40
		800	378	0.06	15	54	50	45	38	29	23	52	48	43	35	27	22	56	52	46	38	30	28	59	55	48	40	33	32	62	58	50	42	36	36	64	59	52	43	37	39
		1900	897	0.28	12	76	68	59	53	52	46	76	67	58	52	49	44	76	67	59	53	49	44	77	68	60	53	50	45	77	69	60	54	51	47	77	70	61	55	52	50
	14	1600	755	0.19	47	72	64	56	50	47	40	71	62	54	47	43	37	71	64	56	49	45	39	73	65	57	50	46	42	74	66	58	51	48	45	75	67	59	52	50	48
	X	1350	637	0.14	35	67	59	53	47	44	36	67	58	51	45	40	33	68	61	53	46	42	35	71	63	55	48	45	40	73	64	56	49	47	45	72	64	57	50	49	48
	10	1100	519	0.09	22	63	55	50	43	38	31	63	54	48	40	36	29	66	57	50	43	39	32	68	59	52	45	42	39	68	58	53	46	45	44	68	61	54	48	48	48
		800	378	0.05	12	56	51	46	41	37	29	55	48	44	38	35	27	59	52	46	41	38	31	61	54	48	43	41	38	62	55	49	44	45	43	63	56	52	46	47	47

ARI Certification Rating Points

Unit Size	Inlet Size	Pri. cfm	Fan cfm	Fan† Watts	Min. ΔPs	Fan Only* 2	3	4	5	6	7	Fan and Primary cfm shown @ 1.5" w.g. ΔPs 2	3	4	5	6	7
1	8	500	500	60	.05	58	56	49	44	37	33	58	58	49	44	39	41
2	10	800	800	330	.06	66	59	53	47	40	34	66	60	55	50	42	42
3	10	950	950	410	.05	68	62	56	50	44	38	69	62	58	52	44	43
4	14 X 10	1900	1900	700	.05	76	68	59	53	52	46	77	69	60	54	51	47

† PSC Motor Size 2,3,4. ECM Motor Size 1

* Primary air valve is closed and therefore primary cfm is zero.

ARI PERFORMANCE CERTIFIED
ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

Performance Notes:

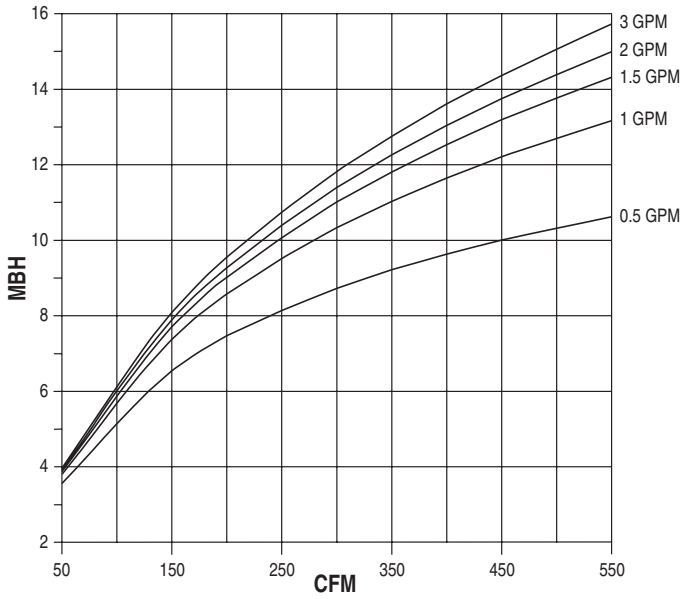
1. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases. It is the difference (ΔPs) in static pressure from terminal discharge to the room.
2. Radiated sound power is the breakout noise transmitted through the unit casing walls.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Standard 130-1996 and ARI Standard 880-98 and certified to ARI.

Performance Data • Hot Water Coil

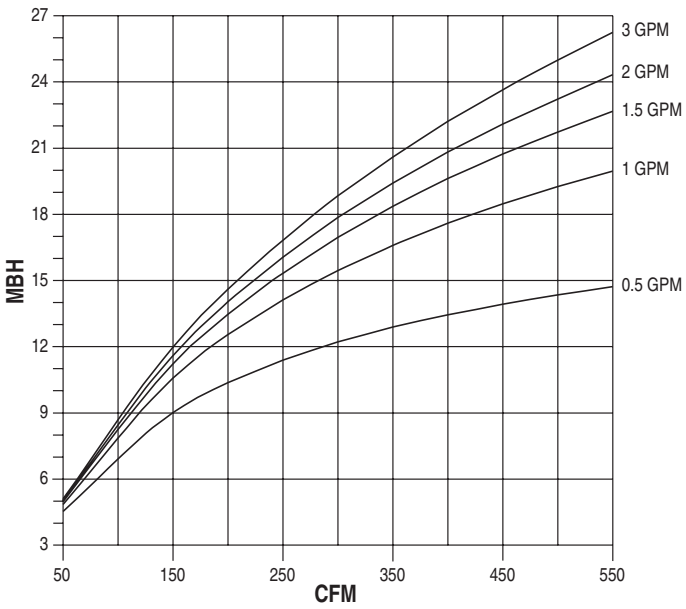
Models: 37SW and 37SWST • Low Profile Series Flow

Unit Size 1

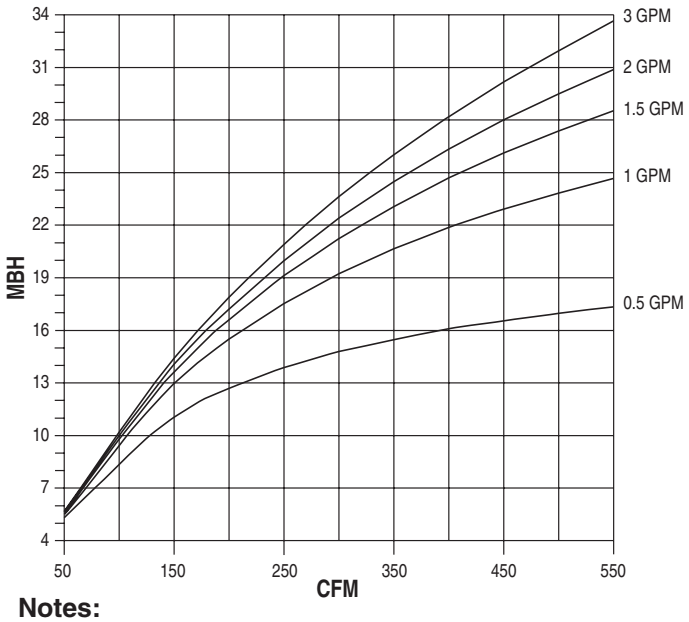
1 Row (single circuit)



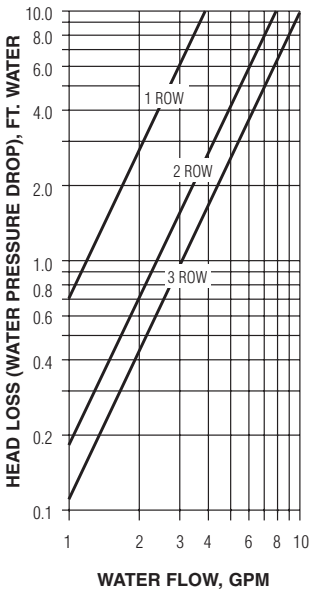
2 Row (multi-circuit)



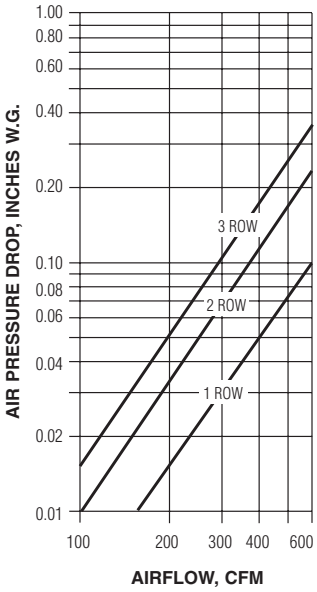
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



Notes:

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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" (13), 2 and 3 Row 7/8" (22); 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:

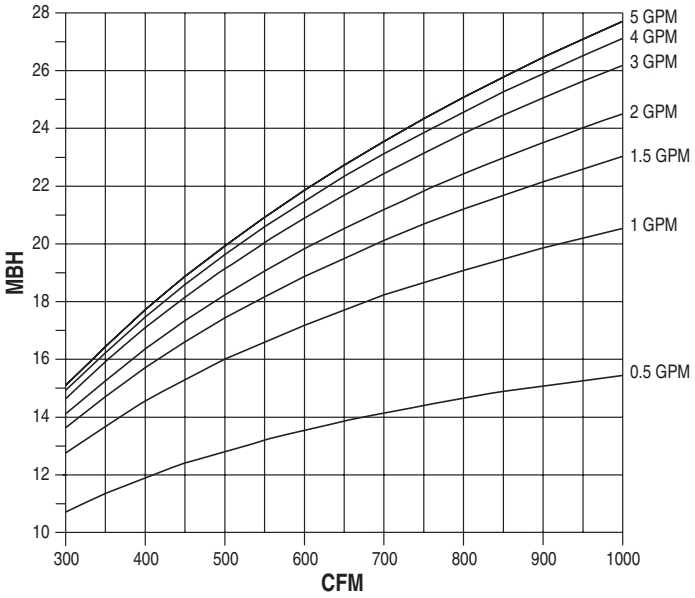
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Performance Data • Hot Water Coil

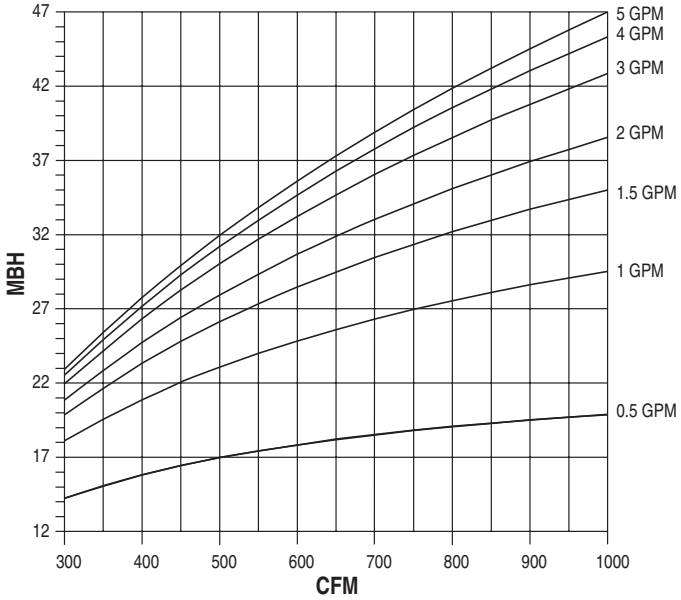
Models: 37SW and 37SWST • Low Profile Series Flow

Unit Sizes 2 & 3

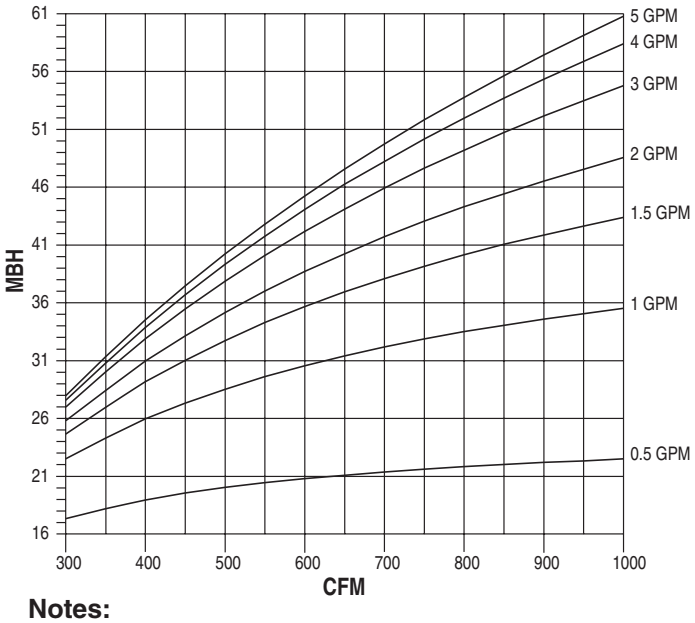
1 Row (single circuit)



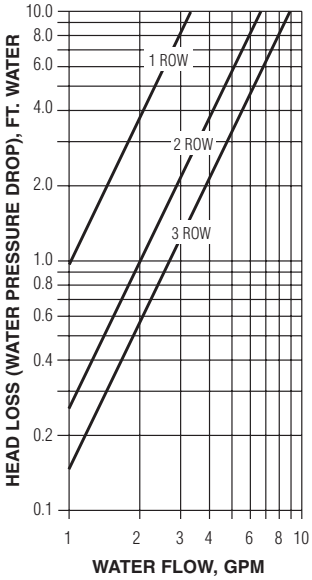
2 Row (multi-circuit)



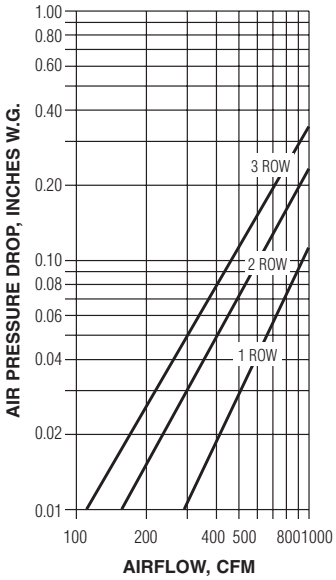
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



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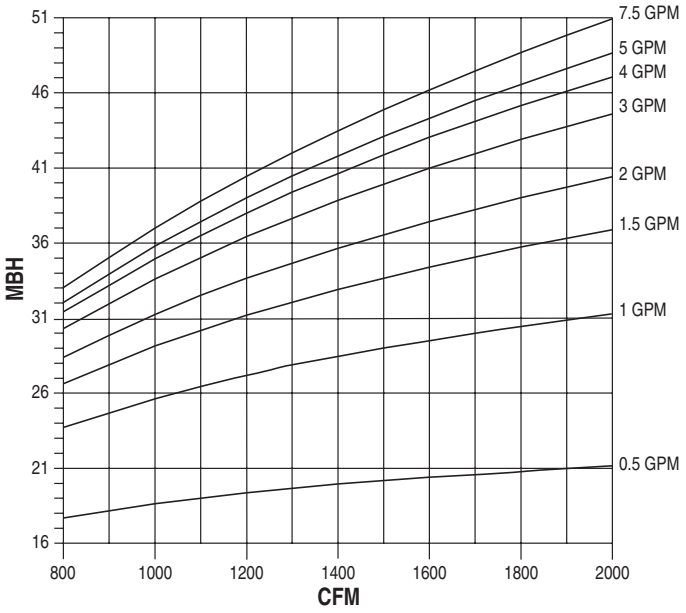
Performance Data • Hot Water Coil

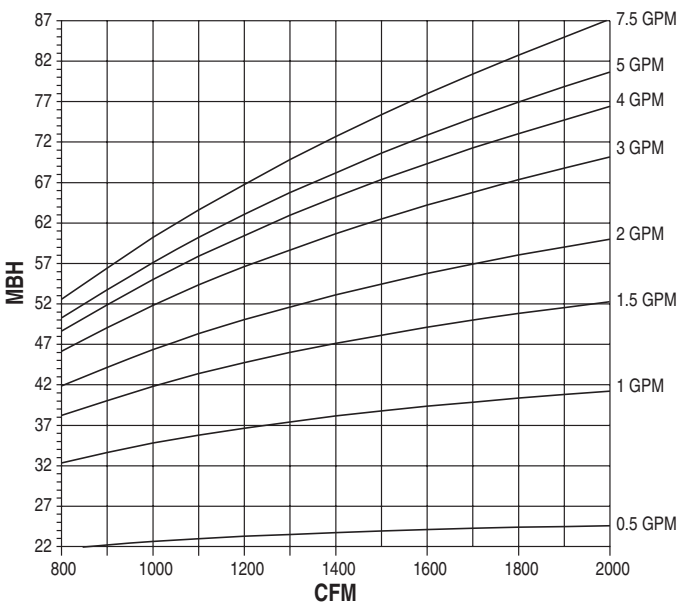
Models: 37SW and 37SWST • Low Profile Series Flow

Unit Size 4

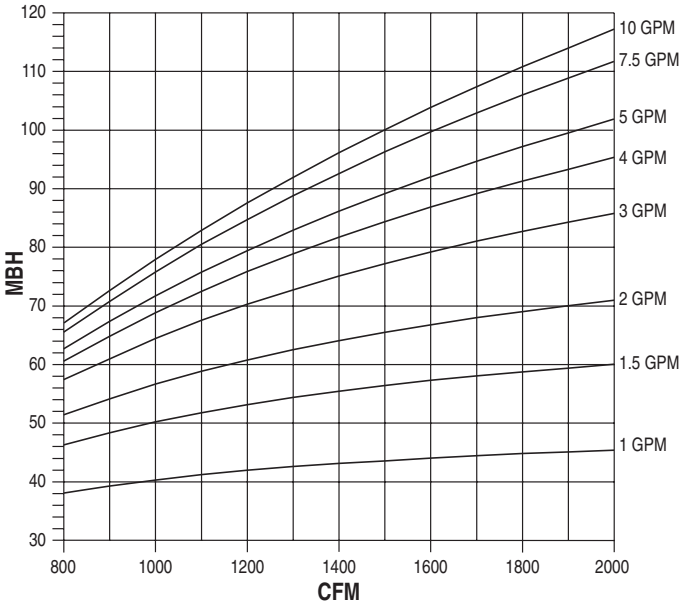
1 Row (single circuit)



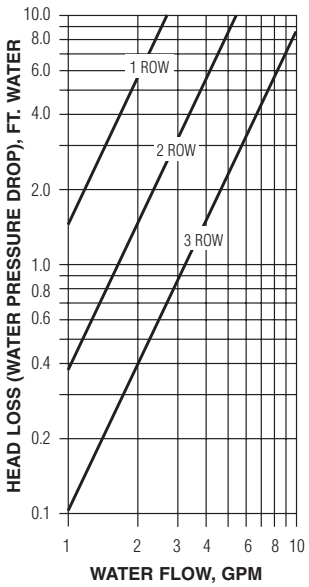
2 Row (multi-circuit)



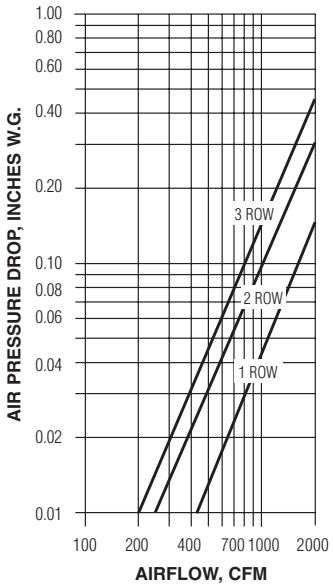
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



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PARALLEL FLOW VARIABLE AIR VOLUME

35N SERIES

Models:

35N **No Heat**
35NE **Electric Heat**
35NW **Hot Water Heat**

Model 35NE

The **35N Series** provides many standard design features and excellent sound performance when compared with other designs. The **35N** offers a compact and economical design that provides excellent performance in the most demanding variable air volume/intermittent fan applications. The fan is mounted at ninety degrees to the primary airflow to provide optimum mixing.

FEATURES:

- 20 ga. (1.0) galvanized steel construction.
- Round 2 x 20 ga. (1.0) primary air damper with peripheral cross-linked polyurethane gasket. 90° rotation, CW to close. 1/2" (13) dia. plated steel drive shaft. An indicator mark on the end of the shaft shows damper-position. Damper leakage is less than 2% of nominal flow at 3" w.g. (750 Pa).
- Round minimum 6" (152) deep inlet collars for field duct connection.
- Pressure independent primary airflow control (also available in pressure dependent configuration).
- Multi-point averaging 'Diamond Flow' sensor (pressure independent control only).
- Access panels on underside of terminal for ease of maintenance and service.
- Energy efficient PSC fan motor with thermal overload protection.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Adjustable solid state fan speed controller with minimum voltage stop.
- Gasketed backdraft damper mounted on fan discharge prevents primary air from escaping through the fan section into the ceiling plenum.
- Hinged door on fan controls enclosure.
- 3/4" (19) dual density insulation. Exposed edges coated to prevent air erosion. Meets requirements of NFPA 90A and UL 181.
- Available with electric or hot water supplementary heat.
- Hot water coils are mounted on discharge of 35NW unit with slip and drive duct connection. Coils are mounted on downstream side of fan, so that fan motor is not exposed to the air temperature rise during the heating cycle, to prevent reduced motor life.
- All controls are mounted on exterior of terminal providing ready access for field adjustment.
- Each terminal factory tested prior to shipment.
- Single point electrical and/or pneumatic main air connection.
- Discharge opening on 35N and 35NE designed for flanged duct connection.
- Full primary air valve low voltage enclosure for factory mounted digital and analog electronic controls.

Controls:

- Pneumatic and analog electronic controls. Factory supplied, mounted and calibrated.
- Digital controls. Factory mounting and wiring of DDC controls supplied by BAS Controls Contractor.

Options and Accessories:

- Induced air filter, 1" (25) thick, disposable type.
- Primary air valve enclosure for field mounted controls.
- Toggle disconnect switch (except units with electric heat, when disconnect is an electric heat option and includes fan).
- Various 'IAQ' linings are available.
- Fan airflow switch for night shutdown.
- Night setback fan/heat cycle (pneumatic and analog).
- Fan unit fusing.
- Hanger brackets.
- 'Q' option induced air attenuator.

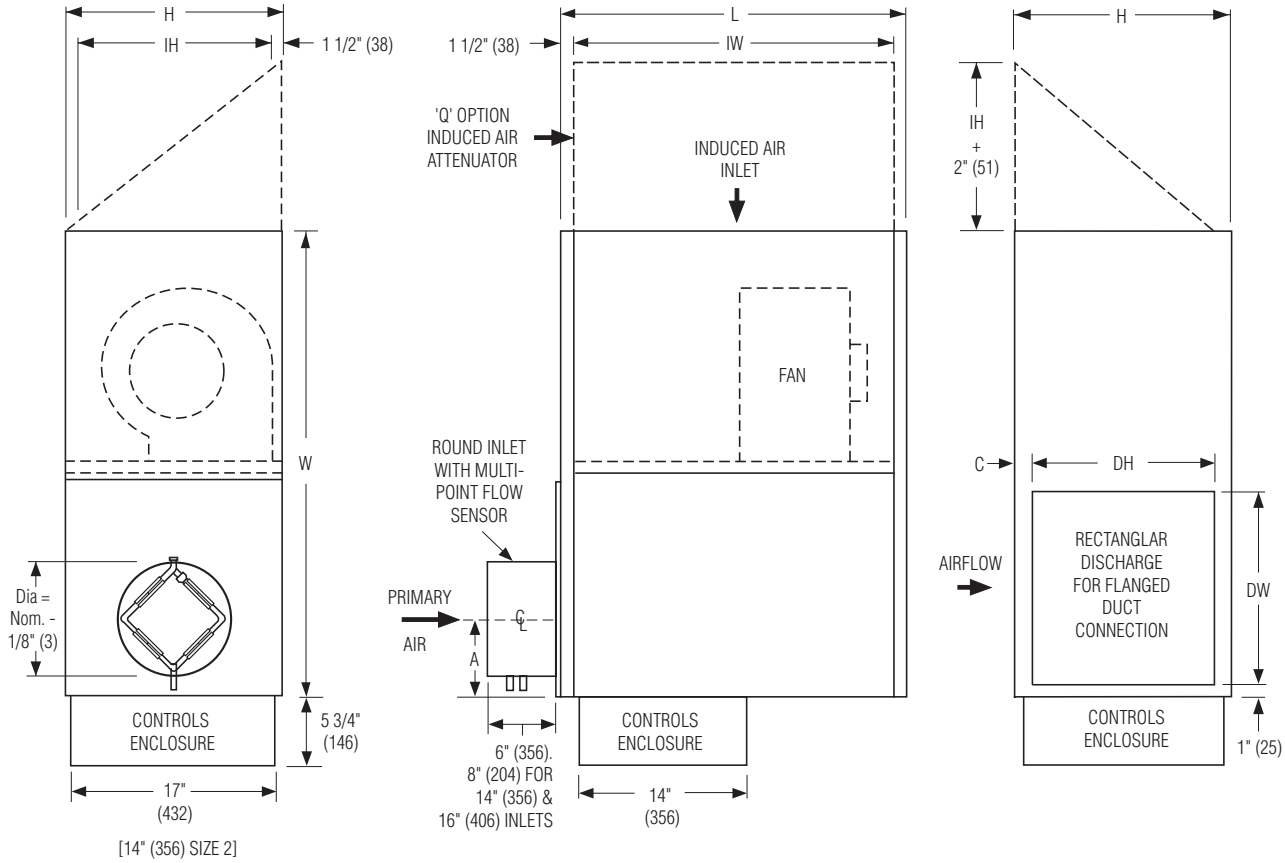
ARI PERFORMANCE CERTIFIED ARI Standard 880

A Participating Corporation in the ARI 880 Certification program.

INTERTEK ETL LISTED C US

Dimensions

Model Series 35N • Parallel Flow



Right hand unit, top view illustrated. Controls mounted as standard on RH side as shown. Left hand units / terminals ordered with LH controls (optional), are built as mirror image. Inlet, discharge and control enclosure are opposite of the drawing.

Dimensional Data. Imperial Units (inches)

Unit Size	Inlet Size	W	H	L	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	C	Filter Size
2	6, 8, 10, 12	34 3/4	14	27 9/16	24 9/16 x 10 3/4	16 x 12	1	26 x 13
3	8, 10, 12, 14	38 1/4	18	28 9/16	25 9/16 x 14 3/4	16 x 15	1 1/2	27 x 17
5	10, 12, 14	45 5/8	18	34 1/2	31 1/2 x 14 3/4	24 x 15	1 1/2	33 x 17
6	12, 14, 16	50 3/4	20	36	33 x 16 3/4	28 x 17 1/2	1 1/4	35 x 19

Inlet Size	Dim. A	
	inches	mm
6	5	127
8	6	152
10	7	178
12	8	203
14	9	229
16	10	254

Dimensional Data. Metric Units (mm)

Unit Size	Inlet Size	W	H	L	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	C	Filter Size
2	152, 203, 254, 305	883	356	700	624 x 273	406 x 305	25	660 x 330
3	203, 254, 305, 356	972	457	725	649 x 375	406 x 381	38	686 x 432
5	254, 305, 356	1159	457	876	800 x 375	610 x 381	38	838 x 432
6	305, 356, 406	1289	508	914	838 x 426	711 x 445	32	889 x 483

'Q' Option – Induced Air Inlet Attenuator

This acoustically lined accessory is designed to deflect radiated sound upward and away from the ceiling, eliminating any direct sound path from the terminal to the occupied space. Radiated sound is diffused within the ceiling cavity and the decay that occurs as a result due to this ceiling plenum effect may result in a sound reduction in the occupied space of up to 5 NC.

A minimum clearance of 6" (152) must be provided above the unit, so that induced airflow is not impeded.

Dimensions

Model Series 35N • Parallel Flow

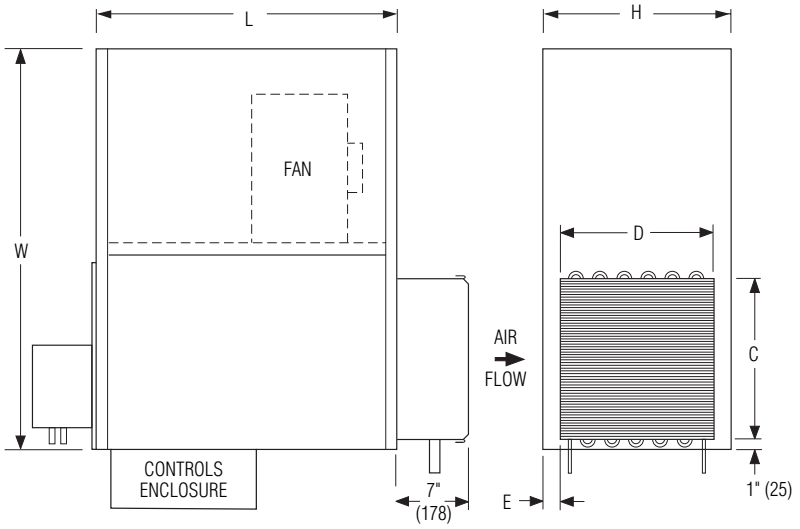
Hot Water Coil Section

Model 35NW

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional.

Standard Features:

- Coil is mounted on unit discharge.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- Sweat Connections: Size 2 and 3 one row, 1/2" (13) O.D. male solder. All others 7/8" (22) O.D. male solder.
- Bottom access panel for inspection and coil cleaning.
- Discharge opening for slip and drive connection.



Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size C x D	W	H	L	E	Outlet Duct Size C x D	W	H	L	E
2	16 x 12 1/2	34 3/4	14	27 9/16	3/4	406 x 318	864	356	700	19
3	16 x 15	38 1/4	18	28 9/16	1 1/2	406 x 381	1016	457	725	38
5	24 x 15	45 5/8	18	34 1/2	1 1/2	610 x 381	1270	457	876	38
6	28 x 17 1/2	50 3/4	20	36	1 1/4	711 x 445	1270	508	914	32

Electric Coil Section

Model 35NE

Standard Features:

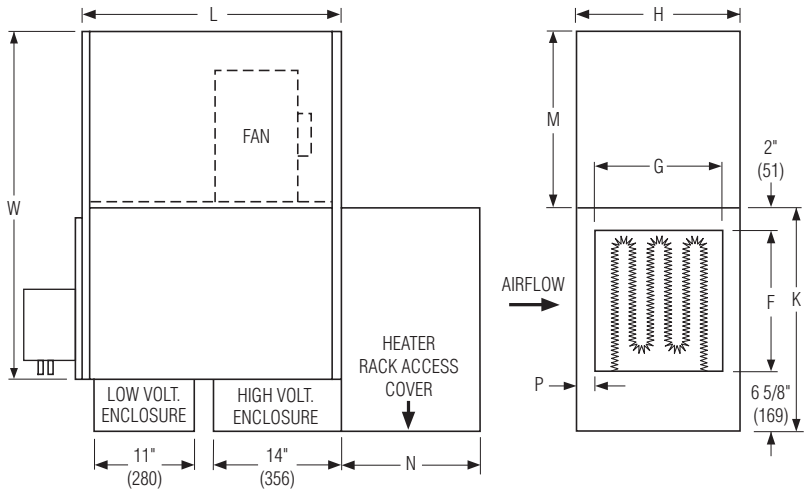
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit (except 600V/3ph., which comes with 120V/1 ph. motor).
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is ETL Listed as an assembly.
- Controls mounted as standard on RH side as shown. Terminals ordered with LH controls (optional) are built as mirror image.

