FORM 145.05-EG1 (1004)

VERSECON™

Indoor Vertical Self-Contained Air Conditioner
YSWU 10–105 Ton Water-Cooled

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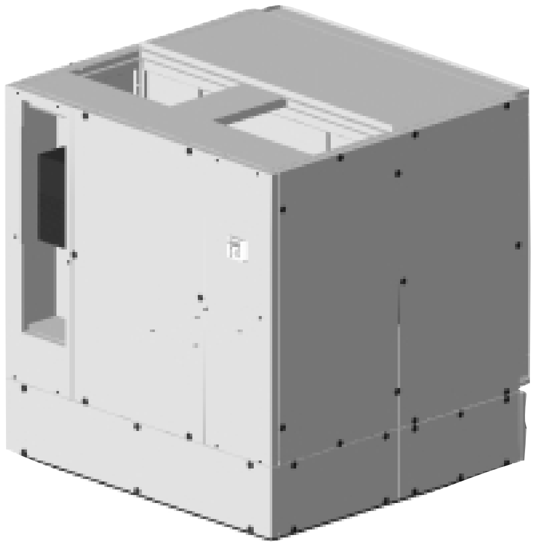
Features and Benefits



Versecon offers a simple system design, increases system redundancy by providing individual air conditioning systems per floor, lowers maintenance costs, and eases operation and maintenance.

COOLING SECTION

Scroll Compressors

YORK Versecon offers established scroll compressor technology for dependable, efficient, and durable performance. With less moving parts, and continuous refrigerant flow, scroll compressors are quiet in operation.

Multiple compressors with independent circuits

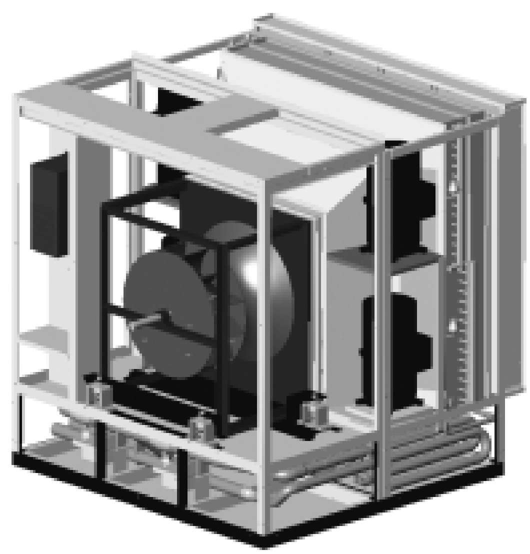
A minimum of 2 scroll compressors are used on all units up to nominal 32 tons. By using 2 compressors of unequal size, minimum 3 capacity steps are achieved. Larger units have 4 scroll compressors with a minimum 4 capacity steps. When unequal size compressors are used, capacity steps go up to 6. Each compressor has independent refrigerant circuit and individual fusing. Each refrigerant circuit is provided with discharge and suction pressure transducers for monitoring and easy diagnostics.

Cleanable tube in tube condensers

The condenser has counter flow arrangement between water and refrigerant for high heat transfer efficiency. Low operating charge ensures lower system charge and better compressor reliability. It is constructed out of nonferrous materials – copper and brass. Its straight tube bundles are mechanically cleanable and are rated for 400 psig on both refrigerant and waterside.

Components out of air stream and accessible

Refrigerant system components like compressors, condensers, expansion valves, filter-driers, and sight glass are easily accessible, out of the air stream, and may be worked on while unit is operating.



Low temperature water operation

Compressors are enabled to operate with 55º F entering condenser water temperature, when there is no waterside economizer, and at 50º F with waterside economizer. At these water temperatures, the compressor energy consumption is typically less than 0.5 kW per ton. Compressor operation at lower condenser water temperatures is available with condenser water flow control.

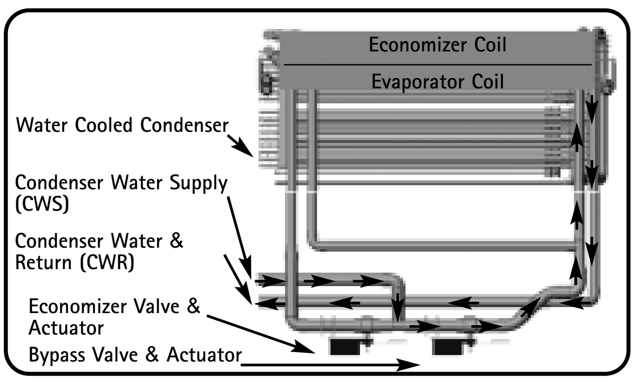
Evaporator coil

This coil, 4 row or 6 row, is row split, with each refrigerant circuit covering entire coil face in 2-compressor units. In 4 compressor units, the coil is row split and has intertwined circuiting to activate entire coil face when any compressor is started.

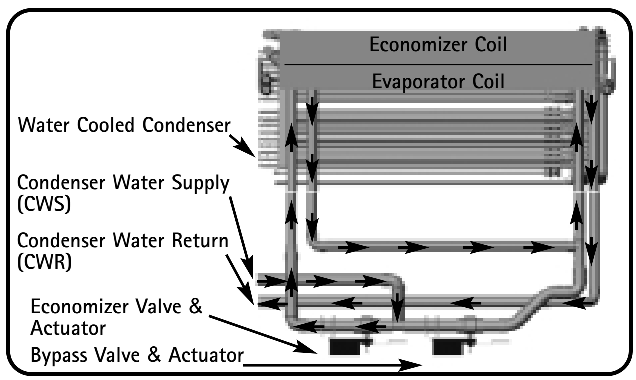
Waterside economizer – Optional

4 row waterside economizer coil is offered as chemically cleanable or mechanically cleanable. In either case, the coil is rated for 400 psig waterside pressure. Waterside economizer option also includes complete water piping, sensors, and 2 two-way motorized valves for control of the economizer cycle. When condenser water is colder than the mixed air entering the unit, waterside economizer is activated, allowing the condenser water through the waterside economizer coil. If additional cooling is required to meet the load, condenser water leaving the economizer coil enters the condenser, and compressors are turned on as needed.

CONDESNSER WATER PIPING DIAGRAM
mechanical cooling mode only



CONDESNSER WATER PIPING DIAGRAM
economizer with or without mechanical cooling mode



FAN SECTION

Plenum fan – quiet, efficient

The YORK Versecon uses an efficient and quiet airfoil blade backward curve plenum fan, with a minimum of Class II construction. The fan section acts as a plenum, keeping discharge velocities and noise lower, and efficiency high. Bearing lubrication lines are brought closer to the front of the unit for easy maintenance.

Vibration isolation

Fan is mounted on vibration isolation springs and connected on the inlet side with a canvas flexible connection, minimizing vibration and noise transmission.

Double wall construction

Unit cabinet in the air stream has double wall construction with 22 gage perforated liner to absorb maximum amount of noise and to hold the insulation permanently in place without use of studs or glue.

Variable Air volume with unit mounted and tested VFD – Optional

Variable air volume units include a unit mounted and tested Variable Frequency Drive on all 460 volt motors and up to 25 HP motors on 208 or 230 volt units. Unit controller adjusts the VFD speed to maintain static pressure as sensed by a unit mounted differential air pressure transducer. The pressure transducer senses air pressure at an appropriate location in the supply ductwork through a pressure tube supplied and installed by others. All VAV units are supplied with a Duct High Limit pressure switch to stop the supply fan if the supply air pressure exceeds the set point.

HEATING – OPTIONAL

Hot water

Factory installed modulating hot water heat is offered with the hot water coil upstream of the evaporator coil. It is complete with hot water piping and a two-way motorized hot water valve. The unit controller modulates motorized hot water valve.

Steam

Steam coil is installed upstream of the evaporator coil. Unit controller provides a signal for control of the steam valve, provided and installed by others. All other steam accessories including steam valve, valve actuator, and steam trap etc. are provided and installed by others.

Electric

Factory installed electric heat is at the unit outlet, and requires discharge air plenum. Unit controller operates the 2-stage electric heat.

CONTROLS AND BAS COMMUNICATIONS

YORK Versecon comes complete with a controller and a variety of sensors throughout the unit for reliable unit operation. A return air temperature sensor, supplied with the unit, is installed by others to read return air temperature before it mixes with the outdoor air. Unit Mounted keypad and display, accessible without opening any panels, is provided as user interface to monitor unit operation and change set points. York Versecon may be adapted to operate with any building automation system that is BACnet (MSTP) compatible. Other protocol options are also available.

INDOOR AIR QUALITY

Condensate Drain Pan

A stainless steel drain pan sloped in all directions collects condensate from coils and collects it at a single location that is the lowest in the drain pan. This ensures that there is no standing water at any time in the drain pan, avoiding microbial growth in the drain pan.

Solid Liners – Optional

Galvanized solid liners may be ordered in the air stream in lieu of the standard perforated liners. This allows wash-down of the unit air path.

High Efficiency Filtration – Optional

30% Efficiency filters are standard 4-inch high efficiency filters (up to 90%) with 30% efficiency pre-filters are available.

ACCESSORIES

Airside economizer – Optional

A mixing box containing outdoor air damper, return air damper, filters and damper actuators is available for the airside economizer. Unit controller operates the dampers based on the factory supplied temperature sensors, installed by others. Airside economizer uses cool outdoor air, when possible to meet fully or partially, the cooling load. In case additional cooling is required after outdoor damper is open 100%, the compressors come on as needed. For proper building pressurization, a variable air volume relief fan must be provided and installed by others with the airside economizer.

Acoustical Discharge Air Plenums – Optional

Discharge air plenum, made of painted galvanized steel, insulated with 3-inch, 3 lbs/ cu ft fiberglass insulation, and covered with 22 gage galvanized perforated liner is available for attenuation of sound through the discharge air outlet. The plenum is ordered with the duct openings as required by the field.

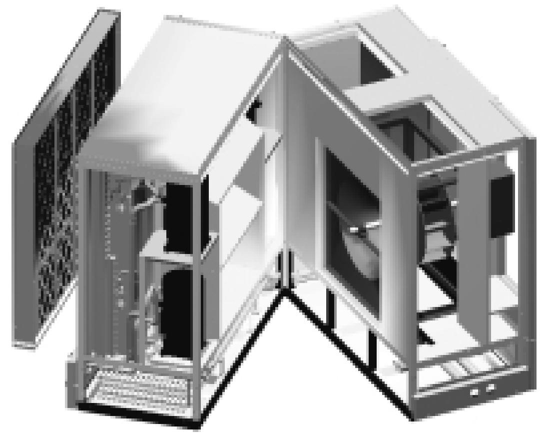
Return air plenums – Optional

Return air plenum, made of galvanized steel, insulated on the back with 4-inch, 3 lbs/ cu ft fiberglass insulation, and covered with 22 gage galvanized perforated liner is available for attenuation of sound through the return air outlet.

Design Features

MODULAR CONSTRUCTION

The YORK Versecon unit, up to 55 nominal tons may be knocked down into three pieces. The first piece, the cooling section, incorporates the waterside economizer, evaporator coil, water cooled condenser and multiple compressors. The second piece, the fan section, includes the fan, variable speed drive, and control panel. The third piece contains filters and filter frame, optional hydronic heating, and optional inlet plenum. All sections can be navigated in small service elevators, an existing window frame, or standard 36" doorframe. The dimensions for the standard product are designed to easily install in many scenarios. In order to separate the three sections, water piping and electrical connections must be disconnected. Unit may be ordered to ship in separate pieces. The water piping is designed with grooves for easier connections. The control wire harnesses use quick-connect couplings. Power connections are identified with each compressor.



Economizer Comparison

Advantages of Airside Economizer

- Reduces cooling tower fan energy consumption
- Reduces pump energy consumption by eliminating the economizer coil water pressure drop
- Decreased air pressure drop by eliminating waterside economizer coil (air pressure drop for the mixing box, additional ductwork losses, return and outdoor dampers, and return fan should be included in the comparison)
- Reduces tower makeup water and related water treatment
- Cooling tower must be designed for winter operation
- The increased operation (including winter operation) required of the cooling tower may reduce its life

Advantages of waterside economizers

- The waterside economizer coil capacity can be selected to provide the majority of the design load with an entering condenser water temperature of 50°F.
- Achieves better relative humidity of the conditioned space during winter operation.
- Eliminate return fan energy consumption
- Mechanical equipment rooms can be centrally located in a building
- More net usable floor space is available because large fresh air and relief air ducts are unnecessary
- On cold, rainy days, the waterside economizer can be used without introducing more humidity into the occupied space.
- Reduce the installed cost and complexity by eliminating the airside economizer's mixing box, dampers, actuators, larger air shaft with smoke dampers (when located on the interior of the building), return fans, exhaust/relief fans, etc.
- Decrease commissioning cost to air balance the system
- Using discharge air temperature reset during the waterside economizer cycle reduces humidity-related problems.
- Eliminate wall penetrations, expensive aesthetic and appearance of architectural louvers (when located on the perimeter of the building)
- Reduce the amount of contaminated outdoor air supplied to the space
- Reduced maintenance costs, as filters will not need to be changed frequently. Also, an airside economizer requires more mechanical parts.
- Building pressurization issues are eliminated which can occur using an airside economizer cycle

Operating Limits

Airflow

The minimum VAV design airflow limits are also listed in the data table on pages 11 and 12. This airflow corresponds to 400 FPM velocity over DX coil. It is highly recommended to keep the face velocity above 200 FPM. This minimum face velocity prevents heat transfer and refrigerant control problems. At the minimum design airflow, therefore, 50% turndown is available. At the maximum airflow for the unit, 33% turndown is available. Once the units are installed and the fit out work is complete, the entire air system needs to be air balanced. As part of this procedure, it is very critical that the total minimum airflow for the VAV boxes is set to be the same as or greater than the absolute minimum airflow for the York Versecon unit. This should cover all VAV box position scenarios, including if only one zone needs cooling. If the VAV box and unit minimum airflow are not coordinated, the low face velocities will cause nuisance alarms in the self-contained unit.

Condenser Water Flow

Typical design condenser water flow for a water-cooled unit is 3.0 gpm/ton. This corresponds to a 10°F difference between the entering and leaving condenser water temperatures. The Versecon unit is designed for a minimum water flow of 2.0 gpm/ton. This corresponds to a 15°F condenser water temperature change. The benefit of using a lower gpm/ton is the cost savings for the smaller diameter pipe, smaller pump and pumping costs. The downside to using a lower water flow is it will increase the leaving condenser water temperature. With the increase in water temperature, there is an increase in the condensing temperature. At the elevated condensing temperatures, the compressor will lose some capacity and slightly increase the electrical consumption.

Selection Procedure

York Versecon is designed to be very flexible. In doing this, many cabinet sizes, evaporator coil types and compressor sizes can be used to meet each specific design load. The catalog should be used as a guide, as it represents a limited number of selection possibilities. Contact the local trained sales representative if selection assistance is needed.

1. Design criteria should be available to make a qualified selection. This includes the design airflow, entering air conditions to the unit, total and sensible loads, condenser water conditions, external static pressure, electrical service and which factory-installed options are to be provided with the unit. This would include:
   - Acoustical discharge plenum
   - Waterside economizer coil
   - Heating options if applicable (hydronic, steam, or electric)

     a. If heat is to be provided, winter design criteria would be needed. This would include entering dry bulb, load, water conditions (for hot water heating only), or steam conditions (for steam only)
   - Return inlet options

     a. Filter efficiency and thickness

     b. Inlet sound attenuator

     c. Airside economizer mixing box
2. To establish the smallest cabinet size, divide the design airflow by the maximum acceptable face velocity. Use the general data tables on pages 11 and 12 to obtain the unit size that would have a coil face area the same or greater than the calculated minimum face area. Larger units may be used to lower the static pressure losses and/or to decrease the fan break horsepower because a larger fan could be used.
3. Divide the design airflow by the airflow in the capacity table to establish the correction factor for the total and sensible capacity for mechanical cooling, waterside economizer cooling, and compressor kW. *Use the table at the bottom of this page for those factors.*
4. Divide required total and sensible capacities with appropriate multipliers to determine adjusted capacities. Use the capacity tables to see if the catalogued compressor combination will meet the adjusted capacities. If not, use a bigger unit or contact the local sales representative for additional selection possibilities using other compressor combinations or DX coil options.
5. To establish the correct compressor kW and condenser water flow, multiply the compressor kW by compressor kW factor and water flow from the capacity table by total capacity correction factor.

Correction Table	DX Cooling			Waterside Economizer	
CFM Compared To Rated Quantity	Total Capacity	Sensible Capacity	Compressor kW	Total Capacity	Sensible Capacity
-20%	0.968	0.900	0.980	0.920	0.870
-15%	0.971	0.925	0.985		
-10%	0.985	0.952	0.989	0.960	0.930
-5%	0.991	0.974	0.995		
Standard	1.000	1.000	1.000	1.000	1.000
5%	1.006	1.024	1.004		
10%	1.012	1.048	1.006	1.040	1.060
15%	1.019	1.070	1.011		
20%	1.025	1.093	1.017	1.080	1.120

- For 50 Hz applications, derate total and sensible capacities using 0.89 and 0.94 respectively
- An altitude correction must be made for units applied over 2500 feet in elevation.
- Glycol can be used in these systems. Propylene or Ethylene with up to 50% by weight is typically used.
- If the application requires any of the above, contact the local sales office to make the selection.

6. Determine the waterside economizer cooling in a similar fashion from steps 3, 4, and 5.
7. If the application requires heat, use the following:
   - Hot water heating capacity is calculat ed in a similar fashion as steps 3, 4, and 5. Capacity tables are on page 23.
   - Steam heating capacity is calculated in a similar fashion as steps 3, 4, and 5. Capacity tables are on page 24.
8. Establish the type of return section needed. Several options are available: filter section, airside economizer/filter section, or sound attenuator/filter section.
9. With all the internal components selected, calculate the internal static pressure loss using the design airflow. Add this to the external static pressure loss to obtain the total static pressure. Use the corresponding fan curves to establish the fan motor break horsepower and rpm. The supply fan motor horsepower would be the next available line above the fan break horsepower point. The fan curves include the static loss for the cabinet.
10. To calculate the net cooling, the fan motor heat needs to be subtracted from the gross cooling. This is true because the fan is in the draw through position. The fan motor heat is equal to the fan brake horsepower multiplied by 2.8. This is expressed in MBh.
11. Determine the leaving air conditions at the coil (indicating gross capacity) by using a psychrometric chart.
12. The water pressure drop(s) need to be calculated for the condenser, waterside economizer, head pressure control valve, and/or hot water coil. The pressure drops include the heat exchangers, piping, and valve package (if applicable). (Refer to pages 33 to 35)
13. The MCA (Minimum Circuit Ampacity) and MROPD (Maximum Rated Over Protection Device) need to be established. The MCA value is used to size the wire for the power service to the unit. The MROPD is used to size either the breaker or fuse for the entire unit. Use the following formula and data on page 46 to calculate these.

MCA

For units with cooling capability (all concurrent loads) with or without hot water heating and circuits with motor loads only:

MCA = 1.25 (largest motor RLA or FLA) + other loads + 2 amps

For units with cooling capability and non-concurrent electric heat capability: In the cooling mode, the loads will be composed of supply fan motor and compressors. In heating mode, the loads will be composed of a supply fan motor and electric heater. The MCA is calculated for unit running in either mode; the highest value obtained is used for the MCA.

