Product Catalog

Modular Self-Contained

Water Cooled — 20 to 80 Tons — R-454B

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Features and Benefits

Features

Standard Features

- 40 through 80 ton commercial water cooled, modular self-contained units.
- Unique Cassette Design Ideal for Replacement Market allowing all components to fit through a standard 36-inch width commercial door and through standard IBC 44-inch hallways.
- Variable Speed Technology on lead compressor for highest efficiencies.
- Available with lower MCA design ideal for retrofit applications.
- Fully integrated, factory-installed, and commissioned microelectronic controls.
- Variable Air Volume (VAV) operation.
- Direct Drive Plenum Fans with Integrated Motor, Electronics and VFD's.
- Emergency stop input.
- Units are shipped with Nitrogen.
- Factory piped, chemically cleanable, brazed plate condensers for efficient operation and modularity. Condensers do not need to be removed from unit for cleaning.
- Upstream inline 20 mesh strainer for added protection along with alerts for when strainer needs to be cleaned.
- Sloped drain pans to confirm complete condensate removal for IAQ.
- Expansion Valves and Filter Driers are easily accessible.
- Access panels and clearance provided to clean both evaporator and waterside economizer coil fins.
- Shipped as individual cassettes.
- One inch insulated panel modular frame construction.
- Panels meet UL1995, ASTM E84/UL 723 for flame spread and smoke develop rating.

Standard Control Features

- Durable unit-mounted touch screen display. The 7-inch WVGA 800 x 480 resolution touchsensitive color screen is backlit, which enables viewing in poor light conditions including outdoor usage.
- Phase reversal protection provided in each compressor - fixed or variable.
- Compressor lead/lag on fixed speed compressors.
- Fan failure detection.
- Occupied/unoccupied switching.
- Programmable water purge during unoccupied mode.
- High leaving air temperature limit.
- BACNet® communication by MSTP.

Optional Features

- Waterside modulating with spring return temperature control valves include factory installed piping and control wiring.
- Fully integrated, factory-installed/commissioned variable frequency drive control.
- Protective coatings for the evaporator coils.
- Stainless steel sloped drain pan.
- Medium efficiency throwaway filters.
- Non-fused external disconnect switch.
- Left hand/right hand electrical connections.
- Left hand/right hand water connections.
- 2- and 4-inch filter racks for all sizes.
- Condensing pressure control on all variable water flow systems with valves.

  Note: *A water flow switch is required for the installation, either supplied from the factory or field-provided.*

Factory-Installed or Ship-Separate Options

- Waterside economizer with factory-installed piping and controls.
- Optional clean in place fittings on brazed plate condensers.
- Field-Installed Accessories.

Benefits

Servicing Advantages

- Strategically placed service doors with easy access to critical components.
- Cassette Concept allows for easier maintenance than other built-up systems.
- Field connected power/control wiring is color-coded and individually keyed for easy installation and quality assurance.

Tenant Satisfaction

- Complete HVAC system on each floor minimizes tenant inconvenience during routine maintenance.
- Tenants can control system after hours to increase productivity and minimize expense.

Lower Installed Cost

- Single point power connection. Left hand to right hand electrical connections for easier installation into existing applications.
- Single point water connection. Left hand or right hand water connections for easier installation in existing applications.
- Factory-commissioned and tested controls.
- Factory-installed options.
- Internally trapped drain connection.
- Available with low MCA VSD to meet the needs of retrofit applications, while still gaining benefits of Variable Speed Technology.

Economical Operation

- Free cooling with optional waterside economizer.
- Energy savings with floor-by-floor system since only units on floors requiring cooling need to operate.
- Variable speed compressors for increased efficiency.
- Variable speed plenum fans for increased efficiency.
- Energy savings from the integrated water valve control using pump unloading.

Assured Acoustical Performance

- Double wall insulated panels assure quiet operation.
- Multiple compressor design reduces acoustical levels. Scroll compressor design smooths gas flow for quieter operation.

Indoor Air Quality (IAQ) Features

- Stainless steel sloped drain pan option.
- Double wall insulated panel modular frame construction.
- High-efficiency throwaway filter option.
- Easily cleanable evaporator, condensers, and waterside economizers.
- Filter access door allows easy removal to encourage frequent filter changing.

Enhanced Serviceability

- Access Doors for ease of service.
- Hinged and removable panels on all components.
- Easy to adjust setpoints and operating parameters using the human interface panel on units.
- Refrigerant line sight glasses in view during operation.

Competitive Advantage

- Cassette construction for transporting unit components into the most demanding spaces.
- Optional left hand/right hand electrical connections meets the needs of the mechanical room.
- Optional left hand/right hand water connections meets the needs of the mechanical room.
- Compact cabinet to minimize mechanical room requirements.
- Up to 17 percent more efficient than competitive units.
- Low leaving air temp capability to reduce fan motor energy, improve acoustical performance, and minimize duct sizes.
- Factory-installed and tested microprocessor controller.

Variable Speed Drives

- Variable speed Electronically Commutated Motors (ECM) are integral to the fans and are tested in the factory. Easy field wiring ensures quick/easy start-up.
- Variable Frequency Drive (VFD) on the lead compressor is factory installed and tested. Easy field wiring ensures quick/easy start-up.

Application Considerations

Modular Self-Contained Acoustical Recommendations

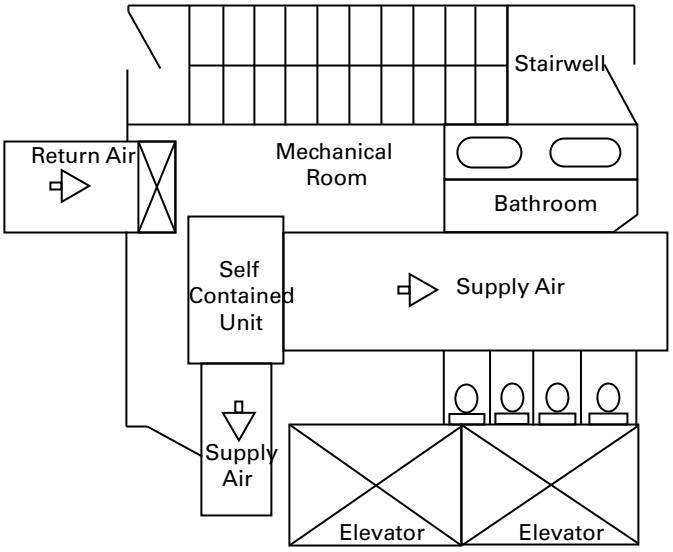
Successful acoustical results are dependent on many system design factors.

Following are general acoustical recommendations. For more information, or if there is concern about a particular installation, contact a professional acoustical consultant.

Location and Orientation of the Mechanical Equipment Room

Locate the equipment room adjacent to stairwells, utility rooms, electrical closets, and rest rooms if possible, to minimizes the acoustic effects and risk of workmanship or installation errors. (**See figure below**) Place the discharge and return air ductwork over these less acoustically sensitive areas, using vertical or horizontal fresh air shafts. Consult code requirements for fresh air and smoke purge constraints.

Figure 1. Equipment room and location and orientation



Return Air Ductwork

Duct the return air into the mechanical equipment room. Connect ductwork to the unit if local code dictates. The return air ductwork must have an elbow inside the equipment room. This elbow will reduce sound transmissions through the return duct. Extend the ductwork from the elbow far enough to block the **line of sight** to the exterior of the equipment room. Use a minimum ductwork length of 15 feet to the equipment room exterior. Line the duct with two-inch, three-pound density insulation. Use multiple, small return ducts for better acoustical performance to the occupied space.

Supply Air Ductwork

Insulate the supply air duct with two-inch, three-pound density insulation. Extend this lining at least 15 feet out from the equipment room wall, keeping the duct aspect ratio as small as possible. Minimize large flat panels since they transmit sound. In addition, small aspect ratios will minimize potential **oil canning** of the duct due to flow turbulence.

The flexible horizontal discharge plenum option helps avoid complicated ductwork transitions. Ductwork turning vanes typically improve pressure drop but degrade acoustical performance.

Recommended Maximum Air Velocities

The maximum recommended velocity for the discharge air duct is 2,000 fpm. The maximum recommended velocity for the return air duct is 1,000 fpm. Limit air velocities below these operating points to minimize the risk of flow turbulence that causes regenerated noise. Using round supply duct

and static regain allows maximum discharge air velocities up to 3,000 fpm. Lining round supply duct also substantially lowers frequency noise attenuation. However, flow regenerated noise potential increases dramatically at air velocities over 3000 fpm.

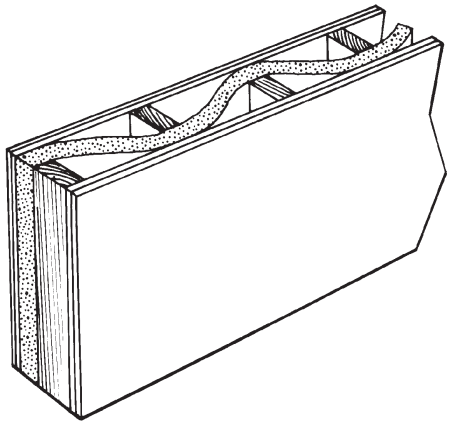
Equipment Room Construction Options

The preferred equipment room wall construction is concrete block. If this is not feasible then a double stud offset wall is suggested (See figure below).This removes physical contact that would transmit sound through the equipment room wall to the occupied space. Interweave fiberglass insulation between the wall studs. Use two layers of drywall on each side of the wall.

Workmanship details are critical to acoustical performance. Seal all wall and floor penetrations by the ductwork, water piping, and equipment room access doors with a flexible material such as caulk and/or gasketing to stop noise and air leaks.

Locate the equipment room door away from acoustically sensitive areas like conference rooms. The door should swing out of the equipment room, if possible, so that the low pressure in the equipment room pulls the door in to help maintain a tight seal.

Figure 2. Double stud offset wall with interwoven insulation



Equipment Options

The flexible horizontal discharge plenum allows multiple tested outlet options. This minimizes the risk of acoustic and/or pressure drop problems by avoiding complex transitions close to the fan discharge.

Static Pressure Versus Acoustics

Design the system to minimize the total static pressure required from the self-contained unit fan. Typically a change in static pressure of only 0.5 inches can reduce NC level by approximately 2 or 3 in the occupied space.

Isolation Recommendations

Unit

The compressors are internally isolated. All fans are factory balanced. The unit fan and compressors are internally isolated. Therefore, external isolation is not required. Consult a vibration specialist before considering external or double vibration isolation.

Ductwork

Design duct connections to the unit using a flexible material. Consult local codes for approved flexible duct material to prevent fire hazard potential.

Piping Connections

Rubber isolator connectors are recommended for condenser piping to prevent vibration transmission to or from the building plumbing. The self-contained unit is internally isolated and does not require additional isolation. However, confirm that proper system vibration isolation design prevents vibration transmission from the building plumbing to the unit. Also be sure to properly isolate the drain line.

Condenser Water Piping

Piping Location and Arrangement

Provide at least 24 inches of clearance between the piping and the unit for service. Place the risers away from the side of the unit if possible. Be sure to allow sufficient space for valves and unions between the piping and the self-contained unit. Lay out condenser piping in reverse returns to help balance the system. This is accomplished by equalizing the supply and return pipe length. Multi-story buildings can use a direct return system with balancing valves at each floor. Install all heat exchangers and most cooling tower piping below the sump operating water level to prevent overflow during unit and/or system shutdown.

Recommended Pump Location

Locate pump downstream of the cooling tower and upstream of the modular self-contained unit. This provides smoother and more stable unit operation.

When the tower and pump are both roof mounted, be sure to provide the necessary net positive suction head pressure to prevent cavitation. Raise the tower or submerge the pump in a sump to provide positive suction. To prevent an on-line pump failure, use a standby pump to avoid a complete system shutdown.

Several partial capacity pumps or variable speed pumps can be used. Review the economics of these alternate pumping options.

Strainers and Water Treatment

Water strainers are required at the unit inlet to eliminate potential unit damage from dirty water. Each unit will be supplied with a field installed 20 mesh strainer. The unit also comes standard with differential pressure monitoring that can be used to alert owner when 20 mesh screen requires cleaning. Untreated or poorly treated water may result in equipment damage. Consult a water treatment specialist for treatment recommendations.

Isolation Valves

Install isolation valves at each unit before the strainer and after the condenser. This allows periodic servicing of the unit or strainer while allowing other units in the system to remain in operation.

