



# WATER SOURCE HEAT PUMPS



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# Serenity Vertical Hi-Rise • 44VH Series

*Brings comfort to every room*



The Serenity® Vertical Hi-Rise Model series 44VH Water-Source Heat Pump is one of the most efficient and economical commercial application options available. With simultaneous heating and cooling individual space capabilities paired with whisper quiet control and innovative engineering, the Serenity® Series is unquestionably the best solution for comfort, efficiency and reliability.

## MODEL:

44VH • Unit Sizes 9 to 36  
@ 60Hz - R410A

## FEATURES:

- Exceeds ASHRAE 90.1 efficiencies
- Removable chassis allows staged installation and ease of maintenance
- High efficiency constant volume ECM
- Multiple discharge air configurations with the option to have knock outs
- TXV metering device
- Cabinet and chassis sections can be staged during the installation process
- Labor saving Chassis section is a one-piece slide in unit with quick connects
- Stainless steel braided hose kits for connection from piping risers to chassis
- Double isolation compressor mounting for quiet operation



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## GENERAL OVERVIEW

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## SERENITY VERTICAL HI-RISE WATER SOURCE HEAT PUMPS

A

## SERENITY PACKAGED WATER SOURCE HEAT PUMPS

B

## CONTROLS & PIPING PACKAGES

C

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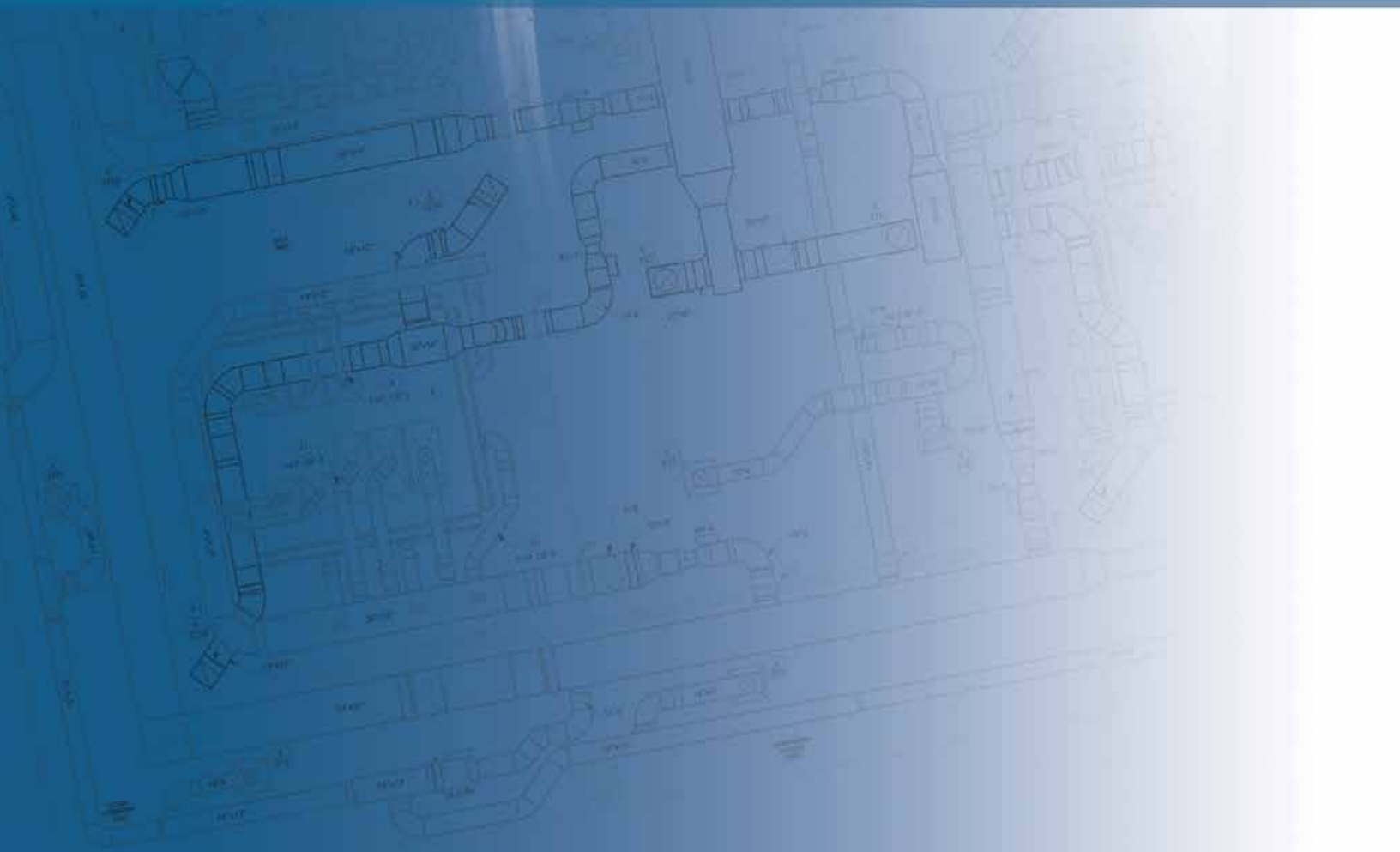
Nailor Industries Inc. pursues a policy of continuous product development and we therefore reserve the right to change any of the information in this publication without notice.

Contact your Nailor representative to verify current product details.

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# **GENERAL OVERVIEW**



## Water Source Heat Pumps

Water source heat pumps (WSHPs) are highly efficient heating, ventilation, and air conditioning (HVAC) systems that use the consistent temperature of a water source to provide heating, cooling, and hot water for buildings. Here are the key features and benefits of water source heat pumps:

### Features:

#### ENERGY EFFICIENCY:

- WSHPs are highly energy efficient, as they transfer heat between the building and the water source, rather than generating heat directly.
- They have higher Coefficient of Performance (COP) compared to traditional HVAC systems, meaning they produce more heating or cooling per unit of energy consumed.

#### ENVIRONMENTAL FRIENDLINESS:

- WSHPs reduce greenhouse gas emissions and are eco-friendly, especially if the electricity used to run them comes from renewable sources.
- They use natural water sources, which are renewable and sustainable.

#### CONSISTENT PERFORMANCE:

- Water temperatures are relatively stable compared to outdoor air temperatures, ensuring consistent performance regardless of the season.
- This stability results in more reliable heating and cooling compared to air-source heat pumps, which can struggle in extreme temperatures.

#### ZONING CAPABILITIES:

- WSHP systems can be designed with multiple zones, allowing for precise control over the temperature in different areas of a building.
- Zoning helps in saving energy by only conditioning the spaces that are in use.

#### QUIET OPERATION:

- WSHPs are quieter compared to traditional HVAC systems, making them suitable for environments where low noise levels are essential, such as offices and bedrooms.

#### LONG LIFESPAN:

- When properly maintained, WSHPs have a longer lifespan compared to traditional heating and cooling systems, leading to reduced replacement and maintenance costs.

### Benefits:

#### ENERGY COST SAVINGS:

- WSHPs can significantly reduce energy bills due to their high efficiency, providing substantial savings over the long term.

#### IMPROVED INDOOR AIR QUALITY:

- WSHPs typically include air filters that can improve indoor air quality by trapping dust, pollen, and other airborne particles.

#### FLEXIBILITY IN INSTALLATION:

- WSHPs can be installed vertically or horizontally, making them suitable for various types of buildings, including those with limited space.

#### REDUCTION IN MAINTENANCE COSTS:

- With fewer moving parts and protection from outdoor elements, WSHPs often require less maintenance compared to other HVAC systems.

#### POTENTIAL FOR INCENTIVES AND REBATES:

- Many regions offer incentives, tax credits, or rebates for the installation of energy-efficient HVAC systems, including WSHPs, which can further reduce costs.

#### INCREASED PROPERTY VALUE:

- Energy-efficient systems, like WSHPs, can increase the overall value of a property, making it more attractive to potential buyers or tenants.

#### CARBON FOOTPRINT REDUCTION:

- By reducing reliance on fossil fuels and lowering energy consumption, WSHPs contribute to a reduction in the carbon footprint of buildings and help combat climate change.

## Water Source Heat Pumps

### Model Series 44VH

The 44VH series is designed as a modular unit with integral risers to allow units to be "stacked" one on top of the other in a vertical column rising floor to floor up the building. This allows the use of one set of common risers. Engineered Comfort has designed these units with the state of the art components to deliver the best combination of performance, cost, and efficiency on the market.

#### Model 44VH: Serenity Vertical Hi-Rise Water Source Heat Pumps

300 – 1200 CFM (142 – 566 l/s)

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



#### Model 44PH: Serenity Horizontal Packaged Water Source Heat Pump

200 – 2000 CFM (142 – 944 l/s)

The 44PH horizontal water source packaged heat pump is the perfect solution for constraint spaces above the ceiling, offering the full performance of a packaged unit with a limited height space to fit into most applications requiring a low-cost alternative.



#### Model 44PV: Serenity Vertical Packaged Water Source Heat Pump

200 – 2000 CFM (142 – 944 l/s)

The 44VH series vertical water source packaged heat pump offers a smart solution for spaces with small footprint that require efficient heating and cooling performance with minimal maintenance. The 44PV are designed to fit inside closets with narrow space, a great alternative for limited budget high rise projects.



## Water Source Heat Pumps

### Model 44CO: Serenity Console Packaged Water Source Heat Pump

260 – 600 CFM (125 – 283 l/s)

The 44COseries console packaged heat pump offers a compact, high energy efficient cooling and heating all in one solution for small spaces. From hotel rooms, dorms, classrooms, or offices, our console packaged water source provides the comfort of a full-size unit with a small footprint and simple design full of features and benefits.



**A Participating Corporation in  
the ANSI/AHRI/ASHRAE/ISO Standard 13256**

## AHRI CERTIFICATION

Engineered Comfort is a participating company in the ASHRAE/ANSI/AHRI/ISO Standard 13256 certification program for Water Source Heat Pumps. Nailor has completed and received AHRI certification for our complete line of Water Source Heat Pumps in this catalog.

To comply with ANSI/AHRI/ASHRAE/ISO Standard 13256, manufacturers must rate their products at standard rating conditions as specified by the standard. This permits direct comparison between manufacturers. In addition to standard ratings, Nailor also publishes application ratings. These application ratings are based upon tests conducted in accordance with the standard but at other conditions as well in order to provide the design engineer with a wider range of data from which to make his selection.

Participation in the AHRI program provides assurance that manufacturers' equipment will meet the claimed performance ratings. Compliance with ASHRAE/ANSI/AHRI/ISO Standard 13256 by participants in the certification program is assured by regular testing of random samples by an independent laboratory.

## INDEPENDENT LABORATORY



## CERTIFICATION

Although AHRI Certification, as explained above, provides some assurance of product performance, the program only verifies a single standard rating condition (certification rating point) for each terminal size. This is for valid logistical reasons. However, the correlation of the AHRI rating points with the comprehensive application data is sometimes difficult to reconcile in some manufacturers catalogs.

In order to provide assurance and complete credibility to the engineering community, Nailor tests its products at Energistics Laboratory; one of the foremost research, development and test facilities in North America.



# SERENITY VERTICAL HI-RISE WATER SOURCE HEAT PUMPS



A

SERENITY VERTICAL HI-RISE WATER SOURCE HEAT PUMPS



## Features & Benefits

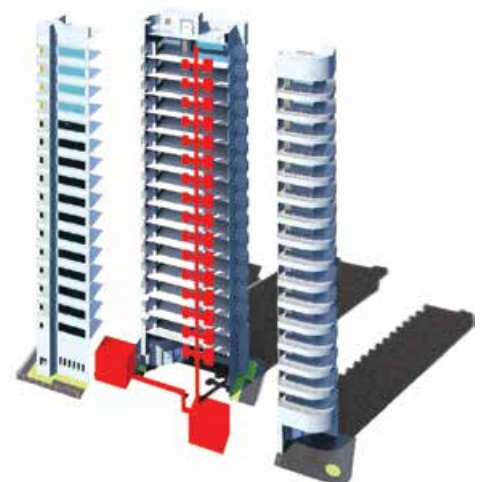
When designing a multi-tenant residential or hospitality hi-rise building there are several different choices for the air conditioning system. The system selection must consider how the decision affects all the interested parties over the life of the building, including the developer, contractors, building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

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

## WSHP Systems benefit all interested parties

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

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



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

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

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

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



A

SERENITY VERTICAL HI-RISE WATER SOURCE HEAT PUMPS

## Model Series 44VH

### Standard Features

#### CONSTRUCTION:

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

#### FAN ASSEMBLIES:

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

#### COMPRESSOR

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

#### HEAT EXCHANGER

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

#### THERMAL EXPANSION VALVE

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

#### FRONT RETURN PANEL

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

#### SUPPLY AIR LOCATION

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

#### CHASSIS:

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

#### COIL

- 3 Rows, 3 Circuits, 14 fins/in

#### FILTERS

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

#### ELECTRICAL:

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

#### WATER HOSES:

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

#### BALL VALVES

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

### Options

#### CABINET

- ½" (13) Steri-liner, 4 lb/ft³ density foil backed insulation.
- ½" (13) Fiber-free elastomeric closed cell foam insulation.
- Manual or motorized outside air damper.
- Custom built sub-base.

#### SUPPLY/RETURN RISERS

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

#### RISER CHASE

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



## Model Series 44VH • High Performance (88" High)

### TYPES:

C Concealed M Master S Slave

### CABINET OPTIONS:

SSS Standard (Chassis ships separately)

SWC Standard (Shipped with Chassis)

### STANDARD FEATURES:

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

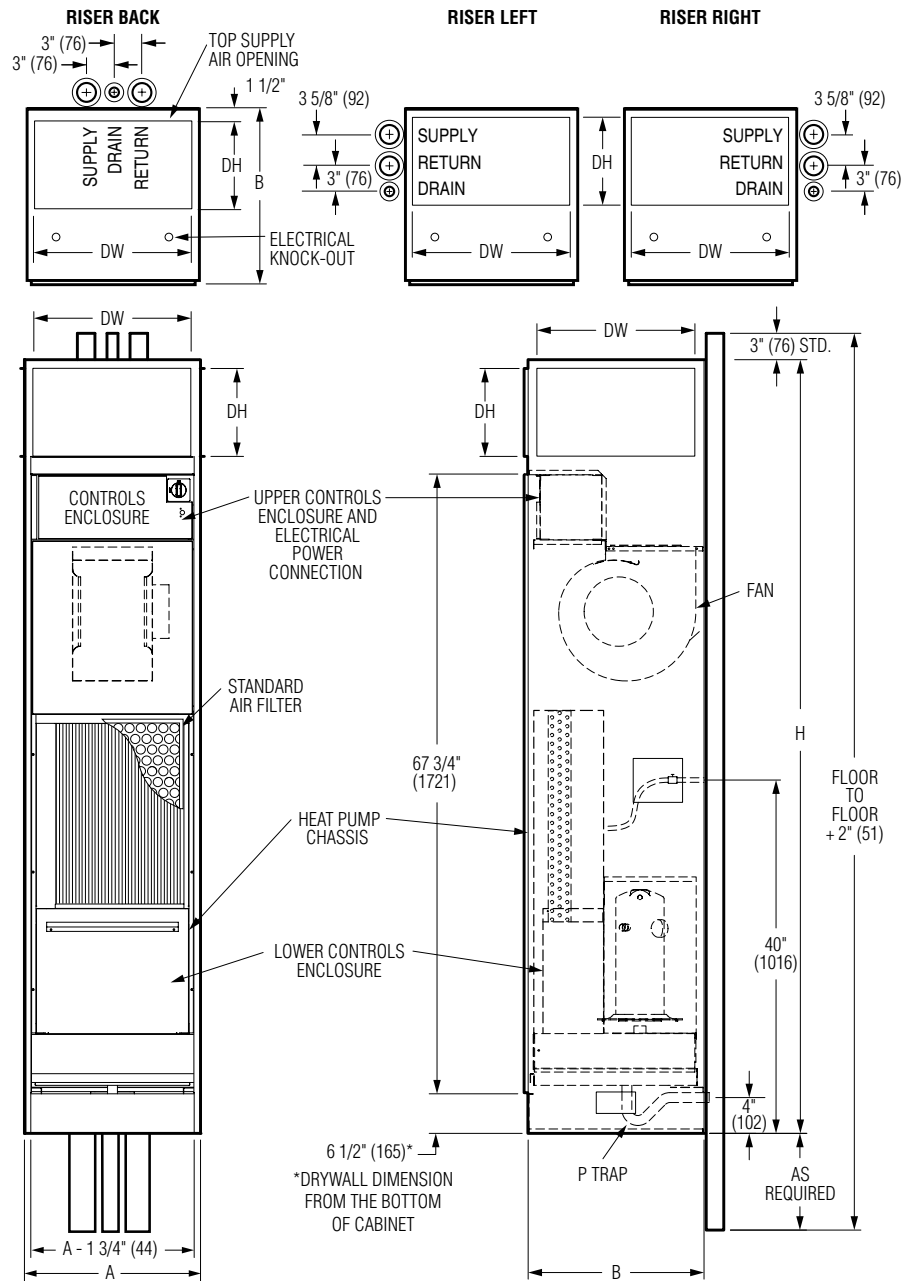
### OPTIONS:

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

### Voltage:

Single phase, 60 Hz.

☐ 208V/230V ☐ 265V



### Dimensional Data

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

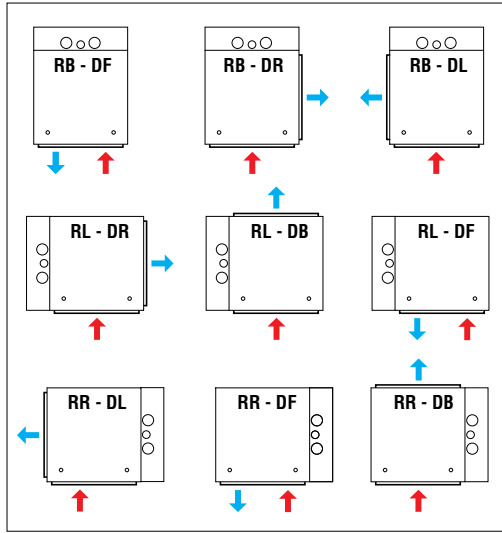
### NOTES:

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

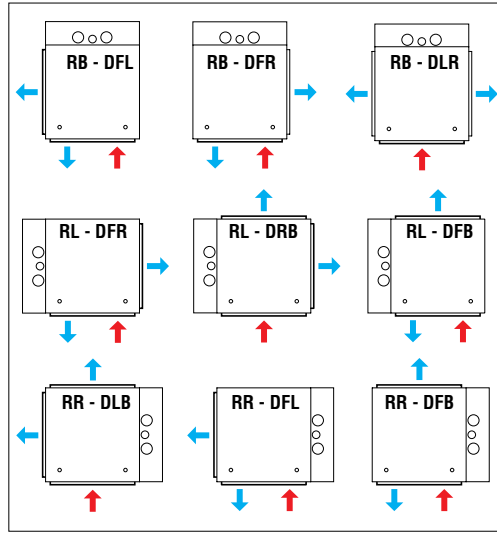
Dimensions are in inches (mm).

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

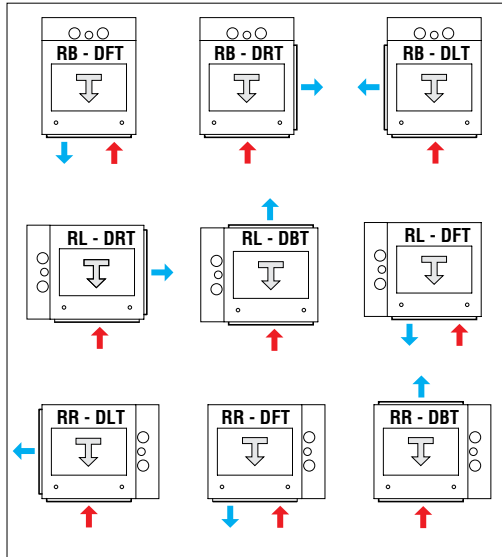
### SINGLE SIDE SUPPLY



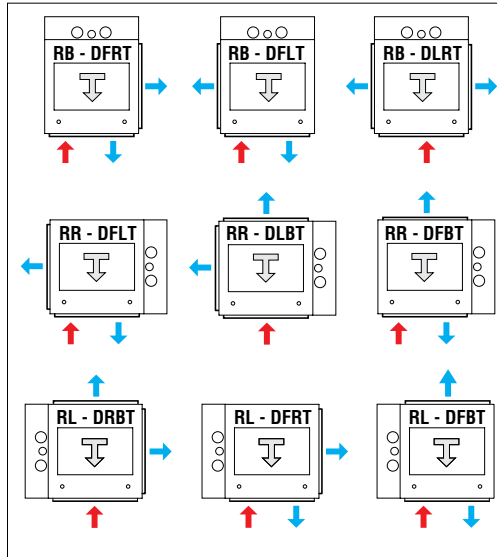
### DOUBLE SIDE SUPPLY



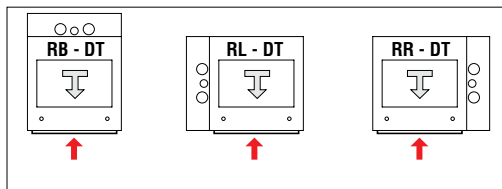
### TOP AND SINGLE SIDE SUPPLY



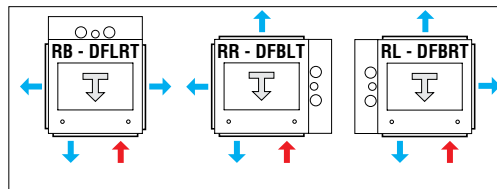
### TOP AND DOUBLE SIDE SUPPLY



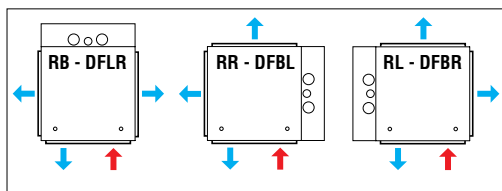
### TOP ONLY SUPPLY



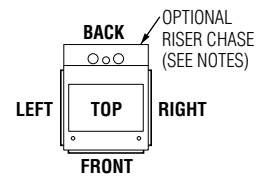
### TOP AND TRIPLE SIDE SUPPLY



### TRIPLE SIDE SUPPLY



### UNIT DESIGNATIONS



### EXAMPLE: RB-DFXXX-VR

#### RISER LOCATION:

RB = BACK  
RR = RIGHT  
RL = LEFT

#### DISCHARGE GRILLE LOCATION 1:

DF = FRONT  
DT = TOP  
DL = LEFT  
DR = RIGHT

#### DISCHARGE GRILLE LOCATION 2, 3 & 4:

L = LEFT  
B = BACK  
R = RIGHT  
T = TOP

#### OUTSIDE AIR LOCATION:

VL = LEFT  
VR = RIGHT

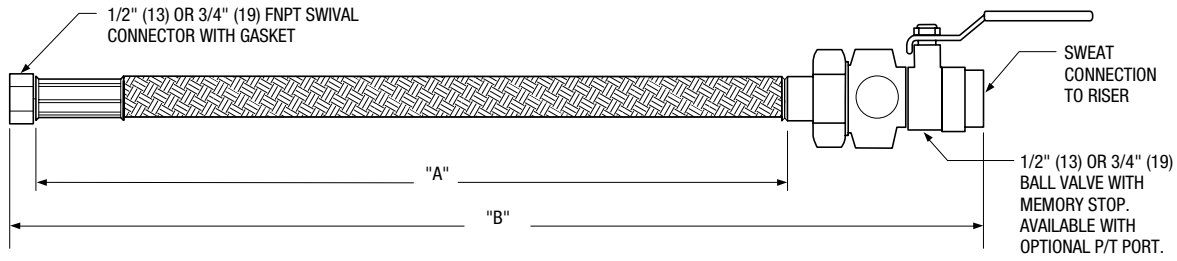
← SUPPLY AIRFLOW

→ RETURN AIRFLOW

### NOTES:

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

## Model Series 44VH Stainless Steel Flexible Hoses



Piping packages on Engineered Comfort water source heat pumps feature 1/2" (13) or 3/4" (19) flexible stainless steel braided hoses on all 2-pipe configurations as standard. Flexible hose kits provide significant benefits over hard piping during installation, commissioning, operation and maintenance.

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

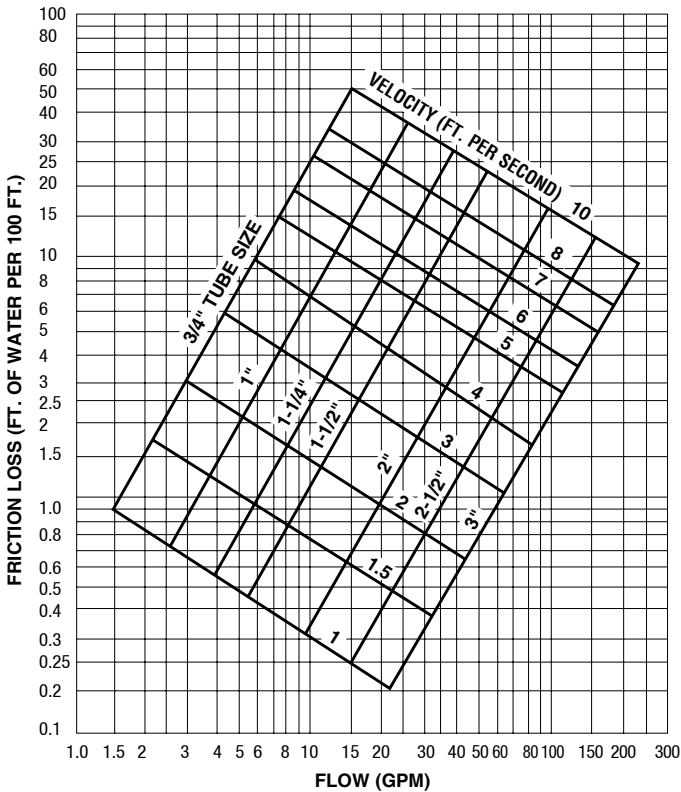
Available Hose Lengths		
No.	"A" inches (mm)	"B" inches (mm)
1	18 (457)	22 (559)
2	24 (610)	28 (711)
3	36 (914)	40 (1016)
4	48 (1219)	52 (1321)

## Model Series 44VH • Riser Selection and Data

### Riser Application and Sizing

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

### Friction Loss for Risers Chart

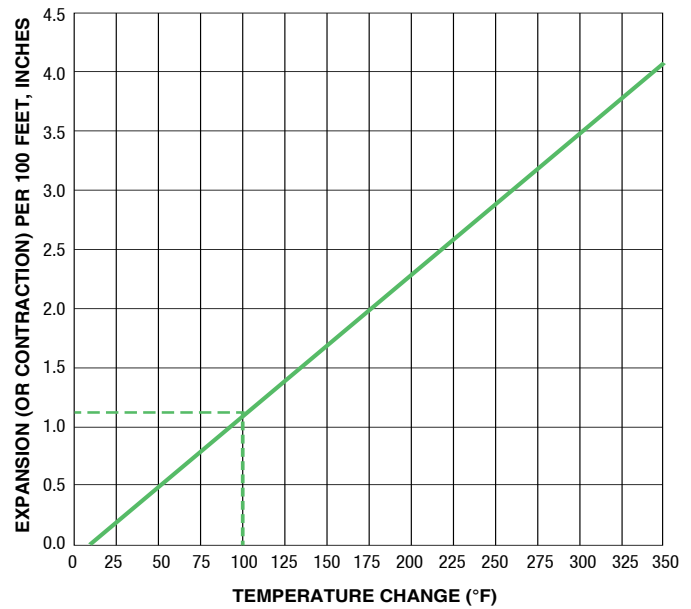


### Riser Expansion

Generally, in medium to high rise buildings, allowance must be made for pipe expansion. Model Series 44 water source heat pumps are furnished with hoses which act as expansion loops integral to the unit. The hose will allow for +/- 1 1/2" (38) of riser expansion and contraction. Additional expansion compensation must be made in the riser system in the field where movement is expected to exceed the factory allowances. Technical information on pipe expansion, contraction and anchoring can be found in the ASHRAE HVAC Systems and Equipment Handbook and various other technical documents and publications.

Risers may not be anchored to water source heat pumps. They must be anchored to structure.

### Riser Expansion Chart



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

$$\text{Temperature Rise (°F)} \times \text{Length (ft.)} \times 12 \text{ (in. per ft.)} \times 0.0000094 \text{ (in. per in. per °F)} = \text{Expansion (in.)}$$

For example:

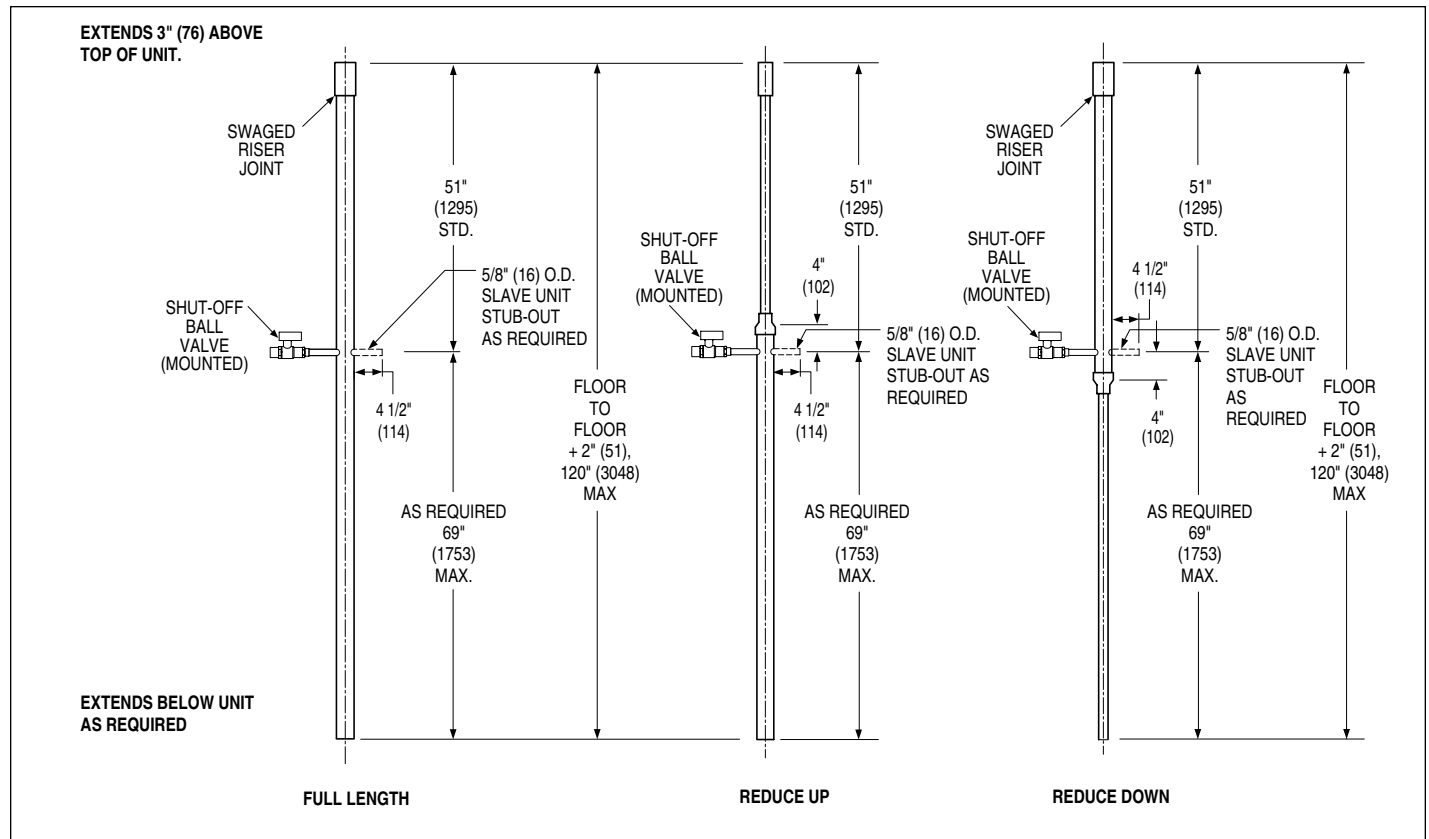
The expansion of each 100 ft. of length of any size tube heated from room temperature 70°F to 170°F (a 100°F rise) is 1.128 in.

$$100^\circ\text{F} \times 100 \text{ ft.} \times 12 \text{ in./ft.} \times 0.0000094 \text{ in./in./}^\circ\text{F} = 1.128 \text{ in.}$$

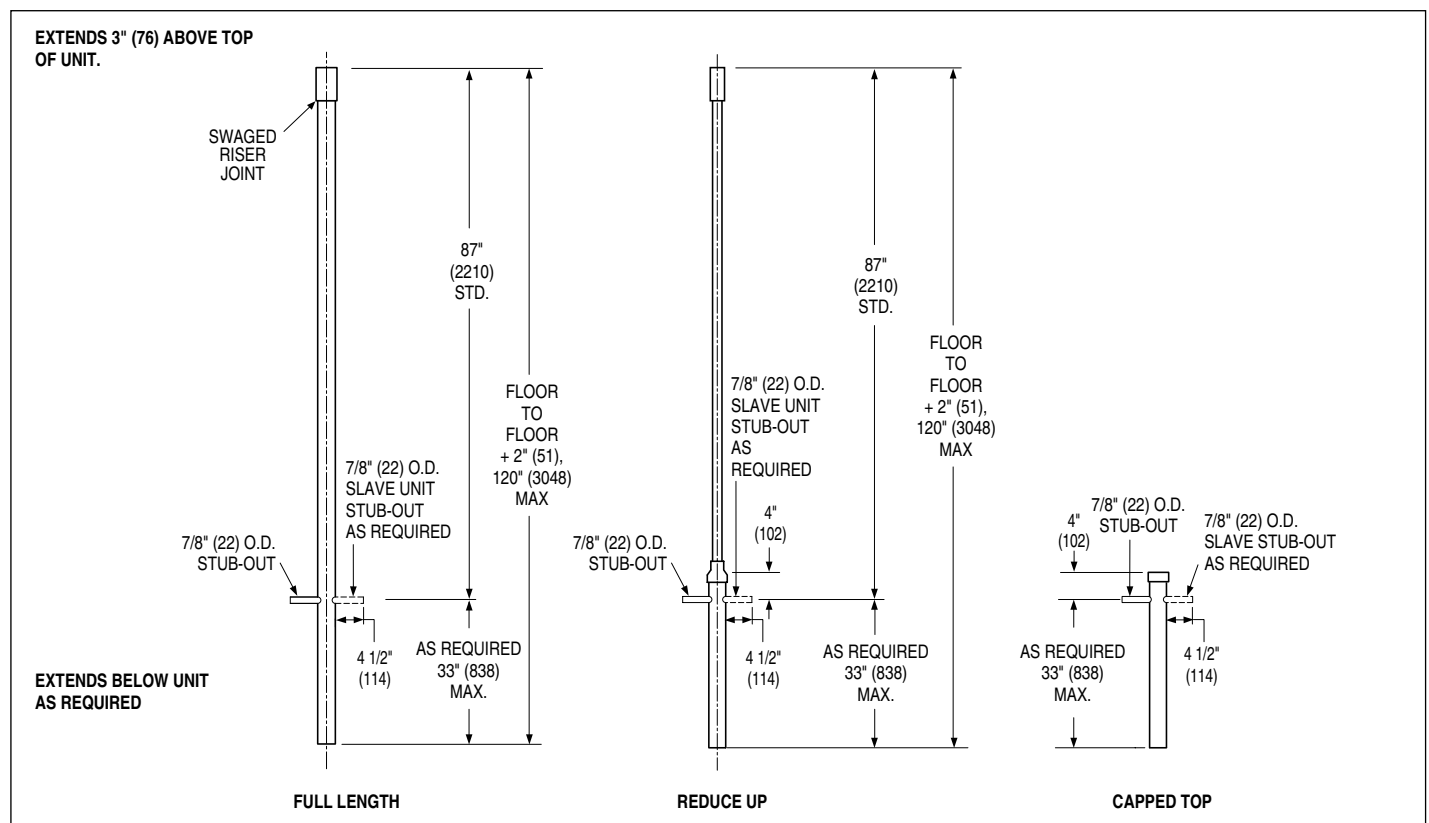


## Model Series 44VH

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

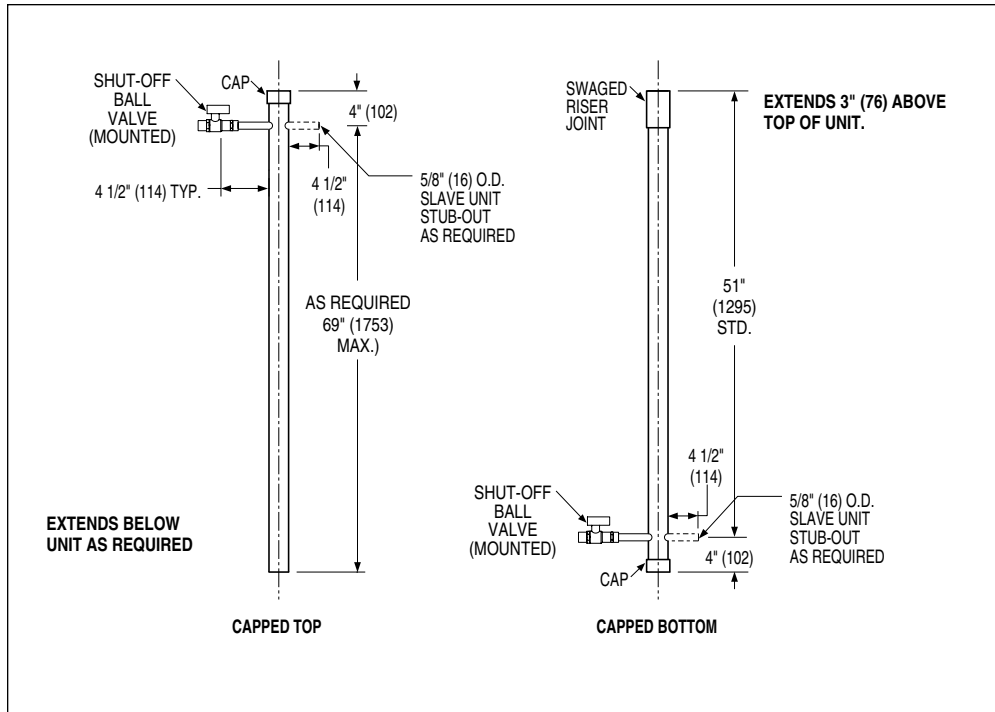


### Standard Capped Supply/Return Risers • Full Length, Reducing & Capped

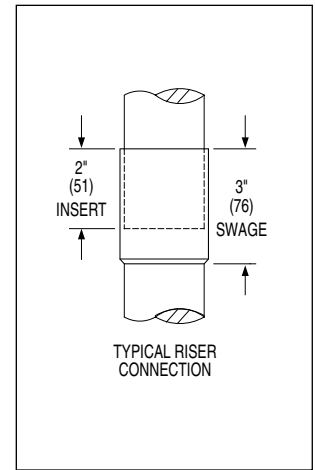


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SERENITY VERTICAL HI-RISE WATER SOURCE HEAT PUMPS

## Model Series 44VH • Standard Capped Supply/Return Risers



### Swaged Riser Joint Detail



#### NOTES:

1. Supply and Return Risers are available from 3/4" (19) to 3" (76) diameter in Type K (heavy wall), Type M (medium wall) and Type L (light wall) copper.
2. Risers are available "full length" (one piece), "capped top", "capped bottom", "reduced up" and "reduced down". Risers are reduced one nominal pipe size only.
3. Drain Risers are Type M copper only and maximum 1 1/4" diameter with maximum 1/2" (13) insulation. Drain risers are available in "full length", "reduced up" and "capped top" only.
4. Risers extend 3" (76) above the top of the unit as standard. The riser extension below the bottom of the unit is variable and dependent upon the floor to floor height for the building installation. Stacked unit risers are designed with a swaged

- socket connection in the top to accommodate 2" (51) of tail piece insertion from the riser above. Connections require field brazing.
5. Risers are ordered by specifying the exact overall length. The required overall riser length = Floor to Floor height + 2" (51).
6. Maximum riser length is 120" (3048). Minimum is 100" (2540). If required riser length exceeds 120" (3048), which represents a floor to floor height of 118" (2997), riser extensions will be required. Consult Nailor.
7. Risers may be ordered and shipped in advance to facilitate field installation.