For unit in cooling mode:

MCA = 1.25 (largest RLA or FLA) + other loads + 2 amps

For unit in heating mode:

MCA = 1.25 (electric heat FLA + supply fan motor FLA) + 2 amps

MROPD

For units with cooling capability (all concurrent loads) with or without hot water heating and circuits with motor loads only:

MCA = 2.25 (largest motor RLA or FLA) + other loads + 2 amps

For units with cooling capability and non-concurrent electric heat capability: In the cooling mode, the loads will be composed of supply fan motor and compressors. In heating mode, the loads will be composed of a supply fan motor and electric heater. The MCA is calculated for the unit running in either mode; the highest value obtained is used for the MCA.

For unit in cooling mode:

MCA = 2.25 (largest RLA or FLA) + other loads + 2 amps

For unit in heating mode:

MCA = 2.25 (electric heat FLA + supply fan motor FLA) + 2 amps

14. The component weights are located on pages 37 and 38. Add the individual weights of each option to obtain the total shipping weight. To calculate the operating weight, add the corresponding water weight for the condenser, waterside economizer (if applicable), or hot water coil (if applicable).

Model Nomenclature & Data Table

Y S W U 039

First Letter: Company Name
Y = York International

Second letter: Product Name
S = Self-contained Unit

Third Letter: Condenser Type
W = Water-cooled condenser

Fourth Letter: Air flow Direction
U = Upflow

Number: Rated Tons
039 = 39 nominal tons

MEA

CERTIFIED ISO 9001

DATA TABLE

	DATA	012	016	021	025	032	039	048	050	055	060
Capacity Range	Min. capacity (tons)	10	15	20	25	30	35	40	40	50	55
	Max. capacity (tons)	20	25	30	35	45	55	65	70	75	80
Airflow Range	Min. VAV design CFM	3,300	4,400	5,600	6,700	8,700	10,700	12,700	14,000	14,700	16,000
	Max. VAV design & operating CFM	5,000	6,700	8,400	10,000	13,000	16,000	19,000	21,000	22,000	24,000
Cabinet Dimensions	Depth (excluding return section)	70	70	70	70	70	70	70	84	70	84
	Length	52	52	52	52	64	76	88	84	100	84
	Height (excluding discharge plenum)	79	79	79	79	79	79	79	99	79	99
	Box type	M1	M1	M1	M1	M2	M3	M4	N1	M5	N1
EER	Based on ARI 340/360-93	15.7	15.7	14.5	13.9	13.8	14.2	13.6	14.1	13.6	14.2
Cooling Coil Section	Face Area	8.3	11.1	13.9	16.7	21.7	26.7	31.7	35.0	36.7	40.0
	Rows–12 FPI*	4 or 6	4 or 6	4 or 6	4 or 6	4 or 6	4 or 6	4 or 6	4 or 6	4 or 6	4 or 6
Waterside Econo Section	Face Area	8.3	11.1	13.9	16.7	21.7	26.7	31.7	35.0	36.7	40.0
	Rows–12 FPI	2 or 4	2 or 4	2 or 4	2 or 4	2 or 4	2 or 4	2 or 4	2 or 4	2 or 4	2 or 4
Heating Section	Hot Water Heat–Face Area	8.3	11.1	13.9	16.7	21.7	26.7	31.7	35	36.7	40
	Rows–10 FPI	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2
	Electric Heat–kW	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Steam–Face Area	8.3	11.1	13.9	16.7	21.7	26.7	31.7	35	36.7	40
	Rows–8 FPI	1	1	1	1	1	1	1	1	1	1
Return Air Section	Filter Type	2” or 4” PLEATED, 12” CARTRDIGE									
	Filter area	18.3	18.3	18.3	18.3	24.4	28.5	32.5	40.8	36.7	40.8
	Pre-filter	2” or 4”	2” or 4”	2” or 4”	2” or 4”	2” or 4”	2” or 4”	2” or 4”	2” or 4”	2” or 4”	2” or 4”
	Efficiency (%)	30 to 95	30 to 95	30 to 95	30 to 95	30 to 95	30 to 95	30 to 95	30 to 95	30 to 95	30 to 95
	Final-Filter	4” or 12”	4” or 12”	4” or 12”	4” or 12”	4” or 12”	4” or 12”	4” or 12”	4” or 12”	4” or 12”	4” or 12”
	Efficiency (%)	65–95	65–95	65–95	65–95	65–95	65–95	65–95	65–95	65–95	65–95
Fan Section	Type	AIRFOIL PLENUM FAN (SWSI)									
	Quantity–Dia. (in): standard capacity	1–18	1–18	1–18	1–18	1–20	1–24	1–24	1–30	1–27	1–30
	Quantity–Dia. (in): high capacity	1–20	1–20	1–20	1–20	1–24	1–27	1–27	1–33	n/a	1–33
	Motor hp range	1.0–20.0	1.0–20.0	1.0–20.0	1.0–20.0	1.5–20.0	2.0–20.0	2.0–20.0	3.0–30.0	3.0–20.0	3.0–30.0
Compressor Section	Type	SCROLL									
	Quantity	2	2	2	2	2	4	4	4	4	4
	Stages–VAV systems	3	3	3	3	3	4–6	4–6	4–6	4–6	4–6
Condenser Section	Type	WATER-COOLED, MECHANICALLY CLEANABLE									
	Quantity	2	2	2	2	2	4	4	4	4	4
	GPM Range 2.0 to 3.0 GPM/Ton	24–36	32–48	42–63	50–75	64–96	78–117	96–144	100–150	110–165	120–180

Due to the dedication of continuous product improvement and enhancements, the information provided is subject to change without notice.

** Aluminum fins standard. ** M-Available Modular Construction, N- for New Construction*

	DATA	072	079	090
Capacity Range	Min. capacity (tons)	65	70	80
	Max. capacity (tons)	100	105	120
Airflow Range	Min. VAV design CFM	19,100	21,000	24,000
	Max. VAV design & operating CFM	28,700	31,500	36,000
Cabinet Dimensions	Depth (excluding return section)	84	96	96
	Length	98	120	120
	Height (excluding discharge plenum)	99	99	99
	Box type	N2	N3	N3
EER	Based on ARI 340/360-93	14.6	14.5	14.3
Cooling Coil Section	Face Area	47.8	52.5	60.0
	Rows–12 FPI	4 or 6	4 or 6	4 or 6
Waterside Econo Section	Face Area	47.8	52.5	60.0
	Rows–12 FPI	2 or 4	2 or 4	2 or 4
Heating Section	Hot Water Heat–Face Area	47.8	52.5	60
	Rows–10 FPI	1 or 2	1 or 2	1 or 2
	Electric Heat–kW	TBD	TBD	TBD
	Steam–Face Area	47.8	52.5	60
	Rows–8 FPI	1	1	1
Return Air Section	Filter Type	2” or 4” PLEATED, 12” CARTRIDGE		
	Filter area	48.9	62.5	62.5
	Pre-filter	2” or 4”	2” or 4”	2” or 4”
	Efficiency (%)	30–95	30–95	30–95
	Final-Filter	4” or 12”	4” or 12”	4” or 12”
	Efficiency (%)	65–95	65–95	65–95
Fan Section	Type	AIRFOIL PLENUM FAN (SWSI)		
	Quantity–Dia. (in): standard capacity	1–33	1–36	1–36
	Quantity–Dia. (in): high capacity	1–36	1–40	1–40
	Motor hp range	3.0–40.0	5.0–50.0	5.0–50.0
Compressor Section	Type	SCROLL		
	Quantity	4	4	4
	Stages–VAV systems	4–6	4–6	4–6
Condenser Section	Type	WATER-COOLED, MECHANICALLY CLEANABLE		
	Quantity	4	4	4
	GPM Range 2.0 to 3.0 GPM/Ton	144–216	158–237	180–270

Due to the dedication of continuous product improvement and enhancements, the information provided is subject to change without notice.

** Aluminum fins standard. ** M-Available Modular Construction, N- for New Construction*

Cooling Capacity Tables

YSWU012

		4,600 CFM with 4-row Evaporator and (1)4 & (1)7 HP Scroll Compressors																	
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	145	112	57.9	56.9	23.4	8.9	147	112	57.8	56.8	29.3	8.6	148	113	57.7	56.7	35.2	8.4
	88	143	111	58.1	57.0	23.3	9.2	145	112	57.9	56.9	29.2	8.9	146	112	57.8	56.8	35.1	8.7
	90	142	110	58.2	57.1	23.2	9.4	144	111	58.0	57.0	29.1	9.1	145	111	58.0	56.9	35.0	8.9
77/64	85	138	112	54.7	53.7	22.4	8.8	140	113	54.6	53.6	28.1	8.5	141	114	54.5	53.5	33.8	8.4
	88	137	112	54.9	53.8	22.4	9.1	138	112	54.7	53.7	28.1	8.8	139	113	54.6	53.6	33.7	8.6
	90	136	111	55.0	53.9	22.3	9.3	137	112	54.8	53.8	28.0	9.0	138	112	54.7	53.7	33.7	8.8

		4,600 CFM with 6-row Evaporator and (1)7 & (1)12 HP Scroll Compressors																	
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	229	150	50.3	50.1	37.4	15.2	231	151	50.0	49.9	47.0	14.7	233	152	49.9	49.7	56.4	14.4
	88	226	149	50.5	50.3	37.3	15.6	229	150	50.3	50.1	46.8	15.2	231	151	50.1	49.9	56.3	14.9
	90	225	148	50.6	50.4	37.2	16.0	227	149	50.4	50.2	46.7	15.5	229	150	50.3	50.1	56.1	15.2
77/64	85	217	151	47.1	46.9	35.8	15.0	220	152	46.8	46.6	44.8	14.5	221	153	46.7	46.5	53.9	14.3
	88	214	150	47.3	47.1	35.7	15.5	217	151	47.1	46.9	44.7	15.0	218	152	46.9	46.7	53.7	14.7
	90	213	149	47.4	47.2	35.6	15.8	215	150	47.2	47.0	44.6	15.3	217	151	47.1	46.9	53.6	15.0

YSWU016

		6,100 CFM with 4-row Evaporator and (1)4 & (1)10 HP Scroll Compressors																	
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	193	149	57.9	56.8	31.3	12.1	195	149	57.7	56.7	39.3	11.8	197	150	57.6	56.6	47.2	11.5
	88	191	148	58.0	57.0	31.2	12.5	193	149	57.9	56.8	39.1	12.1	195	149	57.8	56.8	47.1	11.9
	90	190	147	58.1	57.0	31.1	12.8	192	148	57.9	56.9	39.0	12.4	193	149	57.9	56.8	46.9	12.1
77/64	85	184	149	54.7	53.6	30.0	12.0	186	150	54.6	53.5	37.6	11.6	187	151	54.5	53.4	45.2	11.4
	88	182	148	54.8	53.8	29.9	12.4	184	149	54.7	53.6	37.5	12.0	185	150	54.6	53.6	45.1	11.8
	90	181	148	54.9	53.9	29.8	12.7	182	149	54.8	53.8	37.4	12.3	184	149	54.7	53.6	45.0	12.0

		6,100 CFM with 6-row Evaporator and (1)7 & (1)15 HP Scroll Compressors																	
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	276	187	52.1	51.8	45.2	18.4	279	188	51.9	51.6	56.7	17.8	281	189	51.8	51.5	68.1	17.5
	88	273	186	52.3	52.0	45.1	19.1	277	187	52.1	51.8	56.5	18.4	278	188	52.0	51.7	68.0	18.1
	90	271	185	52.4	52.1	45.1	19.5	274	186	52.2	51.9	56.5	18.9	276	187	52.1	51.8	67.8	18.5
77/64	85	262	187	49.0	48.6	43.2	18.3	264	189	48.8	48.5	54.1	17.7	266	190	48.6	48.3	65.0	17.3
	88	259	186	49.2	48.8	43.1	18.9	262	188	49.0	48.6	54.0	18.3	263	188	48.8	48.5	64.9	17.9
	90	257	185	49.3	49.0	43.1	19.4	259	186	49.1	48.8	53.9	18.7	261	187	49.0	48.7	64.8	18.3

YSWU021

8,400 CFM with 4-row Evaporator and (1)7 & (1)12 HP Scroll Compressors

EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
	85	251	190	57.3	56.4	40.4	15.4	253	191	57.2	56.3	50.8	15.0	255	191	57.1	56.2	61.1	14.7
80/67	88	247	188	57.5	56.5	40.3	15.9	251	190	57.3	56.4	50.5	15.5	252	190	57.2	56.3	60.8	15.2
	90	246	187	57.6	56.6	40.2	16.3	249	189	57.4	56.5	50.4	15.8	250	189	57.3	56.4	60.7	15.5
	85	238	190	54.2	53.2	38.7	15.3	241	192	54.0	53.1	48.6	14.8	243	192	53.9	53.0	58.5	14.5
77/64	88	236	189	54.3	53.3	38.6	15.8	238	190	54.2	53.2	48.4	15.3	240	191	54.1	53.1	58.2	15.0
	90	234	188	54.4	53.4	38.5	16.1	236	189	54.3	53.3	48.3	15.6	238	190	54.2	53.2	58.1	15.3

8,400 CFM with 6-row Evaporator and (1)10 & (1)15 HP Scroll Compressors

EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
	85	338	231	52.4	52.2	54.9	21.8	341	232	52.2	52.0	68.9	21.1	343	233	52.1	51.9	82.8	20.7
80/67	88	334	229	52.5	52.3	54.7	22.5	338	231	52.4	52.2	68.6	21.8	340	232	52.3	52.1	82.5	21.3
	90	332	228	52.7	52.5	54.6	23.0	335	230	52.5	52.3	68.5	22.3	337	231	52.4	52.2	82.4	21.8
	85	320	232	49.2	49.0	52.5	21.6	324	233	49.0	48.8	65.8	20.9	326	234	48.9	48.7	79.1	20.5
77/64	88	317	231	49.3	49.1	52.5	22.3	320	232	49.2	49.0	65.6	21.6	322	233	49.1	48.9	78.9	21.2
	90	315	230	49.4	49.2	52.4	22.8	319	231	49.3	49.0	65.6	22.1	320	232	49.2	49.0	78.7	21.6

YSWU025

9,100 CFM with 4-row Evaporator and (1)7 & (1)15 HP Scroll Compressors

EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
	85	291	222	57.8	56.8	47.2	18.6	294	223	57.7	56.6	59.1	18.0	296	224	57.6	56.6	71.1	17.6
80/67	88	287	221	57.9	56.9	47.0	19.2	290	222	57.8	56.8	59.0	18.6	292	223	57.7	56.7	70.9	18.2
	90	285	220	58.1	57.0	46.9	19.6	288	221	57.9	56.9	58.8	19.0	290	222	57.8	56.8	70.8	18.6
	85	275	223	54.7	53.6	45.1	18.4	278	224	54.6	53.5	56.5	17.8	280	225	54.5	53.4	67.9	17.5
77/64	88	272	221	54.8	53.7	45.0	19.1	275	223	54.7	53.6	56.4	18.5	277	223	54.6	53.5	67.8	18.1
	90	270	220	54.9	53.8	44.9	19.5	273	222	54.8	53.7	56.3	18.9	275	222	54.7	53.6	67.6	18.5

9,100 CFM with 6-row Evaporator and (1)10 & (1)20 HP Scroll Compressors

EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
	85	372	261	53.9	53.5	61.5	26.1	376	262	53.8	53.3	77.0	25.4	378	263	53.7	53.2	92.6	24.9
80/67	88	368	259	54.1	53.7	61.4	27.0	372	260	53.9	53.5	76.9	26.2	374	262	53.8	53.4	92.4	25.7
	90	366	258	54.2	53.8	61.3	27.5	369	259	54.1	53.6	76.8	26.7	372	260	53.9	53.5	92.2	26.2
	85	353	262	50.7	50.3	58.9	25.9	357	264	50.6	50.1	73.8	25.1	359	265	50.5	50.0	88.7	24.6
77/64	88	350	260	50.9	50.4	58.8	26.7	353	262	50.7	50.3	73.7	25.9	356	263	50.6	50.2	88.5	25.4
	90	347	259	51.0	50.6	58.7	27.3	351	261	50.8	50.4	73.5	26.5	353	262	50.7	50.3	88.4	25.9

YSWU032

11,900 CFM with 4-row Evaporator and (1)12 & (1)15 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
	85	372	288	58.0	57.0	60.0	23.0	375	290	57.9	56.9	75.3	22.3	378	291	57.8	56.8	90.6	21.9
80/67	88	368	286	58.1	57.1	59.8	23.8	371	288	58.0	57.0	75.1	23.0	374	289	57.9	56.9	90.3	22.6
	90	365	285	58.2	57.2	59.7	24.3	369	287	58.1	57.1	74.9	23.5	371	288	58.0	57.0	90.0	23.1
	85	355	289	54.9	53.8	57.7	22.8	359	291	54.7	53.6	72.4	22.1	361	292	54.6	53.6	87.1	21.7
77/64	88	351	287	55.0	53.9	57.6	23.6	355	289	54.9	53.8	72.2	22.9	358	290	54.8	53.7	86.8	22.4
	90	348	286	55.1	54.0	57.4	24.1	352	288	55.0	53.9	72.0	23.4	355	289	54.9	53.8	86.6	22.9

11,900 CFM with 6-row Evaporator and (1)12 & (1)25 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
	85	481	341	53.9	53.7	78.2	31.1	486	343	53.8	53.5	98.1	30.1	489	345	53.7	53.4	117.9	29.5
80/67	88	476	339	54.1	53.8	78.0	32.0	480	341	53.9	53.7	97.8	31.1	484	343	53.8	53.6	117.5	30.5
	90	472	338	54.2	54.0	77.9	32.7	477	340	54.1	53.8	97.6	31.7	480	341	53.9	53.7	117.3	31.1
	85	457	343	50.8	50.5	75.0	30.8	462	345	50.6	50.3	93.9	29.9	465	346	50.5	50.2	112.9	29.3
77/64	88	452	341	50.9	50.6	74.8	31.8	457	343	50.8	50.5	93.7	30.8	460	344	50.7	50.4	112.6	30.2
	90	449	339	51.0	50.7	74.6	32.5	454	341	50.9	50.6	93.5	31.5	457	343	50.8	50.5	112.4	30.8

YSWU039

14,600 CFM with 4-row Evaporator and (2)7 & (2)10 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
	85	463	355	57.9	56.8	75.0	29.0	468	357	57.7	56.7	94.0	28.1	472	359	57.6	56.6	113.1	27.5
80/67	88	458	353	58.0	57.0	74.7	29.9	463	355	57.9	56.8	93.7	29.0	467	357	57.8	56.7	112.7	28.3
	90	454	352	58.1	57.0	74.5	30.6	460	354	58.0	56.9	93.5	29.6	464	356	57.9	56.8	112.4	28.9
	85	443	358	54.6	53.6	72.1	28.7	448	361	54.5	53.5	90.4	27.8	451	362	54.4	53.4	108.7	27.2
77/64	88	438	356	54.8	53.7	71.9	29.7	443	358	54.6	53.6	90.1	28.7	446	360	54.5	53.5	108.4	28.1
	90	435	355	54.9	53.8	71.7	30.3	439.4	356.9	54.7	53.7	90.0	29.3	443	358	54.6	53.6	108.2	28.7