Pressure Gauges

Install pressure gauges on the inlet and outlet of the self-contained unit. Select the gauge's scale so that the unit design operating point is approximately mid-scale.

Thermometers

Install thermometers on the condenser water inlet and outlet lines to each unit for system analysis. Trane® recommends using a thermometer temperature range of 40°F to 140°F, using a 2°F temperature increment.

Drains

Install a trapped drain in the low point of the mechanical equipment room floor to collect water from cleaning operations.

Note: *Units are not internally trapped. Externally trapped drain must be added in the field.*

Condensing Pressure Control (Water-Cooled Condensers)

Often cold condensing water applications between 35°F and 54°F require a condensing pressure control valve. However, to utilize this feature, the building water system must be capable of operating at reduced water flow rates through the modular self-contained units. It is imperative to install variable volume pumps or an external bypass in the water distribution system.

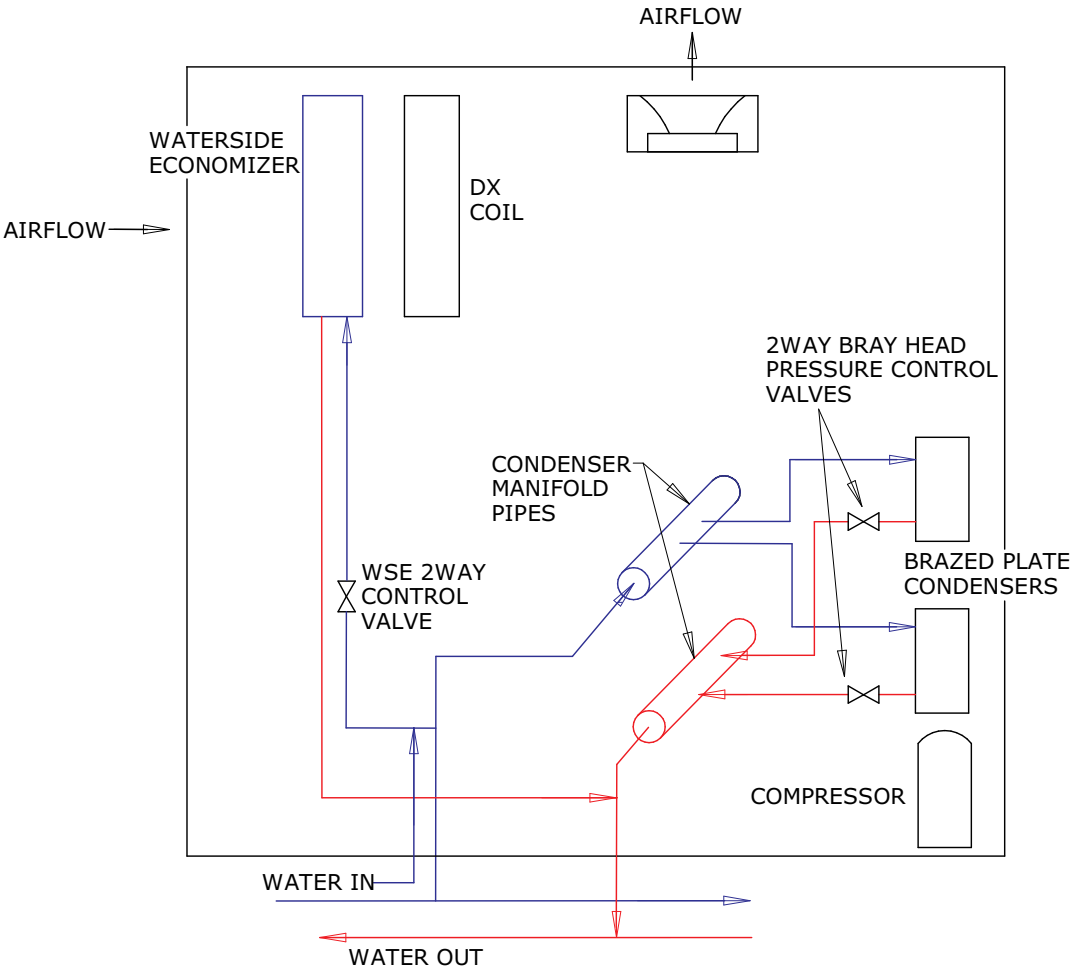
Waterside Economizer Flow Control

Units equipped with waterside economizer and intermediate piping package can be set up for variable or constant water flow.

Use constant water flow setup on water systems that are not capable of unloading water supply to the unit. The economizer and condenser valves will operate in complement to one another to provide continuous water flow.

Use variable water flow setup with water flow systems that can take advantage of pump unloading for energy savings. Since non-cooling operation restricts water flow during part load economizing or condensing temperature control, it is imperative to install variable volume pumps or an external bypass in the water distribution system.

Figure 3. Waterside economizer flow control



Free Cooling Opportunities and Alternatives

Free cooling is available with either the airside or waterside economizer options. The advantages and disadvantages of each type are listed as follows:

Waterside Economizer

The waterside economizer substantially reduces the compressor energy requirements because it uses the cooling water before it enters the condensers. Additional equipment room space is not required since the coils are contained within the overall unit dimensions.

Disadvantages include higher airside pressure drop and a higher head on condenser water pumps.

The coils can be mechanically cleaned (optional) for ease in maintenance versus expensive and difficult chemical cleaning methods.

Airside Economizer

The airside economizer substantially reduces compressor, cooling tower, and condenser water pump energy requirements using outside air for free cooling. It also reduces tower make up water needs and related water treatment.

Disadvantages include building requirements that locate the mechanical room and self-contained unit toward an exterior wall to minimize ductwork, building barometric control, or additional air shafts. Also, airside economizers require additional mechanical room space.

Unit Operating Limits

Airflow

The minimum recommended airflow for proper VAV system staging and temperature control is 35 percent of nominal design airflow. Adjusting VAV boxes with the appropriate minimum settings prevents the self-contained unit from operating in a surge condition at airflows below this point. Continuous operation in a surge condition can cause fan failure. Reference General Data Tables on for minimum airflow conditions.

Note: *Contact your local Trane sales office for minimum airflow conditions.*

Self-contained units use fixed pitch sheaves. Adjust air balancing by obtaining alternate fixed pitch sheave selections from the local Trane sales office.

Water Flow

Use 3 gpm/ton for optimum unit capacity and efficiency. Use 2.5 or 2 gpm/ton to reduce pump energy, cooling tower, and piping costs. However, these reduced water flows may impact unit capacity and efficiency by one or two percent. Consult General Data tablesfactory for unit specific water flow ranges.

A2L Application Considerations

This product is listed to UL standard 60335-2-40, Household and Similar Electrical Appliances – Safety – Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers, which defines safe design and use strategies for equipment using A2L refrigerants. This standard limits the refrigerant concentration in a space in the event of a refrigerant leak. To meet the requirements, the UL standard defines minimum room area, refrigerant charge limit, minimum circulation airflow and/or ventilation airflow requirements, and limits the use of ignition sources in spaces. The standard may require a unit refrigerant leak detection system.

For equipment with R-454B and charge amounts less than or equal to 3.91 lbs per circuit, this UL standard does not prescribe a room area limit and does not require a refrigerant leak detection system or any circulation airflow or ventilation airflow mitigation strategies. However, ignition sources in ductwork must be evaluated.

Depending on the application, a specific requirement of ANSI/ASHRAE Standard 15, Safety Standard for Refrigeration Systems, could be more stringent than UL 60335-2-40 requirements. See *Refrigeration Systems and Machinery Rooms Application Considerations for Compliance with ASHRAE® Standard 15-2022 Application Engineering Manual* (APP-APM001*-EN) for more information.

Ignition Sources in Ductwork

Do not install open flames in the ductwork. Hot surfaces exceeding 700°C (1290°F) should not be installed in the ductwork unless the average airflow velocity is not less than 1.0 m\s (200 ft\min) across the heater and proof of airflow is verified before system is energized.

Electric heaters can exceed the surface temperature limit if airflow distribution is poor, or insufficient airflow is provided over the heater.

Surface temperatures of most gas heaters do not exceed the surface temperature limits due to ANSI construction requirements.

Ignition Sources in Unit

This unit does not contain any ignition sources. All potential ignition sources, (including factory or field installed accessory electric heaters, gas heaters, relays, and contactors) were evaluated during product UL listing.

Minimum Room Area Limits (Refrigerant charge greater than 3.91 lb per circuit)

Equipment with R–454B charge amounts greater than 3.91 lb per circuit may require additional circulation or ventilation airflow mitigation strategies. In this case, two minimum room area (A_{min}) thresholds:

- The first threshold defines when equipment serving a single room is required to provide circulation airflow, either continuous or activated by a leak detection system. A ducted system requires circulation airflow unless the smallest room it serves is larger than the adjusted A_{min} threshold. This product contains a leak detection system if a circuit charge is greater than 3.91 lbs. As a result, no further leak detection system evaluation is required.
- The second threshold defines when additional ventilation airflow is required. If the room area, A or TA, is below the adjusted A_{min} or TA_{min} threshold, additional ventilation is required to remove refrigerant in the event of a leak. Refer to UL 60335-2-40 Clause GG.8 and ANSI\ASHRAE Standard 15 Section 7 for natural and mechanical ventilation requirements.

Table 1. Minimum room area

		Minimum Room Area[(a)]	
Tonnage	Eff	m2	ft2
20	S	40	427
20	H	42	450

Table 1. Minimum room area (continued)

		Minimum Room Area[a]	
20	V	42	457
25	S	46	491
25	H	49	532
25	V	47	510
30	S	50	536
30	H	57	611
30	V	50	543
40	S	71	765
40	H	73	791
40	V	73	787
50	S	84	900
50	H	100	1072
50	V	101	1083
55	S	81	873
55	H	96	1038
55	V	99	1061
60	S	100	1072
60	H	115	1233
60	V	116	1248
70	S	104	1121
70	H	133	1428
70	V	139	1499
75	S	130	1398
75	H	127	1372
75	V	126	1361
90	S	158	1705
90	H	194	2091
105	S	178	1919
115	S	187	2009
130	S	169	1822

[a] Based on 2.5m ceiling height.

Minimum Room Area (A_{min}) Adjustments

Use equation below to adjust the minimum room area, as applicable, based on the unit's installation height, altitude, and occupancy level it serves.

$$A_{min.adj} = \text{Nameplate } A_{min} \times \text{Altitude Adj} \times \text{Height Adj} \times F_{occ}$$

Multiply the altitude adjustment factor in the table below by A_{min} listed on the unit nameplate or in the Installation, Operation, and Maintenance (IOM) manual.

Table 2. Altitude adjustment factor

Altitude (ft)	Sea Level to 2000	2001 to 4000	4001 to 6000	6001 to 8000	8001 to 10000	10001 to 12000	12001 to 14000	14001 to 15000	Over 15000
A_{min} Adjustment	1	1.05	1.11	1.17	1.24	1.32	1.41	1.51	1.57

In addition, A_{min} can be adjusted if the unit is installed in a room at a height that is higher than the minimum height shown on the unit. To adjust A_{min}, multiply by the ratio of the unit minimum release height (in meters) / actual release height (in meters). Use 0.6 m in the ratio for unit minimum installation heights less than or equal to 0.6 m.

For institutional occupancies, ASHRAE Standard 15 applies an additional adjustment factor F_{occ} to the amount of a charge allowed in a space. To calculate the adjusted A_{min} for institutional occupancies, multiply the A_{min} on the nameplate by two.

EXAMPLE 1: 20 Ton Packaged Rooftop Multi-Zone VAV System Serving an Institutional Occupancy Space

The packaged unit serves 7600 ft² of a nursing home located at an attitude of 4000 ft. The unit has two equally charged 10 ton refrigeration circuits. Each circuit has 12 lbs of refrigerant with a minimum room area requirement of 180 ft² with a 2.2 m release height.

$$TA_{min.adj} = 180\ ft^2 \times 1.05 \times 2 = 378\ ft^2$$

No additional ventilation is required.

EXAMPLE 2: 10 Ton Split System Serving a Single Commercial Occupancy Space

The split system serves a 1500 ft² manufacturing space at 5000 ft altitude. The final installed charge of the single circuit 10 ton unit is 20 lb. The unit has an open return with a release height of 1 m and ducted supply air. The unit A_{min} is 660 ft².

$$A_{min.adj} = 660\ ft^2 \times 1.11 = 733\ ft^2$$

No additional ventilation is required.

Determining Room Area (A or TA)

The room area (A) is the room area enclosed by the projection to the floor of the walls, partitions, and doors of the space that the equipment serves. For ducted systems, total room area (TA) of all rooms connected by ducts, may be used instead of A.