Standard Supply Voltage (60 Hz):

- 208, 240 and 277V single phase.
- 208, 480 and 600V (4 wire wye) three phase.

Options:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.

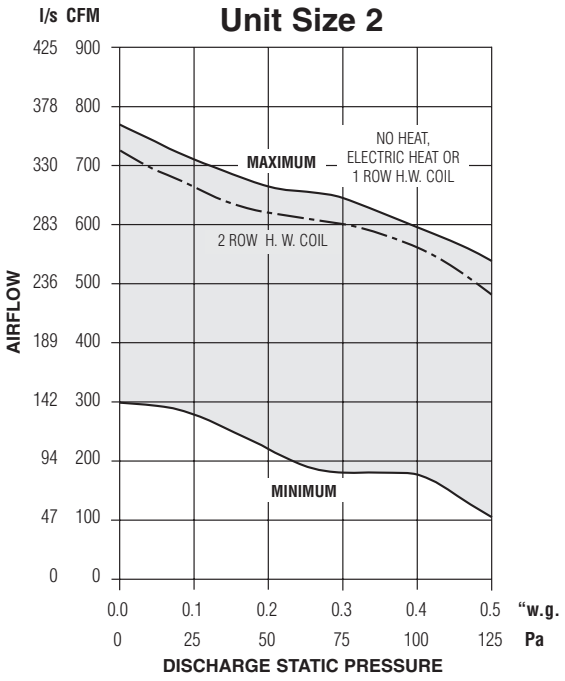


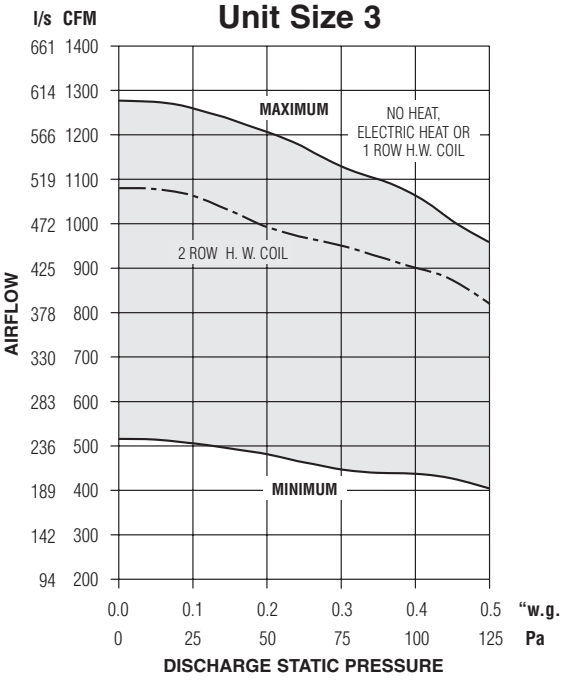
Unit Size	Imperial Units (inches)						Metric Units (mm)					
	Outlet Duct Size F x G	K	H	M	N	P	Outlet Duct Size F x G	K	H	M	N	P
2	16 x 12	24 5/8	14	15 7/8	12 1/2	1	406 x 305	626	356	403	318	25
3	16 x 15	24 5/8	18	19 3/8	15 1/4	1 1/2	406 x 381	626	457	502	387	38
5	24 x 15	32 5/8	18	18 3/4	15 1/4	1 1/2	610 x 381	829	457	476	387	38
6	28 x 17 1/2	36 5/8	20	19 7/8	15 1/4	1 1/4	711 x 444	931	508	505	387	32

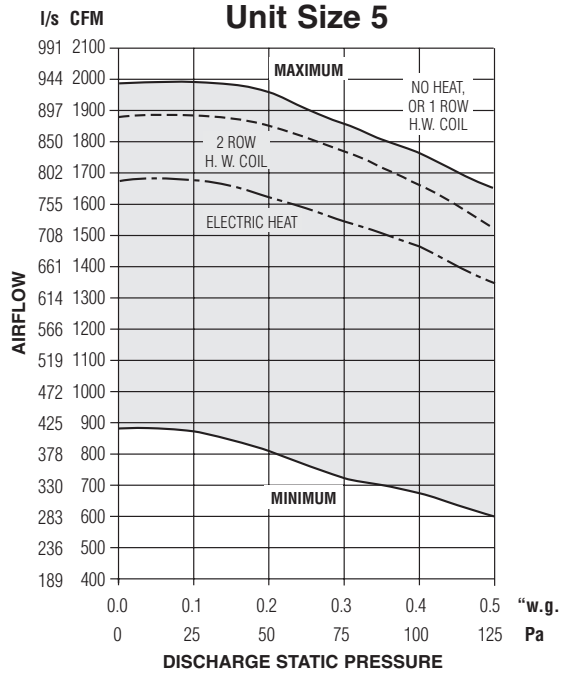
Performance Data

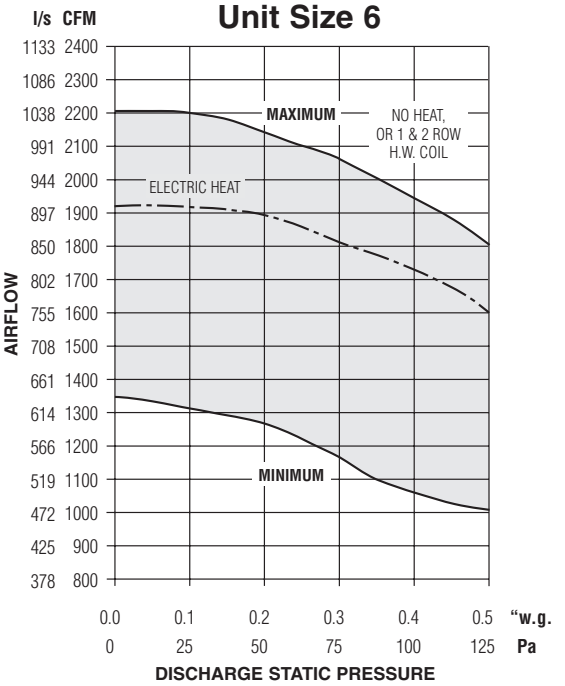
PSC Motor Fan Curves – Airflow vs. Downstream Static Pressure

35N Series • Parallel Flow









- Fan curves shown are applicable to 120, 208, 240 and 277 volt, single phase PSC motors.

Electrical Motor Data

Unit Size	Motor H.P.	PSC Motor FLA		
		120/1/60	208/1/60	277/1/60
2	1/10	2.8	1.4	1.2
3	1/4	4.7	2.0	1.7
5	1/2	9.9	4.1	3.5
6	3/4	8.4	3.8	3.7

FLA = Full load amperage

Performance Data • NC Level Application Guide

35N Series • Parallel Flow • 100% Primary Air • Cooling Cycle

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. Inlet ΔPs "w.g.	Min. Inlet ΔPs Pa	NC Levels @ Inlet pressure (ΔPs) shown									
						DISCHARGE					RADIATED				
						Min. ΔPs	0.5" w.g. (125 Pa)	1.0" w.g. (250 Pa)	1.5" w.g. (375 Pa)	2.0" w.g. (500 Pa)	Min. ΔPs	0.5" w.g. (125 Pa)	1.0" w.g. (250 Pa)	1.5" w.g. (375 Pa)	2.0" w.g. (500 Pa)
2	6	500	236	0.49	122	-	23	30	34	35	-	-	23	29	34
		400	189	0.32	80	-	20	28	33	33	-	-	20	29	32
		300	142	0.18	45	-	-	24	29	31	-	-	-	25	30
		200	94	0.08	20	-	-	21	27	30	-	-	-	22	24
		100	47	0.02	5	-	-	20	24	25	-	-	-	-	-
	8	875	413	0.30	75	-	-	29	32	35	-	-	23	28	34
		700	330	0.20	50	-	-	27	32	34	-	-	23	29	32
		525	248	0.11	27	-	-	23	29	32	-	-	20	27	30
		350	165	0.05	12	-	-	20	27	31	-	-	-	22	24
		175	83	0.01	2	-	-	22	27	27	-	-	-	-	-
	10	1375	649	0.40	100	21	24	29	34	37	-	-	23	30	34
		1100	520	0.24	60	-	20	27	33	36	-	-	22	28	30
		825	389	0.15	37	-	-	25	30	34	-	-	-	24	27
		550	260	0.06	15	-	-	22	27	30	-	-	-	21	23
		275	130	0.02	5	-	-	20	24	27	-	-	-	-	-
	12	2000	944	0.45	112	32	32	35	35	36	-	-	23	29	34
		1600	755	0.30	75	27	29	28	32	34	-	-	23	29	32
		1200	566	0.18	45	-	-	24	29	32	-	-	22	25	28
		800	378	0.08	20	-	-	20	22	25	-	-	-	22	23
		400	189	0.02	5	-	-	-	21	24	-	-	-	-	-
3	8	875	413	0.24	60	-	-	24	29	32	20	21	30	33	36
		700	330	0.15	37	-	-	23	29	30	-	20	28	33	34
		525	248	0.08	20	-	-	20	24	28	-	-	22	27	30
		350	165	0.04	10	-	-	-	22	22	-	-	-	23	28
		175	83	0.01	2	-	-	-	-	-	-	-	-	20	23
	10	1375	649	0.25	62	-	-	23	28	33	-	22	28	32	35
		1100	519	0.16	40	-	-	22	27	29	-	20	25	32	34
		825	389	0.09	22	-	-	-	24	28	-	-	23	29	31
		550	260	0.04	10	-	-	-	23	23	-	-	22	27	30
		275	130	0.01	2	-	-	-	-	-	-	-	-	-	22
	12	2000	944	0.34	85	-	-	24	29	34	-	23	29	32	36
		1600	755	0.22	55	-	-	22	29	32	-	-	25	33	35
		1200	566	0.12	30	-	-	20	25	27	-	-	25	29	33
		800	378	0.05	12	-	-	-	22	25	-	-	21	24	27
		400	189	0.01	2	-	-	-	20	21	-	-	-	20	23
	14	2625	1239	0.39	97	-	-	25	30	34	22	23	30	33	36
		2100	991	0.25	62	-	-	23	28	30	-	20	27	32	34
		1575	743	0.14	35	-	-	20	24	27	-	-	22	29	32
		1050	496	0.06	15	-	-	-	22	25	-	-	21	27	29
		525	248	0.02	5	-	-	-	-	23	-	-	-	22	24

Performance Notes:

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

2. 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. Min. inlet ΔPs is the minimum static pressure required to achieve rated airflow (damper full open).

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

6. For a complete explanation and details on NC calculations, refer to page D19 and the engineering section of this catalog.

Performance Data • NC Level Application Guide

35N Series • Parallel Flow • 100% Primary Air • Cooling Cycle

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. Inlet ΔPs "w.g.	Min. Inlet ΔPs Pa	NC Levels @ Inlet pressure (ΔPs) shown									
						DISCHARGE					RADIATED				
						Min. ΔPs	0.5" w.g. (125 Pa)	1.0" w.g. (250 Pa)	1.5" w.g. (375 Pa)	2.0" w.g. (500 Pa)	Min. ΔPs	0.5" w.g. (125 Pa)	1.0" w.g. (250 Pa)	1.5" w.g. (375 Pa)	2.0" w.g. (500 Pa)
5	10	1375	649	0.26	65	-	-	27	29	34	-	22	27	33	35
		1100	519	0.17	42	-	-	22	28	30	-	24	27	32	34
		825	389	0.11	27	-	-	20	25	28	-	-	23	27	29
		550	260	0.04	10	-	-	-	23	27	-	-	-	24	27
		275	130	0.01	2	-	-	-	-	20	-	-	-	-	21
	12	2000	944	0.24	60	-	-	27	32	34	20	23	29	33	36
		1600	755	0.15	37	-	-	24	30	30	-	-	28	33	33
		1200	566	0.08	20	-	-	23	27	29	-	-	24	28	31
		800	378	0.03	7	-	-	-	23	25	-	-	23	24	28
		400	189	0.01	2	-	-	-	20	23	-	-	-	21	23
	14	2625	1239	0.30	75	-	-	24	29	32	20	22	28	32	34
		2100	991	0.19	47	-	-	22	26	27	-	-	24	28	31
		1575	743	0.10	25	-	-	-	23	26	-	-	22	25	28
		1050	495	0.04	10	-	-	-	21	24	-	-	-	22	25
		525	248	0.01	2	-	-	-	-	22	-	-	-	-	23
6	12	2000	944	0.21	52	-	-	24	29	32	-	20	29	33	35
		1600	755	0.13	32	-	-	22	28	25	-	-	28	30	30
		1200	566	0.07	17	-	-	-	23	24	-	20	22	24	29
		800	378	0.04	10	-	-	-	21	22	-	-	-	21	24
		400	189	0.01	2	-	-	-	-	22	-	-	-	-	20
	14	2625	1239	0.22	55	-	-	24	28	30	22	22	28	30	36
		2100	991	0.14	35	-	-	20	24	26	-	-	27	29	30
		1575	743	0.07	17	-	-	-	22	25	-	-	20	23	27
		1050	495	0.03	7	-	-	-	20	23	-	-	-	21	23
		525	248	0.01	2	-	-	-	-	21	-	-	-	-	21
	16	3425	1616	0.25	62	24	24	27	29	33	25	27	30	32	34
		2750	1298	0.16	40	-	-	22	27	29	-	23	25	29	31
		2050	967	0.08	20	-	-	20	25	28	-	-	23	27	28
		1375	649	0.04	10	-	-	-	23	26	-	22	20	22	24
		700	330	0.01	2	-	-	-	22	26	-	-	-	-	21

Performance Notes:

1. NC levels are calculated from the published raw data and based on procedures outlined in Appendix E, ARI 885-98.
2. 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. Min. inlet ΔPs is the minimum static pressure required to achieve rated airflow (damper full open).
5. Dash (-) in space denotes an NC level of less than 20.
6. For a complete explanation and details on NC calculations, refer to page D19 and the engineering section of this catalog.

Performance Data • NC Level Application Guide

35N Series • Parallel Flow • Fan Only • Heating Cycle

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Discharge ΔPs "w.g.	Discharge ΔPs Pa	NC Levels Discharge	NC Levels Radiated
2	ALL	750	354	0.25	62	-	34
		600	283	0.25	62	-	30
		500	236	0.25	62	-	27
		400	189	0.25	62	-	23
		300	142	0.25	62	-	20
3	ALL	1000	472	0.25	62	-	37
		850	401	0.25	62	-	36
		700	330	0.25	62	-	33
		550	260	0.25	62	-	30
5	ALL	1850	873	0.25	62	-	42
		1600	755	0.25	62	-	40
		1400	661	0.25	62	-	38
		1200	566	0.25	62	-	35
		1000	472	0.25	62	-	32
		800	378	0.25	62	-	29
6	ALL	2100	991	0.25	62	28	42
		1900	897	0.25	62	25	40
		1700	802	0.25	62	24	38
		1500	708	0.25	62	-	37
		1200	566	0.25	62	-	35

Performance Notes:

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

2. 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. Min. inlet ΔPs is the minimum static pressure required to achieve rated airflow (damper full open).

5. Dash (-) in space denotes an NC level of less than 20.

6. Discharge (external) static pressure is 0.25" w.g. (63 Pa) in all cases.

7. For a complete explanation and details on NC calculations, refer to page D19 and the engineering section of this catalog.

Performance Data • Discharge Sound Power Levels

100% Primary Air • Cooling Cycle

35N Series • Parallel Flow (Variable Volume)

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. Inlet ΔPs "w.g.	Min. Inlet ΔPs Pa	Primary Air Only – Sound Power Octave Bands @ Inlet pressure shown																							
						Minimum ΔPs						0.5" wg (125Pa) ΔPs						1.0" wg (250Pa) ΔPs						1.5" wg (375Pa) ΔPs						2.0" wg (500Pa) ΔPs					
						2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
2	6	500	236	0.49	122	54	55	51	47	44	46	54	56	52	48	45	47	68	64	59	54	50	53	72	69	63	57	53	57	74	73	66	58	55	60
		400	189	0.32	80	49	50	45	42	38	38	57	55	50	46	43	43	66	62	57	51	49	51	71	69	62	55	53	56	72	71	65	57	54	58
		300	142	0.18	45	47	44	39	36	32	30	57	54	48	44	41	41	65	61	56	49	48	49	67	66	60	53	51	54	69	70	63	56	54	58
		200	94	0.08	20	45	36	30	27	-	-	52	50	43	39	37	36	60	58	53	47	46	46	61	62	58	51	50	52	59	64	60	55	52	56
		100	47	0.02	5	-	-	-	-	-	-	50	50	44	40	38	36	50	52	51	46	44	44	49	52	54	50	46	47	49	55	57	53	49	51
	8	875	413	0.30	75	51	52	49	48	45	45	57	58	53	52	49	49	66	65	60	57	53	55	72	69	64	59	56	60	74	74	68	61	58	63
		700	330	0.20	50	50	49	44	44	40	38	60	58	52	50	48	48	65	64	58	54	52	54	69	70	64	56	56	59	70	71	66	57	57	61
		525	248	0.11	27	-	42	37	38	32	29	56	55	48	46	45	43	62	62	56	50	51	52	66	67	63	54	55	57	66	70	65	56	57	60
		350	165	0.05	12	-	36	30	29	20	-	53	52	46	44	43	41	57	60	54	48	50	50	59	63	59	52	54	55	59	65	63	54	56	58
		175	83	0.01	2	-	-	-	-	-	-	50	50	45	43	42	39	50	57	53	47	48	47	51	55	59	50	53	51	53	57	63	54	54	55
	10	1375	649	0.40	100	55	56	54	50	50	49	57	59	56	51	51	51	64	65	63	55	55	57	70	71	68	59	58	62	71	74	70	60	59	64
		1100	519	0.24	60	51	50	49	45	44	41	56	57	55	49	49	48	63	64	61	53	54	55	67	69	66	57	57	61	68	71	66	59	58	63
		825	389	0.15	37	46	44	42	39	36	32	55	55	52	46	47	45	60	62	58	50	52	53	63	66	64	54	56	42	63	69	67	57	58	62
		550	260	0.06	15	-	36	33	29	23	-	51	51	47	43	43	40	55	60	56	48	51	51	58	61	61	52	54	57	57	62	63	54	56	59
		275	130	0.02	5	-	-	-	-	-	-	46	49	46	42	42	38	48	54	54	46	47	47	50	56	60	50	51	52	50	58	62	53	53	56
	12	2000	944	0.45	112	57	57	54	52	50	51	57	57	54	52	50	51	63	65	62	57	56	58	69	71	66	59	59	62	71	74	70	62	61	65
		1600	755	0.30	75	52	52	48	46	44	43	56	57	54	50	50	49	64	65	61	54	55	57	67	70	65	58	58	61	68	72	68	60	60	64
		1200	566	0.18	45	46	43	41	38	35	30	56	55	52	47	46	46	62	64	59	52	54	55	63	67	63	55	57	60	64	69	66	58	58	63
		800	378	0.08	20	45	37	33	31	26	-	52	51	48	44	45	42	56	59	55	49	51	51	58	64	61	53	55	57	61	64	63	56	56	59
		400	189	0.02	5	44	33	28	23	-	-	47	48	45	42	42	38	49	55	55	48	48	48	51	57	58	51	51	51	52	58	61	54	53	55
3	8	875	413	0.24	60	54	53	50	48	46	46	59	57	53	52	49	50	67	66	61	57	55	57	71	70	64	59	57	61	70	72	66	59	58	63
		700	330	0.15	37	50	48	44	44	41	39	62	56	52	51	49	49	65	64	58	54	53	55	68	69	62	56	56	59	70	70	65	59	58	62
		525	248	0.08	20	-	39	36	35	31	27	57	55	49	46	46	45	61	62	56	50	52	53	63	65	60	53	54	57	63	68	63	56	57	61
		350	165	0.04	10	-	-	28	25	-	-	52	50	44	42	43	41	57	59	53	47	50	51	59	63	58	51	53	56	59	62	61	54	56	58
		175	83	0.01	2	-	-	-	-	-	-	47	46	44	40	41	38	49	52	52	46	47	47	50	54	56	49	50	51	50	55	59	53	52	53
	10	1375	649	0.25	62	53	53	53	48	47	46	57	59	58	51	51	50	63	65	61	54	55	56	66	69	65	57	58	61	67	73	68	59	59	63
		1100	519	0.16	40	49	48	48	42	41	38	56	56	54	48	49	47	62	65	59	52	54	55	64	68	63	55	57	59	66	70	67	57	59	62
		825	389	0.09	22	45	41	40	34	31	24	55	53	50	44	46	44	59	61	56	49	52	52	62	66	61	53	55	57	62	69	65	55	57	60
		550	260	0.04	10	5	34	31	26	-	-	50	49	45	41	43	40	57	60	55	48	51	52	57	64	60	51	54	55	58	64	63	54	56	58
		275	130	0.01	2	-	-	-	-	-	-	47	48	45	40	41	39	49	53	53	46	49	48	50	54	56	50	51	51	52	58	58	53	54	55
	12	2000	944	0.34	85	57	57	58	51	50	50	59	60	59	52	52	53	65	67	64	55	57	59	68	70	67	58	59	63	70	74	70	60	61	66
		1600	755	0.22	55	52	51	52	45	44	41	57	58	56	49	51	50	63	64	61	53	56	57	66	70	65	56	59	62	67	72	69	59	60	65
		1200	566	0.12	30	45	44	43	37	34	28	54	54	52	45	48	46	61	63	59	51	55	56	62	67	63	54	58	60	63	68	66	57	59	64
		800	378	0.05	12	-	34	31	24	-	-	51	49	47	42	44	41	55	59	57	49	54	55	56	61	59	51	56	58	58	61	61	54	57	61
		400	189	0.01	2	-	33	29	20	-	-	44	47	46	41	45	42	47	53	53	47	50	51	51	56	57	50	54	56	49	56	57	53	55	57
	14	2625	1239	0.39	97	61	62	60	55	52	50	62	62	61	55	54	53	67	67	64	58	58	60	69	71	66	60	60	63	70	74	70	62	62	66
		2100	991	0.25	62	57	57	54	49	47	43	59	59	56	51	52	50	64	65	61	55	57	58	65	69	64	57	59	62	68	71	68	59	61	65
		1575	743	0.14	35	50	50	45	40	36	30	55	54	51	47	49	46	61	62	58	52	55	56	63	66	62	55	58	60	64	68	65	57	60	63
		1050	496	0.06	15	43	39	34	29	22	-	51	50	47	44	47	44	55	58	56	49	53	54	57	62	60	52	56	58	59	63	63	56	58	61
		525	248	0.02	5	-	-	24	-	-	-	44	47	45	42	44	42	49	55	53	48	51	52	50	57	57	51	53	56	53	60	61	54	56	59

ARI Certification Rating Points

Unit Size	Inlet Size	Pri. cfm	Min. ΔPs	Sound Power @ 1.5" w.g. ΔPs					
				2	3	4	5	6	7
2	6	400	.32	71	69	62	55	53	56
	8	700	.20	69	70	64	56	56	59
	10	1100	.24	67	69	66	57	57	61
	12	1600	.30	67	70	65	58	58	61
3	8	700	.15	68	69	62	56	56	59
	10	1100	.16	64	68	63	55	57	59
	12	1600	.22	66	70	65	56	59	62
	14	2100	.25	65	69	64	57	59	62

Performance Notes:

1. Sound levels are primary air only with fan turned off – cooling cycle.
2. Discharge sound power is the sound emitted from the unit discharge into the downstream duct.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
   Dash (-) in space indicates sound power level is less than 20 dB.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Std 130-1996 and ARI Standard 880-98.

ARI PERFORMANCE CERTIFIED
ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

Performance Data • Discharge Sound Power Levels

100% Primary Air • Cooling Cycle

35N Series • Parallel Flow (Variable Volume)

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. Inlet ΔPs "w.g.	Min. Inlet ΔPs Pa	Primary Air Only – Sound Power Octave Bands @ Inlet pressure shown																							
						Minimum ΔPs						0.5" wg (125Pa) ΔPs						1.0" wg (250Pa) ΔPs						1.5" wg (375Pa) ΔPs						2.0" wg (500Pa) ΔPs					
						2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
5	10	1375	649	0.26	65	55	54	55	50	49	49	61	60	59	52	52	53	67	68	64	56	56	59	69	71	66	57	58	61	68	74	70	59	60	64
		1100	519	0.17	41	49	48	48	43	41	39	58	57	55	48	49	49	65	65	61	52	54	56	67	69	65	56	57	61	68	71	68	57	59	63
		825	389	0.11	27	46	42	42	36	34	29	57	55	52	45	47	46	62	63	58	50	53	54	63	67	62	53	56	59	65	69	66	56	58	62
		550	260	0.04	10	-	36	32	27	-	-	54	52	48	43	45	43	59	61	57	49	52	53	59	64	61	51	54	57	62	67	65	54	57	61
		275	130	0.01	2	-	-	-	-	-	-	47	48	46	40	41	40	49	53	53	45	48	48	51	57	57	50	52	54	52	59	60	53	54	57
	12	2000	944	0.24	60	55	55	55	49	49	48	59	60	58	52	53	53	66	68	65	56	58	60	67	72	67	59	60	63	68	74	70	61	61	66
		1600	755	0.15	37	51	50	49	44	43	40	58	58	56	50	51	50	64	67	62	54	56	58	66	71	66	57	59	63	67	71	68	59	61	65
		1200	566	0.08	20	45	43	41	37	34	29	55	55	52	47	49	46	61	65	61	52	55	57	62	68	64	55	57	60	64	70	68	58	60	54
		800	378	0.03	7	-	35	32	28	-	-	51	52	49	44	46	44	57	62	59	50	53	54	58	64	63	53	56	59	60	65	64	56	58	62
		400	189	0.01	2	-	-	29	22	-	-	47	51	48	43	41	43	51	56	55	48	51	51	53	58	59	52	54	56	53	60	61	55	56	59
	14	2625	1239	0.30	75	59	58	56	51	49	50	61	60	58	53	52	52	67	66	62	56	56	59	67	70	66	58	59	63	69	72	69	61	61	65
		2100	991	0.19	47	54	51	50	45	43	41	59	57	55	49	50	51	64	64	58	54	55	57	65	67	64	57	58	62	67	68	66	59	59	63
		1575	743	0.10	25	47	44	42	37	34	30	54	51	49	45	46	44	60	60	58	51	53	55	61	63	62	55	56	59	64	65	64	58	58	62
		1050	496	0.04	10	-	35	31	27	20	-	49	50	48	43	45	44	56	56	55	49	51	53	57	59	58	52	54	57	59	61	61	56	56	60
		525	248	0.01	2	-	-	23	-	-	-	44	45	44	40	41	40	49	54	53	48	50	52	51	55	56	51	52	56	52	57	58	53	54	58
6	12	2000	944	0.21	52	59	55	54	49	49	47	61	60	59	52	53	52	66	66	62	55	56	57	68	70	66	58	59	61	69	72	69	60	61	64
		1600	755	0.13	32	53	49	49	43	43	39	59	58	56	49	51	50	63	64	60	53	55	56	66	69	65	56	59	61	67	69	67	58	60	63
		1200	566	0.07	17	46	43	41	36	34	30	57	54	51	46	48	45	60	62	58	51	54	55	62	65	62	54	57	59	63	64	64	56	58	61
		800	378	0.04	10	-	34	31	28	22	-	52	50	48	44	45	42	54	57	56	49	52	44	57	59	59	52	55	57	59	61	62	55	57	60
		400	189	0.01	2	-	32	28	23	-	-	45	46	46	41	43	40	48	51	53	47	49	19	51	55	57	51	53	54	52	56	59	54	55	58
	14	2625	1239	0.22	55	61	56	55	50	49	48	63	59	57	53	52	52	66	66	62	56	56	58	67	69	65	58	58	61	70	71	67	60	60	64
		2100	991	0.14	35	56	50	49	44	43	39	60	55	53	48	49	48	63	63	60	54	55	56	65	66	63	56	58	60	66	67	65	59	59	62
		1575	743	0.07	17	49	43	41	36	33	29	55	52	49	45	47	44	59	59	56	51	53	53	60	62	60	54	56	58	63	63	62	57	58	61
		1050	495	0.03	7	-	34	29	25	-	-	50	49	46	43	44	41	52	54	53	48	51	51	56	56	57	52	54	56	58	59	59	56	56	59
		525	248	0.01	2	-	-	-	-	-	-	44	43	44	40	40	38	48	49	50	47	48	49	51	53	54	52	52	54	52	55	57	55	54	57
	16	3425	1616	0.25	62	69	66	63	60	57	55	70	66	64	60	58	57	70	68	65	61	60	60	72	70	67	62	62	64	73	73	70	64	63	67
		2750	1298	0.16	40	64	60	57	53	51	47	64	61	58	54	54	52	67	64	61	57	58	58	69	69	65	60	60	63	69	69	67	61	62	65
		2050	967	0.08	20	57	53	48	44	42	37	59	57	54	50	50	48	62	61	58	53	56	56	63	64	62	57	59	61	66	65	64	59	60	64
		1375	649	0.04	10	49	41	36	33	30	27	51	48	46	44	46	41	57	56	55	51	54	54	58	60	59	55	57	59	60	62	62	58	59	62
		700	330	0.01	2	-	-	27	23	-	-	47	47	46	44	45	42	49	52	52	49	52	52	53	56	57	54	55	58	53	58	59	57	57	62

ARI Certification Rating Points

Unit Size	Inlet Size	Pri. cfm	Min. ΔPs	Sound Power @ 1.5" w.g. ΔPs					
				2	3	4	5	6	7
5	10	1100	.17	67	69	65	56	57	61
	12	1600	.15	66	71	66	57	59	63
	14	2100	.19	65	67	64	57	58	62
6	12	1600	.13	66	69	65	56	59	61
	14	2100	.14	65	66	63	56	58	60
	16	2750	.16	69	69	65	60	60	63

Performance Notes:

1. Sound levels are primary air only with fan turned off – cooling cycle.
2. Discharge sound power is the sound emitted from the unit discharge into the downstream duct.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
   Dash (-) in space indicates sound power level is less than 20 dB.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Std 130-1996 and ARI Standard 880-98.