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SERENITY VERTICAL HI-RISE WATER SOURCE HEAT PUMPS

## Model Series 44VH • Performance Data

### GENERAL INFORMATION

Unit Size	CFM	GPM	Cooling		Heating		Compressor		Charge (oz)
			Capacity (Btuh)	EER	Capacity (Btuh)	COP	Qty.	Type	
9	300	3.00	10,000	15.8	12,000	5.2	1	Rotary	30.0
12	400	3.50	12,400	15.7	14,500	5.1	1	Rotary	34.0
15	500	4.50	15,500	16.3	17,400	5.3	1	Rotary	36.0
18	625	5.50	18,500	16.0	21,000	5.0	1	Scroll	41.5
24	800	7.00	25,400	16.1	28,500	5.0	1	Scroll	63.0
30	1000	8.00	31,200	16.0	33,600	4.9	1	Scroll	70.0
36	1200	9.00	36,000	15.9	40,200	4.8	1	Scroll	74.0

### ELECTRICAL DATA

Unit Size	Voltage	Horsepower - RPM	Blower FLA	Compressor RLA / LRA	Total FLA	MCA	Breaker Size
9	208 / 1	1/4-1600	1.1	3.7 / 29.0	4.8	5.8	15
	265 / 1	1/4-1600	1.0	3.5 / 22.0	4.5	5.4	15
12	208 / 1	1/4-1600	1.4	4.7 / 25.0	6.1	7.6	15
	265 / 1	1/4-1600	1.2	4.2 / 22.0	5.4	6.5	15
15	208 / 1	1/3-1075	1.8	5.6 / 22.0	7.4	8.8	15
	265 / 1	1/3-1075	1.6	5.0 / 28.0	6.6	7.9	15
18	208 / 1	1/3-1075	1.8	9.0 / 47.5	10.8	13.1	20
	265 / 1	1/3-1075	1.6	7.3 / 43.0	8.7	10.5	15
24	208 / 1	1/3-1075	2.4	10.9 / 62.9	13.3	16.1	25
	265 / 1	1/3-1075	2.1	9.0 / 54.0	11.1	13.4	20
30	208 / 1	1/3-1075	3.2	13.5 / 75.5	16.7	20.1	30
	265 / 1	1/3-1075	2.9	11.2 / 60.0	14.1	16.5	25
36	208 / 1	1/2-1075	3.7	14.1 / 72.2	17.8	21.4	30
	265 / 1	1/2-1075	3.3	12.2 / 72.0	15.5	18.6	30

### NOTES:

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

## Model Series 44VH • ECM Motor Fan Performance Data

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

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SERENITY VERTICAL HI-RISE WATER SOURCE HEAT PUMPS

## Model Series 44VH • ECM Motor Fan Performance Data

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

## Model Series 44VH • Sound Power Performance Data

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

**A**
**SERENITY VERTICAL HI-RISE WATER SOURCE HEAT PUMPS**

## Model Series 44VH • Performance Data Unit Size 9

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

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

**COP** = coefficient of performance  
**EER** = energy efficiency ratio  
**HA** = heat absorption  
**HC** = heating capacity

**HR** = heat rejection  
**LAT** = leaving air temp  
**S/T** = sensible/cooling capacity  
**SC** = sensible capacity

**TC** = total cooling capacity  
**W** = power unit

## Model Series 44VH • Performance Data Unit Size 12

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

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

**COP** = coefficient of performance  
**EER** = energy efficiency ratio  
**HA** = heat absorption  
**HC** = heating capacity

**HR** = heat rejection  
**LAT** = leaving air temp  
**S/T** = sensible/cooling capacity  
**SC** = sensible capacity

**TC** = total cooling capacity  
**W** = power unit

**A**  
SERENITY VERTICAL HI-RISE WATER SOURCE HEAT PUMPS



## Model Series 44VH • Performance Data Unit Size 15

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

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

**COP** = coefficient of performance  
**EER** = energy efficiency ratio  
**HA** = heat absorption  
**HC** = heating capacity

**HR** = heat rejection  
**LAT** = leaving air temp  
**S/T** = sensible/cooling capacity  
**SC** = sensible capacity

**TC** = total cooling capacity  
**W** = power unit

## Model Series 44VH • Performance Data Unit Size 18

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

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

**COP** = coefficient of performance  
**EER** = energy efficiency ratio  
**HA** = heat absorption  
**HC** = heating capacity

**HR** = heat rejection  
**LAT** = leaving air temp  
**S/T** = sensible/cooling capacity  
**SC** = sensible capacity

**TC** = total cooling capacity  
**W** = power unit

## Model Series 44VH • Performance Data Unit Size 24

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

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

**COP** = coefficient of performance  
**EER** = energy efficiency ratio  
**HA** = heat absorption  
**HC** = heating capacity

**HR** = heat rejection  
**LAT** = leaving air temp  
**S/T** = sensible/cooling capacity  
**SC** = sensible capacity

**TC** = total cooling capacity  
**W** = power unit

## Model Series 44VH • Performance Data Unit Size 30

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

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

**COP** = coefficient of performance  
**EER** = energy efficiency ratio  
**HA** = heat absorption  
**HC** = heating capacity

**HR** = heat rejection  
**LAT** = leaving air temp  
**S/T** = sensible/cooling capacity  
**SC** = sensible capacity

**TC** = total cooling capacity  
**W** = power unit

## Model Series 44VH • Performance Data Unit Size 36

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

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

**COP** = coefficient of performance  
**EER** = energy efficiency ratio  
**HA** = heat absorption  
**HC** = heating capacity

**HR** = heat rejection  
**LAT** = leaving air temp  
**S/T** = sensible/cooling capacity  
**SC** = sensible capacity

**TC** = total cooling capacity  
**W** = power unit

## Model Series 44VH • Suggested Specifications

### General

#### 1.1 Section includes

Vertical stack water source heat pumps description

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

#### 1.2 Related sections

#### 1.3 References

- .1 Air-Conditioning, Heating and Refrigeration Institute (AHRI) AHRI ISO 13256-1, Testing and rating for performance Water - Source Heat Pumps.
- .2 ETL Listing Laboratories (ETL), UL Standard 1995.

#### 1.4 Delivery & storage

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

#### 1.5 Environmental requirements

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

#### 1.6 factory testing

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

#### 1.7 shop drawings and product data

- .1 Submit shop drawings in accordance Nailor's Submittal Procedures. The submittals shall
- .2 Indicate:
  - .01 Capacities.
  - .02 AHRI Ratings.
  - .03 Sound Power levels.
  - .04 Installation instructions.
  - .05 Start-up Instructions.
  - .06 Instructions.

#### 1.8 Training

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

### Products

#### 2.0 Water to air vertical stack water source heat pumps

- .1 Units shall be supplied completely factory built capable of operating over an entering water temperature range from standard range 60–95°F and extended 20–120°F. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute/International Standards Organization (AHRI / ISO 13256-1). All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI / ISO and ETL-US-C labels. All units shall pass a factory acceptance test. The quality control system shall perform factory acceptance test.
- .2 Casing and Cabinet: The cabinet panels shall be fabricated from heavy gauge 18/20 gauge galvanized steel. The rigid cabinet assembly shall be constructed so that it is self-supporting, and can be installed prior to the chassis arrival, and to be able to

avoid damage during construction. Blower deck, and other metal structural parts are to be 16 gauge construction, while exterior panels to be 20 gauge .

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

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

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

- 1) 2" (50 mm) filter holder with 2" (50.8 mm) thick fiberglass throwaway filter.

Cabinet arrangements shall allow placement of riser piping on any one of the three sides of the cabinet not used for the chassis access and air supply. All cabinets shall have supply air knockouts on all sides and top. Field shall configure cabinets by removing factory knockouts and install duct flanges per model configuration shown on plans.

- 2) Master and slave cabinets.
- 3) Isolation pad can be supplied to be placed upon installation on the bottom of cabinet for best sound attenuation.
- 4) Cabinet height 88" (223 cm)
- 5) Construction for unit mounted Thermostat (thermostat ordered separate) has a polarized connector inside for quick connection to thermostat.

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

- 6) Type L & K riser piping.
- 7) Supply and return risers insulated with 1/2" (12.6 mm) ARMAFLEX (closed cell) type insulation. 1" through 3" diameter standard, 4" diameter available. Union style or brazed shutoffs available.

#### 2.1 Chassis Refrigerant Circuit

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

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

## Model Series 44VH • Suggested Specifications (continued)

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

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

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

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

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

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

### 2.2 Drain Pan

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

### 2.3 Electrical

A control compartment shall be located within the unit cabinet and shall contain a 40VA transformer, terminal block or optional toggle disconnect for high voltage and low voltage connections, relay and

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

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

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

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

### 2.4 Fan and Motor Assembly

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

### 2.5 WSHP Solid State Control System

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

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

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

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

## Model Series 44VH • Suggested Specifications (continued)

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

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

Field installed options

### 3.0 Return Panels

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

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

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

### 3.1 Supply grille(s)

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

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

### 3.2 Cabinet Subbase

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

### 3.3 Filters

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

### 3.4 Thermostats

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

#### a. Single Stage Digital Auto or Manual Changeover

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

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

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

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

Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a blue backlit dot matrix LCD display with temperature, setpoints, mode, and status indication. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24-hour clock. Fault identification shall be provided (when used with Engineered Comfort WSHP controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide

heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

### Execution

#### 4.0 Heat pump installation

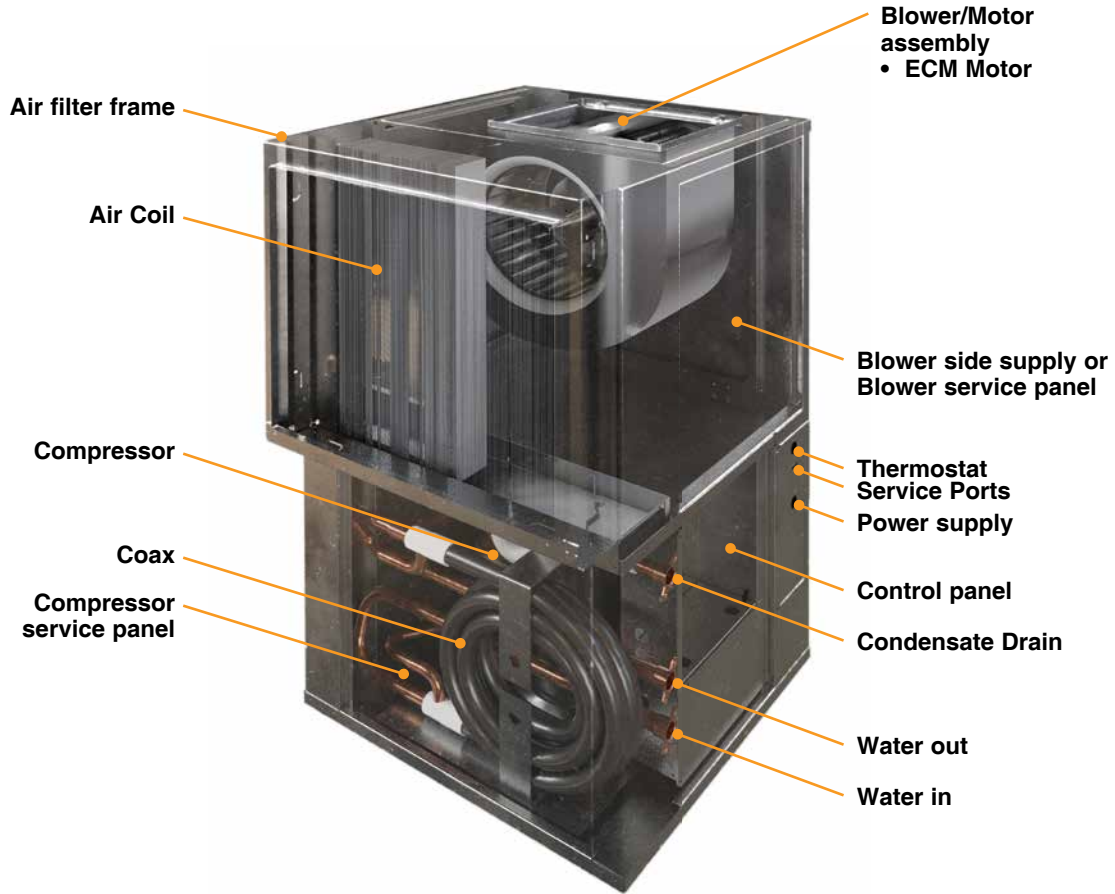
- .1 Install heat pumps in accordance with the manufacturers recommendations.
  - .01 Contractor to be aware the space is limited in most of the buildings, and the size of the unit and condensate piping route to have particular attention paid to it, with regard to placement.
  - .02 The final arrangement of each heat pump shall allow easy access to all service panels and allow filter removal.
  - .03 Provide all wiring and refrigerant tubing as required to connect water control valve and water regulating valve.
  - .04 Provide detailed start-up reports for each heat pump to be completed by trained service technicians.



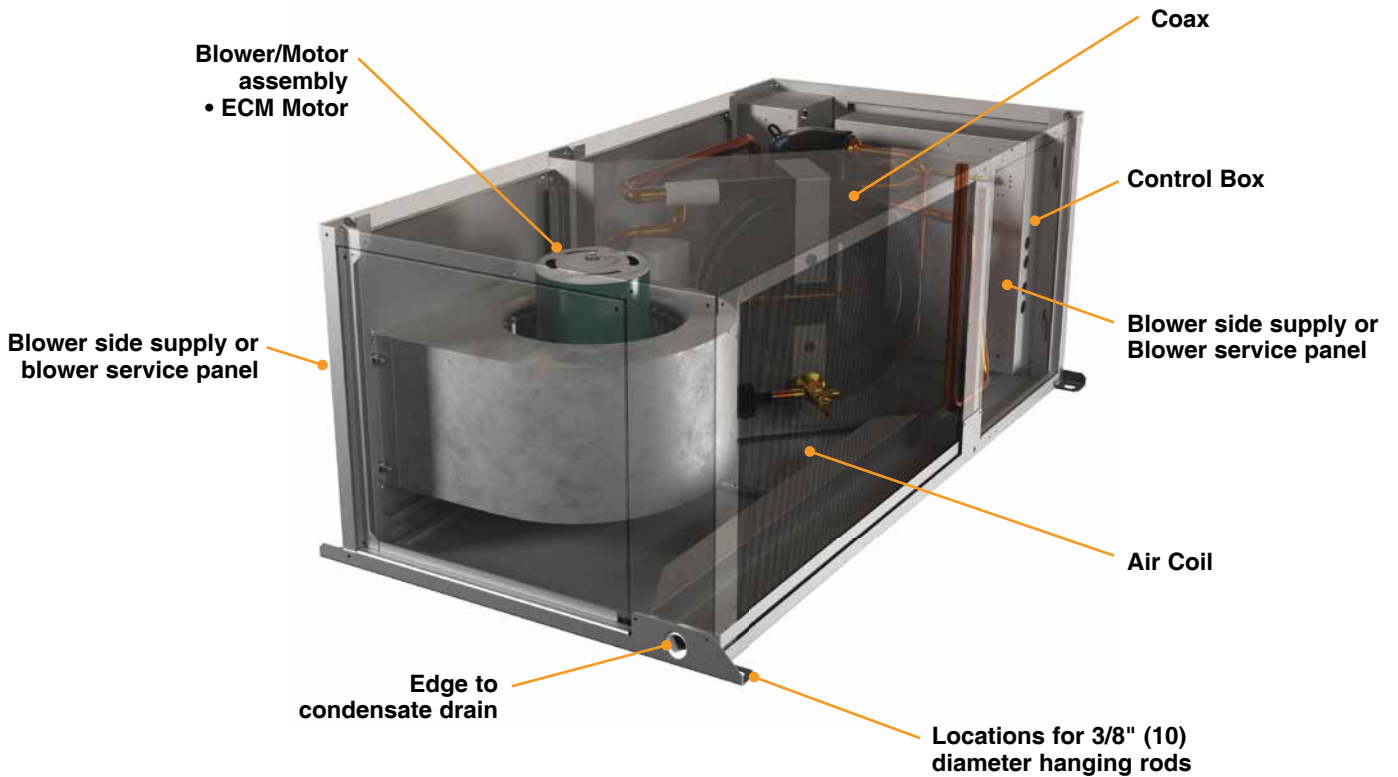
# SERENITY PACKAGED WATER SOURCE HEAT PUMPS



## MODEL SERIES 44PV



## MODEL SERIES 44PH



B

SERENITY PACKAGED WATER SOURCE HEAT PUMPS

## Model Series 44P

### Standard Features

#### CONSTRUCTION:

- G90 galvanized heavy casing.
- Two cabinet configurations are available in either a left hand return or right hand return air arrangement to provide the optimum return air location and service access.

#### FAN ASSEMBLIES:

- Easily removable slide out fan/motor deck for service.
- A large panel provides service access to the blower and motor.
- All blower/motor assemblies have a removable orifice ring on the housing to accommodate motor and blower removal without disconnecting the unit from the ductwork.

#### SOUND REDUCTION PACKAGE

- The unit has a unique dual-level vibration isolation system.
- A heavy-gauge mounting plate is isolated from the cabinet via a dense neoprene pad to minimize vibration transfer.
- The compressor is then isolated from the mounting plate with our standard rubber in shear isolators to enhance the dual-level vibration isolation.
- The compressor is located in a well-insulated compartment separated from the air stream to minimize sound transmission.

#### FIELD CONVERTIBLE FAN OUTLET

- Access panels are interchangeable to allow field conversion of the blower to provide maximum flexibility during installation.

#### BOTTOM SERVICE ACCESS

- Horizontal units include bottom service access where the fan housing, fan motor, expansion valve, reversing valve and filters are easily accessed from the bottom of the unit to allow routine in-place maintenance.

#### LED SIGHT GLASS

- The LED status sight glass allows an instant visual of unit operation for quick troubleshooting and advanced diagnosis without removing the access panel.

#### SERVICE PORT CONNECTIONS

- Two service valves are located inside the compressor access panel, one on the low side and one on the high side of the refrigeration circuit.
- Easily accessible for routine service.

#### WATER CONNECTIONS

- The water and condensate connections are FPT fittings, securely mounted flush to the corner post to allow for connection to a flexible hose without the use of a back-up wrench for easy installation.

#### SOLID STATE CONTROL BOARD

- Freeze protection - Factory set switch for water and water / glycol solution systems initiates a fault when temperatures drop below the selected limit for 30 continuous seconds.
- Condensate overflow - The controller is designed to sense when condensate water levels in the drain pan become excessively high. When high condensate water levels are detected during cooling or dehumidification mode, the controller will go into condensate overflow warning mode.

MODEL SERIES 44PV



MODEL SERIES 44PH



B

SERENITY PACKAGED WATER SOURCE HEAT PUMPS

## Model Series 44P

- Low pressure switch - A normally closed low refrigerant pressure switch is used to help protect the refrigerant circuit from excessively low refrigerant pressure. The controller will monitor the switch, when the low-pressure switch contacts are open for more than the low-pressure time delay, the controller will go into the low-pressure fault mode.
- Low liquid temp - Factory set switch for water and water / glycol solution systems initiates a fault when temperatures exceed the selected limit for 30 continuous seconds.

### STAINLESS STEEL HOSES

- Field installed flexible 304 stainless steel hose with internal single braid high strength Kevlar® spiral reinforced rubber.
- Meets UL-94 VO fire rating.

### CONSTANT TORQUE ECM MOTOR

- All sizes provide the efficiency and operability of an ECM at a lower cost than a constant airflow ECM.
- Constant torque ECMs provide 5 available motor speed settings and will maintain a constant motor torque as external static pressure in the system increases. As the system static pressure increases, reduction in fan airflow with a constant torque ECM is minor.

### CONSTANT AIRFLOW ECM MOTOR

- All unit sizes will maintain a constant unit airflow as the static pressure in the system increases.

### T-STATS

- See thermostat table.

### CONDENSATE PUMP

- A field installed condensate pump allows the unit to be located virtually wherever desired.
- The condensate pump serves as an effective means for disposing of condensate generated during cooling operation.
- A condensate pump should be designed and installed at the unit to pump condensate to a building drain.

### VIBRATION ISOLATION PAD

- Vibration isolator pads dampen vibration from the compressor and fan motors.
- The ½" (13) thick neoprene isolation pads are attached to the bottom of the cabinet at the factory eliminating any additional field labor.

### 2-WAY VALVE

- Available internally factory mounted on all sizes, 2-way valves are used for a variety of pumping applications when more than one unit is installed on a common loop.
- These valves are also used to shut off flow when the unit is not operating. On a call for cooling or heating the valve opens providing full water flow prior to compressor operation.
- A 24 volt control wire harness is included with the factory provided control valve option. Factory mounted.

### AUTOMATIC FLOW CONTROL

- Available internally factory mounted on all sizes, an automatic flow control device includes a ball valve cast in the valve body and is located on the return water pipe.

- The flow control valve consists of a stainless steel/ brass flow cartridge and a contoured orifice plate.
- As the pressure drop increases, the flow cartridge will move into the contoured orifice plate to decrease the flow.
- This flexing action provides a constant flow, independent of pressure (2-80 psi), makes it difficult to clog and resistant to cavitation damage.
- This valve sets flow through the coil without any action required by a system balancer.

### MANUAL FLOW CONTROL

- A manual flow control valve, acts as both a flow setting device and a stop valve, taking the place of a ball valve.
- This valve allows water flow through the unit and can be set quickly and accurately.

### BALL VALVES

- Ball valves allow the unit to be shut off for servicing purposes.
- They have a low resistance to water flow, operate easily.
- These valves have a compact handle that rotates 90 degrees to a fully open position.
- The valve body is forged brass and the ball is polished brass with Teflon seats and seals.
- Ball valves are included on both the supply and return water pipes.

### MEMORY STOP

- Adjustable Memory Stop provides both balancing and shut-off in one valve.
- With the memory stop locked in place, the valve can be closed and then reopened to the same balanced position.

### PETE'S PLUG

- An accessible port where pressure and temperature can be measured.
- Accepts standard 1/8" gauge adapter or thermometer stem.

### STRAINER

- The Y-type strainer body is constructed of brass with a 16 mesh 304 stainless steel screen.
- Used for removal of small particles from the water supply pipe during normal system operation.
- The strainer helps protect the coil and minimizes the chance of control valves clogging.
- Screens should be regularly removed and cleaned as part of a routine maintenance schedule.

### HIGH EFFICIENCY AIR FILTERS

- 1" (25) or 2" (51) fiberglass throwaway filter are standard.

### WATERSIDE ECONOMIZER

- The waterside economizer option helps to reduce energy consumption by using existing cold loop water temperature to condition a space without utilizing mechanical cooling.
- The waterside economizer ships factory installed on the return air opening, upstream of the evaporator coil.
- When entering water temperature is between 60°F and 45°F, a call for cooling will divert the cold water to the economizer coil.

## Model Series 44P

### HANGING BRACKET

- The hanging brackets are factory mounted to shorten job installation requirements.
- Isolation for the hanging bracket is provided with a rubber-in-shear grommet.
- This isolation device helps prevent sound vibration from reaching the structural support of the building during unit operation.
- Field supplied spring isolators may also be used provided appropriate weight calculations are preformed.

### HOT GAS REHEAT

- The hot gas reheat mode is designed to dehumidify the conditioned space with minimal change to the indoor air temperature and is controlled by a thermostat with an integral humidistat.
- The leaving air dry-bulb temperature is typically within 5°F of the return air temperature to maintain occupant comfort. While in dehumidification mode, operation will occur until the humidistat is satisfied or until there is a call for heating or cooling.
- The moisture removal capacity of each heat pump will depend on the entering water temperature and the entering air dry-bulb and wet-bulb temperatures.
- Details can be found in the published performance specifications for the hot gas reheat mode.
- Cooling Mode - The thermostat with its integrated humidistat is monitoring both room temperature and humidity. On a call for cooling, the compressor is energized, the reversing valve is positioned for cooling, and the unit operates in normal cooling mode. When the space temperature is satisfied, the compressor is turned off. If the humidity setpoint is not satisfied, the unit will continue to operate in dehumidification mode.
- Dehumidification Mode - On a call for dehumidification, the compressor is energized, the reversing valve is positioned for cooling, and the hot gas reheat valve opens to allow compressor discharge gas into the hot gas reheat coil. With dehumidification mode activated, the unit will cool and dehumidify the air through the evaporator coil, and then reheat the air back to room temperature using the hot gas reheat coil. When the humidity setpoint is satisfied, the hot gas reheat valve is closed, and the compressor is turned off. If there is a call for cooling, the hot gas reheat valve is closed, and the unit continues to operate in cooling mode.
- Heating Mode - The thermostat with its integrated humidistat is monitoring both room temperature and humidity. On a call for heating, the compressor is energized, the reversing valve is positioned for heating, the unit operates in normal heating mode. When the heating setpoint is reached, the compressor is turned off.

### Options

#### TIN DIPPED COIL

- Optional tin electro-plated copper tubing protects the air coil from many corrosive elements in the air stream.
- Corrosion often referred to as Formicary Corrosion occurs due to the presence of dissimilar metals such as copper and aluminum in conjunction with water causes results in refrigerant leaks and eventual failure of the air coil costing hundreds of dollars to replace.
- Studies have also shown that isolating the copper from the aluminum greatly reduces or eliminates the corrosion thereby increasing the life of the air coil.

#### NON-FUSED DISCONNECT

- Optional non-fused disconnect switch.
- The disconnect switch is used to break power to the unit for ease of field.

#### CIRCUIT BREAKER

- Optional circuit breaker (HACR breaker).
- The circuit breaker is used to break power to the unit for ease on the field.

#### COMPRESSOR SOUND BLANKET

- Optional factory installed sound attenuating compressor blanket to further reduce sound transmission.

#### CU-NI COAXIAL HEAT EXCHANGER

- Optional cupronickel tube-in-tube coaxial heat exchanger used in vertical stack water source heat pumps is designed for maximum heat transfer at normal and low water flow rates with minimum pressure drop.
- The inside tube is deeply fluted to enhance heat transfer and minimize fouling. All coaxial coils are tested to 400 psig on the water side and 600 psig on the refrigerant side.
- The extended range chassis has coil and piping insulation to protect against condensation in low-temperature geothermal applications.

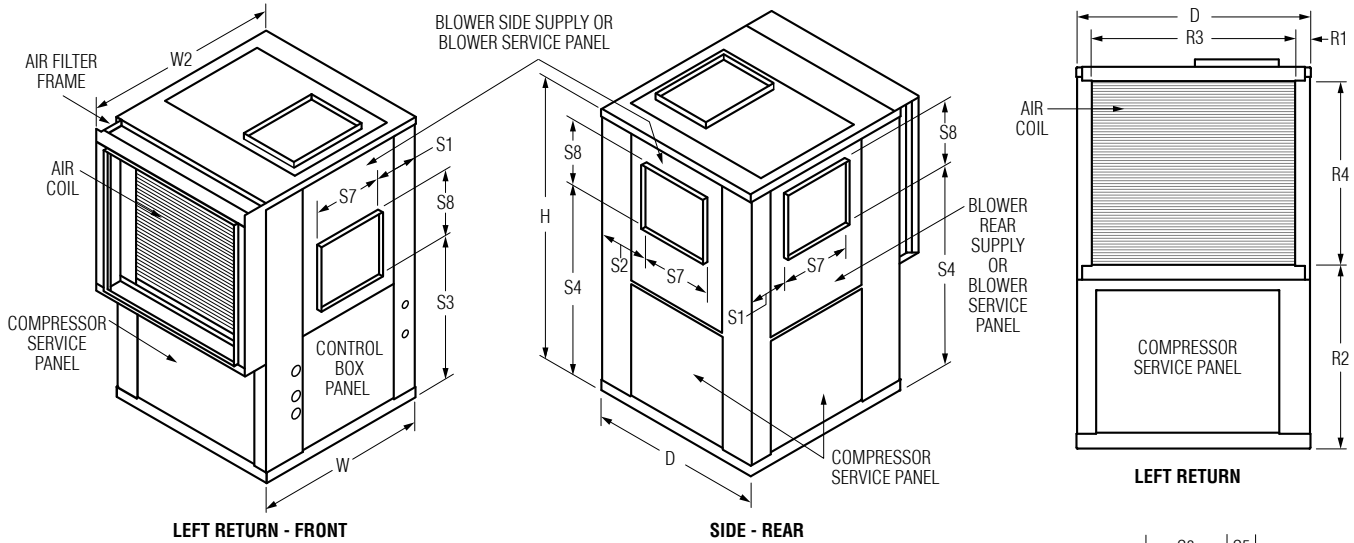
#### HYDRONIC HYBRID HEATING

- The hydronic heat option helps to reduce energy consumption by using warm loop water temperatures to condition a space without energizing mechanical heating.
- The hydronic heating coil ships factory installed on the return air opening, upstream of the evaporator coil.
- A call for heating will divert the warm water to the hydronic coil providing heat to the occupied space.

#### HIGH EFFICIENCY AIR FILTERS

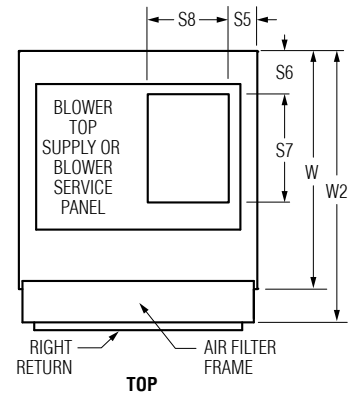
- Optional High efficiency MERV 8, MERV 11, and MERV 13 pleated filters
- Optional washable aluminum mesh filter.