Rooms connected by drop ceilings only are not considered a single room.

Rooms on the same floor of the building, and connected by an open passageway, can be considered part of the same room if the passageway is a permanent opening, extends to the floor and is intended for people to walk through.

Adjacent rooms on the same floor of the building and connected by permanent openings in the walls and/or doors between rooms (including gaps between the wall and the floor), can be considered part of the same room if the openings meet the following criteria.

- The opening is permanent and cannot be closed.
- Openings extending to the floor, such as door gaps, need to be at least 20 mm above the floor covering surface.
- Natural ventilations opening areas must meet the requirements of ANSI\ASHRAE Standard 15-2022, Section 7.2.3.2.

Rooms that are connected by a mechanical ventilation system can be considered a single room area if the mechanical ventilation system meets the requirements of ANSI\ASHRAE Standard 15-2022, Section 7.6.4.

Leak Detection System (Refrigerant charge greater than 3.91 lb per circuit)

The leak detection system consists of one or more refrigerant detection sensors. When the system detects a leak, the following mitigation actions will be initiated until refrigerant has not been detected for at least 5 minutes:

- Energize the supply fan(s) to deliver a required minimum amount of circulation airflow.
- Disable compressor operation.
- Provide an output signal that can be used to fully open zone dampers and/or VAV boxes and disable electric heat in VAV boxes.
- Provide an output signal that can be used to energize additional mechanical ventilation (if needed).
- Units without airflow proving will disable electric heat sources.

Building fire and smoke systems may override this function.

If the refrigerant sensor has a fault, is at the end of its life, or is disconnected, the unit will initiate the mitigation actions. Mitigation actions may be verified by disconnecting the sensor.

The refrigerant sensors do not need service. Use only manufacturer-approved sensors when replacement is required.

A2L Mitigation Airflow

Table 3. A2L mitigation airflow

Unit Tonnage	Total Refrigerant Charge (kg)	Min Airflow (m3h)
20	14	1386
25	14	1386
30	14	1386
35	14	1386
40	14	1386
50	21	2079
60	21	2079
70	28	2772
80	28	2772
90	42	4158
100	42	4158
110	42	4158

Model Number Description

Digit 1 — Unit Model

S = Self-Contained

Digit 2 — Unit Type

C = Commercial

Digit 3 — Condenser

W = Water-cooled

Digit 4 — Construction

M = Modular

Digit 5— Refrigerant

5 = R–454B

Digit 6, 7, 8 — Capacity

020 = 20 Tons
025 = 25 Tons
030 = 30 Tons
035 = 35 Tons
04M = 40 Tons Slim
040 = 40 Tons
04N = 40 Tons New York
050 = 50 Tons
060 = 60 Tons
06N = 60 Tons New York
06S = 60 Tons Split Coil
070 = 70 Tons
080 = 80 Tons
08N = 80 Tons New York

Digit 9 — Unit Voltage

F = 208–230/60/3
4 = 460/60/3

Digit 10, 11 — Design Sequence

**

Digit 12 — Number of Fans

1 = 1 Fan
2 = 2 Fans
3 = 3 Fans
4 = 4 Fans
5 = 5 Fans
6 = 6 Fans

Digit 13 — Compressor Technology

V = Variable Speed

Digit 14— Control Valves

0 = None
H = Head Pressure Control Valves

Digit 15 — Condenser Cleanable Options

0 = None

Digit 16 — Economizer

0 = No Economizer
W = With Water Side Economizer
H = 2-position damper ventilation interface
J = Airside economizer interface
K = Airside economizer interface with comparative enthalpy

Digit 17 — Water Connections

L = Left Hand Connections
R = Right Hand Connections

Digit 18 — Unit Water Connections

1 = Victaulic
2 = Pipe Connections

Digit 19 — Air Discharge

H = Horizontal Discharge
V = Vertical Discharge

Digit 20 — Electrical Connections

L = Left Hand Connections
R = Right Hand Connections

Digit 21 — Unit Electrical Connections

1 = Disconnect Switch
2 = Terminal Block

Digit 22 — Drain Pan

G = Galvanized Drain Pan
S = Stainless Steel Drain Pan

Digit 23 — For Future Use

0

Digit 24 – Filter Type

A = 2 inch — MERV 8
B = 4 inch — MERV 8
C = 2 inch Pre MERV 8, 4 inch Post MERV 13
D = 2 inch 0 MERV 13
E = 2 inch — MERV 13

Digit 25 — Heater

0 = None
1 = Hydronic
4 = Hydronic Remote
5 = Electric Remote (3 Stage Max On/Off)
6 = Electric Remote SCR
7 = Gas Remote
8 = Steam Remote

Digit 26 — Shipping Method

M = Modular

Digit 27 — Unit Isolators

0 = None
A = Isopads

Digit 28 — Air Volume / Temperature Control

A = VAV Control Scheme (Fixed DA Temp)
B = VAV Control Scheme (Return Air Reset)
C = VAV Control Scheme (Space Temp Reset)
D = CV Control Scheme (Fixed DA Temp)

Digit 29 — Agency Listing

0 = None
E = ETL listing

Digit 30 — Options

0 = None

Digit 31 — Space Sensor Options

0 = None
1 = Space Sensor Only

Digit 32 — For Future Use

0

Digit 33 — Industrial Options

0 = None
A = Protective Coating Evaporator Coil
B = Protective Coating Evap Coil + WSE

Digit 34 — Discharge Plenum

0 = None
S = Std plenum with field-cut holes

Digit 35 — For Future Use

0

Digit 36 — For Future Use

0

Digit 37 — Controller

3 = Symbio 500 — BAS Communication Option
4 = Symbio 500 — Air-Fi(R)
5 = Symbio 500 — BACnet/IP

Digit 38 — For Future Use

0

Digit 39 — Major Design Version

A = 1.0

Digit 40 — Design Special

0 = None
S = Design Special

General Data

Table 4. SCWM water-cooled self-contained, 20 to 80 tons

Tonnage	20 Ton	25 Ton	30 Ton	35 Ton	40 Ton	40 Ton NY	50 Ton	60 Ton	60 Ton NY	60 Ton Split	70 Ton	80 Ton	80 Ton NY
Compressor Data													
Quantity	2	2	2	2	2	3	3	3	3	4	4	4	4
Unit Capacity (MBH)	304	304	354	382	420	491	593	674	674	691	847	897	847
Circuits	2	2	2	2	2	3	3	3	3	4	4	4	4
Evaporator Coil Data													
Rows	4	4	4	4	4	4	4	4	4	4	4	4	4
Sq. ft.	15.6	15.6	21.9	21.9	26.6	26.6	38.0	38.0	38.0	35.4	53.1	53.1	53.1
Fins/in	13	13	12	12	12	12	12	12	12	12	12	12	12
Number of Coils	1	1	1	1	1	1	1	1	1	2	2	2	2
Condenser Data													
Minimumum GPM w/ o Econ[a]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Minimum GPM w/ Econ	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Maximum GPM	70	70	140	140	140	210	210	210	210	280	280	280	280
Evaporator Fan Data													
Quantity	2	2	2	2	3	3	3	4	4	4	5	5	6
Diameter	500 mm	500 mm	500 mm	500 mm	500 mm	500 mm	500 mm	500 mm	500 mm	500 mm	500 mm	500 mm	500 mm
Power consumption kW (208/280V)	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
Power consumption kW (460V)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Design cfm[b]	5500	6875	8250	9625	11000	11000	13750	16500	16500	16500	19250	22000	22000
Maximum Design cfm	8000	10000	12000	14000	16000	16000	20000	24000	24000	24000	28000	32000	32000
Refrigerant Charge, lbs. R-454B[c]													

Table 4. SCWM water-cooled self-contained, 20 to 80 tons (continued)

Ton-nage	20 Ton	25 Ton	30 Ton	35 Ton	40 Ton	40 Ton NY	50 Ton	60 Ton	60 Ton NY	60 Ton Split	70 Ton	80 Ton	80 Ton NY
Circuit A	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
Circuit B	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
Circuit C	x	x	x	x	x	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
Circuit D	x	x	x	x	x	x	x	x	x	14.5	14.5	14.5	14.5
Circuit E	x	x	x	x	x	x	x	x	x	x	x	x	x
Circuit F	x	x	x	x	x	x	x	x	x	x	x	x	x
Filter Data, Water-Cooled Units													
Number - Size (in.)	6 - 24"x 24"		6 - 24"x 24"		9 - 24"x 20"		12 - 24"x 20"			12 - 24"x 24"			
Number of Compressors													
14 Ton - Variable Speed	1	1	1	1	1	1	1	1	1	1	1	1	1
12.5 Ton - Fixed Speed	1	1	0	0	0	0	0	0	0	0	0	0	0
14.5 Ton - Fixed Speed	0	0	0	0	0	2	0	0	0	2	0	0	0
16 Ton - Fixed Speed	0	0	1	0	0	0	1	0	0	0	0	0	0
19 Ton - Fixed Speed	0	0	0	1	0	0	1	0	2	0	2	0	2
23 Ton - Fixed Speed	0	0	0	0	1	0	0	2	0	0	0	2	0
16 Ton - Tandem Fixed Speed	0	0	0	0	0	0	0	0	0	1	0	0	0
18 Ton - Tandem Fixed Speed	0	0	0	0	0	0	0	0	0	0	1	1	1
Number of fans/unit													
No. of fans	2				3			4			5		

(a) All performance data is provided in the Performance Selection Program.
(b) Minimum air flow at part load is 35 percent of full load design CFM.
(c) Refrigerant charge shown is a general guideline, charge to sub-cooling as described in IOM. Note that occasionally a TXV adjustment may need to be made but only after adequate sub-cooling has been reached.

Table 5. SCWM EER/IEER ratings

Tonnage	Model Number		Nameplate Voltage	EER	IEER (VAV)	AHRI Net Cooling Capacity (MBH)
20	SCWM5020F		208-230/60/3	15.2	20.5	304
	SCWM50204		460/60/3	15.2	20.5	304
25	SCWM5025F		208-230/60/3	15.2	20.5	304
	SCWM50254		460/60/3	15.2	20.5	304
30	SCWM5030F		208-230/60/3	15.4	19.7	354
	SCWM50304		460/60/3	15.4	19.7	354
35	SCWM5035F		208-230/60/3	14.9	19.7	382
	SCWM50354		460/60/3	14.9	19.7	382
40	SCWM5040F		208-230/60/3	15.0	19.7	420
	SCWM504MF	Slim	208-230/60/3	15.0	19.7	420
	SCWM504NF	NY	208-230/60/3	15.9	19.7	491
	SCWM50404		460/60/3	15.0	19.7	420
	SCWM504M4	Slim	460/60/3	15.0	19.7	420
	SCWM504N4	NY	460/60/3	15.9	19.7	491
50	SCWM5050F		208-230/60/3	15.8	18.6	593
	SCWM50504		460/60/3	15.8	18.6	593
60	SCWM5060F		208-230/60/3	14.6	18.6	674
	SCWM506SF	Split	208-230/60/3	15.3	19.7	674
	SCWM506NF	NY	208-230/60/3	14.6	18.6	674
	SCWM50604		460/60/3	14.6	18.6	674
	SCWM506S4	Split	460/60/3	15.3	19.7	674
	SCWM506N4	NY	460/60/3	14.6	18.6	674
70	SCWM5070F		208-230/60/3	15.7	20.4	847
	SCWM50704		460/60/3	15.7	20.4	847
80	SCWM5080F		208-230/60/3	14.7	20.4	897
	SCWM508NF	NY	208-230/60/3	14.7	20.4	897
	SCWM50804		460/60/3	14.7	20.4	897
	SCWM508N4	NY	460/60/3	14.7	20.4	897

Notes:

1. Cooling only.
2. Cooling performance is rated at 80F EDB/67F EWB with 85 EWT for water-cooled performance.
3. EER, IEER, and AHRI Net Cooling Capacity are tested in accordance with the AHRI 340/360 (I-P) and certified to 10 CFR Part 431 from the US Department of Energy.