ARI PERFORMANCE CERTIFIED
ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

Performance Data • Radiated Sound Power Levels

100% Primary Air • Cooling Cycle

35N Series • Parallel Flow (Variable Volume)

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. Inlet ΔPs "w.g.	Min. Inlet ΔPs Pa	Primary Air Only – Sound Power Octave Bands @ Inlet pressure shown																							
						Minimum ΔPs						0.5" wg (125Pa) ΔPs						1.0" wg (250Pa) ΔPs						1.5" wg (375Pa) ΔPs						2.0" wg (500Pa) ΔPs					
						2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
2	6	500	236	0.49	122	54	49	44	39	36	33	60	52	49	39	37	35	66	58	53	43	40	39	69	62	57	45	42	42	70	64	59	48	45	44
		400	189	0.32	80	48	41	37	33	30	26	58	49	45	36	34	31	64	55	51	39	38	36	68	60	55	43	41	40	68	62	58	46	43	43
		300	142	0.18	45	44	35	31	28	23	-	55	45	41	32	30	26	61	52	49	36	35	33	64	58	54	41	39	38	64	60	56	43	41	41
		200	94	0.08	20	-	-	-	-	-	-	52	44	40	30	30	25	57	50	47	34	34	31	56	53	52	38	37	35	54	55	55	41	39	39
		100	47	0.02	5	-	-	-	-	-	-	46	39	36	38	26	-	47	45	46	33	32	29	46	47	50	37	35	33	46	48	51	39	37	35
	8	875	413	0.30	75	50	46	41	36	32	29	55	50	45	40	35	32	65	57	52	42	39	38	67	61	56	45	43	42	67	64	59	45	44	44
		700	330	0.20	50	49	43	37	32	29	24	54	49	43	36	33	29	62	57	51	39	38	36	65	61	57	42	41	41	66	63	59	44	43	43
		525	248	0.11	27	-	36	31	27	-	-	53	48	41	33	32	29	58	54	49	36	37	35	61	58	55	39	39	39	61	61	57	42	41	41
		350	165	0.05	12	-	35	28	24	-	-	51	45	39	30	30	26	53	51	46	33	35	33	55	55	52	37	38	37	53	58	56	40	40	40
		175	83	0.01	2	-	-	-	-	-	-	45	41	36	28	27	22	46	50	48	33	33	31	45	49	52	36	36	33	45	48	53	39	38	36
	10	1375	649	0.40	100	56	51	47	39	37	36	57	53	50	41	39	38	64	58	54	43	42	43	67	63	58	46	44	47	69	66	61	48	46	49
		1100	519	0.24	60	51	46	42	34	32	30	54	50	46	36	35	33	61	56	52	40	40	40	64	62	56	43	43	45	66	64	61	46	45	48
		825	389	0.15	37	46	39	34	28	26	21	53	47	43	33	33	32	59	55	51	37	38	39	59	59	55	41	41	44	61	61	59	44	44	48
		550	260	0.06	15	-	34	26	-	-	-	51	45	39	30	31	29	53	53	49	35	37	37	54	53	52	39	40	42	56	56	55	42	42	46
		275	130	0.02	5	-	-	-	-	-	-	45	42	38	28	29	25	47	48	46	34	35	35	47	49	50	37	38	39	47	50	52	41	41	42
	12	2000	944	0.45	112	62	59	57	49	42	38	62	59	57	49	42	38	68	63	60	49	43	40	69	64	60	49	45	44	69	66	61	50	47	47
		1600	755	0.30	75	59	55	52	43	35	30	60	57	54	43	36	31	64	58	53	43	41	38	65	61	56	46	44	43	66	63	59	49	47	46
		1200	566	0.18	45	52	48	45	35	27	-	55	49	44	34	32	26	59	54	50	40	39	35	60	58	54	43	43	42	62	60	57	45	44	45
		800	378	0.08	20	44	38	33	22	-	-	50	44	38	32	32	26	52	49	46	36	38	35	54	50	48	38	40	41	56	53	51	42	42	46
		400	189	0.02	5	42	34	26	-	-	-	41	37	34	28	30	21	46	44	44	34	37	34	47	46	47	37	39	41	48	48	50	40	41	48
3	8	875	413	0.24	60	49	49	46	42	40	38	55	51	47	43	40	38	63	60	55	47	45	45	65	62	57	48	46	47	67	65	60	50	48	50
		700	330	0.15	37	48	43	41	37	34	31	53	49	46	41	38	36	62	58	52	45	43	42	65	62	57	48	46	47	65	63	59	49	47	49
		525	248	0.08	20	-	35	32	27	-	-	50	46	41	35	33	30	56	53	48	39	39	38	57	56	52	42	41	42	58	59	55	45	43	46
		350	165	0.04	10	-	34	23	-	-	-	47	42	36	31	29	27	52	50	45	37	36	36	52	53	49	40	39	40	53	56	53	44	42	44
		175	83	0.01	2	-	-	-	-	-	-	45	40	36	29	28	25	46	46	45	35	33	33	46	47	46	36	36	36	47	49	49	41	39	41
	10	1375	649	0.25	62	55	47	44	38	35	31	55	50	48	41	38	36	64	57	53	44	42	42	66	61	56	47	44	45	68	64	59	48	46	48
		1100	519	0.16	40	48	43	40	35	31	27	55	49	46	39	36	34	61	56	51	42	40	40	64	61	55	45	43	45	64	63	58	47	45	47
		825	389	0.09	22	45	37	34	29	25	-	53	48	42	35	34	31	58	54	49	39	39	38	60	59	54	42	42	43	59	60	56	45	44	46
		550	260	0.04	10	-	34	25	-	-	-	49	44	36	31	31	29	54	53	47	37	37	37	56	56	52	41	41	42	57	58	55	44	43	45
		275	130	0.01	2	-	-	-	-	-	-	45	41	37	29	30	28	46	44	42	34	35	34	46	46	45	37	38	38	47	50	48	41	41	43
	12	2000	944	0.34	85	53	49	45	40	38	34	54	53	49	43	40	38	60	58	54	45	44	44	64	62	57	48	48	48	65	65	60	50	50	51
		1600	755	0.22	55	48	44	41	35	32	27	51	49	44	38	36	32	59	56	51	43	44	42	62	62	56	47	47	48	63	64	59	48	48	49
		1200	566	0.12	30	42	37	33	27	21	-	52	48	43	37	37	33	56	56	49	41	42	41	58	59	54	44	45	45	59	61	58	47	47	48
		800	378	0.05	12	-	-	23	-	-	-	48	44	37	33	33	28	51	50	47	38	40	38	53	53	50	41	43	43	52	54	52	44	45	46
		400	189	0.01	2	-	-	-	-	-	-	43	40	35	30	31	27	45	45	43	36	38	37	47	47	46	40	41	42	50	50	49	43	44	45
	14	26251	239	0.39	97	55	51	48	42	38	34	55	52	49	44	39	36	63	59	55	46	44	44	64	62	57	48	47	48	66	66	61	51	49	51
		2100	991	0.25	62	51	46	43	36	32	27	54	50	46	38	37	33	60	58	52	43	43	43	62	61	56	46	46	47	64	62	59	48	48	50
		1575	743	0.14	35	46	40	35	28	22	-	52	46	42	35	35	31	56	53	48	40	41	40	60	58	54	44	45	46	61	59	57	47	48	47
		1050	496	0.06	15	-	-	22	-	-	-	49	43	39	33	34	30	52	51	47	39	40	40	55	54	52	43	44	45	57	55	54	45	46	48
		525	248	0.02	5	-	-	-	-	-	-	-	40	38	32	34	34	47	46	44	37	39	40	50	50	49	41	43	44	49	51	50	43	45	45

ARI Certification Rating Points

Unit Size	Inlet Size	Pri. cfm	Min. ΔPs	Sound Power @ 1.5" w.g. ΔPs					
				2	3	4	5	6	7
2	6	400	.32	68	60	55	43	41	40
	8	700	.20	65	61	57	42	41	41
	10	1100	.24	64	62	56	43	43	45
	12	1600	.30	65	61	56	46	44	43
3	8	700	.15	65	62	57	48	46	47
	10	1100	.16	64	61	55	45	43	45
	12	1600	.22	62	62	56	47	47	48
	14	2100	.25	62	61	56	46	46	47

Performance Notes:

1. Sound levels are primary air only with fan turned off – cooling cycle.
2. Radiated sound power is the breakout sound transmitted through the unit casing walls and the induced air inlet.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
Dash (-) in space indicates sound power level is less than 20 dB.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Std 130-1996 and ARI Standard 880-98.

ARI PERFORMANCE CERTIFIED
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Performance Data • Radiated Sound Power Levels

100% Primary Air • Cooling Cycle

35N Series • Parallel Flow (Variable Volume)

Unit Size	Inlet Size	Airflow cfm	Airflow l/s	Min. Inlet ΔPs "w.g.	Min. Inlet ΔPs Pa	Primary Air Only – Sound Power Octave Bands @ Inlet pressure shown																							
						Minimum ΔPs						0.5" wg (125Pa) ΔPs						1.0" wg (250Pa) ΔPs						1.5" wg (375Pa) ΔPs						2.0" wg (500Pa) ΔPs					
						2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
5	10	1375	649	0.26	65	49	43	42	39	38	34	55	52	48	42	41	40	62	57	51	44	43	43	65	62	55	46	45	48	63	64	58	48	47	49
		1100	519	0.17	42	45	40	39	36	34	29	59	54	50	43	39	37	60	57	50	42	42	42	61	61	54	44	44	47	63	63	57	46	46	49
		825	389	0.11	27	45	36	33	30	26	-	51	47	39	33	33	31	56	54	47	39	40	40	58	57	51	41	42	44	57	59	54	44	43	46
		550	260	0.04	10	-	33	28	21	-	-	48	44	37	31	31	30	52	50	44	36	37	37	56	56	50	40	41	43	55	56	52	42	42	45
		275	130	0.01	2	-	-	-	-	-	-	-	40	35	28	29	28	-	43	42	33	35	35	-	44	45	37	38	39	45	47	47	40	41	42
	12	2000	944	0.24	60	53	49	46	40	37	34	56	53	49	43	40	38	61	59	54	46	44	44	63	62	57	48	46	47	65	65	59	49	48	49
		1600	755	0.15	37	48	43	40	34	31	27	52	48	44	37	36	33	60	58	51	43	43	42	62	62	56	46	46	47	63	62	58	48	47	49
		1200	566	0.08	20	44	37	33	28	22	-	53	48	43	36	35	32	57	55	48	40	41	39	58	58	53	43	44	44	60	59	57	46	46	47
		800	378	0.03	7	-	-	27	-	-	-	48	44	37	32	32	28	53	54	49	39	40	39	55	53	50	41	42	42	55	55	53	44	44	46
		400	189	0.01	2	-	-	21	-	-	-	44	42	35	30	31	28	52	47	43	35	37	35	51	48	47	39	40	39	50	50	49	42	43	43
	14	2625	1239	0.30	75	55	49	46	40	38	36	57	52	48	42	39	38	62	58	52	45	44	44	63	61	55	47	46	47	65	63	58	49	48	50
		2100	991	0.19	47	50	44	40	34	32	28	55	49	45	38	37	35	59	56	50	42	41	41	61	58	53	45	45	46	63	59	56	47	46	48
		1575	743	0.10	25	45	39	33	27	23	-	52	47	41	34	35	33	56	53	48	40	41	42	58	55	51	43	43	45	60	57	53	46	46	48
		1050	495	0.04	10	-	38	24	-	-	-	49	44	38	32	33	31	51	48	44	37	39	39	54	52	48	41	43	44	56	54	51	44	45	47
		525	248	0.01	2	-	-	-	-	-	-	-	40	34	29	31	29	47	46	42	36	38	39	48	48	45	39	41	43	51	50	49	42	45	47
6	12	2000	944	0.21	52	54	47	44	39	38	34	58	51	46	41	40	37	62	59	51	44	44	43	64	62	55	47	46	46	65	64	56	48	47	49
		1600	755	0.13	32	50	42	39	34	32	28	56	49	43	37	37	34	62	58	51	43	43	41	62	60	53	44	45	45	63	60	55	46	47	48
		1200	566	0.07	17	49	38	34	29	26	-	57	50	46	38	34	31	57	53	46	39	41	39	59	55	50	42	43	43	62	57	54	45	46	47
		800	378	0.04	10	44	36	29	-	-	-	49	44	36	32	33	30	53	48	44	37	39	38	55	49	47	40	42	41	57	52	50	43	44	45
		400	189	0.01	2	-	-	28	-	-	-	44	39	34	29	30	28	48	43	41	35	36	35	49	45	44	38	40	39	48	46	46	41	43	43
	14	2625	1239	0.22	55	54	49	48	43	40	39	56	51	48	43	41	39	61	58	53	46	45	46	62	60	55	48	47	48	67	64	60	63	50	51
		2100	991	0.14	35	51	44	43	36	32	30	54	48	44	39	37	35	60	56	52	44	43	44	61	58	54	46	46	48	63	58	55	47	48	50
		1575	743	0.07	17	45	39	35	28	25	-	52	46	41	35	35	34	55	52	46	39	41	41	56	54	49	42	44	46	59	55	52	45	46	48
		1050	495	0.03	7	-	33	29	24	-	-	48	42	37	32	33	31	52	48	45	39	41	42	54	49	47	41	43	45	54	51	49	44	45	47
		525	248	0.01	2	-	-	29	-	-	-	44	38	36	31	33	32	45	42	40	35	37	38	49	45	44	39	41	42	50	48	47	43	44	46
	16	3425	1616	0.25	62	62	53	49	44	41	38	63	54	50	45	42	39	66	59	54	48	47	46	66	61	56	49	49	49	67	64	58	51	48	52
		2750	1298	0.16	40	56	49	45	38	34	31	60	52	47	41	40	36	62	55	50	43	44	43	63	59	54	47	47	48	64	60	56	48	48	50
		2050	967	0.08	20	51	41	37	30	26	-	55	47	42	36	37	33	58	53	49	41	43	42	60	55	52	44	46	46	62	57	53	46	48	50
		1375	649	0.04	10	44	35	29	-	-	-	56	50	48	41	37	32	53	49	46	39	42	41	56	51	48	42	44	45	57	53	50	45	47	48
		700	330	0.01	2	45	34	28	-	-	-	47	39	35	31	33	29	48	44	41	37	40	40	50	48	45	41	43	46	52	49	47	43	45	49

ARI Certification Rating Points

Unit Size	Inlet Size	Pri. cfm	Min. ΔPs	Sound Power @ 1.5" w.g. ΔPs					
				2	3	4	5	6	7
5	10	1100	.17	61	61	54	44	44	47
	12	1600	.15	62	62	56	46	46	47
	14	2100	.19	61	58	53	45	45	46
6	12	1600	.13	62	60	53	44	45	45
	14	2100	.14	61	58	54	46	46	48
	16	2750	.16	63	59	54	47	47	48

Performance Notes:

1. Sound levels are primary air only with fan turned off – cooling cycle.
2. Radiated sound power is the breakout sound transmitted through the unit casing walls and the induced air inlet.
3. Sound power levels are in decibels, dB re 10^{-12} watts.
4. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
Dash (-) in space indicates sound power level is less than 20 dB.
5. Min. inlet ΔPs is the minimum operating pressure of the primary air valve section.
6. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Std 130-1996 and ARI Standard 880-98.

ARI PERFORMANCE CERTIFIED
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A Participating Corporation in the ARI 880 Certification program.

Performance Data • Sound Power Levels

Fan Only • Heating Cycle

35N Series • Parallel Flow (Variable Volume)

Unit Size	Unit Size	Airflow cfm	Airflow l/s	Discharge ΔPs "w.g.	Discharge ΔPs Pa	Discharge Sound Power Octave Bands 2	3	4	5	6	7	Radiated Sound Power Octave Bands 2	3	4	5	6	7
2	ALL	750	354	0.25	62	62	59	61	57	54	53	60	58	59	54	48	47
		600	283	0.25	62	60	56	57	58	53	48	56	54	55	50	43	41
		500	236	0.25	62	56	47	51	46	43	40	53	52	52	47	39	36
		400	189	0.25	62	54	44	47	42	38	33	50	49	49	42	34	30
		300	142	0.25	62	49	39	40	35	31	26	48	45	46	39	30	26
3	ALL	1000	472	0.25	62	63	61	63	60	55	53	65	62	62	60	57	54
		850	401	0.25	62	61	58	61	57	53	50	64	61	61	58	54	52
		700	330	0.25	62	56	53	56	51	46	42	61	58	58	54	50	46
		550	260	0.25	62	55	51	54	49	44	39	58	55	55	50	45	40
5	ALL	1850	873	0.25	62	64	64	65	65	62	62	74	68	66	63	60	59
		1600	755	0.25	62	62	62	63	63	60	59	72	66	65	60	57	56
		1400	661	0.25	62	60	59	61	60	56	55	70	64	63	58	54	53
		1200	566	0.25	62	57	57	58	56	53	51	67	61	60	56	51	49
		1000	472	0.25	62	54	52	54	52	48	45	64	57	57	52	47	44
		800	378	0.25	62	54	52	54	52	48	45	61	55	54	48	43	39
6	ALL	2100	991	0.25	62	68	69	68	68	64	64	73	67	66	64	62	60
		1900	897	0.25	62	66	67	66	66	62	61	72	66	65	63	60	59
		1700	802	0.25	62	64	66	65	64	60	60	70	64	63	61	58	57
		1500	708	0.25	62	61	62	62	61	57	55	67	62	62	58	55	53
		1200	566	0.25	62	59	58	60	57	54	51	66	58	60	56	52	49

ARI Certification Rating Points

Unit Size	Fan cfm	Fan Watts	Discharge ΔPs " w.g.	Discharge Octave Band 2	3	4	5	6	7	Radiated Octave Band 2	3	4	5	6	7
2	600	254	.25	60	56	57	58	53	48	56	54	55	50	43	41
3	1000	385	.25	63	61	63	60	55	53	65	62	62	60	57	54
5	1850	995	.25	64	64	65	65	62	62	74	68	66	63	60	59
6	2100	814	.25	68	69	68	68	64	64	73	67	66	64	62	60

Performance Notes:

1. Sound levels are 100% recirculated air only with fan on – heating cycle.
2. Discharge (external) static pressure is the difference (ΔPs) in static pressure from terminal discharge to the room.
3. Radiated sound power is the break-out sound transmitted through the unit casing walls and the induced air inlet.
4. Discharge sound power is the sound emitted from the unit discharge into the downstream duct.
5. Sound power levels are in decibels, dB re 10^{-12} watts.
6. All sound data listed by octave bands is raw data without any corrections for room absorption or duct attenuation.
7. Data derived from independent tests conducted in accordance with ANSI/ASHRAE Std. 130-1996 and ARI Standard 880-98.

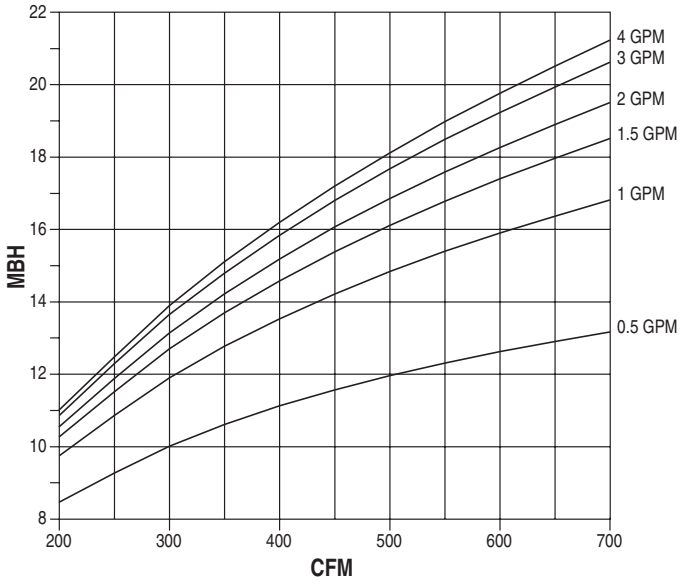
ARI PERFORMANCE CERTIFIED
ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

Performance • Data Hot Water Coil

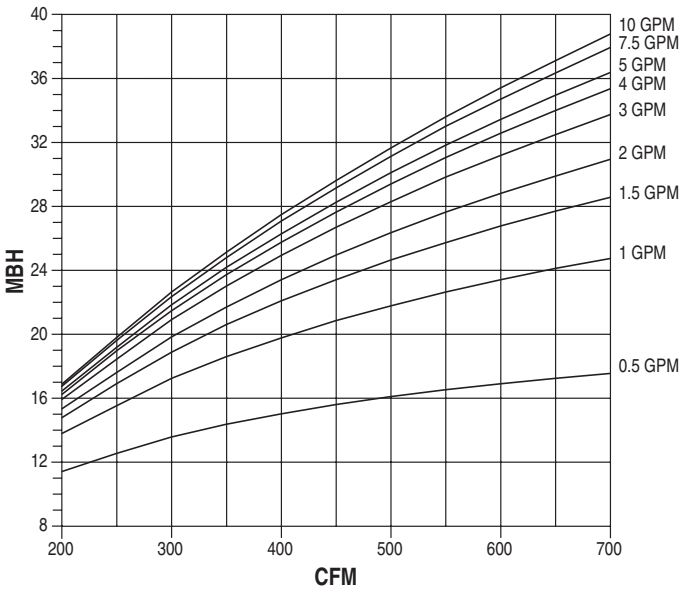
Model: 35NW • Parallel Flow

Unit Size 2

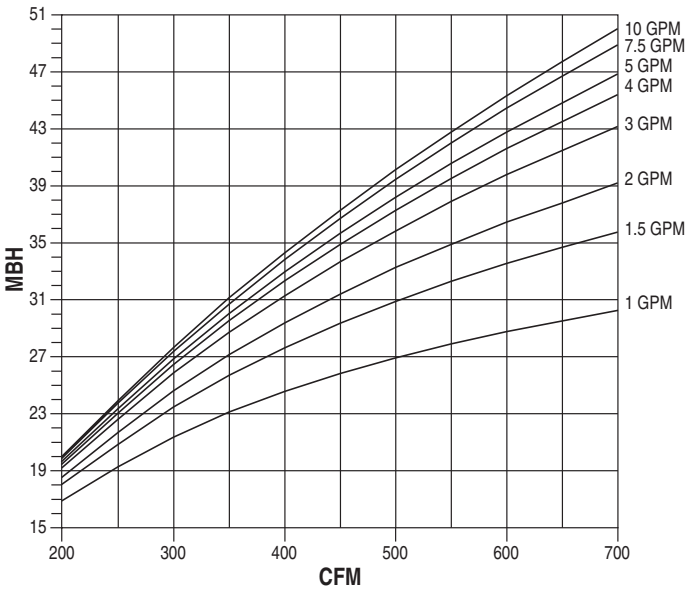
1 Row (single circuit)



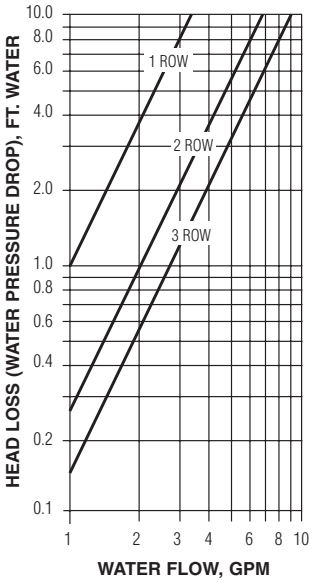
2 Row (multi-circuit)



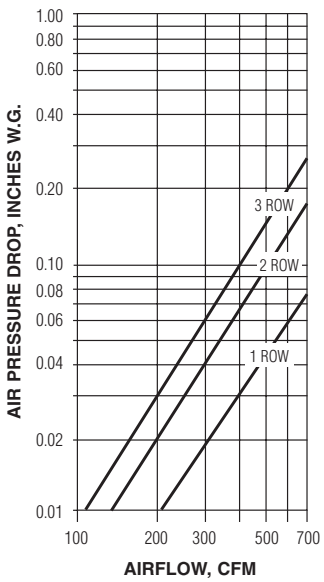
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



Notes:

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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" (13), 2 and 3 Row 7/8" (22); 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:

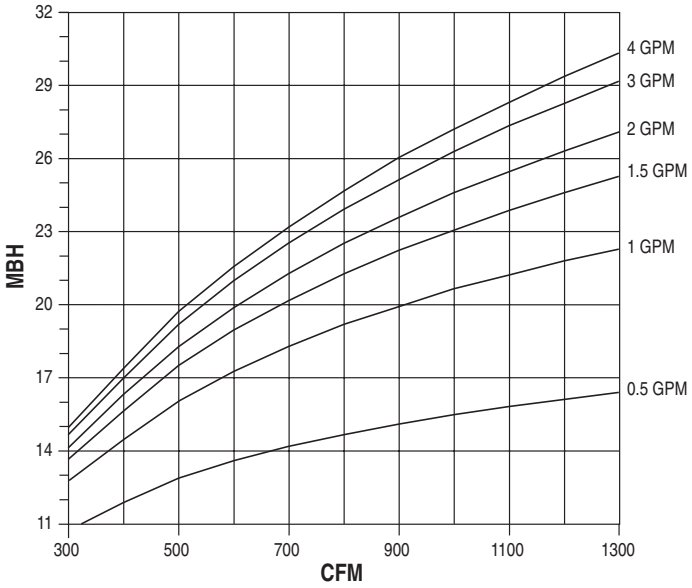
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Performance Data • Hot Water Coil

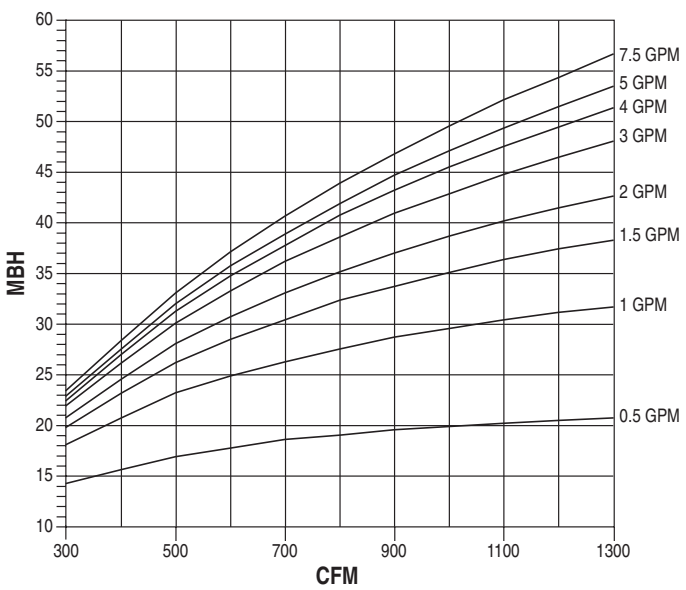
Model: 35NW • Parallel Flow

Unit Size 3

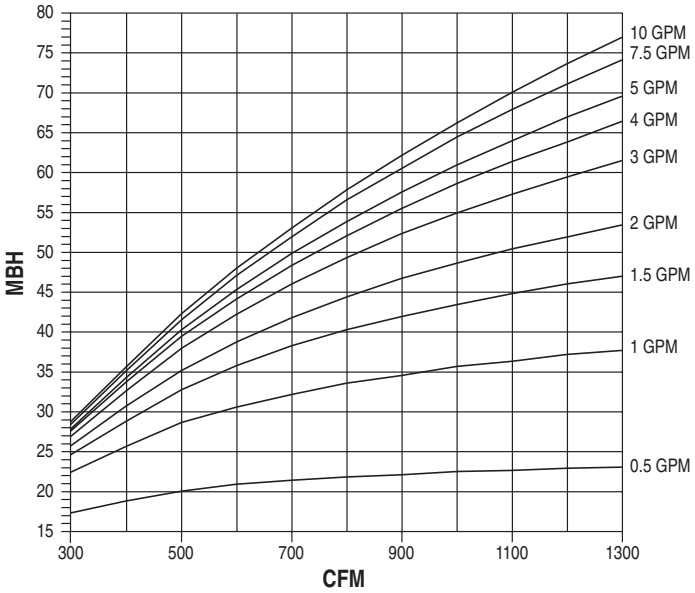
1 Row (single circuit)



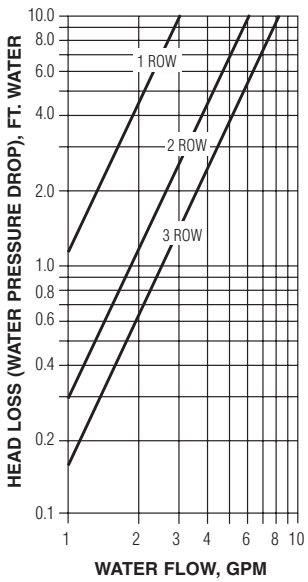
2 Row (multi-circuit)



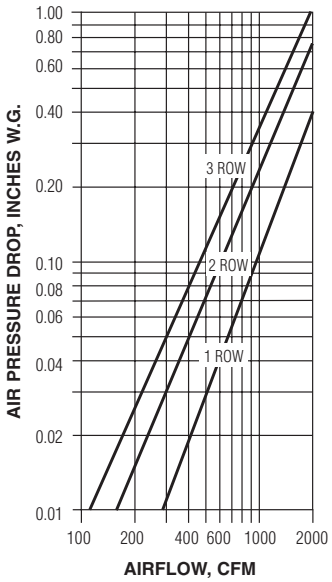
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



Notes:

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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" (13), 2 and 3 Row 7/8" (22); 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:

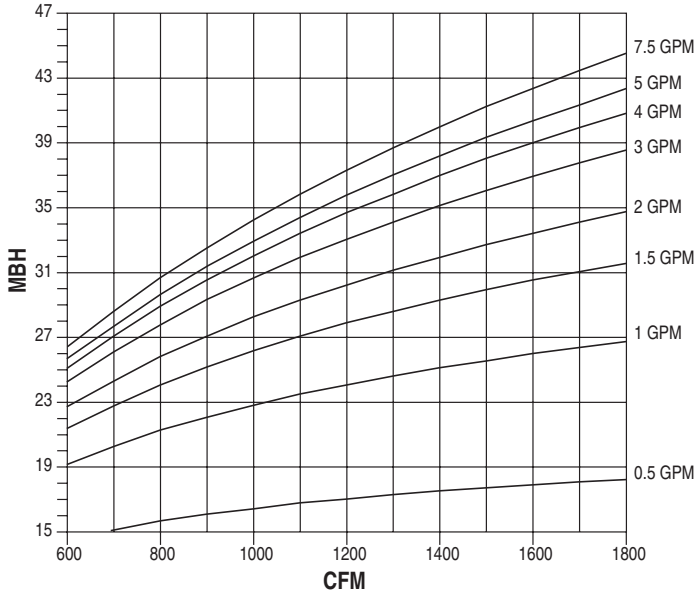
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Performance Data • Hot Water Coil