## Model Series 44PV • Vertical Unit Sizes 6 - 60 • Left Return



### Dimensional Data with Optional Hydronic Heat and Water Side Economizer

Unit Size	W	W2	D	H
6, 9, 12	22 1/2 (572)	25 5/8 (651)	19 (483)	26 (660)
15, 18	25 1/2 (648)	28 5/8 (727)	22 (559)	38 (965)
24	25 1/2 (648)	28 5/8 (727)	22 (559)	42 (1067)
30	28 1/2 (724)	31 5/8 (803)	26 (660)	42 (1067)
36	28 1/2 (724)	31 5/8 (803)	26 (660)	47 (1194)
42	28 1/2 (724)	31 5/8 (803)	26 (660)	47 (1194)
48	29 1/2 (750)	32 3/8 (822)	32 (813)	48 (1219)
60	29 1/2 (750)	32 3/8 (822)	32 (813)	48 (1219)

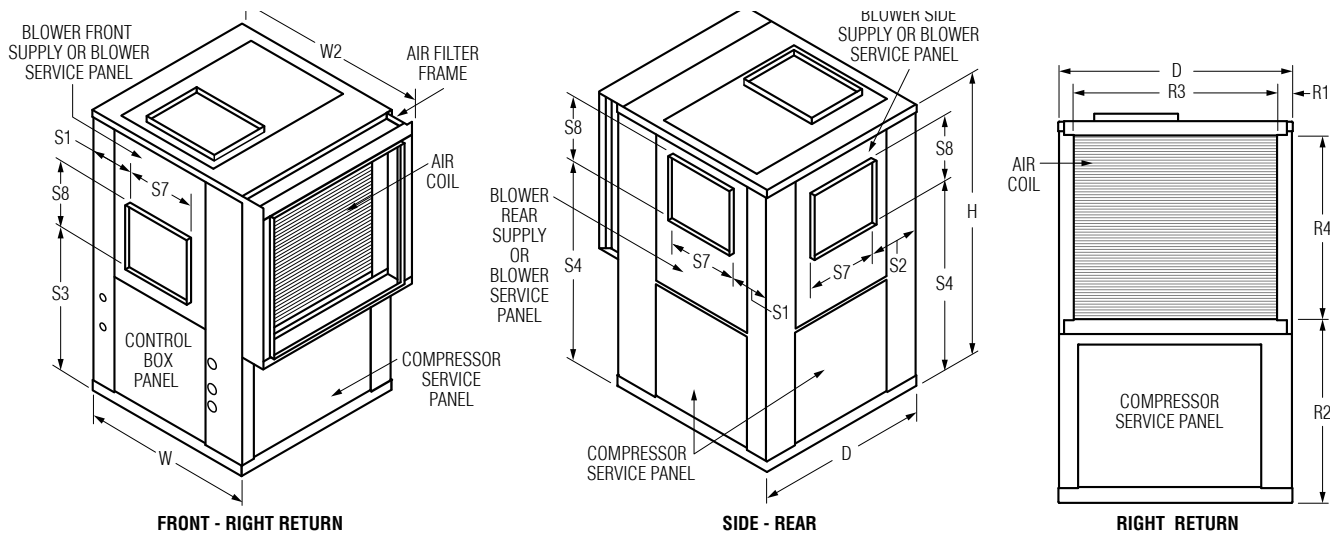


### Dimensional Data

Unit Size	W	W2	D	H	S1	S2	S3	S4	S5	S6	S7	S8	R1	R2	R3	R4	Filter Size
6, 9, 12	19 (483)	22 1/8 (562)	19 (483)	24 (610)	1 11/16 (42)	3 1/2 (80)	12 1/2 (317)	15 1/4 (388)	4 3/4 (120)	1 11/16 (42)	10 11/16 (272)	6 3/4 (171)	1 3/8 (34)	13 3/16 (335)	15 5/16 (389)	9 1/2 (241)	12 x 16 (305 x 406)
15	22 (559)	25 1/8 (638)	22 (559)	36 (914)	2 5/16 (58)	4 9/16 (116)	17 1/2 (445)	25 1/2 (647)	3 (76)	4 5/16 (109)	11 7/8 (302)	8 (204)	1 3/8 (34)	17 5/16 (439)	19 5/16 (490)	17 3/8 (442)	20 x 20 (508 x 508)
18	22 (559)	25 1/8 (638)	22 (559)	36 (914)	3 1/16 (77)	5 5/16 (135)	17 1/2 (445)	24 1/4 (616)	3 (76)	4 5/16 (109)	10 3/8 (264)	9 1/4 (235)	1 3/8 (34)	17 5/16 (439)	19 5/16 (490)	17 3/8 (442)	20 x 20 (508 x 508)
24	22 (559)	25 1/8 (638)	22 (559)	40 (1016)	4 1/16 (103)	6 5/16 (160)	20 1/2 (521)	25 3/4 (653)	2 1/2 (64)	5 11/16 (145)	10 3/16 (259)	11 3/4 (299)	1 3/8 (34)	21 5/16 (541)	19 5/16 (490)	17 3/8 (442)	20 x 20 (508 x 508)
30	25 (635)	28 1/8 (715)	26 (660)	40 (1016)	4 1/16 (103)	6 13/16 (173)	20 1/2 (521)	26 7/8 (682)	4 1/2 (114)	6 1/16 (154)	11 (280)	10 5/8 (271)	1 3/8 (34)	21 5/16 (541)	23 5/16 (592)	17 3/8 (442)	20 x 24 (508 x 610)
36	25 (635)	28 1/8 (715)	26 (660)	45 (1143)	4 1/16 (103)	7 5/16 (185)	22 (559)	30 3/4 (780)	2 3/4 (70)	6 1/16 (154)	11 1/2 (289)	11 3/4 (299)	1 3/8 (34)	22 5/16 (566)	23 5/16 (592)	21 3/8 (544)	24 x 24 (610 x 610)
42	25 (635)	28 1/8 (715)	26 (660)	45 (1143)	3 9/16 (90)	6 13/16 (173)	22 (559)	30 3/4 (780)	2 3/4 (70)	5 9/16 (141)	12 1/8 (308)	11 3/4 (299)	1 3/8 (34)	22 5/16 (566)	23 5/16 (592)	21 3/8 (544)	24 x 24 (610 x 610)
48	25 (635)	28 1/8 (715)	32 (813)	45 (1143)	3 9/16 (90)	9 13/16 (249)	22 (559)	30 3/4 (780)	5 3/4 (146)	5 9/16 (141)	12 1/8 (308)	11 3/4 (299)	1 3/8 (34)	22 5/16 (566)	29 5/16 (744)	21 3/8 (544)	24 x 30 (610 x 762)
60	25 (635)	28 1/8 (715)	32 (813)	45 (1143)	3 9/16 (90)	9 13/16 (249)	22 (559)	28 11/16 (728)	5 3/4 (146)	5 9/16 (141)	12 5/8 (321)	13 13/16 (352)	1 3/8 (34)	22 5/16 (566)	29 5/16 (744)	21 3/8 (544)	24 x 30 (610 x 762)

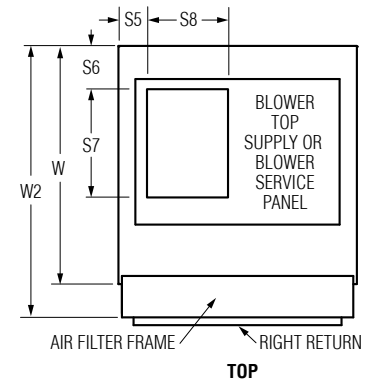
SERENITY PACKAGED WATER SOURCE HEAT PUMPS

## Model Series 44PV • Vertical Unit Sizes 6 - 60 • Right Return



### Dimensional Data with Optional Hydronic Heat and Water Side Economizer

Unit Size	W	W2	D	H
6, 9, 12	22 1/2 (572)	25 5/8 (651)	19 (483)	26 (660)
15, 18	25 1/2 (648)	28 5/8 (727)	22 (559)	38 (965)
24	25 1/2 (648)	28 5/8 (727)	22 (559)	42 (1067)
30	28 1/2 (724)	31 5/8 (803)	26 (660)	42 (1067)
36	28 1/2 (724)	31 5/8 (803)	26 (660)	47 (1194)
42	28 1/2 (724)	31 5/8 (803)	26 (660)	47 (1194)
48	29 1/2 (750)	32 3/8 (822)	32 (813)	48 (1219)
60	29 1/2 (750)	32 3/8 (822)	32 (813)	48 (1219)



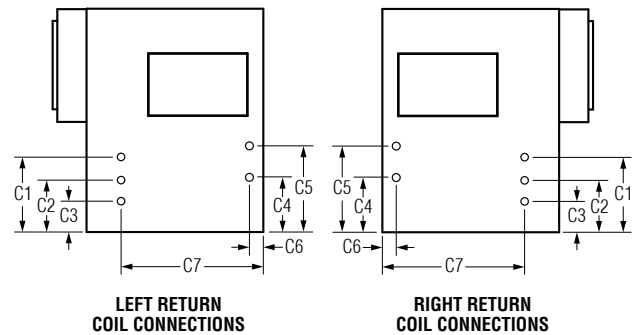
### Dimensional Data

Unit Size	W	W2	D	H	S1	S2	S3	S4	S5	S6	S7	S8	R1	R2	R3	R4	Filter Size
6, 9, 12	19 (483)	22 1/8 (562)	19 (483)	24 (610)	1 11/16 (42)	3 1/2 (80)	15 1/4 (388)	12 1/2 (317)	7 1/2 (191)	1 11/16 (42)	10 11/16 (272)	6 3/4 (171)	1 3/8 (34)	13 3/16 (335)	15 5/16 (389)	9 1/2 (241)	12 x 16 (305 x 406)
15	22 (559)	25 1/8 (638)	22 (559)	36 (914)	2 5/16 (58)	4 9/16 (116)	25 1/2 (647)	17 1/2 (445)	10 15/16 (278)	2 5/16 (58)	11 7/8 (302)	8 (204)	1 3/8 (34)	17 5/16 (439)	19 5/16 (490)	17 3/8 (442)	20 x 20 (508 x 508)
18	22 (559)	25 1/8 (638)	22 (559)	36 (914)	3 1/16 (77)	5 5/16 (135)	24 1/4 (616)	17 1/2 (445)	9 3/4 (247)	3 1/16 (77)	10 3/8 (264)	9 1/4 (235)	1 3/8 (34)	17 5/16 (439)	19 5/16 (490)	17 3/8 (442)	20 x 20 (508 x 508)
24	22 (559)	25 1/8 (638)	22 (559)	40 (1016)	4 1/16 (103)	6 5/16 (160)	25 3/4 (653)	20 1/2 (521)	7 3/4 (196)	4 1/16 (103)	10 3/16 (259)	11 3/4 (299)	1 3/8 (34)	21 5/16 (541)	19 5/16 (490)	17 3/8 (442)	20 x 20 (508 x 508)
30	25 (635)	28 1/8 (715)	26 (660)	40 (1016)	4 1/16 (103)	6 13/16 (173)	26 7/8 (682)	20 1/2 (521)	10 13/16 (275)	4 1/16 (103)	11 (280)	10 5/8 (271)	1 3/8 (34)	21 5/16 (541)	23 5/16 (592)	17 3/8 (442)	20 x 24 (508 x 610)
36	25 (635)	28 1/8 (715)	26 (660)	45 (1143)	4 1/16 (103)	7 5/16 (185)	30 3/4 (780)	22 (559)	11 1/2 (291)	4 1/16 (103)	11 1/2 (289)	11 3/4 (299)	1 3/8 (34)	22 5/16 (566)	23 5/16 (592)	21 3/8 (544)	24 x 24 (610 x 610)
42	25 (635)	28 1/8 (715)	26 (660)	45 (1143)	3 9/16 (90)	6 13/16 (173)	30 3/4 (780)	22 (559)	11 1/2 (291)	3 9/16 (90)	12 1/8 (308)	11 3/4 (299)	1 3/8 (34)	22 5/16 (566)	23 5/16 (592)	21 3/8 (544)	24 x 24 (610 x 610)
48	25 (635)	28 1/8 (715)	32 (813)	45 (1143)	3 9/16 (90)	9 13/16 (249)	30 3/4 (780)	22 (559)	14 1/2 (367)	3 9/16 (90)	12 1/8 (308)	11 3/4 (299)	1 3/8 (34)	22 5/16 (566)	29 5/16 (744)	21 3/8 (544)	24 x 30 (610 x 762)
60	25 (635)	28 1/8 (715)	32 (813)	45 (1143)	3 9/16 (90)	9 13/16 (249)	28 11/16 (728)	22 (559)	12 3/8 (315)	3 9/16 (90)	12 5/8 (321)	13 13/16 (352)	1 3/8 (34)	22 5/16 (566)	29 5/16 (744)	21 3/8 (544)	24 x 30 (610 x 762)

## Model Series 44PV • Vertical Unit Sizes 6 - 60 • Left and Right Return

### Dimensions Data - Coil Connections

Unit Size	C1 COND. DRAIN	C2 WATER OUT	C3 WATER IN	C4 POWER SUPPLY	C5 THERMO- STAT	C6 EDGE TO CONNECTIONS	C7 EDGE TO COND. DRAIN
6, 9, 12	8 1/16 (204)	5 9/16 (141)	3 5/16 (84)	5 15/16 (151)	9 1/4 (235)	1 1/2 (38)	15 1/4 (388)
15, 18	12 9/16 (319)	9 (228)	6 3/4 (171)	10 7/16 (265)	13 3/4 (350)	1 1/2 (38)	17 3/8 (442)
24	15 9/16 (395)	9 1/4 (234)	6 1/4 (158)	12 13/16 (326)	16 3/4 (426)	2 1/2 (64)	17 3/8 (442)
30	15 9/16 (395)	11 1/4 (285)	6 1/4 (158)	12 13/16 (326)	16 3/4 (426)	2 1/2 (64)	20 3/8 (518)
36	17 1/16 (434)	12 3/8 (314)	7 3/8 (314)	14 5/16 (364)	18 1/4 (464)	2 1/2 (64)	19 3/8 (493)
42	17 1/16 (434)	12 3/8 (314)	7 3/8 (314)	14 5/16 (364)	18 1/4 (464)	2 1/2 (64)	19 5/8 (498)
48	17 1/16 (434)	12 3/8 (314)	7 3/8 (314)	14 5/16 (364)	18 1/4 (464)	2 1/2 (64)	19 5/8 (498)
60	17 1/16 (434)	12 3/8 (314)	7 3/8 (314)	14 5/16 (364)	18 1/4 (464)	2 1/2 (64)	19 5/8 (498)



### Standard Features

- Heat pump system
- Refrigerant circuit
- Copper tube/Aluminum fin
- Cabinets are constructed with a minimum 16 ga. galvanized steel base and a combination of 16 and 20 ga. cabinet components
- ECM Ultra-high efficiency fan motor with overload protection
- High-efficiency rotary and scroll compressors
- Compressors mounted on rubber vibration isolators to minimize vibration transmission
- Highly efficient heat exchanger optimizes efficiency
- TXV metering device
- 1/2" (13) dual density fiberglass insulation
- Galvanized steel insulated condensate drain pan
- Multiple return air configurations
- 1" (25) throwaway filter
- Flow control (1.0 to 20.0 GPM)
- Solid state control with thermostat
- Exceeds ASHRAE 90.1 efficiencies

### Options

- Systems: Cooling only, Cooling with HW heat, Heat pump w/hot gas reheat and Heat pump with water side economizer
- 2" (51) throwaway filter.
- 1" (25) or 2" (51) MERV 8 pleated filter
- 1" (25) or 2" (51) MERV 11 pleated filter
- 1" (25) or 2" (51) MERV 13 pleated filter
- Toggle disconnect switch
- Fused disconnect switch
- Cupro-Nickel
- Compressor sound blanket
- Vibration isolation pad
- Vibration pad and sound blanket
- Tin dipped hairpins
- Epoxy coating
- External flow control (1.0 to 20.0 GPM)
- Thermostat
- Solid state control with IO zone 560 DDC control

- IO zone 560 DDC control with fan status & compressor status current switch or with discharge air temperature or with fault alarm
- IO zone 560 DDC control with fan status & compressor status current switch with discharge air temperature or/and fault alarm
- IO zone 560 DDC control with discharge air temperature and fault alarm
- Freeze protection (32 °F - 10 °F) with Low/High liquid temp setting (36 °F - 0 °F)
- Valve package internal or external
- 2-Way or 3-Way valve
- Flow control valve
- 1/2" (13) Foil face or Fiber-free liner
- Ball valve
- Memory stop
- Condensate pump
- Condensate drain pan overflow switch
- Unit circuit breaker

### Voltage:

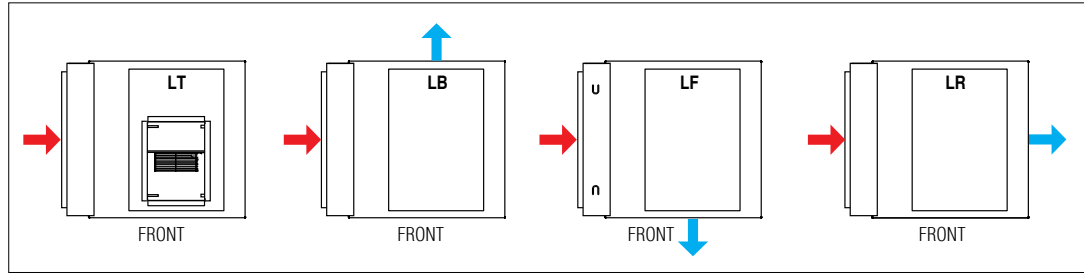
- Single phase, 60 Hz.
- 208V/230V
- 265V
- Three phase, 60 Hz.
- 460V
- 575V



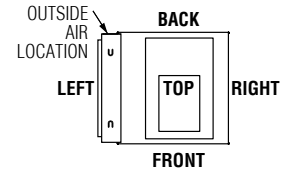
## Model Series 44PV • Vertical Unit Sizes 6 - 60 • Left and Right Return

### Airflow Configurations

#### VERTICAL - LEFT RETURN



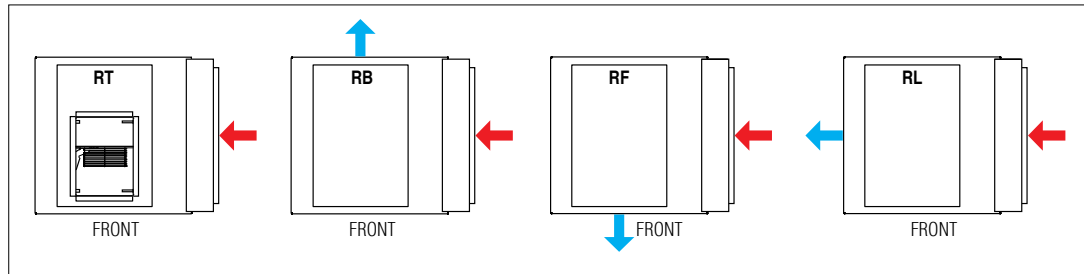
#### UNIT DESIGNATIONS



- AIRFLOW CONFIGURATIONS:**
- LT** = LEFT RETURN / TOP SUPPLY
  - LB** = LEFT RETURN / BACK SUPPLY
  - LF** = LEFT RETURN / FRONT SUPPLY
  - LR** = LEFT RETURN / RIGHT SUPPLY
  - RT** = RIGHT RETURN / TOP SUPPLY
  - RB** = RIGHT RETURN / BACK SUPPLY
  - RF** = RIGHT RETURN / FRONT SUPPLY
  - RR** = RIGHT RETURN / RIGHT SUPPLY

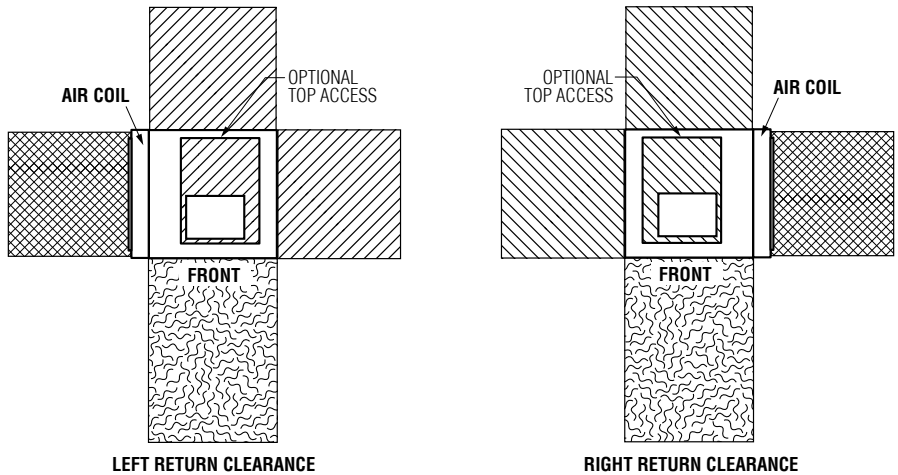
- SUPPLY AIRFLOW**
- RETURN AIRFLOW**

#### VERTICAL - RIGHT RETURN



**NOTES:** The airflow configuration may be built to order or modified on-site to meet installation requirements.

### Clearance Requirements



- = OPTIONAL 24" (610) UNIT ACCESS (ONE OF TWO REQUIRED)
- = OPTIONAL 24" (610) UNIT ACCESS
- = REQUIRED 36" (914) UNIT ACCESS

#### NOTES:

1. Front of unit is located by the unit control box. Thirty-six inches (36" [914]) clearance is required by the National Electric Code.
2. While clear access to all removable panels is not required, installer should comply with all building codes and allow adequate clearance for future field service.
3. Front or side access is preferred for service access depending on unit options.

## Model Series 44PV • Vertical Unit Sizes 6 - 60

### General Information

Component	Unit Size										
	6	9	12	15	18	24	30	36	42	48	60
TON	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5
CFM	200	300	400	500	600	800	1000	1200	1400	1600	2000
<b>COOLING PERFORMANCE *</b>											
Total Capacity (Btuh)	6,000	9,000	12,500	15,000	18,000	24,000	30,000	36,000	42,000	48,000	58,000
EER (Btuh/W)	17.0	14.0	13.0	17.0	17.0	16.4	16.0	17.0	15.0	15.0	15.0
Entering Water Temp (°F)	86	86	86	86	86	86	86	86	86	86	86
Water Flow (GPM)	2.0	2.5	3.0	3.8	4.5	6.0	7.5	9.0	10 1/2	12.0	15.0
Rated CFM	200	300	400	500	600	800	1000	1200	1400	1600	2000
Refrigerant type	R410A										
Refrigerant charge (oz)	22	20	22	36	34	48	54	60	68	76	78
<b>HEATING PERFORMANCE **</b>											
Total Capacity (Btuh)	7,500	11,500	15,000	18,000	21,600	28,000	34,000	43,000	49,000	56,000	72,000
COP (W/W)	5.6	4.4	4.4	5.6	5.6	5.2	5	5	4.6	4.6	4.6
Entering Water Temp (°F)	68	68	68	68	68	68	68	68	68	68	68
Water Flow (GPM)	2.0	2.5	3.0	3.8	4.5	6.0	7.5	9.0	10 1/2	12.0	15.0
<b>DIMENSIONS</b>											
Width	19	19	19	22	22	22	25	25	25	25	25
Depth	19	19	19	22	22	22	26	26	26	32	32
Height	24	24	24	36	36	40	40	45	45	45	45
Operating Weight (lbs.)	135	138	140	185	195	235	255	280	290	320	340
Shipping Weight (lbs.)	163	166	168	213	223	263	310	335	345	375	395
Compressor Types, Qty. 1	Rotary	Rotary	Rotary	Rotary	Rotary	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
<b>EVAPORATOR COIL- 3 Rows</b>											
Refrigerant Control	TXV										
Supply Fan Size (D x W) , Qty. 1	8 1/2 x 4	8 1/2 x 4	8 1/2 x 4	7 1/8 x 8	7 1/8 x 8	10 5/8 x 6	9 1/2 x 7	9.87 x 7	10 3/4 x 7 3/4	10 3/4 x 7 3/4	11 5/8 x 8
Fan Type	Centrifugal										
Maximum E.S.P. - ECM Motor	0.65	0.65	0.60	0.80	0.80	0.90	0.60	0.90	0.80	0.90	0.80
<b>CONSTANT TORQUE ECM HP</b>											
Voltage - 208/230-1, 265-1	1/4	1/4	1/4	1/4	1/4	1/2	1/2	1/2	3/4	3/4	1
Voltage - 208/230-3, 460-3	1/4	1/4	1/4	1/4	1/4	1/2	1/2	1/2	3/4	3/4	1
Entering Water Connection (inches)	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1
Leaving Water Connection (inches)	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1
Condensate Drain	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Return Air Duct Connection	15 5/16 x 9 1/2	15 5/16 x 9 1/2	15 5/16 x 9 1/2	19 5/16 x 17 2/5	19 5/16 x 17 2/5	19 5/16 x 17 2/5	23 5/16 x 17 2/5	23 5/16 x 21 2/5	23 5/16 x 21 2/5	29 5/16 x 21 2/5	29 5/16 x 21 2/5
Filter Size - Qty. 1	12 x 16	12 x 16	12 x 16	20 x 20	20 x 20	20 x 20	20 x 24	24 x 24	24 x 24	24 x 30	24 x 30

\* Based on 80.6°F DB, 66.2°F WB entering air temperature.

\*\* Based on 68°F DB, 59°F WB entering air temperature.

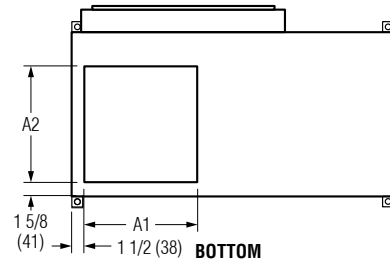
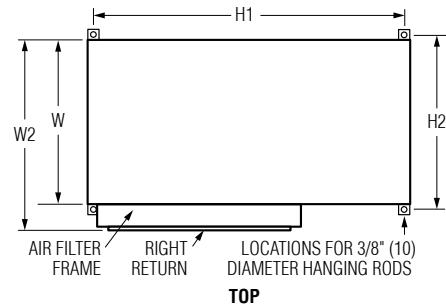
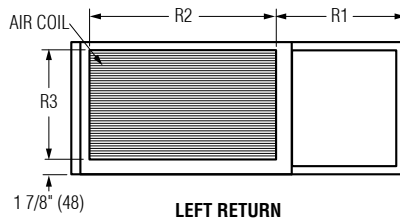
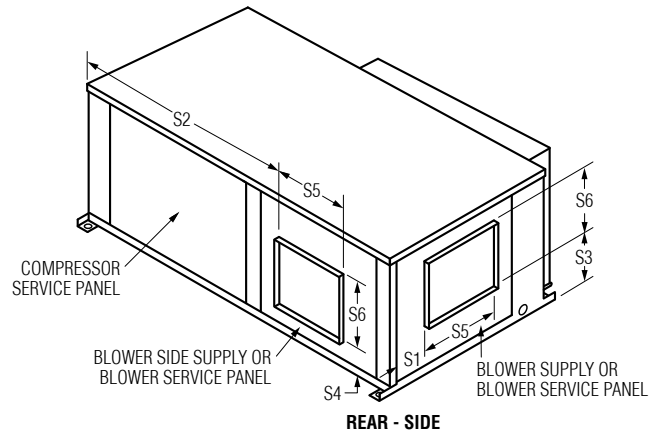
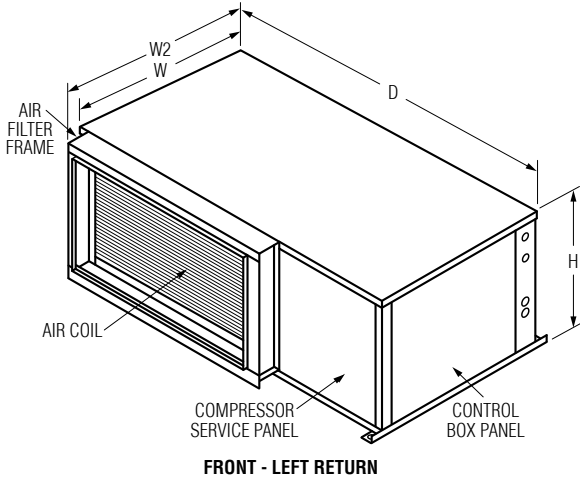
## Model Series 44P • Vertical Unit Sizes 6 - 60 • ECM Motor

### Electrical Data

Unit Size	Compressor				Supply Blower Motor		Single Point Power	
	Voltage-Hertz-Phase	RLA	LRA	QTY	FLA	HP	MCA	MOPD
6	208/230-60-1	2.5	17.7	1	2.2	1/4	5.3	15
	265-60-1	2.1	13.5	1	2.2	1/4	4.8	15
9	208/230-60-1	4.0	22.2	1	2.2	1/4	7.2	15
	265-60-1	3.3	18.8	1	2.2	1/4	6.3	15
12	208/230-60-1	5.6	29.0	1	2.2	1/4	9.2	15
	265-60-1	4.6	20.0	1	2.2	1/4	8.0	15
15	208/230-60-1	4.8	26.0	1	2.2	1/4	8.2	15
	265-60-1	4.2	25.0	1	2.2	1/4	7.5	15
18	208/230-60-1	7.7	38.0	1	2.2	1/4	11.8	15
	265-60-1	7.1	30.0	1	2.2	1/4	11.1	15
24	208/230-60-1	13.5	58.3	1	4.6	1/2	21.5	30
	265-60-1	9.0	54.0	1	3.2	1/2	14.5	20
	208/230-60-3	7.1	55.4	1	4.6	1/2	13.5	20
	460-60-3	3.5	28.0	1	3.2	1/2	7.6	15
30	208/230-60-1	14.1	73.0	1	4.6	1/2	22.2	30
	265-60-1	11.2	60.0	1	3.2	1/2	17.2	20
	208/230-60-3	8.9	58.0	1	4.6	1/2	15.7	20
	460-60-3	4.2	28.0	1	3.2	1/2	8.5	15
36	208/230-60-1	14.1	77.0	1	4.6	1/2	22.2	30
	265-60-1	12.2	72.0	1	3.2	1/2	18.5	30
	208/230-60-3	9.0	71.0	1	4.6	1/2	15.9	20
	460-60-3	5.6	38.0	1	3.2	1/2	10.2	15
42	208/230-60-1	17.9	112.0	1	6.3	3/4	28.7	40
	265-60-1	16.0	87.0	1	3.9	3/4	23.9	30
	208/230-60-3	13.5	88.0	1	6.3	3/4	23.2	30
	460-60-3	6.0	44.0	1	3.9	3/4	11.4	15
48	208/230-60-1	21.8	117.0	1	6.3	3/4	33.6	50
	265-60-1	16.3	98.0	1	3.9	3/4	24.3	40
	208/230-60-3	13.7	83.1	1	6.3	3/4	23.4	30
	460-60-3	6.2	41.0	1	3.9	3/4	11.7	15
60	208/230-60-1	26.3	134.0	1	6.6	1	39.5	60
	265-60-1	19.9	128.0	1	6.0	1	30.9	50
	208/230-60-3	15.6	110.0	1	6.6	1	26.1	40
	460-60-3	7.8	52.0	1	6.0	1	15.8	20

**NOTE:** Four wire power supply with neutral connection required for all 460 volt units with ECM motor.

## Model Series 44PH • Horizontal Unit Sizes 6 - 60 • Left Return



### Dimensional Data with Optional Hydronic Heat and Water Side Economizer

Unit Size	W	W2
6, 9, 12	23 1/2 (597)	26 5/8 (676)
15, 18	25 1/2 (648)	28 5/8 (727)
24, 30	26 1/4 (667)	28 5/8 (727)
36, 42	26 1/4 (667)	28 5/8 (727)
48, 60	29 1/4 (743)	32 3/8 (822)

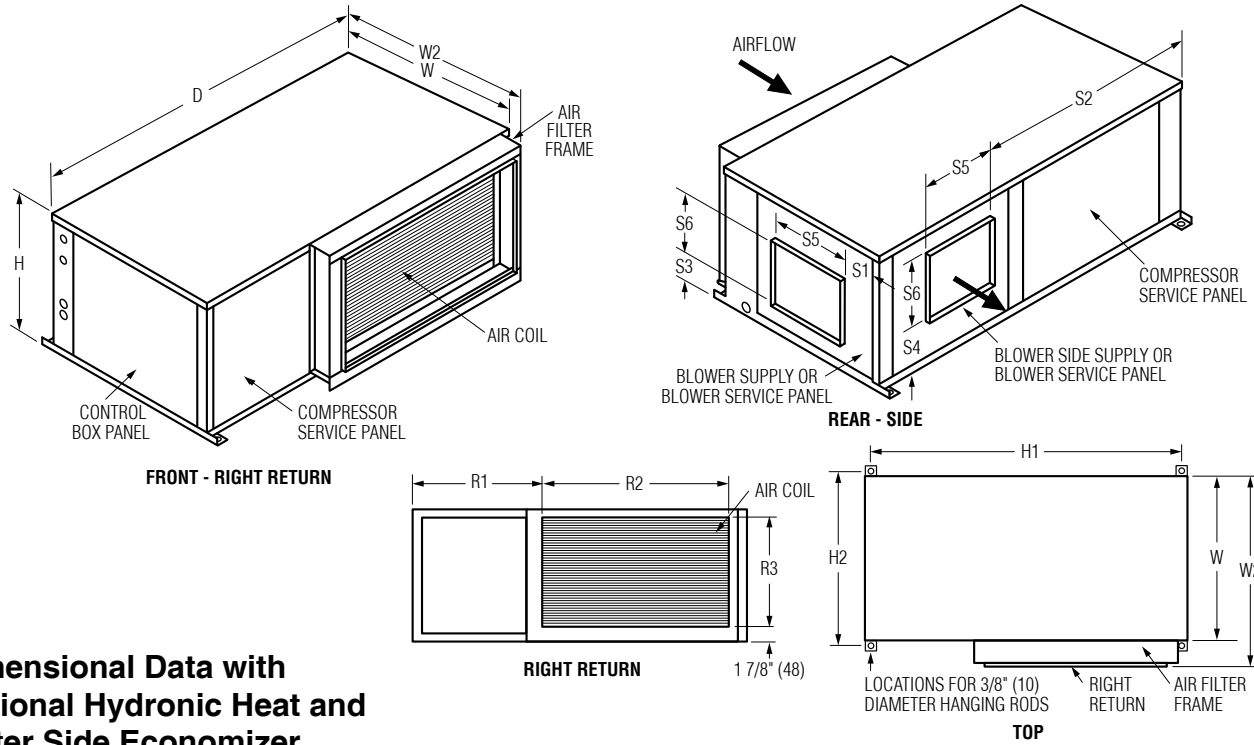


### Dimensional Data for Standard Units

Unit Size	W	W2	D	H	S1	S2	S3	S4	S5	S6	R1	R2	R3	H1	H2	A1	A2	Filter Size
6, 9, 12	20 (508)	23 1/8 (587)	34 (864)	11 1/2 (292)	1 7/16 (36)	21 7/8 (555)	2 7/8 (73)	1 3/4 (45)	10 11/16 (272)	6 3/4 (171)	15 3/8 (391)	16 (406)	8 1/2 (216)	32 9/16 (827)	21 1/2 (546)	13 13/16 (352)	14 3/16 (360)	10 x 18 (254 x 457)
15, 18	22 (559)	25 1/8 (638)	43 (1092)	17 (432)	4 1/16 (103)	26 1/16 (662)	7 5/16 (186)	1 1/2 (39)	11 7/8 (302)	8 (204)	17 3/8 (442)	23 (584)	14 (356)	41 9/16 (1055)	23 1/2 (597)	16 13/16 (428)	16 3/16 (411)	16 x 25 (406 x 653)
24	22 (559)	25 1/8 (638)	45 (1143)	18 (457)	1 7/16 (36)	29 1/8 (740)	6 (152)	2 3/4 (70)	13 7/16 (342)	9 1/8 (232)	16 3/8 (417)	26 (660)	15 (382)	43 9/16 (1106)	23 1/2 (597)	16 13/16 (428)	16 3/16 (411)	16 x 28 (406 x 711)
30	22 (559)	25 1/8 (638)	45 (1143)	18 (457)	4 1/16 (103)	28 15/16 (735)	5 3/4 (145)	1 1/2 (39)	11 (279)	10 5/8 (270)	16 3/8 (417)	26 (660)	15 (382)	43 9/16 (1106)	23 1/2 (597)	16 13/16 (428)	16 3/16 (411)	16 x 28 (406 x 711)
36	22 (559)	25 1/8 (638)	55 (1397)	19 (483)	2 13/16 (71)	36 13/16 (935)	6 1/2 (164)	1 3/4 (45)	14 3/8 (366)	10 5/8 (271)	18 7/16 (469)	33 15/16 (862)	16 (407)	53 9/16 (1360)	23 1/2 (597)	16 13/16 (428)	16 3/16 (411)	18 x 36 (457 x 914)
42	22 (559)	25 1/8 (638)	55 (1397)	22 (559)	4 9/16 (116)	37 5/16 (948)	8 1/16 (205)	2 (51)	12 1/8 (308)	11 3/4 (299)	18 7/16 (469)	33 15/16 (862)	19 (483)	53 9/16 (1360)	23 1/2 (597)	16 13/16 (428)	16 3/16 (411)	20 x 36 (508 x 660)
48	25 (635)	28 1/8 (714)	55 (1397)	22 (559)	4 9/16 (116)	37 5/16 (948)	8 1/16 (205)	2 (51)	12 1/8 (308)	11 3/4 (299)	18 7/16 (469)	33 15/16 (862)	19 (483)	53 9/16 (1360)	26 1/2 (673)	19 13/16 (504)	19 3/16 (487)	20 x 36 (508 x 660)
60	25 (635)	28 1/8 (714)	55 (1397)	22 (559)	4 9/16 (116)	34 9/16 (878)	8 1/16 (205)	2 (51)	14 7/8 (378)	11 3/4 (299)	18 7/16 (469)	33 15/16 (862)	19 (483)	53 9/16 (1360)	26 1/2 (673)	19 13/16 (504)	19 3/16 (487)	20 x 36 (508 x 660)

SERENITY PACKAGED WATER SOURCE HEAT PUMPS

## Model Series 44PH • Horizontal Unit Sizes 6 - 60 • Right Return



### Dimensional Data with Optional Hydronic Heat and Water Side Economizer

Unit Size	W	W2
6, 9, 12	23 1/2 (597)	26 5/8 (676)
15, 18	25 1/2 (648)	28 5/8 (727)
24, 30	26 1/4 (667)	28 5/8 (727)
36, 42	26 1/4 (667)	28 5/8 (727)
48, 60	29 1/4 (743)	32 3/8 (822)