Table 6. SCWM water volumes

Tonnage	Water Volume in U.S. Gallons/Liters			
	w/o Economizer		With Chem. Cleanable Econ, Add	
	Gallons	Liters	Gallons	Liters
20	6.4	24.2	11.6	43.9
25	6.4	24.2	11.6	43.9
30	6.4	24.2	13.5	51.1

Table 6. SCWM water volumes (continued)

Tonnage	Water Volume in U.S. Gallons/Liters			
35	6.4	24.2	13.5	51.1
40	6.4	24.2	15.6	59.1
40NY	9.7	36.7	18.9	71.5
50	9.7	36.7	22.0	83.3
60/60 NY	9.7	36.7	22.0	83.3
60 Split	12.9	48.9	26.7	101.1
70	12.9	48.9	31.3	118.5
80/80 NY	12.9	48.9	31.3	118.5

Table 7. SCWM refrigerant circuits, number of compressors by circuit

Tonnage	Model No.	Circuit					
		A	B	C	D	E	F
20	SCWM5020	14T VS	12.5T FS	N/A	N/A	N/A	N/A
25	SCWM5025	14T VS	12.5T FS	N/A	N/A	N/A	N/A
30	SCWM5030	14T VS	16T FS	N/A	N/A	N/A	N/A
35	SCWM5035	14T VS	19T FS	N/A	N/A	N/A	N/A
40	SCWM5040	14T VS	23T FS	N/A	N/A	N/A	N/A
40 Slim	SCWM504M	14T VS	23T FS	N/A	N/A	N/A	N/A
40 NY	SCWM504N	14T VS	14.5T FS	14.5T FS	N/A	N/A	N/A
50	SCWM5050	14T VS	19T FS	16T FS	N/A	N/A	N/A
60	SCWM5060	14T VS	23T FS	23T FS	N/A	N/A	N/A
60 Split	SCWM506S	14T VS	14.5T FS	14.5T FS	16T FST	N/A	N/A
60 NY	SCWM506N	14T VS	19T FS	19T FS	N/A	N/A	N/A
70	SCWM5070	14T VS	19T FS	19T FS	18T FST	N/A	N/A
80	SCWM5080	14T VS	23T FS	23T FS	18T FST	N/A	N/A
80 NY	SCWM508N	14T VS	19T FS	19T FS	18T FST	N/A	N/A

Note: VS - Variable Speed Compressor, FS - Fixed Speed Compressor, FST -Fixed Speed Tandem

Table 8. Waterside economizer coil physical data

Model	Tonnage	Rows	FPF	Height	Length
MSC	20	4	120	75	30
MSC	25	4	120	75	30
MSC	30	4	120	75	42
MSC	35	4	120	75	42
MSC	40	4	120	75	51
MSC	50	4	120	75	73
MSC	60	4	120	75	73
MSC[a]	60 Split	4	120	75	34
MSC[a]	70	4	120	75	51
MSC[a]	80	4	120	75	51

[a] Split coils

Table 9. Hot water coil physical data

Model	Tonnage	Rows	FPF	Height	Length
MSC	20	2	120	75	30
MSC	25	2	120	75	30
MSC	30	2	120	75	42
MSC	35	2	120	75	42
MSC	40	2	120	75	51
MSC	50	2	120	75	73
MSC	60	2	120	75	73
MSC[(a)]	60 Split	2	120	75	34
MSC[(a)]	70	2	120	75	51
MSC[(a)]	80	2	120	75	51

(a) Split coils

Important: *All performance data is provided in the Performance Selection Program. Contact your local Trane Sales office for more information.*

Controls

The Trane Modular Self-Contained unit is controlled through Trane Tracer® UC600 controller programmed with specific controls sequences to meet the needs of the unit configuration and application.

The Trane Modular Self-Contained unit includes Trane Symbio™ 500 unit controls and the TD-7 touch screen display.

Depending upon unit options, units can operate as follows:

- Stand-alone
- Interface with BACnet® MS/TP building management system

Figure 4. Symbio 500

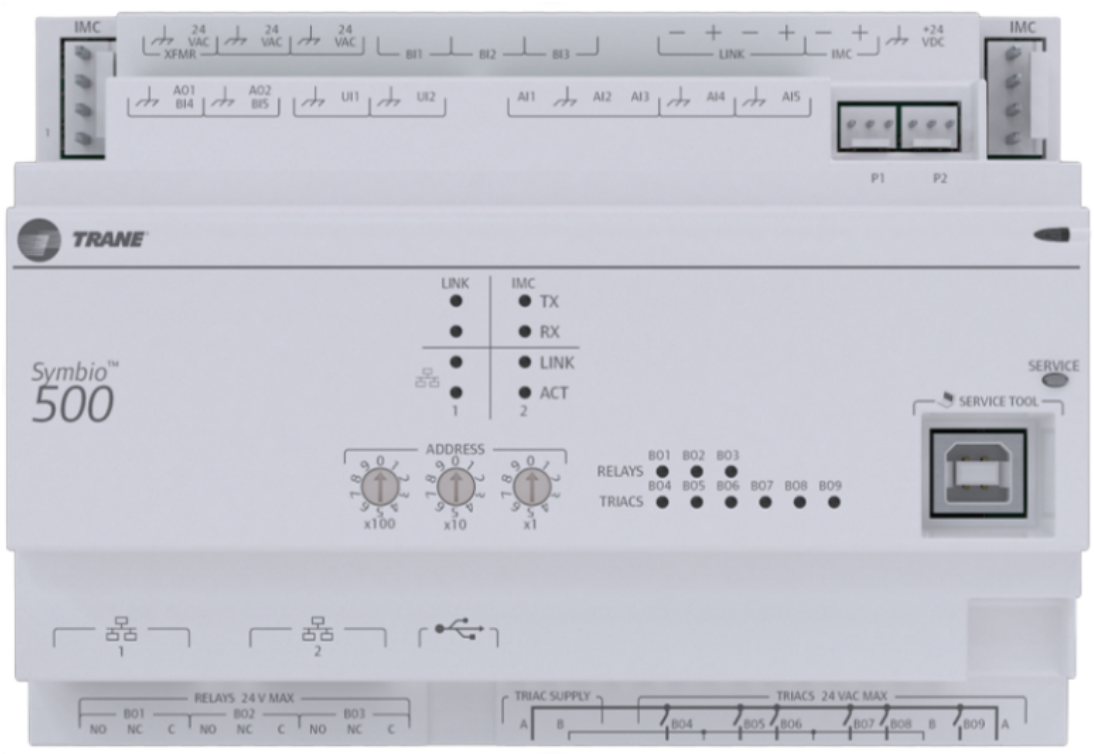


Figure 5. TD-7 display

Available Inputs and Outputs for the Unit Module (on all units with controls)

Binary Inputs

- Emergency stop
- External auto/stop
- Unoccupied/occupied
- Dirty filter

Binary Outputs

- VAV box drive max (VAV units only)
- Alarm
- Fan run status
- Water pump request

BACnet/Building Automation System

The Symbio™ 500 utilizes the BACnet® defined MS/TP protocol as defined in ASHRAE standard 135-2004. This controller works in standalone mode, with Tracer® SC+ or when connected to a third party building automation system that supports BACnet.

Standard Unit Control Features

Note: *All set-up parameters are preset from the factory, requiring less start-up time during installation.*

Unit Features

- Durable unit-mounted touch screen display. The 7-inch WVGA 800 x 480 resolution touch-sensitive color screen is backlit, which enables viewing in poor light conditions including outdoor usage.
- Compressor lead/lag for units with two or more fixed speed compressors
- Fan failure detection
- Occupied/unoccupied switching
- Programmable water purge during unoccupied mode

Controls — Symbio™

Enhanced BAS Integration and Connectivity

- Open standard communications
  - BACnet® MS/TP
- Securely access, troubleshoot, and monitor equipment from anywhere via Trane Connect™
- Open Optional communications (accessory required)
  - BACnet IP
  - BACnet over Zigbee (Air-Fi Wireless)

Air-Fi® Wireless Communications

The optional Air-Fi communications module allows the unit to communicate directly with a Tracer SC+ via BACnet over Zigbee wireless.

Control Sequences of Operation

Occupied/Unoccupied Switching

There are three ways to switch occupied/unoccupied:

- Field-supplied contact closure (hardwired binary input to field wiring terminal block (2TB3)) — This input accepts a field supplied switch or contacts closure such as a time clock.
- BACnet BAS system can control the occupied/unoccupied request of the self- contained unit.
- Through the TD-7 Display via the on-board schedule.

Compressor Lead/Lag

20-60 Tons:

Compressor lead/lag is present in the controls for all units with two or more fixed speed compressors. Only Compressors 2 and 3 rotate. Balanced run hours is achieved by changing the Fixed Speed compressors sequence number when commanded to rotate.

60 ton split - 80 tons:

Only the tandem compressors rotate. Balanced run hours is achieved by changing the tandem compressors sequence number when commanded to rotate.

Emergency Stop Input

A binary input is provided on the unit's field wiring terminal block (2TB3) for installation of a field-provided switch or contacts to immediately shutdown all unit functions.

External Stop Input

A binary input is provided on the unit's field wiring terminal block (2TB3) for installation of a field-provided switch or contacts to safely shutdown all unit functions.

Front Panel Auto Stop

A binary value is located on the TD-7 which allows the user to start and stop the unit in a safe manner for maintenance. On the TD-7 home screen in the upper right hand corner the unit can be put into Auto to perform normally or Stop to perform a controlled shutdown and keep the unit off.

Water Flow Control

The standard configuration of a unit is with constant water flow. With compatible piping configurations, the unit can be configured to provide orderable option variable water flow, which maximizes energy saving by unloading the water pumping system.

Head Pressure Control

Water-cooled condensers — Units that are ordered with the optional flow control valves and configured for variable water flow will modulate a water valve to maintain both the user-defined refrigerant condenser pressure and refrigerant pressure differential setpoints. Refrigerant pressures will be referenced utilizing factory installed suction and discharge pressure sensors located at each compressor.

Water Purge

This user-definable feature allows the user to select a purge schedule to automatically circulate water through the economizer and condensers periodically during non-operational times. This allows fresh chemicals to circulate in waterside heat exchangers.

Supply Air Static Pressure High Limit

During normal operation, the Supply Air Static is monitored. If at any time the static pressure exceeds the software high static limit (defaulted at 2.0 inches from the factory) the unit will immediately shutdown and generate a diagnostic.

In order for the unit to resume operation, the Alarm Reset must be toggled from the TD-7. The software high static limit can be user adjusted at the TD-7.

Supply Air Temperature Control Unit Sequence of Operation

1 — Occupied Supply Air Temperature Control

Cooling/Waterside Economizer

During occupied cooling mode, the waterside economizer option and mechanical cooling are used to control the supply air temperature. The supply air temperature setpoint is user defined at the human interface panel.

After the fans run for 5 minutes, and a call for cooling is calculated, the Cooling Tower/Pump Command is turned on. After the Condenser Water flow switch closes proving flow, the Compressors and/or Economizer will be allowed to start.

Waterside economizing enables when the unit's entering water temperature is less than the entering mixed air temperature. This is set at Waterside Economizer Enable Offset setpoint. The factory default is 7°F, but can be adjusted by the user in the TD-7 or via BACnet®.

The economizer acts as the first stage of cooling. If the economizer is unable to maintain the supply air setpoint, the unit controller will bring on the compressors as required to meet the setpoint. If the unit does not include an economizer, only mechanical cooling will satisfy cooling requirements.

Discharge Air Cooling Setpoint

The Discharge Air Cooling Setpoint BAS default valve of 55 degrees and the unit will control to this value when in the cooling mode. This method is used directly from the factory when digit 28 of the model number is set to A. The setpoint can be adjusted 3 different ways.

Building Automation Control of setpoint

Anytime a BAS system controls the Discharge Air Cooling Setpoint BAS at a priority level is will take precedence over locally calculated values in the Cooling Mode.

Reset Based on Return Air Temperature (Ordered Option of Digit 28 set to B)

The Discharge Air Temperature can be reset based off the return air temperature which will work to keep this temepature between its heating and cooling setpoints.

Reset Based on Zone Temperature (Ordered Option of Digit 28 set to C)

The Discharge Air Temperature can be reset based off the return air temperature which will work to keep this temepature between its heating and cooling setpoints.

Reset Based on Zone Temperature

Zone reset is applied to the zone(s) in a building that tends to overcool or overheat. The supply air temperature setpoint is adjusted based on the temperature of the critical zone(s).This can have the effect of improving comfort and/or lowering energy usage.The user-defined parameters are the same as for outdoor air reset.

Heat/Cool Mode

The unit is in Cooling mode by default. The front end Building Automation System will switch the Heat Cool Mode Request Multistate Value between the Heating and Cooling modes to get the desired control.

Heating Operation

During occupied heating mode, the hot water valve modulates to maintain the discharge air setpoint.