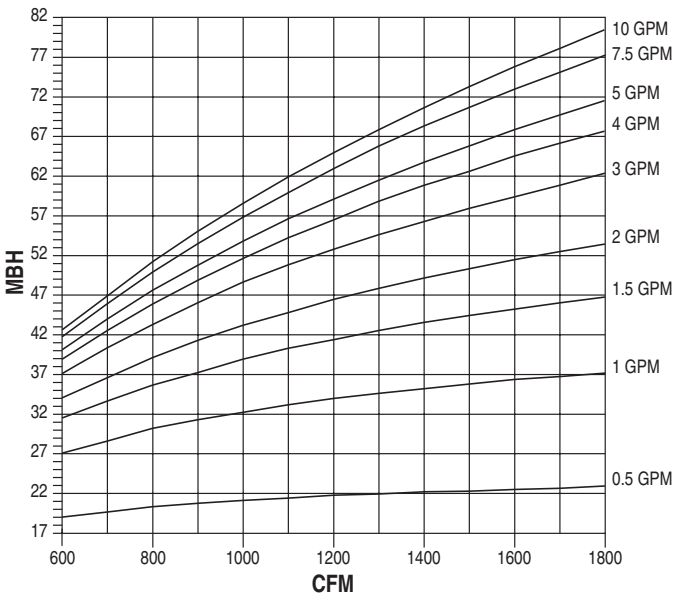
Model: 35NW • Parallel Flow

Unit Size 5

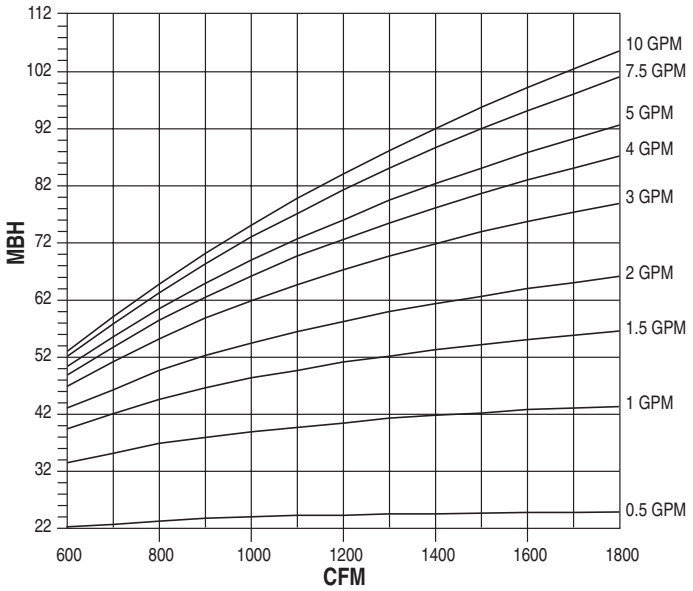
1 Row (multi-circuit)



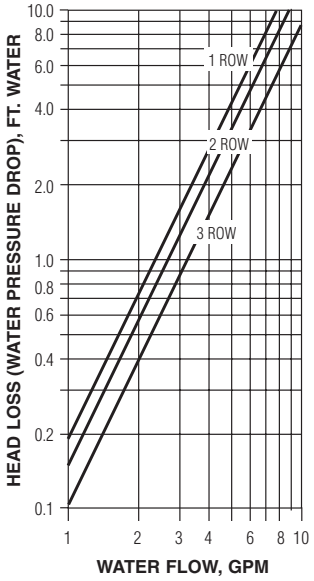
2 Row (multi-circuit)



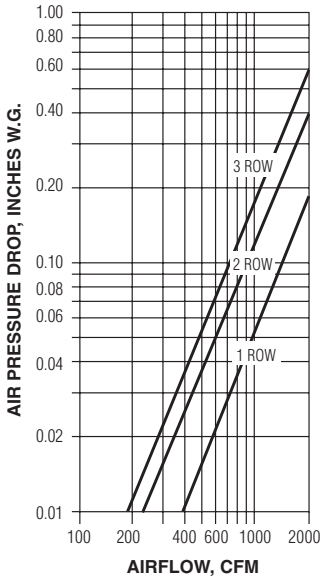
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



Notes:

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4. Water Temp. Drop. WTD = 2.04 x $\frac{\text{MBH}}{\text{GPM}}$
5. Connections: 1, 2 and 3 Row 7/8" (22); 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:

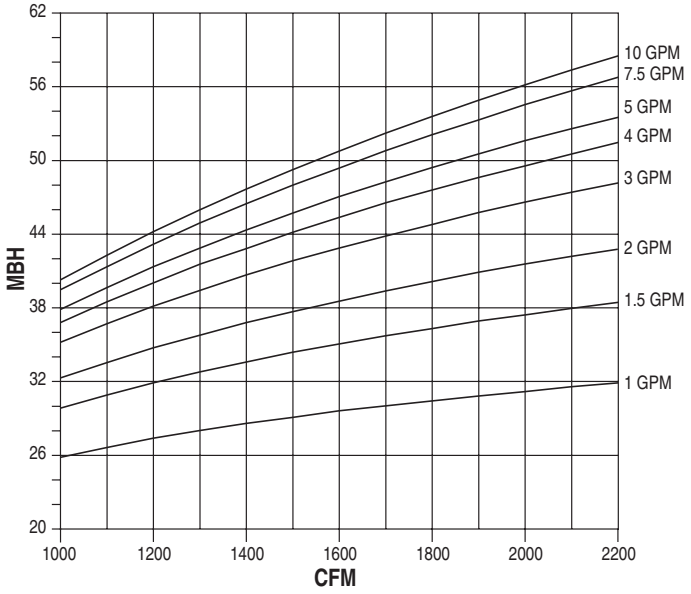
Altitude (ft.)	Sensible Heat Factor
0	1.00
2000	0.94
3000	0.90
4000	0.87
5000	0.84
6000	0.81
7000	0.78

Performance Data • Hot Water Coil

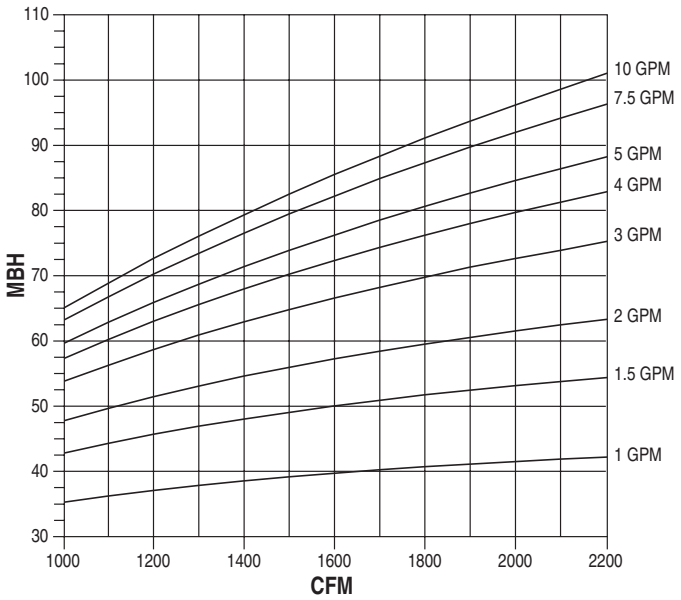
Model: 35NW • Parallel Flow

Unit Size 6

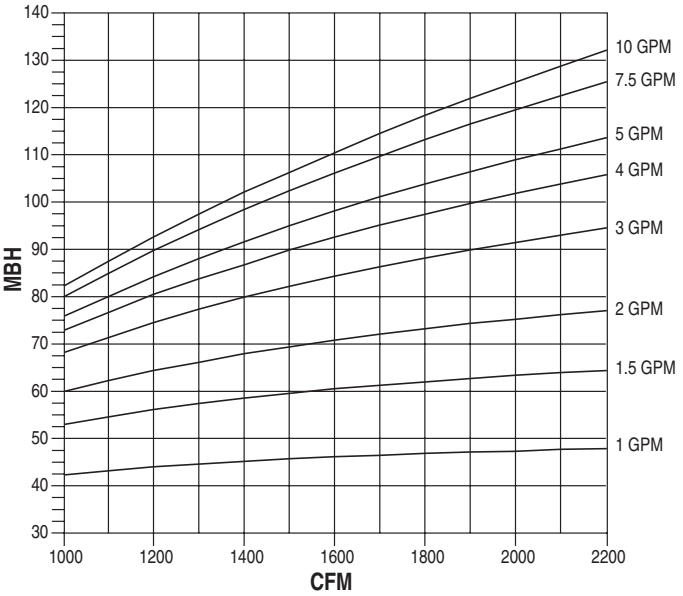
1 Row (multi-circuit)



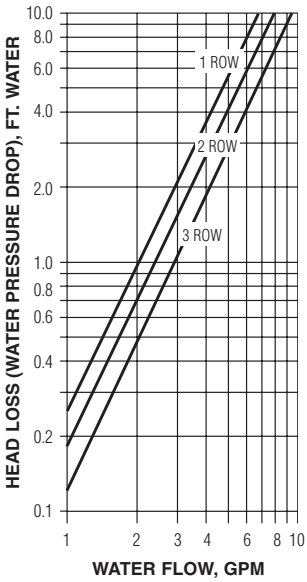
2 Row (multi-circuit)



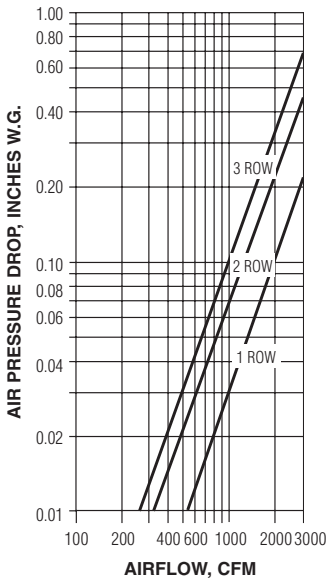
3 Row (multi-circuit)



Water Pressure Drop



Air Pressure Drop



Notes:

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4. Water Temp. Drop. WTD = 2.04 x $\frac{\text{Mbh}}{\text{GPM}}$
5. Connections: 1, 2 and 3 Row 7/8" (22); 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

Features, Selection and Capacities

Electric Heating Coils

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 or on the terminal.

Standard Features:

- Automatic reset high limit thermal cut-outs.
- Nickel-chrome heating elements.
- Magnetic contactors per stage on terminals with DDC or analog electronic controls.
- P.E. switch per stage to carry load or pilot duty with magnetic contactors as required with pneumatic control.
- Positive pressure airflow safety switch.
- P.E. switch for fan on parallel terminals (P35NE) with pneumatic control.
- Fan relay for DDC fan terminals.
- Control voltage transformer (Class 2) for DDC or analog electronic terminals.

Options:

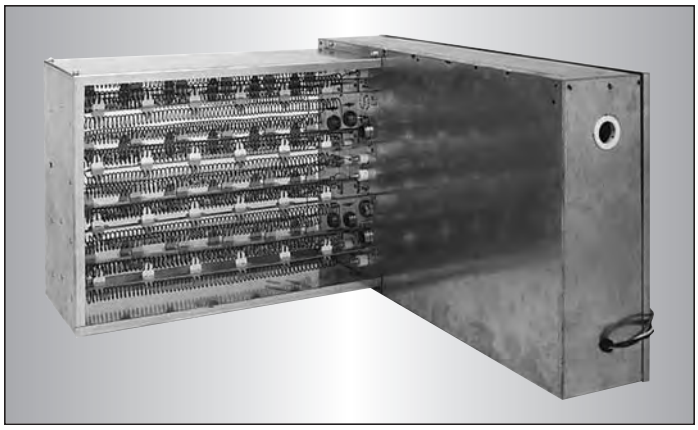
- Toggle disconnect switch.
- Door interlocking disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Dust tight control enclosure.
- Class 'A' 80/20 nickel/chrome element wire.
- Manual reset high limits.
- SCR Control.

SCR Control Option:

The SCR (Silicon Controlled Rectifier) option provides infinite solid state heater control using a proportional signal (0 – 10 Vdc or 4 – 20 mA). This option may be specified compatible with pneumatic, 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. Rooms 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.



Model	Unit Size	Maximum Kilowatts			
		208/240 Volt. 1 phase	277 Volt. 1 phase	208 Volt. 3 phase	480 Volt. 3 phase
35SE 35SEST	2	7.0	7.0	7.0	7.0
	3	8.0	11.5	11.5	11.5
	4	8.0	11.5	14.5	16.0
	5	8.0	11.5	14.5	20.5
	6	8.0	11.5	14.5	30.0
	7	8.0	11.5	14.5	30.0
37SE 37SEST	1	7.0	7.0	7.0	7.0
	2	10.0	11.5	11.5	11.5
	3	10.0	11.5	13.5	13.5
	4	10.0	11.5	14.5	27.0
35NE	2	7.0	7.0	7.0	7.0
	3	8.0	11.5	11.5	11.5
	5	8.0	11.5	14.5	23.0
	6	8.0	11.5	14.5	27.0

Recommended Selection:

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

- Pneumatic and digital control terminals are available with up to 3 stages of heat. Analog electronic control terminals are available with 1 or 2 stages of heat only. 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 terminal in order to avoid possible nuisance tripping of the thermal cutouts.
- Discharge air temperature should not exceed 120°F (49°C).

Tested and approved to the following standards:

ANSI/UL 1995, 1st. ed.

CSA C22.2 No. 236.

D

FAN POWERED TERMINAL UNITS

Application Guidelines
Electric Heating Coils

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) 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 Nailor Fan Powered VAV Terminal Unit 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 powered terminal units in a return air plenum. Mbh can be converted to kW by using the chart or by calculation. There are 3413 Btus 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:

$$cfm = \frac{kW \times 3160}{\Delta t \text{ (discharge air temp} - \text{inlet air temp.) °F}}$$

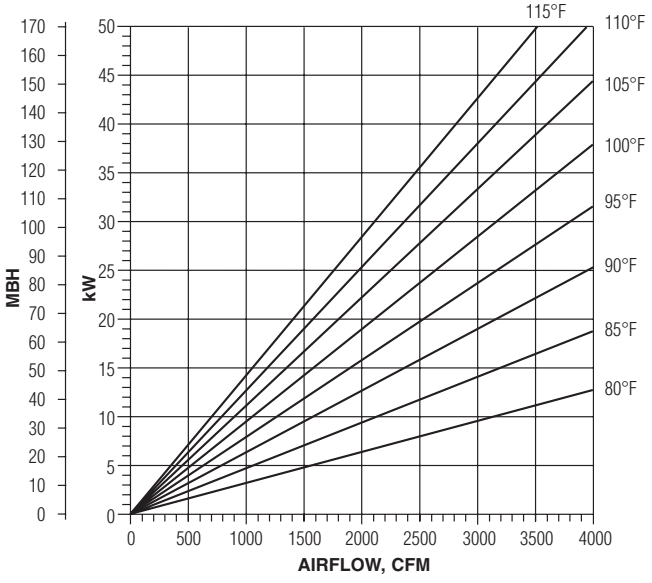
Assuming 70°F (21°C) supply air temperature to the heater, the room airflow can be selected directly from the chart. Start at the left at the design kW. Move horizontally to the desired discharge air temperature. Then, move vertically down to the cfm at the bottom of the chart.

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.

General Information

Controls

For a description of individual control components; see the controls overview section of this catalog.

Pneumatic

Pressure Dependent pneumatic air terminal actuators are controlled directly by branch line pressure signals from the room thermostat. They do not compensate for static pressure changes immediately upstream of the terminal. Consequently, the thermostat is a damper blade positioner rather than a flow regulator.

Pressure Independent pneumatic air terminal actuators are controlled directly by a flow control device which balances velocity pressure readings from a flow sensor located at the inlet and branch air pressure from the thermostat. The controller operates within adjustable minimum and maximum flow rates.

The most commonly used thermostat is a **Direct Acting Thermostat** which causes an increase in output pressure as room temperature rises. A Reverse Acting Thermostat causes a decrease in output pressure as room temperature rises. Since the pneumatic actuator is a spring return device, the damper may be connected so that it returns either to a normally closed position (shutting off primary air) upon loss of main air, or to a normally open position upon loss of main air (allowing a central system morning warm up sequence).

The standard and recommended **Nailor 3000 Universal Controller** is a multi-function device and has a constant reset span (factory set at 5 psi) regardless of maximum and minimum flow setting for superior temperature control. The controller is suitable and may be field modified for use with either a direct or reverse acting thermostat and with either a normally open or normally closed primary air damper.

With pressure independent controls (unlike pressure dependent), the damper normal position is not related to the thermostat action.

The selection of direct or reverse acting thermostats are most commonly dictated by the desire for supplementary heat to fail "open" or "off" (using a reverse acting thermostat) or to fail "closed" or "on" (using a direct acting thermostat). A pneumatic-electric (P.E.) switch is an integral part of the 35NE control sequence. When the primary air damper approaches its minimum flow position, the P.E. switch is activated to energize the fan.

If supplementary heat is present on 35NE (or 35SE models), additional P.E. switches are sequenced to activate the stages of electric heat. For hot water heat a pneumatic hot water valve (by others) is required.

P.E. switches are wired normally closed with a direct acting thermostat, so that the fan and optional heat fail in an "on" position. With a reverse acting thermostat, the P.E. switches are wired normally open to fail in an "off" position.

Analog Electronic

The analog electronic controls provide pressure independent control. The components are matched and calibrated and provide regulated airflow in response to the electronic room thermostat, which is furnished as a part of the control package. Minimum and maximum airflow settings are adjusted at the thermostat, using a digital voltmeter. It is not necessary to adjust flow setting at the terminal in the ceiling space.

The new range of Nailor analog electronic controls utilize the 'Diamond Flow' multi-point averaging sensor as standard for accurate flow measurement.

The electronic thermostat has a fixed 2°F proportional band regardless of minimum or maximum velocity set points and provides a linear reset function. Thermostat has a built-in thermometer and set point indicator. The electronic controller/actuator features an on-board flow transducer.

Electric actuators are not spring return devices (there is no normally open or normally closed action). If there is a loss of power to the terminal, the damper will remain in the position it was in at the time of power failure. All electric components use low voltage (24 volt) controls. A step down transformer is provided as standard.

Direct Digital Controls

Nailor Industries Fan Powered Terminals are generic in nature and compatible with all DDC controls currently available.

Nailor can supply and mount its own 'Diamond Flow' multi-point averaging flow sensor.

Controls may be factory mounted and wired by **Nailor** or field installed by the controls contractor.

A 24 volt Class 2 control transformer and fan relay are provided by Nailor as standard on all fan powered terminals intended for use with digital controls.

Control Operation

35S, 35SST, 37S and 37SST Series • Series Flow

Pressure Independent

Pneumatic and Analog Electronic

Occupied Cycle

1. The series terminal fan is directly or indirectly interlocked and energized before or when the central system starts up.

Nailor recommends that the terminal fan is indirectly interlocked by means of an airflow switch (optional) which senses primary air pressure at the inlet. Upon central system start up, the fan in the terminal is automatically energized.

2. On a rise in room temperature, the thermostat sends a signal to increase the flow of cold primary air.

3. As more cold air is supplied to the fan section, less warm air is induced from the ceiling space or plenum.

4. When the room temperature exceeds the set point by 2°F or more, cold airflow is maintained at the maximum setting. The maximum setting is the same as the total fan volume setting.

5. On a decrease in room temperature, the thermostat sends a signal to decrease the flow of cold primary air.

6. As less cold air is supplied to the fan section, more warm air is induced from the ceiling space.

7. When the room temperature and thermostat output signal reach the thermostat set point, the cold airflow is at its minimum limit (usually zero) and the fan is supplying the maximum volume of induced air.

8. If room temperature continues to drop, an optional heating coil may be energized.

9. When the optional airflow switch is supplied, and the central system is turned off (night-time or weekend), the series terminal fan is shut down upon loss of primary air.

Pneumatic Options

1. Night Shutdown (Airflow Switch). Accessory code: QK.

An airflow switch de-energizes fan upon loss of primary (central) air (indirect fan interlock). The terminal fan will remain off until the primary air is restored.

2. Night Shutdown (P.E. Switch). Accessory code: QL.

A pneumatic electric switch de-energizes the fan upon loss of main air. Primary air fan must be shut down. The terminal fan will remain off until the main air is restored. Units with electric heat require reverse acting thermostats to prevent heat operation when terminal fan is off.

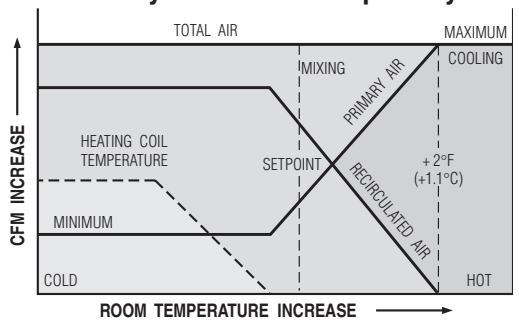
3. Night Setback (P.E. and Airflow Switch). Acc. code: QM.

Airflow switch de-energizes fan upon loss of primary (central) air. A P.E. switch overrides the airflow switch upon a call for heating and will cycle the unit fan followed by the supplementary heat intermittently in response to the night setback thermostat.

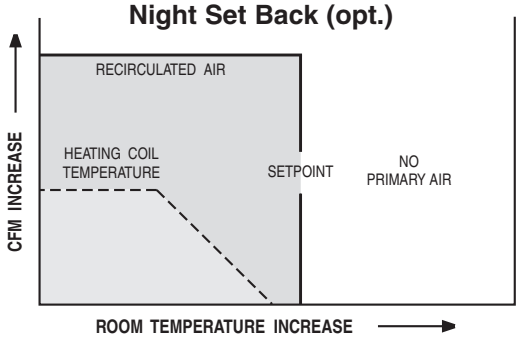
4. Night Setback (Two P.E.'s). Accessory code: QN.

A P.E. switch de-energizes fan upon loss of main air. Primary air fan must be shut down. A second P.E. switch provides an override upon a call for heating and will cycle the unit fan and supplementary heat in response to a separate pneumatic signal or night setback thermostat.

Central System On • Occupied Cycle



Central System Off • Unoccupied Cycle Night Set Back (opt.)



Pneumatic Sequence (Pressure Independent)			Code
Thermostat Action	Damper Fail Position	Electric or Hot Water Heat Option	
D.A.	NO	Yes	1P3
R.A.	NO	Yes	2P3
D.A.	NC	Yes	3P3
R.A.	NC	Yes	4P3

Control Operation

35S, 35SST, 37S and 37SST Series • Series Flow

Analog Electronic Sequences

Description	Code
Cooling (continuous operation)	A1
Cooling w/morning warm-up (continuous operation)	A2
Cooling w/staged electric, auxiliary or on-off hot water heat (continuous operation)	A3
Cooling w/proportional heat (continuous operation)	A4
Cooling w/night cycle	A5
Cooling w/morning warm-up and night cycle	A6
Cooling w/staged electric, auxiliary or on-off hot water heat and night cycle	A7
Cooling w/proportional heat and night cycle	A8
Cooling w/auto night shutdown	B1
Cooling w/morning warm-up and auto night shutdown	B2
Cooling w/staged electric, auxiliary or on-off hot water heat and auto night shutdown	B3
Cooling w/proportional heat and auto night shutdown	B4
Cooling w/auto night setback cycle	B5
Cooling w/morning warm-up and auto night setback cycle	B6
Cooling w/staged electric, auxiliary or on-off hot water heat and auto night setback cycle	B7
Cooling w/proportional heat and auto night setback cycle	B8
Cooling w/staged electric, auxiliary or on-off hot water heat, auto night setback cycle and morning warm-up	B9
Cooling w/proportional heat, auto night setback cycle and morning warm-up	B10
Cooling w/staged electric, auxiliary or on-off hot water heat and morning warm-up (continuous operation)	B23
Cooling w/proportional heat and morning warm-up (continuous operation)	B24
Cooling w/staged electric, auxiliary or on-off hot water heat, auto night shutdown and morning warm-up	B25
Cooling w/proportional heat, auto night shutdown and morning warm-up	B26
Cooling w/auto changeover (continuous operation)	B13
Cooling w/staged electric, auxiliary or on-off hot water heat and auto changeover (continuous operation)	B17
Cooling w/proportional heat and auto changeover (continuous operation)	B18
Cooling w/auto changeover and auto night shutdown	B15
Cooling w/staged electric, auxiliary or on-off hot water heat, auto changeover and auto night shutdown	B16
Cooling w/proportional heat, auto central heating changeover and auto night shutdown	B22

Sequence Notes:

Morning Warm-Up

A duct stat is mounted in the terminal inlet. Upon sensing a central system supply air temperature above 77°F (25°C), the primary air damper drives to a full open position. Optional terminal supplementary heat is locked out. Upon sensing cool air, the terminal reverts to daytime operation.

Auxiliary or On-off Hot Water Heat

Control relay provides a 24 Vac output signal for operation of valve (10 VA maximum by others).

Proportional Hot Water Heat

Thermostat heating output provides an 0 – 10 Vdc reverse acting control signal to proportional valve (by others). Closed at 0 Vdc and fully open at 10 Vdc (10 mA maximum).

Night Cycle

An airflow switch de-energizes fan upon loss of primary (central system) air. Upon a call for heat, the thermostat will override the airflow switch and cycle the unit fan followed by any supplementary heat intermittently to maintain day set point temperature.

Auto Night Shutdown

An airflow switch de-energizes fan upon loss of primary (central system) air and locks out any optional supplementary heat.

Auto Night Setback

An airflow switch de-energizes fan upon loss of primary (central system) air and activates the night side of the thermostat. Primary air damper cycles closed. Upon a call for heat, the thermostat will override the airflow switch and cycle the unit fan and optional supplementary heat intermittently to maintain a lower energy saving setback temperature.

Auto Changeover

(Central Heat/Cool Systems)

These sequences incorporate a duct stat and heat/cool thermostat. Upon sensing a central system supply air temperature above 77°F (25°C), the heating side of the thermostat is activated and the damper throttling action is reversed. Warm central air is modulated between minimum and maximum set points.

Optional Strategies

Night setback, night shutdown and primary damper overrides may be initiated by external 24 Vac inputs and/or dry contact closures.

Consult your Nailor representative for non-standard control sequences.

Control Operation

35N Series • Parallel Flow (Variable Volume)

Pressure Dependent

Pneumatic

The actuator and fan respond directly to a signal from the room thermostat.

P.E. switches are furnished to sequentially activate fan and optional hot water heat upon demand (electric heat is not available with pressure dependent controls).

Pressure Independent

Pneumatic and Analog Electronic

Occupied Cycle

1. Upon start-up of the central system, cold air is delivered to the space through the primary air section at the flow rate dictated by the thermostat. The reset controller compensates for any variation in inlet static pressure. The fan remains off. A backdraft damper at the fan outlet prevents cold air from flowing back through the fan into the ceiling space.

2. On a rise in room temperature, the thermostat sends a signal to increase the flow of primary air.

3. When the room temperature exceeds set point by 2°F or more, cold airflow is maintained at the maximum setting.

4. On a decrease in room temperature, the thermostat sends a signal for less cooling to the flow controller and cold airflow begins to decrease.

5. When the room temperature is at or below the thermostat set point, cold airflow is at its minimum limit.

6. If room temperature continues to drop, the fan section is energized to supply warm ceiling plenum air.

7. If room temperature drops further still, an optional supplementary heating coil may be energized.

8. When the central system is turned off (night-time or weekend operation), the fan and optional heat can be energized by the room thermostat on an intermittent basis on a call for heating.

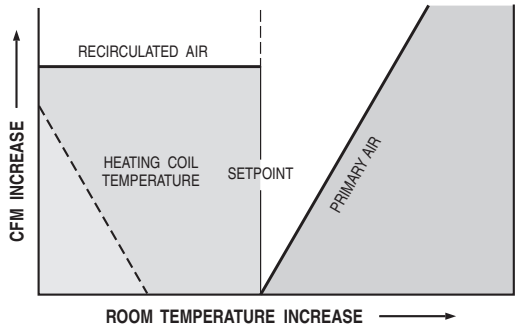
Pneumatic Options

1. Night Setback

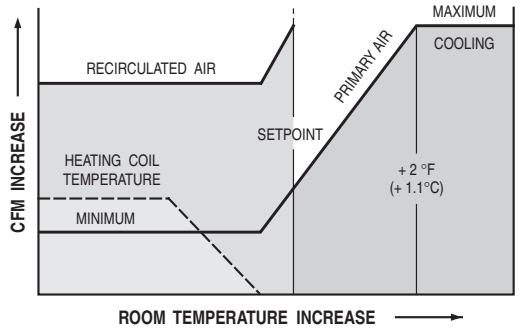
The space temperature may be reset to a lower setting through a change in main air pressure. The fan and optional heat will be energized through the P.E. switch furnished with the unit while the central system remains off.

2. A normally open damper configuration may be utilized for a central morning warm-up sequence by removing main air to the terminal.

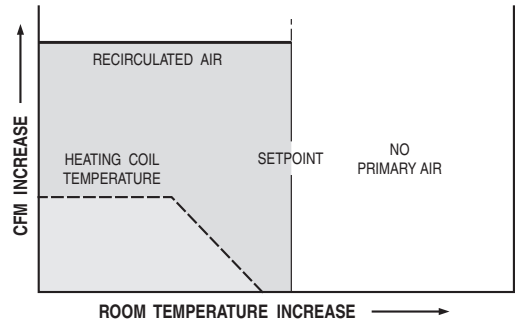
Central System On • Pressure Dependent Occupied Cycle



Central System On • Pressure Independent Occupied Cycle



Central System Off • Pressure Dependent/Independent – Unoccupied Cycle



Control Operation

35N Series • Parallel Flow (Variable Volume)

Pneumatic Control Combinations

Pressure Dependent	Pressure Independent	Thermostat Action	Terminal Damper	Primary Air Cooling Range Max. – Min.	Suggested Range Settings: Fan P.E. Switch** Off - On Setting	Fan P.E. Switch** Normal Position	Electric Heating Coil P.E. Off – On 1st Stage	2nd Stage	3rd Stage	Code
✔		D.A.	N.C.	15 – 10 psi	12 – 10	N.C.	10 - 8	9 - 7	8 - 6	D1
✔		R.A.	N.O.	5 – 10 psi	9 – 11	N.O.	11 - 13	12 - 14	13 - 15	D2
	✔	D.A.	N.O.	13 – 8 psi	10 – 8	N.C.	8 - 5	7 - 4	6 - 3	1P3
	✔	R.A.	N.O.	3 – 8 psi	6 – 8	N.O.	8 - 11	9 - 12	10 - 13	2P3
	✔	D.A.	N.C.	13 – 8 psi	10 – 8	N.C.	8 - 5	7 - 4	6 - 3	3P3
	✔	R.A.	N.C.	3 – 8 psi	6 – 8	N.O.	8 - 11	9 - 12	10 - 13	4P3

Notes: ** A normally closed (N.C.) P.E. switch fails on. A normally open (N.O.) P.E. switch fails off.
Hot water coil valves (by others) should be selected to modulate through the desired heating range in sequence with the cooling range.