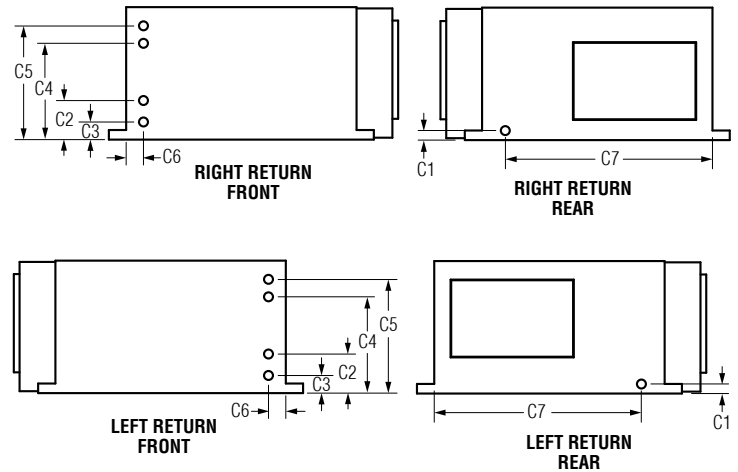
### Dimensional Data for Standard Units

Unit Size	W	W2	D	H	S1	S2	S3	S4	S5	S6	R1	R2	R3	H1	H2	A1	A2	Filter Size
6, 9, 12	20 (508)	23 1/8 (587)	34 (864)	11 1/2 (292)	1 7/16 (36)	21 7/8 (555)	1 9/16 (40)	3 1/16 (78)	10 11/16 (272)	6 3/4 (171)	15 3/8 (391)	16 (406)	8 1/2 (216)	32 9/16 (827)	21 1/2 (546)	13 13/16 (352)	14 3/16 (360)	10 x 18 (254 x 457)
15, 18	22 (559)	25 1/8 (638)	43 (1092)	17 (432)	4 1/16 (103)	26 1/16 (662)	1 5/16 (34)	7 1/2 (191)	11 7/8 (302)	8 (204)	17 3/8 (442)	23 (584)	14 (356)	41 9/16 (1055)	23 1/2 (597)	16 13/16 (428)	16 3/16 (411)	16 x 25 (406 x 653)
24	22 (559)	25 1/8 (638)	45 (1143)	18 (457)	1 7/16 (36)	29 1/8 (740)	2 9/16 (66)	6 1/8 (156)	13 7/16 (342)	9 1/8 (232)	16 3/8 (417)	26 (660)	15 (382)	43 9/16 (1106)	23 1/2 (597)	16 13/16 (428)	16 3/16 (411)	16 x 28 (406 x 711)
30	22 (559)	25 1/8 (638)	45 (1143)	18 (457)	4 1/16 (103)	28 15/16 (735)	1 5/16 (34)	5 7/8 (150)	11 (280)	10 5/8 (270)	16 3/8 (417)	26 (660)	15 (382)	43 9/16 (1106)	23 1/2 (597)	16 13/16 (428)	16 3/16 (411)	16 x 28 (406 x 711)
36	22 (559)	25 1/8 (638)	55 (1397)	19 (483)	2 13/16 (71)	36 13/16 (935)	1 9/16 (40)	6 5/8 (169)	14 3/8 (366)	10 5/8 (271)	18 7/16 (469)	33 15/16 (862)	16 (407)	53 9/16 (1360)	23 1/2 (597)	16 13/16 (428)	16 3/16 (411)	18 x 36 (457 x 914)
42	22 (559)	25 1/8 (638)	55 (1397)	22 (559)	4 9/16 (116)	37 5/16 (948)	1 13/16 (47)	8 1/4 (210)	12 1/8 (308)	11 3/4 (299)	18 7/16 (469)	33 15/16 (862)	19 (483)	53 9/16 (1360)	23 1/2 (597)	16 13/16 (428)	16 3/16 (411)	20 x 36 (508 x 660)
48	25 (635)	28 1/8 (714)	55 (1397)	22 (559)	4 9/16 (116)	37 5/16 (948)	1 13/16 (47)	8 1/4 (210)	12 1/8 (308)	11 3/4 (299)	18 7/16 (469)	33 15/16 (862)	19 (483)	53 9/16 (1360)	26 1/2 (673)	19 13/16 (504)	19 3/16 (487)	20 x 36 (508 x 660)
60	25 (635)	28 1/8 (714)	55 (1397)	22 (559)	4 9/16 (116)	34 9/16 (878)	1 13/16 (47)	8 1/4 (210)	14 7/8 (378)	11 3/4 (299)	18 7/16 (469)	33 15/16 (862)	19 (483)	53 9/16 (1360)	26 1/2 (673)	19 13/16 (504)	19 3/16 (487)	20 x 36 (508 x 660)

## Model Series 44PH • Horizontal Unit Sizes 6 - 60 • Left and Right Return

### Dimensions Data - Coil Connections

Unit Size	C1 COND. DRAIN	C2 WATER OUT	C3 WATER IN	C4 POWER SUPPLY	C5 THERMO- STAT	C6 EDGE TO CONNECTIONS	C7 EDGE TO COND. DRAIN
6, 9, 12	7/8 (22)	3 3/8 (86)	1 1/2 (39)	8 3/8 (212)	9 7/8 (251)	1 1/2 (38)	18 (457)
15, 18	7/8 (22)	3 3/8 (86)	1 1/2 (39)	13 7/8 (352)	15 3/8 (390)	1 1/2 (38)	20 (507)
24	7/8 (22)	3 3/8 (86)	1 1/2 (39)	11 7/8 (301)	16 3/8 (416)	2 1/2 (964)	20 (507)
30	7/8 (22)	3 3/8 (86)	1 1/2 (39)	11 7/8 (301)	16 3/8 (416)	2 1/2 (964)	20 (507)
36	7/8 (22)	3 3/8 (86)	1 1/2 (39)	12 7/8 (327)	17 3/8 (441)	2 1/2 (964)	20 (507)
42	7/8 (22)	5 15/16 (150)	3 1/16 (77)	15 7/8 (403)	20 3/8 (517)	2 1/2 (964)	20 (507)
48	7/8 (22)	5 15/16 (150)	3 1/16 (77)	15 7/8 (403)	20 3/8 (517)	2 1/2 (964)	23 (584)
60	7/8 (22)	5 15/16 (150)	3 1/16 (77)	15 7/8 (403)	20 3/8 (517)	2 1/2 (964)	23 (584)



### Standard Features

- Heat pump system
- Refrigerant circuit
- Copper tube/Aluminum fin
- Cabinets are constructed with a minimum 16 ga. galvanized steel base and a combination of 16 and 20 ga. cabinet components
- ECM Ultra-high efficiency fan motor with overload protection
- High-efficiency rotary & scroll compressors
- Compressors mounted on rubber vibration isolators to minimize vibration transmission
- Highly efficient heat exchanger optimizes efficiency
- TXV metering device.
- 1/2" (13) dual density fiberglass insulation
- Galvanized steel insulated condensate drain pan
- Multiple return air configurations
- 1" (25) throwaway filter
- Flow control (1.0 to 20.0 GPM)
- Solid state control with thermostat
- Exceeds ASHRAE 90.1 efficiencies

### Options

- Systems: Cooling only, Cooling with HW heat, Heat pump w/hot gas reheat and Heat pump w/water side economizer
- 2" (51) throwaway filter.
- 1" (25) or 2" (51) MERV 8 pleated filter
- 1" (25) or 2" (51) MERV 11 pleated filter
- 1" (25) or 2" (51) MERV 13 pleated filter
- Toggle disconnect switch
- Fused disconnect switch
- Cupro-Nickel
- Compressor sound blanket
- Vibration isolation pad
- Vibration pad and sound blanket
- Tin dipped hairpins
- Epoxy coating
- External flow control (1.0 to 20.0 GPM)
- Thermostat
- Solid state control with IO zone 560 DDC control

- IO zone 560 DDC control with fan status & compressor status current switch or with discharge air temperature or with fault alarm
- IO zone 560 DDC control with fan status & compressor status current switch with discharge air temperature or/and fault alarm
- IO zone 560 DDC control with discharge air temperature and fault alarm
- Freeze protection (32 °F - 10 °F) with Low/High liquid temp setting (36 °F - 0 °F)
- Valve package internal or external
- 2-Way or 3-Way valve
- Flow control valve
- 1/2" (13) Foil face or Fiber-free liner
- Ball valve
- Memory stop
- Condensate pump
- Condensate drain pan overflow switch
- Unit circuit breaker

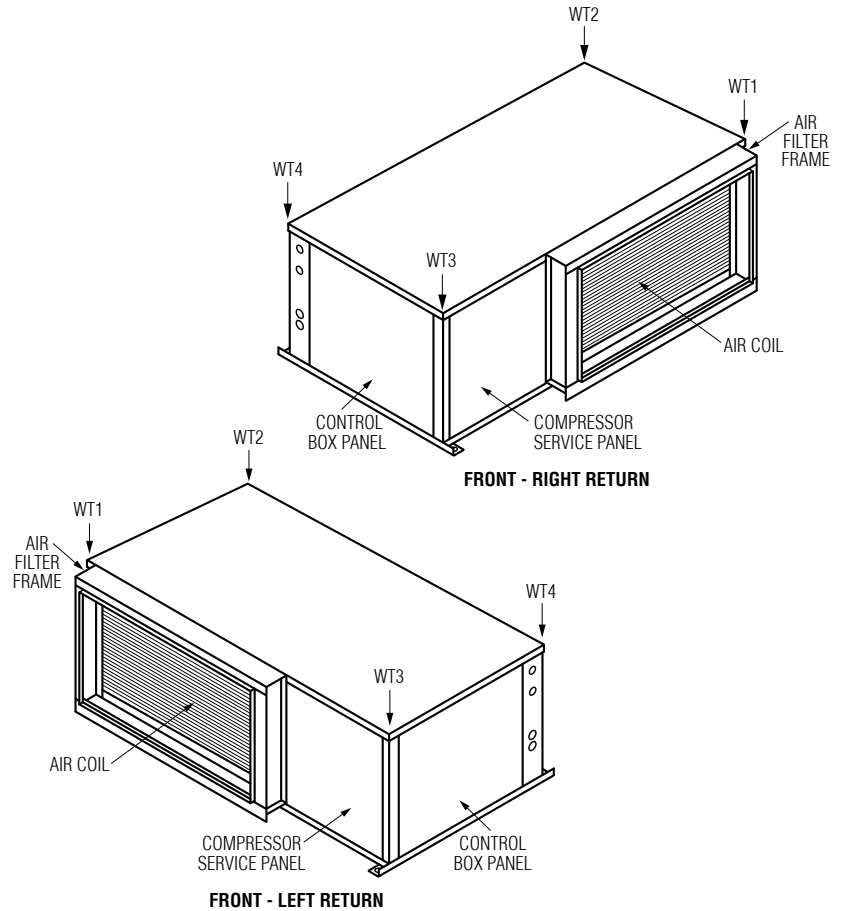
### Voltage:

- Single phase, 60 Hz.
- 208V/230V
- 265V
- Three phase, 60 Hz.
- 460V
- 575V

## Model Series 44PH • Horizontal Unit Sizes 6 - 60 • Left and Right Return

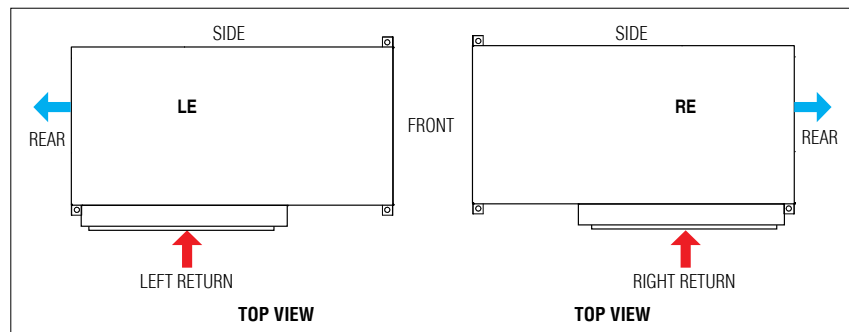
### Corner Weights

Unit Size	TOTAL WEIGHT	CORNER WT1	CORNER WT2	CORNER WT3	CORNER WT4
6	125	27	25	41	32
9	128	27	26	42	33
12	130	28	26	43	33
15	180	39	36	59	46
18	190	41	38	62	49
24	230	49	47	75	59
30	235	50	48	77	60
36	280	60	57	91	72
42	320	68	65	105	82
48	325	70	66	106	83
60	340	73	69	111	87

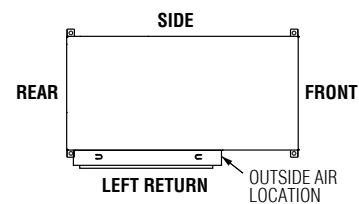


### Airflow Configurations

#### HORIZONTAL - 90 DEGREE



#### UNIT DESIGNATIONS

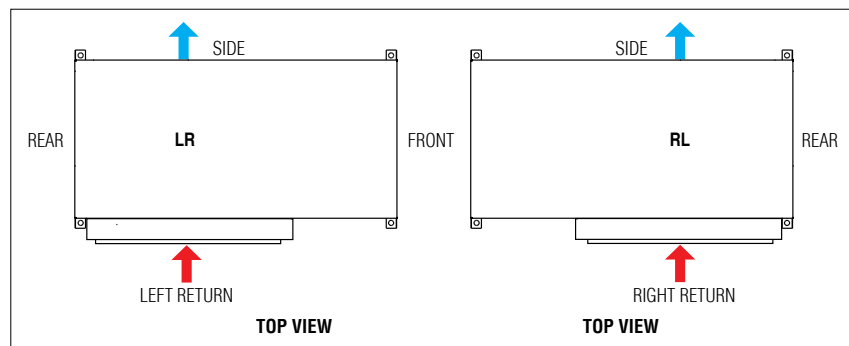


#### AIRFLOW CONFIGURATIONS:

- LE = LEFT RETURN/END SUPPLY (90 DEGREE)
- RE = RIGHT RETURN/END SUPPLY (90 DEGREE)
- LR = LEFT RETURN/RIGHT SUPPLY (STRAIGHT)
- RL = RIGHT RETURN/LEFT SUPPLY (STRAIGHT)

- SUPPLY AIRFLOW
- RETURN AIRFLOW

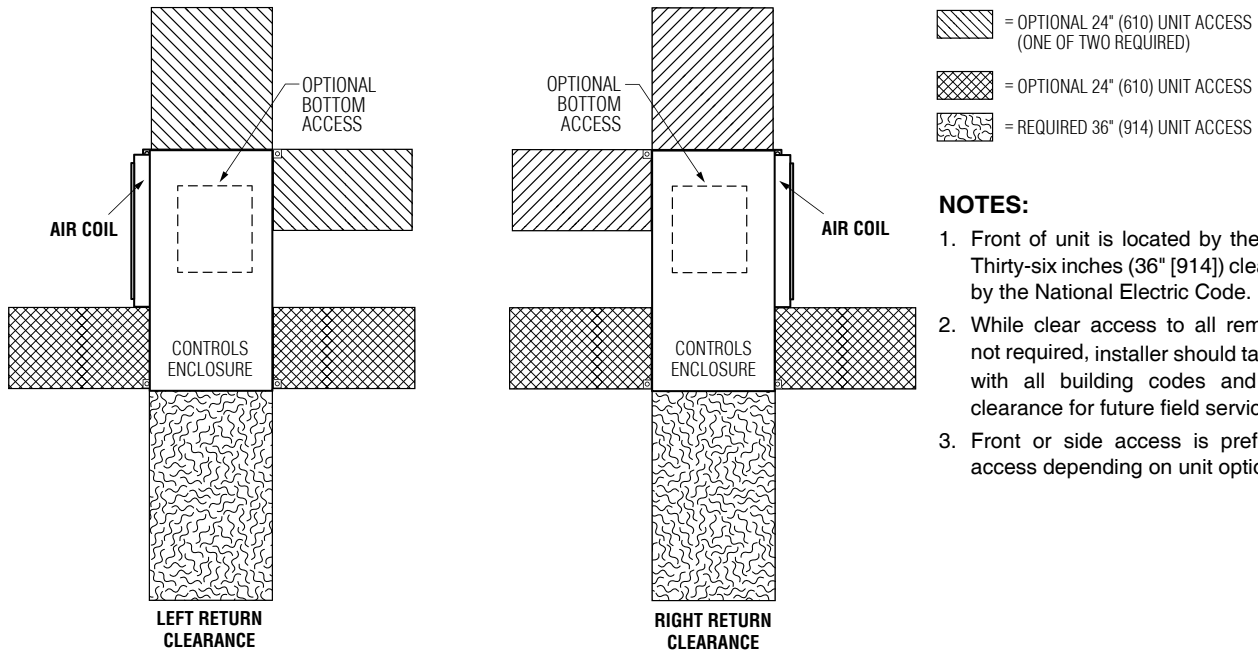
#### HORIZONTAL - STRAIGHT



**NOTES:** The airflow configuration may be built to order or modified on-site to meet installation requirements.

## Model Series 44PH • Horizontal Unit Sizes 6 - 60 • Left and Right Return

### Clearance Requirements



B

SERENITY PACKAGED WATER SOURCE HEAT PUMPS



## Model Series 44PH • Horizontal Unit Sizes 6 - 60

### General Information

Component	Unit Size										
	6	9	12	15	18	24	30	36	42	48	60
<b>TON</b>	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5
<b>CFM</b>	200	300	400	500	600	800	1000	1200	1400	1600	2000
<b>COOLING PERFORMANCE *</b>											
<b>Total Capacity (Btuh)</b>	6,000	9,000	12,500	15,000	18,000	24,000	30,000	36,000	42,000	48,000	58,000
<b>EER (Btuh/W)</b>	17.0	14.0	13.0	17.0	17.0	16.4	16.0	17.0	15.0	15.0	15.0
<b>Entering Water Temp (°F)</b>	86	86	86	86	86	86	86	86	86	86	86
<b>Water Flow (GPM)</b>	2.0	2.5	3.0	3.8	4.5	6.0	7.5	9.0	10 1/2	12.0	15.0
<b>Rated CFM</b>	200	300	400	500	600	800	1000	1200	1400	1600	2000
<b>Refrigerant type</b>	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
<b>Refrigerant charge (oz)</b>	18	18	19	34	36	50	56	62	70	78	80
<b>HEATING PERFORMANCE **</b>											
<b>Total Capacity (Btuh)</b>	7,500	11,500	15,000	18,000	21,600	28,000	34,000	43,000	49,000	56,000	72,000
<b>COP (W/W)</b>	5.6	4.4	4.4	5.6	5.6	5.2	5.0	5.0	4.6	4.6	4.6
<b>Entering Water Temp (°F)</b>	68	68	68	68	68	68	68	68	68	68	68
<b>Water Flow (GPM)</b>	2.0	2.5	3.0	3.8	4.5	6.0	7.5	9.0	10.5	12.0	15.0
<b>DIMENSIONS</b>											
<b>Width</b>	20	20	20	22	22	22	22	22	22	25	25
<b>Depth</b>	34	34	34	43	43	45	45	55	55	55	55
<b>Height</b>	11 1/2	11 1/2	11 1/2	17	17	17	17	19	22	22	22
<b>Operating Weight (lbs.)</b>	125	128	130	180	190	230	235	280	320	325	340
<b>Shipping Weight (lbs.)</b>	140	143	145	205	215	255	260	308	348	353	368
<b>Compressor Types, Qty. 1</b>	Rotary	Rotary	Rotary	Rotary	Rotary	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
<b>EVAPORATOR COIL DATA - 3 Rows</b>											
<b>Refrigerant Control</b>	TXV	TXV	TXV	TXV	TXV	TXV	TXV	TXV	TXV	TXV	TXV
<b>Supply Fan Size (D x W) , Qty. 1</b>	8 1/2 x 4	8 1/2 x 4	8 1/2 x 4	7 1/8 x 8	7 1/8 x 8	10 5/8 x 6	9 1/2 x 7	9.87 x 7	10 3/4 x 7 3/4	10 3/4 x 7 3/4	10 3/4 x 10 1/2
<b>Fan Type</b>	Centrifugal										
<b>Maximum E.S.P. - ECM Motor</b>	0.65	0.65	0.60	0.80	0.80	0.90	0.60	0.90	0.80	0.90	0.80
<b>CONSTANT TORQUE ECM HP</b>											
<b>Voltage - 208/230-1, 265-1</b>	1/4	1/4	1/4	1/4	1/4	1/2	1/2	1/2	3/4	3/4	3/4
<b>Voltage - 208/230-3, 460-3</b>	1/4	1/4	1/4	1/4	1/4	1/2	1/2	1/2	3/4	3/4	3/4
<b>Entering Water Connection (inches)</b>	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1
<b>Leaving Water Connection (inches)</b>	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1
<b>Condensate Drain</b>	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
<b>Return Air Duct Connection</b>	16 x 8 1/2	16 x 8 1/2	16 x 8 1/2	23 x 14	23 x 14	26 x 14	26 x 14	34 x 16	34 x 19	34 x 19	34 x 19
<b>Filter Size - Qty. 1</b>	10 x 18	10 x 18	10 x 18	16 x 25	16 x 25	16 x 28	16 x 28	18 x 36	20 x 36	20 x 36	20 x 36

\* Based on 80.6°F DB, 66.2°F WB entering air temperature.

\*\* Based on 68°F DB, 59°F WB entering air temperature.

## Model Series 44PH • Horizontal Unit Sizes 6 - 60 • ECM Motor

### Electrical Data

Unit Size	Compressor				Supply Blower Motor		Single Point Power	
	Voltage-Hertz-Phase	RLA	LRA	QTY	FLA	HP	MCA	MOPD
6	208/230-60-1	2.5	17.7	1	2.2	1/4	5.3	15
	265-60-1	2.1	13.5	1	2.2	1/4	4.8	15
9	208/230-60-1	4.0	22.2	1	2.2	1/4	7.2	15
	265-60-1	3.3	18.8	1	2.2	1/4	6.3	15
12	208/230-60-1	5.6	29.0	1	2.2	1/4	9.2	15
	265-60-1	4.6	20.0	1	2.2	1/4	8.0	15
15	208/230-60-1	4.8	26.0	1	2.2	1/4	8.2	15
	265-60-1	4.2	25.0	1	2.2	1/4	7.5	15
18	208/230-60-1	7.7	38.0	1	2.2	1/4	11.8	15
	265-60-1	7.1	30.0	1	2.2	1/4	11.1	15
24	208/230-60-1	13.5	58.3	1	4.6	1/2	21.5	30
	265-60-1	9.0	54.0	1	3.2	1/2	14.5	20
	208/230-60-3	7.1	55.4	1	4.6	1/2	13.5	20
	460-60-3	3.5	28.0	1	3.2	1/2	7.6	15
30	208/230-60-1	14.1	73.0	1	4.6	1/2	22.2	30
	265-60-1	11.2	60.0	1	3.2	1/2	17.2	20
	208/230-60-3	8.9	58.0	1	4.6	1/2	15.7	20
	460-60-3	4.2	28.0	1	3.2	1/2	8.5	15
36	208/230-60-1	14.1	77.0	1	4.6	1/2	22.2	30
	265-60-1	12.2	72.0	1	3.2	1/2	18.5	30
	208/230-60-3	9.0	71.0	1	4.6	1/2	15.9	20
	460-60-3	5.6	38.0	1	3.2	1/2	10.2	15
42	208/230-60-1	17.9	112.0	1	6.3	3/4	28.7	40
	265-60-1	16.0	87.0	1	3.9	3/4	23.9	30
	208/230-60-3	13.5	88.0	1	6.3	3/4	23.2	30
	460-60-3	6.0	44.0	1	3.9	3/4	11.4	15
48	208/230-60-1	21.8	117.0	1	6.3	3/4	33.6	50
	265-60-1	16.3	98.0	1	3.9	3/4	24.3	40
	208/230-60-3	13.7	83.1	1	6.3	3/4	23.4	30
	460-60-3	6.2	41.0	1	3.9	3/4	11.7	15
60	208/230-60-1	26.3	134.0	1	6.3	3/4	39.2	60
	265-60-1	19.9	128.0	1	3.9	3/4	28.8	40
	208/230-60-3	15.6	110.0	1	6.3	3/4	25.8	40
	460-60-3	7.8	52.0	1	3.9	3/4	13.7	20

**NOTE:** Four wire power supply with neutral connection required for all 460 volt units with ECM motor.

**B**

**SERENITY PACKAGED WATER SOURCE HEAT PUMPS**

## Model Series 44P • Vertical and Horizontal Units • Unit Sizes 6 - 60

### Voltage Limitations

Voltage-Hertz-Phase	Minimum	Maximum
208/230-60-1	197	253
265-60-1	239	292
208/230-60-3	197	253
460-60-3	414	506
575-60-3	518	633

### Vertical and Horizontal Continuous Operating Limits

Mode	Ambient Air °F		Entering Air °F				Entering Fluid °F			
	Minimum	Maximum	Minimum		Maximum		Standard Range		Extended Range	
	DB	DB	DB	WB	DB	WB	Min	Max	Min	Max
Cooling	60	100	75	63	100	83	60	120	30	120
Heating	60	80	60	–	80	–	60	90	20	90

### Start-up Operating Limits

Mode	Ambient Air °F		Entering Air °F				Entering Fluid °F			
	Minimum	Maximum	Minimum		Maximum		Standard Range		Extended Range	
	DB	DB	DB	WB	DB	WB	Min	Max	Min	Max
Cooling	50	100	50	42	100	83	50	120	30	120
Heating	50	80	50	–	80	–	50	90	20	90

#### Standard Range Units

Units are designed to start in an ambient of 50°F (10°C) with entering air at 50°F (10°C), with entering water at 50°F (10°C), with nominal air flow and water flow (3.0 GPM/Ton), for initial start-up in heating and cooling mode.

**Note:** This is not a normal or continuous operating condition. It is assumed that such start-up is for the purpose of bringing the building space up to occupancy temperature and operating for extended periods of time.

#### Extended Range Units

Units are designed to start in an ambient of 50°F (10°C) with entering air at 50°F (10°C), with entering water at 20°F (-7°C), with nominal air flow and water flow (3.0 GPM/Ton), for initial start-up in heating.

Units are designed to start in an ambient of 50°F. (10°C) with

entering air at 50°F (10°C), with entering water at 30°F (-1°C), with nominal air flow and water flow (3.0 GPM/Ton), for initial start-up in cooling.

**Note:** This is not a normal or continuous operating condition. It is assumed that such start-up is for the purpose of bringing the building space up to occupancy temperature and operating for extended periods of time.

#### Environment

This equipment is designed for indoor installation only. Unconditioned locations such as attics, garages, etc., generally will not provide sufficient protection against extremes in temperature and/or humidity, and equipment performance, reliability, and service life may be adversely affected.

#### Power supply

A voltage variation of +/-10% of nameplate voltage is acceptable.

## Model Series 44P • Vertical and Horizontal Units • Cooling • Performance Data

Unit Size	EWT [°F]	GPM	Entering Air - 80°F / 67°F					Entering Air - 78°F / 65°F					Entering Air - 75°F / 63°F				
			TC (Btu/hr)	SC (Btu/hr)	kW	HR (Btu/hr)	Liquid Temp Rise (°F)	TC (Btu/hr)	SC (Btu/hr)	kW	HR (Btu/hr)	Liquid Temp Rise (°F)	TC (Btu/hr)	SC (Btu/hr)	kW	HR (Btu/hr)	Liquid Temp Rise (°F)
6	86	1.00	5.88	4.22	0.37	7.13	14.26	5.61	3.90	0.38	6.89	13.78	5.33	3.29	0.39	6.65	13.31
		1.25	5.94	4.25	0.36	7.17	11.47	5.67	3.93	0.37	6.92	11.08	5.39	3.32	0.38	6.68	10.70
		2.00	6.12	4.35	0.34	7.28	7.28	5.84	4.02	0.35	7.02	7.02	5.55	3.39	0.36	6.78	6.78
9	86	1.50	8.99	5.93	0.67	11.26	15.01	8.68	5.75	0.67	10.96	14.61	8.38	4.85	0.67	10.66	14.21
		1.88	9.04	5.96	0.65	11.26	12.02	8.73	5.78	0.65	10.96	11.69	8.43	4.87	0.65	10.66	11.37
		2.50	9.13	6.00	0.63	11.28	9.02	8.82	5.82	0.63	10.97	8.78	8.51	4.91	0.63	10.67	8.53
12	86	2.00	12.28	8.91	0.98	15.62	15.62	11.91	8.58	0.98	15.25	15.25	11.56	7.44	0.98	14.91	14.91
		2.50	12.48	9.08	0.96	15.76	12.61	12.10	8.74	0.96	15.38	12.31	11.74	7.58	0.96	15.03	12.03
		3.00	12.67	9.25	0.94	15.89	10.59	12.29	8.90	0.94	15.51	10.34	11.93	7.72	0.94	15.15	10.10
15	86	2.50	14.87	10.67	0.91	17.97	14.37	14.36	10.16	0.91	17.47	13.97	13.83	8.72	0.91	16.94	13.56
		3.13	15.04	10.73	0.89	18.07	11.56	14.53	10.22	0.89	17.56	11.24	13.99	8.77	0.89	17.03	10.90
		3.75	15.22	10.80	0.86	18.17	9.69	14.69	10.28	0.87	17.66	9.42	14.15	8.82	0.87	17.12	9.13
18	86	3.00	17.94	12.74	1.09	21.66	14.44	17.36	12.23	1.09	21.09	14.06	16.79	10.47	1.09	20.51	13.68
		3.75	18.09	12.78	1.07	21.73	11.59	17.51	12.26	1.07	21.15	11.28	16.93	10.50	1.06	20.57	10.97
		4.50	18.24	12.82	1.04	21.79	9.68	17.66	12.30	1.04	21.21	9.43	17.08	10.53	1.04	20.62	9.16
24	86	4.00	24.00	17.20	1.50	29.12	14.56	23.26	16.53	1.50	28.38	14.19	22.57	14.24	1.50	27.69	13.85
		5.00	24.16	17.39	1.47	29.16	11.67	23.41	16.71	1.47	28.42	11.37	22.72	14.40	1.47	27.73	11.09
		6.00	24.32	17.59	1.43	29.21	9.74	23.57	16.90	1.43	28.45	9.48	22.87	14.57	1.43	27.76	9.25
30	86	5.00	30.02	21.30	1.88	36.62	14.65	29.14	20.45	1.89	35.57	14.23	28.25	17.64	1.89	34.69	13.88
		6.25	30.20	21.60	1.84	36.48	11.68	29.31	20.74	1.85	35.61	11.39	28.42	17.89	1.85	34.72	11.11
		7.50	30.37	21.90	1.80	36.52	9.74	29.48	21.03	1.80	35.64	9.50	28.58	18.14	1.81	34.75	9.27
36	86	6.00	35.98	25.76	2.10	43.41	14.47	34.88	24.88	2.11	42.07	14.02	33.82	21.44	2.10	40.99	13.66
		7.50	36.23	25.80	2.06	43.26	11.54	35.12	24.92	2.06	42.16	11.24	34.05	21.47	2.06	41.08	10.95
		9.00	36.47	25.84	2.02	43.36	9.64	35.36	24.96	2.02	42.25	9.39	34.28	21.50	2.02	41.16	9.15
42	86	7.00	42.28	28.41	2.88	52.10	14.89	40.92	28.02	2.89	50.78	14.51	39.61	24.23	2.90	49.50	14.14
		8.75	42.43	28.42	2.80	51.97	11.88	41.07	28.03	2.81	50.65	11.58	39.75	24.24	2.82	49.36	11.28
		10.50	42.58	28.44	2.71	51.84	9.87	41.22	28.04	2.72	50.51	9.62	39.89	24.25	2.73	49.21	9.37
48	86	8.00	48.57	32.80	3.31	59.85	14.96	46.56	31.57	3.32	57.90	14.48	44.58	27.11	3.34	55.96	13.99
		10.00	48.70	32.96	3.21	59.65	11.93	46.68	31.72	3.23	57.70	11.54	44.69	27.24	3.24	55.75	11.15
		12.00	48.82	33.11	3.12	59.46	9.91	46.80	31.87	3.13	57.50	9.58	44.81	27.37	3.15	55.54	9.26
60	86	10.00	57.61	40.46	3.90	70.91	14.18	55.89	39.28	3.90	69.20	13.84	54.18	33.85	3.92	67.55	13.51
		12.50	58.16	40.78	3.79	71.11	11.38	56.42	39.59	3.80	69.39	11.10	54.70	34.12	3.81	67.72	10.83
		15.00	58.72	41.10	3.69	71.31	9.51	56.96	39.90	3.70	69.58	9.28	55.22	34.38	3.71	67.88	9.05

EWT = enter water temperature  
 WPD = water pressure drop  
 TC = total capacity  
 SC = sensible capacity

HR = heating rejection  
 S/T = sensible/cooling capacity  
 W = power unit  
 EER = energy efficiency ratio

B

SERENITY PACKAGED WATER SOURCE HEAT PUMPS

## Model Series 44P • Vertical and Horizontal Units • Heating • Performance Data

Unit Size	EWT [°F]	GPM												
			HC (Btu/hr)	kW	HE (Btu/hr)	Liquid Temp Drop (°F)	HC (Btu/hr)	kW	HE (Btu/hr)	Liquid Temp Drop (°F)	HC (Btu/hr)	kW	HE (Btu/hr)	Liquid Temp Drop (°F)
6	86	1.00	6.84	0.38	5.56	11.11	6.81	0.40	5.45	10.89	6.79	0.43	5.33	10.67
		1.25	6.99	0.38	5.71	9.13	6.96	0.40	5.59	8.95	6.94	0.43	5.48	8.77
		2.00	7.45	0.38	6.15	6.15	7.42	0.41	6.04	6.04	7.39	0.43	5.92	5.92
9	86	1.50	10.81	0.72	8.34	11.12	10.78	0.76	8.19	10.92	10.75	0.80	8.03	10.71
		1.88	10.95	0.73	8.47	9.03	10.92	0.76	8.31	8.86	10.89	0.80	8.15	8.70
		2.50	11.18	0.73	8.67	6.94	11.15	0.77	8.51	6.81	11.12	0.81	8.35	6.68
12	86	2.00	14.44	0.84	11.58	11.58	14.42	0.88	11.43	11.43	14.41	0.92	11.28	11.28
		2.50	14.66	0.84	11.79	9.43	14.64	0.88	11.64	9.31	14.63	0.92	11.49	9.19
		3.00	14.88	0.84	12.01	8.00	14.86	0.88	11.85	7.90	14.84	0.92	11.70	7.80
15	86	2.50	17.44	0.89	14.39	11.51	17.21	0.95	13.98	11.19	16.98	1.00	13.58	10.86
		3.13	17.73	0.90	14.67	9.39	17.49	0.95	14.26	9.12	17.26	1.00	13.85	8.86
		3.75	18.02	0.90	14.95	7.97	17.78	0.95	14.53	7.75	17.54	1.00	14.12	7.53
18	86	3.00	20.99	1.08	17.29	11.53	20.72	1.14	16.83	11.22	20.45	1.20	16.37	10.91
		3.75	21.33	1.08	17.64	9.41	21.06	1.14	17.17	9.16	20.79	1.20	16.70	8.91
		4.50	21.68	1.08	17.98	7.99	21.40	1.14	17.51	7.78	21.13	1.20	17.04	7.57
24	86	4.00	27.41	1.49	22.32	11.16	27.03	1.57	21.68	10.84	26.66	1.65	21.03	10.52
		5.00	27.79	1.50	22.67	9.07	27.41	1.58	22.01	8.81	27.03	1.66	21.36	8.54
		6.00	28.17	1.51	23.01	7.67	27.78	1.59	22.35	7.45	27.39	1.67	21.69	7.23
30	86	5.00	33.74	1.86	27.40	10.96	33.30	1.95	26.64	10.66	32.85	2.04	25.88	10.35
		6.25	33.99	1.87	27.62	8.84	33.54	1.96	26.86	8.59	33.09	2.05	26.10	8.35
		7.50	34.24	1.87	27.85	7.43	33.78	1.96	27.08	7.22	33.33	2.06	26.31	7.02
36	86	6.00	41.84	2.34	33.86	11.29	41.33	2.44	32.99	11.00	40.82	2.55	32.13	10.71
		7.50	42.55	2.36	34.51	9.20	42.03	2.46	33.63	8.97	41.50	2.56	32.76	8.74
		9.00	43.26	2.37	35.16	7.81	42.73	2.48	34.28	7.62	42.19	2.58	33.39	7.42
42	86	7.00	47.91	2.93	37.90	10.83	47.31	3.07	36.83	10.52	46.72	3.21	35.75	10.21
		8.75	48.59	2.95	38.53	8.81	47.98	3.09	37.44	8.56	47.38	3.23	36.36	8.31
		10.50	49.27	2.96	39.16	7.46	48.65	3.10	38.06	7.25	48.04	3.25	36.96	7.04
48	86	8.00	54.62	3.37	43.12	10.78	53.94	3.53	41.90	10.48	53.25	3.68	40.68	10.17
		10.00	55.49	3.39	43.92	8.78	54.79	3.55	42.69	8.54	54.09	3.70	41.45	8.29
		12.00	56.36	3.41	44.72	7.45	55.65	3.57	43.47	7.25	54.94	3.73	42.22	7.04
60	86	10.00	70.44	4.24	55.96	11.19	69.66	4.43	54.52	10.90	68.87	4.63	53.09	10.62
		12.50	71.41	4.27	56.83	9.09	70.62	4.47	55.38	8.86	69.82	4.66	53.93	8.63
		15.00	72.39	4.30	57.70	7.69	71.58	4.50	56.24	7.50	70.77	4.69	54.77	7.30

EWT = enter water temperature  
 COP = coefficient of performance  
 HA = heat absorption  
 HC = heating capacity

LAT = leaving air temp  
 W = power unit

**B**

SERENITY PACKAGED WATER SOURCE HEAT PUMPS

## Model Series 44P • Vertical and Horizontal Units • Optional Hydronic Heat and Water Side Economizer • Cooling • Performance Data