Discharge Air Heating Setpoint

The Discharge Air Heating Setpoint BAS default valve of 95 degrees and the unit will control to this value when in the heating mode.

Zone Sensor Options

Zone Temperature Sensor, BAYSENS077

This zone sensor includes an internal thermistor and should be mounted in the zone, Model Number Digit 31=1. This sensor is available for use with all zone sensor options to provide remote sensing capabilities.

Additional sensors are also available for order using the Model Number Digit 31.

Electrical Data

Selection Procedures

- RLA = Rated Load Amps
- Compressor LRA = Locked Rotor Amps
- Compressor Input = VFD drive Input
- Compressor Output = VFD drive output
- Voltage utilization range is ±10 percent

Determination of Minimum Circuit Ampacity (MCA)

MCA = 1.25 x Largest motor amps/VFD Input + the sum of the remaining motor amps.

Determination of Max Fuse (MFS) and Max Circuit Breaker (MCB) Sizes

MFS and MCB = 2.25 x Largest motor amps (RLA)/VFD input) + the sum of the remaining motor amps.

If the rating value calculation does not equal a standard over current protective device rating, use the next lower standard rating as the maximum.

Table 10. Electrical service sizing data

Ton-nage	Model Number		Unit Wiring					Motor Data													
								Compressor (EA)											Fan (EA)		
								Fixed Speed Size 1			Fixed Speed Size 2			Fixed Speed Size 3			Variable Speed		VSD		
			Nameplate Voltage	Voltage Range	MCA	MOP	Disc	Qty	RLA	LRA	Qty	RLA	LRA	Qty	RLA	LRA	Qty	Max Input (A)	Qty	kW	FLA
20	SCW-M5020F		208-230/60/3	187-253	124.0	175.0	200	1	33.3	255.0	NA	-	-	NA	-	-	1	53.1	2	3.75	11.3
	SCW-M50204		460/60/3	414-506	63.0	90.0	100	1	15.4	140.0	NA	-	-	NA	-	-	1	27.6	2	3.9	6
25	SCW-M5025F		208-230/60/3	187-253	124.0	175.0	200	1	33.3	255.0	NA	-	-	NA	-	-	1	53.1	2	3.75	11.3
	SCW-M50254		460/60/3	414-506	63.0	90.0	100	1	15.4	140.0	NA	-	-	NA	-	-	1	27.6	2	3.9	6
30	SCW-M5030F		208-230/60/3	187-253	137.0	175.0	200	1	45.9	355.5	NA	-	-	NA	-	-	1	53.1	2	3.75	11.3
	SCW-M50304		460/60/3	414-506	68.0	90.0	100	1	20.6	141.0	NA	-	-	NA	-	-	1	27.6	2	3.9	6
35	SCW-M5035F		208-230/60/3	187-253	140.0	175.0	200	1	49	386.3	NA	-	-	NA	-	-	1	53.1	2	3.75	11.3
	SCW-M50354		460/60/3	414-506	72.0	90.0	100	1	24	182.0	NA	-	-	NA	-	-	1	27.6	2	3.9	6
40	SCW-M5040F		208-230/60/3	187 - 253	169.0	225.0	200	1	63.7	528.2	NA	-	-	NA	-	-	1	53.1	3	3.75	11.3
	SCW-M504M-F	Slim	208-230/60/3	187-253	169.0	225.0	200	1	63.7	528.2	NA	-	-	NA	-	-	1	53.1	3	3.75	11.3
	SCW-M504NF	NY	208-230/60/3	187-253	184.0	225.0	200	2	40.8	270.0	NA	-	-	NA	-	-	1	53.1	3	3.75	11.3
	SCW-M50404		460/60/3	414-506	88.0	110.0	100	1	33.1	246.9	NA	-	-	NA	-	-	1	27.6	3	3.90	6.0
	SCW-M504-M4	Slim	460/60/3	414-506	88.0	110.0	100	2	33.1	246.9	NA	-	-	NA	-	-	1	27.6	3	3.90	6.0
	SCW-M504N4	NY	460/60/3	414-506	92.0	110.0	100	2	19.4	147.0	NA	-	-	NA	-	-	1	27.6	3	3.90	6.0

Table 10. Electrical service sizing data (continued)

Ton-nage	Model Number		Unit Wiring					Motor Data													
								Compressor (EA)											Fan (EA)		
								Fixed Speed Size 1			Fixed Speed Size 2			Fixed Speed Size 3			Variable Speed		VSD		
			Nameplate Voltage	Voltage Range	MCA	MOP	Disc	Qty	RLA	LRA	Qty	RLA	LRA	Qty	RLA	LRA	Qty	Max Input (A)	Qty	kW	FLA
50	SCW-M5050F		208-230/60/3	187-253	197.0	250.0	400	1	49.0	386.3	1	45.9	355.5	NA	-	-	1	53.1	3	3.75	11.3
	SCW-M50504		460/60/3	414-506	98.0	125.0	200	2	24.0	182.0	1	20.6	141.0	NA	-	-	1	27.6	3	3.90	6.0
60	SCW-M5060F		208-230/60/3	187 - 253	244.0	300.0	400	2	63.7	528.2	NA	-	-	NA	-	-	1	53.1	4	3.75	11.3
	SCW-M506SF	Split	208-230/60/3	187-253	244.0	250.0	400	2	40.8	270.0	2	24.4	200.0	NA	-	-	1	53.1	4	3.75	11.3
	SCW-M506NF	NY	208-230/60/3	187-253	212.0	250.0	400	2	49.0	386.3	NA	-	-	NA	-	-	1	53.1	4	3.75	11.3
	SCW-M50604		460/60/3	414-506	127.0	150.0	200	2	33.1	246.9	NA	-	-	NA	-	-	1	27.6	4	3.90	6.0
	SCW-M506S4	Split	460/60/3	414-506	122.0	125.0	200	3	19.4	147.0	2	11.9	103.0	NA	-	-	1	27.6	4	3.90	6.0
	SCW-M506N4	NY	460/60/3	414-506	108.0	125.0	200	3	24.0	182.0	NA	-	-	NA	-	-	1	27.6	4	3.90	6.0
70	SCW-M5070F		208-230/60/3	187-253	280.0	300.0	400	2	49.0	386.3	2	28.7	207.5	NA	-	-	1	53.1	5	3.75	11.3
	SCW-M50704		460/60/3	414-506	138.0	150.0	200	2	24.0	182.0	2	12.4	100.2	NA	-	-	1	27.6	5	3.90	6.0
80	SCW-M5080F		208-230/60/3	187-253	312.0	350.0	400	2	63.7	528.2	2	28.7	207.5	NA	-	-	1	53.1	5	3.75	11.3
	SCW-M508NF	NY	208-230/60/3	187-253	280.0	300.0	400	2	49.0	386.3	2	28.7	207.5	NA	-	-	1	53.1	5	3.75	11.3
	SCW-M50804		460/60/3	414-506	158.0	175.0	200	2	33.1	246.9	2	12.4	100.2	NA	-	-	1	27.6	5	3.90	6.0
	SCW-M508N4	NY	460/60/3	414-506	138.0	150.0	200	2	24.0	182.0	2	12.4	100.2	NA	-	-	1	27.6	5	3.90	6.0

Table 10. Electrical service sizing data (continued)

Ton-nage	Model Number	Unit Wiring					Motor Data													
							Compressor (EA)											Fan (EA)		
							Fixed Speed Size 1			Fixed Speed Size 2			Fixed Speed Size 3			Variable Speed		VSD		
		Nameplate Voltage	Voltage Range	MCA	MOP	Disc	Qty	RLA	LRA	Qty	RLA	LRA	Qty	RLA	LRA	Qty	Max Input (A)	Qty	kW	FLA

Notes:

1. MCA: Minimum Circuit Ampacity is 125 percent of the largest compressor RLA or Drive input current, plus 100% of the other compressor (s) RLA, plus the sum of the condenser fan RLA, plus any other load rated at 1 AMP or more.
2. Maximum Breaker Overcurrent Protection (MOP): 225 percent of the largest compressor RLA or VSD drive Input, plus 100 percent of the other compressor(s) RLA, plus the sum of the condenser fan Motor/Drive FLA, plus any other load rated at 1 AMP or more.
3. Recommended disconnect switch: 110 percent to 115 percent of the sum of the RLA of the compressors, VSD drive input, fan motor/drive and controls FLA.
4. RLA: Rated in accordance with UL standard 1995
5. Local codes may take precedence.
6. Fix speed compressor are across the line starting, the VSD compressors are controlled by VSD drive. Compressors will never start simultaneously.
7. Voltage utilization range is ±10 percent.

Dimensional Data

Figure 6. Unit dimensions (in inches)

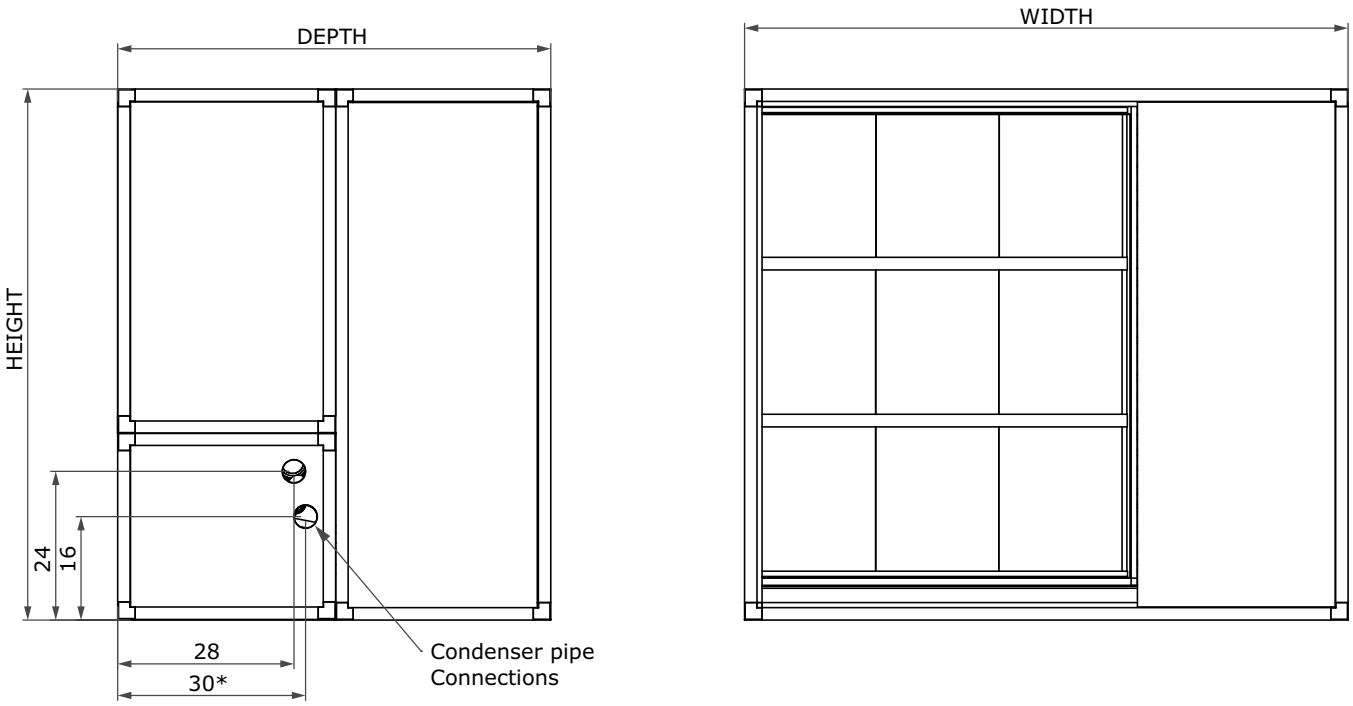
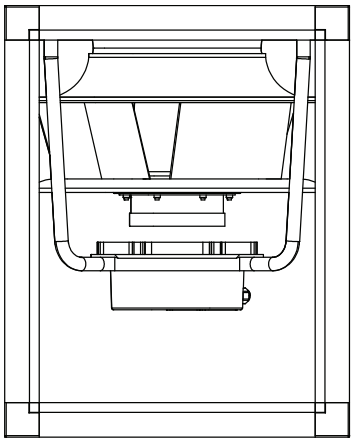


Table 11. Unit dimensions (in inches)

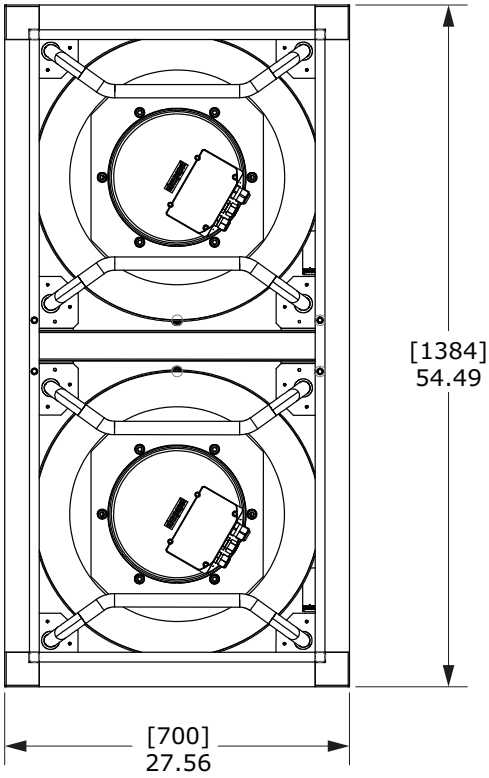
Model	Width	Height	Depth
25	55.2	84	69
30	67.7	84	69
35	67.7	84	69
40/40L	96[a]	84	69
50/50L	96[a]	84	69
60/60L	96[a]	84	69
70/70L	127[a]	84	69
80/80L	127[a]	84	69

[a] Does not include condensate drain connection. Add an additional 1.5 inch to width to account for drain connection.