Analog Electronic Sequences

Description	Code
Cooling w/night cycle	A1
Cooling w/morning warm-up and night cycle	A2
Cooling w/staged electric, auxiliary or on-off hot water heat and night cycle	A3
Cooling w/proportional heat and night cycle	A4
Cooling w/auto night shutdown	B1
Cooling w/morning warm-up and auto night shutdown	B2
Cooling w/staged electric, auxiliary or on-off hot water heat and auto night shutdown	B3
Cooling w/proportional heat and auto night shutdown	B4
Cooling w/auto night setback cycle	B5
Cooling w/morning warm-up and auto night setback cycle	B6
Cooling w/staged electric, auxiliary or on-off hot water heat and auto night setback cycle	B7
Cooling w/proportional heat and auto night setback cycle	B8
Cooling w/staged electric, auxiliary or on-off hot water heat, auto night setback cycle and morning warm-up	B9
Cooling w/proportional heat, auto night setback cycle and morning warm-up	B10
Cooling w/staged electric, auxiliary or on-off hot water heat and morning warm-up	B23
Cooling w/proportional heat, morning warm-up and night cycle	B24
Cooling w/staged electric, auxiliary or on-off hot water heat, auto night shutdown and morning warm-up	B25
Cooling w/proportional heat and morning warm-up	B26
Cooling w/auto changeover	B13
Cooling w/staged electric, auxiliary or on-off hot water heat and auto changeover	B17
Cooling w/proportional heat and auto changeover	B18
Cooling w/auto changeover and auto night shutdown	B15
Cooling w/staged electric, auxiliary or on-off hot water heat, auto changeover and auto night shutdown	B16
Cooling w/proportional heat, changeover and auto night shutdown	B22

Sequence Notes:

Morning Warm-Up

A duct stat is mounted in the terminal inlet. Upon sensing a central system supply air temperature above 77°F (25°C), the primary air damper drives to a full open position. Fan and optional supplementary heat are locked out. Upon sensing cool air, the terminal reverts to daytime operation.

Night Cycle

Upon a call for heat, the thermostat will cycle the unit-fan followed by any supplementary heat intermittently to maintain day set point temperature.

Auto Night Setback

An airflow switch senses central system shutdown upon loss of primary air and activates the night side of the thermostat. Primary air damper cycles closed. Upon a call for heat, the thermostat will cycle the unit fan and optional supplementary heat intermittently to maintain a lower energy saving setback temperature.

Auto Changeover

(Central Heat/Cool Systems)

These sequences incorporate a duct stat and heat/cool thermostat. Upon sensing a central system supply air temperature above 77°F (25°C), the heating side of the thermostat is activated and the damper throttling action is reversed. Warm central air is modulated between minimum and maximum set points. Terminal fan and optional supplementary heat are locked out.

Optional Strategies

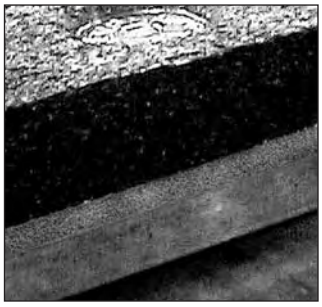
Night setback, night shutdown and primary damper overrides may be initiated by external 24 Vac inputs and/or dry contact closures. Consult your Nailor representative for non-standard control sequences.

Optional Terminal Unit Liners For 'IAQ' Sensitive Applications

Nailor offers several options for terminal unit applications where the maintenance of an high Indoor Air Quality is a primary concern. Specific 'IAQ' liners are designed to address applications where the issue of fiberglass insulation eroding and entering the airstream is a concern and/or to reduce the risk of microbial growth.

The sound power levels published in this catalog for fan powered terminal units are based upon testing with standard dual density fiberglass insulation. Dual density insulation is surface treated to prevent erosion and was developed to optimize attenuation for terminal unit applications. Cataloged discharge sound levels for series terminals are not significantly affected by the different liner options, as the fan is mounted on the discharge, however radiated sound levels may escalate depending on the terminal model and liner selection. Contact your Nailor representative for further information.

Fiber-Free Liner



Fiber-Free liner.

Nailor's Fiber-Free liner is 3/4" (19) thick, closed cell elastomeric foam which totally eliminates fiberglass. The liner has excellent thermal insulating characteristics. The foam does not absorb water, reducing the likelihood of mold or bacterial growth.

The Fiber-Free liner surface is smooth, so that dirt and debris won't accumulate, durable, erosion resistant and washable.

Complies with the following standards and tests:

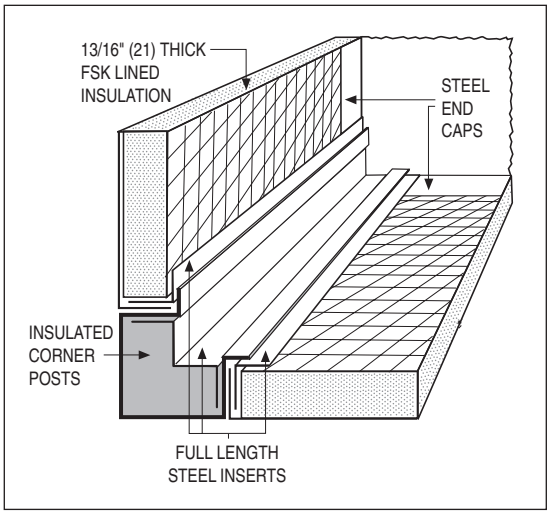
- NFPA 90A Supplementary materials for air distribution systems.
- ASTM E84 and UL 181 (25/50) Smoke and Flame spread.
- ASTM C1071, G21, G22. No bacterial or fungal growth.
- Acoustical attenuation of radiated sound is reduced compared with standard dual density fiberglass insulation.

Steri-Liner

Steri-Liner is an internal insulation designed to reduce the risk of microbial growth within the terminal. A smooth non-porous facing provides a vapor barrier to moisture and reduces the risk of micro-organisms becoming trapped. It also facilitates cleaning and prevents insulating material erosion. Damage to the liner though, will expose fiberglass particles to the airstream.

Acoustic absorption of aluminum foil lined insulation is reduced for discharge sound levels and essentially unchanged for radiated sound levels when compared to standard fiberglass insulation.

- 13/16" (21) thick, 4 lb./sq. ft. (64 kg/m^3) density rigid fiberglass with a fire resistant reinforced aluminum foil-scrim-kraft (FSK) facing on all panels in the mixing chamber.
- Meets the requirements of NFPA 90A and UL 181 for smoke and flame spread and the bacteriological requirements of ASTM C665. Will not support the growth of fungi or bacteria.
- No exposed edges. All Steri-Liner panels feature full length steel angle inserts and end caps to encapsulate the edges. Nailor's "Stealth" models with Steri-Liner are unique and have been especially designed, utilizing a low density foil back insulation with perforated metal covering in the tuned induction port that maintains cataloged radiated sound levels. No other manufacturer can maintain their cataloged sound levels like Nailor with a foil face liner option.



Steri-Liner detail on single duct terminal unit.

Solid Metal Liner

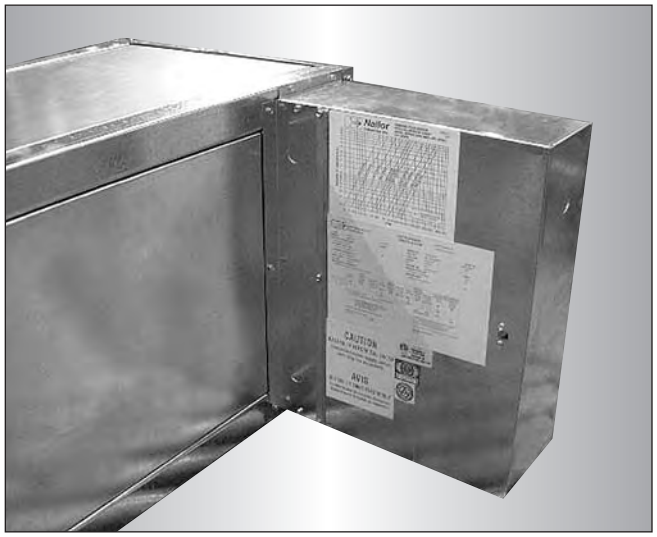
Nailor also offers a solid inner metal liner that completely isolates the standard insulation from the airstream within the terminal mixing chamber. Solid metal liners offer the ultimate protection against exposure of fiberglass particles to the airstream, all but eliminating the possibility of punctures exposing fiberglass. This option is also resistant to moisture. Fully performance tested for our clients, the "Stealth" series terminals with solid metal liner feature the tuned induction attenuation design described above for Steri-Liner and maintain catalogued radiated sound level ratings. No other terminal manufacturer can make that claim.

Perforated Metal Liner

Provides additional security and retains standard dual density fiberglass insulation or optional Steri-Liner insulation reducing possibility of long term erosion or breakdown.

90° Line Voltage Enclosure Option (Code FN2)

- **Help ensure NEC clearance requirements**
- **Reduces footprint**



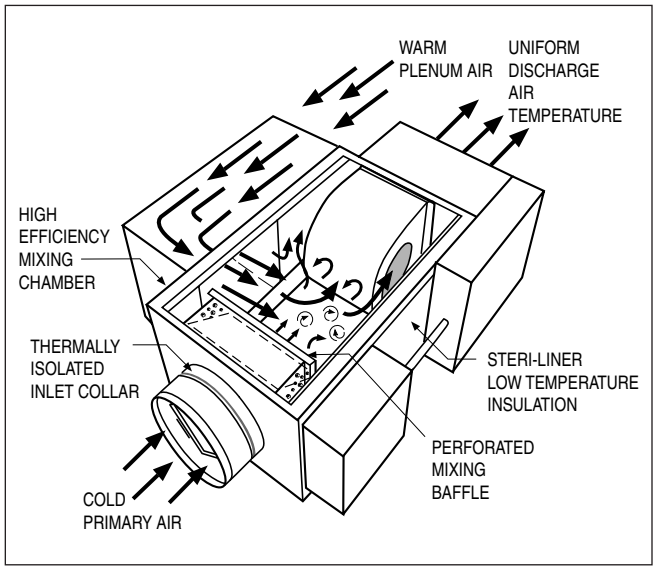
The most universal problem encountered on nearly every job is finding adequate space in the ceiling plenum for mounting the mechanical equipment. That is why Nailor researched at length to develop the narrowest series fan powered terminal units available in the industry today. Making the units narrow, increases the chance that they will physically fit between floor joists or into coffers. Unfortunately, the width of the unit is not the only limiting factor. The National Electrical Code calls for a working clearance in front of the controls enclosure. The required clearance is 36" (914) for 0 – 150 Vac and 42" (1067) for 151 – 600 Vac. It is a common practice to mount the controls enclosure flat against the side of the unit; however, that causes the terminal unit footprint to be effectively 42" (1067) wider in order to meet this NEC clearance requirement.

Nailor offers a unique mounting option for the controls enclosure on several models of the series fan powered terminal units. The enclosure can be mounted at 90° on the discharge end of the basic terminal as shown in the photograph. This FN2 option allows the 42" (1067) clearance requirement to run along the side of the unit or along the discharge duct where there is a good chance of clear areas already. This again serves to keep the equipment narrow to fit in the tightest of locations within the ceiling cavity.

Low Temperature Construction

Nailor offers series flow (constant volume) fan powered terminal units with low temperature construction for applications involving low temperature/cold air distribution systems. The fan powered terminal unit is ideal for use with low temperature primary air 40° – 48°F (4° – 9°C) supplied to the terminal from chilled water/ice storage systems. These low temperature system designs are feasible where off-peak utility rates encourage their use. For instance, ice can be made at night using cheaper power and then used during occupied hours to produce cold air.

The terminal is designed to both handle the low temperature primary air without condensation and effectively mix the cold supply air with warm induced plenum air, resulting in a uniform discharge temperature. It is common practice to set the fan airflow higher than the maximum primary airflow setting in order to temper the air when used with conventional diffusers in order to optimize performance and eliminate any risk of dumping.

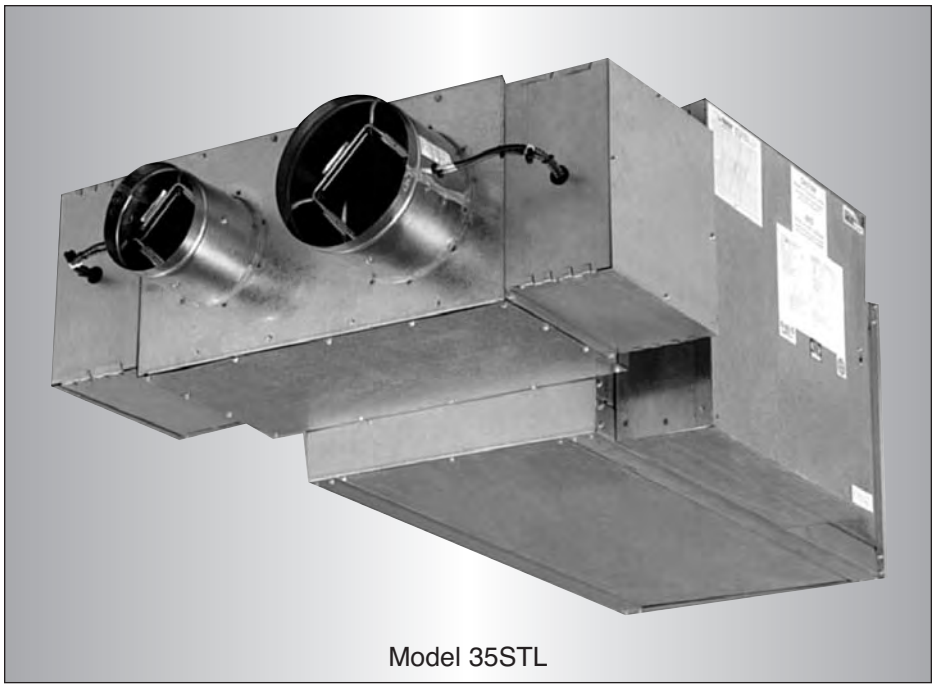


Construction Features:

- Thermally isolated inlet collar eliminates the risk of condensation forming on the terminal casing inlet.
- Integral perforated mixing baffle on the damper discharge improves mixing efficiency, reduces stratification and improves discharge temperature equalization in the discharge duct.
- Steri-Liner insulation construction provides a foil vapor/thermal barrier, which reduces the risk of moisture damaging the internal insulation and helps eliminate condensation forming on the outside of the terminal unit, which could cause damage in the ceiling space.

SERIES FLOW CONSTANT VOLUME WITH OUTSIDE AIR INLET 35STL SERIES

- MINIMUM VENTILATION 'IAQ' APPLICATIONS



Model 35STL

Models:

35STL	**No Heat**
35SETL	**Electric Heat**
35SWTL	**Hot Water Heat**
35STLST	**No Heat "Stealth™"**
35SETLST	**Electric Heat "Stealth™"**
35SWTLST	**Hot Water Heat "Stealth™"**

A major concern facing building owners and engineers today is Indoor Air Quality (IAQ). Nailor has developed an 'IAQ' fan powered terminal unit option that addresses this issue. Nailor's 35S and 35SST "Stealth™" fan powered terminal units with the TL option provide a direct connection for outside air to the terminal, in addition to the standard cool air connection. The TL option adds a second pressure independent outside air valve.

New standards practice for HVAC system design, including ANSI/ASHRAE Standard 62-1999, dictate a minimum amount of ventilation within buildings. Ventilation control has traditionally been done at the central air handling unit; however, this does not always ensure the minimum ventilation to each zone is maintained.

The TL option controls outside air to each occupied zone, independently of the primary cooling requirement and therefore prevents over-ventilation that might otherwise occur when relying on sufficient outside air from the primary air system. The TL option dual duct inlet design allows the fan powered terminal unit to mix the outside air to the zone with the primary cooling air. The outside air pressure independent air valve provides a constant volume to the zone regardless of thermal conditions. This fixes the outside air requirement for the zone without putting excessive demands for outside air on the primary air handler. In turn, the primary air handler does not have to reset outside air rates for all zones in the building. The first cost of the outside air handler and its associated ductwork can be offset by the savings provided by running smaller outside air volumes for those zones with lower occupancy rates.

The TL option is perfect for schools. The high occupancy in the classrooms is served without creating excessive loads at the primary air handler serving zones with lower occupancies. Office buildings with conference rooms, kitchen areas and workrooms with copiers can also benefit. When these areas are occupied and require large percentages of outside air, the primary air handler does not have to reset the outside air for all the office spaces in the building.

When integrated with a DDC building management system, the amount of outside air can be tracked and logged to ensure 'IAQ' standards for each zone are met and by using occupancy sensors, the outside air volume for individual zones can be reset.

FEATURES:

• Engineered integral dual duct inlet design is compact and not a bolt on single duct terminal.

• Diamond Flow Sensor located in both primary and outside air inlets.

35STL Series:

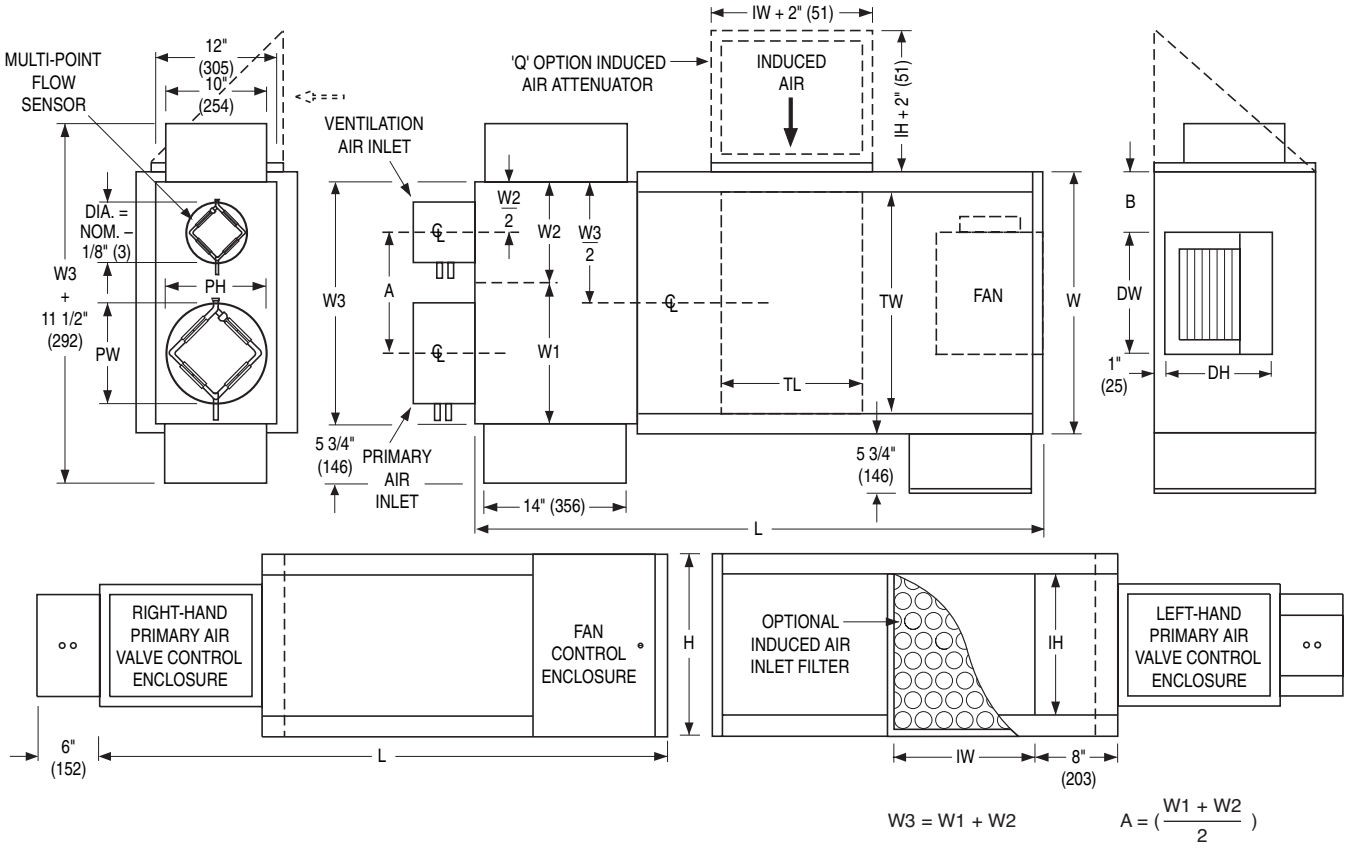
35STLST "Stealth™" Series:

ARI PERFORMANCE CERTIFIED
ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

INTERTEK ETL LISTED C US

Dimensions

Model Series 35STL • Series Flow • Outside Air Inlet • Unit Sizes 2 – 6



Dimensional Data. Imperial Units (inches)

Unit Size	Primary Inlet Size	Ventilation Inlet Size	W	H	L	B	Induced Air Inlet		Outlet Discharge DW x DH	Filter Size	
							Side (Std.) IW x IH	Top (Opt.) TL x TW		Side (standard)	Top (option)
2	6, 8	4, 5, 6	18	14	51 1/2	3 1/2	8 x 10	10 x 14	9 1/4 x 10 1/2	10 x 12	14 x 16
3	6, 8, 10	4, 5, 6, 7, 8	18	18	51 1/2	3 1/2	12 x 14	14 x 14	9 1/4 x 10 1/2	14 x 16	16 x 16
4	6, 8, 10	4, 5, 6, 7, 8, 10	26	18	56 1/2	6	14 x 14	12 x 22	12 x 10 1/2	16 x 16	16 x 25
5	8, 10, 12*	4, 5, 6, 7, 8, 10	26	18	56 1/2	5	14 x 14	12 x 22	13 1/4 x 11 1/2	16 x 16	16 x 25
6	10, 12*, 14*	4, 5, 6, 8, 10, 12*	30	19	59 1/2	6	16 x 15	14 x 26	13 1/4 x 11 1/2	17 x 18	18 x 28

Dimensional Data. Metric Units (mm)

Unit Size	Primary Inlet Size	Ventilation Inlet Size	W	H	L	B	Induced Air Inlet		Outlet Discharge DW x DH	Filter Size	
							Side (Std.) IW x IH	Top (Opt.) TL x TW		Side (standard)	Top (option)
2	152, 203	102, 127, 152	457	356	1308	89	203 x 254	254 x 356	235 x 267	254 x 305	356 x 406
3	152, 203, 254	102, 127, 152, 178, 203	457	457	1308	89	305 x 356	356 x 356	235 x 267	356 x 406	406 x 406
4	152, 203, 254	102, 127, 152, 178, 203, 254	660	457	1435	152	356 x 356	305 x 559	305 x 267	406 x 406	406 x 635
5	203, 254, 305*	102, 127, 152, 178, 203, 254	660	457	1435	127	356 x 356	305 x 559	337 x 292	406 x 406	406 x 635
6	254, 305*, 356*	102, 127, 152, 203, 254, 305*	762	483	1511	152	406 x 381	356 x 660	337 x 292	432 x 457	457 x 711

* Flat oval inlets

Primary/Vent Inlet Size	W1/W2	
	inches	mm
4, 5, 6	10	254
7, 8	12	305
10	14	356
12	18	457
14	24	610

Oval Inlet Dimensions

Size	PW x PH	
	inches	mm
12	12 13/16 x 9 13/16	329 x 249
14	16 1/16 x 9 13/16	408 x 249

Dimensions

Model Series 35STL• Series Flow • Outside Air Inlet • Unit Sizes 2 – 6

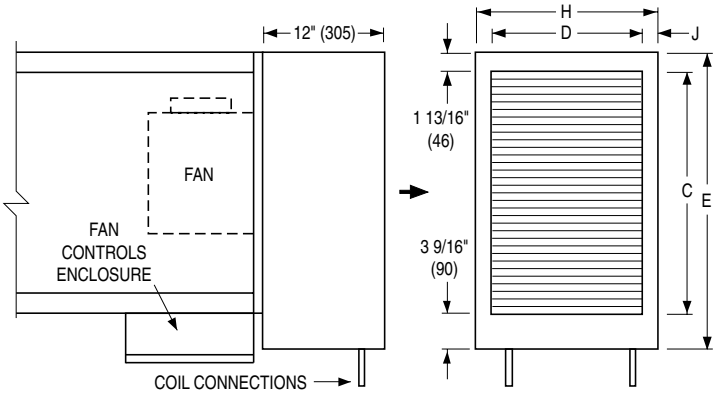
Hot Water Coil Section

Model 35SWTL

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 1/2" (13) or 7/8" (22) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size C x D	E	H	J	Outlet Duct Size C x D	E	H	J
2	16 x 12 1/8	21 3/8	14	15/16	406 x 308	543	356	24
3	16 x 14 7/8	21 3/8	18	1 9/16	406 x 378	543	457	40
4, 5	24 x 14 7/8	29 3/8	18	1 9/16	610 x 378	746	457	40
6	28 x 17 1/8	33 3/8	19	15/16	711 x 435	848	483	24

Electric Coil Section

Model 35SETL

Standard Features:

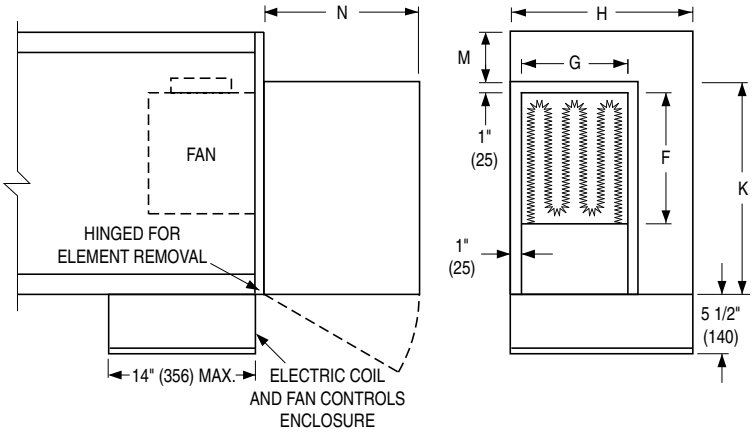
- Unique hinged heater design permits easy access, removal and replacement of heater element without disturbing ductwork.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is 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 elevation will therefore change.

Standard Supply Voltage (60 Hz):

- 208, 240 and 277V, single phase.
- 208, 480 (4 wire wye) and 600V three phase.

Options:

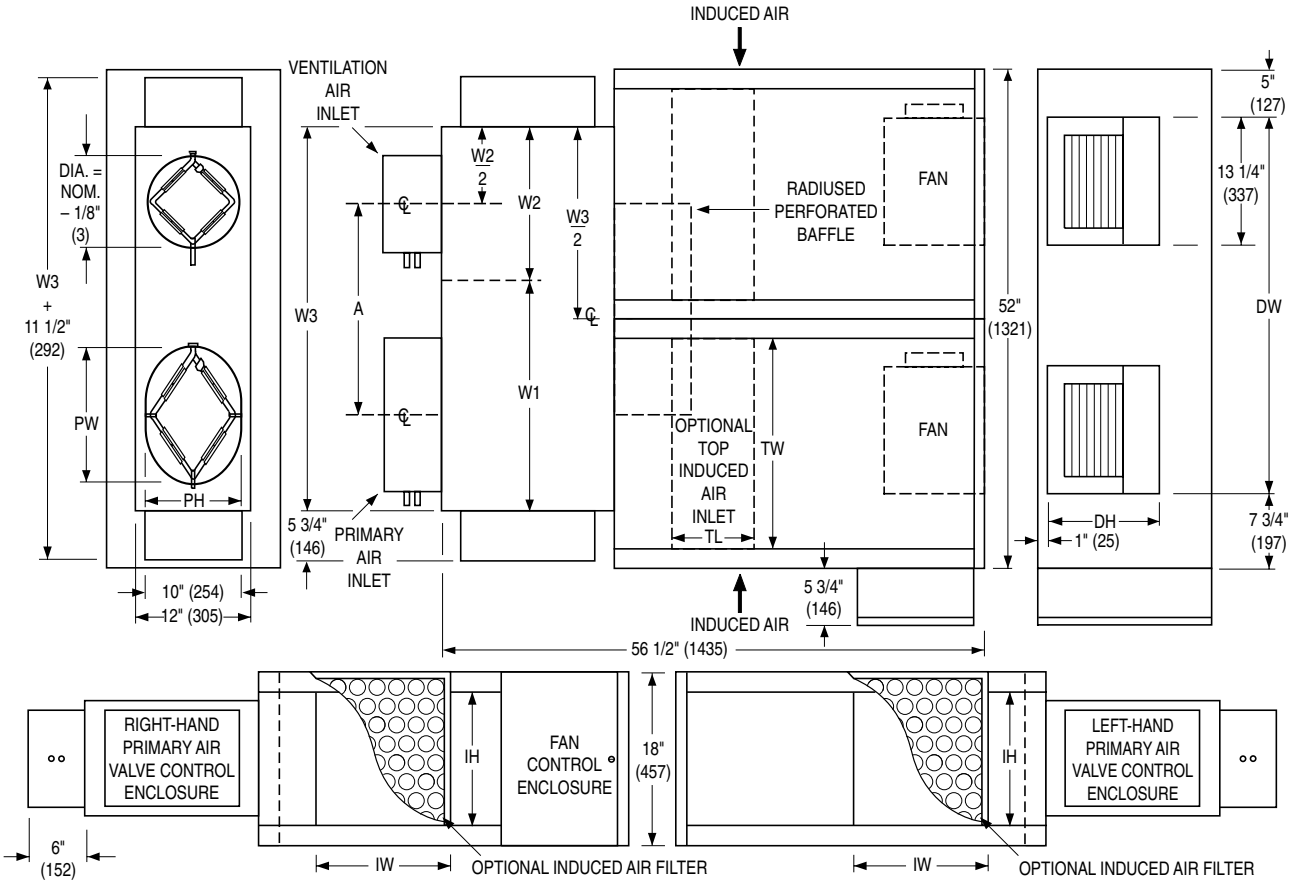
- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.



Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size F x G	K	H	M	N	Outlet Duct Size F x G	K	H	M	N
2	10 1/4 x 10 1/2	15 1/2	14	2 1/2	12 1/2	260 x 267	394	356	64	318
3	10 1/4 x 10 1/2	15 1/2	18	2 1/2	15 1/4	260 x 267	394	457	64	387
4	13 x 10 1/2	21	18	5	15 1/4	330 x 267	533	457	127	387
5	14 1/4 x 11 3/4	22	18	4	15 1/4	362 x 298	559	457	102	387
6	14 1/4 x 11 3/4	25	19	5	15 1/4	362 x 298	635	483	127	387

Dimensions

Model Series 35STL • Series Flow • Outside Air Inlet • Unit Size 7



$W3 = W1 + W2$ $\quad A = (\frac{W1 + W2}{2})$

Dimensional Data. Imperial Units (inches)

Primary Inlet Size	Ventilation Air Inlet Size	Induced Air Inlet		Outlet Discharge DW x DH	Filter Size	
		Side (std.) IW x IH	Top (opt.) TL x TW		Side Inlet (std.)	Top Inlet (opt.)
10 12* 14* 16*	6, 8, 10 or 12*	14 x 14 (2)	8 1/2 x 20 (2)	39 1/4 x 11 1/2	14 x 16 (2)	16 x 25 (2)

* Flat oval inlets

Dimensional Data. Metric Units (mm)

Primary Inlet Size	Ventilation Air Inlet Size	Induced Air Inlet		Outlet Discharge DW x DH	Filter Size	
		Side (std.) IW x IH	Top (opt.) TL x TW		Side Inlet (std.)	Top Inlet (opt.)
254 305* 356* 406*	152, 203, 254 or 305*	356 x 356 (2)	216 x 508 (2)	997 x 292	356 x 406 (2)	406x 635 (2)

* Flat oval inlets

Primary/Vent Inlet Size	W1/W2	
	inches	mm
4, 5, 6	10	254
7, 8	12	305
10	14	356
12	18	457
14	24	610
16	28	711

Oval Inlet Dimensions

Size	PW x PH	
	inches	mm
12	12 15/16 x 9 13/16	329 x 249
14	16 1/16 x 9 13/16	408 x 249
16	19 3/16 x 9 13/16	487 x 249

Dimensions

Model Series 35STL • Unit Size 7

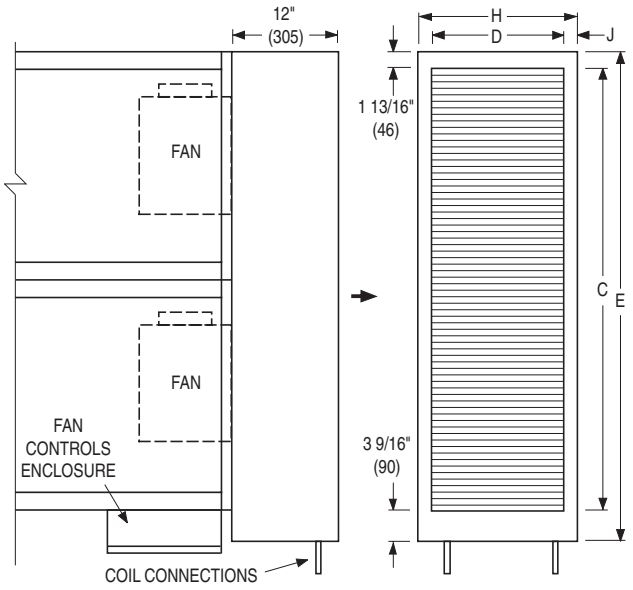
Hot Water Coil Section

Model 35SWTL

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted).

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 7/8" (22) or 1 3/8" (35) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size C x D	E	H	J	Outlet Duct Size C x D	E	H	J
7	50 x 14 7/8	55 3/8	18	1 9/16	1270 x 378	1407	457	40

Electric Coil Section

Model 35SETL

Standard Features:

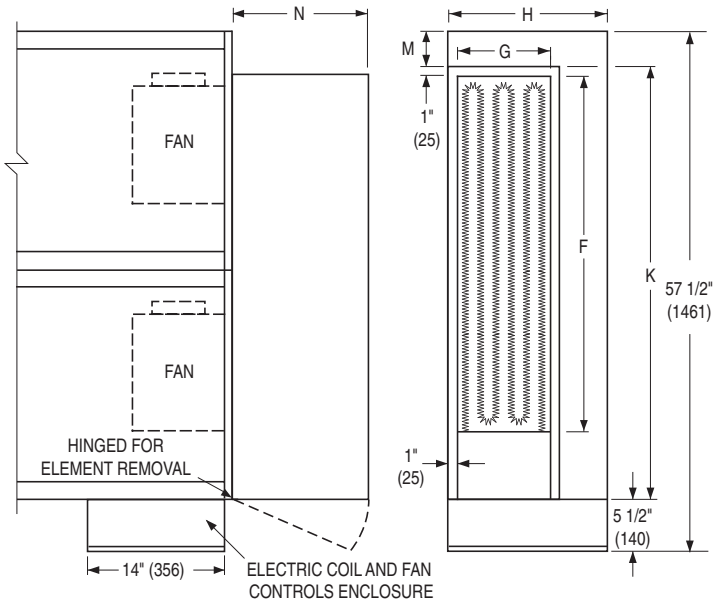
- Unique hinged heater design permits easy access, removal and replacement of heater element without disturbing ductwork.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is 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 elevation will therefore change.

Standard Supply Voltage (60 Hz):

- 208, 240, and 277V single phase.
- 208, 480 (4 wire wye) and 600V three phase.

Options:

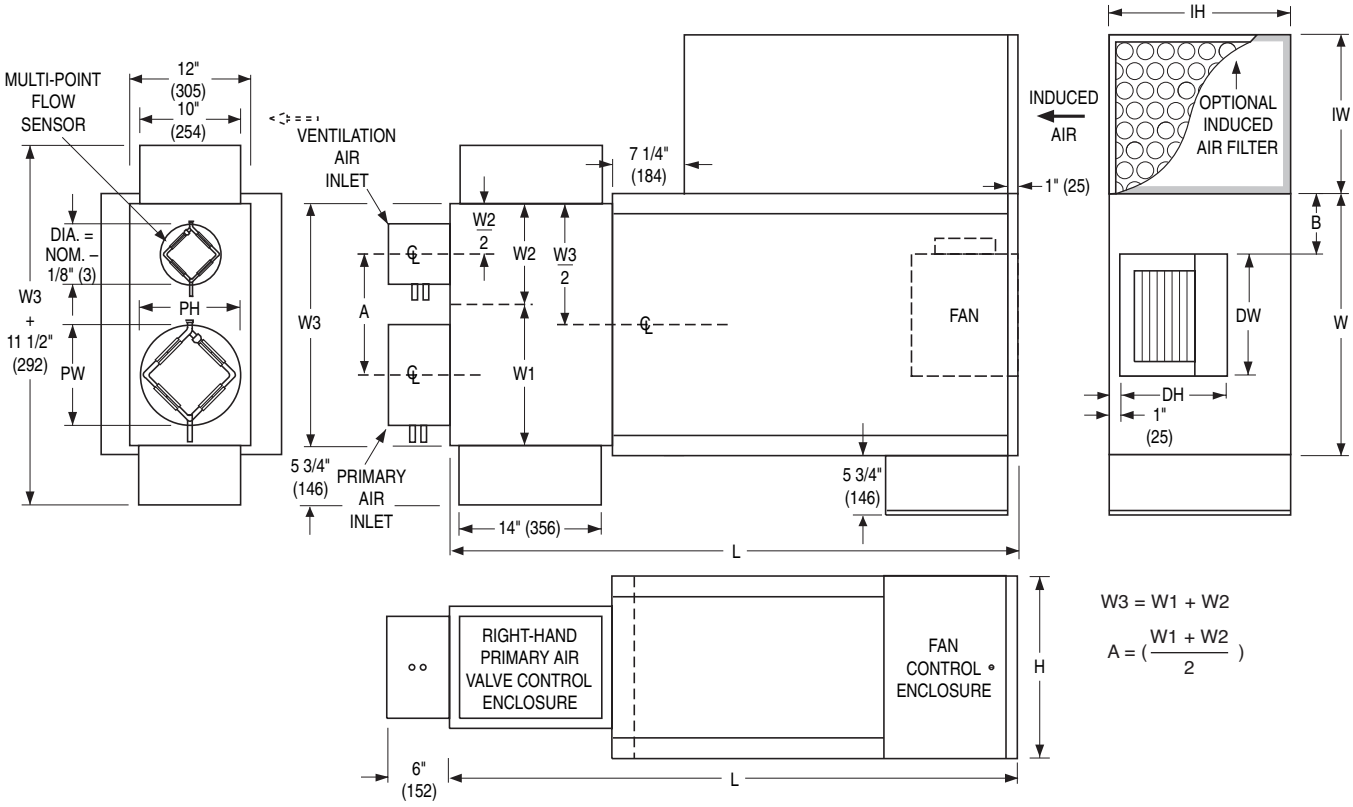
- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.



Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size F x G	K	H	M	N	Outlet Duct Size F x G	K	H	M	N
7	40 1/4 x 11 3/4	48	18	4	15 1/4	1022 x 298	1219	457	102	387

Dimensions

Model Series 35STLST "Stealth™" • Series Flow • Outside Air Inlet • Unit Sizes 2 – 6



Dimensional Data. Imperial Units (inches)

Unit Size	Primary Inlet Size	Ventilation Inlet Size	W	H	L	B	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
2	6, 8	4, 5, 6	18	14	51 1/2	3 1/2	9 x 14	9 1/4 x 10 1/2	10 x 14
3	6, 8, 10	4, 5, 6, 7, 8	18	18	51 1/2	3 1/2	11 x 18	9 1/4 x 10 1/2	12 x 18
4	6, 8, 10	4, 5, 6, 7, 8, 10	26	18	56 1/2	6	15 3/4 x 14	12 x 10 1/2	16 x 14
5	8, 10, 12*	4, 5, 6, 7, 8, 10	26	18	56 1/2	5	14 1/2 x 18	13 1/4 x 11 1/2	14 x 18
6	10, 12*, 14*	4, 5, 6, 8, 10, 12*	30	19	59 1/2	6	17 1/2 x 19	13 1/4 x 11 1/2	18 x 19

* Flat oval inlets

Dimensional Data. Metric Units (mm)

Unit Size	Primary Inlet Size	Ventilation Inlet Size	W	H	L	B	Induced Air Inlet IW x IH	Outlet Discharge DW x DH	Filter Size
2	152, 203	102, 127, 152	457	356	1308	89	229 x 356	235 x 267	254 x 356
3	152, 203, 254	102, 127, 152, 178, 203	457	457	1308	89	279 x 457	235 x 267	305 x 457
4	152, 203, 254	102, 127, 152, 178, 203, 254	660	457	1435	152	400 x 356	305 x 267	406 x 356
5	203, 254, 305*	102, 127, 152, 178, 203, 254	660	457	1435	127	368 x 457	337 x 292	356 x 457
6	254, 305*, 356*	102, 127, 152, 203, 254, 305*	762	483	1511	152	445 x 483	337 x 292	457 x 483

* Flat oval inlets

Primary/Vent Inlet Size	W1/W2	
	inches	mm
4, 5, 6	10	254
7, 8	12	305
10	14	356
12	18	457
14	24	610

Oval Inlet Dimensions

Size	PW x PH	
	inches	mm
12	12 13/16 x 9 13/16	329 x 249
14	16 1/16 x 9 13/16	408 x 249

Dimensions

Model Series 35STLST "Stealth™" • Series Flow • Outside Air Inlet • Unit Sizes 2 – 6

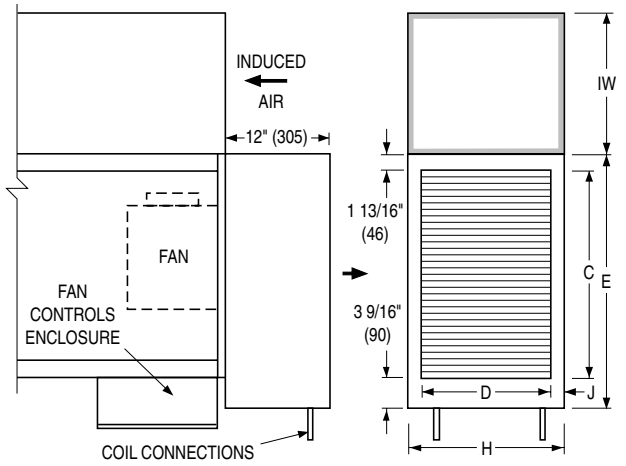
Hot Water Coil Section

Model 35SWTLST

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 1/2" (13) or 7/8" (22) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size C x D	E	H	J	Outlet Duct Size C x D	E	H	J
2	16 x 12 1/8	21 3/8	14	15/16	406 x 308	543	356	24
3	16 x 14 7/8	21 3/8	18	1 9/16	406 x 378	543	457	40
4, 5	24 x 14 7/8	29 3/8	18	1 9/16	610 x 378	746	457	40
6	28 x 17 1/8	33 3/8	19	15/16	711 x 435	848	483	24

Electric Coil Section

Model 35SETLST

Standard Features:

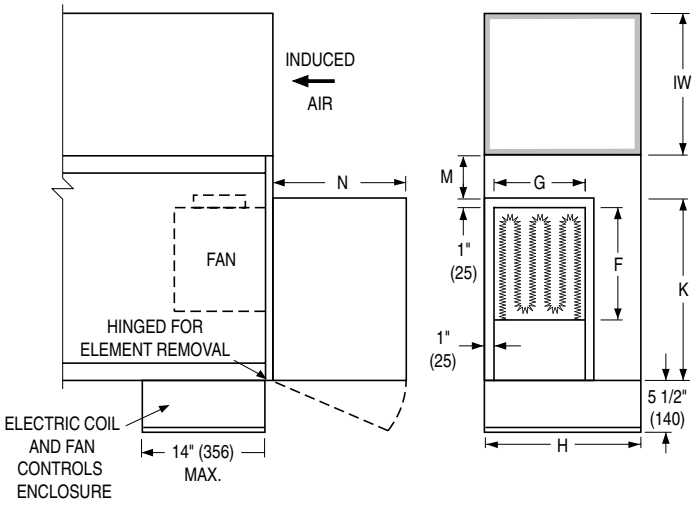
- Unique hinged heater design permits easy access, removal and replacement of heater element without disturbing ductwork.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is 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 elevation will therefore change.

Standard Supply Voltage (60 Hz):

- 208, 240 and 277V single phase.
- 208, 480 (4 wire wye) and 600V three phase.

Options:

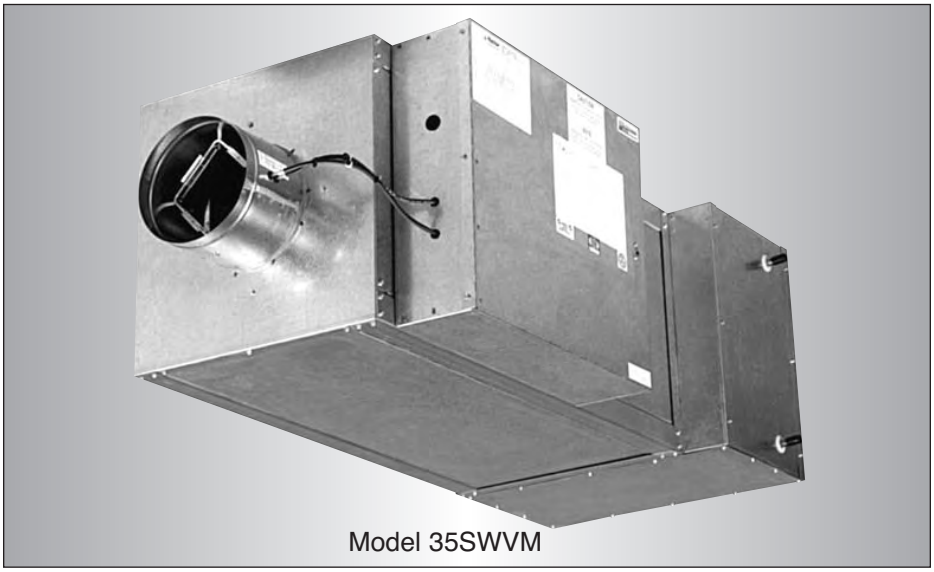
- Toggle disconnect switch (includes fan)
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.



Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size F x G	K	H	M	N	Outlet Duct Size F x G	K	H	M	N
2	10 1/4 x 10 1/2	15 1/2	14	2 1/2	12 1/2	260 x 267	394	356	64	318
3	10 1/4 x 10 1/2	15 1/2	18	2 1/2	15 1/4	260 x 267	394	457	64	387
4	13 x 10 1/2	21	18	5	15 1/4	330 x 267	533	457	127	387
5	14 1/4 x 11 3/4	22	18	4	15 1/4	362 x 298	559	457	102	387
6	14 1/4 x 11 3/4	25	19	5	15 1/4	362 x 298	635	483	127	387

SERIES FLOW
CONSTANT VOLUME
35SVM SERIES

- **PRESSURIZATION UNIT**
- **CRITICAL ENVIRONMENT APPLICATION**
- **EPIC™/ECM MOTOR**



Model 35SWVM

Models:

35SVM	**No Heat**
35SEVM	**Electric Heat**
35SWVM	**Hot Water Heat**

Nailor's 35S Series unit with the VM option is perfect for use as a pressurization unit for critical environment applications. Utilizing Nailor's EPIC™ fan technology, the fan and blower operate as a pressure independent constant volume assembly. This means that the airflow through the unit will not change due to pressure changes in the system as the filter loads or as the pressure in the exhaust or supply ducts change. The induction port is closed so that the unit operates as a straight through cooling unit. Both electric and hot water reheat options are available. HEPA filters may be installed either upstream or downstream of the terminal unit depending on whether the room pressure is negative or positive. The fan and damper are set to maintain pressure in the room being served. Temperature control is through reheat in the unit. The VM option allows designers to take advantage of Nailor's EPIC™ fan technology for pressurization application while also benefiting from the low noise levels generated by the Nailor 35SST terminal units and the associated low operating costs of Nailor's EPIC™ fan technology.

"Smart" Brushless DC motor technology provides continuous monitoring, automatic compensation and precise control and maintenance of discharge airflow regardless of discharge static pressure variations incurred by a HEPA filter. Available in two units sizes, suitable for 200 – 1650 cfm (94 – 779 l/s) zone designs with up to a maximum total external discharge static pressure of 1.0" w.g. (250 Pa).

Ideally, suited to clean room applications such as hospital isolation wards, operating rooms, pharmaceutical and biotechnology manufacturing and research facilities.

FEATURES:

- Unique 16 ga. (1.6) galvanized steel channel space frame construction provides extreme rigidity and 20 ga. (1.0) casing components.
- 16 ga. (1.6) galvanized steel inclined opposed blade primary air damper operating on a 45° arc.
- EPIC™/ECM motor fan technology.
- Solid metal 'IAQ' inner liner.
- Pressure independent primary airflow control.
- Multi-point averaging flow sensor.
- Terminal may be field installed either way up, providing the additional flexibility of right or left field connections.
- Universal access panels on all four sides of terminal for ease of maintenance and service.
- Motor blower assembly mounted on special 16 ga. (1.6) angles and isolated from casing with rubber isolators.
- Hinged door on fan controls enclosure.
- 3/4" (19), dual density insulation. Exposed edges coated to prevent air erosion. Meets requirements of NFPA 90A and UL 181.
- Available with electric or hot water reheat.
- All controls are mounted on exterior of terminal providing ready access for field adjustment.
- Each terminal factory tested prior to shipment.
- Single point electrical and/or pneumatic main air connection.
- Discharge opening designed for flanged duct connection.
- Full primary air valve low voltage enclosure for factory mounted DDC and analog electronic controls.

Controls:

- Pneumatic and analog electronic controls. Factory supplied, mounted and calibrated.
- Digital controls. Factory mounting and wiring of DDC controls supplied by BMS Controls Contractor.

Options and Accessories:

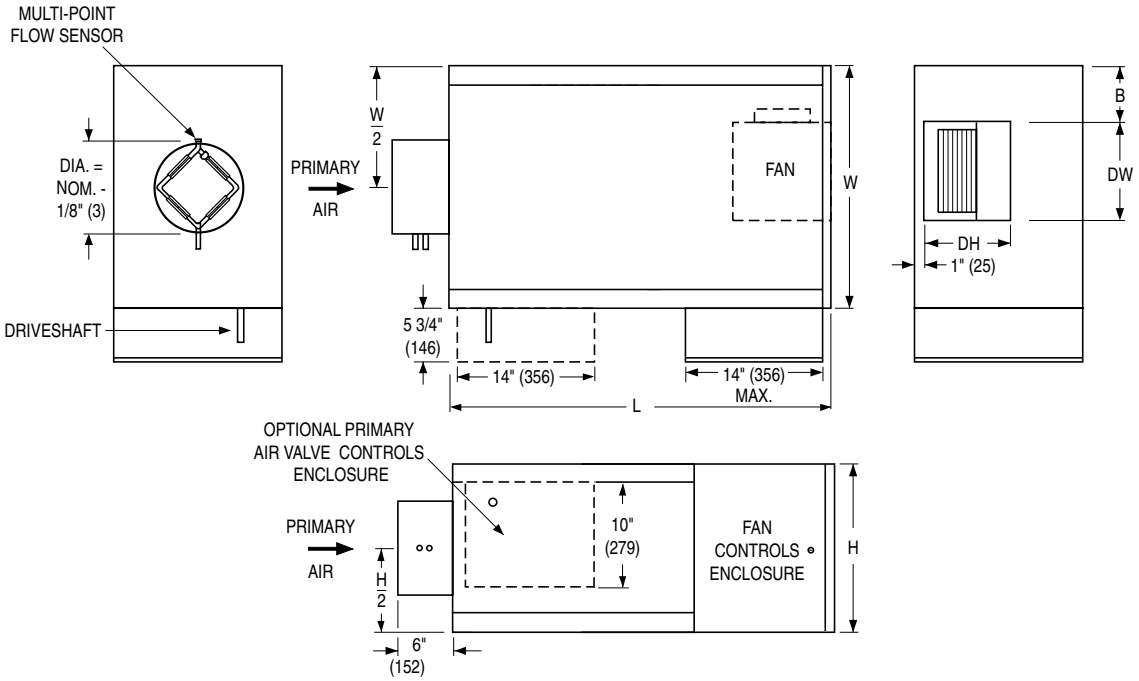
- Primary air valve enclosure for field mounted controls.
- Toggle disconnect switch (except units with electric heat, when disconnect is an electric heat option and includes fan).
- Fan unit fusing.
- Hanger brackets.
- FN2 90° Line Voltage enclosure.

Performance Data:

Refer to "Stealth™" unit on Page D30.

Dimensions

Model Series 35SVM • Pressurization Unit • Unit Sizes 3 & 5



Dimensional Data. Imperial Units (inches)

Unit Size	Inlet Size	W	H	L	B	Outlet Discharge DW x DH
3	6, 8, 10	18	18	36	3 ½	9 ¼ x 10 ½
5	8, 10, 12	26	18	41	5	13 ¼ x 11 ½

ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

Dimensional Data. Metric Units (mm)

Unit Size	Inlet Size	W	H	L	B	Outlet Discharge DW x DH
3	152, 203, 254	457	457	914	89	235 x 267
5	203, 254, 305	660	457	1041	127	337 x 292

Model 35SWVM

Dimensions

Model Series 35SVM • Pressurization Unit • Unit Sizes 3 and 5

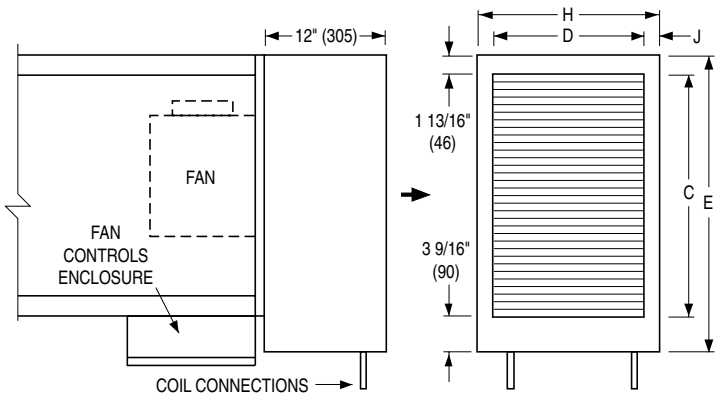
Hot Water Coil Section

Model 35SWVM

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil (and header on multi-circuit units) is installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 1/2" (13) or 7/8" (22) O. D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



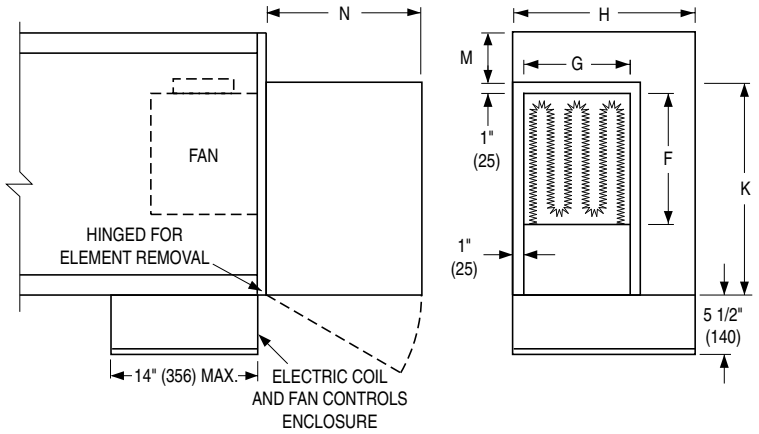
Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size C x D	E	H	J	Outlet Duct Size C x D	E	H	J
3	16 x 14 7/8	21 3/8	18	1 9/16	406 x 378	543	457	40
5	24 x 14 7/8	29 3/8	18	1 9/16	610 x 378	746	457	40

Electric Coil Section

Model 35SEVM

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 terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is 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 elevation will therefore change.



Standard Supply Voltage (60 Hz):

- 208, 240 and 277V, single phase.
- 208, 480 (4 wire wye) and 600V three phase.

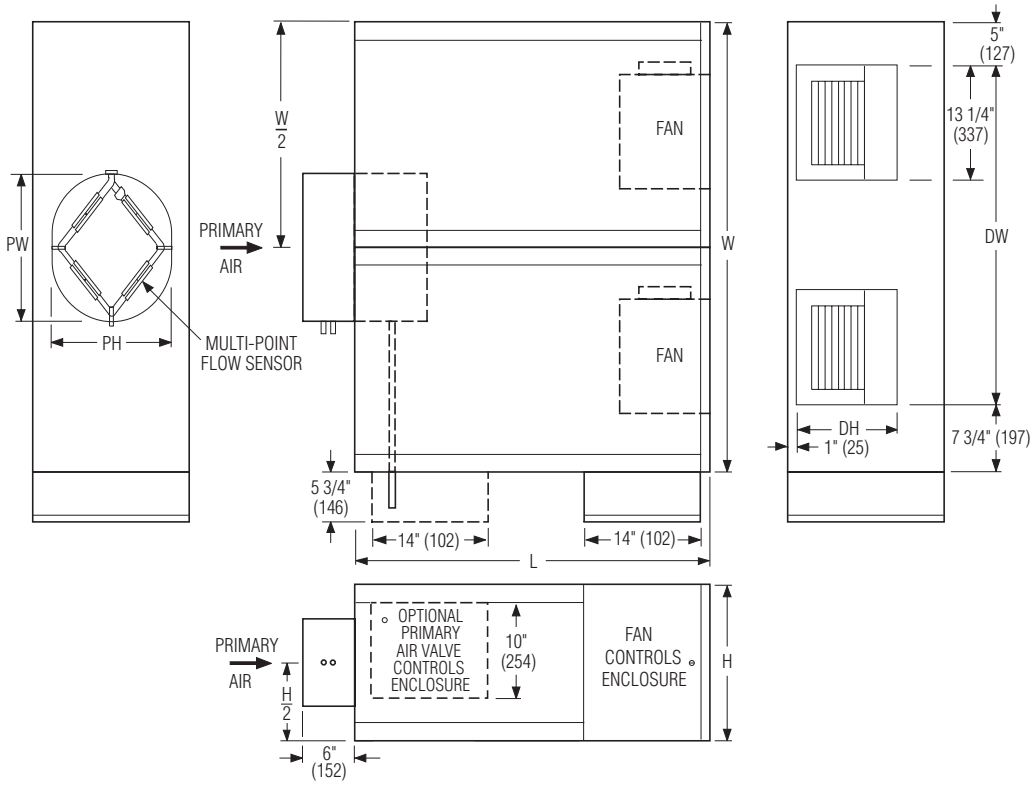
Options:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.

Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size F x G	K	H	M	N	Outlet Duct Size F x G	K	H	M	N
3	10 1/4 x 10 1/2	15 1/2	18	2 1/2	15 1/4	260 x 267	394	457	64	387
5	14 1/4 x 11 3/4	22	18	4	15 1/4	362 x 298	559	457	102	387

Dimensions

Models 35SVM • Pressurization Unit • Unit Size 7



Dimensional Data. Imperial Units (inches)

Unit Size	Inlet		W	H	L	Outlet Discharge DW x DH
	Size	PW x PH				
7	14 rnd 16 rnd 18 oval	13 7/8 15 7/8 20 3/16 x 13 7/8	52	18	41	39 1/4 x 11 1/2

Dimensional Data. Metric Units (mm)

Unit Size	Inlet		W	H	L	Outlet Discharge DW x DH
	Size	PW x PH				
178	356 rnd 407 rnd. 457 oval	352 403 513 x 352	1321	457	1041	997 x 292

ARI Standard 880
A Participating Corporation in the ARI 880 Certification program.