14,600 CFM with 6-row Evaporator and (2)10 & (2)12 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
	85	593.6	419.1	53.9	53.6	96.1	37.4	600	422	53.7	53.4	120.7	36.2	605	424	53.6	53.3	145.2	35.5
80/67	88	586.8	416.1	54.1	53.8	95.8	38.5	594	419	53.9	53.6	120.2	37.3	598	421	53.8	53.5	144.6	36.6
	90	582.3	414.2	54.2	53.9	95.5	39.4	589	417	54.0	53.7	119.8	38.1	594	419	53.9	53.6	144.2	37.3
	85	564.9	421.7	50.7	50.3	92.2	37.0	572	425	50.5	50.1	115.7	35.8	576	427	50.4	50.0	139.3	35.1
77/64	88	558.7	418.9	50.9	50.5	91.9	38.2	566	422	50.6	50.3	115.2	37.0	570	424	50.5	50.2	138.7	36.2
	90	554.8	417.2	51.0	50.6	91.6	39.0	561	420	50.8	50.4	115.0	37.7	566	422	50.6	50.3	138.3	36.9

YSWU048

17,400 CFM with 4-row Evaporator and (2)7 & (2)12 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	513	409	58.7	57.6	82.7	31.2	520	411	58.5	57.5	103.8	30.3	524	413	58.4	57.4	124.9	29.7
	88	510	408	58.7	57.7	82.6	32.2	513	409	58.7	57.6	103.4	31.2	518	411	58.6	57.5	124.4	30.6
	90	505	406	58.8	57.8	82.4	32.9	510	407	58.7	57.7	103.1	31.8	514	409	58.6	57.6	124.0	31.2
77/64	85	492	412	55.4	54.4	79.7	30.9	498	415	55.3	54.2	100.0	30.0	502	417	55.2	54.1	120.4	29.3
	88	486	410	55.6	54.5	79.4	31.9	493	412	55.4	54.3	99.6	30.9	497	414	55.3	54.2	119.8	30.3
	90	483	408	55.7	54.5	79.2	32.6	489	411	55.5	54.4	99.4	31.6	493	413	55.4	54.3	119.5	30.9

17,400 CFM with 6-row Evaporator and (4)10 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	596	454	56.3	55.9	95.9	35.9	603	457	56.2	55.8	120.3	34.8	608	459	56.1	55.7	144.7	34.1
	88	590	446	56.4	56.1	95.5	37.0	597	454	56.3	55.9	119.8	35.9	601	456	56.2	55.8	144.2	35.1
	90	586	444	56.5	56.2	95.3	37.8	592	452	56.4	56.0	119.5	36.6	597	454	56.3	55.9	143.8	35.8
77/64	85	573	453	53.0	52.6	92.5	35.6	579	455	52.9	52.5	116.0	34.4	583	458	52.8	52.4	139.6	33.7
	88	566	449	53.2	52.8	92.2	36.7	573	453	53.0	52.6	115.6	35.5	577	454	52.9	52.5	139.1	34.8
	90	563	447	53.3	52.8	92.0	37.5	569	450	53.1	52.7	115.4	36.3	573	453	53.0	52.6	138.8	35.5

YSWU050

19,200 CFM with 4-row Evaporator and (2)7 & (2)15 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	593	459	58.3	57.1	96.1	37.6	599	462	58.1	57.0	120.5	36.3	603	463	58.1	56.9	144.9	35.5
	88	586	457	58.4	57.2	95.8	38.9	593	459	58.3	57.1	120.1	37.5	597	461	58.2	57.1	144.5	36.7
	90	582	455	58.5	57.3	95.6	39.7	588	458	58.3	57.2	119.9	38.4	593	459	58.3	57.1	144.2	37.5
77/64	85	563	461	55.1	54.0	92.1	37.3	569	464	55.0	53.8	115.4	36.0	574	466	54.9	53.7	138.7	35.2
	88	556	459	55.2	54.1	91.9	38.6	564	462	55.1	53.9	115.1	37.3	567	463	55.0	53.9	138.4	36.4
	90	553	457	55.3	54.2	91.7	39.5	559	460	55.2	54.0	114.9	38.1	564	462	55.1	53.9	138.1	37.2

19,200 CFM with 6-row Evaporator and (4)15 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	824	570	53.0	52.7	133.8	52.6	834	575	52.8	52.5	167.7	50.8	839	577	52.6	52.4	201.7	49.6
	88	815	567	53.1	52.9	133.4	54.4	825	571	52.9	52.7	167.2	52.5	831	573	52.8	52.6	201.1	51.3
	90	809	564	53.3	53.0	133.2	55.6	819	568	53.1	52.8	167.0	53.7	825	571	52.9	52.7	200.7	52.5
77/64	85	783	573	49.8	49.5	128.1	52.2	792	578	49.6	49.3	160.6	50.4	797	580	49.5	49.2	193.0	49.3
	88	774	570	50.0	49.7	127.8	54.0	783	574	49.8	49.5	160.1	52.2	789	576	49.6	49.4	192.5	51.0
	90	769	567	50.1	49.8	127.6	55.3	777	571	49.9	49.6	159.9	53.4	783	574	49.8	49.5	192.2	52.1

YSWU055

20,300 CFM with 4-row Evaporator and (4)12 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	655	496	57.5	56.6	105.4	39.8	663	499	57.4	56.5	132.4	38.6	668	501	57.3	56.4	159.4	37.9
	88	647	492	57.7	56.8	105.0	41.0	656	496	57.5	56.6	131.8	39.8	661	498	57.4	56.5	158.7	39.0
	90	643	490	57.8	56.8	104.7	41.8	651	494	57.6	56.7	131.4	40.6	656	496	57.5	56.6	158.2	39.8
77/64	85	627	499	54.4	53.4	101.5	39.4	635	502	54.2	53.2	127.5	38.2	640	505	54.1	53.1	153.5	37.5
	88	620	496	54.5	53.5	101.1	40.6	627	499	54.4	53.4	126.9	39.4	632	501	54.2	53.3	152.8	38.6
	90	615	493	54.6	53.6	100.8	41.4	622	497	54.4	53.5	126.5	40.2	627	499	54.4	53.4	152.3	39.3

20,300 CFM with 6-row Evaporator and (4)15 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	833	587	53.7	53.5	135.0	52.6	842	591	53.5	53.3	169.3	50.9	848	593	53.4	53.2	203.6	49.7
	88	824	583	53.9	53.6	134.6	54.4	834	587	53.7	53.4	168.8	52.6	840	590	53.6	53.3	203.0	51.4
	90	818	581	54.0	53.7	134.4	55.7	827	584	53.8	53.6	168.5	53.8	834	587	53.7	53.4	202.6	52.5
77/64	85	791	590	50.5	50.2	129.4	52.3	801	594	50.3	50.0	162.1	50.5	806	596	50.2	49.9	194.9	49.4
	88	785	587	50.6	50.3	129.3	54.1	792	590	50.5	50.2	161.7	52.2	798	593	50.4	50.1	194.4	51.0
	90	780	585	50.8	50.5	129.1	55.4	788	589	50.6	50.3	161.8	53.5	792	590	50.5	50.2	194.0	52.2

YSWU060

22,000 CFM with 4-row Evaporator and (2)10 & (2)15 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	700	537	57.8	56.8	113.4	44.0	708	540	57.7	56.7	142.3	42.6	714	543	57.6	56.6	171.1	41.6
	88	693	534	57.9	56.9	113.0	45.5	701	538	57.8	56.8	141.8	44.0	705	540	57.7	56.7	170.5	43.0
	90	688	532	58.0	57.0	112.8	46.5	696	536	57.9	56.9	141.5	44.9	701	537	57.8	56.8	170.2	43.9
77/64	85	670	542	54.6	53.5	109.3	43.7	678	546	54.4	53.4	136.9	42.3	682	547	54.3	53.3	164.7	41.3
	88	664	539	54.7	53.6	109.0	45.2	671	542	54.6	53.5	136.6	43.7	675	544	54.5	53.4	164.3	42.7
	90	658	537	54.8	53.7	108.8	46.2	665	540	54.7	53.6	136.4	44.6	671	542	54.6	53.5	163.9	43.6

22,000 CFM with 6-row Evaporator and (2)15 & (2)20 HP Scroll Compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	926	642	53.5	53.0	151.5	61.7	936	646	53.3	52.9	189.9	59.7	942	648	53.2	52.8	228.3	58.4
	88	916	637	53.6	53.2	151.1	63.7	926	642	53.5	53.0	189.4	61.6	932	644	53.3	52.9	227.7	60.3
	90	909	634	53.8	53.3	150.8	65.0	919	639	53.6	53.2	189.1	62.9	926	642	53.5	53.0	227.3	61.6
77/64	85	879	645	50.3	49.8	145.0	61.2	888	649	50.1	49.7	181.7	59.2	894	652	50.0	49.6	218.5	57.9
	88	869	640	50.5	50.0	144.7	63.2	880	645	50.3	49.8	181.2	61.1	885	648	50.1	49.7	217.89	59.8
	90	863	638	50.6	50.1	144.4	64.5	873	642	50.4	49.9	181.0	62.4	880	645	50.3	49.8	217.5	61.1

YSWU072

28,800 CFM with 4-row Evaporator and (2)12 & (2)20 HP Scroll Compressors

EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	878	659	57.2	56.2	141.6	54.0	888	663	57.1	56.1	177.7	52.5	893	666	57.0	56.0	213.9	51.6
	88	868	655	57.3	56.4	141.1	55.7	877	659	57.2	56.2	177.0	54.1	884	662	57.1	56.2	213.0	53.1
	90	862	653	57.4	56.5	140.7	56.8	871	656	57.3	56.3	176.5	55.2	878	659	57.2	57.4	212.4	54.1
77/64	85	836	663	54.0	53.0	135.7	53.5	845	667	53.9	52.9	170.3	52.0	850	669	53.8	53.9	205.0	51.0
	88	826	659	54.2	53.2	135.2	55.1	835	663	54.0	53.0	169.7	53.6	841	666	53.9	54.1	204.1	52.6
	90	819	656	54.3	53.3	134.9	56.3	829	660	54.1	53.1	169.2	54.6	835	663	54.0	54.1	203.6	53.6

26,300 CFM Airflow with 4-row Evaporator coil and (2)15 & (2)25 compressors

EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	1,016	715	55.3	54.3	165.4	65.9	1,026	719	55.1	54.2	207.4	64.0	1,032	722	55.0	54.1	249.5	62.9
	88	1,005	710	55.4	54.5	165.0	67.9	1,016	715	55.3	54.3	206.8	66.0	1,022	718	55.2	54.2	248.6	64.7
	90	998	708	55.5	54.6	164.6	69.3	1,008	712	55.4	54.4	206.4	67.3	1,015	715	55.3	57.4	248.1	66.0
77/64	85	966	719	52.1	51.1	158.4	65.3	975	723	51.9	51.0	198.6	63.5	982	726	51.8	53.9	238.7	62.2
	88	955	714	52.2	51.3	158.0	67.4	965	719	52.1	51.1	198.0	65.4	972	722	52.0	54.1	238.0	64.1
	90	948	711	52.3	51.4	157.7	68.8	958	716	52.2	51.2	197.7	66.7	964	719	52.1	54.1	237.6	65.4

YSWU079

28,800 CFM Airflow with 4-row Evaporator coil and (2)15 & (2)20 compressors

EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	966	722	57.2	56.2	156.2	60.3	975	726	57.1	56.1	196.0	58.5	983	729	57.0	56.0	235.6	57.4
	88	956	718	57.4	56.3	155.8	62.2	966	721	57.2	56.2	195.3	60.4	973	724	57.1	56.1	234.8	59.2
	90	949	715	57.4	56.4	155.4	63.5	959	719	57.3	56.3	194.9	61.6	966	721	57.2	56.2	234.3	60.4
77/64	85	922	727	54.0	52.9	150.2	59.9	931	732	53.9	52.8	188.3	58.1	937	734	53.8	52.7	226.4	57.0
	88	913	723	54.1	53.1	149.9	61.8	922	727	54.0	52.9	187.8	60.0	928	730	53.9	52.9	225.7	58.8
	90	906	720	54.2	53.2	149.6	63.1	916	724	54.1	53.0	187.5	61.2	922	727	54.0	52.9	225.3	60.0

28,800 CFM Airflow with 4-row Evaporator coil and (4)25 compressors

EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	1,205	826	53.9	53.1	197.1	79.9	1,217	832	53.7	53.0	247.1	77.8	1,225	835	53.6	52.9	297.2	76.5
	88	1,193	821	54.0	53.3	196.4	82.2	1,205	826	53.9	53.1	246.3	80.0	1,213	830	53.8	53.0	296.2	78.6
	90	1,183	817	54.2	53.4	196.0	83.8	1,196	822	54.0	53.3	245.8	81.5	1,204	826	53.9	53.1	295.5	80.1
77/64	85	1,144	831	50.7	49.9	188.6	79.1	1,156	836	50.5	49.8	236.4	77.0	1,164	840	50.4	49.7	284.3	75.6
	88	1,132	825	50.9	50.1	188.1	81.4	1,144	830	50.7	49.9	235.7	79.2	1,152	834	50.6	49.8	283.4	77.8
	90	1,124	821	51.0	50.2	187.6	83.1	1,135	827	50.8	50.0	235.2	80.7	1,144	830	50.7	49.9	282.8	79.3

YSWU090

33,000 CFM Airflow with 4-row Evaporator coil and (2)15 + (2)25 compressors																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	1,077	815	57.6	56.5	173.9	66.6	1,089	820	57.4	56.4	218.3	64.8	1,096	823	57.3	56.3	262.6	63.7
	88	1,066	810	57.7	56.6	173.3	68.6	1,077	815	57.6	56.5	217.4	66.7	1,084	817	57.5	56.4	261.6	65.5
	90	1,057	807	57.8	56.7	172.9	70.0	1,069	811	57.6	56.6	216.9	68.0	1,076	815	57.6	56.5	260.9	66.7
77/64	85	1,028	822	54.3	53.3	167.2	66.0	1,039	827	54.2	53.1	209.7	64.2	1,046	830	54.1	53.1	252.2	63.0
	88	1,017	817	54.5	53.4	166.6	68.0	1,028	822	54.3	53.3	209.0	66.1	1,035	825	54.2	53.2	251.3	64.9
	90	1,011	814	54.5	53.5	166.3	69.4	1,021	819	54.4	53.3	208.5	67.4	1,028	822	54.3	53.3	250.7	66.2

33,000 CFM Airflow with 6-row Evaporator coil and (4)25																			
EAT	ECWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW	TMBH	SMBH	LDB	LWB	GPM	kW
80/67	85	1,319	938	54.2	53.9	212.9	81.5	1,332	944	54.0	53.7	267.2	79.5	1,341	948	53.9	53.6	321.6	78.2
	88	1,304	932	54.3	54.0	212.0	83.7	1,318	938	54.2	53.9	266.0	81.6	1,326	941	54.1	53.8	320.2	80.3
	90	1,295	928	54.4	54.1	211.4	85.3	1,308	934	54.3	54.0	265.3	83.1	1,317	938	54.2	53.9	319.3	81.7
77/64	85	1,256	945	50.9	50.6	204.2	80.6	1,268	951	50.8	50.4	256.1	78.5	1,277	954	50.6	50.3	308.1	77.2
	88	1,243	939	51.1	50.8	203.4	82.9	1,256	945	50.9	50.6	255.2	80.7	1,264	948	50.8	50.5	307.0	79.3
	90	1,234	935	51.2	50.9	202.9	84.4	1,247	941	51.0	50.7	254.5	82.2	1,256	945	50.9	50.6	306.1	80.7

Waterside Economizer Capacity

YSWU012

4,600 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	101	92	61.9	60.2	23.3	58.6	115	99	60.6	59.2	29.2	57.9	123	102	59.8	58.6	35.1	57.0
77/64	50	83	83	60.4	58.1	22.4	57.4	95	92	58.8	57.1	28.1	56.8	104	97	57.9	56.5	33.7	56.1

YSWU016

6,100 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	128	121	62.0	60.5	31.2	58.2	151	132	60.4	59.3	39.1	57.7	168	139	59.3	58.4	47.1	57.1
77/64	50	108	108	60.7	58.2	29.9	57.2	124	123	58.7	57.3	37.5	56.6	140	131	57.5	56.4	45.1	56.2

YSWU021

8,300 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	178	163	62.2	60.4	40.3	58.8	203	175	60.9	59.4	50.5	58.0	215	181	60.2	58.9	60.8	57.1
77/64	50	147	147	60.7	58.2	38.6	57.6	168	164	59.1	57.3	48.4	56.9	181	171	58.3	56.7	58.2	56.2

YSWU025

9,100 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	225	195	60.5	59.3	47.0	59.6	254	208	59.2	58.2	59.0	58.6	271	216	58.5	57.6	70.9	57.6
77/64	50	185	182	58.9	57.3	45.0	58.2	213	196	57.4	56.2	56.4	57.5	228	204	56.7	55.6	67.8	56.7

YSWU032

11,900 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	294	251	60.9	59.3	59.8	59.8	318	263	59.9	58.6	75.1	58.4	331	270	59.4	58.2	90.3	57.3
77/64	50	245	235	59.1	57.2	57.6	58.5	268	249	58.0	56.5	72.2	57.4	279	255	57.6	56.2	86.8	56.4

YSWU039

14,600 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	277	273	63.1	61.2	74.7	57.4	329	301	61.3	60.0	93.7	57.0	366	317	60.3	59.2	112.7	56.5
77/64	50	267	266	63.5	61.4	71.9	57.4	320	296	61.6	60.2	90.1	57.1	357	313	60.5	59.4	108.4	56.6

YSWU048

17,400 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	325	319	63.4	61.3	82.6	57.8	380	349	61.8	60.2	103.4	57.3	419	367	60.9	59.5	124.4	56.7
77/64	50	282	282	62.1	58.7	79.4	57.1	318	318	60.1	58.0	99.6	56.4	353	345	59.0	57.3	119.8	55.9

YSWU050

19,200 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	399	373	62.4	60.6	95.8	58.3	454	401	61.1	59.6	120.1	57.5	494	420	60.2	59.0	144.5	56.8
77/64	50	338	338	60.8	58.2	91.9	57.3	387	379	59.1	57.3	115.1	56.7	416	396	58.3	56.8	138.4	56.0

YSWU055

20,300 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	384	378	63.1	61.2	105.0	57.3	454	415	61.5	60.1	131.8	56.9	502	437	60.5	59.3	158.7	56.3
77/64	50	334	334	61.8	58.6	101.1	56.6	378	378	59.8	57.9	126.9	56.0	422	410	58.7	57.1	152.8	55.5

YSWU060

22,000 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	449	426	62.4	60.7	113.0	57.9	521	463	60.9	59.6	141.8	57.3	581	491	59.8	58.7	170.5	56.8
77/64	50	435	419	62.7	60.9	109.0	58.0	507	457	61.2	59.8	136.6	57.4	570	485	60.0	58.9	164.3	56.9

YSWU072

26,300 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	572	525	61.9	60.3	141.1	58.1	639	556	60.8	59.4	177.0	57.2	684	578	60.1	58.9	213.0	56.4
77/64	50	477	477	60.3	58.0	135.2	57.1	541	524	58.9	57.2	169.7	56.4	576	545	58.2	56.7	204.1	55.6