Unit Size	EWT [°F]	GPM	Entering Air - 80°F / 67°F					Entering Air - 78°F / 65°F					Entering Air - 75°F / 63°F				
			TC (Btu/hr)	SC (Btu/hr)	kW	HR (Btu/hr)	Liquid Temp Rise (°F)	TC (Btu/hr)	SC (Btu/hr)	kW	HR (Btu/hr)	Liquid Temp Rise (°F)	TC (Btu/hr)	SC (Btu/hr)	kW	HR (Btu/hr)	Liquid Temp Rise (°F)
6	86	1.00	5.88	4.22	0.37	7.13	14.26	5.61	3.90	0.38	6.89	13.78	5.33	3.29	0.39	6.65	13.31
		1.25	5.94	4.25	0.36	7.17	11.47	5.67	3.93	0.37	6.92	11.08	5.39	3.32	0.38	6.68	10.70
		2.00	6.12	4.35	0.34	7.28	7.28	5.84	4.02	0.35	7.02	7.02	5.55	3.39	0.36	6.78	6.78
9	86	1.50	8.99	5.93	0.67	11.26	15.01	8.68	5.75	0.67	10.96	14.61	8.38	4.85	0.67	10.66	14.21
		1.88	9.04	5.96	0.65	11.26	12.02	8.73	5.78	0.65	10.96	11.69	8.43	4.87	0.65	10.66	11.37
		2.50	9.13	6.00	0.63	11.28	9.02	8.82	5.82	0.63	10.97	8.78	8.51	4.91	0.63	10.67	8.53
12	86	2.00	12.28	8.91	0.98	15.62	15.62	11.91	8.58	0.98	15.25	15.25	11.56	7.44	0.98	14.91	14.91
		2.50	12.48	9.08	0.96	15.76	12.61	12.10	8.74	0.96	15.38	12.31	11.74	7.58	0.96	15.03	12.03
		3.00	12.67	9.25	0.94	15.89	10.59	12.29	8.90	0.94	15.51	10.34	11.93	7.72	0.94	15.15	10.10
15	86	2.50	14.87	10.67	0.91	17.97	14.37	14.36	10.16	0.91	17.47	13.97	13.83	8.72	0.91	16.94	13.56
		3.13	15.04	10.73	0.89	18.07	11.56	14.53	10.22	0.89	17.56	11.24	13.99	8.77	0.89	17.03	10.90
		3.75	15.22	10.80	0.86	18.17	9.69	14.69	10.28	0.87	17.66	9.42	14.15	8.82	0.87	17.12	9.13
18	86	3.00	17.94	12.74	1.09	21.66	14.44	17.36	12.23	1.09	21.09	14.06	16.79	10.47	1.09	20.51	13.68
		3.75	18.09	12.78	1.07	21.73	11.59	17.51	12.26	1.07	21.15	11.28	16.93	10.50	1.06	20.57	10.97
		4.50	18.24	12.82	1.04	21.79	9.68	17.66	12.30	1.04	21.21	9.43	17.08	10.53	1.04	20.62	9.16
24	86	4.00	24.00	17.20	1.50	29.12	14.56	23.26	16.53	1.50	28.38	14.19	22.57	14.24	1.50	27.69	13.85
		5.00	24.16	17.39	1.47	29.16	11.67	23.41	16.71	1.47	28.42	11.37	22.72	14.40	1.47	27.73	11.09
		6.00	24.32	17.59	1.43	29.21	9.74	23.57	16.90	1.43	28.45	9.48	22.87	14.57	1.43	27.76	9.25
30	86	5.00	30.02	21.30	1.88	36.62	14.65	29.14	20.45	1.89	35.57	14.23	28.25	17.64	1.89	34.69	13.88
		6.25	30.20	21.60	1.84	36.48	11.68	29.31	20.74	1.85	35.61	11.39	28.42	17.89	1.85	34.72	11.11
		7.50	30.37	21.90	1.80	36.52	9.74	29.48	21.03	1.80	35.64	9.50	28.58	18.14	1.81	34.75	9.27
36	86	6.00	35.98	25.76	2.10	43.41	14.47	34.88	24.88	2.11	42.07	14.02	33.82	21.44	2.10	40.99	13.66
		7.50	36.23	25.80	2.06	43.26	11.54	35.12	24.92	2.06	42.16	11.24	34.05	21.47	2.06	41.08	10.95
		9.00	36.47	25.84	2.02	43.36	9.64	35.36	24.96	2.02	42.25	9.39	34.28	21.50	2.02	41.16	9.15
42	86	7.00	42.28	28.41	2.88	52.10	14.89	40.92	28.02	2.89	50.78	14.51	39.61	24.23	2.90	49.50	14.14
		8.75	42.43	28.42	2.80	51.97	11.88	41.07	28.03	2.81	50.65	11.58	39.75	24.24	2.82	49.36	11.28
		10.50	42.58	28.44	2.71	51.84	9.87	41.22	28.04	2.72	50.51	9.62	39.89	24.25	2.73	49.21	9.37
48	86	8.00	48.57	32.80	3.31	59.85	14.96	46.56	31.57	3.32	57.90	14.48	44.58	27.11	3.34	55.96	13.99
		10.00	48.70	32.96	3.21	59.65	11.93	46.68	31.72	3.23	57.70	11.54	44.69	27.24	3.24	55.75	11.15
		12.00	48.82	33.11	3.12	59.46	9.91	46.80	31.87	3.13	57.50	9.58	44.81	27.37	3.15	55.54	9.26
60	86	10.00	57.61	40.46	3.90	70.91	14.18	55.89	39.28	3.90	69.20	13.84	54.18	33.85	3.92	67.55	13.51
		12.50	58.16	40.78	3.79	71.11	11.38	56.42	39.59	3.80	69.39	11.10	54.70	34.12	3.81	67.72	10.83
		15.00	58.72	41.10	3.69	71.31	9.51	56.96	39.90	3.70	69.58	9.28	55.22	34.38	3.71	67.88	9.05

EWT = enter water temperature  
 WPD = water pressure drop  
 TC = total capacity  
 SC = sensible capacity

HR = heating rejection  
 S/T = sensible/cooling capacity  
 W = power unit  
 EER = energy efficiency ratio

**B** SERENITY PACKAGED WATER SOURCE HEAT PUMPS

## Model Series 44P • Vertical and Horizontal Units • VP Blower EC Constant Torque Performance Data

Unit Size	Rated CFM	Min. CFM	Fan Option		CFM at External Static Pressure (in w.g.) Speed											
			Option	Speed	0.00	0.05	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
6	200	140	EC Constant Torque	HI	340	333	326	308	287	261	232	200	163	–	–	–
				MED HI	321	314	306	286	261	231	196	156	–	–	–	–
				MED	292	285	276	252	221	183	–	–	–	–	–	–
				MED LO	253	241	228	196	157	–	–	–	–	–	–	–
				LOW	213	199	181	–	–	–	–	–	–	–	–	–
9	300	210	EC Constant Torque	HI	443	435	427	408	388	366	343	318	291	263	233	–
				MED HI	420	412	403	383	361	337	312	284	255	223	–	–
				MED	396	387	378	357	333	306	277	245	210	–	–	–
				MED LO	368	356	344	317	287	255	220	–	–	–	–	–
				LOW	343	330	317	287	254	217	–	–	–	–	–	–
12	400	280	EC Constant Torque	HI	531	526	520	506	490	471	450	426	400	371	339	306
				MED HI	509	504	498	483	466	445	422	396	367	335	300	–
				MED	495	487	477	458	436	412	386	359	329	298	–	–
				MED LO	471	464	455	437	415	391	364	335	302	–	–	–
				LOW	435	425	415	391	366	337	305	–	–	–	–	–
15	500	350	EC Constant Torque	HI	864	847	828	788	744	695	642	585	524	458	389	–
				MED HI	808	788	768	722	671	613	551	482	408	–	–	–
				MED	752	732	710	658	598	529	452	365	–	–	–	–
				MED LO	672	652	628	567	492	401	–	–	–	–	–	–
				LOW	604	573	538	459	365	–	–	–	–	–	–	–
18	600	420	EC Constant Torque	HI	915	900	884	851	814	773	729	682	632	578	520	460
				MED HI	860	843	826	788	746	700	649	594	536	473	–	–
				MED	811	792	771	727	679	626	568	506	439	–	–	–
				MED LO	748	727	704	653	597	534	466	–	–	–	–	–
				LOW	688	663	636	577	512	440	–	–	–	–	–	–
24	800	560	EC Constant Torque	HI	1035	1021	1007	979	952	925	898	872	846	820	795	770
				MED HI	984	969	954	924	895	866	837	808	779	751	723	695
				MED	894	878	861	829	797	766	735	704	674	645	616	588
				MED LO	845	828	811	777	744	711	679	648	618	588	–	–
				LOW	775	758	741	707	674	641	609	577	–	–	–	–
30	1000	700	EC Constant Torque	HI	1130	1125	1119	1104	1085	1063	1037	1008	975	939	899	856
				MED HI	1076	1086	1094	1100	1094	1076	1047	1005	952	887	810	721
				MED	1092	1086	1080	1065	1048	1029	1007	983	956	928	896	863
				MED LO	1056	1051	1046	1032	1016	997	976	951	923	893	860	824
				LOW	1017	1012	1007	994	980	963	945	925	903	879	853	825
36	1200	840	EC Constant Torque	HI	1394	1382	1369	1344	1318	1292	1265	1239	1212	1184	1156	1128
				MED HI	1357	1344	1332	1306	1280	1254	1227	1200	1172	1144	1115	1086
				MED	1324	1311	1298	1272	1245	1218	1190	1162	1134	1105	1076	1046
				MED LO	1285	1271	1257	1229	1201	1173	1145	1116	1088	1059	1031	1002
				LOW	1252	1237	1223	1194	1165	1136	1107	1078	1049	1020	991	962
42	1400	980	EC Constant Torque	HI	1591	1581	1571	1550	1528	1505	1480	1454	1426	1397	1367	1335
				MED HI	1542	1532	1522	1501	1478	1454	1428	1401	1373	1344	1313	1281
				MED	1485	1473	1461	1436	1411	1384	1356	1328	1298	1267	1236	1203
				MED LO	1433	1423	1412	1390	1366	1341	1314	1285	1254	1222	1188	1153
				LOW	1412	1405	1397	1379	1358	1334	1307	1277	1244	1207	1168	1126
48	1600	1120	EC Constant Torque	HI	1804	1787	1771	1740	1709	1680	1652	1624	1598	1574	1550	1527
				MED HI	1776	1760	1744	1714	1684	1655	1627	1600	1574	1549	1525	1501
				MED	1748	1731	1715	1684	1654	1624	1596	1568	1542	1516	1491	1468
				MED LO	1688	1671	1655	1623	1592	1563	1534	1506	1480	1454	1430	1406
				LOW	1625	1607	1590	1557	1525	1494	1464	1435	1408	1381	1356	1332
60	2000	1400	EC Constant Torque	HI	2209	2194	2179	2149	2118	2087	2056	2024	1992	1960	1927	1894
				MED HI	2136	2121	2106	2077	2049	2022	1995	1970	1945	1922	1899	1877
				MED	2076	2060	2045	2016	1988	1960	1933	1908	1883	1859	1836	1814
				MED LO	2009	1996	1982	1955	1929	1903	1877	1852	1827	1803	1779	1755
				LOW	1951	1936	1921	1892	1864	1836	1810	1783	1758	1733	1710	1686

**B** SERENITY PACKAGED WATER SOURCE HEAT PUMPS

# SERENITY PACKAGED WATER SOURCE HEAT PUMPS



## Model Series 44PH • Horizontal Units • Sound Data - Standard Construction

Unit Size	Model	Sound Rating <sup>1</sup> (dB-A)	Ducted Discharge Octave Bands (Hz)								Sound Rating <sup>1</sup> (dB-A)	Free Inlet Combined with Casing Radiated Octave Bands (Hz)							
			63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000
6	Fan Only - Low	53.3	71.9	62.8	51.4	49.3	46.7	42.2	33.8	24.6	44.9	56.7	55.7	47.7	42.9	35.1	26.1	21.5	19.6
	Fan Only - High	61.0	78.3	70.1	58.4	56.3	55.0	51.0	47.0	39.4	52.1	63.3	62.5	54.8	50.0	43.8	34.9	31.7	22.7
	Cooling - Low	56.7	81.6	63.8	52.1	49.5	47.3	46.0	33.4	24.5	49.1	61.0	61.2	50.9	44.4	38.9	35.6	31.2	32.3
	Cooling - High	61.6	81.3	70.1	58.4	56.4	55.1	51.2	47.3	39.8	52.6	63.8	63.4	54.5	50.4	44.1	37.4	33.4	32.8
	Heating - Low	55.8	78.3	63.3	52.5	50.1	48.1	44.6	35.4	29.8	50.4	61.9	62.8	50.5	44.7	42.1	37.1	34.6	36.1
	Heating - High	61.6	79.3	70.3	59.6	56.5	55.8	51.4	47.0	39.5	53.1	63.5	64.3	55.3	50.3	44.8	37.3	33.9	32.9
9	Fan Only - Low	63.3	80.2	72.0	61.4	58.2	57.7	53.1	50.0	43.3	53.0	63.0	61.8	55.4	51.5	45.8	36.7	32.9	24.5
	Fan Only - High	71.0	86.4	80.0	70.7	65.0	65.0	60.7	58.8	54.1	60.4	69.1	69.2	64.3	58.2	52.7	44.0	42.2	35.8
	Cooling - Low	62.8	81.4	72.0	60.4	57.9	56.4	52.2	49.1	42.2	58.7	68.2	73.1	56.6	52.2	48.1	38.6	34.6	31.4
	Cooling - High	70.9	86.7	80.0	70.3	64.7	64.6	60.6	58.8	54.1	62.0	70.6	74.1	64.1	58.4	53.3	44.3	42.3	37.0
	Heating - Low	63.4	81.5	72.5	61.5	57.9	57.8	52.6	49.2	42.6	56.8	70.2	69.4	57.7	53.2	47.9	39.1	35.8	35.0
	Heating - High	70.9	86.6	79.8	70.8	65.0	65.0	60.5	58.5	54.0	61.7	71.4	72.4	65.3	58.9	53.2	44.3	42.8	39.2
12	Fan Only - Low	64.3	77.3	74.7	63.4	58.0	57.4	55.6	53.9	48.4	54.4	65.4	64.1	57.0	51.4	47.9	39.6	35.2	27.3
	Fan Only - High	69.9	84.8	81.1	70.5	62.8	62.3	60.3	58.6	54.4	57.7	67.2	67.2	60.3	54.4	51.2	44.2	40.0	33.6
	Cooling - Low	64.7	85.8	74.9	62.9	57.1	56.0	54.6	52.6	46.6	57.1	76.4	67.6	59.5	51.9	48.1	40.3	36.5	30.5
	Cooling - High	68.3	86.5	78.6	67.2	60.9	60.7	59.0	57.8	53.6	59.1	76.5	69.1	61.6	54.7	51.2	44.3	40.8	34.5
	Heating - Low	65.8	88.4	74.9	63.0	57.8	57.5	55.4	53.4	47.6	58.2	80.4	67.3	59.9	52.6	48.8	40.5	37.3	41.4
	Heating - High	70.5	90.1	81.4	70.3	62.8	62.3	60.1	58.2	53.9	59.6	79.5	68.6	62.3	54.8	51.5	44.2	40.4	41.1
15	Fan Only - Low	62.4	80.3	70.2	59.9	57.2	56.5	52.5	50.7	43.9	52.6	65.2	60.1	56.1	50.0	42.2	40.9	38.3	27.5
	Fan Only - High	68.1	84.2	75.4	66.6	63.9	61.7	58.0	56.6	53.2	59.1	69.1	66.1	62.8	56.5	48.8	47.3	45.1	38.8
	Cooling - Low	61.8	80.2	69.1	59.8	56.9	55.9	52.0	50.3	43.0	54.1	67.4	62.5	57.4	50.8	45.4	41.4	38.6	34.8
	Cooling - High	67.9	84.7	74.6	66.4	63.7	61.5	57.9	56.8	53.4	59.6	70.1	67.4	63.1	56.8	49.8	47.6	45.2	39.3
	Heating - Low	63.9	87.0	69.2	59.4	57.3	56.4	52.2	49.9	42.5	55.1	66.6	64.7	56.9	52.8	46.2	42.0	39.3	33.3
	Heating - High	68.4	87.7	75.0	66.0	63.7	61.9	57.9	56.1	52.9	60.3	70.1	69.2	63.4	57.2	50.6	47.9	45.5	39.8
18	Fan Only - Low	63.5	81.3	71.5	61.5	58.4	57.2	53.7	52.0	46.9	55.2	66.6	63.4	58.7	51.6	45.0	43.9	41.4	33.6
	Fan Only - High	69.7	85.5	76.8	68.5	65.2	63.2	60.0	58.6	55.3	60.6	69.9	68.2	64.6	56.1	50.4	49.9	47.7	41.8
	Cooling - Low	64.4	86.0	71.5	62.0	58.5	56.8	53.4	51.6	46.3	56.0	71.3	63.9	59.5	51.9	46.2	43.8	41.0	34.4
	Cooling - High	69.8	88.0	76.7	68.3	64.9	63.0	59.8	58.4	55.0	60.7	71.9	68.2	64.6	56.3	51.0	49.8	47.3	41.3
	Heating - Low	67.0	91.4	71.4	62.9	59.3	57.9	53.8	51.4	46.3	57.1	66.6	66.9	60.5	53.2	47.1	43.7	41.5	37.2
	Heating - High	70.0	88.7	77.0	68.6	64.7	63.6	60.0	58.0	54.8	60.5	69.7	68.1	64.5	55.9	50.3	49.9	47.6	41.8
24	Fan Only - Low	59.0	73.1	63.2	54.2	55.0	54.8	50.3	46.0	36.7	52.4	64.2	57.0	52.4	50.9	47.9	39.2	32.3	23.3
	Fan Only - High	65.6	79.1	69.3	60.3	61.4	60.7	57.6	54.8	46.8	57.9	67.9	62.8	58.1	55.3	53.0	47.4	41.9	31.1
	Cooling - Low	60.6	82.4	64.5	55.7	55.1	54.5	50.6	46.6	37.6	57.2	71.1	69.5	56.4	52.0	50.5	42.6	36.0	33.5
	Cooling - High	66.0	82.5	69.9	60.7	61.4	60.6	57.9	55.4	47.7	60.0	70.8	68.8	59.7	56.7	54.1	49.8	44.8	36.4
	Heating - Low	60.3	78.3	66.5	55.7	55.7	55.5	50.8	46.4	37.1	62.9	71.1	77.8	58.9	55.5	50.9	42.7	37.8	31.7
	Heating - High	66.2	80.5	70.8	60.9	62.0	61.2	57.9	55.0	47.2	62.3	70.7	76.0	60.2	56.1	54.2	48.0	43.1	37.2
30	Fan Only - Low	63.0	79.2	66.7	57.5	59.9	57.5	54.1	51.7	43.8	55.0	66.0	61.2	56.2	52.4	50.3	41.9	37.5	25.6
	Fan Only - High	70.3	85.1	73.6	64.9	65.0	65.7	61.6	60.2	54.6	61.2	70.0	67.6	62.8	56.7	56.9	49.7	46.8	38.4
	Cooling - Low	63.5	81.9	70.0	58.3	59.3	57.5	54.3	52.0	44.2	59.2	67.2	72.0	57.8	54.6	51.9	44.1	38.6	32.5
	Cooling - High	70.6	85.9	74.5	65.3	64.8	66.0	62.2	60.7	55.3	62.2	70.4	72.0	63.6	57.4	56.8	50.0	47.0	39.4
	Heating - Low	65.0	82.8	74.8	59.9	60.4	58.3	54.3	51.9	44.5	61.7	65.9	75.5	59.4	57.0	52.4	44.7	40.9	39.3
	Heating - High	70.8	86.4	76.2	65.5	65.3	66.3	61.9	60.4	55.2	63.1	69.9	74.5	64.1	58.0	57.2	49.5	46.9	40.7
36	Fan Only - Low	64.0	81.9	69.4	60.2	61.5	57.8	54.5	52.3	45.2	58.5	70.4	67.2	61.4	56.7	48.9	44.4	41.2	30.0
	Fan Only - High	71.3	84.2	75.5	68.3	68.3	66.0	61.9	60.9	56.0	63.8	74.9	71.2	66.8	60.6	55.9	52.3	49.7	40.8
	Cooling - Low	63.9	83.0	69.3	59.9	61.4	57.3	54.1	51.8	44.6	59.9	73.0	71.3	61.5	56.6	50.8	45.6	42.2	35.4
	Cooling - High	71.0	85.5	75.1	68.3	67.6	65.4	62.0	60.8	55.8	64.2	75.1	73.0	66.9	60.6	56.4	52.6	49.8	41.6
	Heating - Low	64.6	82.6	73.1	60.7	61.3	58.3	54.0	51.6	44.4	61.7	71.7	73.8	63.3	58.7	51.6	46.0	41.9	39.0
	Heating - High	71.3	84.6	76.3	68.4	68.0	66.2	61.7	60.4	55.6	65.0	75.2	75.0	67.7	61.2	56.3	52.3	49.5	42.3
42	Fan Only - Low	61.6	77.6	65.2	56.7	59.9	55.5	52.0	51.0	43.7	54.4	64.8	60.2	55.0	53.0	47.3	44.1	40.0	28.6
	Fan Only - High	69.7	83.6	72.7	63.9	65.3	65.6	60.4	60.4	55.1	61.6	70.9	66.7	62.0	58.4	56.0	52.4	49.3	40.6
	Cooling - Low	61.4	78.4	66.5	56.8	58.9	55.1	52.3	51.2	43.7	58.9	67.6	71.8	58.1	54.1	50.6	45.4	40.9	34.2
	Cooling - High	69.8	83.8	73.1	65.1	64.6	65.6	60.8	60.8	55.3	63.4	72.4	74.3	63.0	58.6	56.8	53.0	49.6	40.8
	Heating - Low	62.1	77.4	67.3	58.3	60.2	56.0	52.0	50.8	44.0	62.2	68.1	76.4	59.2	56.1	52.5	46.8	43.6	40.8
	Heating - High	70.0	82.9	73.1	64.5	65.6	66.0	60.6	60.4	55.5	64.2	70.6	76.1	63.6	59.5	56.7	52.8	49.9	42.4
48	Fan Only - Low	63.8	77.1	65.6	58.2	61.8	58.7	54.4	53.6	46.9	55.7	66.0	61.7	57.5	53.1	49.0	45.6	41.8	30.5
	Fan Only - High	72.0	81.7	72.7	67.2	67.4	68.6	62.7	62.5	57.3	63.0	72.1	67.5	65.3	58.6	57.8	53.4	50.5	42.0
	Cooling - Low	64.1	76.3	66.2	59.2	61.7	59.0	54.9	54.3	47.8	63.7	68.4	78.7	60.0	54.9	52.3	47.9	43.5	37.1
	Cooling - High	72.4	82.2	73.0	66.9	67.4	68.8	63.4	63.2	58.3	66.0	72.2	78.5	67.1	59.3	58.8	54.0	50.9	43.1
	Heating - Low	64.6	77.0	71.4	58.5	62.1	59.4	54.5	53.6	47.4	68.6	69.3	84.0	62.1	57.6	54.9	52.0	49.4	49.6
	Heating - High	72.3	82.0	74.6	66.0	67.7	68.9	62.8	62.5	57.8	69.0	73.3	83.3	65.0	60.0	59.1	56.2	53.7	50.1



## Model Series 44PH • Horizontal Units • Sound Data - Quiet Construction

Unit Size	Model	Sound Rating <sup>1</sup> (dB-A)	Ducted Discharge Octave Bands (Hz)								Sound Rating <sup>1</sup> (dB-A)	Free Inlet Combined with Casing Radiated Octave Bands (Hz)							
			63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000
6	Fan Only - Low	55.1	77.4	63.7	51.5	49.7	46.9	42.6	34.6	25.2	43.9	57.3	53.4	47.2	41.9	34.1	24.4	22.4	20.8
	Fan Only - High	61.6	79.7	70.4	58.6	56.6	55.3	51.3	47.4	39.8	51.1	62.5	60.3	53.8	49.5	42.9	33.8	30.3	22.1
	Cooling - Low	53.6	72.2	62.9	51.4	49.4	46.9	42.6	34.6	25.2	52.0	69.3	65.1	51.4	44.8	40.3	38.1	34.9	35.7
	Cooling - High	61.2	78.5	70.4	58.6	56.4	55.2	51.2	47.3	39.9	53.4	67.4	65.0	54.3	50.7	43.8	38.4	34.8	35.5
	Heating - Low	54.0	71.5	63.6	52.7	49.6	47.8	44.6	35.2	29.4	53.5	76.5	63.1	51.4	46.1	43.3	38.5	36.3	37.1
	Heating - High	61.3	77.1	70.8	59.7	56.4	55.8	51.7	47.0	39.7	54.6	74.2	64.4	55.7	51.0	45.6	39.1	36.0	33.0
9	Fan Only - Low	63.2	80.7	71.9	61.5	58.1	57.3	52.8	49.7	43.1	53.2	62.8	62.0	55.7	51.8	46.0	37.1	33.2	24.1
	Fan Only - High	70.8	87.0	79.6	70.3	64.9	64.8	60.5	58.8	54.1	60.4	68.6	68.9	64.4	58.3	52.7	44.1	42.4	35.4
	Cooling - Low	63.9	81.9	74.6	61.4	58.0	57.0	52.7	49.6	42.8	59.9	70.0	74.7	58.4	51.9	47.4	38.6	36.3	35.3
	Cooling - High	70.8	87.2	79.8	70.3	64.7	64.6	60.5	58.8	54.0	62.6	71.3	75.3	64.8	58.4	52.9	44.2	42.6	38.1
	Heating - Low	64.5	85.1	74.6	62.0	57.8	57.6	52.6	49.1	42.4	58.1	72.8	71.6	58.2	52.5	47.1	39.0	37.0	36.7
	Heating - High	71.1	88.0	80.3	70.7	64.7	64.8	60.4	58.6	54.1	62.0	72.7	73.6	65.2	58.4	52.6	44.2	42.7	37.6
12	Fan Only - Low	63.9	77.4	75.0	63.1	57.4	56.8	55.3	53.3	47.6	54.2	64.4	64.0	56.4	51.3	47.7	39.3	35.3	28.4
	Fan Only - High	70.1	85.8	81.4	70.9	62.6	62.2	60.3	58.6	54.4	57.7	67.3	67.2	60.2	54.2	51.4	43.9	40.3	34.4
	Cooling - Low	64.6	84.2	75.2	63.4	57.5	56.3	54.9	53.0	47.2	60.2	81.6	71.3	60.8	52.7	49.5	44.4	39.7	33.9
	Cooling - High	68.5	86.1	78.7	67.4	61.1	61.1	59.3	58.1	54.0	61.4	82.3	71.9	62.5	55.0	52.1	46.0	41.9	35.9
	Heating - Low	67.9	92.8	76.0	63.5	57.7	57.3	55.2	53.1	47.3	61.6	82.0	72.7	63.1	53.5	49.5	44.3	41.3	43.0
	Heating - High	71.2	92.6	81.9	70.8	62.8	62.3	60.0	58.2	53.9	62.2	81.9	72.9	63.9	55.7	51.9	46.1	43.2	43.7
15	Fan Only - Low	61.9	80.5	69.3	59.7	56.9	55.9	52.1	50.3	43.0	53.5	66.1	60.9	56.8	51.2	43.1	41.6	39.1	28.9
	Fan Only - High	68.0	84.5	75.3	66.6	63.6	61.5	58.0	56.8	53.5	59.0	69.2	66.0	62.5	56.3	48.9	47.4	45.1	38.9
	Cooling - Low	63.0	85.5	69.3	59.7	56.6	55.6	51.8	50.2	42.9	54.1	66.7	63.3	57.2	50.8	45.3	41.7	38.6	33.8
	Cooling - High	68.0	86.9	75.0	66.6	63.0	61.1	57.7	56.7	53.2	59.7	74.8	67.7	62.7	56.4	49.9	47.6	45.2	39.2
	Heating - Low	64.5	88.5	69.6	59.3	57.2	56.3	52.0	49.6	42.2	55.6	67.8	65.1	57.1	53.8	46.3	41.8	39.1	34.5
	Heating - High	68.3	87.7	75.2	66.1	63.6	61.6	57.8	56.0	52.8	59.9	70.2	67.7	63.4	56.8	50.4	47.9	45.6	39.7
18	Fan Only - Low	63.7	81.5	71.7	61.7	58.8	57.5	53.8	52.0	46.9	54.5	65.6	62.8	58.0	50.8	44.2	43.2	40.7	32.5
	Fan Only - High	69.6	84.8	76.9	68.2	64.6	63.5	60.1	58.6	55.4	60.4	70.1	68.1	64.3	55.7	50.2	49.9	47.6	41.7
	Cooling - Low	64.4	86.1	71.4	62.2	58.4	56.8	53.4	51.6	46.2	55.4	72.0	63.4	58.7	50.9	45.6	43.4	40.8	34.3
	Cooling - High	69.7	87.9	76.5	68.3	65.0	62.9	59.7	58.3	54.8	60.5	73.3	68.1	64.4	55.8	50.7	49.7	47.4	41.4
	Heating - Low	65.2	87.5	71.7	62.6	59.2	57.8	53.7	51.1	45.9	57.1	66.7	67.2	60.3	52.9	47.6	44.1	41.6	37.4
	Heating - High	69.5	84.6	76.6	68.3	64.6	63.5	59.9	58.0	54.7	61.1	70.1	70.0	64.8	56.6	50.9	49.8	47.6	42.4
24	Fan Only - Low	59.2	73.6	63.0	54.4	55.1	54.9	50.7	46.6	37.6	52.2	62.7	56.4	52.1	50.4	48.1	39.1	32.4	23.0
	Fan Only - High	65.9	79.5	69.6	60.6	61.6	60.9	57.9	55.4	47.9	58.3	68.1	63.5	58.3	55.8	53.5	47.8	42.4	31.0
	Cooling - Low	59.2	76.5	64.2	55.0	54.8	54.4	50.4	46.3	37.4	56.1	68.9	63.3	55.2	52.9	51.5	45.0	40.1	34.8
	Cooling - High	65.6	80.2	69.2	60.1	61.5	60.3	57.6	55.1	47.5	60.1	70.3	65.5	58.9	56.4	55.1	51.5	47.5	40.9
	Heating - Low	60.3	74.2	69.7	55.3	55.6	55.3	50.6	46.2	37.0	61.1	68.7	75.4	60.4	53.9	51.1	42.3	37.9	38.2
	Heating - High	66.2	79.2	71.6	60.9	62.0	61.3	58.0	55.0	47.4	60.9	70.2	72.5	60.4	56.2	54.7	47.9	43.0	37.6
30	Fan Only - Low	63.3	78.9	66.7	57.9	59.9	57.9	54.5	52.4	44.9	55.2	66.3	61.3	56.1	52.6	50.6	41.9	38.2	26.8
	Fan Only - High	70.7	85.5	73.4	65.5	65.1	66.2	62.2	60.9	55.7	61.3	70.3	67.4	62.9	56.9	57.2	49.4	46.7	37.9
	Cooling - Low	63.9	83.5	69.7	58.9	59.5	57.6	54.4	52.1	44.3	57.6	70.4	68.3	57.2	53.8	51.7	43.2	38.9	31.5
	Cooling - High	70.6	85.8	74.0	65.9	65.0	66.1	62.1	60.8	55.4	61.8	73.1	70.2	63.0	57.1	57.0	49.7	46.9	38.4
	Heating - Low	65.9	86.5	75.1	61.9	60.5	58.4	54.2	51.8	44.4	60.9	69.6	73.1	62.2	56.2	52.1	44.6	41.0	39.1
	Heating - High	71.0	88.3	76.1	65.9	65.3	66.2	61.8	60.4	55.2	62.6	71.7	72.5	64.1	57.7	57.4	49.3	46.9	41.2
36	Fan Only - Low	63.9	81.2	69.1	60.1	61.7	57.7	53.9	51.7	44.3	56.2	69.3	64.8	58.4	54.0	47.1	44.1	40.1	28.7
	Fan Only - High	71.0	84.2	75.5	67.5	67.9	65.6	61.4	60.3	55.2	63.1	73.2	70.2	66.5	59.8	54.6	52.1	49.0	40.0
	Cooling - Low	64.0	82.7	69.2	60.1	62.0	57.3	54.2	51.8	44.5	59.4	72.9	70.9	60.9	55.8	50.8	45.1	41.1	33.7
	Cooling - High	71.0	85.5	75.3	67.7	67.8	65.7	61.9	60.5	55.5	64.3	75.0	74.1	66.8	60.6	55.8	52.2	49.2	40.6
	Heating - Low	64.4	81.9	70.5	60.6	61.8	58.3	54.1	51.8	44.6	61.9	71.9	73.8	63.9	59.4	51.4	46.1	42.1	39.3
	Heating - High	71.3	84.6	75.7	67.8	68.0	66.1	61.6	60.5	55.6	64.7	74.5	74.6	67.5	61.0	56.0	52.2	49.4	42.1
42	Fan Only - Low	61.8	79.1	65.7	56.6	59.7	55.5	52.2	51.3	44.0	54.6	64.5	60.5	55.2	53.2	47.5	44.4	40.3	29.1
	Fan Only - High	70.0	84.0	73.4	64.5	65.2	65.9	60.9	60.9	55.7	61.9	70.5	66.8	62.7	58.6	56.4	52.7	49.7	41.2
	Cooling - Low	61.6	77.5	64.9	56.7	59.4	55.7	52.4	51.4	44.1	61.2	71.5	75.9	57.8	54.2	49.8	45.1	40.9	35.0
	Cooling - High	70.0	83.9	73.6	65.5	64.9	65.8	60.9	60.8	55.3	64.2	74.1	76.5	62.8	58.8	56.8	52.9	49.7	41.2
	Heating - Low	62.1	77.2	66.8	58.1	60.3	56.0	51.9	50.7	43.9	62.8	69.5	77.4	59.1	56.0	52.5	46.5	43.6	40.8
	Heating - High	70.1	83.6	73.3	64.8	65.7	66.0	60.6	60.5	55.7	64.5	72.9	77.0	64.1	59.0	56.4	52.7	49.8	42.4
48	Fan Only - Low	64.1	77.3	66.6	58.7	61.7	58.9	54.8	54.1	47.9	56.3	66.6	62.2	58.8	53.5	49.6	46.1	42.5	31.4
	Fan Only - High	72.4	83.3	73.5	67.3	67.6	68.7	63.4	63.0	58.2	63.8	72.7	68.2	66.6	59.2	58.5	54.1	51.2	42.9
	Cooling - Low	63.9	78.3	67.5	59.2	61.3	58.6	54.7	53.7	46.8	62.9	68.0	77.6	59.6	54.5	51.9	47.8	43.6	37.4
	Cooling - High	72.1	83.5	74.0	67.2	67.0	68.5	63.2	62.7	57.5	65.5	73.4	77.0	67.2	59.4	58.6	54.1	51.2	43.4
	Heating - Low	64.5	78.6	69.7	58.9	62.1	59.4	54.6	53.6	47.4	69.2	69.7	84.7	60.4	57.6	54.3	52.1	49.7	49.2
	Heating - High	72.5	82.8	74.9	66.8	67.9	68.9	63.0	62.6	57.9	68.7	73.5	83.2	64.7	59.8	58.6	54.8	52.0	48.0