Dimensions

Model Series 35SWVM • Series Flow • Unit Size 7

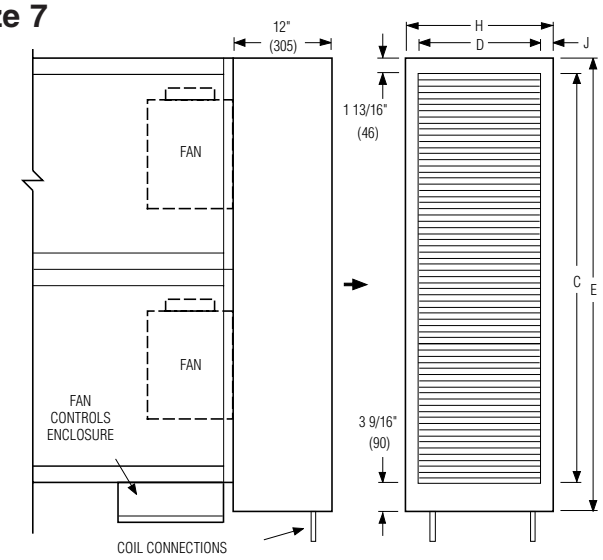
Hot Water Coil Section

Model 35SWVM

Available in one, two or three row. Coil section installed on unit discharge. Right hand coil connection looking in direction of airflow standard (shown). Left hand is optional (terminals are inverted). Connections must be selected same hand as controls enclosure location.

Standard Features:

- Coil section installed on unit discharge.
- Coil and header are installed in insulated casing for increased thermal efficiency.
- 1/2" (13) copper tubes.
- Aluminum ripple fins.
- 7/8" (22) or 1 3/8" (35) O.D. sweat connections.
- Top and bottom access panels for inspection and coil cleaning.
- Flanged outlet duct connection.



Unit Size	Imperial Units (inches)				Metric Units (mm)			
	Outlet Duct Size C x D	E	H	J	Outlet Duct Size C x D	E	H	J
7	50 x 14 7/8	55 3/8	18	1 9/16	1270 x 378	1407	457	40

Electric Coil Section

Model 35SEVM

Standard Features:

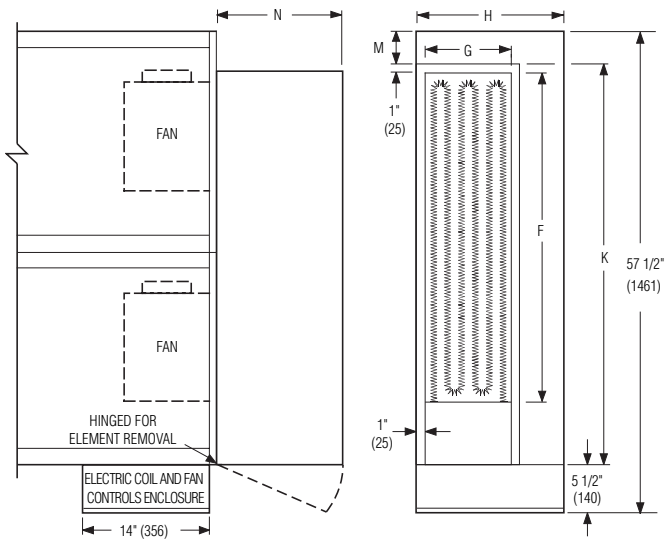
- Unique hinged heater design permits easy access, removal and replacement of heater element without disturbing ductwork.
- Coil installed on unit discharge.
- Insulated coil element wrapper.
- Automatic reset high limit cut-outs (one per element).
- Single point electrical connection for entire terminal unit.
- Positive pressure airflow switch.
- Flanged outlet duct connection.
- Terminal unit with coil is 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 elevation will therefore change.

Standard Supply Voltage (60 Hz):

- 208, 240 and 277V single phase.
- 208, 480 (4 wire wye) and 600V
- three phase.

Options:

- Toggle disconnect switch (includes fan).
- Door interlock disconnect switch.
- Mercury contactors.
- Power circuit fusing.
- Class 'A' 80/20 Ni./Ch. wire.
- Dust tight construction.
- Manual reset secondary thermal cut out.
- SCR Control.

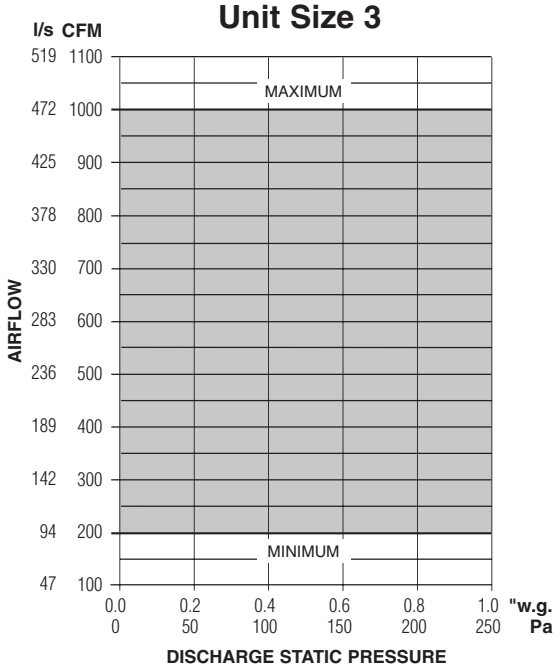


Unit Size	Imperial Units (inches)					Metric Units (mm)				
	Outlet Duct Size F x G	K	H	M	N	Outlet Duct Size F x G	K	H	M	N
7	40 1/4 x 11 3/4	48	18	4	15 1/4	1022 x 298	1219	457	102	387

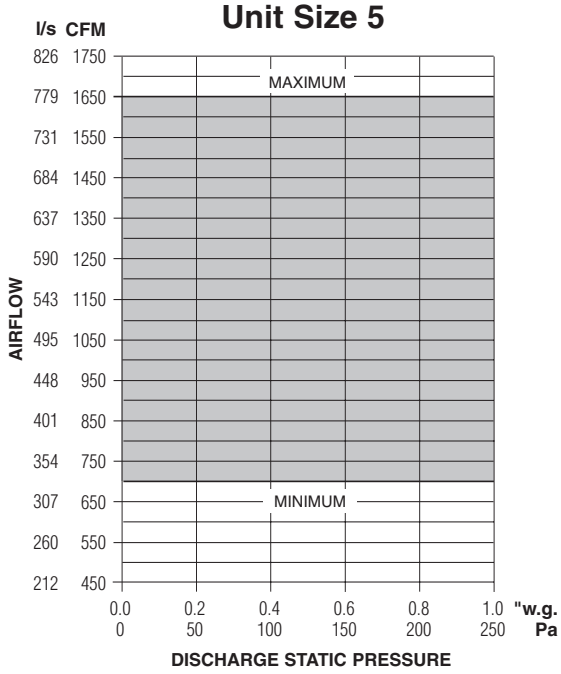
Performance Data

EPIC™/ECM Motor (Standard) - Fan Curves – Airflow vs. Downstream Static Pressure
35SVM Series • Pressurization Unit

Unit Size 3



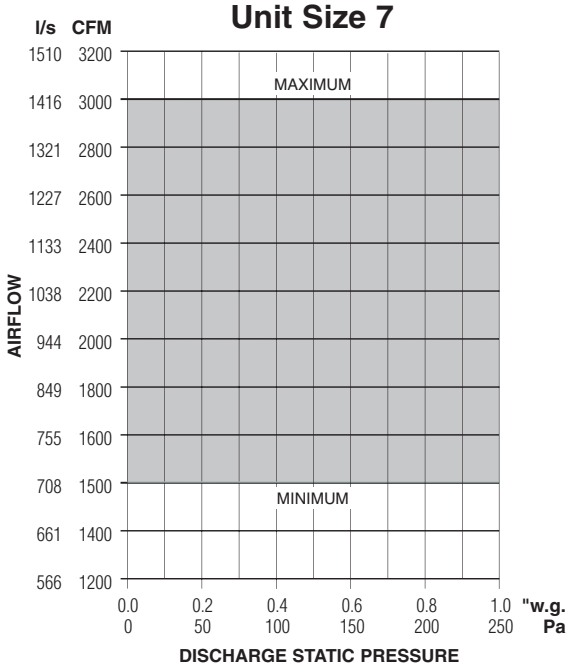
Unit Size 5



NOTES:

- The fan curves for the ECM motor are unlike those for traditional PSC motors. The ECM motor is constant volume at factory or field set point and airflow does not vary with changing static pressure conditions. The motor compensates for any changes in external static pressure or induced air conditions such as filter loading.
- Airflow can be set to operate on horizontal performance line at any point within shaded area using the solid state volume controller provided.
- Fan curves shown are applicable to 120/240 and 277 volt, single phase ECM motors. ECM motors, although DC in operation, include a built-in inverter.

Unit Size 7



Electrical Data

Unit Size	Motor H.P.	ECM Motor FLA	
		120/1/60	277/1/60
3	1/2	7.9	3.5
5	3/4	12.6	5.5
7	2@3/4	25.2	10.9

FLA = Full load amperage

Specification Text File

Suggested Specifications

Series Flow (Constant Volume) Fan Powered Terminals – 35S Series

(Section 15840)

1.01 Furnish and install constant volume series fan powered terminal units of the sizes and capacities as indicated on the drawings. Units shall be pressure independent with (pneumatic, analog electronic, digital electronic) controls. Units shall be manufactured by **Nailor Industries Inc.** Model **35S**.

1.02 The entire terminal unit shall be designed and built as a single unit. The units shall be provided with a primary variable air volume damper that controls the air quantity in response to a (pneumatic, electronic) thermostat. The space limitations shall be reviewed carefully to ensure that all units will fit into the space allowed.

1.03 Unit casings shall be space frame construction utilizing 16 gauge galvanized steel corner structural members and 20 gauge galvanized steel panels. Unit shall be fully lined with fiberglass insulation which shall be at least 3/4" (19 mm) thick dual density insulation complying with NFPA 90 for fire and smoke resistivity and UL 181 for erosion. Any cut edges of insulation shall be coated with NFPA 90 approved sealant.

1.04 Unit casing shall have four access panels, one on each side of the unit and one on the bottom and top for easy access to motor and blower assembly and for maintenance and replacement of parts without disturbing duct connections. The unit shall be rated to operate in left hand or right hand mode by turning the unit over. Access panels shall be attached to casing with (screws, quick acting latches, hinges). Casing leakage shall not exceed 2% of terminal rated airflow at 0.5" w.g. (125 Pa) interior casing pressure. All high side casing joints shall be sealed with approved sealant and high side casing leakage shall not exceed 2% of terminal rated airflow at 3" w.g. (750 Pa).

1.05 Units shall have round inlets for the primary air connections and shall have a 6" (152 mm) deep inlet duct collar for field connection. The outlets shall be rectangular and suitable for flanged duct connections. Casing shall have mounting area for hanging by sheet metal straps from a concrete slab.

1.06 The damper shall be of rectangular, multiple inclined opposed blade construction and designed to operate on a 45° arc. Blades shall be minimum 16 ga. galvanized steel, single thickness construction with heavy duty gasket glued to the blades. The blades shall be screwed through the damper shaft to ensure that no slippage occurs. Blade shafts shall pivot on corrosion free bearings. Damper leakage shall not exceed 2% of the terminal rated cfm at 3" w.g. (750 Pa) inlet static pressure.

1.07 Entire terminal unit shall be factory assembled with (pneumatic, electronic) controls. All components including all controls except the room thermostat and (pneumatic piping, field wiring) shall be factory installed and mounted with the unit.

1.08 Provide a (pneumatic, analog electronic, digital electronic) flow control device that will limit the maximum and minimum airflow to that scheduled on the drawings. Airflow limits shall be factory set. Thermostat signal shall reset the flow control device to adjust primary airflow to match load requirements. Control of the terminal unit shall be pressure independent.

1.09 The terminal unit shall be capable of operation as described herein with inlet static pressure of 0.05" w.g. (12 Pa) at full cooling with no mixing of induced and primary air. (The sequence of operation should be described here, if not part of the temperature controls specifications). Mixing of the primary and secondary airstreams shall be such that no more than 2.5° F (1.4°C) variation shall exist in the discharge airstream for each 20° F (11.1°C) of difference between the primary and secondary airstreams.

1.10 Blower casings shall be constructed of heavy gauge coated steel. Blower wheel shall be forward curved centrifugal type, dynamically balanced and driven by direct drive, single speed split capacitor motors. Motors shall be suitable for (120, 208, 240, 277 volts) single phase power. Motors shall have built-in overload protection, bearings capable of low rpm oiling, permanently oiled bearings and a built-in anti-backward rotation device. Fan assembly shall be mounted so as to isolate the casing from the motor and blower vibration at no less than four points. Isolation shall be supplied at the motor and at the blower mounting points.

1.11 An electronic motor speed controller sized and designed for the specific blower motor combination shall be provided to allow infinitely adjustable fan speed from the minimum voltage stop to the line voltage signal to the motor. A minimum voltage stop shall be employed to ensure that fan cannot run in stall mode.

1.12 Units shall incorporate a single point electrical (and pneumatic) connection for the entire unit. All electrical components shall be UL or ETL listed or recognized and installed in accordance with the National Electrical Code. All electrical components shall be mounted in a control box. The entire assembly shall be ETL listed (cETL in Canada) and so labeled.

1.13 All sound data shall be compiled in an independent laboratory and in accordance with the latest version of ARI 880. All units shall be ARI certified and bear the ARI certification label.

1.14 Unit maximum radiated sound power levels at 1.0" w.g. (250 Pa) inlet pressure and 0.25" w.g. (63 Pa) discharge static pressure shall not exceed the values in Tables 1 and 2 at the specified airflow. No credit or reduction shall in any way be considered for room, plenum, ceiling, and/or similar item effects.

Unit Size	Airflow		Sound Power Octave Band Center Frequency (Hz.)					
	cfm	l/s	2	3	4	5	6	7
			125	250	500	1000	2000	4000
2	450	212	63	60	55	52	53	53
3	900	425	68	60	59	56	60	60
4	1300	614	72	67	63	58	61	62
5	1700	802	75	70	64	59	63	66
6	2000	944	76	72	65	62	64	67

Table 1. Maximum Radiated Sound Power Levels.
Full Cooling (Fan on and 100% primary air).

Unit Size	Airflow		Sound Power Octave Band Center Frequency (Hz.)					
	cfm	l/s	2	3	4	5	6	7
			125	250	500	1000	2000	4000
2	450	212	58	51	47	40	34	31
3	900	425	66	55	54	49	46	42
4	1300	614	72	63	58	53	51	47
5	1700	802	73	67	59	54	52	50
6	2000	944	74	68	61	58	55	52

Table 2. Maximum Radiated Sound Power Levels.
Full heating (Fan only).

1.15 Unit maximum discharge sound power levels at 1.0" w.g. (250 Pa) inlet pressure and 0.25" w.g. (63 Pa) discharge static pressure shall not exceed the values in Table 3 at the specified airflow. No credit or reduction shall in any way be considered for room, downstream duct, elbows and/or similar item effects.

Unit Size	Airflow		Sound Power Octave Band Center Frequency (Hz.)					
	cfm	l/s	2	3	4	5	6	7
			125	250	500	1000	2000	4000
2	450	212	57	59	58	54	52	49
3	900	425	63	64	65	63	60	57
4	1300	614	68	70	69	68	65	64
5	1700	802	72	71	71	70	67	66
6	2000	944	73	74	74	73	70	70

Table 3. Maximum Discharge Sound Power Levels.
Full cooling (Fan on and 100% primary air).

Suggested Specifications

Series Flow (Constant Volume) Fan Powered Terminals – 35S Series (continued)

Options

"STEALTH™"

Specification Text File

Substitute the following paragraphs:

1.01 Furnish and install series flow (constant volume) fan powered terminal units of the sizes and capacities as indicated on the drawings. Units shall be pressure independent with (pneumatic, analog electronic, digital electronic) controls. Units shall be manufactured by **Nailor Industries Inc.** Model **35SST "Stealth™"**.

1.14 Unit maximum radiated sound power levels at 1.0" w.g. (250 Pa) inlet pressure and 0.25" w.g. (63 Pa) discharge static pressure shall not exceed the values in Tables 4 and 5 at the specified airflow. No credit or reduction shall in any way be considered for room, plenum, ceiling, and/or similar item effects.

Unit Size	Airflow		Sound Power Octave Band Center Frequency (Hz.)					
	cfm	l/s	2	3	4	5	6	7
			125	250	500	1000	2000	4000
2	450	212	59	60	48	40	36	37
3	900	425	63	61	52	46	42	42
4	1300	614	68	63	57	49	45	46
5	1700	802	70	66	57	51	48	48
6	2000	944	73	66	60	53	50	50

Table 4. Maximum Radiated Sound Power Levels. Full Cooling (Fan on and 100% primary air).

Unit Size	Airflow		Sound Power Octave Band Center Frequency (Hz.)					
	cfm	l/s	2	3	4	5	6	7
			125	250	500	1000	2000	4000
2	450	212	55	51	39	34	32	29
3	900	425	58	55	48	41	35	30
4	1300	614	66	59	52	46	39	36
5	1700	802	69	62	53	48	46	42
6	2000	944	71	63	56	50	45	40

Table 5. Maximum Radiated Sound Power Levels. Full Heating (Fan only).

1.15 Unit maximum discharge sound power levels at 1.0" w.g. (250 Pa) inlet pressure and 0.25" w.g. (63 Pa) discharge static pressure shall not exceed the values in Table 6 at the specified airflow. No credit or reduction shall in any way be considered for room, downstream duct, elbows and/or similar item effects.

Unit Size	Airflow		Sound Power Octave Band Center Frequency (Hz.)					
	cfm	l/s	2	3	4	5	6	7
			125	250	500	1000	2000	4000
2	450	212	57	59	58	54	52	49
3	900	425	63	64	65	63	60	57
4	1300	614	68	70	69	68	65	64
5	1700	802	72	71	71	70	67	66
6	2000	944	73	74	74	73	70	70

Table 6. Maximum Discharge Sound Power Levels. Full cooling (Fan on and 100% primary air).

Electric Heat

Specification Text File

Substitute the following paragraphs:

1.01 Furnish and install series flow (constant volume) fan powered terminal units with integral electric heat of the sizes and capacities as indicated on the drawings. Units shall be pressure independent with (pneumatic, analog electronic, digital electronic) controls. Units shall be manufactured by **Nailor Industries Inc.** Model **35SE** or **35SEST "Stealth™"** (select one).

1.12 An electric heater shall be factory mounted and pre-wired as an integral package with the fan powered terminal unit. Heaters shall be sized as shown on the drawings. The entire assembly including the electric heater shall be ETL listed (cETL in Canada) for zero clearance and so labeled and shall meet all requirements of the latest National Electrical Code (Canadian Electrical Code, CSA Standard C22.1). The unit with the heater mounted shall be listed and rated to be turned over for either left or right hand configuration. The unit shall have a single point electrical (and pneumatic) connection. Heater casing and panel shall be a minimum of 20 gauge galvanized steel. Each heater shall be complete with primary disc type automatic high limit, contactors as required, ground terminal, fan relay for interlocking the heater and fan and high grade nickel chrome alloy resistance wire. Element wires shall be suspended in insulators designed to expose the entire face area of the wire thereby eliminating hot spots. Each heater shall be supplied with factory supplied and pre-wired branch circuit fusing as required by NEC and UL. Circuiting and fusing shall also be in accordance with the circuiting requirements as shown on the plans. Additional accessories shall include (control transformer, circuit fusing, disconnect switch, electric step controller, pneumatic electric switches) for staging the heater.
(Additional performance requirements that you might want to include can be found in the electric heater section). The electric heater shall be located on the discharge side of the fan so as not to add heat to the motor and shorten its expected lifetime.

Heater voltage and stages to be as follows:
0 to 5.0 kW ..... 277V/1 phase, 1 Step
5.1 kW and up ..... 480V/3 phase, 1 Step

Hot Water Heating Coils

Specification Text File

Substitute the following paragraphs:

1.01 Furnish and install series flow (constant volume) fan powered terminal units with integral hot water coils of the sizes and capacities as indicated on the drawings. Units shall be pressure independent with (pneumatic, analog electronic, digital electronic) controls. Units shall be manufactured by **Nailor Industries Inc.** Model **35SW** or **35SWST "Stealth™"** (select one).

1.12 A hot water coil shall be factory mounted as an integral package with the fan powered terminal unit. Hot water coils shall be sized as shown on the drawings. The entire assembly including the hot water coil shall be ETL listed (cETL in Canada) for zero clearance and so labeled and shall meet all requirements of the latest National Electrical Code. The unit shall have a single point electrical (and pneumatic) connection. Water coil casing and panels shall be a minimum of 20 gauge galvanized steel. Access panels shall be supplied on the top and bottom of the unit for easy access to the coil for inspection and cleaning. All copper, including the headers and return bends, shall be encased to eliminate heat loss during heating sequence and heat gain during cooling sequence. Coils shall be 1, 2 or 3 row as required and heating capacities shall be as shown on the plans. Coils shall have aluminum plate fins spaced 10 per inch and bonded to 1/2" (13 mm) O.D. copper tubes. Copper connections shall be sweat. All coils shall be tested at a minimum of 300 psi under water to produce a guaranteed working pressure of 250 psi. Controls and valves for the hot water coils shall be field mounted. Heating coils shall be located on the discharge side of the fan so as not to add heat to the motor and shorten its expected lifetime.

Specification Text File

Suggested Specifications

Series Fan Powered VAV Terminal Units MODEL SERIES 35SST "STEALTH™"

(Section 15840)

The following specification is recommended where an independent laboratory test and performance verification is required.
The specification includes Digital Controls by Division 17, EPIC™/ECM motor and 'IAQ' Solid Metal Liner (Double Wall Construction).

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. Section 15 - - - General
2. Section 15 - - - Scope of Work
3. Section 15 - - - Design Conditions
4. Section 15 - - - Electric Motors and Controllers
5. Section 15 - - - Access Doors and Color Coded Identification in General Construction
6. Section 15 - - - Ductwork and Sheet Metal
7. Section 15 - - - Testing, Balancing and Adjusting

1.02 SUMMARY

A. Furnish and install all air terminal units herein specified and as indicated on the Drawings.

1.03 REFERENCE STANDARDS

A. All air terminal units shall be designed, manufactured and tested in accordance with the latest applicable industry standards including the following:

1. ANSI/ASHRAE Standard 130-96.
2. ARI Standard 880-98.
3. Underwriters Laboratories UL Standard 1995.
4. Underwriters Laboratories UL Standard 1996.

1.04 QUALITY ASSURANCE

A. 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 Authority having jurisdiction, and suitable for its intended use on this Project. Space limitations shall be reviewed to ensure that the equipment will fit into the space allowed.

B. All equipment and material to be furnished and installed on this project shall be run tested at the factory and results of that testing shall be tabulated and provided to the engineer when the equipment ships to the job site. See paragraph 2.03 G for specific requirements.

C. All equipment and material to be furnished and installed on this project shall have been pre-tested in a mock up facility suitable to the engineer. The test shall be as described in 2.03 D. The test results shall be supplied with the equipment submittal.

1.05 SUBMITTALS

A. The following submittal data shall be furnished according to the Conditions of the Construction Contract, Division 1 Specifications, and Section 15 - - - General and shall include but not be limited to:

1. Series Fan Powered Variable Air Volume Terminal Units, complete with capacity data, test data, construction details, physical dimensions, electrical characteristics, etc.

1.06 ACOUSTICS

Section A of this acoustical specification describes sound power levels as tested to ARI 880 and ASHRAE 130. These are not the selection criteria for this specification. The selection criteria will be in section B where sound pressure readings are taken in an actual mock up that will exhibit worst case performance for the purpose of guaranteeing equipment performance when the building is commissioned and turned over to the occupant. Section A is important in that it provides a guideline for the minimum performance that the terminal units will have to meet in order to anticipate performance that will be acceptable under section B.

A. Sound Power Acoustical Performance:

1. Discharge Noise: Maximum permissible sound power levels in octave bands of discharge sound through discharge ducts from terminal units operated at an inlet pressure of **0.75" w.g.** and the maximum amount of air volume shown on the Project Mechanical Drawings leaving the terminal unit and entering the reverberant chamber shall be as follows:

Octave Band	NC-35	NC-40
2	67	71
3	64	69
4	67	72
5	66	71
6	67	72
7	67	72

Table 1. Maximum Discharge Sound Power Levels (dB re 10^{-12} Watts)

2. Radiated Noise: Maximum permissible radiated sound power levels in octave bands of radiated transmission from terminal units operated at an inlet pressure of **0.75" w.g.** and the maximum scheduled air quantity in an installed condition over occupied spaces shall be as follows:

Octave Band	NC-35	NC-40
2	64	68
3	57	62
4	53	58
5	50	55
6	50	55
7	53	58

Table 2. Maximum Radiated Sound Power Levels (dB re 10^{-12} Watts)

B. Sound Pressure Acoustical Performance:
Each size of each terminal unit to be used on this project shall be completely laboratory tested for air performance and acoustics. Performance to NC 30, 35, 40 and 45 shall be charted for each size unit showing its maximum and minimum range limits under each NC condition listed above. If heater options change the overall performance, then the equipment shall be shown with electric and hot water coils in addition to no heat configurations. This data shall be submitted with the equipment submittal. Units that comply with the sound power data listed above, may comply with the sound pressure performance. Testing is required to determine compliance and the performance range. Units that do not comply with the sound power performance in paragraph 1.06 A. probably will not comply with the sound pressure requirements or will have restricted ranges of acceptance.

Specification Text File

Suggested Specifications

Series Fan Powered VAV Terminal Units MODEL SERIES 35SST "STEALTH™" (continued)

1.07 WARRANTY

A. Manufacturer shall warrant equipment for one year from start up or 18 months from shipment.

PART 2 - PRODUCTS

2.01 UNAUTHORIZED MATERIALS

A. Materials and products required for the work of this section shall not contain asbestos, polychlorinated biphenyl's (PCB) or other hazardous materials identified by the Engineer or Owner.

2.02 ACCEPTABLE MANUFACTURERS

A. These Specifications set forth the minimum requirements for series fan powered VAV terminal units. If they comply with these Specifications, series fan powered VAV terminal units manufactured by one of the following manufacturers will be acceptable:

1. Nailor Industries.

2.03 VARIABLE PRIMARY AIR VOLUME SERIES FAN POWERED TERMINAL UNITS

A. Furnish and install series fan powered VAV terminal units as indicated on the Drawings. The units shall be designed and built as a single unit and provided with a primary variable air volume damper that controls the primary air quantity in response to a temperature control signal. The damper construction shall be rectangular with multiple opposed blades designed to operate on a 45° arc. Blades shall be 16 gauge galvanized steel, single thickness construction with heavy-duty gasket glued to the blades. Units shall be suitable for pressure independent control with **Digital [DDC]** controls. The units shall contain a fan and motor assembly and [electric or hot water] heating coils where scheduled and/or indicated on the Drawings. The fan shall provide a constant volume of discharge air at all air blending ratios from minimum to maximum scheduled primary air quantities and zero to 100% return airflow rates and shall be controlled in sequence as outlined hereinafter. The space limitations shall be reviewed carefully to ensure all terminal units will fit into the space provided including National Electric Code clearances required in front of all panels containing electrical devices. Units shall be of space frame construction with 16 gauge corner posts for structural support and attachment points. Removable access doors or panels of minimum 20 gauge galvanized steel on the top, bottom and both sides of the terminal unit shall provide access to service the fan, electric motor and all internal components. Panels shall be attached with [screws or quick connect latches or hinges]. Units shall be fully rated, even with electric or hot water heater coils, to operate in left hand or right hand mode by turning the unit over. Unit shall be fully lined with at least 3/4" thick, dual density fiberglass insulation completely encapsulated between solid outer and inner solid liners, which comply with NFPA 90 for fire and smoke resistivity and UL 181 for erosion. Casing leakage shall not exceed 2% of terminal rated airflow at 0.5" w.g. interior casing pressure. All high side casing joints shall be sealed with approved sealant and high side casing leakage shall not exceed 2% of terminal rated airflow at 3" w.g.. Provide a filter rack with a 1" thick throwaway filter to be used during construction. Terminal unit manufacturer shall provide flow curves for the primary air sensor clearly labeled and permanently attached on the bottom or side of each fan terminal.

The unit shall include all equipment and controls as required to provide a complete and operating system with at least the following equipment and controls:

1. Single point electrical connection for the voltage/phase as scheduled in the Contract Documents. See Electrical Drawings for power feeder arrangements. Motors shall be rated at **[120 or 277]** volt single phase as scheduled in the contract documents.
2. A toggle disconnect switch for cooling only units, or a door interlocking disconnect switch for terminal units with electric heating coils. All disconnecting devices shall be sized and located as required to disconnect all ungrounded power conductors to all internal electrical components.
3. Individual overcurrent protection devices as required to protect individual units and transformers.
4. The primary inlet shall be equipped with an inlet collar sized to fit the primary duct size shown on the Drawings. Any transitions shall be provided and installed by the Division 15 Mechanical Subcontractor. The inlet collar shall provide at least a 6" length with a 1/8" high raised single or double bead located approximately 1½" from the inlet connection. The primary and fan design cfm settings shall be clearly and permanently marked on the bottom of the unit along with the terminal unit identification numbers. Each terminal unit shall incorporate a Nailor Diamond Flow sensor with four pick up points on each side to insure that with typical duct turbulence, the controller fidelity shall be ± 5% of set volume even with a hard 90° elbow at the inlet. Static variation of 0.5" w.g. to 6.0" w.g. shall not affect the flow reading. Provide a transformer with 24 volt AC secondary to provide power for the unit's controls and the Division 17 controls. The VAV terminal unit manufacturer and the Division 17 Building Controls Subcontractor shall verify compatibility of the multipoint flow sensors with transducer and DDC microprocessor furnished under Division 17 prior to bidding this Project.
5. The outlets shall be rectangular and suitable for flanged duct connections. Space frame casing shall have mounting area for hanging by sheet metal straps from a concrete slab or shall be supplied with angle brackets for mounting on all thread rods.
6. Fan motor assembly shall be a forward curved centrifugal fan with a direct drive motor. Motors shall be General Electric ECM and/or Nailor EPIC™ variable speed brushless DC motors specifically designed for use with a single phase, **[120 or 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 rotor losses. Motor shall have built-in soft start and slewed speed change ramps. Motor shall be able to be mounted with shaft in horizontal or vertical orientation. Motor shall be permanently lubricated with ball bearings. Motor shall be direct coupled to the blower. Motor shall maintain a minimum of 65% efficiency over its entire operating range. Provide isolation between fan motor assembly and unit casing in at least 4 locations to eliminate any vibration from the fan to the terminal unit casing. Provide anti-back rotation system or provide a motor that is designed to overcome reverse rotation and not affect life expectancy.
    a. The manufacturer of the fan powered terminal units shall set the fan discharge airflow (cfm) at the factory. If the fan powered terminal unit manufacturer cannot factory set the fan airflow (cfm), he shall send factory technicians to the field to adjust the GE ECM™ and/or Nailor EPIC™ motor and the associated controller/inverter to the discharge airflow (cfm) indicated in the Schedules in the Contract Documents. Fan airflow (cfm) shall be constant within ± 5% regardless of

Specification Text File

Suggested Specifications

Series Fan Powered VAV Terminal Units MODEL SERIES 35SST "STEALTH™" (continued)

changes in static upstream or downstream of the terminal unit after it is installed in the field. Fan airflow (cfm) is to be set with a potentiometer and digital meter. Neither SCR's nor rheostats shall be an acceptable means of setting the fan airflow (cfm). The terminal unit manufacturer shall provide one speed adjustment device to the Owner for field adjustment of the fan speed should construction or design changes become necessary.

b. A witnessed test shall be conducted by the fan powered terminal unit manufacturer in an independent testing laboratory to confirm that the terminal unit and the fan motor as an assembly performs in accordance with this specification. If the fan powered terminal unit and DC motor as an assembly fails to perform as specified and as scheduled on the drawings, the terminal unit manufacturer shall make adjustments and take all corrective action as necessary at the terminal unit manufacturer's sole expense.