YSWU079

28,800 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	677	599	61.1	59.7	155.8	58.7	753	636	60.0	58.8	195.3	57.7	798	658	59.3	58.3	234.8	56.8
77/64	50	583	568	59.1	57.3	149.9	57.8	636	600	58.1	56.7	187.8	56.8	671	621	57.4	56.2	225.7	55.9

YSWU090

33,000 CFM through standard 4-row waterside economizer coil																			
EAT	EWT	Condenser water D T = 15						Condenser water D T = 12						Condenser water D T = 10					
		TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT	TMBH	SMBH	LDB	LWB	GPM	LWT
80/67	50	790	691	61.0	59.6	173.3	59.1	864	728	60.0	58.8	217.4	57.9	909	750	59.4	58.3	261.6	56.9
77/64	50	684	659	58.9	57.1	166.6	58.2	732	688	58.1	56.6	209.0	57.0	765	709	57.5	56.3	251.3	56.1

Hot Water Heat

Based on a 20°F water temperature change and 60°F entering air temperature

Unit	CFM	160°F EWT				180°F EWT			
		TMBH	LDB	GPM	WPD* (ft)	TMBH	LDB	GPM	WPD* (ft)
YSWU012	4,800	120	82.9	12.2	1.3	154	89.4	15.7	2.0
	3,500	102	86.7	10.4	0.9	131	94.3	13.4	1.4
YSWU016	6,400	160	82.9	16.2	1.7	26	89.4	21.0	2.8
	4,600	135	86.9	13.7	1.2	173	94.5	17.7	2.0
YSWU021	8,400	204	82.3	20.8	2.7	263	88.7	26.9	4.2
	6,400	178	85.5	18.1	2.0	229	92.8	23.4	3.3
YSWU025	10,000	245	82.4	24.9	3.6	315	88.8	32.2	5.6
	7,700	214	85.5	21.8	2.8	275	92.8	28.2	4.4
YSWU032	12,800	330	83.6	33.6	6.2	420	90.1	43.0	9.7
	9,600	285	87.2	29.0	4.8	362	94.6	37.0	7.4
YSWU039	15,600	419	84.3	42.6	9.4	530	90.7	54.2	14.8
	11,700	359	88.1	36.5	7.0	453	95.5	46.3	11.0
YSWU048	19,200	513	84.5	52.2	15.2	646	90.9	66.1	20.4
	14,800	449	87.8	45.7	10.3	564	95.0	57.8	15.5
YSWU050	20,000	547	85.1	55.7	4.7	690	91.6	70.6	7.2
	15,500	479	88.4	48.8	3.7	604	95.7	61.8	5.6
YSWU055	22,000	600	85.0	61.1	12.1	753	91.4	77.1	18.4
	16,900	524	88.4	53.3	9.3	656	95.6	67.2	14.3
YSWU060	24,000	641	84.5	65.2	5.4	808	90.9	82.7	8.3
	17,800	549	88.3	55.9	4.0	692	95.6	70.8	6.2
YSWU072	28,800	782	84.9	79.6	8.2	982	91.3	100.5	12.7
	21,300	669	88.8	68.0	6.1	839	96.1	85.8	9.4
YSWU079	31,600	877	85.4	89.2	12.0	1,096	91.8	112.1	19.4
	24,200	763	88.9	77.6	9.8	953	96.1	97.5	15.0
YSWU090	36,000	1,000	85.5	101.7	14.5	1,250	91.8	127.9	21.9
	27,750	873	88.9	88.9	11.4	1,091	96.0	111.6	17.1

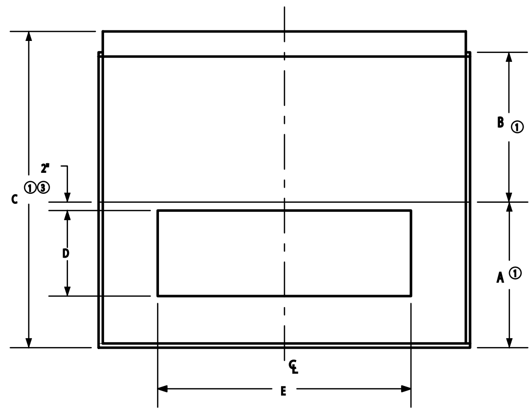
*Water pressure drop includes coil, valve, and piping.

Steam Heat

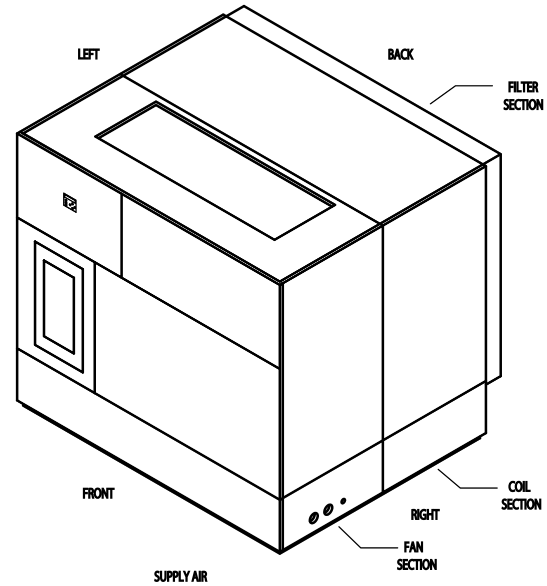
Selections based on 60°F entering air temperature

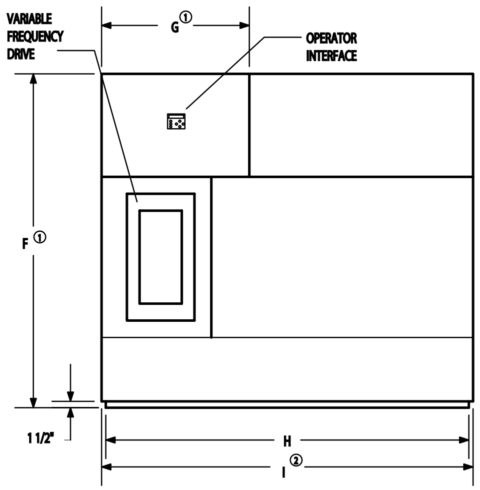
Unit	CFM	10 psi		
		TMBH	LDB	Steam Flow Rate (lb/hr)
YSWU012	4,800	200	98.4	210
	3,500	175	106	106
YSWU016	6,400	263	97.9	276
	4,600	228	105.7	239
YSWU021	8,400	338	97.1	355
	6,400	301	103.4	316
YSWU025	10,000	406	97.4	426
	7,700	364	103.6	382
YSWU032	12,800	524	97.7	549
	9,600	464	104.5	486
YSWU039	15,600	647	97.7	678
	11,700	569	104.9	597
YSWU048	19,200	688	93.1	722
	14,800	630	99.2	661
YSWU050	20,000	827	98.1	867
	15,500	754	104.9	791
YSWU055	22,000	807	93.8	847
	16,900	737	100.2	773
YSWU060	24,000	857	104.4	899
	17,800	953	96.6	1000
YSWU072	28,800	1,175	94.3	1232
	21,300	1,023	104.3	1073
YSWU079	31,600	1,082	91.6	1135
	24,200	990	97.7	1039
YSWU090	36,000	1,422	96.4	1492
	27,750	1,298	103.1	1362

Unit Dimensions 012, 016, 021, 025 & 032

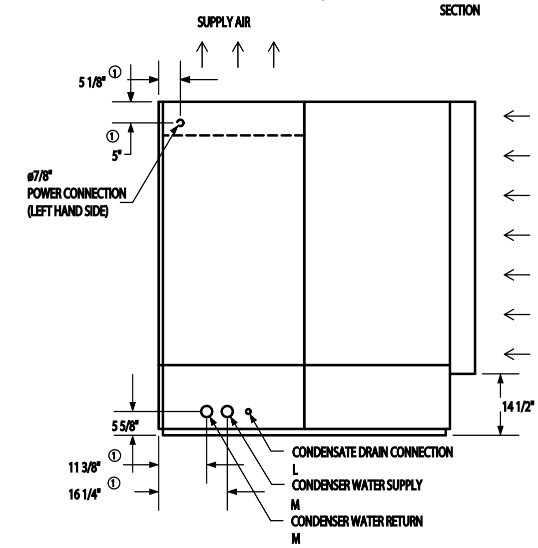


TOP VIEW





FRONT VIEW



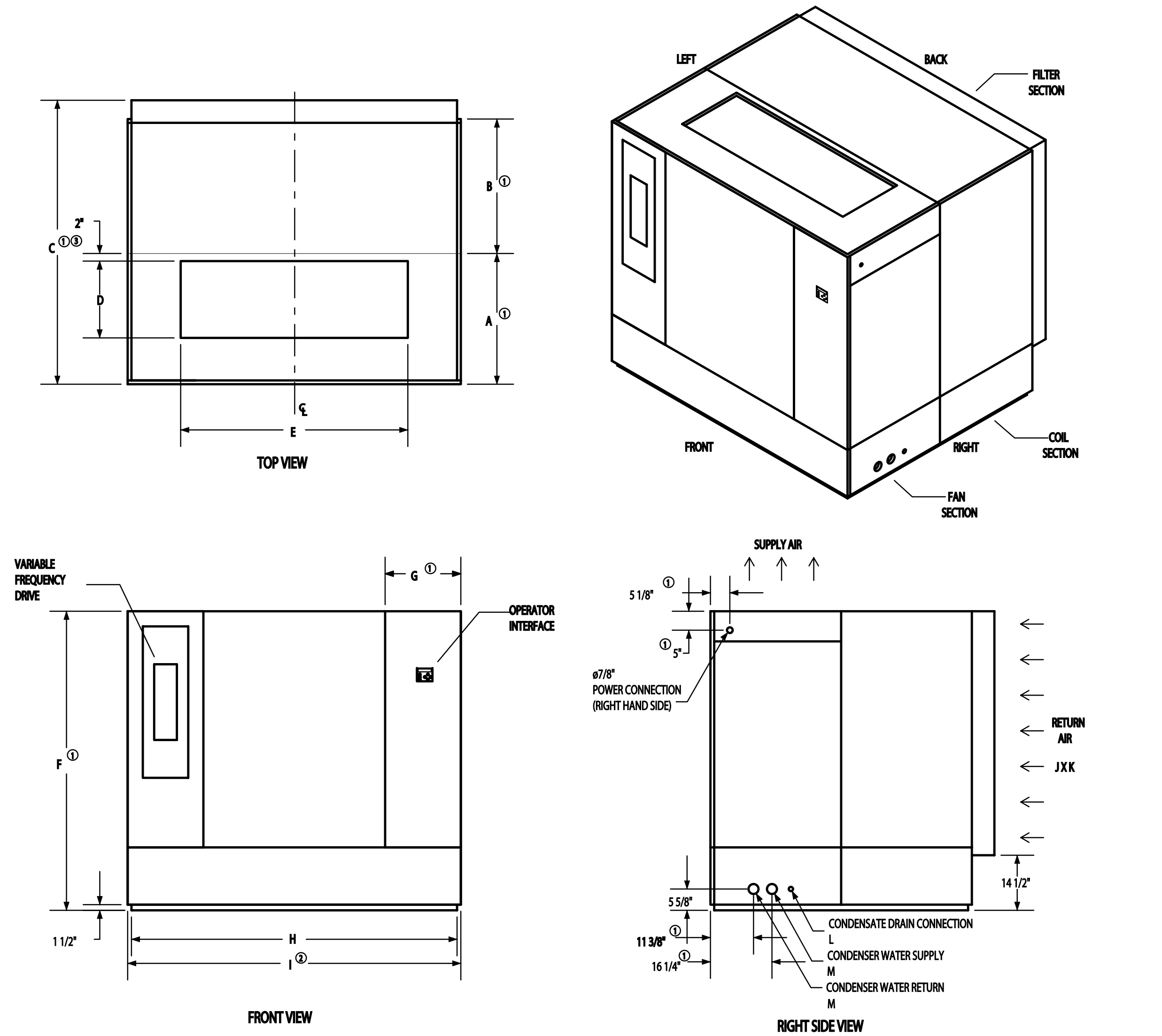
RIGHT SIDE VIEW

Notes: **A.** Dimensions do not include handles, latches, lifting lugs or fastner extensions **B.** All dimensions are ±0.25" **C.** Condenser water supply/return can be located on the left or the right hand side of the unit (right hand side shown)

Model YSWU		012, 016, 021 & 025	032	NOTES
CFM Range		3,300 to 10,000	8,700–13,000	**Modular** : construction allows the unit to be broken into sections to fit thru a 3' door or small freight elevator.
Tonnage Range		10 to 35	30–45	**New/Retrofit** : ability to be broken into smaller sections.
Unit Style		Modular	Modular	
A 1	Fan Section Width	34	34	**1** Add 1" for 1" access panels
B1	Coil Section Width	34	34	Add 2" for 2" access panels
C 1 & 3	Installed Width	68	68	Add 3" for 3" access panels
D	Discharge Opening Width	20	20	
E	Discharge Opening Length	40	48	**2** Add 2" for 1" access panels
F 1	Installed Height	78	78	Add 4" for 2" access panels
G 1	Electrical Section Width	22	22	Add 6" for 3" access panels
H	Base Length (no panels)	50	62	
I 2	Installed Length	50	62	**3** Add 6" for 4" pre-filters
J	Inlet Height	44	58 1/2	Add 12" for 4" pre-filters with 4" final filters
K	Inlet Length	60	60	Add 22" for 4" pre-filters and 12" final filters
L	Drain Connection	1 1/8	1 1/8	
M	Condenser Water Supply/Return	2 1/8	2 5/8	**C F** Consult Factory

All dimensions in inches

Unit Dimensions 039 to 090



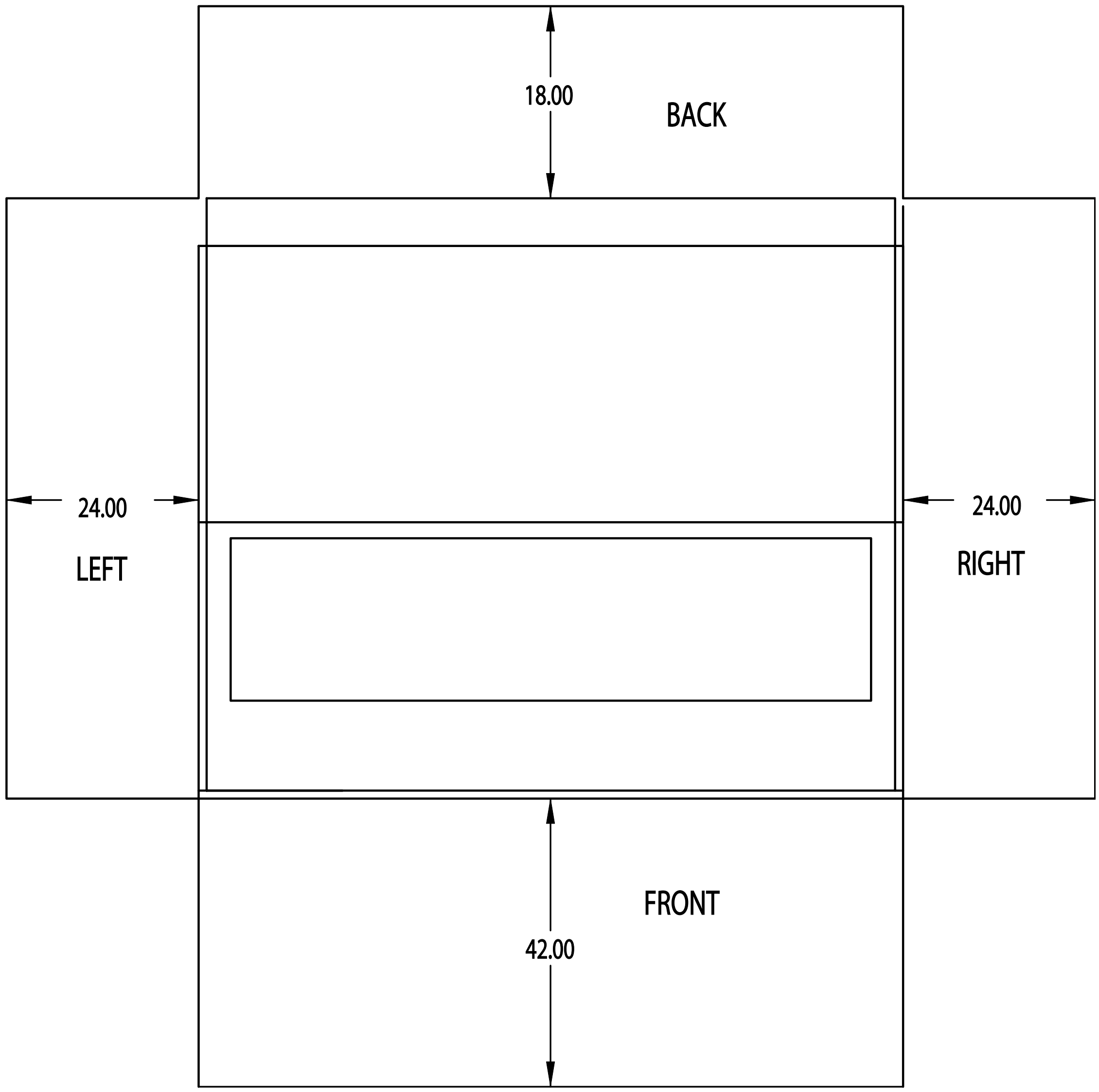
Notes: **A.** Dimensions do not include handles, latches, lifting lugs or fastner extensions **B.** All dimensions are ±0.25" **C.** Condenser water supply/return can be located on the left or the right hand side of the unit (right hand side shown)

	Model YSWU	039	048	050 & 060	055	072	079 & 090
CFM Range		10,700–16,000	12,700–19,000	14,000–24,000	14,700–22,000	19,100–28,700	21,000–36,000
Tonnage Range		35–55	40–65	40–80	50–75	65–100	70–120
Unit Style		Modular	Modular	New/Retrofit	Modular	New/Retrofit	New/Retrofit
A 1	Fan Section Width	34	34	CF	34	CF	CF
B 1	Coil Section Width	34	34	CF	34	CF	CF
C 1&3	Installed Width	68	68	82	68	82	94
D	Discharge Opening Width	20	20	24	20	24	24
E	Discharge Opening Length	64	76	72	84	90	112
F 1	Installed Height	78	78	98	78	98	98
G 1	Electrical Section Width	19 5/8	19 5/8	19 5/8	19 5/8	19 5/8	19 5/8
H	Base Length (no panels)	74	86	82	98	96	118
I 2	Installed Length	74	86	82	98	96	118
J	Inlet Height	58 1/2	58 1/2	73 1/2	58 1/2	73 1/2	73 1/2
K	Inlet Length	60	60	80	60	80	80
L	Drain Connection	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8
M	Condenser Water Supl/Ret.	2 5/8	2 5/8	2 5/8	3 1/8	3 1/8	3 1/8

NOTES
(see page 25)