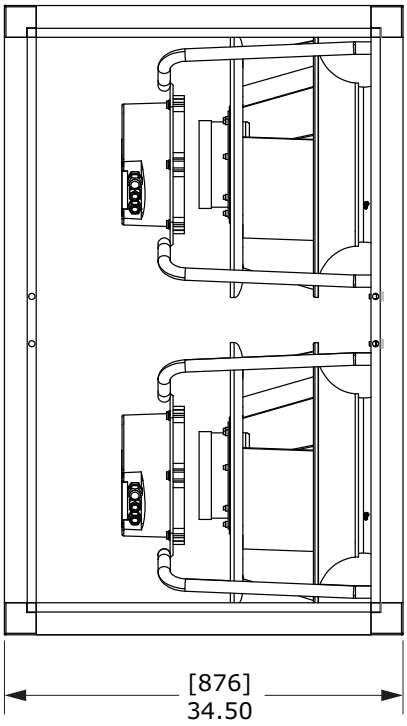
Figure 7. Fan assembly footprint (in mm/inches)



TOP VIEW



FRONT VIEW



SIDE VIEW

Figure 8. Variable speed compressor assembly footprint (in mm/inches)

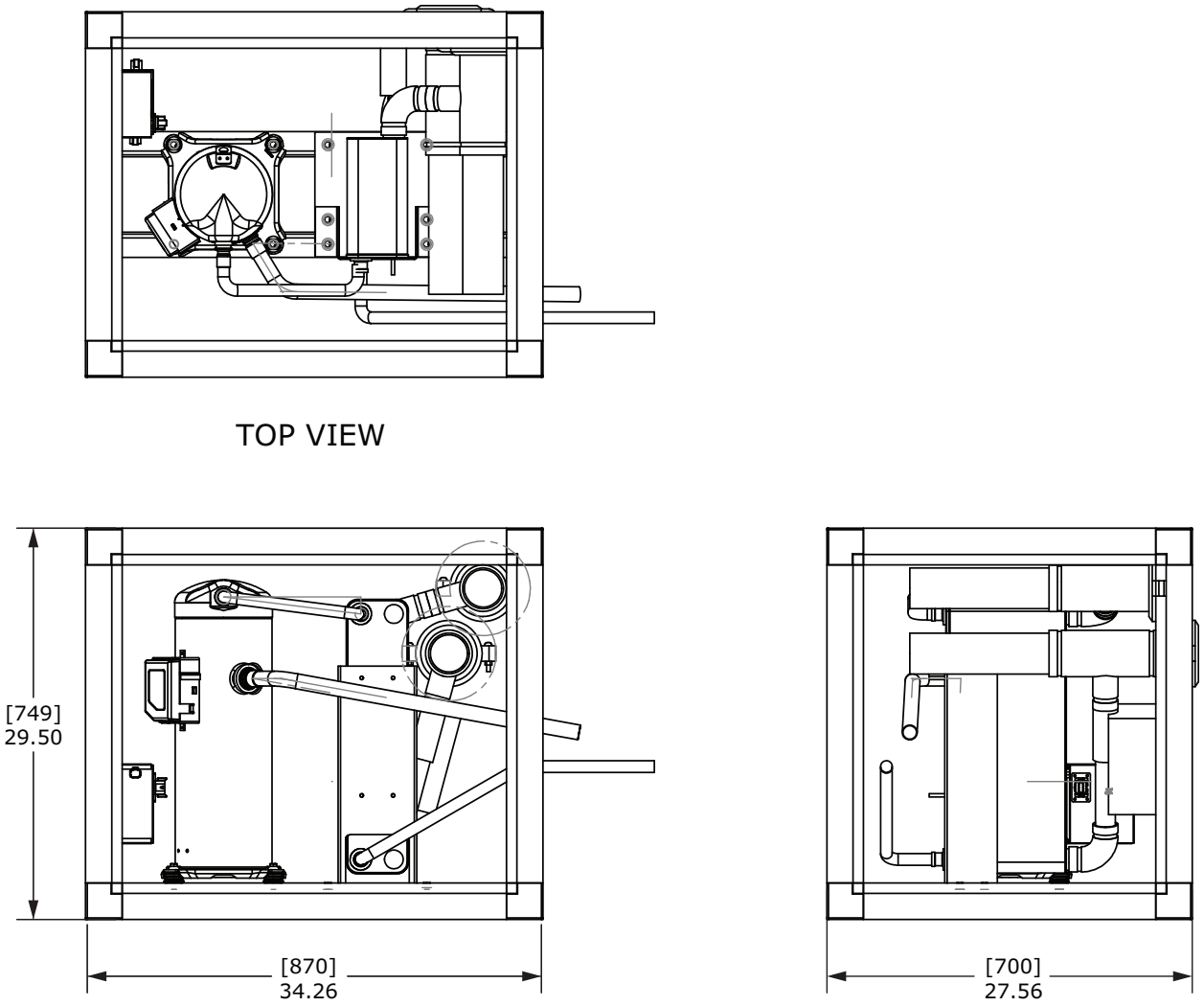


Figure 9. Starter cassette assembly footprint (in inches)

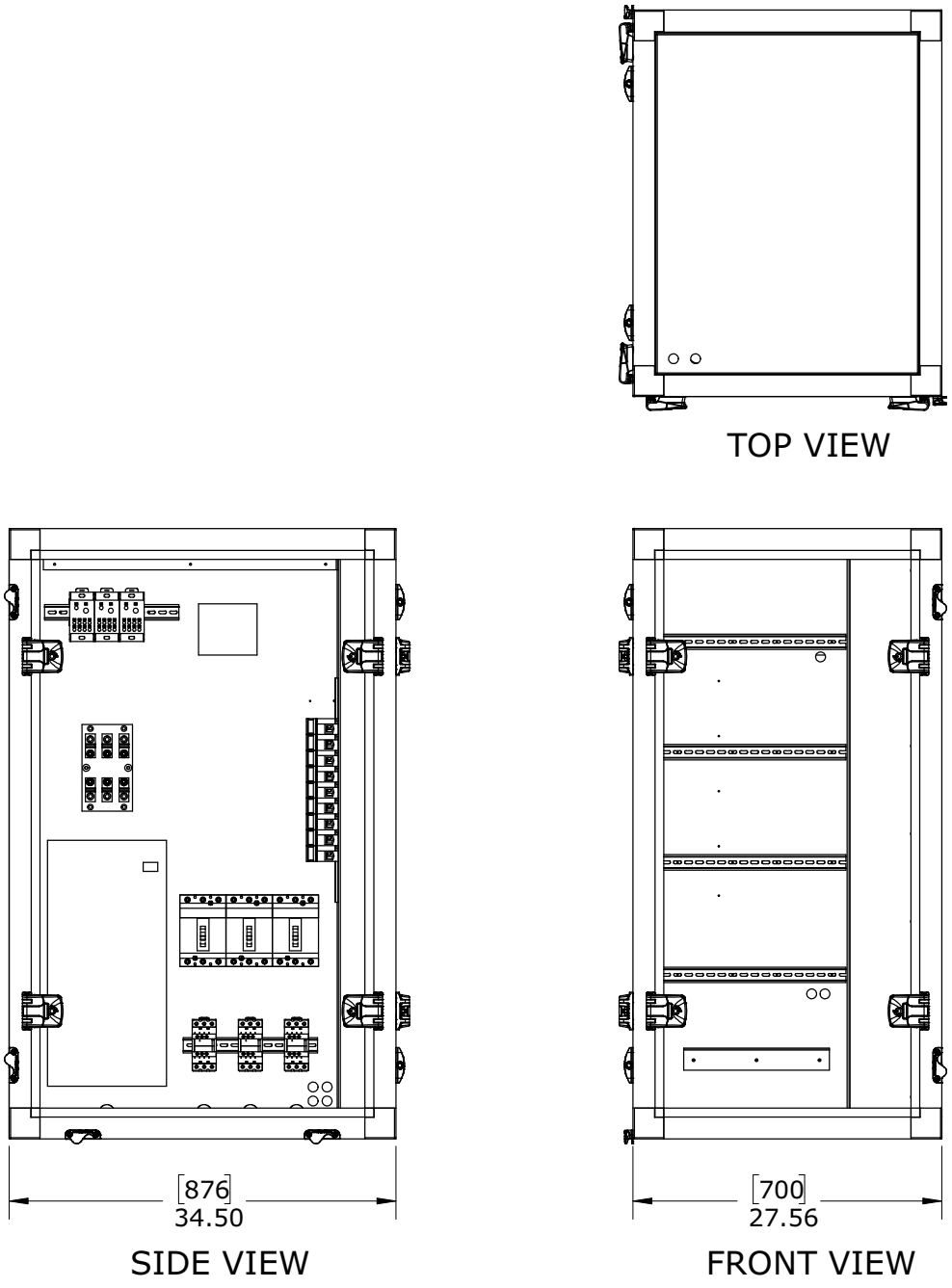


Figure 10. Evaporator cassette assembly footprint (in inches)

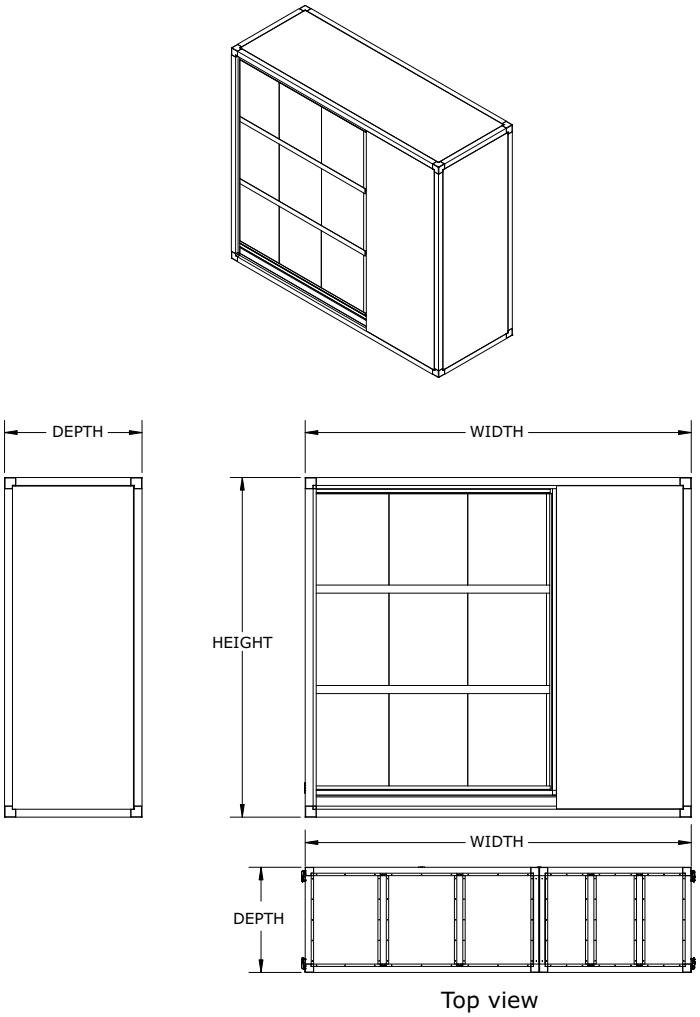
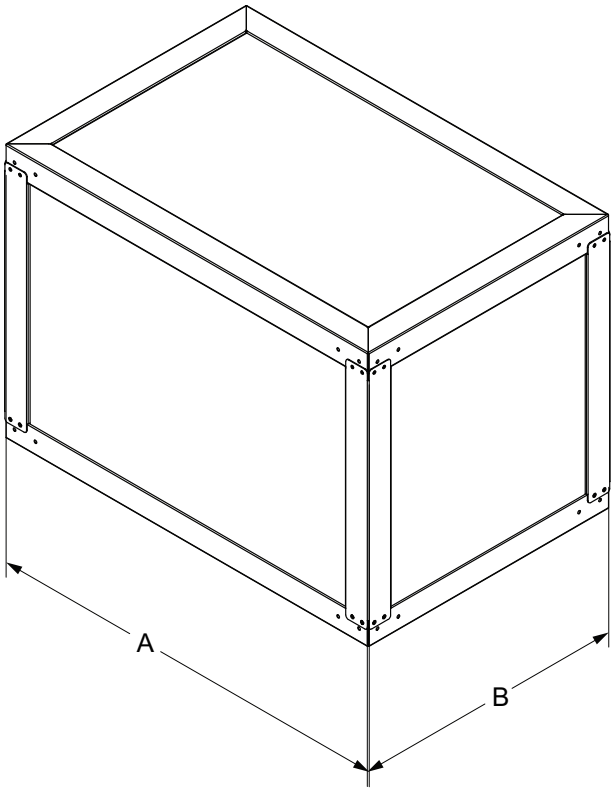