## Model Series 44PV • Vertical Units • Sound Data - Standard Construction

Unit Size	Model	Sound Rating <sup>1</sup> (dB-A)	Ducted Discharge Octave Bands (Hz)								Sound Rating <sup>1</sup> (dB-A)	Free Inlet Combined with Casing Radiated Octave Bands (Hz)							
			63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000
6	Fan Only - Low	57.0	77.1	66.6	55.0	52.6	49.6	45.3	38.8	29.8	48.1	60.8	58.4	50.2	46.2	39.4	33.1	26.0	20.6
	Fan Only - High	63.5	81.1	72.7	66.7	57.4	55.8	51.7	47.4	40.5	53.0	64.7	63.3	55.7	50.4	45.1	38.1	33.8	25.2
	Cooling - Low	57.9	78.5	68.3	55.8	52.7	49.5	45.1	38.7	29.1	50.7	69.9	60.7	51.4	45.9	39.9	36.8	37.2	38.8
	Cooling - High	63.5	81.3	72.7	67.2	57.3	55.7	51.6	47.4	40.3	54.6	73.2	63.7	56.5	50.3	45.4	40.6	40.8	41.8
	Heating - Low	58.6	80.5	68.4	56.8	52.9	50.9	45.9	39.0	30.4	53.4	76.7	64.4	51.1	46.8	40.5	36.5	34.2	33.1
Heating - High	63.8	82.1	74.2	63.7	57.5	57.3	52.2	47.8	41.0	54.7	75.8	65.0	55.7	50.3	45.2	38.6	35.2	28.9	
9	Fan Only - Low	64.5	82.2	74.8	63.2	57.9	58.3	53.2	49.0	42.3	52.6	64.2	63.0	55.4	49.1	44.6	38.2	33.2	25.7
	Fan Only - High	70.9	86.6	81.3	71.2	63.4	64.5	59.6	56.5	51.4	58.9	69.2	69.1	63.0	54.5	49.9	43.9	40.8	33.5
	Cooling - Low	65.7	87.9	75.9	61.9	57.8	57.1	52.4	48.3	41.4	54.6	70.3	66.3	56.6	50.1	44.3	38.5	34.8	35.1
	Cooling - High	70.9	89.4	81.4	70.3	62.7	63.6	59.1	56.3	51.1	58.9	72.5	69.7	62.2	54.2	49.6	43.6	40.6	36.6
	Heating - Low	65.8	87.6	76.1	63.9	57.5	58.4	52.8	48.3	41.5	54.9	70.8	65.8	58.3	50.3	46.0	39.7	34.8	32.6
Heating - High	71.0	88.8	81.4	71.8	62.9	64.4	59.3	56.1	51.1	59.4	71.1	69.8	64.0	54.8	50.1	43.7	40.7	35.0	
12	Fan Only - Low	63.5	76.5	72.3	62.2	57.4	57.9	55.2	52.9	47.2	52.8	61.9	60.7	53.0	49.9	47.4	41.8	37.1	28.0
	Fan Only - High	69.1	79.7	76.6	68.0	62.3	63.8	60.9	59.4	55.7	58.9	66.1	65.6	58.2	58.1	52.9	47.7	43.7	36.6
	Cooling - Low	62.4	76.8	71.6	61.9	56.9	56.1	53.7	51.2	44.9	53.6	65.9	62.4	55.2	50.4	47.3	41.8	36.5	29.0
	Cooling - High	68.3	80.8	75.8	67.6	61.7	62.7	60.0	58.6	54.6	58.5	67.4	65.7	58.9	55.7	52.8	47.9	44.4	39.7
	Heating - Low	63.6	79.6	72.6	61.8	57.3	57.9	54.9	52.3	46.5	55.6	69.7	63.0	56.6	52.2	49.6	44.2	40.2	38.9
Heating - High	69.1	80.1	77.0	67.7	62.1	64.0	60.8	59.2	55.5	59.3	68.8	65.9	59.7	57.5	53.5	48.4	45.4	42.3	
15	Fan Only - Low	62.2	83.4	71.6	60.0	56.9	54.6	49.7	47.3	40.6	53.0	69.6	64.4	55.8	47.8	40.3	37.1	32.9	24.1
	Fan Only - High	68.3	86.5	77.5	66.9	64.3	61.3	56.4	55.0	51.1	58.7	73.8	69.5	62.3	52.9	46.2	43.8	40.7	32.5
	Cooling - Low	63.7	87.1	72.1	62.4	56.6	54.1	49.5	47.3	40.5	54.6	71.0	66.4	57.7	48.5	44.3	36.8	32.6	26.1
	Cooling - High	68.7	89.9	77.3	67.6	63.8	60.9	56.3	54.9	51.1	59.2	75.2	70.5	62.5	53.1	47.7	43.6	40.7	33.0
	Heating - Low	64.7	88.6	72.1	61.8	57.8	55.4	50.2	47.1	40.6	55.2	73.1	66.6	57.1	50.1	45.6	38.2	33.7	31.3
Heating - High	69.2	89.4	77.6	66.8	64.9	62.0	56.7	54.7	51.0	59.6	75.5	70.6	62.8	54.4	48.3	44.1	40.8	33.1	
18	Fan Only - Low	59.8	73.2	66.8	56.9	56.2	54.2	50.8	47.9	40.3	49.7	63.3	57.8	51.7	46.5	40.5	39.9	33.8	23.5
	Fan Only - High	64.7	76.2	70.1	61.0	61.1	59.3	55.8	54.6	49.0	54.0	65.5	61.6	55.3	50.7	45.6	45.1	40.5	30.1
	Cooling - Low	62.9	87.4	66.2	56.9	55.2	53.0	49.9	46.7	38.7	55.8	78.2	66.2	56.3	47.3	45.0	39.4	33.4	26.4
	Cooling - High	68.1	92.3	72.8	61.4	60.6	58.8	55.1	53.7	48.1	57.2	77.4	66.9	59.4	50.9	47.2	44.7	40.0	29.8
	Heating - Low	66.5	92.0	70.6	58.3	56.1	54.3	50.2	47.0	39.3	58.9	79.2	71.8	58.9	49.1	47.0	41.8	37.3	32.3
Heating - High	67.9	91.8	72.8	61.6	60.8	59.1	55.3	53.9	48.3	60.0	80.7	72.2	59.4	52.4	48.4	45.9	41.7	34.1	
24	Fan Only - Low	65.2	80.4	72.3	59.9	61.6	59.6	56.3	53.7	46.6	56.6	65.5	65.0	55.9	53.7	50.3	48.5	41.1	29.3
	Fan Only - High	66.1	80.2	72.3	60.8	62.9	60.6	57.3	55.1	48.5	57.4	65.5	65.4	59.5	54.0	50.3	48.7	41.4	29.8
	Cooling - Low	65.2	80.8	71.6	59.5	61.8	59.6	56.5	53.7	46.5	57.4	69.9	66.1	57.2	54.1	50.9	48.9	41.9	32.3
	Cooling - High	66.1	82.0	72.4	60.6	62.4	60.4	57.4	55.0	48.0	57.9	70.0	66.2	57.7	54.6	51.4	49.9	43.1	33.2
	Heating - Low	65.7	80.3	72.2	61.2	62.8	60.3	56.1	53.6	46.4	58.7	67.2	69.3	58.8	55.9	51.8	49.8	43.0	35.6
Heating - High	66.6	80.8	72.8	62.3	63.3	61.3	57.3	54.8	48.0	59.0	67.4	69.4	58.3	55.9	51.3	48.8	41.8	35.1	
30	Fan Only - Low	62.5	82.0	69.8	58.1	60.0	55.1	52.5	50.7	44.1	52.6	66.4	59.6	55.0	49.7	44.3	42.5	37.4	26.9
	Fan Only - High	69.6	86.3	75.8	65.6	66.0	63.8	60.0	59.0	55.4	58.8	71.0	65.3	61.3	54.3	51.5	49.8	45.5	37.9
	Cooling - Low	62.2	80.4	70.3	57.9	59.6	54.9	52.4	50.4	43.3	55.1	69.6	64.3	58.5	50.9	46.5	43.1	37.8	31.4
	Cooling - High	69.5	85.7	77.1	67.0	65.6	63.6	59.8	58.8	54.9	59.9	73.5	66.7	63.3	55.0	52.5	50.5	45.9	38.4
	Heating - Low	63.1	82.0	70.6	58.0	61.2	55.4	51.8	49.7	42.7	57.9	69.6	69.7	60.4	53.3	46.8	44.2	39.5	37.7
Heating - High	69.0	83.7	75.7	63.8	65.8	63.3	59.1	58.0	54.3	60.2	72.2	68.3	62.6	55.8	52.5	50.5	46.3	40.2	
36	Fan Only - Low	64.0	76.6	66.9	56.4	62.2	58.2	54.6	54.4	49.2	53.2	65.3	59.1	55.1	49.6	46.4	44.5	39.7	29.8
	Fan Only - High	71.6	82.6	74.2	63.5	67.7	66.8	62.6	62.7	60.0	60.5	71.3	67.1	61.7	54.7	54.0	52.5	47.8	40.0
	Cooling - Low	64.0	79.1	67.5	56.4	62.2	58.0	54.4	54.3	48.8	55.8	67.0	66.2	57.7	50.2	48.1	46.1	40.2	32.9
	Cooling - High	71.5	83.9	75.4	63.3	67.4	66.7	62.6	62.7	59.6	61.2	71.3	69.6	62.4	55.1	54.3	52.7	47.7	40.2
	Heating - Low	64.4	80.0	70.7	57.9	62.2	58.5	54.1	53.5	48.7	60.8	67.6	75.4	58.4	53.1	48.9	47.5	42.8	37.7
Heating - High	71.5	82.3	76.1	63.6	67.5	66.8	62.1	62.0	59.4	62.1	70.9	73.6	62.3	55.6	54.2	52.5	47.9	41.2	
42	Fan Only - Low	62.9	80.0	71.0	59.3	60.0	56.5	52.4	50.7	42.6	54.7	69.1	64.4	56.8	50.2	47.1	43.9	37.4	25.8
	Fan Only - High	70.7	86.7	78.0	67.7	66.7	65.3	60.5	59.7	54.2	62.0	75.4	69.4	65.6	56.6	54.6	52.0	46.6	37.9
	Cooling - Low	62.8	79.4	70.6	59.9	59.5	56.4	52.7	51.0	42.7	58.3	70.3	65.2	58.9	53.7	54.3	46.8	39.2	31.2
	Cooling - High	71.1	88.3	78.2	68.8	66.5	65.3	61.1	60.5	54.9	63.4	75.3	70.2	66.3	58.0	57.5	53.7	47.7	39.5
	Heating - Low	64.5	79.6	73.3	66.2	60.6	57.4	52.6	50.6	43.0	62.5	71.0	71.6	68.7	55.4	51.2	46.9	41.1	44.3
Heating - High	71.3	87.1	78.9	68.4	67.4	66.0	60.8	59.8	54.7	64.4	76.3	75.9	66.6	57.9	56.4	52.5	47.0	41.0	
48	Fan Only - Low	63.8	76.0	68.1	58.0	61.8	58.4	54.4	52.7	46.2	55.0	66.2	61.5	56.5	51.1	48.3	46.2	41.0	31.0
	Fan Only - High	72.1	80.9	74.9	64.8	67.4	69.2	62.4	61.3	56.6	61.8	72.4	65.8	62.5	56.3	56.7	53.9	49.5	41.8
	Cooling - Low	63.5	78.1	67.7	57.4	61.2	57.9	54.2	53.0	46.9	56.9	70.4	65.0	58.3	52.6	50.1	47.3	42.2	33.1
	Cooling - High	72.1	82.2	74.7	64.8	66.8	69.2	62.6	61.8	57.1	62.5	73.6	66.7	62.9	57.3	57.6	54.6	49.9	41.7
	Heating - Low	64.5	77.4	70.1	58.5	62.6	59.2	54.6	52.8	47.0	58.4	71.8	69.2	58.4	53.0	51.7	47.6	43.0	40.2
Heating - High	72.4	81.9	74.6	65.8	67.8	69.6	62.6	61.5	57.2	62.9	74.4	71.0	63.1	57.0	57.3	54.3	50.1	43.2	

## Model Series 44PV • Vertical Units • Sound Data - Quiet Construction

Unit Size	Model	Sound Rating <sup>1</sup> (dB-A)	Ducted Discharge Octave Bands (Hz)								Sound Rating <sup>1</sup> (dB-A)	Free Inlet Combined with Casing Radiated Octave Bands (Hz)							
			63	125	250	500	1000	2000	4000	8000		63	125	250	500	1000	2000	4000	8000
6	Fan Only - Low	57.1	76.4	67.0	55.3	52.5	49.6	45.3	38.8	30.0	47.1	59.7	57.2	49.5	45.2	38.3	31.5	24.7	20.3
	Fan Only - High	63.5	81.7	73.6	64.9	57.3	56.2	51.9	47.7	40.6	53.0	64.5	62.6	57.6	49.6	44.1	37.3	32.9	24.0
	Cooling - Low	58.1	79.5	68.3	55.3	52.6	49.5	45.0	38.5	29.1	53.8	78.4	62.4	51.6	46.2	38.7	32.3	26.8	22.0
	Cooling - High	63.5	81.9	72.8	66.6	57.4	55.7	51.5	47.4	40.4	56.0	77.9	64.8	59.6	50.3	43.7	37.3	32.6	24.4
	Heating - Low	60.8	85.5	69.1	57.1	52.6	50.9	45.9	38.7	30.2	56.5	81.8	66.3	53.6	48.6	41.6	34.1	29.5	26.7
	Heating - High	64.8	87.5	73.6	63.0	57.1	56.9	51.8	47.2	40.4	56.5	80.0	65.9	56.5	50.6	45.3	37.9	33.4	24.8
9	Fan Only - Low	63.7	82.0	73.9	61.9	57.6	57.4	52.5	48.2	41.4	52.3	64.7	62.8	54.8	49.0	44.2	38.0	32.9	24.4
	Fan Only - High	70.4	86.7	80.7	70.5	62.9	63.8	59.2	56.2	51.2	58.7	69.4	69.2	62.6	54.3	49.6	43.4	40.3	32.8
	Cooling - Low	64.3	85.4	73.6	61.4	57.7	57.0	52.4	48.2	41.2	54.5	72.1	64.2	57.3	50.2	44.9	37.9	33.3	29.3
	Cooling - High	70.5	88.2	80.8	70.2	62.9	63.7	59.2	56.3	51.1	59.4	73.7	69.6	62.8	55.1	50.0	43.9	40.7	34.1
	Heating - Low	64.6	84.3	75.1	63.5	57.3	58.1	52.7	48.0	41.1	55.9	75.6	65.9	58.9	50.5	45.2	38.5	33.8	31.3
	Heating - High	70.8	87.4	81.1	71.9	62.8	64.2	59.2	55.9	50.9	59.9	75.0	70.5	64.0	54.9	50.0	43.7	40.7	34.5
12	Fan Only - Low	62.9	75.5	72.0	61.4	57.0	57.2	54.6	52.2	46.2	52.4	62.9	60.5	52.4	49.3	47.1	41.6	36.7	27.8
	Fan Only - High	68.8	80.0	76.0	67.6	62.0	63.5	60.7	59.2	55.5	57.7	66.3	65.0	57.6	54.2	52.8	47.5	43.5	36.4
	Cooling - Low	62.7	80.1	71.5	61.6	56.8	56.3	53.9	51.4	45.1	54.2	65.9	65.2	56.1	50.0	46.6	40.9	35.8	27.8
	Cooling - High	68.5	82.0	76.1	67.5	61.8	62.8	60.1	58.8	54.9	58.1	67.7	67.1	58.8	54.3	52.4	47.2	43.0	35.6
	Heating - Low	64.8	87.0	72.6	61.6	57.3	58.2	55.0	52.5	46.7	55.9	72.7	67.3	56.7	50.6	48.4	42.7	38.1	37.5
	Heating - High	69.3	85.7	77.0	67.9	61.9	63.9	60.6	59.0	55.3	58.6	70.0	67.2	59.8	54.5	53.1	47.5	43.6	39.2
15	Fan Only - Low	63.0	84.1	72.2	60.8	58.0	55.4	50.6	48.4	42.4	52.2	68.9	63.6	55.2	47.2	39.7	36.4	31.8	23.4
	Fan Only - High	68.7	87.4	77.8	66.9	64.8	61.7	56.5	54.9	51.3	58.3	73.9	69.2	61.9	52.5	46.0	43.5	40.4	32.7
	Cooling - Low	62.3	84.1	72.4	60.5	56.8	54.2	49.6	47.4	40.8	55.7	74.2	68.3	56.8	49.7	43.1	36.5	32.2	25.6
	Cooling - High	68.2	88.3	77.3	67.3	63.8	60.9	56.2	54.9	51.0	60.0	75.5	72.5	62.3	53.7	47.5	43.5	40.3	32.5
	Heating - Low	62.6	83.9	71.5	60.2	57.8	55.4	50.2	47.3	40.7	57.5	72.5	71.1	57.0	51.8	45.6	39.3	35.7	32.0
	Heating - High	68.7	86.6	77.7	66.9	64.7	62.0	56.6	54.7	50.9	60.2	75.5	72.3	62.5	54.5	48.0	44.1	41.5	35.8
18	Fan Only - Low	59.1	73.5	66.3	56.7	55.3	53.4	50.2	46.8	38.8	48.9	62.5	57.2	50.8	45.7	39.6	39.4	33.2	23.2
	Fan Only - High	64.3	77.0	69.3	60.5	60.6	58.7	55.6	54.2	48.6	53.6	64.6	60.8	54.6	50.5	45.2	44.8	40.1	29.6
	Cooling - Low	63.0	87.3	67.3	59.3	55.1	53.1	49.9	46.7	38.7	57.3	80.0	69.2	55.0	47.6	43.6	39.3	33.8	26.9
	Cooling - High	65.8	87.1	70.2	61.7	60.6	58.6	55.4	54.2	48.4	58.3	79.7	69.4	57.4	51.4	47.0	44.5	39.8	29.6
	Heating - Low	65.6	91.0	70.9	58.9	55.8	53.9	49.9	46.5	38.6	58.2	74.9	72.0	57.8	49.6	47.0	40.9	39.6	26.4
	Heating - High	67.6	91.3	72.3	61.3	60.8	59.0	55.3	53.8	48.0	59.2	76.8	72.2	59.2	52.0	47.3	45.2	40.8	31.3
24	Fan Only - Low	65.7	79.7	71.1	60.4	63.2	60.0	56.4	53.9	47.0	57.6	65.5	65.4	59.5	54.0	50.3	48.7	41.4	29.8
	Fan Only - High	66.6	79.7	71.6	61.6	63.8	61.1	57.6	55.2	48.5	58.9	66.0	65.7	61.7	54.7	51.0	49.7	42.7	31.7
	Cooling - Low	65.3	81.3	71.7	60.1	62.0	59.5	56.4	53.6	46.4	57.3	67.1	66.1	57.3	54.0	50.8	49.0	41.9	31.7
	Cooling - High	66.1	80.8	72.1	60.9	62.6	60.5	57.4	54.9	47.9	60.7	67.4	66.9	64.1	56.4	52.5	50.2	43.3	33.0
	Heating - Low	66.1	80.3	73.1	61.6	63.3	60.4	56.3	53.6	46.4	59.3	66.4	70.9	59.2	55.9	51.0	48.9	41.9	34.1
	Heating - High	66.9	80.6	73.7	62.8	64.0	61.3	57.4	55.0	48.1	59.5	66.5	70.7	59.5	56.1	51.5	49.7	42.9	34.6
30	Fan Only - Low	62.2	79.1	70.3	57.9	60.4	54.8	51.9	50.2	43.5	53.6	66.8	60.1	56.8	50.3	44.1	42.2	37.3	26.6
	Fan Only - High	68.9	82.1	74.8	63.3	66.0	63.1	59.5	58.5	54.9	59.3	70.5	65.8	62.0	54.7	51.7	50.0	45.7	38.2
	Cooling - Low	62.5	81.2	71.3	58.5	59.8	54.8	52.2	50.3	43.4	55.0	69.1	64.5	59.0	50.4	45.5	42.6	37.3	28.8
	Cooling - High	69.3	83.9	76.0	65.8	65.7	63.4	59.9	58.9	55.0	61.1	72.4	67.1	65.3	55.7	52.1	50.1	45.6	38.1
	Heating - Low	63.2	81.9	71.4	58.3	61.1	55.3	52.0	48.4	43.4	59.4	68.2	71.7	62.2	54.1	46.2	44.1	39.5	38.7
	Heating - High	69.4	83.9	76.2	64.6	65.9	63.7	59.6	58.5	55.1	60.1	71.3	69.1	62.3	55.6	52.0	50.3	46.1	40.8
36	Fan Only - Low	64.1	78.4	67.3	56.9	62.3	58.0	54.4	54.4	49.4	53.2	65.9	59.1	55.2	49.5	46.3	44.4	39.8	30.4
	Fan Only - High	71.5	82.5	75.0	63.4	67.3	66.8	62.6	62.8	59.8	60.2	70.0	66.0	62.3	54.6	53.7	52.3	47.7	40.5
	Cooling - Low	63.9	78.7	68.0	57.6	62.1	57.7	54.3	54.1	48.5	56.0	67.9	67.0	58.3	50.1	47.7	45.8	40.0	32.1
	Cooling - High	71.4	83.2	74.8	63.7	67.3	66.6	62.5	62.6	59.4	60.9	71.0	68.0	63.1	55.0	54.0	52.5	47.6	40.2
	Heating - Low	64.8	77.7	73.8	58.1	62.5	58.6	54.2	53.7	48.9	61.4	66.9	76.1	58.8	54.4	48.4	47.0	42.4	36.2
	Heating - High	71.6	82.1	75.2	63.5	67.7	66.9	62.3	62.2	59.5	62.4	70.5	74.6	62.0	55.6	53.8	52.4	47.9	41.0
42	Fan Only - Low	63.1	79.0	70.9	59.6	60.3	56.7	52.9	51.1	43.2	54.9	69.6	64.5	57.3	50.4	47.3	44.1	37.6	26.0
	Fan Only - High	71.2	87.9	78.7	68.4	67.1	65.6	61.2	60.2	55.0	62.2	75.9	69.6	65.8	56.8	54.8	52.2	46.8	38.2
	Cooling - Low	62.8	78.9	70.9	59.7	59.7	56.4	52.7	51.0	42.8	58.0	69.8	65.4	59.8	53.8	52.7	47.2	40.1	31.2
	Cooling - High	71.6	88.7	78.9	69.1	67.3	65.7	61.7	60.8	55.4	63.2	75.6	70.6	66.0	57.8	57.3	53.3	47.4	39.1
	Heating - Low	65.1	79.2	75.6	66.6	61.1	57.5	52.7	50.7	43.1	64.7	70.3	79.1	65.6	56.6	52.7	48.1	42.3	42.5
	Heating - High	71.6	87.8	79.5	68.8	67.6	66.2	61.1	60.1	55.0	64.4	76.7	74.7	68.2	58.2	55.6	52.6	47.2	40.7
48	Fan Only - Low	63.9	77.0	68.7	58.0	61.6	58.5	54.7	53.3	47.4	55.5	66.3	63.1	56.8	51.3	48.7	46.6	41.5	31.6
	Fan Only - High	72.4	82.1	74.7	65.4	67.3	69.4	62.9	61.9	57.7	62.3	73.0	65.8	63.1	56.8	57.2	54.4	50.1	42.4
	Cooling - Low	63.7	78.7	68.4	57.7	61.3	58.1	54.5	53.1	46.7	56.8	69.4	64.1	58.7	52.9	49.6	47.2	42.3	33.5
	Cooling - High	72.3	82.6	74.7	65.2	67.2	69.5	62.7	61.8	57.2	62.5	74.0	66.6	63.3	57.1	57.5	54.6	50.0	41.7
	Heating - Low	64.6	78.2	70.3	59.2	62.5	59.2	54.6	52.8	47.1	61.0	71.0	73.2	60.9	54.4	55.2	47.7	43.2	38.5
	Heating - High	72.7	83.1	75.2	66.2	68.0	69.7	63.0	61.9	57.7	62.8	73.5	71.2	63.5	57.1	57.0	54.2	49.9	42.6

## Model Series 44P • Standard Units • Suggested Specifications

### General

#### 1.1 Section includes

Horizontal and Vertical Packaged Water Source Heats

#### 1.2 Related sections

#### 1.3 References

- .1 ETL Listed under Underwriters Laboratories Standard for Safety UL1995 for heat pumps.
- .2 AHRI ISO Standard 13256-1.

#### 1.4 Delivery, storage and handling

- .1 Deliver products to site, store and protect from the weather and construction debris and be tagged with model number, configuration, and (OPTION) site location.

#### 1.5 Environmental requirements

- .1 Protect units from construction debris by covering all openings prior to start-up of the equipment. Units must not be used for heating, cooling, or ventilation prior to the start-up of equipment for permanent use. Use of the equipment for the temporary heating, cooling or ventilation is prohibited.

#### 1.6 Factory testing

- .1 All units shall be factory tested at normal operating conditions. Cabinets and fans shall be tested to verify proper fan and control operation. Refrigeration chassis shall be factory tested with cataloged water flow rates and sequenced to verify the proper operation of safety controls. Testing without utilizing cataloged water flow rates is unacceptable.

#### 1.7 Submittal documentation

- .1 Standard submittals shall include capacities, drawings, electrical data, installation, operation and maintenance manuals and other details.

### Products

#### 2.1 Type

- .1 Vertical and Horizontal (Water Source) (Ground Source) Heat Pump with, discharge arrangements, hose kits, and all accessories. Units shall be (water source 60°F to 95°F [15.6°C to 35°C]) (ground source 20°F to 120°F [6.7°C to 48.9°C]) entering fluid temperature for (water source) (ground source) heat pump applications.

#### 2.2 Capacity

- .1 Shall be as indicated on the drawings, which are based on Nailor units. Capacities shall be certified under AHRI.

#### 2.3 Cabinets

- .1 The unit cabinet shall be fabricated of 18 Gauge G60 galvanized steel, and service panels shall be fabricated of 22 Gauge G60 galvanized steel. All welded assemblies are treated to prevent corrosion.
- .2 The cabinet shall be insulated with 1/2-inch thick 2-pound density thermal and acoustical fiberglass insulation meeting material standard ASTM-C1071 and have an integral water repellent. The insulation shall have a fungi and bacteria resistant barrier with no growth conforming to ASTM-C1338, ASTM G21 and ASTM G22 and meet fire safety standards under NFPA90A and NFPA90B. (OPTION 1) 1/2-inch 1-1/2-pound density foil faced thermal and acoustical fiberglass insulation. (OPTION 2) 1/2-inch closed cell thermal and acoustical fiberglass insulation.
- .3 Cabinet return and discharge air openings shall be factory cut and flanged on all sides.
- .4 Hanging brackets shall be provided on all horizontal units and shall be integral to unit construction. Screw on style brackets are not acceptable.
- .5 (OPTION) A factory installed vibration isolation pad shall be installed on the bottom of vertical units.

#### 2.4 Refrigeration system

- .1 The refrigeration system consists of the compressor, air coil, water coil, reversing valve, expansion device, filter drier, and safety controls. System components shall be designed for easy field service accessibility.

- .2 The compressor shall be the sealed hermetic type approved and tested for reverse cycle operation. Internal thermal overload protection shall be provided. The compressor shall be internally dual isolated.

- .3 The air coils shall be copper tubes mechanically bonded to aluminum fins, multi-circuited to insure maximum coil distribution and effectiveness. The coil shall be rated to withstand 600 psig refrigerant working pressure. Face velocity shall not exceed 400 feet per minute to insure quiet operation and positive condensate drainage.

- .4 The water coils shall incorporate an electro-coated steel outer tube and a copper inner tube. The inner tube shall be spirally fluted and bonded to the outer tube to insure controlled refrigerant velocity and distribution. The coil shall be rated to withstand 650 psig refrigerant and 400 psig fluid working pressures. (OPTION) Provide Cupro-nickel COAX coil.

- .5 The reversing valve shall be 4-way electric type, pilot operated for quiet reversal.

- .6 (OPTION) Automatic flow control valve – An automatic flow control valve shall be provided with each unit and be factory preset for a fixed flow rate regardless of system pressure. Each automatic balancing valve shall be capable of operation over a pressure differential range of 2 to 80 PSID and be easily accessible for cleaning and maintenance.

- .7 (OPTION1) Standard Two-way, two-position (On/Off) control valve (30 psi differential pressure) – A two-way, two-position (On/Off) electric control valve may be factory or field mounted and wired unit.

- (OPTION2) High Pressure Two-way, two-position (On/Off) control valve (60 psi differential pressure) – A two-way, two-position (On/Off) electric control valve may be factory or field mounted and wired unit.

#### 2.5 Water connections

- .1 Entering water, leaving water, and condensate drain connections shall be FNPT.

- .2 (OPTION) Water connections shall be accomplished via an Insta-Lock™ quick connect accessory hose kit consisting of synthetic yarn-reinforced EPDM core hose surrounded by a 304 stainless-steel braid. Hose kit shall have brass fittings with stainless-steel locking balls and EPDM seals. Hose ends shall have colored bands to indicate supply or return water as well as colored indicator to verify locking status which connects to Insta-Lock™ fitting on entering water and leaving water connections. Threaded connections with or without sealing washers are not permitted. The hose kit shall be rated for maximum working pressure of 750 psi and minimum burst pressure rating of 2250 psi.

#### 2.6 Drain pan

- .1 The drain pan shall collect and drain condensate that may form from any component internal to the heat pump and shall be fabricated of welded and soldered 20 ga. 304 stainless steel. Vertical equipment is internally trapped, horizontal equipment require an external trap, the copper condensate drain shall be rolled and soldered into the pan.

#### 2.7 Fans

- .1 The fan shall be slow speed forward curved centrifugal type capable of two fan speeds, and shall be accessible for removal and maintenance through the service panels.

#### 2.8 MOTORS

- .1 (OPTION) Fan motors shall be of the permanently lubricated constant-torque ECM type, suitable for the current characteristics shown on the drawings, and shall have built-in overload protection.

- .2 Motors shall be plug-in, multi-speed type.

## Model Series 44P • Standard Units • Suggested Specifications (continued)

### 2.9 Supply grilles

- .1 The supply grilles shall be of the single deflection type fabricated of clear anodized aluminum. All supply openings shall be painted black with a damper assembly and sight baffle provided when one unit is serving two separate rooms.

(OPTION 1) The supply grilles shall be of the single deflection type fabricated of (factory white painted extruded aluminum) or (custom painted extruded aluminum) (SELECT ONE). All supply openings shall be painted black with a damper assembly and sight baffle provided when one unit is serving two separate rooms.

(OPTION 2) The supply grilles shall be of the double deflection type fabricated of (clear anodized extruded aluminum), (factory white painted extruded aluminum) or (custom painted extruded aluminum) (SELECT ONE). All supply openings shall be painted black with a damper assembly and sight baffle provided when one unit is serving two separate rooms.

### 2.10 Filters

- .1 (STANDARD) Filters shall be 1" (25) thick disposable fiberglass media, MERV 4.

(OPTION 1) Filters shall be 1" (25) thick disposable pleated media, MERV 8.

(OPTION 2) Filters shall be 1" (25) thick disposable pleated media, MERV 11.

(OPTION 3) Filters shall be 1" (25) thick disposable pleated media, MERV 13.

(OPTION 4) Filters shall be 2" (51) thick disposable pleated media, MERV 8.

(OPTION 5) Filters shall be 2" (51) thick disposable pleated media, MERV 11.

(OPTION 6) Filters shall be 2" (51) thick disposable pleated media, MERV 13.

### 2.11 Power supply

- .1 Single point field power connection is made to unit junction box through either of the 7/8" knockouts located on the side of the cabinet as shown on the drawings.

(OPTION 1) Each unit shall include a non-fused disconnect switch, factory mounted and wired.

(OPTION 2) Each unit shall include a supplemental over current protection switch, factory mounted and wired.

### 2.12 Controls

- .1 Unit shall include a solid-state control board as part of the unit control system incorporating these features:

a. Random start compressor protection. Anti-short cycle compressor minimum OFF time delay. Safety controls that protect the compressor from the following conditions:

- i. High pressure
- ii. Low pressure (Loss of Charge Protection)
- iii. Low airflow
- iv. Low liquid flow
- v. Low entering air temperature
- vi. Brown-out power conditions
- vii. Condensate Overflow Protection
- viii. Low liquid temperature protection with three different settings based on liquid properties.

b. Status LED indicating the device causing a fault condition.

c. Soft lockout feature that provides for an automatic reset prior to the initiation of a hard lockout.

d. Test mode capability with shortened time delays for servicing.

### 2.13 Thermostat

- .1 The heat pump manufacturer shall provide a 24-volt manual changeover wall thermostat with a HEAT-OFF-COOL system switch and AUTO-ON fan selector switch.

- .2 Thermostats shall be remote mounted and wired in the field. (OPTION: factory wired thermostat extension permitting thermostat installation by plugging into the control wiring with a polarized male-female plug after the walls are finished when unit mounted. High voltage, return air thermostats with remote bulbs subject to damage during routine service will not be accepted.

### 2.14 Spare parts

- .1 Intentionally Left Blank

### 3.1 Installation

- .1 Furnish as shown on the drawings and as specified herein, vertical and horizontal (water source) (ground source) heat pumps, and with capacity and electrical characteristics as scheduled. Units shall be 44P Series as manufactured by Nailor Industries.

- .2 Install in accordance with manufacturer's installation instructions and maintain manufacturer's recommended clearances for the unit and accessories.

- .3 Follow manufacturer's recommendations for cleaning and flushing.

## Model Series 44P • With Optional Hydronic Heat • Suggested Specifications

### General

#### 1.1 Section includes

Horizontal and Vertical Packaged Water Source with Hydronic Heats

#### 1.2 Related sections

#### 1.3 References

- .1 ETL Listed under Underwriters Laboratories Standard for Safety UL1995 for heat pumps.
- .2 AHRI ISO Standard 13256-1.

#### 1.4 Delivery, storage and handling

- .1 Deliver products to site, store and protect from the weather and construction debris and be tagged with model number, configuration, and (OPTION) site location.

#### 1.5 Environmental requirements

- .1 Protect units from construction debris by covering all openings prior to start-up of the equipment. Units must not be used for heating, cooling, or ventilation prior to the start-up of equipment for permanent use. Use of the equipment for the temporary heating, cooling or ventilation is prohibited.

#### 1.6 Factory testing

- .1 All units shall be factory tested at normal operating conditions. Cabinets and fans shall be tested to verify proper fan and control operation. Refrigeration chassis shall be factory tested with cataloged water flow rates and sequenced to verify the proper operation of safety controls. Testing without utilizing cataloged water flow rates is unacceptable.

#### 1.7 Submittal documentation

- .1 Standard submittals shall include capacities, drawings, electrical data, installation, operation and maintenance manuals and other details.

### Products

#### 2.1 Type

- .1 Vertical and Horizontal Water Source Heat Pump with, discharge arrangements, hose kits, and all accessories. Units shall be [water source 60°F to 95°F (15.6°C to 35°C)] (ground source 20°F to 120°F (6.7°C to 48.9°C)) entering fluid temperature for (water source) (ground source) heat pump applications.

#### 2.2 Capacity

- .1 Shall be as indicated on the drawings, which are based on Nailor units. Capacities shall be certified under AHRI.

#### 2.3 Cabinets

- .1 The unit cabinet shall be fabricated of 18 Gauge G60 galvanized steel, and service panels shall be fabricated of 22 Gauge G60 galvanized steel. All welded assemblies are treated to prevent corrosion.
- .2 The cabinet shall be insulated with 1/2-inch thick 2-pound density thermal and acoustical fiberglass insulation meeting material standard ASTM-C1071 and have an integral water repellent. The insulation shall have a fungi and bacteria resistant barrier with no growth conforming to ASTM-C1338, ASTM G21 and ASTM G22 and meet fire safety standards under NFPA90A and NFPA90B. (OPTION 1) 1/2-inch 1-1/2-pound density foil faced thermal and acoustical fiberglass insulation. (OPTION 2) 1/2-inch closed cell thermal and acoustical fiberglass insulation.
- .3 Cabinet return and discharge air openings shall be factory cut and flanged on all sides.
- .4 Hanging brackets shall be provided on all horizontal units and shall be integral to unit construction. Screw on style brackets are not acceptable.
- .5 (OPTION) A factory installed vibration isolation pad shall be installed on the bottom of vertical units.

#### 2.4 Refrigeration system

- .1 The refrigeration system consisting of the compressor, air coil, water coil, expansion device, receiver, filter-drier, hot water heating air coil and safety controls shall be slide-rail base mounted in the cabinet, and shall be designed for easy removal

after disconnecting the two hoses and a polarized electrical power plug.

- .2 The compressor shall be the sealed hermetic type. Internal thermal overload protection shall be provided. The compressor shall be internally dual isolated.
- .3 The air coils shall be copper tubes mechanically bonded to aluminum fins, multi-circuited to insure maximum coil distribution and effectiveness. The coil shall be rated to withstand 600 psig refrigerant working pressure. Face velocity shall not exceed 400 feet per minute to insure quiet operation and positive condensate drainage.
- .4 The water coils shall incorporate an electro-coated steel outer tube and a copper inner tube. The inner tube shall be spirally fluted and bonded to the outer tube to insure controlled refrigerant velocity and distribution. The coil shall be rated to withstand 650 psig refrigerant and 400 psig fluid working pressures. (OPTION) Provide Cupro-nickel COAX coil.
- .5 The hot water heating air coil shall be copper tubes mechanically bonded to the aluminum fins, multi-circuited to insure maximum coil distribution and effectiveness and a minimum of two rows deep. Face velocity shall not exceed 400 feet per second to insure quiet operation. The refrigeration circuit shall not operate on a call for heating.
- .6 (OPTION) Automatic flow control valve – An automatic flow control valve shall be provided with each unit and be factory preset for a fixed flow rate regardless of system pressure. Each automatic balancing valve shall be capable of operation over a pressure differential range of 2 to 80 PSID and be easily accessible for cleaning and maintenance.
- .7 Provide two, two-way, two-position (On/Off) electric control valves (30 psi differential pressure) for variable flow systems. The valves shall factory mounted and wired into the refrigeration chassis to prevent fluid flow to the unit when a call for cooling or heating is not present.
- .8 (OPTION1) A three-way, two-position (On/Off) electric control valve (30 psi differential pressure) shall be factory mounted and wired into the refrigeration chassis to divert fluid flow between the water to refrigerant coil and hot water heating air coil.
- .9 (OPTION2) High Pressure Two-way, two-position (On/Off) control valve (60 psi differential pressure).