All dimensions in inches

Recommended Service Clearances



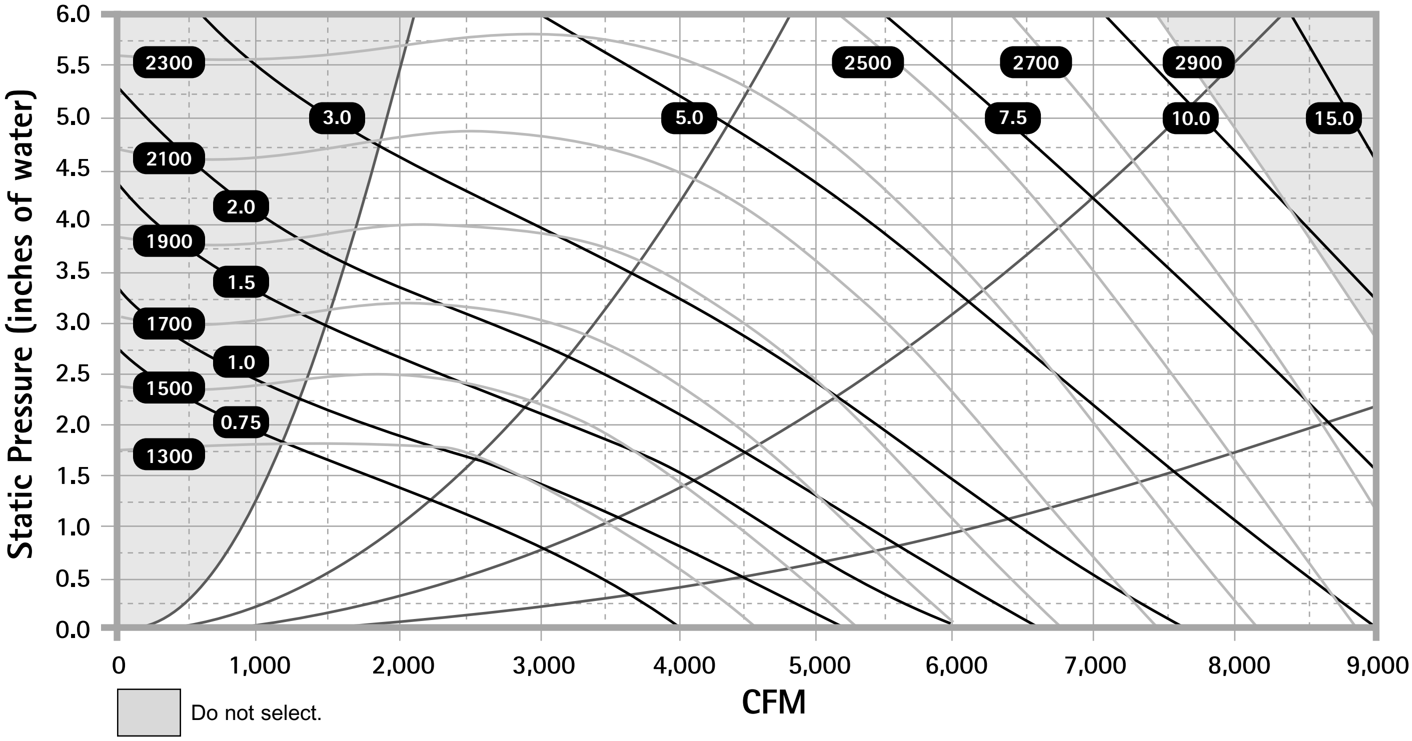
All dimensions in inches

Air Pressure Drops

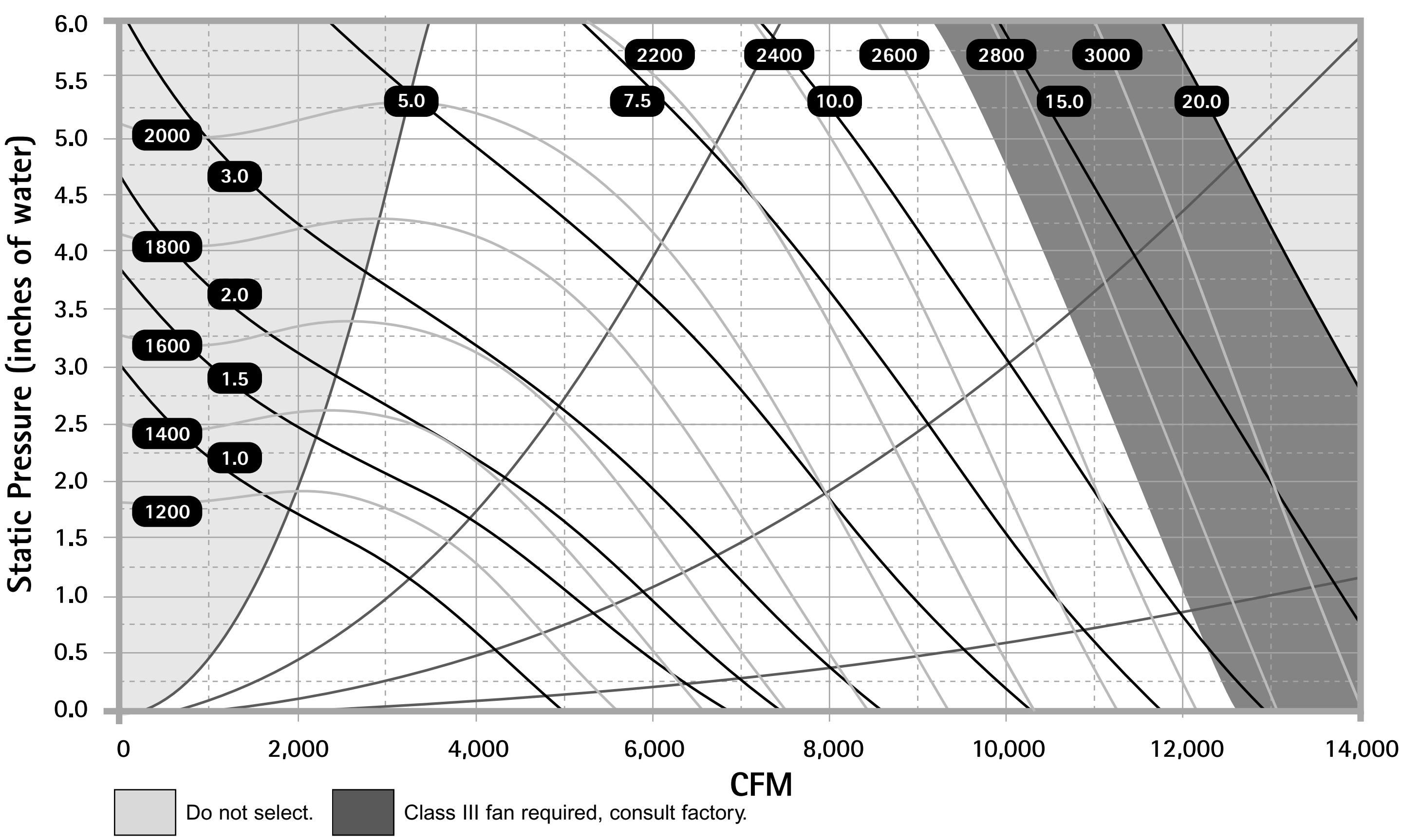
Unit	CFM	DX Coil	Water Econo	Heating HW	Heating Steam	Filters 4", 30%	Discharge Plenum Front or back	Discharge Plenum Side
YSWU012	2,500	0.25	0.17	0.04	0.04	0.05	0.22	0.33
	3,300	0.39	0.27	0.07	0.06	0.07	0.37	0.57
	4,100	0.56	0.39	0.10	0.09	0.09	0.56	0.88
	5,000	0.77	0.55	0.14	0.13	0.12	0.83	1.30
YSWU016	3,300	0.25	0.16	0.04	0.04	0.07	0.21	0.32
	4,400	0.39	0.27	0.07	0.06	0.10	0.37	0.57
	5,500	0.56	0.40	0.10	0.09	0.14	0.57	0.88
	6,600	0.75	0.54	0.14	0.12	0.18	0.81	1.27
YSWU021	4,100	0.24	0.16	0.04	0.04	0.09	0.21	0.32
	5,500	0.39	0.27	0.07	0.06	0.14	0.37	0.57
	6,900	0.56	0.40	0.10	0.09	0.19	0.57	0.89
	8,300	0.76	0.55	0.14	0.12	0.25	0.81	1.28
YSWU025	5,000	0.25	0.17	0.04	0.04	0.12	0.22	0.33
	6,600	0.39	0.27	0.07	0.06	0.18	0.37	0.56
	8,300	0.56	0.40	0.10	0.09	0.25	0.57	0.89
	10,000	0.76	0.55	0.14	0.12	0.32	0.82	1.28
YSWU032	6,500	0.25	0.17	0.04	0.04	0.12	0.22	0.33
	8,600	0.39	0.27	0.07	0.06	0.17	0.37	0.57
	10,800	0.57	0.40	0.10	0.09	0.24	0.57	0.89
	13,000	0.76	0.55	0.14	0.12	0.31	0.82	1.29
YSWU039	8,000	0.25	0.17	0.04	0.04	0.13	0.22	0.33
	10,600	0.39	0.27	0.07	0.06	0.19	0.37	0.57
	13,300	0.57	0.40	0.10	0.09	0.25	0.57	0.89
	16,000	0.76	0.55	0.14	0.12	0.33	0.82	1.29
YSWU048	9,500	0.25	0.17	0.04	0.04	0.14	0.22	0.33
	12,600	0.39	0.27	0.07	0.06	0.20	0.37	0.57
	15,800	0.57	0.40	0.10	0.09	0.27	0.57	0.89
	19,000	0.76	0.55	0.14	0.12	0.35	0.82	1.29
YSWU050	10,500	0.25	0.17	0.04	0.04	0.11	0.22	0.33
	14,000	0.40	0.27	0.07	0.06	0.17	0.38	0.58
	17,500	0.57	0.40	0.10	0.09	0.23	0.58	0.90
	21,000	0.77	0.55	0.14	0.12	0.29	0.82	1.29
YSWU055	11,000	0.25	0.17	0.04	0.04	0.14	0.22	0.33
	14,600	0.39	0.27	0.07	0.06	0.21	0.37	0.57
	18,300	0.57	0.40	0.10	0.09	0.28	0.58	0.89
	22,000	0.76	0.55	0.14	0.12	0.36	0.82	1.29
YSWU060	12,000	0.25	0.17	0.04	0.04	0.14	0.22	0.33
	16,000	0.40	0.27	0.07	0.06	0.20	0.38	0.58
	20,000	0.57	0.40	0.10	0.09	0.27	0.58	0.90
	24,000	0.77	0.55	0.14	0.12	0.35	0.82	1.29
YSWU072	14,300	0.25	0.17	0.04	0.04	0.14	0.22	0.32
	19,100	0.40	0.27	0.07	0.06	0.20	0.38	0.58
	23,800	0.57	0.40	0.10	0.09	0.27	0.57	0.89
	28,600	0.76	0.55	0.14	0.12	0.35	0.82	1.28
YSWU079	15,700	0.25	0.17	0.04	0.04	0.11	0.22	0.32
	21,000	0.40	0.27	0.07	0.06	0.16	0.38	0.58
	26,200	0.57	0.40	0.10	0.09	0.22	0.58	0.90
	31,500	0.77	0.55	0.14	0.12	0.28	0.82	1.29
YSWU090	18,000	0.25	0.17	0.04	0.04	0.13	0.22	0.33
	24,000	0.40	0.27	0.07	0.06	0.20	0.38	0.58
	30,000	0.57	0.40	0.10	0.09	0.26	0.58	0.90
	36,000	0.77	0.55	0.14	0.12	0.34	0.82	1.29

Fan Curves

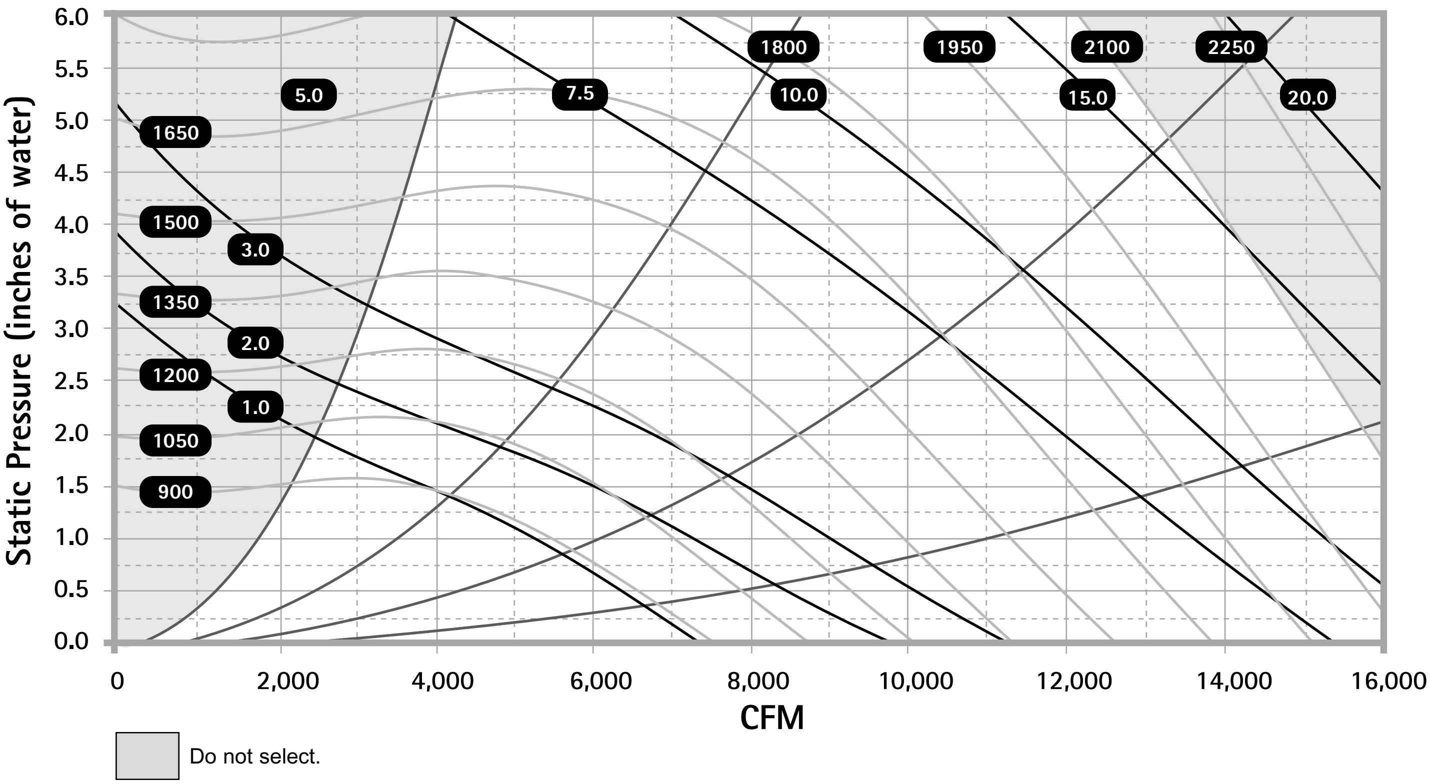
18” PLENUM FAN – MODELS 012, 016, 021, 025