Table 12. Evaporator cassette dimensions (in inches)

Model	Width	Split Coil Width	Height	Depth
25	55.2	N/A	84	34.5
30	67.7	N/A	84	34.5
35	67.7	N/A	84	34.5
40/40L	96[a]	N/A	84	34.5
50/50L	96[a]	N/A	84	34.5
60/60L	96[a]	N/A	84	34.5
70/70L[b]	127[a]	77	84	34.5
		50	84	34.5
80/80L[b]	127[a]	77	84	34.5
		50	84	34.5

[a] Does not include condensate drain connection. Add an additional 1.5 inch to width to account for drain connection.
[b] Split coils.

Figure 11. Standard plenum (option)



Note: *Custom height plenums available upon request.*

Figure 12. Discharge opening for 30 and 35 ton

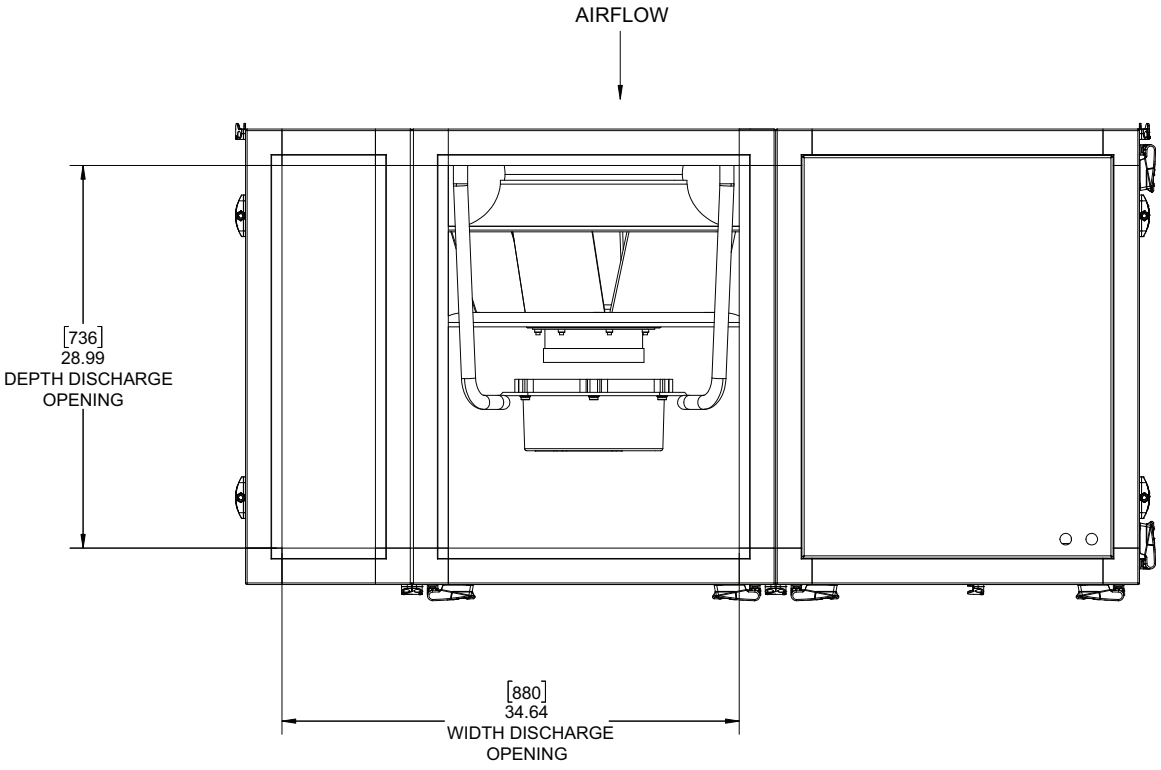


Figure 13. Discharge opening for 40 to 60 ton

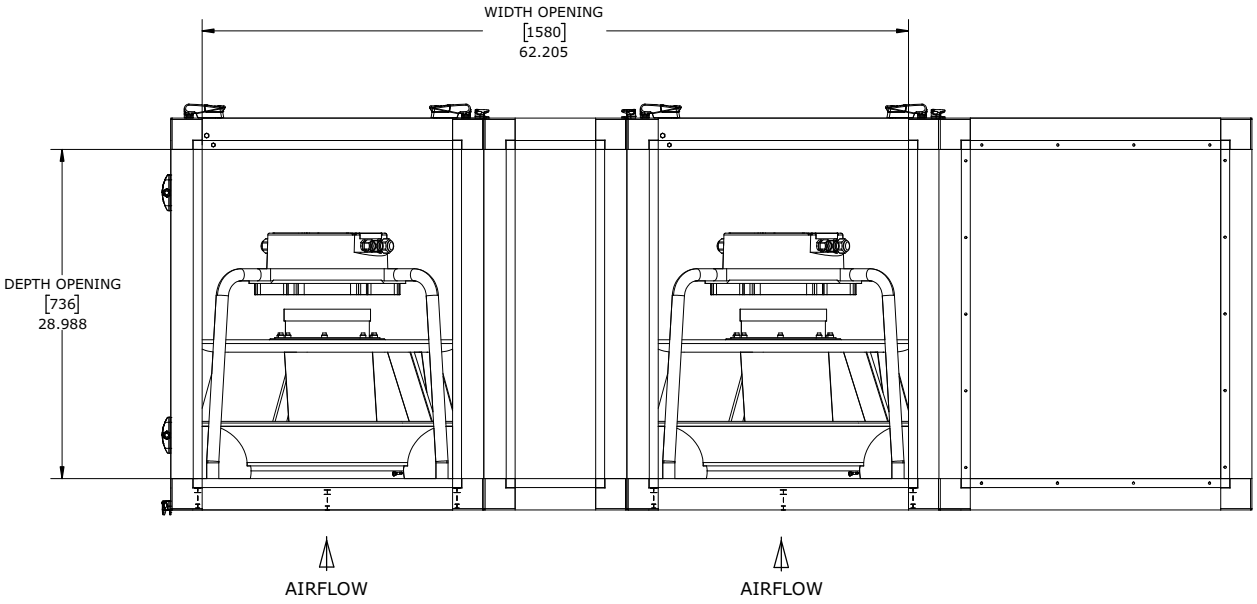
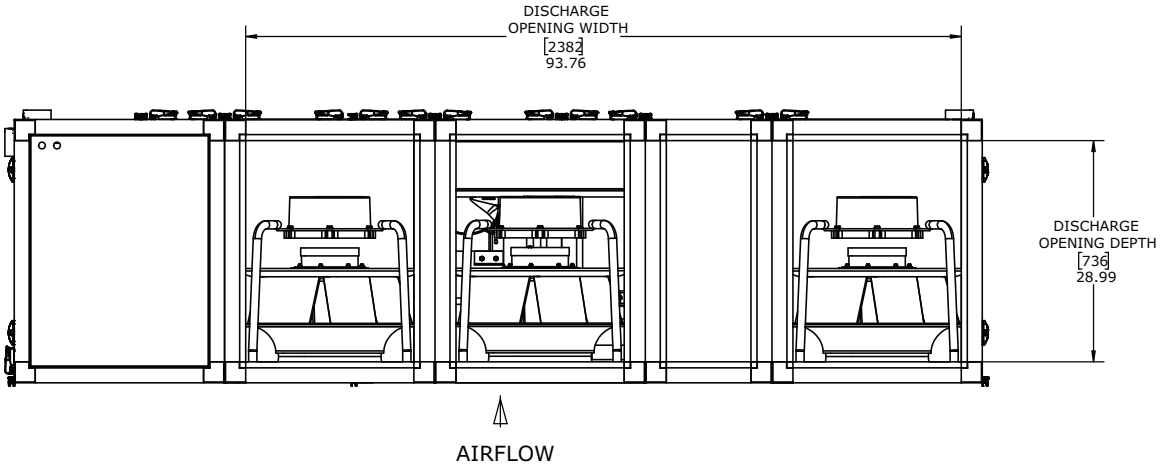


Figure 14. Discharge opening for 70 to 80 ton



Service Clearances

Table 13. Service/code clearance requirements

Side		Distance - in. (mm)	Purpose
Front		42 (1066)	Fans, Compressors, Condensers, Refrigeration access
Left	Left Hand Starter	42 (1066)	NEC Code Requirement (Starter Panel)
	Right Hand Starter	9 (229)	
Right	Left Hand Starter	9 (229)	NEC Code Requirement (Starter Panel)
	Right Hand Starter	42 (1066)	
Inlet		18 (457)	Provides uniform air flow

Weights

Table 14. Unit weights

Unit Size	Base Weight		Waterside Economizer	
	(lbs)	(kg)	(lbs)	(kg)
25 Ton	2138	970	204	93
30 Ton	2688	1219	228	104
35 Ton	2688	1219	228	104
40 Ton	3041	1379	381	173
50 Ton	3506	1590	468	212
60 Ton	3641	1652	568	258
70 Ton	4733	2146	762	346
80 Ton	4733	2146	762	346

Note: All unit weights include refrigerant, water, and controllers.