#### 2.5 Water connections

- .1 Entering water, leaving water, and condensate drain connections shall be FNPT.
- .2 (OPTION 1) Water connections shall be accomplished via an Insta-Lock™ quick connect accessory hose kit consisting of synthetic yarn-reinforced EPDM core hose surrounded by a 304 stainless-steel braid. Hose kit shall have brass fittings with stainless-steel locking balls and EPDM seals. Hose ends shall have colored bands to indicate supply or return water as well as colored indicator to verify locking status which connects to Insta-Lock™ fitting on entering water and leaving water connections. Threaded connections with or without sealing washers are not permitted. The hose kit shall be rated for maximum working pressure of 750 psi and minimum burst pressure rating of 2250 psi.

#### 2.6 Drain pan

- .1 The drain pan shall collect and drain condensate that may form from any component internal to the heat pump and shall be fabricated of welded and soldered 20 ga. 304 stainless steel. Vertical equipment is internally trapped, horizontal equipment require an external trap, the copper condensate drain shall be rolled and soldered into the pan.

#### 2.7 Fans

- .1 The fan shall be slow speed forward curved centrifugal type capable of two fan speeds, and shall be accessible for removal and maintenance through the service panels.

## Model Series 44P • With Optional Hydronic Heat • Suggested Specifications

### 2.8 MOTORS

- .1 Fan motors shall be of the permanently lubricated constant-torque ECM type, suitable for the current characteristics shown on the drawings, and shall have built-in overload protection.
- .2 Motors shall be plug-in, multi-speed type.

### 2.9 Supply grilles

- .1 The supply grilles shall be of the single deflection type fabricated of clear anodized aluminum. All supply openings shall be painted black with a damper assembly and sight baffle provided when one unit is serving two separate rooms.  
(OPTION 1) The supply grilles shall be of the single deflection type fabricated of (factory white painted extruded aluminum) or (custom painted extruded aluminum) (SELECT ONE). All supply openings shall be painted black with a damper assembly and sight baffle provided when one unit is serving two separate rooms.  
(OPTION 2) The supply grilles shall be of the double deflection type fabricated of (clear anodized extruded aluminum), (factory white painted extruded aluminum) or (custom painted extruded aluminum) (SELECT ONE). All supply openings shall be painted black with a damper assembly and sight baffle provided when one unit is serving two separate rooms.

### 2.10 Filters

- .1 (STANDARD) Filters shall be 1" (25) thick disposable fiberglass media, MERV 4.  
(OPTION 1) Filters shall be 1" (25) thick disposable pleated media, MERV 8.  
(OPTION 2) Filters shall be 1" (25) thick disposable pleated media, MERV 11.  
(OPTION 3) Filters shall be 1" (25) thick disposable pleated media, MERV 13.  
(OPTION 4) Filters shall be 2" (51) thick disposable pleated media, MERV 8.  
(OPTION 5) Filters shall be 2" (51) thick disposable pleated media, MERV 11.  
(OPTION 6) Filters shall be 2" (51) thick disposable pleated media, MERV 13.

### 2.11 Power supply

- .1 Single point field power connection is made to unit junction box through either of the 7/8" knockouts located on the side of the cabinet as shown on the drawings.  
(OPTION 1) Each unit shall include a non-fused disconnect switch, factory mounted and wired.  
(OPTION 2) Each unit shall include a supplemental over current protection switch, factory mounted and wired.

### 2.12 Controls

- .1 Unit shall include a solid-state control board as part of the unit control system incorporating these features:
  - a. Random start compressor protection. Anti-short cycle compressor minimum OFF time delay. Safety controls that protect the compressor from the following conditions:
    - i. High pressure
    - ii. Low pressure (Loss of Charge Protection)
    - iii. Low airflow
    - iv. Low liquid flow
    - v. Low entering air temperature
    - vi. Brown-out power conditions
    - vii. Condensate Overflow Protection
    - viii. Low liquid temperature protection with three different settings based on liquid properties.
  - b. Status LED indicating the device causing a fault condition.
  - c. Soft lockout feature that provides for an automatic reset prior to the initiation of a hard lockout.
  - d. Test mode capability with shortened time delays for servicing.

### 2.13 Thermostat

- .1 The heat pump manufacturer shall provide a 24-volt manual changeover wall thermostat with a HEAT-OFF-COOL system switch and AUTO-ON fan selector switch.
- .2 Thermostats shall be remote mounted and wired in the field. (OPTION: factory wired thermostat extension permitting thermostat installation by plugging into the control wiring with a polarized male-female plug after the walls are finished when unit mounted. High voltage, return air thermostats with remote bulbs subject to damage during routine service will not be accepted.

### 2.14 Spare parts

- .1 Intentionally Left Blank

### 3.1 Installation

- .1 Furnish as shown on the drawings and as specified herein, vertical and horizontal (water source) (ground source) heat pumps, and with capacity and electrical characteristics as scheduled. Units shall be Series 44P as manufactured by Nailor Industries.
- .2 Install in accordance with manufacturer's installation instructions and maintain manufacturer's recommended clearances for the unit and accessories.
- .3 Follow manufacturer's recommendations for cleaning and flushing.

## Model Series 44CO

### Standard Features

#### CONSTRUCTION:

- G90 galvanized heavy casing.
- Two cabinet configurations are available in either a left hand return or right hand return air arrangement to provide the optimum return air location and service access.

#### FAN ASSEMBLIES:

- Easily removable slide out fan/motor deck for service.
- A large panel provides service access to the blower and motor.
- All blower/motor assemblies have a removable orifice ring on the housing to accommodate motor and blower removal without disconnecting the unit from the ductwork.

#### SOUND REDUCTION PACKAGE

- The unit has a unique dual-level vibration isolation system.
- A heavy-gauge mounting plate is isolated from the cabinet via a dense neoprene pad to minimize vibration transfer.
- The compressor is then isolated from the mounting plate with our standard rubber in shear isolators to enhance the dual-level vibration isolation.
- The compressor is located in a well-insulated compartment separated from the air stream to minimize sound transmission.

#### FIELD CONVERTIBLE FAN OUTLET

- Access panels are interchangeable to allow field conversion of the blower to provide maximum flexibility during installation.

#### BOTTOM SERVICE ACCESS

- Horizontal units include bottom service access where the fan housing, fan motor, expansion valve, reversing valve and filters are easily accessed from the bottom of the unit to allow routine in-place maintenance.

#### LED SIGHT GLASS

- The LED status sight glass allows an instant visual of unit operation for quick troubleshooting and advanced diagnosis without removing the access panel.

#### SERVICE PORT CONNECTIONS

- Two service valves are located inside the compressor access panel, one on the low side and one on the high side of the refrigeration circuit.
- Easily accessible for routine service.

#### WATER CONNECTIONS

- The water and condensate connections are FPT fittings, securely mounted flush to the corner post to allow for connection to a flexible hose without the use of a back-up wrench for easy installation.

#### SOLID STATE CONTROL BOARD

- Freeze protection - Factory set switch for water and water / glycol solution systems initiates a fault when temperatures exceed the selected limit for 30 continuous seconds.
- Condensate overflow - The controller is designed to sense when condensate water levels in the drain pan become excessively high. When high condensate water levels are detected during cooling or dehumidification mode, the controller will go into condensate overflow warning mode.

FLAT TOP

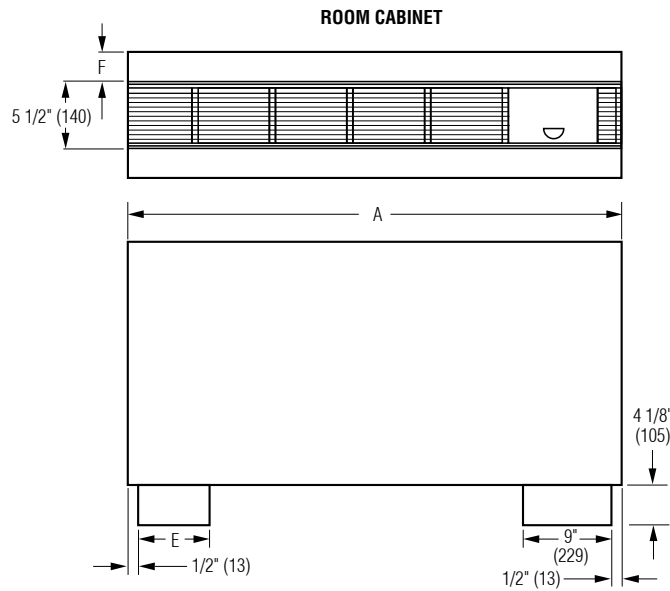
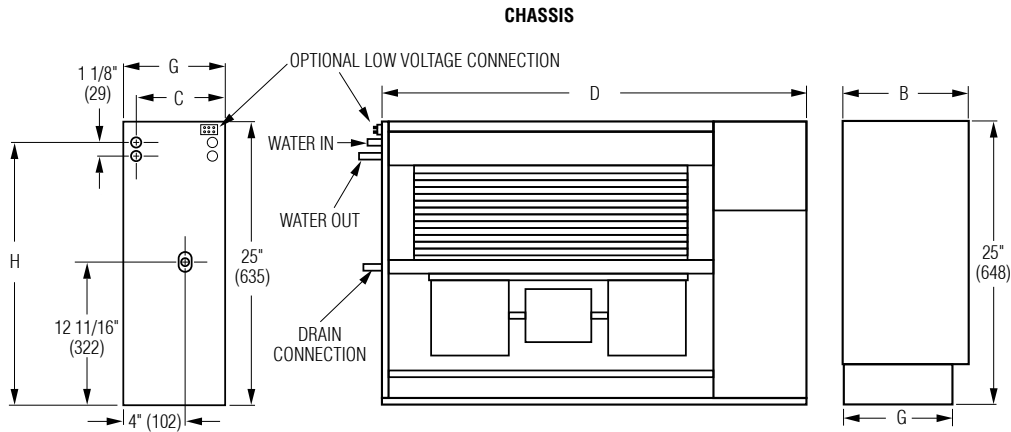


SLOPED TOP





## Model Series 44CO • Console • Flat Top • Unit Sizes 8 - 18



Intertek

### Dimensional Data

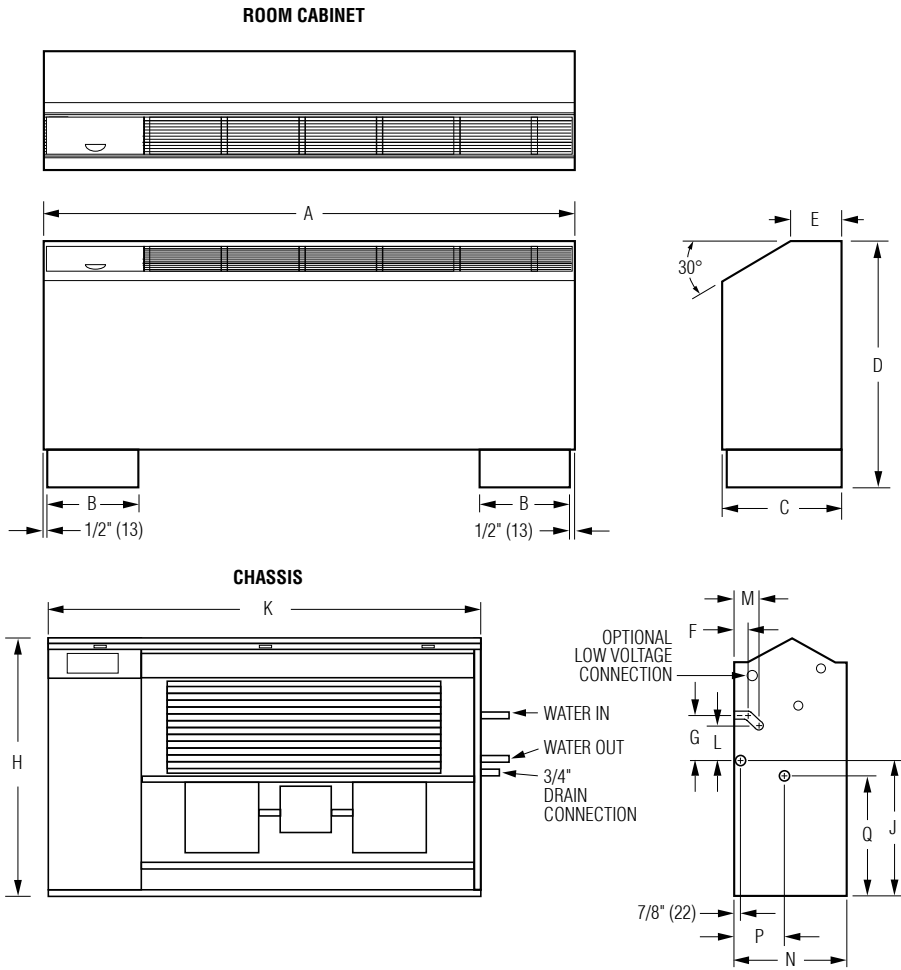
Unit Size	A	B	C	D	E	F	G	H	WATER IN-OUT	DRAIN	Chassis Weight (lbs.)
8	44 9/16 (1132)	10 3/4 (273)	8 7/8 (225)	37 (940)	6 (152)	2 5/8 (967)	10 (254)	23 5/16 (592)	5/8" (15.88) O.D.	3/4" (19.05) O.D.	120
10, 12											176
15, 18	54 9/16 (1381)	12 9/16 (319)	10 7/8 (276)	42 (1067)	10 (254)	3 (76)	12 1/8 (308)	24 (610)			151

B  
WATER SOURCE HEAT PUMPS • CONSOLE

## Model Series 44CO • Console • Sloped Top • Unit Sizes 8 - 18

B

WATER SOURCE HEAT PUMPS • CONSOLE



### Dimensional Data

Unit Size	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	WATER IN - OUT
8	48 (1219)	6 3/8 (162)	10 3/4 (273)	25 1/2 (648)	4 1/2 (114)	1 5/8 (41)	4 1/8 (105)	25 1/4 (641)	15 1/8 (384)	37 3/4 (959)	-	-	10 1/4 (260)	4 1/4 (108)	12 1/2 (318)	1/2" O.D.
10	48 (1219)	6 3/8 (162)	10 3/4 (273)	25 1/2 (648)	4 1/2 (114)	1 5/8 (41)	4 1/8 (105)	25 1/4 (641)	15 1/8 (384)	37 3/4 (959)	-	-	10 1/4 (260)	4 1/4 (108)	12 1/2 (318)	1/2" O.D.
12	48 (1219)	6 3/8 (162)	10 3/4 (273)	25 1/2 (648)	4 1/2 (114)	1 5/8 (41)	4 1/8 (105)	25 1/4 (641)	12 1/2 (318)	37 3/4 (959)	-	-	10 1/4 (260)	4 1/4 (108)	12 1/2 (318)	1/2" O.D.
15	52 (1321)	9 1/4 (235)	12 1/2 (318)	25 1/2 (648)	5 1/2 (140)	1 3/4 (44)	4 1/4 (108)	25 1/2 (648)	13 3/8 (340)	42 3/4 (1086)	3 1/4 (83)	2 7/8 (73)	12 1/4 (311)	5 1/4 (133)	11 7/8 (302)	1/2" O.D.
18	52 (1321)	9 1/4 (235)	12 1/2 (318)	25 1/2 (648)	5 1/2 (140)	1 3/4 (44)	4 1/4 (108)	25 1/2 (648)	13 3/8 (340)	42 3/4 (1086)	3 1/4 (83)	2 7/8 (73)	12 1/4 (311)	5 1/4 (133)	11 7/8 (302)	5/8" O.D.

## Model Series 44CO • Console • Unit Sizes 8 - 18

### Performance Ratings

Unit Size	Cooling Total Btuh	Cooling Sensible Btuh	Cooling EER	Heating Total Btuh	Heating COP	Air Flow CFM Hi/Lo	Water Flow GPM
8	7,800	6,000	14	9,200	4.4	300/250	2.0
10	10,600	8,000	13.6	12,100	4.6	395/330	2.5
12	11,500	9,400	12.4	14,000	4.3	400/350	3.0
15	14,700	10,700	13.8	16,100	4.3	475/400	3.8
18	17,800	13,700	13.1	21,000	4.4	540/420	4.5

### Electric Heat Ratings\* (Boilerless)

Unit Size	Volt	Watts	BTU/h	HTR Amps	Total Amps	Min CKT Amps	Max. Fuse
8	208	1,000	3,400	4.8	5.4	7	15
	230	1,220	4,160	5.3	5.9	7	15
	277	1,000	3,400	3.6	4.2	5	15
12	208	2,000	6,820	9.6	10.2	13	15
	230	2,450	8,350	10.7	11.3	14	15
	277	2,000	6,820	7.3	7.9	10	15

\*Optional

### Electric Ratings\*\*

Unit Size	Comp	Voltage/Hz/Ph	Fan Amps	Fan HP	Compressor		Total Amps.	CKT Ampacity	Max. Fuse
					RLA	LRA			
8	Rotary	115/60/1	1.2	1/10	6.1	39.1	7.3	9	15
		208-230/60/1	0.4	1/10	3.0	15.0	3.4	5	15
		265/60/1	0.4	1/10	2.7	11.0	3.1	4	15
10		115/60/1	1.2	1/10	7.8	50.0	9.0	11	15
		208-230/60/1	0.4	1/10	4.4	22.0	4.8	6	15
		265/60/1	0.4	1/10	3.4	21.0	3.7	5	15
12		115/60/1	1.2	1/10	9.5	50.0	10.7	14	20
		208-230/60/1	0.4	1/10	4.7	25.0	5.1	7	15
		265/60/1	0.4	1/10	4.2	22.0	4.6	6	15
15		208-230/60/1	0.6	1/10	5.6	29.0	6.2	8	15
	265/60/1	0.6	1/10	5.0	28.0	5.6	7	15	
18	208-230/60/1	0.6	1/10	7.4	33.0	8.0	10	15	
	265/60/1	0.6	1/10	6.0	28.0	6.6	9	15	

IMPORTANT: Chassis must replace a unit of like capacity to ensure proper power supply.

\*\* If optional electric heat is selected see Electric Heat Ratings Table: Total Amps, Ampacity & Fuse is the larger Value.

NOTES:

**B**

**WATER SOURCE HEAR PUMP UNITS**

# CONTROLS & PIPING PACKAGES



## Ecobee3 lite Smart Thermostat Pro

### Reliably Powered

No common wire? No problem. Your ecobee comes with a Power Extender Kit so it doesn't rely on other equipment to charge itself.

### Easy Installation

Installation takes 30 minutes or less in most cases. We also offer easy access to HVAC tech support, wiring diagrams, and manuals if you ever need assistance.



### Control From Anywhere, Anytime

Customers can easily control temperature and settings from anywhere with an Apple Watch, Android, or iOS device.

### Average 23% Savings\*

When customers bring home the ecobee3 lite, they save an average of 23% annually on heating and cooling costs. \*Learn more at [ecobee.com/savings](http://ecobee.com/savings)

### Updates You As Needed

ecobee3 lite monitors heating and cooling systems, and alerts customers if it senses something is wrong.

## TECH SPECS:

### Compatibility

Conventional (2H/2C)—Gas, Oil, Electric.

Boiler (2-stage-heating).

Air-Cooled & Geo-Thermal Heat pumps (2 stage heat pump + 2 stage aux heat/2 cool) (4H/2C).

Dual-Fuel support.

### Wire Terminals

RC, G, Y1, Y2, O/B, RH, C, W1, W2 and PEK

### Powering Method

Wired 24VAC through terminals C Or Rc. Power extender kit enables you to reliably power your thermostat without having to run a C wire.

### Power Consumption

Less than 3.5VA

### Connectivity And Security

Wi-Fi, IEEE 802.11 b/g/n @ 2.4 GHz

Wi-Fi Protected Access (WPA/WPA2)

Wired Equivalent Privacy (WEP)

DHCP (dynamic) or static IP addressing transport layer security (TLS)

### Bandwith

15-20 MB/Month

### Sustainability

Mercury free, Arsenic free, PVC free and ROHS Compliant

### Thermostat Sensors

Temperature, Proximity and Humidity

### Temperature Range

Temperature: 45° To 92°F (7° To 33°C)

Display: 40° To 100°F (5° To 37°C)

Sensitivity: +/- 1°F (+/- 0.5°C)

Operating: 32° To 130°F (0° To 55°C)

### Humidity Range

Display: 20% To 90% RH

Sensitivity: +/- 5% RH

Operating: 5% To 95% RH (non condensing)

### Storage

-31° To 113°F (-35° To 45°C)

5% To 95% RH (non condensing)

### Warranty

5-Year Warranty (PRO install only)

### Languages

English

### Display

3.5" full-color LCD touch screen

320 x 480 pixel display

### Product Dimensions

Thermostat Length: 102.88 mm

Width: 102.88 mm

Depth: 21.4 mm

### Trim Plate

Length: 170 mm

Width: 170 mm

Depth: 6.25 mm

### Power Extender Kit

Length: 62.1 mm

Width: 60.1 mm

Depth: 21.4 mm

### Works With

Apple HomeKit

Amazon Alexa

SmartThings

IFTTT

Control4

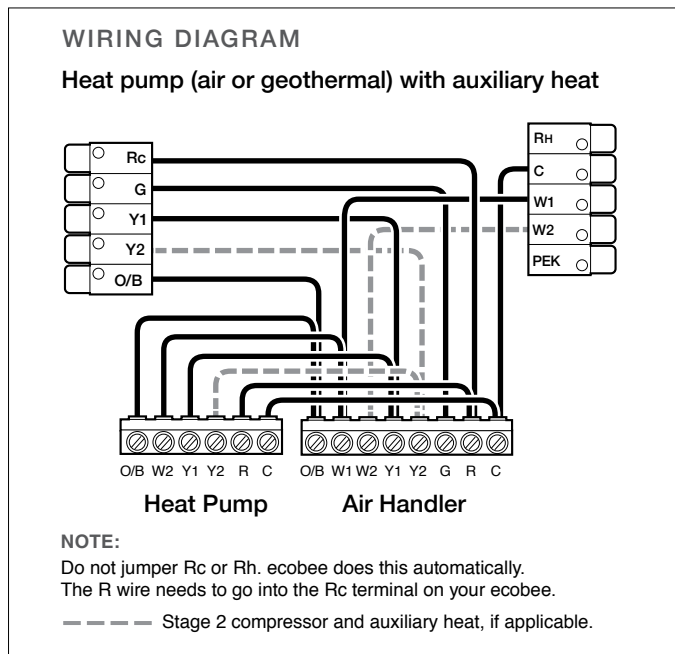
Clare Controls

### Homekit-Enabled

Homekit requires an iPhone, iPad, or iPod touch with iOS 9 or later. Controlling homekit-enabled accessories away from home requires an apple tv with tvOS 9.0 Or later and an iphone, ipad, or ipod touch with iOS 9 or later.

Note: Apple®, iPhone®, iPad®, and iPod touch® are trademarks of Apple Inc., registered in the U.S. and other countries. HomeKit™ is a trademark of Apple Inc. Use of the HomeKit logo means that an electronic accessory has been designed to connect specifically to iPod, iPhone, or iPad, respectively, and has been certified by the developer to meet Apple performance standards. Apple is not responsible for the operation of this device or its compliance with safety and regulatory standards. Please note that the use of this accessory with iPod, iPhone, or iPad may affect wireless performance.

Please go to [www.ecobee.com](http://www.ecobee.com) for up-to-date information.



## Viconics

### VT7652W Water Source Heat Pump Controller

The VT7652W water source heat pump Controller (with dedicated dehumidification sequences) provides exceptional control of water source heat pumps for commercial buildings. Common indoor air quality issues such as mold, mildew, condensation, poor occupant comfort, and overall building health

can be effectively resolved in an energy-efficient manner. Simple to install and commission, this wall-mounted device monitors water temperature, as well as other points, offering added value without the additional costs related to more complex systems.

#### Features

- Built-in dehumidification strategies
- Open protocol allows for easy integration into any network systems
- Controllers are Network Ready and can be field retrofit with optional communication modules
- One simple wall-mounted device to install, wire and commission
- Familiar “thermostat like” look and feel
- Application-specific controllers
- No special software required for configuration
- Fully embedded local configuration utility
- Factory-installed PIR sensor or PIR-ready controller
- Advanced occupancy and monitoring functions
- Available with or without 7-day scheduling

Model	Heat/Cool	Comm.
VT7652W5031	3H/2C	Stand-alone (network ready)
VT7652W5031B	3H/2C	BACnet



## Room Controlers • VT8650 Series

### BACnet MS/TP and BACnet MS/TP with Zigbee Models Available

Smart energy management has never been easier than with the VT8650 Series Room Temperature and Indoor Air Quality (IAQ) Controller.

Designed for new construction and retrofit projects, the temperature and IAC controllers dramatically decrease project delivery costs by reducing installation, configuration and commissioning time. No complex software or tools are required to customize functionality in order to meet your applications requirements. The Room Controllers provide all the advanced features and monitoring functions required by modern building automation systems in a simple compact enclosure.

The VT8650 Room Controllers, part of the VT8000 family, are both application-specific and programmable. This enables the modification of pre-configured control sequences, or the creation of entirely new control sequences for HVAC, lighting and other applications. The VT8650 Room Controllers provide exceptional control of staged heating and cooling equipment such as packaged roof-top units in addition to modulating heating and cooling. Their configurable control sequences, economizer and scheduler functionalities deliver all the flexibility necessary for optimal indoor air quality applications.

Note: Outside air damper can be controlled based on CO<sub>2</sub> or airflow demand.



#### Applications

- Single-speed fans
- Outdoor air temperature sensor
- Supply air temperature sensor
- Differential pressure switch

#### Commercial and hospitality

Suitable for both commercial and hospitality markets and systems

#### Digital touch screen

Customizable color digital touch screen interface with multi-language support

#### 7-day occupancy scheduling

2 to 4 events

#### Wi-Fi option

BACnet/IP and email notification via Wi-Fi (with VCM8002V5031)

#### Highly configurable

LUA custom programming available  
320 x 480 pixel display

#### Product Dimensions

Thermostat Length: 102.88 mm  
Width: 102.88 mm  
Depth: 21.4 mm

#### Trim Plate

Length: 170 mm  
Width: 170 mm  
Depth: 6.25 mm

#### Power Extender Kit

Length: 62.1 mm  
Width: 60.1 mm  
Depth: 21.4 mm

## Viconics

### Room Controllers • VT8650 Series (Con't)

#### Product Specifications

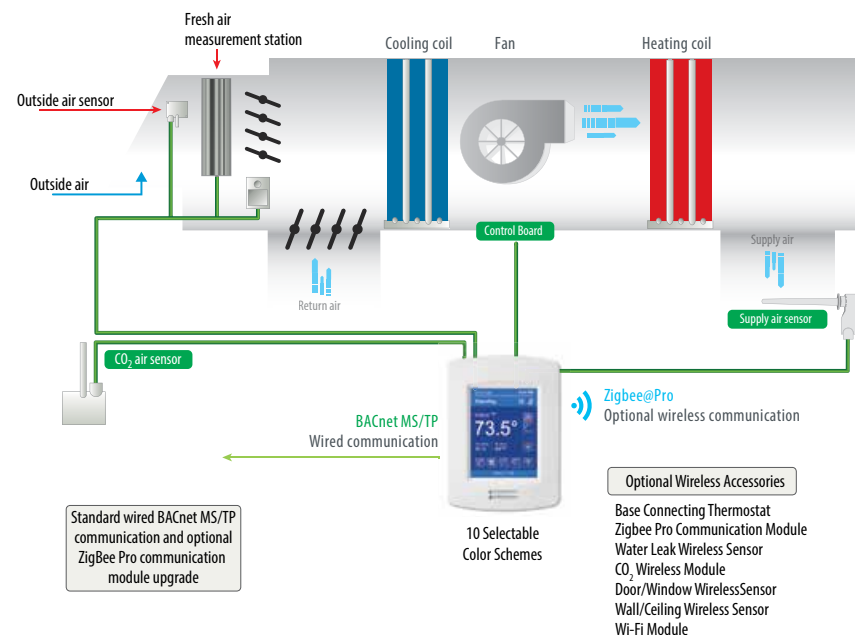
<b>Thermostat Power Requirements</b>	24 Vac ±15%, 50/60 Hz, 6 VA
<b>Operating Conditions</b>	0 to 50 °C (32 to 122 °F); 0 to 95% RH non-condensing
<b>Storage Conditions</b>	-30 to 50 °C (-22 to 122 °F); 0 to 95% RH non-condensing
<b>Temperature Sensor</b>	Local 10k NTC type 2 thermistor
<b>Temp. Sensor Resolution</b>	± 0.1 °C (± 0.2 °F)
<b>Temp. Control Accuracy</b>	±0.5 °C (±0.9 °F) @ 21 °C (70 °F) typical calibrated
<b>Humidity Sensor and Calibration</b>	Single point calibrated bulk polymer sensor
<b>Humidity Sensor Precision</b>	Reading range from 10 to 90% RH non-condensing 10 to 20% precision is 10%; 20 to 80% precision is 5%; 80 to 90% precision is 10%
<b>Humidity Sensor Stability</b>	<1.0% annual drift (typical)
<b>Dehumidification Setpoint Range</b>	30 to 95% RH
<b>Occupied and Unoccupied Setpoint Range Cooling</b>	12 to 38 °C (54 to 100 °F)

<b>Occupied and Unoccupied Setpoint Range Heating</b>	5 to 32 °C (40 to 90 °F)
<b>Room and Outdoor Air Temperature Display</b>	-40 to 50 °C (-40 to 122 °F)
<b>Proportional Band for Room Temperature Range Control</b>	Cooling & Heating: 1.8 °C (3.2 °F)
<b>Binary Inputs</b>	Dry contact across terminal BI1, BI2 and UI3 to Scom
<b>Economizer Analog Output Rating</b>	0 to 10 Vdc into 2k Ω resistance min.
<b>Economizer Analog Output Accuracy</b>	±3% typical
<b>Wire Gauge</b>	18 gauge maximum, 22 gauge recommended
<b>WARRANTY: Limited Warranty</b>	18 months
<b>Agency Approval</b>	<ul style="list-style-type: none"> <li>UL: 61010-1 (2nd edition); CSA: 61010-1 (3rd edition); IEC: 61010-1 (3rd edition), EN 60950-1: 2006A2: 2013, UL 873, CSA 22.2 No. 24-93; 61326-1:2005; FCC: Part 15, Subpart B</li> </ul>

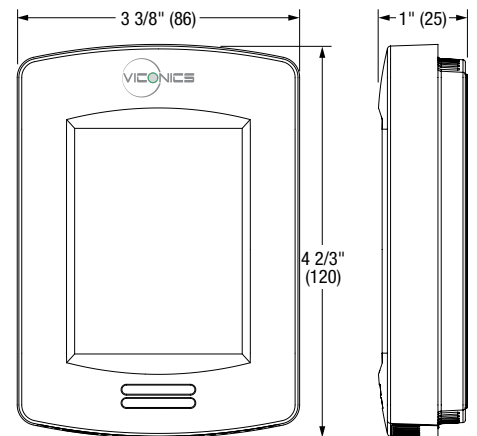
Please go to [viconics.com](http://viconics.com) for up-to-date information.

#### Typical Indoor Air Quality Application

##### Wiring Examples



#### Unit Dimensions



#### Ordering Information

Part Number	Description
<b>VT8650U5000B</b>	Fancoil Control, Low Voltage, RH, BACnet MS/TP
<b>VT8650U5500B</b>	Fancoil Control, Low Voltage, RH, PIR, BACnet MS/TP
<b>VT8650U5500BP</b>	RH, PIR Room Controller, BACnet MS/TP and Zigbee



## White-Rodgers

### 70 Series® Heat Pump Thermostats

With a 70 Series Heat Pump thermostat, your customers can economically upgrade to digital accuracy and energy savings. It is easy to install and is compatible with most heat pump systems. The 70 Series is perfect for customers who want an economical and easy digital upgrade for their heat pump system. Plus, White-Rodgers 70 Series versatility means less inventory for you.

5/2 Day Programmable or Non-Programmable  
Hardwired

**1F72-151 Heat Pump • 5/2 Day Programmable**

**1F79-151 Heat Pump • Non Programmable**

#### Programming

- Choice of 5/2 day programming (weekday/weekend) or non-programmable
- 4 time and 4 temperature settings per program for heating and cooling (1F72-151)
- Energy savings up to 33% (1F72-151)
- Patented pre-programmed software simplifies time and temperature programming (1F72-151)

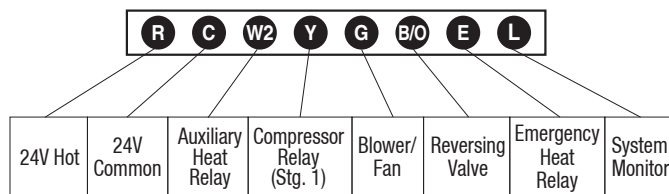
#### Display

- Large LCD with improved contrast for easier reading
- Lighted display for low-light viewing
- Comfort & Convenience
- Electronic temperature accuracy Adjustable room temperature calibration
- Indefinite setpoint Hold (1F72-151)
- Temporary temperature override until next program period (1F72-151)
- Soft-touch keypad
- Maintains room temperature differential within +/- 1°
- Display temperature recalibration (+/- 3°)

#### Performance

- For 2-stage heat, 1-stage cool systems B or O terminal
- Selectable Energy Management Recovery (1F72-151)
- Powerful next-generation microprocessor
- Meets California Building Code, Title 24 (1F72-151)
- System power with optional battery back-up
- Fast (FA) or slow (SL) heating cycle anticipation B or O terminal (selectable)
- Compressor lockout protection (optional)

#### Terminal Designations



Non-Programmable

**Dimensions:** 5.1" W x 3.7" H x 1.1" D

#### Electrical Specifications

<b>Rating</b>	20 to 30 VAC, 50/60 Hz or DC 0.05 to 1.0 Amp (load per terminal) 1.5 Amps maximum load (all terminals combined)
<b>Standard Systems</b>	Heat Pump—2 stage heat, 1 stage cool Single stage heat pump

#### Thermal Specifications

<b>Setpoint Temperature Range</b>	45° to 90°F (7° to 32°C)
<b>Rated Differential</b>	0.6° to 1.6°F with adjustable anticipation
<b>Operating Ambient Temperature</b>	32° to 105°F (0° to 40°C)
<b>Operating Humidity Range</b>	90% non-condensing maximum
<b>Shipping Temperature Range</b>	-4° to 150°F (-20° to 65°C)

#### Accessories

<b>Wall Plate</b>	F61-2510 (6.5" x 4.5")
<b>Thermostat Guard</b>	F29-0231 (For additional guard options refer to White-Rodgers catalog)

Please go to [white-rodgers.com](http://white-rodgers.com) for up-to-date information.

Stages Heat/Cool by System	Programs	Model	Applications	Selectable Performance Features		Comfort & Convenience Features				
Heat Pump	Program Options	Model Number	Thermostat Power Source*	Energy Management Recovery	Energy Star	Display Size (sq. in.)	Alkaline Battery Life (Years)	Lighted Display	Memory Back-up P-Permanent B-Battery	Warranty (Years)
2/1	5+2	1F72-151	H	√	√	1.2	1	√	B	1
2/1	∅	1F79-111	H	N/A	N/A	1.2	1	√	B	1

\* H = Hardwire (Requires Common)

## Honeywell Home • T6 Pro Smart Thermostat

### The new standard for simple connectivity

The Honeywell Home T Series is a portfolio of non-connected and WiFi connected thermostats designed with contractors in mind. With simple functionality that's easy to use, and smart features that are easy to love, the T6 Pro Smart enables you to deliver in-demand connectivity without the complexity.

#### Simple Installation

All T Series thermostats, including the T6 Pro Smart, use the same UWP mounting system, helping your installers get in and out and on their way more quickly and efficiently.

#### Simple Setup

Your installers can choose to do setup and scheduling at the wall like a traditional thermostat, or they can use the Resideo Pro app.

#### Simple and Smart Service App

Download the Resideo Pro App to enjoy faster installs with more ways to connect with customers. Empower your team through an improved installation, registration, and service process to help them close jobs quickly and confidently.