7. The terminal unit shall be listed in accordance with UL 1995 as a composite assembly consisting of the terminal unit with or without the electric or hot water heating device.

8. **Heating Option. (Insert Electric or Hot Water Coil Spec.)**

9. The terminal unit shall be capable of operation as described herein with inlet static pressure of not more than 0.05" w.g. at full cooling with no mixing of induced and primary air. **[The sequence of operation should be described here if not part of the temperature controls specifications.]** The primary air damper shall be of a design that shall vary primary air supply in response to an electronic signal. Primary air damper close-off leakage shall not exceed 2% of the maximum ARI rated primary air cfm as shown in the manufacturer's catalog for each size terminal unit at 3" w.g. inlet static pressure. Submit damper leakage test data to the Engineer for review. Damper linkage and actuator shall be located inside the terminal unit. Damper connection to the operating shaft shall be a positive mechanical through bolt connection to prevent any slippage. Provide non-lubricated Celcon® or bronze oilite bearings for the damper shaft. The primary air damper in conjunction with the DDC controller furnished under Division 17 shall be selected to provide accurate control at low primary air velocities. The total deviation in primary airflow shall not exceed ± 5% of the primary airflow (cfm) corresponding to a 300 fpm air velocity through the primary air damper.

10. Provide a mixing chamber to provide mixing of primary air and plenum air from 100% primary air to 0% primary air. Mixing of the primary and secondary air streams shall be as described in paragraph 2.03 D. The deviation of fan supply air at design conditions and primary air flow rates from 100% primary air to 0% primary air shall not exceed 5%.

11. Provide duct inlet and outlet connections as indicated on the Drawings.

12. A double wall galvanized sheet metal housing shall be provided for the terminal unit casing. The casing construction shall be a minimum 20 gauge outer sheet with a minimum 22 gauge perforated or 26 gauge solid inner sheet encapsulating minimum 3/4" thick, dual density, minimum 1½ lb. density fiberglass insulation. The terminal units utilizing 22 gauge perforated inner sheets shall have reinforced foil faced fiberglass insulation. Each terminal unit shall incorporate the Nailor "Stealth™" attenuator for low radiated noise generation. The terminal units shall not exceed the depth indicated on the Drawings. Mounting connections for hanging the unit by sheet metal straps shall be clearly identified on the housing. All components, including all controls and wiring, shall be factory installed,except the room sensor or thermostat. No field assembly will be allowed. The unit shall be complete and suitable to accept the following field connections:

a. Primary duct.
b. Secondary duct.
c. Single point electrical connection. See Drawings for control box locations required for each terminal unit.
d. DDC controller control signals and wiring.
e. Room sensor connection.

B. The terminal unit shall be capable of operating throughout the full cataloged primary airflow range with an inlet static pressure of 0.10" w.g. or less. All downstream static pressure requirements are to be supplied by the terminal unit internal fan. See the schedules on the Contract Documents for static pressure requirements.

C. The control sequence shall be as specified in Division 17 (DDC by others).

D. Each size of each terminal unit to be used on this Project shall be completely laboratory tested 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 terminal unit manufacturer shall submit complete details, brochures, instrumentation information, etc., for review. The laboratory shall be capable of properly testing the largest terminal unit on this Project. See paragraph 1.06 B for acoustic guidelines. The air volume listed on the Drawings for the terminal units shall be supplied for the test with the primary cold duct supplying 48°F air and the plenum bypass air at 80°F. At primary air damper or valve positions as indicated hereinafter and with an inlet static pressure of 0.20" w.g., 0.50" w.g., and 1.0" w.g. the unit shall be capable of producing a mixed airstream of which the temperature shall not vary more than 2.5°F over the duct 48" downstream of box for each 30°F temperature difference between the temperatures of the entering warm and cold air. The variation of temperature shall be proportionally less at smaller temperature differences. There shall be at least fifteen temperature readings made at the discharge outlet duct over the entire discharge area as described in ARI 880 with the air entering the unit in each of the following proportions:

1. 25% cold air and 75% plenum air.
2. 50% cold air and 50% plenum air.
3. 75% cold air and 25% plenum air.

Operation of the flow control device shall be demonstrated to repeat under all conditions of operation of the primary air damper or valve and duct pressures as specified hereinbefore. If the VAV fan powered terminal unit manufacturer has conducted the hereinbefore specified air performance and air mixing 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. Test results shall clearly state fan performance at test altitude and at Project altitude. See Section 15 - - - Design Conditions.

E. After the manufacturer has submitted certified copies of the laboratory air performance and acoustical performance test results to the Engineer, the Engineer may witness the laboratory tests to verify compliance with the Specifications. See Section 15 - - - General for additional submittal and certification requirements.

F. All fan powered terminal units shall be identified on the bottom of the unit (minimum 1/2" high letters) and on the shipping carton, with

Specification Text File

Suggested Specifications

Series Fan Powered VAV Terminal Units MODEL SERIES 35SST "STEALTH™" (continued)

the floor and box number that identifies it along with the airflow (cfm) settings. Every unit shall have a unique number combination that matches numbers on the contractor's coordination drawings as to its location and capacity and is coordinated with the DDC controller and the Division 17 Building Control System submittal drawings.

G. The terminal unit manufacturer will verify the operation of each fan powered terminal 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. The terminal unit manufacturer shall factory or field adjust the GE ECM™ and/or Nailor EPIC™ motor and associated controller/inverter to the discharge airflow (cfm) indicated in the Schedules. (Refer to paragraph 2.03 A.6.a. hereinbefore.)
4. Energize the electric heat through the electric heating coil relay. Verify the signal with a volt meter and ammeter to ensure proper heater operation.
5. De-energize the electric heating coil and verify the signal with a volt-meter to ensure the heater is de-energized.
6. If DDC controls are mounted, disconnect the primary air damper actuator from the DDC terminal unit controller. Provide separate power source to the actuator to verify operation and rotation of damper. Drive the damper closed and verify by feel or observation that damper is driven fully closed. Return primary air damper to the fully open position prior to shipment.
7. Provide a written inspection report for each terminal unit signed and dated by the factory test technician verifying all terminal unit wiring and testing has been performed per the manufacturer's testing and quality assurance requirements.

Heat Options

Electric Heat

Specification Text File

(Insert the following paragraphs).

2.03.A.8 Fan Powered Terminal Unit Electric Heating Coils.

a. Electric heating coils shall consist of open coils of high grade nickel and chromium resistance wire or nichrome elements and insulated with ceramic insulators in galvanized steel brackets, supported in heavy gauge 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 terminal unit device.

b. Coils shall have the capacities indicated in Contract Documents. Coils rated up through 5 kW shall be single phase, 277 volt, 60 hertz and coils larger than 5 kW shall be three phase, four wire, 480Y/277 volt, 60 hertz. Electric heating coils up to and including 4 kW shall be single stage. Electric coils above 4 kW shall be two stage.

c. 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 clearance. Coils shall be given a 2000 volt dielectric test at the factory.

d. Automatic reset thermal cutouts and an airflow switch shall be furnished for heater protection. An airflow switch shall prove fan airflow before the electric heater can be energized. Both devices shall be serviceable through terminal box without removing heating element from the terminal device. The entire heating element rack shall be removable through an access panel with a hinged door without disturbing the duct connection.

e. Heating coils shall have a terminal box and cover, with quiet type built-in mercury step controlled contactors for each circuit, branch circuit fusing for each branch circuit if heater is 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. Contactors mounted in terminal units shall be quiet mercury step type for terminal units, which are located above the ceiling in tenant occupied spaces with an acoustical requirement of NC40 or less. Contactors mounted in fan powered terminal units located in other areas may be quiet type magnetic or mercury step contactors. Provide a separate 120 or 24 volt control power transformer with an integral or separately mounted primary and/or secondary overcurrent protection device in accordance with NEC requirements. Provide a door interlocking disconnect switch for each unit.

f. 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 or to the bottom of the terminal unit.

g. Electric heating coils shall be designed for operation with the DDC controller and control system as specified in the Division 17 specification.

h. Heating coils and the associated control panels shall be constructed to mount on the discharge end of the terminal unit. The heating coil control panel NEC required working clearances shall be parallel to the terminal unit discharge duct.

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

Hot Water Heat

Specification Text File

(Insert the following paragraphs).

2.03.A.8 Fan Powered Terminal Unit Hot Water Heating Coils.

a. Terminal unit hot water heating coils shall be installed completely within the terminal unit casing and enclosing the coil headers, return bends, "U" bends, and the factory piping assemblies. Provide an access door or panel on the bottom of the terminal unit for servicing and cleaning the unit and to completely expose coil headers and any valves supplied by the terminal unit manufacturer.

b. The factory hydrostatic or air pressure test of the coil and entire piping assembly shall be maintained for a minimum of one minute after which each piping joint connection, etc. shall be examined to verify there is no evidence of weeping or leakage. If liquid was used for the pressure testing, it shall be completely drained and blown out of all coils and the internal piping system prior to shipment. If air pressure is used, the entire coil and piping assembly shall be completely submerged under water. Hot water heating coils shall be constructed with copper tubes and either aluminum plate fins or spiral fins. Coils shall have a maximum of 10 fins per inch. Fin thickness shall be 0.0045". Supply and return connections shall be on the same hard drawn

Specification Text File

Suggested Specifications

Series Fan Powered VAV Terminal Units MODEL SERIES 35SST "STEALTH™" (continued)

end of the coil and shall be ASTM B88-72, H23, I-59 Type K hard drawn seamless copper water pipe. Fins shall be bonded to the tubes by means of mechanical expansion of the tubes or by spiral winding under tension.

c. Coils shall have galvanized steel casings on all sides no lighter than 20 gauge.

d. Tubes shall be 1/2" O.D., spaced on 1 1/4" centers and shall have a minimum wall thickness of 0.016". Hot water shall be equally distributed through all tubes by the use of orifices or header design. Water velocity in the tubes shall not exceed five feet per second. The water pressure drop through the coil shall not exceed 10 feet. Heating coil face velocities shall not exceed the maximum face velocity indicated in the schedules on the Contract Documents.

e. Coils shall have manual air vent connections except on those return connections where the coil header piping is designed to be self-venting.

f. Coils and piping assemblies shall be tested at 300 psig static pressure for a working pressure of 250 psig or as indicated on the Contract Document.

g. Coil ratings, calculations, and selection data shall be in accordance with the applicable ARI Standards and shall be submitted with the Shop Drawings.

h. The complete heating coil piping assembly, including all of the listed appurtenances, shall be provided and factory installed by the terminal unit manufacturer. The coil and piping assembly shall be factory pressure tested.

i. All piping, valves, and fittings shall be suitable for the working pressure shown on the Contract Documents. The internal piping shall be sized to limit the velocity to no more than 8 fps at maximum design flow.

Model Substitution Options

Model Series 35S Fan Powered Terminal Units

(Substitute the following paragraph. Deletes "Stealth" option and solid metal liner).
2.03.A.12.
The terminal units shall not exceed the depth indicated on the drawings. Mounting connections for hanging the unit by sheet metal straps shall be clearly identified on the housing. All components, including all controls and allowed. The unit shall be complete and suitable to accept the following field connections.

Model Series 37S Low Profile Series Fan Powered Terminal Unit

Specification Text File

(Substitute the following in body of text).
2.03.A.
Units shall be of 20 gauge construction. Removable access panels or doors of minimum 20 gauge galvanized steel on the top and bottom of the terminal shall provide access to service the fan, electric motor and all internal components.
Insulation: (Replace 3/4" thick, with 1/2" thick)
(Delete "... completely encapsulated between solid outer and inner solid liners,").

(Substitute the following paragraph).
2.03.A.12
The terminal units shall not exceed the depth indicated on the Drawings or 11" whichever is smaller. Mounting connections for hanging the unit by sheet metal straps shall be clearly identified on the housing. All components, including all controls and wiring, shall be factory installed, except the room sensor or thermostat. No field assembly will be allowed. The unit shall be complete and suitable to accept the following field connections:

Model Series 37SST "Stealth™" Low Profile Series Fan Powered Terminal Units

Specification Text File

(Substitute the following paragraph).
2.03.A.
Units shall be of 20 gauge construction. Removable access doors or panels of minimum 20 gauge galvanized steel on the top and bottom of the terminal shall provide access to service the fan, electric motor and all internal components.
Insulation: (Replace 3/4" thick, with 1/2" thick)

PSC Motor
(In lieu of EPIC™/ECM)

(Substitute the following paragraph).
2.03.A.6
Fan motor assembly shall be forward curved centrifugal fan with a direct drive motor. Motors shall be fasco "Engineered for efficiency" or General Electric "Energy Saver" motors specifically designed for use with a single phase, (120, 208 or 277) volt 60 Hertz electric input, Motor shall have built-in overload protection, bearings capable of low rpm oiling and permanently oiled bearings. Motor shall be direct couple to the blower. Provide isolation between fan motor assembly and unit casing in at least 4 locations to eliminate any vibration from the fan to the terminal unit casing. Provide anti-back rotation system or provide a motor that is designed to overcome reverse rotation and not affect life expectancy. An electronic motor speed controller sized and designed for the specific blower motor combination shall be provided to allow infinitely fan speed from the minimum voltage stop to the line voltage signal to the motor. A minimum voltage stop shall be employed to ensure that the fan cannot run in a stall mode.

Specification Text File

Suggested Specifications

Parallel Flow (Variable Volume) Fan Powered Terminals – 35N Series

(Section 15840)

1.01 Furnish and install variable volume parallel fan powered terminal units of the sizes and capacities as indicated on the drawings. Units shall be pressure independent with (pneumatic, analog electronic, digital) controls. Units shall be manufactured by **Nailor Industries Inc.** Model **35N**.

1.02 The entire terminal unit shall be designed and built as a single unit. The units shall be provided with a primary variable air volume damper that controls the air quantity in response to a (thermostat or digital controller/zone sensor). The units shall also include a fan that sequences on and off in response to the (thermostat or digital controller/zone sensor). The space limitations shall be reviewed carefully to ensure that all units will fit into the space allowed.

1.03 Unit casings shall be 20 ga. galvanized steel. Unit shall be fully lined with fiberglass insulation which shall be at least 3/4" (19 mm) thick dual density insulation complying with NFPA 90 for fire and smoke resistivity and UL 181 for erosion. Any cut edges of insulation shall be coated with NFPA 90 approved sealant.

1.04 The terminal casing shall have full size bottom access panels for easy access to motor and blower assembly and for maintenance and replacement of parts without disturbing duct connections. Access panels shall be attached to casing with (screws, 1/4 turn fasteners).

1.05 Units shall have round inlets for the primary air connections and shall have a minimum 6" (152 mm) deep inlet duct collar for field connection. Models with no heat or electric heat shall have rectangular outlets suitable for flanged duct connections. Models with hot water coils shall have a discharge opening with slip and drive connection. Casing shall have mounting area for hanging by sheet metal straps from a concrete slab.

1.06 The damper shall be round and of laminated 2 x 20 ga. galvanized steel construction with a peripheral gasket and a solid steel 1/2" (13 mm) diameter shaft, pivoted in self-lubricating bronze oilite bearings. Damper leakage shall not exceed 2% of the terminal rated airflow at 3" w.g. (750 Pa) inlet static pressure.

1.07 Entire terminal unit shall be factory assembled with (pneumatic, analog electronic, digital) controls. All components including all controls except the room (thermostat or zone sensor) and (pneumatic piping, field wiring) shall be factory installed and mounted with the unit.

1.08 Provide a (pneumatic, analog electronic, digital) flow control device that will limit the maximum and minimum airflow to that scheduled on the drawings. Control of the terminal unit shall be pressure independent.

1.09 (The sequence of operation should be described here, if not part of the temperature controls specifications).

1.10 Blower casings shall be constructed of heavy gauge coated steel. Blower wheel shall be forward curved centrifugal type, dynamically balanced and driven by direct drive, single speed split capacitor motors. Motors shall be suitable for (120, 208, 240, 277 volts) single phase power. Motors shall have built-in overload protection, bearings capable of low rpm oiling, permanently oiled bearings and a built-in, anti-backward rotation device. Fan assembly shall be mounted so as to isolate the casing from the motor and blower vibration at no less than four points. Isolation shall be supplied at the motor and at the blower mounting points. A gasketed backdraft damper shall be included on the fan discharge to preclude primary air leakage back into the plenum space.

1.11 A solid state SCR fan speed controller sized and designed for the specific blower motor combination shall be provided to allow infinitely adjustable fan speed from the minimum voltage stop to the line voltage signal to the motor. A minimum voltage stop shall be employed to ensure that fan cannot run in stall mode.

1.12 Units shall incorporate a single point electrical (and pneumatic) connection for the entire unit. All electrical components shall be ETL listed or recognized and installed in accordance with the National Electrical Code. All electrical components shall be mounted in a control box. The entire assembly shall be ETL listed and labeled to meet UL 1995 and CSA C22.2 No. 236.

1.13 All sound data shall be compiled in an independent laboratory and in accordance with the latest version of ARI 880. All units shall be ARI certified and bear the ARI certification label.

1.14 Unit maximum radiated and discharge sound power levels with fan only and 0.25" w.g. (63 Pa) discharge static pressure shall not exceed the values in Tables 1 and 2 at the specified airflow. No credit or reduction shall in any way be considered for room, plenum, ceiling, downstream duct, elbows and/or similar item effects.

Unit Size	Airflow		Sound Power Octave Band Center Frequency (Hz)					
	cfm	l/s	2	3	4	5	6	7
			125	250	500	1000	2000	4000
2	400	189	50	49	49	42	34	30
3	700	330	61	58	58	54	50	46
5	1000	472	64	57	57	52	47	44
6	1500	708	67	62	62	58	55	53

Table 1. Maximum Radiated Sound Power Levels. Heating Cycle (Fan only).

Unit Size	Airflow		Sound Power Octave Band Center Frequency (Hz)					
	cfm	l/s	2	3	4	5	6	7
			125	250	500	1000	2000	4000
2	400	189	54	44	47	42	38	33
3	700	330	56	53	56	51	46	42
5	1000	472	54	52	54	52	48	45
6	1500	708	61	62	62	61	57	55

Table 2. Maximum Discharge Sound Power Levels. Heating Cycle (Fan only).

1.15 Unit maximum radiated and discharge sound power levels with 100% primary air and fan off at 1.0" w.g. (250 Pa) inlet pressure and 0.25" w.g. (63 Pa) discharge static pressure shall not exceed the values in Table 3 and 4 at the specified airflow. No credit or reduction shall in any way be considered for room, plenum, ceiling, downstream duct, elbows and/or similar item effects.

Unit/ Inlet Size	Airflow		Sound Power Octave Band Center Frequency (Hz)					
	cfm	l/s	2	3	4	5	6	7
			125	250	500	1000	2000	4000
2 – 08	700	330	62	57	51	39	38	36
3 – 10	1100	519	61	56	51	42	40	40
5 – 12	1600	755	60	58	51	43	43	42
6 – 14	2100	991	60	56	52	44	43	44

Table 3. Maximum Radiated Sound Power Levels. Cooling Cycle (100% primary air and fan off).

Unit/ Inlet Size	Airflow		Sound Power Octave Band Center Frequency (Hz)					
	cfm	l/s	2	3	4	5	6	7
			125	250	500	1000	2000	4000
2 – 08	700	330	65	64	58	54	52	54
3 – 10	1100	519	62	65	59	52	54	55
5 – 12	1600	755	64	67	62	54	56	58
6 – 14	2100	991	63	63	60	54	55	56

Table 4. Maximum Discharge Sound Power Levels. Cooling Cycle (100% primary air and fan off).

Suggested Specifications

Parallel Flow (Variable Volume) Fan Powered Terminals – 35N Series (continued)

Options

Electric Heat

Substitute the following paragraphs:

1.01 Furnish and install variable volume parallel fan powered terminal units with integral electric heat of the sizes and capacities as indicated on the drawings. Units shall be pressure independent with (pneumatic, analog electronic, digital) controls. Units shall be manufactured by **Nailor Industries Inc.** Model **35NE**.

1.12 An electric heater shall be factory mounted and pre-wired as an integral package with the fan powered terminal unit. Heaters shall be sized as shown on the drawings. The entire assembly including the electric heater shall be ETL listed for zero clearance and so labeled and shall meet all requirements of the latest National Electrical Code, CSA C22.2 No.236). The unit shall have a single point electrical (and pneumatic) connection. Heater casing and panel shall be a minimum of 20 ga. galvanized steel. Each heater shall be complete with automatic reset high limit thermal cut-outs, control voltage transformer as required, ground terminal, fan relay for interlocking the heater and fan and high grade nickel chrome alloy resistance wire.

Element wires shall be suspended in insulators designed to expose the entire face area of the wire thereby eliminating hot spots. Each heater shall be supplied with factory supplied and pre-wired branch circuit fusing as required by NEC and UL. Circuiting and fusing shall also be in accordance with the circuiting requirements as shown on the plans.

Additional accessories shall include (control transformer, circuit fusing, disconnect switch, SCR controller, pneumatic electric switches) for staging the heater. (Additional performance requirements that you might want to include can be found in the electric heater section). The electric heater shall be located on the discharge side of the fan so as not to add heat to the motor and shorten its expected lifetime.

Coils rated up through 5 kW shall be single phase, 277 volt, 60 Hz and coils larger than 5 kW shall be three phase, four wire wye, 480 volt, 60 Hz. Electric heating coils up to and including 4 kW shall be single stage. Electric coils above 4 kW shall be two stage.

Hot Water Heating Coils

Substitute the following paragraphs:

1.01 Furnish and install Variable Volume Parallel Fan Powered Terminal Units with integral hot water coils of the sizes and capacities as indicated on the drawings. Units shall be pressure independent with (pneumatic, analog electronic, digital) controls. Units shall be manufactured by **Nailor Industries Inc.** Model **35NW**.

1.12 A hot water coil shall be factory mounted as an integral package with the fan powered terminal unit. Hot water coils shall be sized as shown on the drawings. The entire assembly including the hot water coil shall be ETL listed for zero clearance and so labeled and shall meet all requirements of the latest National Electrical Code (CSA C22.2 No.236). The unit shall have a single point electrical (and pneumatic) connection. Access panels on the bottom of the unit shall permit easy access to the coil for inspection and cleaning. Coils shall be 1, 2 or 3 row as required and heating capacities shall be as shown on the plans. Coils shall have aluminum plate fins spaced 10 per inch and bonded to 1/2" (13 mm) O.D. copper tubes. Copper connections shall be sweat. All coils shall be tested at a minimum of 300 psi under water to produce a guaranteed working pressure of 250 psi. Controls and valves for the hot water coils shall be field mounted. Heating coils shall be located on the discharge side of the fan so as not to add heat to the motor and shorten its expected lifetime.

Liner Options:

(Substitute in the appropriate specification section)

Steri-Liner

Unit shall be fully lined with non-porous, sealed liner which complies with NFPA 90A and UL 181. Installation shall be 13/16" (21 mm) minimum thickness, 4 lb. density with reinforced aluminum foil-scrim-kraft (FSK) facing. All cut edges shall be secured with steel angles or end caps to encapsulate edges and prevent erosion. Insulation shall be Nailor Steri-Liner or equal.

Fiber-Free Liner

Unit shall be fully lined with a non-porous closed cell elastomeric foam liner which complies with NFPA 90A, ASTM E84 and UL 181. Installation shall be 3/4" (19 mm) minimum thickness and secured to the interior of the terminal with mechanical fasteners. No fiberglass is permitted. Insulation shall be Nailor Fiber-Free Liner or equal.

Suggested Specifications

Control Specifications (select one)

Pneumatic Controls (Pressure Independent)

1. The terminal unit manufacturer shall provide factory mounted pressure independent controls which can be reset to modulate airflow between zero and the maximum cataloged capacity. Maximum airflow limits or mechanical volume regulators are not acceptable.
2. Each unit shall be supplied with a **Nailor** 'Diamond Flow' sensor with four pick-up points on each side to ensure that controller fidelity shall be within ± 5% of set volume under various same size duct inlet conditions and inlet static variation of 0.05" – 6.0" w.g. (13 – 1493 Pa). The sensor shall amplify the sensed velocity pressure and provide a minimum differential pressure of 0.03" w.g. (7 Pa) at 500 fpm (2.54 m/s) inlet velocity. Flow measuring taps shall be furnished with each terminal.
3. The reset volume flow controller shall have a constant reset span regardless of the minimum and maximum airflow settings selected. Reset span shall be adjustable from a minimum of 5 psi up to a maximum of 10 psi. Reset start point shall be adjustable from 3 – 10 psi. Controller air bleed off through the flow sensor is not acceptable. Controller shall be field convertible for direct or reverse acting. The compressed air consumption of the controller shall not exceed 1.0 SCFH at 20 psi. Acceptable controller is Kreuter CSC-3011 or equal.
4. Reset volume controller shall be factory calibrated and set for the scheduled maximum and minimum airflow settings. Flow measuring taps and flow charts shall be supplied with each terminal unit for field balancing and adjustment of airflow. All pneumatic tubing shall be UL listed fire retardant (FR) type. Each terminal shall be supplied with a label showing unit type, size, tag location, minimum and maximum airflow settings and control sequence number. Pneumatic spring return actuators shall be provided and factory mounted by the terminal unit manufacturer.
5. Reset volume controller shall be factory set and calibrated for operation with a direct/reverse (select one) acting room thermostat. The actuator/damper connection shall be factory mounted to fail to a normally open/closed (select one) position upon loss of control main air pressure.

Analog Electronic Controls (Pressure Independent)

1. The terminal unit manufacturer shall provide factory mounted pressure independent analog electronic controls which can be reset to modulate airflow between zero and the maximum cataloged capacity. Each terminal shall be equipped a label showing unit type, tag location, minimum and maximum airflow settings and control sequence number. Controls shall be factory calibrated and set for the scheduled minimum and maximum flow rates.
2. Each unit shall be supplied with a **Nailor** 'Diamond Flow' sensor with four pick-up points on each side to ensure that controller fidelity shall be within ± 5% of set volume under various same size duct inlet conditions and inlet static variation of 0.05" – 6.0" w.g. (13 – 1493 Pa). The sensor shall amplify the sensed velocity pressure and provide a minimum differential pressure of 0.03" w.g. (7 Pa) at 500 fpm (2.54 m/s) inlet velocity. Flow measuring taps shall be furnished with each terminal. All pneumatic tubing shall be UL listed for fire retardant (FR) type.
3. The velocity controller shall have a constant 2°F (1.11°C) reset span regardless of minimum and maximum airflow limits. It shall include an onboard flow-through transducer utilizing twin platinum resistance temperature detectors and shall be capable of controlling a velocity setpoint from 0 – 3300 fpm with an accuracy of 3%. The controller shall allow all airflow adjustments to be made from the matching room thermostat. The thermostat shall be furnished by the terminal unit manufacturer and provide a live velocity readout and feature semi-concealed setpoint slider(s) and setpoint indicator(s) and thermometer with a fahrenheit (centigrade optional) scale plate.
4. The terminal shall have a 24 VAC combination controller/actuator single assembly. The actuator shall be of a direct drive design and provide a minimum torque of 50 in. lbs. (5.6 Nm). The actuator shall be of the floating reversible type and include a magnetic clutch, adjustable stops and a gear disengagement button. A tri-color LED shall indicate green for opening, red for closing and white for satisfied damper positions. Power consumption of the controller/actuator shall not exceed 4 VA.
5. The terminal manufacturer shall provide a Class 2, 24 VAC control transformer with internal current limiting protection. All controls shall be installed in an approved NEMA 1 enclosure.

Digital (DDC) Controls (Pressure Independent) Factory Mounting Procedure

1. The terminals shall be equipped with pressure independent direct digital controls supplied by the controls contractor under the automatic temperature controls division 17 and mounted by the terminal unit manufacturer. The controls contractor shall, in addition to sending the controls to the terminal unit manufacturer, provide technical data sheets for all components to be mounted, including dimensional data, mounting hardware and method, as well as application specific wiring and piping diagrams for each terminal type as depicted on the schedules and mechanical drawings.
2. Controls shall be compatible with the pneumatic 'Diamond Flow' multi-point averaging flow sensor supplied by the terminal manufacturer. The sensor shall have four pick-up points on each side to ensure that controller fidelity shall be ± 5% of set volume with any typical air turbulence in the duct and any typical flex inlet condition and with an inlet static variation of 0.05" w.g. to 6.0" w.g. (12 – 1500 Pa). The sensor shall amplify the sensed velocity pressure and provide a minimum differential pressure of 0.03" w.g. (7 Pa) at 500 fpm (2.54 m/s) inlet velocity. Flow measuring taps and flow curves shall be furnished with each terminal.
3. Controls shall be configured and field calibrated in the field by the controls contractor after terminal installation has been completed. Pneumatic tubing shall be UL Listed fire retardant (FR) type. Each terminal shall be supplied with a label showing unit type, size and tag location.
4. The terminal manufacturer shall provide a Class 2, 24 VAC control transformer with internal current limiting protection and disconnect switch. All controls shall be installed in an approved NEMA 1 enclosure supplied and installed by the terminal manufacturer.