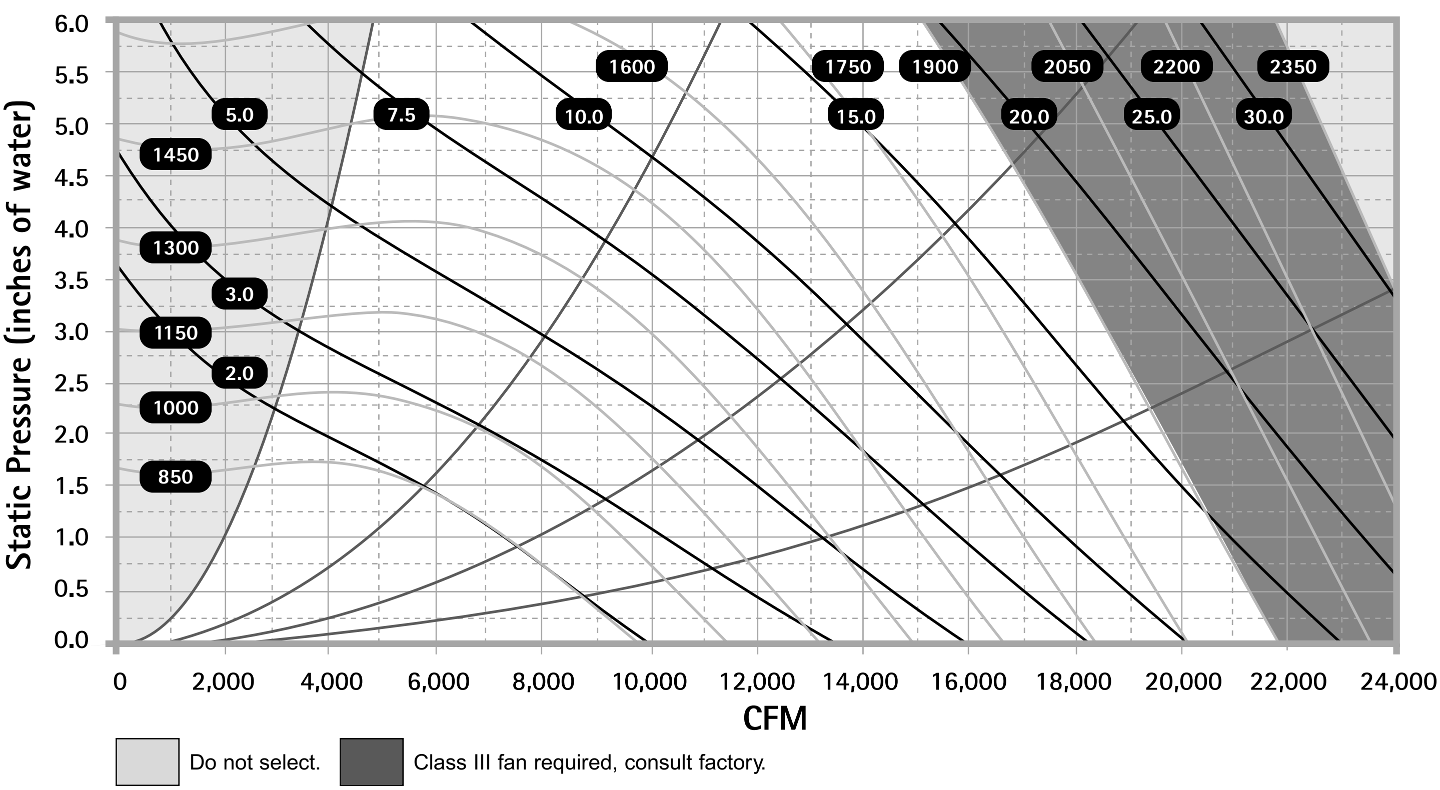
20” PLENUM FAN - MODEL 032



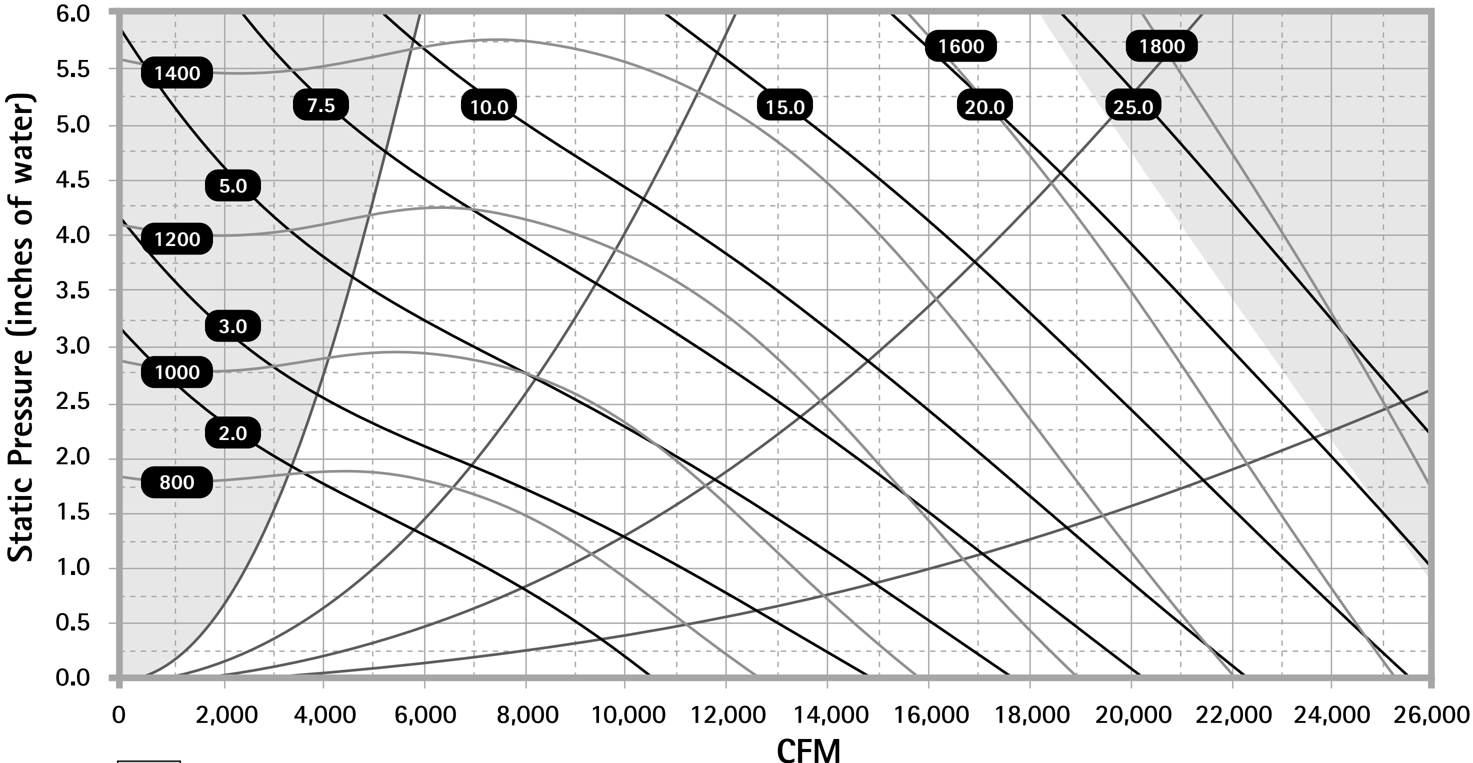
24" PLENUM FAN – MODELS 032, 039, 048



27" PLENUM FAN – MODELS 039, 048, 055

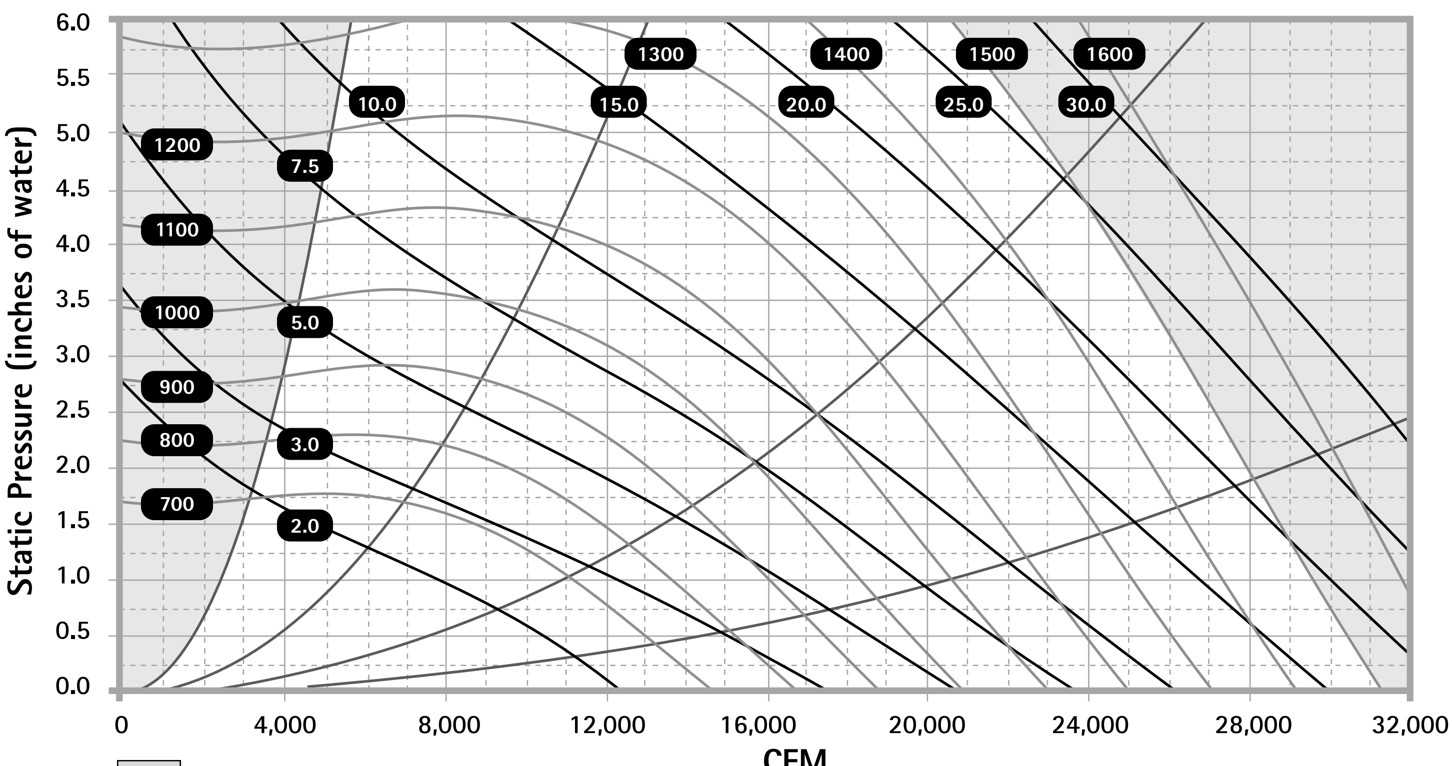


30" PLENUM FAN – MODELS 050, 060



Do not select.

33" PLENUM FAN – MODELS 050, 060, 072



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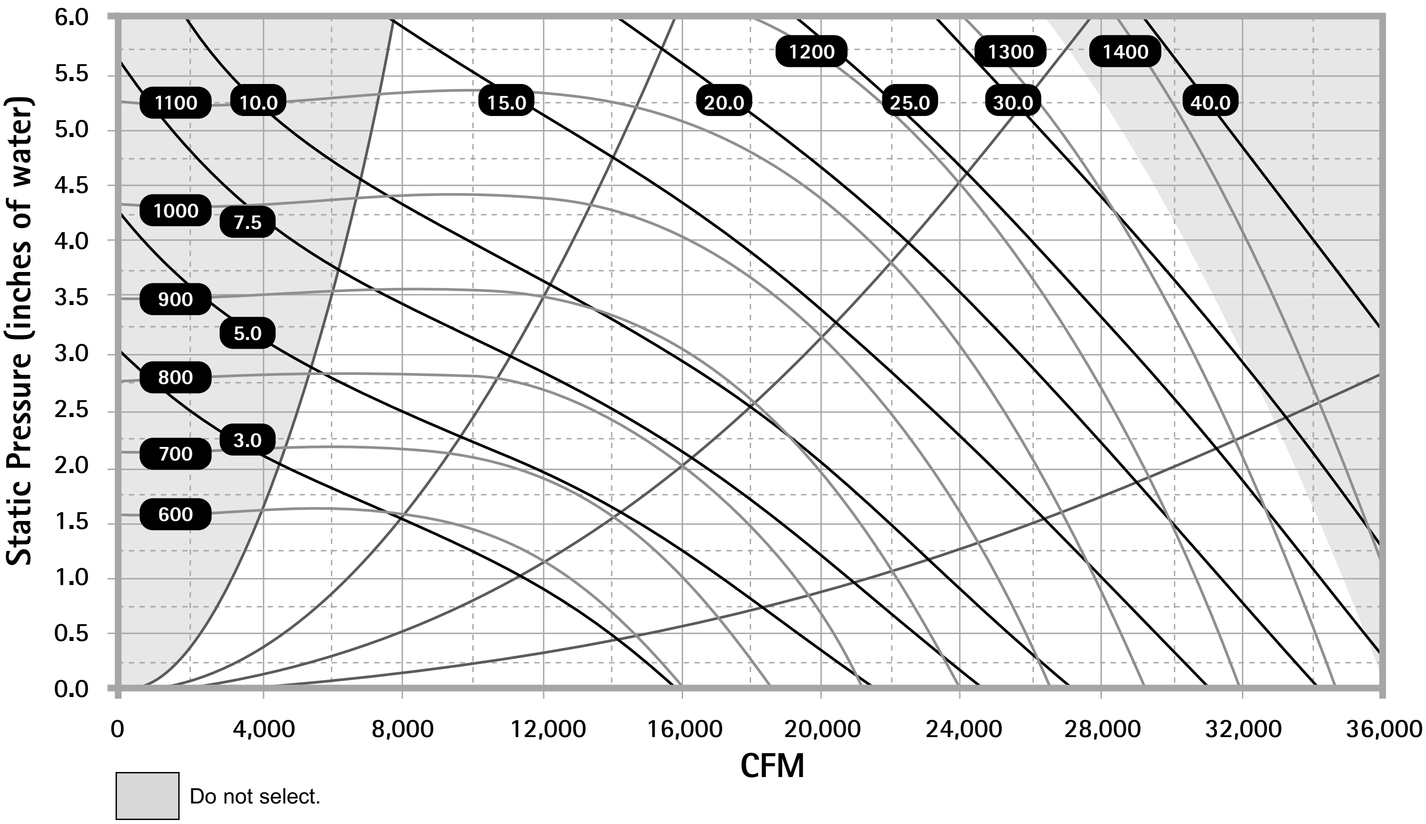
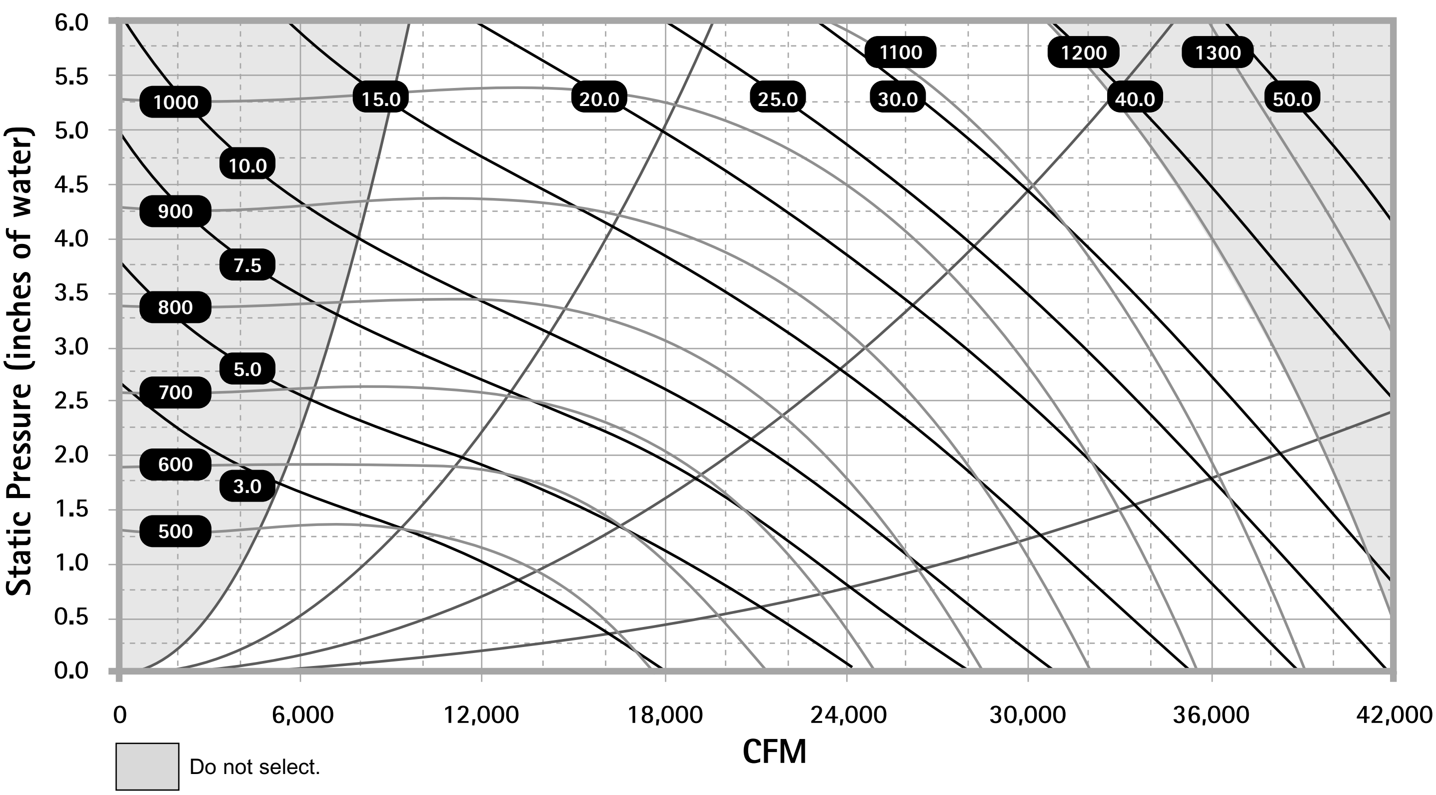
36" PLENUM FAN – MODELS 072, 079, 090



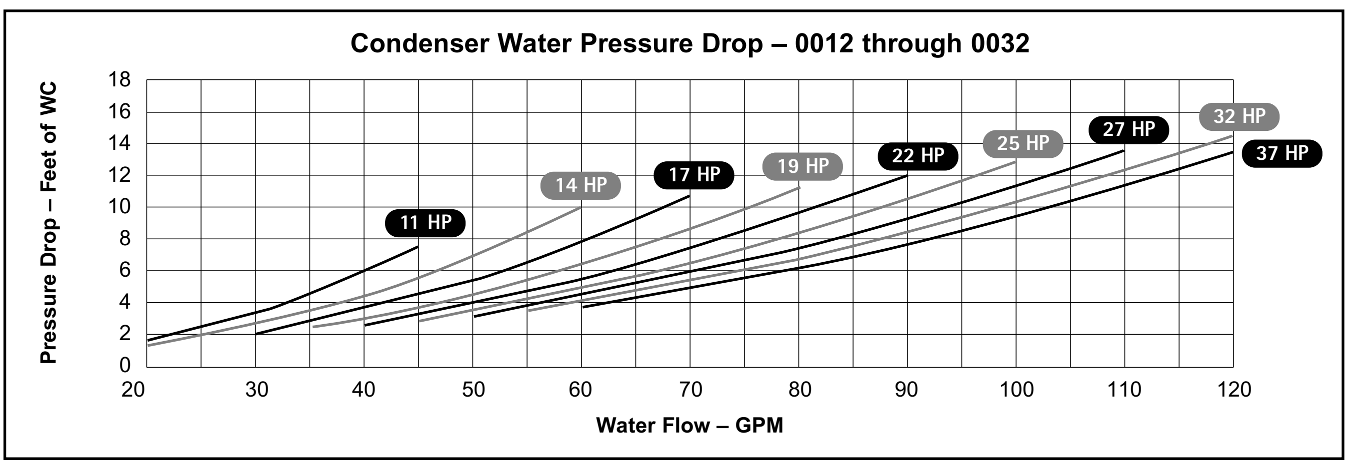
40" PLENUM FAN – MODELS 079, 090



Water Pressure Drop Tables

YSWU012 – YSWU032

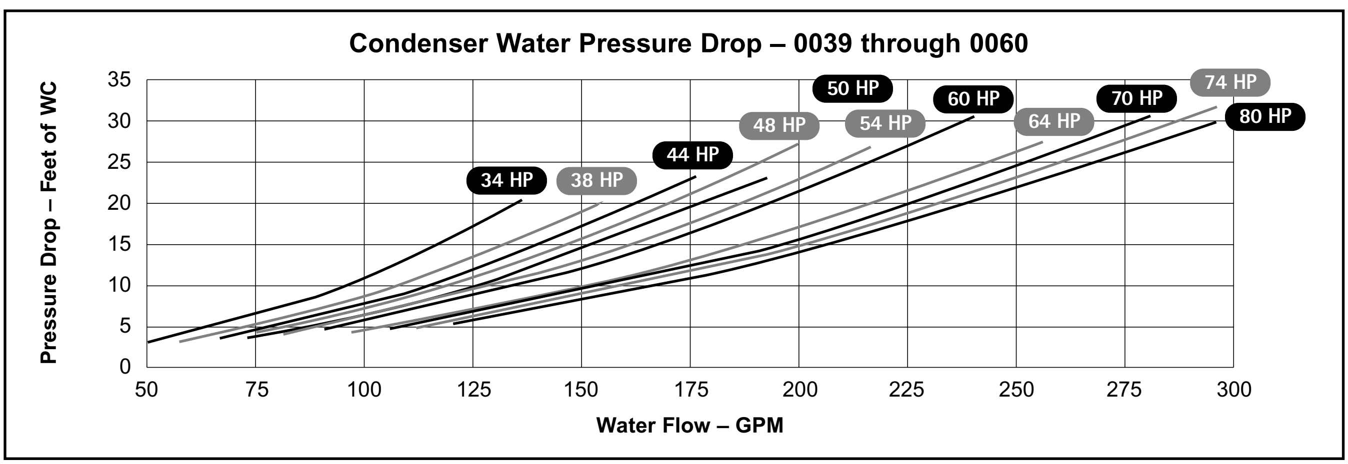
MinWater Flow	15	20	25	30	35	40	45	50	55
Max Water Flow	45	60	70	80	90	100	110	120	130
Compressors*	(1)4 & (1)7	(1)4 & (1)10	(1)7 & (1)10	(1)7 & (1)12	(1)7 & (1)15	(1)10 & (1)15	(1)12 & (1)15	(1)12 & (1)20	(1)12 & (1) 25
GPM	11 HP	14 HP	17 HP	19 HP	22 HP	25 HP	27 HP	32 HP	37 HP
20	1.56	1.17	-	-	-	-	-	-	-
25	2.42	1.80	-	-	-	-	-	-	-
30	3.46	2.57	2.04	-	-	-	-	-	-
35	4.68	3.48	2.75	2.28	-	-	-	-	-
40	6.09	4.51	3.57	2.95	2.52	-	-	-	-
45	7.68	5.68	4.48	3.70	3.16	2.78	-	-	-
50	-	6.98	5.50	4.54	3.87	3.40	3.05	-	-
55	-	8.41	6.62	5.45	4.65	4.08	3.66	3.33	-
60	-	9.97	7.83	6.45	5.49	4.82	4.31	3.93	3.63
65	-	-	9.15	7.52	6.41	5.61	5.02	4.57	4.21
70	-	-	10.56	8.68	7.38	6.46	5.77	5.25	4.84
75	-	-	-	9.91	8.43	7.37	6.58	5.98	5.51
80	-	-	-	11.22	9.54	8.33	7.43	6.75	6.22
85	-	-	-	-	10.72	9.35	8.34	7.57	6.97
90	-	-	-	-	11.96	10.43	9.29	8.43	7.76
95	-	-	-	-	-	11.56	10.29	9.34	8.59
100	-	-	-	-	-	12.74	11.34	10.28	9.46
105	-	-	-	-	-	-	12.44	11.27	10.36
110	-	-	-	-	-	-	13.59	12.31	11.31
115	-	-	-	-	-	-	-	13.38	12.29
120	-	-	-	-	-	-	-	14.50	13.32
125	-	-	-	-	-	-	-	-	14.38
130	-	-	-	-	-	-	-	-	15.47