#### Simple Ventilation Control

The T6 Pro Smart is available with optional ventilation control for residential new construction projects that need to meet the ASHRAE 62.2 standard.

#### Application

**Model TH6320U2008:** Up to 3H/2C Heat Pump systems or up to 2H/2C Conventional systems. Dual fuel and aux heat lockout with outdoor sensor.

**Model TH6220U2000:** Up to 2H/1C Heat Pump systems or up to 2H/2C Conventional systems. Dual fuel and aux heat lockout with outdoor sensor.

**Model TH6210U2001:** Up to 2H/1C Heat Pump systems or up to 1H/1C Conventional systems. No outdoor temperature lockouts.

#### Technical Specifications

Terminal	Voltage (50/60Hz)	Running Current
W Heating	20-30 Vac	0.02-1.0 A
W2 (Aux) Heating	20-30 Vac	0.02-1.0 A
E Emergency Heat	20-30 Vac	0.02-0.5 A
Y Compressor Stage 1	20-30 Vac	0.02-1.0 A
Y2 Compressor Stage 2	20-30 Vac	0.02-1.0 A
G Fan	20-30 Vac	0.02-0.5 A
O/B Changeover	20-30 Vac	0.02-0.5 A
L/A Input	20-30 Vac	0.02-0.5 A

**Power Consumption:** Backlight On: 1.0 VA

**Cool Indication:** Displays "Cool On" when the thermostat turns the cooling on.

**Heat Indication:** Displays "Heat On" when the thermostat turns the heating on.



UWP mounting system



Resideo Pro App

**Clock Accuracy:** +/- 1 minute every month (30 days) at 77°F. +/-2 minutes per month over the operating ambient temperature range.

**Mounting Means:** Thermostat packaged with a UWPTM mounting system that mounts directly on the wall in the living space using mounting screws and anchors provided. Use the optional cover plate (also included with thermostat) to cover marks from previous thermostat

#### Temperature Ranges:

Heating: 40 °F to 90 °F (4.5 °C to 32 °C)  
Cooling: 50 °F to 99 °F (10 °C to 37 °C)

#### Operating Ambient Temperature:

37 °F to 102 °F (2.8 °C to 38.9 °C)

**Shipping Temperature:** -20 °F to 120 °F (-28.9 °C to 48.9 °C)

**Operating Relative Humidity:** 5% to 90% (non-condensing)

**Physical Dimensions:** 4-1/16" H x 4-1/16" W x 1-5/32" D (103.5 mm H x 103.5 mm W x 29 mm D)

**Color:** White

Product	Part Number	Temperature Setpoint Range	Working Ambient Temperature	Operating Relative Humidity	Shipping Temperature	Physical Dimensions Inches (mm)	Color(s)
Thermostat	TH6210U2001 TH6220U2000 TH6320U2008	Heating: 40 °F to 90 °F (4.5 °C to 32 °C) Cooling: 50 °F to 99 °F (10 °C to 37 °C)	32 °F to 120 °F (0 °C to 48.9 °C)	5% to 90% (non-condensing)	-20 °F to 120 °F (-28.9 °C to 48.9 °C)	4-1/16" H x 4-1/16" W x 1-5/32" D (103.5 H x 103.5 W x 29 D)	White

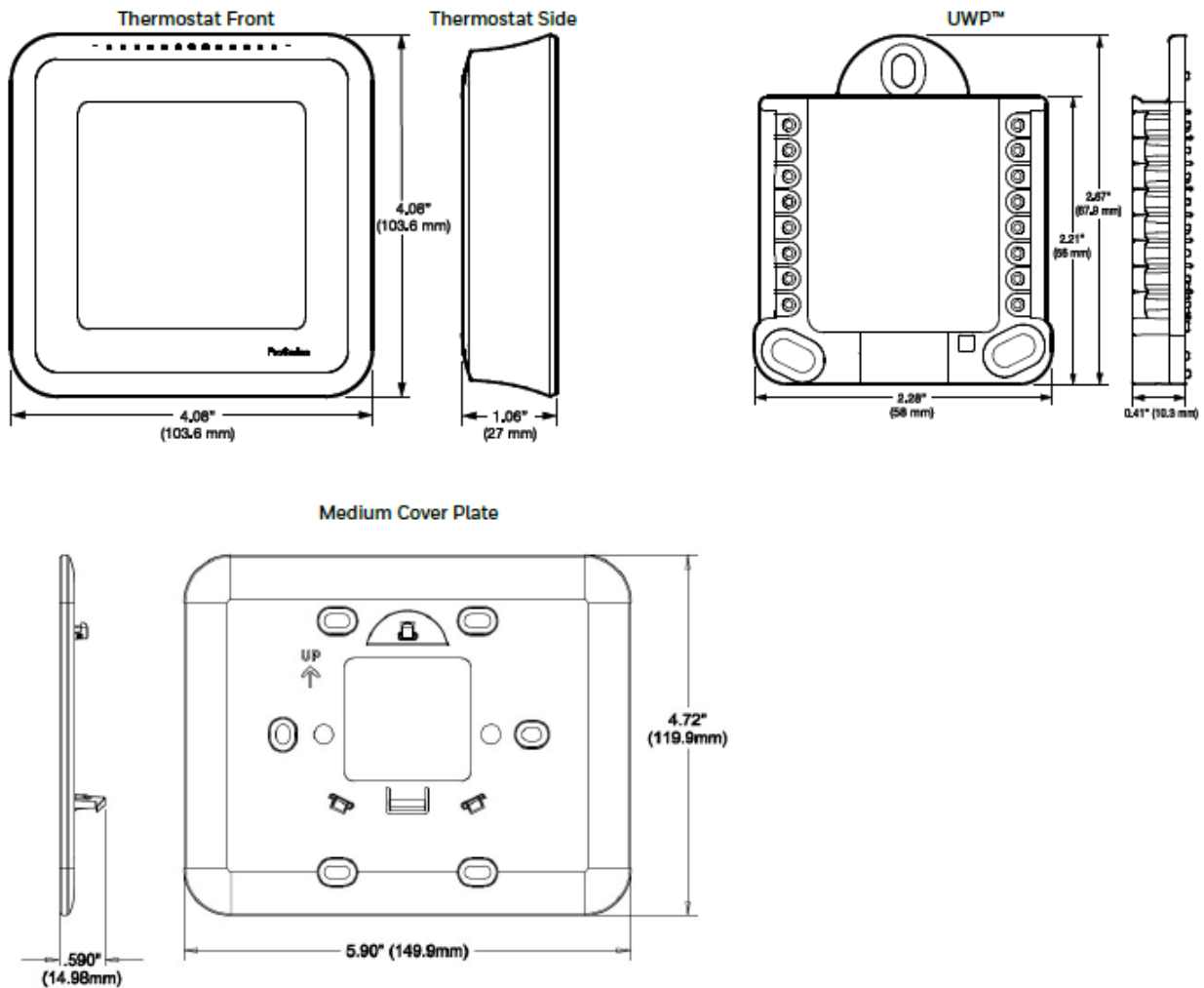
## Honeywell Home • T6 Pro Smart Thermostat

(Con't)

### Specifications

Product	Part Number	Physical Dimensions Inches (mm)
UWP Wall plate	Included with thermostat.	2.67" H X 2.28" W X 0.41" D (67.9 H X 58 W X 10.3 D)
Medium cover plate	Included with thermostat.	4.72" H x 5.9" W (119.89 H x 149.89 W)
Large cover plate	Optional accessory. Not included with thermostat.	6.11" H X 6.11" W X 0.28" D (155.3 H X 155.3 W X 7 D)
Wired outdoor sensor C7089U1006	Not included with thermostat. Used for dual fuel or aux heat lockout only. Outdoor temp. not displayed on thermostat. Not compatible with TH6210U model.	-
Wired indoor sensor C7189U1005	Not included with thermostat. Not compatible with TH6210U model.	-

### Dimensions (not to scale)



Please go to [resideo.com](http://resideo.com) for up-to-date information.

## I/O ZONE 560 • Programmable Controller



The I/O Zone 560 controller delivers powerful control and communication features all in a compact, economical package. Highly flexible, yet easy-to-use programming tools allow customization for a wide variety of small equipment applications. Fully capable of operating in a 100% stand-alone control mode, the I/O Zone 560 can connect to a Building Automation System (BAS) using any of today's most popular protocols, such as BACnet®, Modbus® RTU, N2, and LonWorks®. The I/O Zone 560 also supports communication to OEMCtrl's line of intelligent space sensors and keypad/display units.

### Key Features and Benefits

#### Communications

- Rnet Sensor Network/Local Access Port
- Configurable 485/232 Communication Port
- This port allows integration with a Building Automation System (BAS). A dip switch is used to choose the active protocol between BACnet, Modbus RTU, N2, and \*LonWorks. (\*Note: LonWorks requires additional plug-in card for full support.)

#### I/O Control

- I/O point count: 11 Total > 5 Binary Outputs (relayed), 6 Universal Inputs
- Digital Outputs rated at 1 Amp resistive / 24 VAC
- Inputs configurable for Thermistor or Dry Contact, inputs 1 & 2 also configurable for 0-5 VDC
- LED indication of digital outputs for operational validation


#### Programmability / Serviceability

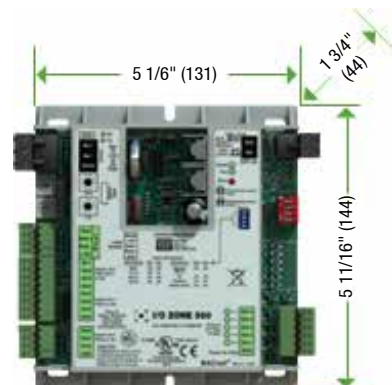
- Custom-programmable using our powerful EIKON® graphic programming tool. The EIKON tool allows you to create graphic control sequences for your application, which can be fully simulated off-line (with the EIKON simulation tool).
- Support for "Live Logic", the ultimate diagnostic tool allows for real-time troubleshooting of the control logic while the equipment is running.
- Built-in support through an Rnet port for OEMCtrl's custom-configurable keypad display units including the Equipment Touch 4.3" touchscreen, ZS intelligent communicating sensors, and for local laptop access.

#### Performance

- Powerful, high-speed 16-bit microprocessor with 4MB Flash memory and 1MB of battery-backed RAM. Memory upgrades can be downloaded locally via the Rnet port or remotely via the network - no chip replacements necessary.
- On-board battery-backed real-time clock is standard, thus enabling full stand-alone scheduling capabilities, as well as historical trend data storage, and alarm event time-stamping.

### Specifications

<b>Power</b>	24 Vac ± 10%, 50-60 Hz, 15 VA (0.63 A) power consumption (26 VA with BACview attached), 26 Vdc (25 V min, 30 V max), Single Class 2 source only, 100 VA or less
<b>Physical</b>	Rugged GE C2950 Cyclopol plastic housing Weight: 0.6 lb. (0.27 kg)
<b>Operating Range</b>	0°F to 130°F (-17.8° to 54.4°C); 10 to 90% relative humidity, non-condensing
<b>Binary Outputs</b>	5 binary outputs, relay contacts rated at 1 A resistive @ 24 Vac; configured as dry contact, normally open
<b>Universal Inputs</b>	6 configurable universal inputs; inputs 1-6 configurable as thermistor or dry contact; inputs 1 and 2 also configurable as 0-5 Vdc type inputs. Resolution of 10 bit A/D
<b>Communication Ports: BACnet Modbus N2</b>	Port 1: Jumper configurable for ARCNET or EIA-485 communication. In ARCNET mode, the port speaks BACnet (at 156k bps). In EIA-485 mode, the communication protocol and baud rate desired are DIP switch selectable between BACnet MS/TP, Modbus RTU, or N2  Rnet port: Communicate with ZS sensors and local displays (BACviews and Equipment Touch). Also provides connection for local access from laptop
<b>Optional Card Port: LonWorks</b>	LonWorks Option Card for connection to Free Topology LON networks (TP/FT-10 Channel)
<b>Status Indication</b>	Visual (LED) status of power, running, and errors. LED indicators for transmit/receive for Port 1 and for all binary outputs
<b>Battery</b>	Lithium 3V coin cell battery, CR2032, provides a minimum of 10,000 hours of data retention during power outages
<b>Protection</b>	Surge and transient protection circuitry for power, communications, inputs and outputs. Module protected by internal solid state Polyswitches on incoming power and network connections. Polyswitches do not need to be replaced as they will reset themselves once the condition that caused them to "trip" returns to normal.
<b>Listed by</b>	 UL916 (Canadian Std C22.2 No. 205-M1983), FCC Part 15-Subpart B-Class A, CE EN50082-1997 BTL (BACnet Test Labs) - BACnet Advanced Application Controller (B-AAC)



## ZS Sensor • Communicating Sensors

The OEMCTRL line of intelligent zone sensors provides the function and flexibility you need to manage the conditions important to the comfort and productivity of the zone occupants. The ZS sensors are available in a variety of zone sensing combinations to address your application needs. These combinations include temperature,

relative humidity, and indoor air quality (carbon dioxide or VOCs (Volatile Organic Compounds)). They are built to be flexible allowing for easy customization of what the user/technician sees. Designed to work with all OEMCtrl controllers the ZS sensor line includes the ZS Standard, ZS Plus, ZS Pro and ZS Pro-F.



Features	ZS Standard	ZS Plus	ZS Pro	ZS Pro-F
Temp, CO <sub>2</sub> , Humidity, and VOC Options	✓	✓	✓	✓
Neutral color	✓	✓	✓	✓
Addressable / supports daisy-chaining	✓	✓	✓	✓
Hidden communication port	✓	✓	✓	✓
Mounts on a standard 2" by 4" electrical box	✓	✓	✓	✓
Occupancy status indicator		✓	✓	✓
Push-button occupancy override		✓	✓	✓
Setpoint adjust		✓	✓	✓
Large, easy- to-read LCD			✓	✓
Alarm indicator			✓	✓
Motion Sensing			✓	
Fan speed control				✓
Cooling / Heating / Fan Only - Mode Control				✓
°F to °C conversion button				✓

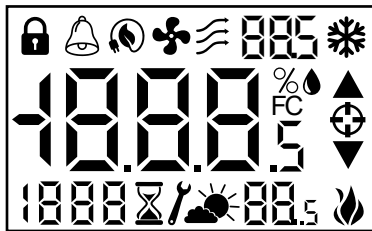
Options/Part Numbers	ZS Standard	ZS Plus	ZS Pro	ZS Pro (motion)	ZS Pro-F
Temperature Only	ZS2-BNK	ZS2PL-BNK	ZS2P-BNK	ZS2P-M-BNK	ZS2PF-BNK
Temp with CO <sub>2</sub>	ZS2-C-BNK	ZS2PL-C-BNK	ZS2P-C-BNK	ZS2P-CM-BNK	ZS2PF-C-BNK
Temp with Humidity	ZS2-H-BNK	ZS2PL-H-BNK	ZS2P-H-BNK	ZS2P-HM-BNK	ZS2PF-H-BNK
Temp with VOC	ZS2-V-BNK	ZS2PL-V-BNK	N/A	N/A	N/A
Temp, Humidity, CO <sub>2</sub>	ZS2-HC-BNK	ZS2PL-HC-BNK	ZS2P-HC-BNK	ZS2P-HCM-BNK	ZS2PF-HC-BNK
Temp, Humidity, VOC	ZS2-HV-BNK	ZS2PL-HV-BNK	N/A	N/A	N/A

## ZS Sensor • Communicating Sensors (con't)

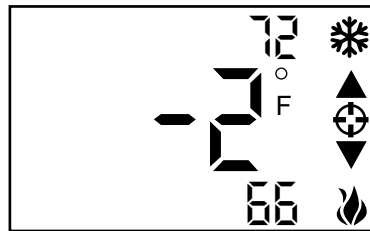
### Specifications

Sensing Element	Range	Accuracy
Temperature (on non-Humidity models)	-4° to 122° F (-20° C to 50° C) K	±0.35° F (0.2° C)
Temperature (on Humidity models)	50° F to 104° F (10° C to 40° C)	±0.5° F (0.3° C)
Humidity	10% to 90%	±1.8% typical
CO <sub>2</sub>	400 to 1250 PPM 1250 to 2000 PPM	±30 PPM or ±33% of reading (greater of two) ±5% of reading plus 30 PPM
VOC	0 to 2000 PPM	±100 PPM
<b>Power Requirements</b>	<b>Sensor Type</b>	<b>Power Required</b>
Temperature Only	All Models	12 Vdc @ 8 mA
Temperature with Humidity		
Temp with VOC, or Temp/VOC/Humidity	All Models	12 Vdc @ 60 mA
Temp with VOC, or Temp/CO <sub>2</sub> /Humidity	All Models	12 Vdc @ 15 mA (idle) up to 190 mA (during CO <sub>2</sub> measurement cycle)
Power Supply	A controller supplies the Rnet sensor network with 12 Vdc @ 210 mA. Additional power may be required for your application. See sensor ZS Installation Guide	
Communication	115 kbps Rnet connection between sensor(s) and controller 15 sensors max per Rnet network; 5 sensors max per control program	
Local Access Port	For connecting a laptop computer to the local equipment for maintenance and commissioning	
Environmental Operating Range	32° to 122° F (0° - 50° C), 10% to 90% relative humidity, non-condensing	
Mounting	Standard 4"x 2" electrical box using provided 6/32" x 1/2" mounting screws	
Motion Sensing	Sensor Type: PIR, Distance: 5 m; Detection range (H x V) 100° x 82° Movement speed: 0.8 to 1.2 m/s; Detection object: 700 x 250 mm	

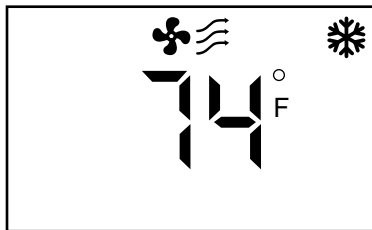
ZS Pro Display - All Segments



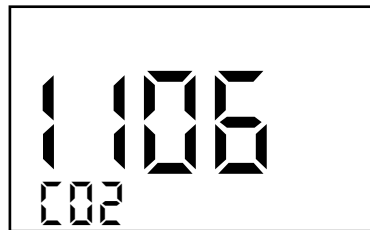
Setpoint Adjust



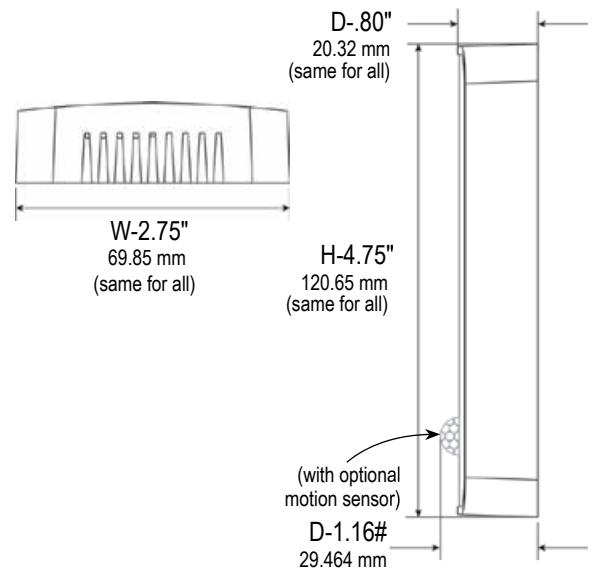
Home Screen



Info Screen - CO<sub>2</sub>



Dimensions



Please go to [oemctrl.com](http://oemctrl.com) for up-to-date information.

## General Notes:

- All 44 Series Water Source Heat Pumps include two flexible stainless steel braided hoses and full port ball isolation valves per coil. This hose/valve combination provides a "union" type connection to allow coil removal. Hi-Rise Units require a Nailor supplied piping package which is factory assembled, installed and wired.
- All standard piping packages and components described in this catalog are for condenser water applications. They may be also used with up to 50% ethylene and propylene glycol solutions.
- Control valve actuators are removable and may be serviced or replaced without removal of the valve body. All control valves are piped on the return side of the coil (3-way control valves are mixing).
- 2-position (spring return) condenser water valve / actuators are piped normally closed to the coil as standard. For hot water coils, control valves are available normally open, contact factory if this is desired.
- All ball isolation valves on the return line are furnished with an adjustable memory stop feature and may be used as a balancing valve.
- If it is required that P/T ports be located to monitor the pressure and temperature directly across the coil only, select PTO (other location) option.
- 1/2" (13) valve: 0.5 to 4.0 GPM in 0.5 GPM increments. 5 to 8 GPM in 1 GPM increments.
- 3/4" (19) valve: 3.0 to 4.0 GPM in 0.5 GPM increments. 5 to 12 GPM in 1 GPM increments.
- The valve package piping and component details in the catalog are for standard valves and components. Performance ratings such as CV, max. close-off pressure, operating temperature and pressure are shown in component specifications. Suitability for use must be based on individual application requirements determined by others. Nailor assumes no responsibility for selection and/or application of valve package and components.

## Coil and Valve Package Pressure Drop:

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

C <sub>v</sub> FACTORS FOR 39 SERIES VALVE PACKAGE COMPONENTS					
Port Diameter	Ball Valve	2-way valve	3-way Valve	Flow Control (Fixed or Auto)	Strainer
1/2"	21	2.5	2.5	2.12	9.13

### NOTES:

C<sub>v</sub> factors are based on Engineered Comfort standard valve package components.

- Flow control C<sub>v</sub> at full open position.

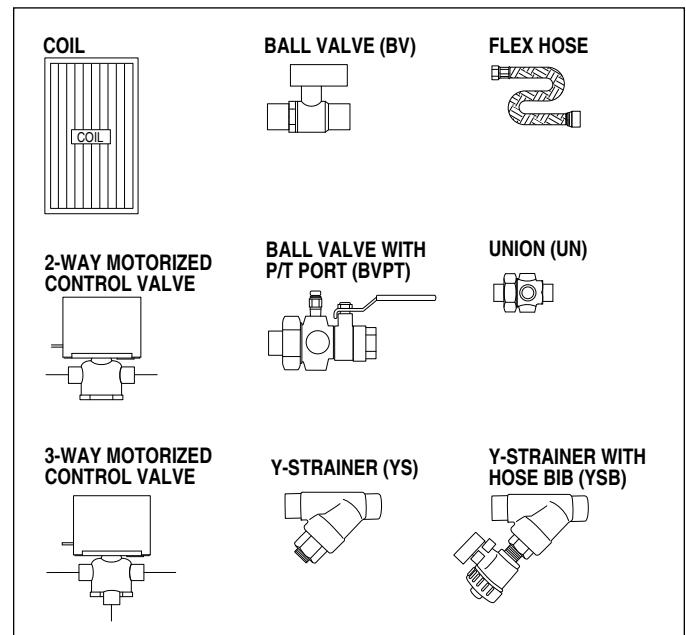
### Example:

Find the pressure drop in feet of head (ft - H<sub>2</sub>O) for a size 10 unit at 7.5 GPM with the following:

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

- $(\text{GPM} \div \text{Cv } 1/2" \text{ ball valve})^2 \times 2 + (\text{GPM} \div \text{Cv Strainer})^2 + (\text{GPM} \div \text{Cv } 2\text{-way valve})^2 = \text{PD (PSI)}$
- $(0.13 \times 2) + 0.67 + 9.00 = 9.80 \text{ PSI}$
- $9.80 \text{ PSI} \times 2.31 \text{ ft./PSI} = 22.64 \text{ ft-H}_2\text{O}$
- $22.64 \text{ ft-H}_2\text{O} + 11.7 \text{ ft-H}_2\text{O (from coil data)} = 34.34 \text{ ft-H}_2\text{O}$

**Answer is 34.34 ft - H<sub>2</sub>O**



## Condenser Water Valve Packages • Water Source Heat Pumps

All MODEL SERIES	CODE CONDENSER WATER		COMPONENTS
2-way 2-position Valve Packages	C202	2W2P, BV	2-way 2-position + Ball Valves (2)
	C203	2W2P, BVPT	2-way 2-position + Ball Valves (2) with Pressure/Temperature Ports
	C212	2W2P, BV, FCC	2-way 2-position + Ball Valves (2) + Fixed Cartridge Flow Control
	C213	2W2P, BVPT, FCC	2-way 2-position + Ball Valves (2) with Pressure/Temperature Ports + Fixed Cartridge Flow Control
3-way 2-position Valve Packages	C302	3W2P, BV	3-way 2-position + Ball Valves (2)
	C303	3W2P, BVPT	3-way 2-position + Ball Valves (2) with Pressure/Temperature Ports
	C312	3W2P, BV, FCC	3-way 2-position + Ball Valves (2) + Fixed Cartridge Flow Control
	C313	3W2P, BVPT, FCC	3-way 2-position + Ball Valves (2) with Pressure/Temperature Ports + Fixed Cartridge Flow Control
	OPTIONS CODE CONDENSER WATER		COMPONENTS
Options	OC01	YS	Y Strainer
	OC02	YSB	Y Strainer with Hose Bib Valve
	OC03	PTO	Pressure/Temperature Ports (2, other location)
	OC04	YS, PTO	Y Strainer, Pressure/Temperature Ports (2, other location)
	OC05	YSB, PTO	Y Strainer with Hose Bib Valve, Pressure/Temperature Ports (2, other location)

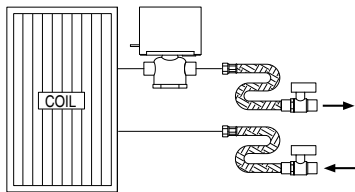
**Note:**

All water source heat pumps include two flexible hoses.

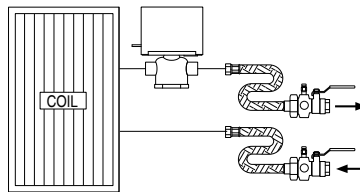
## Model Series: 44 Series • Water Source Heat Pumps

### 2-way Valves Examples:

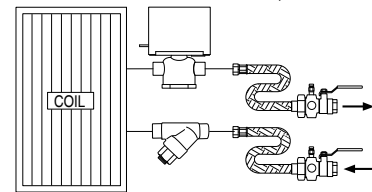
CODE: 202/402  
BALL VALVES



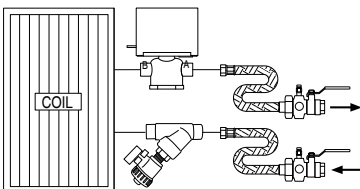
CODE: 203/403  
BALL VALVES WITH P/T PORTS



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

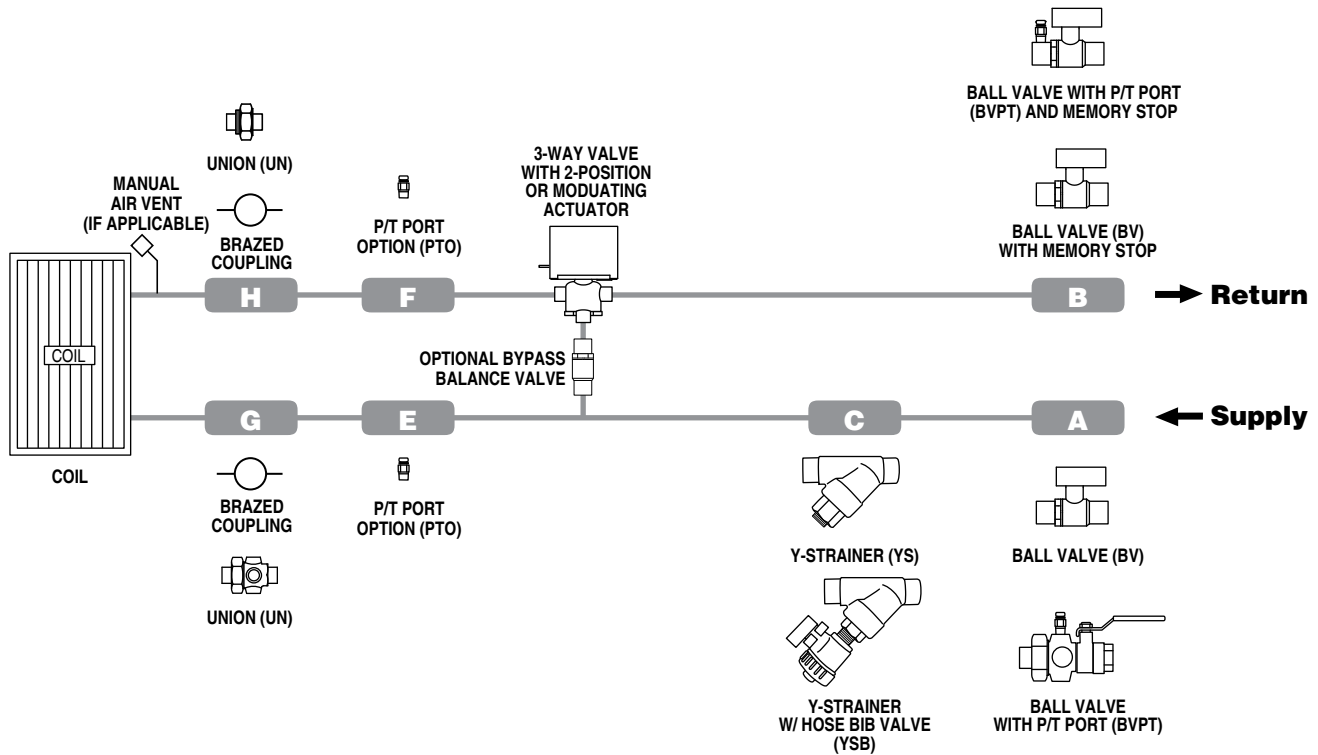


CODE: 203/403-02  
BALL VALVES WITH P/T PORTS,  
Y-STRAINER W/HOSE BIB





## Valve Packages • Water Source Heat Pumps



### Valve Packages Component Notes:

**Component Sizing:** 1/2" nominal ( for 5/8" O.D. copper tubing) or 3/4" nominal (for 7/8" O.D. copper tubing)

**Manual Air Vent:** Standard component - Brazed into high point of hydronic cooling and/or heating coil circuit.

**Coil Connections (G & H):** When isolation valve only is added to supply or return line, the isolation valve will be factory brazed to the coil stub-out. Addition of any other component or connection to the supply or return line will change the respective coil connection(s) to one of the following:

- 1) Standard: Swag fitting for brazed coupling.
- 2) Option: Union(s) added by factory for field connection.

**Service Fitting (E & F):** Optional P/T Ports (PTO) in supply and return lines.

**Water Flow Balancing (B):** Only one device per total valve package to be used for balancing water flow through the coil. When isolation valve (ball valve with memory stop or ball valve with P/T ports and memory stop at position B) is used for water flow balancing, do not specify additional balancing device at position C.

**Y-strainer (C):** Does not include blow down fitting and should not be used in lieu of main pipping strainers.

**Isolation valve (A):** Normally requires one each on supply and return line.

**Ball valve:** Shut-off/balance, No memory stop.

**Ball valve with P/T ports:** Shut-off/balance.

C

CONTROLS & PIPING PACKAGES

## Components and Specifications

Engineered Comfort Water Source Heat Pumps are supplied as standard with a factory supplied and installed valve package for the main cooling coil and optional heating coil. This assures all components are compatible with the application and install with the physical restrictions of the cabinet for ease of maintenance and service.

Engineered Comfort Water Source Heat Pumps have standard valve packages available as a factory installed or "ship loose" option for field connection.

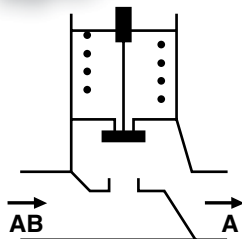
Valve packages consist of a variety of components and selection is dependent upon the application. The following section provides a detailed description of each of the components. Photos are for general representation purposes only. Vendors and models are subject to change without notice.

### 2-way, 2-position Control Valve / Actuator

All valves are piped on the return side of the coil. Figure 1 shows the valves in the open position or full flow position. The valve spring provides the necessary force to hold the stem in the raised or Normally Open (NO) position.

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

Actuator are available for line and 24 Vac low voltage applications.  
 Nominal size: 1/2" or 3/4"  
 Body material: Brass  
 Pressure rating: 125 psi max.  
 Temperature rating: 230°F max.  
 Max. close off pressure: 44 psi  
 Cv: 2.5 (1/2"), 4.1 (3/4")  
 Actuator power consumption: 10 VA max.

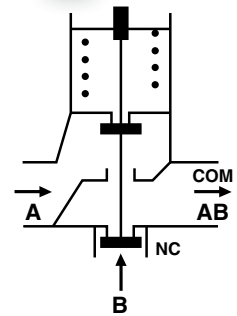


**Figure 1. 2-way Valve**  
(Normally open to coil flow)

### 3-way, 2-position Control Valve / Actuator

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

Actuator are available for line and 24 Vac low voltage applications.  
 Nominal size: 1/2" or 3/4"  
 Body material: Brass  
 Pressure rating: 125 psi max.  
 Temperature rating: 230°F max.  
 Max. close off pressure: 44 psi  
 Cv: 2.5 (1/2"), 4.1 (3/4")  
 Actuator power consumption: 10 VA max.



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

### Manual Ball Valve with Memory Stop (BV)

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

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



## Components and Specifications (continued)

### Manual Ball Valve with P/T Ports (BVPT)

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

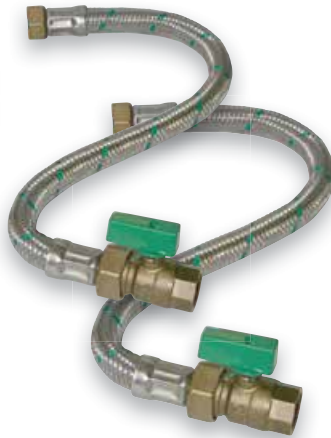


Nominal size: 1/2" or 3/4"  
 Shaft seals: Viton O-Rings  
 Body material: Forged brass  
 Pressure rating: 600 psig max.  
 Temp. rating: 325°F max.  
 Ball: Chrome plated brass Pressure rating: 600 psi  
 Ball seal: Teflon Cv: 21 (1/2"), 42 (3/4")

### Flexible Hose Kits (FH)

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

Core: Fabric reinforced EPDM  
 Braid: Stainless Steel  
 Fitting: Brass OT58  
 Ferrule: Stainless Steel  
 Gasket Seal: Fiber / EDPM  
 Cv: 3.5 (1/2"), 12.8 (3/4")  
 Pressure rating: 400 psig max.



### Fixed Cartridge Flow Control (FCC)

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

Nominal size: 1/2" or 3/4"  
 Body material: Forged brass  
 Flow Range: 0.5 – 8.0 GPM options Pressure differential range: 2 – 80 psig  
 Pressure rating: 600 psig max.  
 Temperature rating: 225°F max.  
 Cv: Variable with inlet pressure



### Y Strainer (YS)

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



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

### Unions (UN)

An optional fitting used to provide a mechanical connection between the coil and valve package on water source heat pumps.

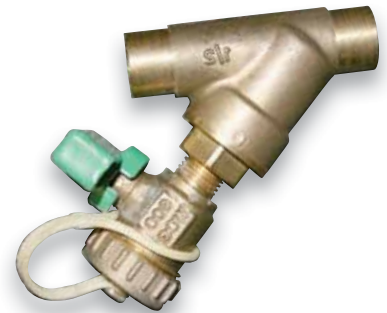


Can be connected and disconnected without the need to cut piping or unsolder a joint.  
 Pressure rating: 600 psig max.  
 Temperature rating: 325°F max.

### Y Strainer with Hose Bib Valve (YSB)

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

Pressure rating: 600 psig max.  
 Temperature rating: 325°F max.



### Pressure / Temperature Ports (PTO)

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

Nominal size: 1/4"  
 Connection: 1/4" MNPT  
 Body material: Brass  
 Pressure rating: 600 psig max.  
 Temperature rating: 325°F max.





#### Air Distribution Products:

- Flowline
- Grilles and Registers
- Ceiling Diffusers
- Linear Diffusers
- Plenum Slot Diffusers
- Fire Rated Assemblies
- Hospital/Cleanroom Diffusers



#### Terminal Units:

- Single Duct
- Dual Duct
- Fan Powered
- Bypass
- Retrofit



#### Electric Duct Heaters:

- Slip-in/Insert Mount
- Flanged Mount
- Round Duct Connection



#### Air Control Products:

- Louvers
- Control & Backdraft Dampers
- Curtain Fire Dampers
- Multi-Blade Fire Dampers
- Smoke Dampers
- Combination Fire/Smoke Dampers
- Ceiling Dampers
- Access Doors



#### Green Building Products:

- Underfloor Air Distribution Systems
- Displacement Ventilation



#### Fan Coil Units:

- Vertical Hi-Rise & Closet
- Horizontal Fan Coil Units
- Vertical Sill Fan Coil Units

WWSHP

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