Table 15. Unit shipping weights (fan cassette)

Unit Size	Overall Dimensions (in)	Unit Weight (lbs)	Fan Cassette (in)	Number of Dual	Fan Weight (Two Fans)	Number of Single	Fan Weight (Single Fan)	Total Fan Weight (lbs)
25 Ton	70" x 84" x 56"	2030	34.5"x 54.5"x 27.6"	-	-	1	308	308
30 Ton	70" x 84" x 68"	2580	34.5"x 54.5"x 27.6"	1	408	-	-	408
35 Ton	70" x 84" x 68"	2580	34.5"x 54.5"x 27.6"	1	408	-	-	408
40 Ton	70"x 84" x 95.5"	2933	34.5"x 54.5"x 27.6"	1	408	1	308	716
50 Ton	70"x 84" x 95.5"	3365	34.5"x 54.5"x 27.6"	1	408	1	308	716
60 Ton	70"x 84" x 95.5"	3500	34.5"x 54.5"x 27.6"	2	408	-	-	816
70 Ton	70"x 84" x 126"	4545	34.5"x 54.5"x 27.6"	2	408	1	308	1124
80 Ton	70"x 84" x 126"	4545	34.5"x 54.5"x 27.6"	2	408	1	308	1124

Table 16. Unit shipping weights (compressor cassette)

Unit Size	Overall Dimensions (in)	Unit Weight (lbs)	Compressor Cassette (in)	Number Fixed Spd	FS Condensing Unit Cassette	Number Var Spd	VS Condensing Unit Cassette	Total Condensing Unit Weight (lbs)
25 Ton	70" x 84" x 56"	2030	34.5"x 29.5"x 27.6"	-	-	1	335	335
30 Ton	70" x 84" x 68"	2580	34.5"x 29.5"x 27.6"	1	385	1	335	720
35 Ton	70" x 84" x 68"	2580	34.5"x 29.5"x 27.6"	1	385	1	335	720
40 Ton	70"x 84" x 95.5"	2933	34.5"x 29.5"x 27.6"	1	385	1	335	720
50 Ton	70"x 84" x 95.5"	3365	34.5"x 29.5"x 27.6"	2	385	1	335	1105
60 Ton	70"x 84" x 95.5"	3500	34.5"x 29.5"x 27.6"	2	385	1	335	1105
70 Ton	70"x 84" x 126"	4545	34.5"x 29.5"x 27.6"	3	385	1	335	1490
80 Ton	70"x 84" x 126"	4545	34.5"x 29.5"x 27.6"	3	385	1	335	1490

Table 17. Unit shipping weights (starter cassette)

Unit Size	Overall Dimensions (in)	Unit Weight (lbs)	Starter Cassette (in)	Starter Cassette Weight (230 Vac) (lbs)
25 Ton	70" x 84" x 56"	2030	34.5"x 54.5"x 27.6"	323
30 Ton	70" x 84" x 68"	2580	34.5"x 54.5"x 27.6"	323
35 Ton	70" x 84" x 68"	2580	34.5"x 54.5"x 27.6"	323

Table 17. Unit shipping weights (starter cassette) (continued)

Unit Size	Overall Dimensions (in)	Unit Weight (lbs)	Starter Cassette (in)	Starter Cassette Weight (230 Vac) (lbs)
40 Ton	70"x 84" x 95.5"	2933	34.5"x 54.5"x 27.6"	323
50 Ton	70"x 84" x 95.5"	3365	34.5"x 54.5"x 27.6"	323
60 Ton	70"x 84" x 95.5"	3500	34.5"x 54.5"x 27.6"	323
70 Ton	70"x 84" x 126"	4545	34.5"x 54.5"x 27.6"	388
80 Ton	70"x 84" x 126"	4545	34.5"x 54.5"x 27.6"	388

Table 18. Unit shipping weights (evaporator cassette)

Tonnage	Overall dimensions (in)	Unit Weight (lbs)	Evaporator Cassette (in)	Total Weight of Cassette (excl. Economizer) (lbs)
25 Ton	70" x 84" x 56"	2030	34.5" x 84" x 55.2"	1018
30 Ton	70" x 84" x 68"	2580	35.5" x 84" x 67.7"	1082
35 Ton	70" x 84" x 68"	2580	34.5" x 84" x 67.7"	1082
40 Ton	70"x 84" x 95.5"	2933	34.5" x 84" x 94"	1127
50 Ton	70"x 84" x 95.5"	3365	34.5" x 84" x 94"	1219
60 Ton	70"x 84" x 95.5"	3500	34.5" x 84" x 94"	1254
70 Ton[(a)]	70"x 84" x 127"	4545	34.5" x 84" x 77"	1032
			34.5" x 84" x 50"	620
80 Ton[(a)]	70"x 84" x 127"	4545	34.5" x 84" x 77"	1032
			34.5" x 84" x 50"	620

(a) Split coils.

Mechanical Specifications

Modular Series Self-Contained Units

Notes: *Certified DOE Performance:*

- *Trane Commercial Self-Contained units are tested in accordance with AHRI 340/360 (I-P).*
- *The net cooling capacity and EER performance are certified to 10 CFR Part 431 from the US Department of Energy.*

Cabinet

- The unit framework are formed structural members of sturdy-gauge aluminium. Exterior panels are fabricated from 1-inch thick insulating foam core sandwiched between two layers of exterior grade cement and finished aluminum sheets.
- The unit is provided with removable panels to allow service access to compressors, condensers, fans, coils, and valves. Removable panels are secured with quick-acting hinges that allow panel to act as door, or completely remove panel when necessary. The refrigerant sight glasses are accessible during operation.

Compressors

- Units have multiple compressors with independent circuits.
- Compressors are manufactured by an independent manufacturer.
- Scroll compressors are heavy duty suction cooled type with suction screen, centrifugal oil pump with dirt separator, oil charging valve, and oil sight glass.
- Protective devices for low pressure, high pressure, and motor temperature are provided.
- The compressors are mounted on isolators for vibration isolation.

Phase and Voltage Monitor

- Protects 3-phase equipment from phase loss, phase reversal and low voltage.
- Any fault condition will produce a Failure Indicator LED and send the unit into an auto stop condition.
- cULus approved.

Condenser

- One condenser is provided for each compressor.
- The condensers are brazed plate and are chemically cleanable. A 20 mesh removable screen is provided upstream of all condensers for additional protection. Pressure differential across the screen also alerts user if the screen needs to be cleaned.
- Condenser waterside working pressure is 400 psig.

Evaporator

- Evaporator coils shall be UL recognized as Refrigerant Containing Component. Coils to be used with refrigerant R-454B shall have undergone cycle testing, and shall be safety listed with 750 psig rating.
- Tubes and return bends shall be constructed from seamless UNS C12200 copper conforming to ASTM B224 and ASTM E527. Properties shall be O50 light annealed, with a maximum grain size of 0.040 mm. Tubes are to be mechanically expanded into fins (secondary surface) for maximum heat transfer. Materials are to be 3/8-inch diameter x (0.014) wall thickness, copper rifled tubes.
- Secondary surface (fins) shall be of the plate-fin designusing aluminum or copper, with die-formed collars. Fin design to be flat, waffle, or sine-wave in a staggered tube pattern to meet performance requirements. Collars will hold fin spacing at specified density, and cover the entire tube surface. Aluminum properties are to be Alloy 1100 per ASTM B209, with O (soft) temper; copper is to be Alloy 11000 per ASTM B152-06 with soft (anneal) temper. Fins are to be free of oils and oxidation.

- Headers are to be constructed of seamless UNS C12200, Type L (drawn) copper material sized to match specified connection size.
- Evaporator coils shall be designed with brass liquid distributors (as required), and copper sweat suction connections. Distributors shall be capped using soft-solder for ease of cap removal; suction connections shall be capped.
- Coil casing material shall be of G90 galvanized steel, 12 gauge. Intermediate tube supports are to be provided on all coils 48–inch and longer fin length. Coil casings on top and bottom of coils are to have double-flange construction, allowing for vertical stacking of coils.
- All coils are to be brazed with minimum 5 percent silver content (BCup-3) filler material to insure joint integrity.
- Coils shall be certified to withstand 750 psig working pressures.

Refrigerant Circuit

- Refrigerant circuits are independent and include sight glasses, distributors, thermal expansion valves with adjustable superheat and external equalizer, and high pressure relief valves with ½-inch (13 mm) flare connection.
- Unit is provided with adequate means of frost control.
- The circuits are shipped with a small nitrogen charge.
- Compressors are mounted on rubber-in-shear isolators for vibration isolation.

Supply Fan

Direct drive plenum fans for increased efficiency. Plenum fans are equipped with integrated motor, electronics, and Variable Frequency drives (VFD) are tested in the factory and easy field wiring ensures quick, easy, and reliable start-up.

Filters

- Standard filters are 2-inch MERV 8 (24–inch x 20–inch).
- Optional 4-inch and 6-inch available.

Unit Controls

- Microprocessor controls control all unit functions. Trane Symbio™ 500 is the provided unit controller.
- Controls are factory-installed and mounted in the control panel of each section. All factory-installed controls are fully commissioned (run-tested) at the factory.
- Unit-mounted Tracer® TD-7 user-interface with a 7-inch WVGA 800 x 480 resolution, touch sensitive color screen is provided. The screen is backlit, to enable viewing in poor light conditions. The TD-7 display is standard to provide the operator with full adjustment and display of control data functions.
- The unit control can be used as a standalone controller or as part of a building management system involving multiple units.

Agency Listing

Units shall have the Intertek ETL agency listing.

Modular Self-Contained Options

Air Volume/Temperature Control

Supply Air Temperature Control With Variable Frequency Drive

This option controls the VAV self-contained unit from the discharge air temperature using factory-mounted, Electronically Commutated Motor (ECM) Fans drives. The ECM safely varies the fan motor speed to allow the motor to meet the dynamic requirements at the motor shaft and meet the system static. Other control components include a discharge air microprocessor controller and discharge air sensor. The microprocessor controller coordinates the optional waterside economizer control and the

stages of cooling with optional discharge air temperature reset capabilities. The ECM receives 0-10 Vdc signal from the unit microprocessor based upon supply static pressure and causes the drive to accelerate or decelerate as required to maintain the supply static pressure setpoint.

Waterside Economizer

The waterside economizer takes advantage of cooling tower water to either pre-cool the entering air to aid the mechanical cooling process or, provides total system cooling if the water temperature is low enough. Waterside economizing enables when the unit's entering water temperature is below the unit's entering mixed air temperature by a minimum of 4°F plus the economizer's approach temperature. The approach temperature default is 4°F and is adjustable from 0 to 9°F. Waterside economizing disables when the unit's entering water temperature is not below the unit's entering mixed air temperature by at least the water economizer approach temperature. The economizer acts as the first stage of cooling. If the economizer is unable to maintain the supply air setpoint, the unit control module brings on compressors as required to meet the setpoint.

The waterside economizer includes a coil, modulating valves, controls, and piping with cleanouts. The coil construction is 0.5-inch (13 mm) OD seamless copper tubes expanded into aluminum fins. The evaporator and economizer coils share a common sloped (IAQ) drain pan. Drain pan options are either galvanized or stainless steel and insulated.

Hot Water Coil (Hydronic)

The hot water heating assembly included the coil and filter section and is factory installed on the unit's inlet. Please note: if a Hot Water coil is requested in conjunction with a Water Side Economizer, the WSE will be installed in the same module as the evaporator, and the HWC will be in an additional cassette that will be bolted to the Evaporator Module. The HWC is constructed of 3/8-inch (10 mm) OD copper. The copper tubes are expanded into aluminum fins and not exceeding 13 fins per inch. The coil casing is galvanized steel. Supply and return water connections are copper MPT. All coils are equipped with a vent/drain on the supply and return side. Please note that all piping for HWC will be field piped.

Unit Flow Control

Units equipped with water regulating valves can be configured at the TD-7 for variable or constant water flow.

Constant Water Flow

Two-way modulating control shutoff valves are wired, controlled, and installed in the unit on each installed compressor. These valves are driven to their maximum value anytime the unit is powered up. The valves will spring return closed in the event of a power failure.

If the unit has the Waterside Economizer option, the Water Side Economizer Valves will modulate to maintain the Discharge Air Setpoint when active, and be fully closed when inactive. These valves always remain variable flow due to the Waterside economizer design.

Variable Water Flow

Two-way modulating control shutoff valves are wired, controlled, and installed in the unit on each installed compressor. When the compressor is in operation the valves modulate to maintain the differential pressure across the compressor and also to maintain the head pressure below the design setpoint. The valve will be limited to stay between the factory set Minimum and maximum valve position.

When the compressor is not running the valve will be fully closed. The valves will spring return closed in the event of a power failure.

If the unit has the Waterside Economizer option, the Waterside Economizer Valves will modulate to maintain the Discharge Air Setpoint when active, and be fully closed when inactive.

Water Flow Switch

A water flow switch is required to be installed in the condenser water pipe to the unit; it can be supplied from the factory as an option or it can be field-provided. Whenever the flow switch detects a water flow loss prior to or during mechanical cooling, compressor operation locks out and a diagnostic code displays. If water flow is restored, the compressor operation automatically restores.

Non-fused External Disconnect Switch Optional - Terminal Block is Standard

The unit is supplied with an external disconnect switch that will be field mounted.

Protective Coating

Coils — Three to five mL of protective coating is applied to the coil using a multiple dip-and-bake process displays a diagnostic. A manual reset is required at the unit. The high duct temperature can be adjusted at the thermostat.

Stainless Steel Drain Pan

The drain pan is/are positively sloped, fabricated from 304L stainless steel, and insulated with 1/4 -inch (6.35 mm) of 1-lb. (0.5 kg) density fiberglass.

Dirty Filter Sensor

A factory installed pressure sensor senses the pressure differential across the filters. When the differential pressure exceeds 0.9-inches (23 mm) WG, contact closure occurs.

A field installed indicator device may be wired to relay terminals that indicate when filter service is required. Contacts are rated at 115 Vac and are powered by a field supplied transformer.

Air Fi® Wireless Communications Interface (WCI)—Field Installed

Air Fi Wireless Communications Interface—Provides wireless communication between the Tracer® SC + and Symbio unit controllers.

Notes

Trane - by Trane Technologies (NYSE: TT), a global innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.com or tranetechnologies.com.

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