*(Quantity) Nominal HP & (Quantity) Nominal HP

YSWU039 – 0060

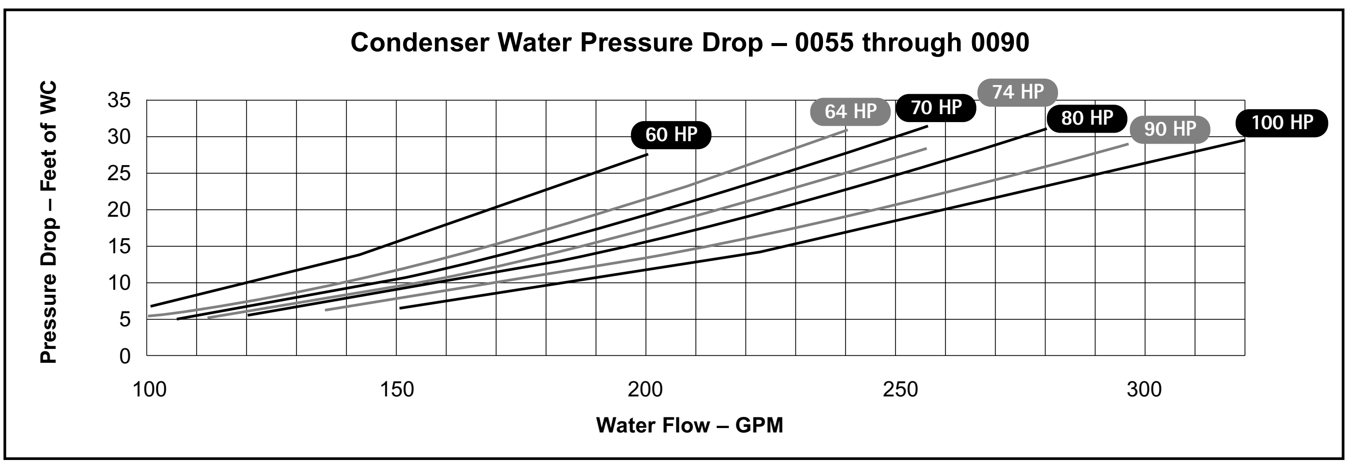
Min Water Flow	51	57	66	72	75	81	90	96	105	111	120
Max Water Flow	136	152	176	192	200	216	240	256	280	296	320
Compressors*	(2)7 & (2)10	(2)7 & (2)12	(2)7 & (2)15	(4)12	(2)10 & (2)15	(2)12 & (2)15	(4)15	(2)12 & (2)20	(2)15 & (2)20	(2)12 & (2)25	(2)15 & (2)25
GPM	34 HP	38 HP	44 HP	48 HP	50 HP	54 HP	60 HP	64 HP	70 HP	74 HP	80 HP
50	2.91	-	-	-	-	-	-	-	-	-	-
57	3.75	2.96	-	-	-	-	-	-	-	-	-
66	5.00	3.93	3.55	-	-	-	-	-	-	-	-
72	5.92	4.65	4.20	3.56	-	-	-	-	-	-	-
75	6.41	5.03	4.55	3.85	4.16	-	-	-	-	-	-
81	7.45	5.84	5.27	4.46	4.82	4.15	-	-	-	-	-
90	9.14	7.15	6.46	5.45	5.90	5.07	4.75	-	-	-	-
96	10.37	8.11	7.32	6.17	6.68	5.74	5.37	4.19	-	-	-
105	12.35	9.64	8.70	7.32	7.94	6.80	6.37	4.99	4.67	-	-
111	13.76	10.73	9.68	8.14	8.83	7.57	7.08	5.55	5.20	4.90	
120	16.02	12.48	11.25	9.45	10.26	8.78	8.21	6.45	6.04	5.69	5.39
136	20.44	15.90	14.32	12.01	13.05	11.14	10.42	8.20	7.68	7.23	6.84
152	-	19.71	17.75	14.85	16.16	13.78	12.87	10.16	9.51	8.95	8.46
176	-	-	23.54	19.66	21.41	18.22	17.01	13.48	12.60	11.85	11.20
192	-	-	-	23.22	25.30	21.50	20.07	15.94	14.90	14.00	13.22
200	-	-	-	-	27.37	23.24	21.68	17.24	16.11	15.14	14.29
216	-	-	-	-	-	26.92	25.10	20.00	18.68	17.54	16.56
240	-	-	-	-	-	-	30.67	24.50	22.87	21.47	20.25
256	-	-	-	-	-	-	-	27.74	25.88	24.29	22.91
280	-	-	-	-	-	-	-	-	30.74	28.84	27.19
296	-	-	-	-	-	-	-	-	-	32.08	30.23



*(Quantity) Nominal HP & (Quantity) Nominal HP

YSWU055 – YSWU090

Min Water Flow	90	96	105	111	120	135	150
Max Water Flow	240	256	280	296	320	360	400
Compressors*	(4)15	(2)12 & (2)20	(2)15 & (2)20	(2)12 & (2)25	(2)15 & (2)25	(2)20 & (2)25	(4)25
GPM	60 HP	64 HP	70 HP	74 HP	80 HP	90 HP	100 HP
90	5.63	-	-	-	-	-	-
96	6.40	5.03	-	-	-	-	-
105	7.65	6.01	5.40	-	-	-	-
111	8.54	6.71	6.03	5.46	-	-	-
120	9.98	7.84	7.04	6.37	5.80	-	-
135	12.61	9.90	8.89	8.04	7.32	6.27	-
150	15.56	12.20	10.95	9.91	9.02	7.71	6.78
200	27.58	21.61	19.38	17.52	15.94	13.51	11.87
240	-	31.03	27.83	25.14	22.86	19.29	16.92
256	-	-	31.63	28.57	25.98	21.88	19.19
280	-	-	-	-	31.02	26.07	22.84
296	-	-	-	-	-	29.05	25.45
320	-	-	-	-	-	-	29.62



*(Quantity) Nominal HP & (Quantity) Nominal HP

Electrical Data

FAN MOTOR DATA

Horsepower	208/60/3 FLA	230/60/3 FLA	460/60/3 FLA	575/60/3 FLA
3	8.8	8.6	4.3	3.8
5	14.2	13.2	6.6	5.9
7.5	21.4	19.6	9.8	8.4
10	28.6	26.4	13.2	10.4
15	42.0	39	19.5	16.0
20	55.0	50.0	25.0	20.0
25	66.0	60.0	30.0	26.0
30	80.0	70.0	35.0	28.5
40	110.0	93.0	46.0	36.1
50	137.0	118.0	59.0	46.5

COMPRESSOR MOTOR DATA

HP	208/60/3		230/60/3		460/60/3		575/60/3	
	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA
4	12.1	91.0	10.9	91.0	5.5	50.0	4.4	37.0
7	19.6	164.0	17.7	164.0	9.7	100.0	7.8	80.0
10	31.2	239.0	28.2	239.0	14.1	125.0	11.3	80.0
12	34.4	245.0	31.1	245.0	15.5	113.0	12.5	100.0
15	42.1	425.0	38.0	425.0	19.0	187.0	15.2	148.0
20	57.5	500.0	52.0	500.0	26.0	250.0	20.8	200.0
25	74.4	500.0	67.2	500.0	32.0	250.0	25.6	200.0

Weights

Unit Weights	012	016	021	025	032	039	048	050	055	060	072	079	090
Cooling Coil Section													
Cabinet	451	456	461	466	529	593	656	818	720	823	911	1135	1140
Evaporative Coil	168	206	244	282	350	418	486	528	554	592	694	761	855
Waterside Economizer Section													
4 Row, 12 FPI	267	305	343	381	457	549	627	679	705	743	855	932	1,026
Water Weight	35	47	58	70	91	112	133	147	154	168	201	221	252
Heating Section													
Hot Water Heat	63	83	105	126	163	201	238	263	276	301	359	395	451
Water Weight	11	14	18	22	28	35	41	46	48	52	62	68	78
Steam	63	83	105	126	163	201	238	263	276	301	359	395	451
Electric Heat	21	21	21	21	21	21	42	42	42	42	42	42	42
Return Air Section													
Filters													
4”, 30%	182	182	182	182	213	244	276	352	306	352	401	477	477
Fan Section													
Cabinet	451	456	461	466	529	593	656	818	720	823	911	1135	1140
Fan and Base													
18”	203	203	203	203	-	-	-	-	-	-	-	-	-
20”	213	213	213	213	213	-	-	-	-	-	-	-	-
22”	-	-	-	-	233	233	-	-	-	-	-	-	-
24”	-	-	-	-	-	285	285	-	-	-	-	-	-
27”	-	-	-	-	-	428	428	-	428	-	-	-	-
30”	-	-	-	-	-	-	-	472	-	472	-	-	-
33”	-	-	-	-	-	-	-	598	-	598	598	-	-
36”	-	-	-	-	-	-	-	-	-	-	685	685	685
40”	-	-	-	-	-	-	-	-	-	-	-	920	920
44”	-	-	-	-	-	-	-	-	-	-	-	-	-
Motor HP													
2	64	-	-	-	-	-	-	-	-	-	-	-	-
3	100	100	-	-	-	-	-	-	-	-	-	-	-
5	117	117	117	117	-	-	-	-	-	-	-	-	-
7.5	194	194	194	194	194	194	-	194	-	-	-	-	-
10	213	213	213	213	213	213	213	213	213	213	213	213	-
15	-	-	326	326	326	326	326	326	326	326	326	326	326
20	-	-	-	-	368	368	368	368	368	368	368	368	368
25	-	-	-	-	-	-	495	495	495	495	495	495	495
30	-	-	-	-	-	-	-	-	-	519	519	519	519
40	-	-	-	-	-	-	-	-	-	-	602	602	602
50	-	-	-	-	-	-	-	-	-	-	-	-	-
Variable Frequency Drive													
2	5	-	-	-	-	-	-	-	-	-	-	-	-
3	8	8	-	-	-	-	-	-	-	-	-	-	-
5	13	13	13	13	-	-	-	-	-	-	-	-	-
7.5	51	51	51	51	51	51	-	51	-	-	-	-	-
10	51	51	51	51	51	51	51	51	51	51	51	51	-
15	-	-	66	66	66	66	66	66	66	66	66	66	66
20	-	-	-	-	66	66	66	66	66	66	66	66	66
25	-	-	-	-	-	-	106	106	106	106	106	106	106
30	-	-	-	-	-	-	-	-	-	106	106	106	106
40	-	-	-	-	-	-	-	-	-	-	106	106	106
50	-	-	-	-	-	-	-	-	-	-	-	-	-

Unit Weights	Water Weight	012	016	021	025	032	039	048	050	055	060	072	079	090
Compressor/Condenser														
(1)4 & (1)7	26	333	333	-	-	-	-	-	-	-	-	-	-	-
(1)4 & (1)10	34	358	358	-	-	-	-	-	-	-	-	-	-	-
(1)7 & (1)10	41	434	434	434	-	-	-	-	-	-	-	-	-	-
(1)7 & (1)12	46	456	456	456	-	-	-	-	-	-	-	-	-	-
(1)7 & (1)15	53	-	597	597	597	-	-	-	-	-	-	-	-	-
(1)10 & (1)15	60	-	-	673	673	673	-	-	-	-	-	-	-	-
(1)12 & (1)15	65	-	-	694	694	694	-	-	-	-	-	-	-	-
(1)12 & (1)20	77	-	-	-	856	856	-	-	-	-	-	-	-	-
(1)12 & (1)25	89	-	-	-	905	905	-	-	-	-	-	-	-	-
(1)15 & (1)25	96	-	-	-	-	1,046	-	-	-	-	-	-	-	-
(2)7 & (2)10	82	-	-	-	-	-	954	-	-	-	-	-	-	-
(2)7 & (2)12	91	-	-	-	-	-	1,016	1,016	-	-	-	-	-	-
(4)10	96	-	-	-	-	-	1,144	1,144	-	-	-	-	-	-
(2)7 & (2)15	106	-	-	-	-	-	1,311	1,311	1,311	-	-	-	-	-
(4)12	115	-	-	-	-	-	1,232	1,232	1,232	1,229	-	-	-	-
(2)10 & (2)15	120	-	-	-	-	-	-	1,483	1,483	1,490	1,483	-	-	-
(2)12 & (2)15	130	-	-	-	-	-	-	-	1,527	1,534	1,527	-	-	-
(4)15	144	-	-	-	-	-	-	-	1,822	1,839	1,822	1,839	-	-
(2)12 & (2)20	154	-	-	-	-	-	-	-	-	-	1,899	1,968	-	-
(2)15 & (2)20	168	-	-	-	-	-	-	-	-	-	2,194	2,273	2,273	-
(2)12 & (2)25	178	-	-	-	-	-	-	-	-	-	-	2,111	2,111	2,111
(2)15 & (2)25	192	-	-	-	-	-	-	-	-	-	-	2,417	2,417	2,417
(2)20 & (2)25	216	-	-	-	-	-	-	-	-	-	-	-	2,851	2,851
(4)25	240	-	-	-	-	-	-	-	-	-	-	-	2,994	2,994
(2)25 & (4)15	264	-	-	-	-	-	-	-	-	-	-	-	-	-
(6)20	288	-	-	-	-	-	-	-	-	-	-	-	-	-
(2)25 & (4)20	312	-	-	-	-	-	-	-	-	-	-	-	-	-
(2)20 & (4)25	336	-	-	-	-	-	-	-	-	-	-	-	-	-
(6)25	360	-	-	-	-	-	-	-	-	-	-	-	-	-
Discharge Plenum														
Factory Installed		492	492	492	492	560	627	695	759	763	759	846	1,073	1,073

Mechanical Specifications

CABINET CONSTRUCTION

Each unit shall be completely factory assembled and shipped in one piece [three pieces]. The unit framework shall be fabricated from formed steel members of 10-gauge and 16-gauge. The galvanized steel base includes 10-gauge formed steel members for structural strength, easy installation, and to prevent damage caused during rigging. Exterior cabinetry and access panels shall be constructed with a minimum of 18-gauge steel. Exterior panels shall be fabricated from pre-painted galvanized steel for aesthetics. Paint finish shall be beige color. Integral lifting brackets shall be installed on the unit base with holes able to accept hooks.

For quick and easy adjustments of refrigerant components and high/low voltage electrical components without interrupting operation during the occupied mode, unit shall include sections to locate these items out of the air stream. The unit shall incorporate removable access panels on all sides of the unit to allow service access to the coil section, fan section, condenser section, compressors and control components. The electrical panel access doors shall be hinged and shall be small enough to open within the service clearance of the unit. Each panel shall be secured with latches. The latches should not require tools for panel removal except those over high voltage electrical components and mopving parts. The exterior panels shall be insulated with 1-inch [2-inch, 3-inch], 1.5 pcf [3.0 pcf] density, heavy mat-faced fiberglass insulation. This type of insulation is used for better acoustics and efficiency. The insulation shall be held in place with 22-gauge perforated galvanized sheet metal, which shall provide additional sound attenuation. [Solid 22-gauge galvanized steel liners shall be provided to allow wash down.]

Installation manual, start-up form, operating bulletin, maintenance bulletin, and a hard copy of the electrical wiring diagrams are supplied inside each unit. Units shall have labels to indicate caution areas for servicing the unit. The data plate (nameplate) is permanently attached to the unit on the external panel next to the user interface panel on the front of the unit.

DISCHARGE PLENUM

Units shall be provided with an optional acoustical discharge plenum shipped factory-mounted [loose for field installation]. The duct opening(s) in the discharge plenum shall be located for horizontal duct connection(s). Single [Multiple] duct opening size(s) and location(s) shall be coordinated with the factory. Duct openings for the discharge plenum shall not require field cutting or modifications.

The plenum shall be constructed of formed 16-gauge galvanized steel. The exterior panels shall be fabricated from 18-gauge pre-painted galvanized steel. The plenum wall shall be insulated with 1-inch [2-inch, 3-inch or 4-inch], 1.5 pcf [3.0 pcf] density fiberglass acoustical insulation. [For acoustical purposes, the interior walls of the plenum shall be lined with 22-gauge, galvanized steel, perforated liner.] [A fiber barrier made from Tedlar shall be placed between the perforated liners and the face of the insulation.]

Closed cell gasket and clear silicon caulking shall be placed between the unit and the discharge plenum to prevent air leakage. Brackets anchored with bolts shall attach the plenum to the unit. When the plenum is to be shipped loose, mounting hardware including bolts, brackets, gasket and caulking shall be provided from the factory. It shall be shipped inside the plenum.

RETURN SECTION

Filters—The filter section shall be constructed of 16-gauge painted galvanized steel. The filters shall be face-loading (removable from the back of the unit). [For servicing the filters from either side, hinged and latched access doors shall be provided on both sides of the unit.] To improve indoor air quality and reduce filter changes, 4” [12”] thick filters shall be provided with a maximum face velocity of 500 FPM. ASHRAE Standard 52.1-1992 shall determine the efficiency of the filter. The minimum efficiency shall be MERV 8 [9, 10, 11, 12, 13 or 14] (efficiency 30% (65%, 85%, or 95%)). The construction of the filter shall have media resistant to water consisting of mini pleats.

Airside Economizer Mixing Box—For ducted return applications, a mixing box with integral low leak dampers shall be provided. This section shall be shipped separate from the unit for field installation. The mixing box panels shall be made from 18-gauge painted galvanized steel. The frame casing shall be constructed of 16-gauge galvanized steel. The section shall include dampers for the return and outdoor air. Dampers shall be opposed, airfoil shaped, and sealed by vinyl gasket along the edges for low leakage. The dampers shall be fabricated from 16-gauge galvanized steel and rotate on nylon bearings. An integral filter section shall be included.

The return and outdoor air opening locations and sizes shall be coordinated with the factory, which include the side(s), top, and/or bottom. A control actuator with linkages for the return air dampers and another for the outdoor air dampers shall be factory installed. The dampers actuator shall modulate in response to the cooling load during the economizer mode. The outdoor air damper and return air damper shall be controlled in a reverse-acting fashion by the unit controller.

Economizer operation shall be controlled to maximize free cooling operation based on dry-bulb set point comparison, enthalpy set point comparison, or return and outdoor air comparative enthalpy control. If outdoor air is suitable for cooling, the outdoor air dampers shall modulate to maintain temperature set point. If the outdoor air cannot satisfy the cooling load, mechanical cooling shall assist the pre-cooling to achieve temperature set point. To maximize energy savings, the economizer shall pre-cool until disabled by the enthalpy or temperature. When the economizer is disabled, the outdoor air dampers shall be set to the minimum position of 15% (keypad adjustable).

COOLING COIL SECTION

Direct Expansion (DX)—DX cooling coils shall be ARI certified and constructed of seamless 0.50-inch outside diameter copper tubing with a minimum wall thickness of 0.016-inches. The copper tubes shall be mechanically expanded to the aluminum fins. Coils shall be a minimum of 4-rows [6-rows or 8-rows], with a minimum of 12 fins per inch. An adjustable thermal expansion valve (TXV) including an external equalizer shall feed each circuit. The TXV shall be sized to operate with a minimum entering condenser water temperatures of 55°F. The coil shall be leak tested with high-pressure nitrogen in a warm water bath. To prevent refrigerant control issues at low load conditions, the minimum design face velocity shall be a minimum 400 FPM.

The coil section shall include an integral drain pan constructed of 16-gauge, type 304 stainless steel. The minimum depth of the drain pan shall be 2 inches. The drain pan shall be sloped in all directions towards the condensate drain connection to provide positive drainage. The unit shall include a factory installed drain line and drain trap with a cleanout for field installation to ensure adequate access to the trap. Convenient access to the coil, drain pan, and drain trap for inspection and cleaning shall be accessible.

Waterside Economizer—Waterside economizer cooling coils shall be ARI certified and constructed of seamless 0.50-inch outside diameter copper tubing with a wall thickness of 0.016-inches. The copper tubes shall be mechanically expanded to the aluminum fins. Coils shall be a minimum of 4-rows, with a minimum of 12 fins per inch. The circuiting of the coil shall be such to allow the lowest water pressure drop. Waterside economizer water coils shall have a vent and drain. The coil shall be provided to be chemically [and mechanically] cleanable. The coil shall be leak tested with high-pressure nitrogen in a warm water bath. The complete economizer package, including the coil, valves, and piping shall be rated for 400-psig waterside working pressure.

To control the water flow through the coil, a factory installed modulating control valve package shall be provided. A valve package includes the valve, actuator, wiring, and piping internal to the unit. The condenser water piping connections shall be located inside, close to the exterior of the unit, located for easy connection to the building risers. One set of connections (one for inlet and one for outlet) is needed for each unit.

Economizer operation shall be controlled to maximize free cooling operation as the entering condenser water is colder than the entering air (mixed air = outdoor air + return air) temperature to the unit. A default differential of 5°F (keypad adjustable between 5°F to 10°F) is needed to prevent intermediate changes. If the condenser water is suitable for cooling, the economizer valve shall modulate to maintain temperature set point. If the cold condenser water cannot satisfy the cooling load, mechanical cooling shall assist the pre-cooling to achieve temperature set point. To maximize energy savings, the economizer shall pre-cool until disabled when the condenser water becomes too warm compared to the entering air temperature. When the economizer is disabled, the economizer valve shall shut and the condenser valve shall open to allow 100% water flow through the condenser.

When the unit is in the unoccupied mode, the economizer is disabled and the economizer valve is always closed. The condenser valve can be set to either closed or 100% open. If the condenser valve is closed, called variable waterflow condenser mode, the system water flow shall be reduced, thus saving pumping energy. If the condenser valve is set to closed in the unoccupied mode, the valves shall be controlled to work independent of the economizer valve. If the condenser valve is set to be 100% open in the unoccupied mode, the valves shall work in reverse acting. This is constant waterflow condeser mode.

[*A non-averaging type freezestat shall be factory installed. When the freezestat senses the entering air temperature is below the set point, the unit shall be put into the unoccupied mode and the economizer valve shall be driven to 100% open and the condenser valve shall be driven closed*.]

HEATING SECTION (OPTIONAL)

Hot Water—Hot water heating coils shall be ARI certified and constructed of seamless 0.50-inch outside diameter copper tubing with a wall thickness of 0.016-inches. The copper tubes shall be mechanically expanded to the aluminum fins. Coils shall be a minimum of 1-row, with a minimum of 12 fins per inch. The circuiting of the coil shall be such to allow the lowest water pressure drop. Hot water coils shall have a vent and drain. The coil shall be leak tested with high-pressure nitrogen in a warm water bath. Convenient access to the coil for inspection and cleaning shall be from both sides of the unit. The coil shall be installed in the draw-through position.

To control the water flow through the coil, a factory installed two-way [three-way control] modulating valve package shall be provided. A valve package includes the valve, actuator, wiring, and piping internal to the unit. The piping connections shall be protruding through the casing, located for easy connection to the building risers.

To protect the coil from freezing, Ethylene or Propylene glycol shall be used, with 30% [40%, 50%] by weight.

[*A non-averaging type freezestat shall be factory installed. When the freezestat senses the entering air temperature is below the set point, the unit shall be put into the unoccupied mode and the hot water valve shall be signaled to drive 50% open*.]

Electric—1 [2]-staged electric heating coils shall be factory installed on the unit outlet. The heating elements in the coils shall be constructed of low-watt density, nickel-chromium elements. Safety controls shall include an automatic reset, high limit control for each heater element. Also, a manual reset backup line break protection in each heater element branch circuit is included. To meet NEC requirements, the heating element branch circuits shall be individually fused to a maximum of 45 amps.

Steam—Steam heating coils shall be ARI certified and constructed of seamless 0.625-inch outside diameter copper tubing with a wall thickness of 0.016-inches. The copper tubes shall be mechanically expanded to the aluminum fins. Coils shall be a minimum of 1-row, with a minimum of 6 fins per inch. The steam coil shall be pitched at a slope of 1/8" per linear foot to provide drainage for the condensate. Steam coils shall have a vent and drain. For the drain, the return connection shall be at the lowest point to enable the condensate to empty from the coil. The coil shall be leak tested with high-pressure nitrogen in a warm water bath. The coil shall be installed in the draw-through position.

[*A non-averaging type freezestat shall be factory installed. When the freezestat senses the entering air temperature is below the set point, the unit shall be put into the unoccupied mode, and the steam valve shall be driven 100% open*.]

FAN SECTION

Supply Air Fan—A single supply fan shall be provided comprised of a medium pressure, single-width, and single-inlet (SWSI) centrifugal fan wheel with airfoil blades. The fan wheel shall be a minimum of Class II construction to handle up to 6.0" total static pressure. The fan wheel and blades shall be constructed of painted steel. The fan shall be secured to a ground and polished solid steel shaft coated with rust inhibitor. The shaft shall be secured and supported by two heavy-duty pillow-block type grease lubricated bearings. Bearing diameter shall be the same size as the main shaft diameter. Bearings shall be sized to provide an L-50 life at 200,000 hours. The fan bearings shall have extended grease lines to a common location.

Fan Motor—Fan motors shall be heavy-duty 1750 rpm open drip-proof (ODP) type with grease-lubricated ball bearings. The motors shall meet applicable EPACT efficiency requirements [motors shall be premium efficiency]. Motors shall be T-frame with class B insulation that is inverter duty. Motors shall be mounted on a heavy-duty adjustable base that provides for proper alignment and belt tension adjustment. The minimum service factor shall be 1.15 fixed pitch V-belt drives with a minimum of two belts shall be provided. Drive shall have V-belts selected at the manufacturer's standard service factor [1.5 times fan brake horsepower].

Completed fan assembly, including fan, drive, motor assembly, and framework, shall be statically and dynamically balanced at the factory. Entire fan assembly shall be mounted on 1" [2"] spring isolators [1" spring isolators with seismic restraints]. The inlet to the fan assembly shall be isolated from the unit with a flexible connection. The entire fan assembly shall be isolated within the unit, thus eliminating external spring isolation. Use of standard waffle pads between the bottom of the unit and the concrete housekeeping pad is sufficient.

Variable Frequency Drives (VFD)—Airflow modulation and static pressure control shall be achieved by increasing or decreasing the speed of the variable frequency drive. The manufacturer of the variable frequency drive shall be approved for plenum duty applications.

When the unit controller has determined a VFD failure, the bypass contactor shall automatically be energized. Manual bypass is not acceptable. In the bypass mode, the fan shall operate at full design airflow and the VFD can be removed for service. When the unit enters the VFD bypass mode, the unit controller shall alert the building automation system (BAS) to signal the VAV boxes. They shall be driven 100% open to prevent over-pressurization until a service technician can look at the unit. The compressors shall be staged to meet the discharge air temperature set point.

The supply air fan drive output shall be controlled by the factory-installed unit control system. The VFD status and operating speed shall be monitored and displayed at the unit control panel. A factory mounted, field adjustable duct high-limit safety control shall be provided to protect ductwork from excessive duct pressure. The installer shall provide and install sensor tubing from [a single unit mounted sensor] [two unit mounted sensors] to the duct location(s).

The VFD and bypass contactor shall be completely wired and run tested at the factory. Motor overload relay is sized to protect the motor during bypass mode.

COMPRESSOR SECTION

Each unit shall have multiple high-efficiency, heavy-duty, suction-cooled scroll compressors. The compressors shall be single speed operating at 3450 rpm at 60 Hz. A refrigerant pressure transducer shall be installed on the discharge and suction side of each compressor. These sensors shall be used to indicate high pressure, low pressure, motor protection, and identify other conditions that could frost the DX coil. Each compressor shall include an oil sight-glass, motor overload protection, and a minimum five-minute interstage timer to prevent short cycling. The compressors shall be isolated internal to the unit by being mounted on rubber and shear isolators. Each refrigerant circuit shall include oil and charged with Refrigerant R-22. [Each compressor shall be complete with suction and discharge service valves with integral gauge ports.]

The compressors shall be independently fused. Single fuse block for multiple compressors shall not be accepted. This provides redundancy within the unit to allow mechanical cooling while a failed compressor is replaced.

CONDENSER SECTION

Water-Cooled—Condensers shall utilize high-efficiency, compact, mechanically cleanable tube in tube design. The condenser shall have removable brass clean-out plugs sealed with a rubber O-ring set into a high precision-machined female receptacle. The condenser shall be constructed of enhanced, heavy-walled copper tubes. The condenser shall have independent refrigerant circuits with a common water supply. Condensers shall be rated for 400 psig refrigerant and waterside working pressure. The factory piping, valve package and condenser shall be capable of a waterside working pressure of 400 psig. The completed condenser and piping assembly shall be leak tested at the factory.

AUXILIARY CONTROL OPTIONS

Non-Fused Disconnect—A factory installed non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. [Two factory installed non-fused disconnect switches shall be provided for disconnecting electrical power at the unit. One shall be sized for the controls and supply air fan motor. The other shall be sized for all the compressors.] The switch(es) shall be located at the front of the unit, visible and accessible without removing any access panels.

Phase Failure/Under Voltage Protection—A phase failure/under voltage protection device shall be provided to protect three-phase motors from damage due to single phasing, phase reversal and low voltage conditions.

Water Flow Switch—With a software algorithm and the discharge pressure input from each compressor, the loss of water flow can be determined. The use of mechanical devices to indicate water flow, such as differential water pressure across the condenser or paddle switches shall not be accepted because of the high failure rate. When the loss of water flow has been determined during compressor operation, the compressors shall be disabled. An alarm signal shall be generated.

Freezestat—A non-averaging type freezestat is factory mounted at the unit's entering face of the coil. When a temperature is sensed on any 18″ of the freezestat below 35°F (adjustable 30°F to 40°F), an alarm signal shall be generated, the fan will shut down, and the waterside economizer [heating] [waterside economizer and heating] valve shall be driven to 100% open to allow full flow. This alarm requires a manual reset.

Head Pressure Control Valve—When the entering condenser water temperature is below 55ºF and the use of waterside economizer is not available, a factory installed and controlled modulating head pressure control valve shall be provided. The valve actuator shall be controlled through the factory installed main unit control system to maintain refrigerant head pressure.

Dirty Filter Switch—A factory installed pressure switch senses the pressure differential across the filters. When the differential pressure exceeds 1.0-inches WG (adjustable), the normally open contacts close. This signals the unit controller that the filters are loaded and are in need of a change.

FACTORY TEST

Each unit shall undergo a rigorous factory-run test prior to shipment and factory test sheets shall be available upon request. The factory test shall include dynamic trim balancing of the completed fan assembly, a compressor run check, a complete run test of all electrical components and safeties (including proper control sequencing), a leak check of all refrigerant circuits, a leak check of all water circuits, and a final unit inspection.

AGENCY LISTING

The unit shall have ETL US/Canada listed by Intertek Testing Services, Inc.

SEQUENCE OF OPERATION

Zone Control

The unit can be put into an occupied mode by an internal time clock [software signal from the BAS][external binary input][through the keypad]. Once in the occupied mode, the unit shall enter the start-up mode. In this mode, before the fan is turned on, the system shall be allowed to make any changes. On initial start-up of the unit only, if the space temperature is below the heating space set point, the unit shall enter the morning warm-up mode. During the morning warm-up mode, the outdoor air damper is held closed and heating is energized. Once the heating space temperature is satisfied, heating shall be disabled, the outdoor air damper shall open to the minimum position, and the unit shall enter the fan mode. Unit shall go into fan mode directly from start-up initialization mode after the start-up timer has expired. In this mode, the unit shall only move air without heating or cooling it. Once the space temperature becomes too hot or cold, the unit shall transition into the heating or cooling mode. In the cooling mode, the economizer or mechanical cooling shall be used to reduce the space temperature. Economizer only mode allows only the economizer to be used to meet the cooling load. Economizer/mechanical cooling mode shall use the economizer whenever possible to pre-cool the entering air. If the economizer cannot satisfy the space temperature, mechanical cooling shall be energized for additional cooling capacity. Mechanical cooling only shall be used when the economizer is disabled. During this mode, only mechanical cooling shall be staged to meet the space temperature. In the heating mode, the unit shall control the heating device(s) to meet the space temperature heating set point. The unit shall stay in the cooling or heating mode until the space temperature is satisfied or the unit is put into the unoccupied mode.

Discharge Air Temperature (DAT) Control

The unit can be put into an occupied mode by an internal time clock [software signal from the BAS][external binary input][through the keypad]. Once in the occupied mode, the unit shall enter the start-up mode. In this mode, before the fan is turned on, the system shall be allowed to make any changes. This includes signaling the VAV boxes to open 100% to prevent duct over-pressurization. Unit shall go into fan mode directly from start-up to initialization mode after start-up timer has expired. In this mode, VAV boxes shall be signaled to operate in their normal mode. The unit shall only move air without heating or cooling it. Once the Return Air Temperature becomes too hot or cold, the unit shall transition into the heating or cooling mode. In the cooling mode, economizer and/or mechanical cooling shall be used to cool the different zones. Economizer only mode allows only the economizer to be used for cooling. Economizer/mechanical cooling mode shall use the economizer whenever possible to pre-cool the entering air. If the economizer cannot satisfy the DAT, mechanical cooling shall be energized for additional cooling capacity. Mechanical cooling only shall be used when the economizer is disabled. During this mode, only mechanical cooling shall be staged to meet the DAT set point. In the heating mode, the unit shall control the heating media to meet the DAT heating set point and the VAV boxes shall be driven 100% open. Airflow modulation for the fan is still maintained. The unit shall stay in the cooling or heating mode until the DAT is satisfied or the unit is put into the unoccupied mode.

CONTROL ALGORITHMS

Waterside Economizer

The waterside economizer shall be enabled when the entering condenser water temperature is below entering air temperature. The economizer is disabled once the condenser water temperature is greater than the entering air temperature. The economizer shall be used for cooling before mechanical cooling is used. The economizer valve shall modulate to maintain the cooling set point. When the economizer valve is 100% open and it cannot satisfy the DAT set point, mechanical cooling shall be staged on to assist the economizer to meet the cooling set point. The waterside economizer shall be used until it is disabled.

Airside Economizer

The airside economizer shall be enabled when the outdoor air temperature is below the outdoor air temperature set point for economizer operation. These values can be changed using the keypad. The economizer shall be disabled once the ambient air temperature is above the return air temperature, and outdoor air temperature setpoint. The economizer shall be used for cooling before mechanical cooling is used. The outdoor air dampers shall modulate to maintain the cooling set point. When the outdoor air damper actuator is 100% open and it cannot satisfy the cooling set point, mechanical cooling shall be staged on to assist the economizer to meet the cooling set point. The airside economizer shall be used until it is disabled.

When the airside economizer is disabled, the outdoor air dampers shall be set to the minimum position. This value is adjustable at the keypad, with a default value of 15%.

Lead/Lag

To even out the compressor run hours, the staging of the compressors shall be based on the number of hours of use. This shall allow better distribution of run time over all the compressors at part load conditions rather than using the first couple of compressors all the time. This feature shall be available on all units.

Discharge Air Temperature (DAT) Reset

DAT reset is used for VAV units. This shall be used for the cooling or heating mode. This feature and its parameters can be set and adjusted using the keypad. When the cooling load is high, the DAT set point shall be set to its minimum value, usually 55°F to stage on more compressors. When the load is light, the DAT set point shall be raised, thus requiring fewer compressors to be energized to meet the cooling set point. The DAT set point can be adjusted based on the return air temperature.

The purpose of this feature is to increase the airflow at very light load conditions. This helps bring more outdoor air to the zones and reduce compressor cycling at light load conditions at the same time trading compressor energy for fan energy. When the DAT set point is higher, economizer shall need less, if any assistance from mechanical cooling. The result is a smoother operating system at light load conditions while maintaining tenant comfort.

The heating mode is similar to the description above.

BUILDING AUTOMATION SYSTEM INTERFACE

BACnet™
MS/TP connection is available.

COMMON ALARM OUTPUT

This binary output signal is used to indicate an alarm signal. When the unit controller has processed an alarm condition, the normally closed dry contacts shall open. When the alarm has been cleared, the contacts shall return to the normal closed position.

OUTDOOR AIR DAMPER OUTPUT

This analog (0 to 10 volts DC) output signal is used to control the outdoor air damper. 0 volts corresponds with a closed damper and 10 volts with a fully open damper.

FAN ON

This binary output signal is used to indicate that the supply fan is about to be energized. This provides a time delay before the fan is started. The normally open contacts shall close when the unit enters the start-up mode. The fan shall be energized after the start-up mode timer has expired. Thus, any device connected to this output shall have the start-up mode timer to do what is has to do before the fan is energized. This output is energized until the fan is de-energized. Voltage for the device(s) connected to the output needs to be provided from another source.

VAV BOX/HEAT

This binary output signal is used to put the VAV box in a heating or cooling mode. When the normally open contacts are closed, this represents a heating mode, and the VAV box should be at the maximum position. When the normally open contacts are open, this represents a cooling mode, and the VAV box should be in the cooling mode and maintaining the space/zone temperature. Voltage for the device(s) connected to the output needs to be provided from another source.

EXTERNAL STOP (FAN STOP)

This binary input signal is used to shut the unit down in an emergency. When the signal is open, the unit is in the shut down emergency mode. Thus, the unit is in the unoccupied mode. When the signal is closed, the unit shall be operating in the typical. After the unit has been in the emergency mode, when the signal is closed, the unit shall be controlled in the normal manner. Reset is not needed unless an alarm condition has occurred.

COOL/HEAT ENABLE

The keypad shall be used to enable or disable cooling and heating and allow the unit to be in the fan on mode. In the fan on mode for VAV units, the unit shall control duct static pressure. When the input is closed, cooling and heating shall be enabled. When the input is open, cooling and heating shall be disabled.

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