



Catalog 634-2

Trailblazer®
Air to Water Scroll Heat Pump

Heating & Cooling
Model EWYQ
25 Tons
R-410A Refrigerant



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Introduction



Air-Cooled Chiller Products

Trailblazer® Air-to Water Scroll Heat Pump
EWYQ • 25 RT

Trailblazer® Air-Cooled Scroll Chiller
AMZ • 10 - 40 RT

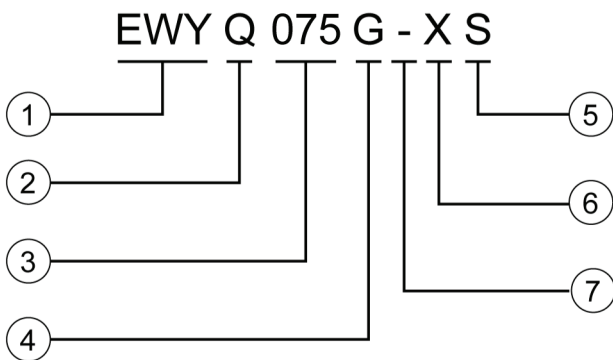
Trailblazer® Air-Cooled Scroll Compressor Chiller
AGZ-E • 30 - 241 RT
Variable Speed Condenser Fan Technology with Remote Evaporator, Heat Recovery, and High-Efficiency options available

Trailblazer® Air-Cooled Scroll Compressor Chiller
AGZ-F • 30 - 245 RT
High-Efficiency options available

Pathfinder® Air-Cooled Screw Compressor Chiller
AWV VFD • 100 - 565 RT
100% Configurable with Variable Volume Ratio (VVR) Technology Remote Evaporator, Pump Package, and Integrated Water-side Economizer options available

2021 AWARD WINNER

Nomenclature



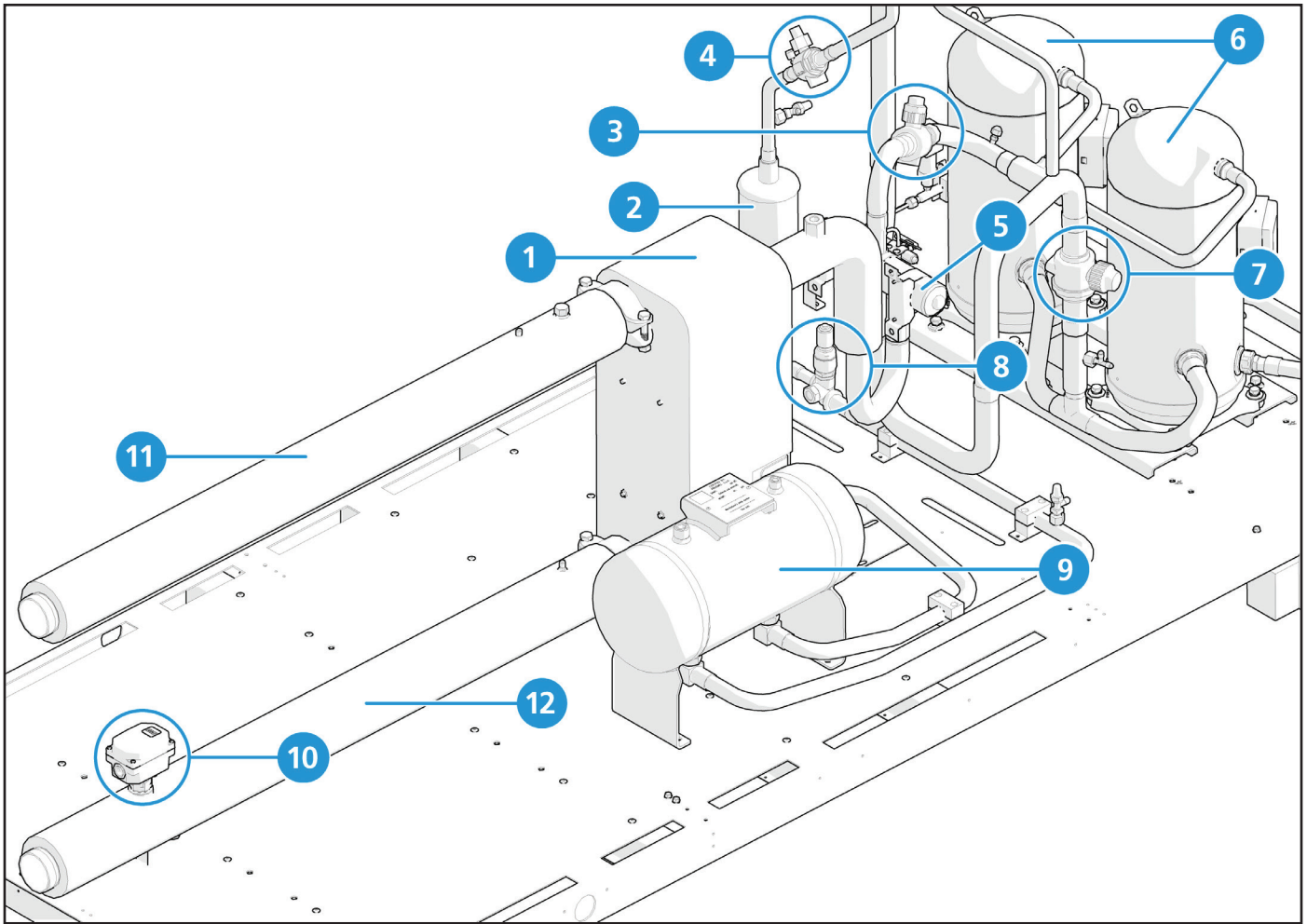
| | | |
|----|------------------------|---|
| 1. | Machine Type: | EWY = Air to Water Heat pump |
| 2. | Refrigerant: | Q = R410A |
| 3. | Class in kW (Cooling): | Always 3-digit code |
| 4. | Model Series: | G = Single Circuit |
| 5. | Inverter: | No Inverter |
| 6. | Efficiency Level: | X = High Efficiency |
| 7. | Sound Level: | S = Standard noise R = Reduced noise |



* Certified in cooling mode only



Features and Benefits



| No. | Component |
|-----|-----------------------------|
| 1 | Brazed Plate Heat Exchanger |
| 2 | Filter Dryer |
| 3 | Isolation Valve |
| 4 | Isolation Valve |
| 5 | 4-way Valve |
| 6 | Compressors |
| 7 | Isolation Valve |
| 8 | Expansion Valve |
| 9 | Expansion Tank |
| 10 | Flow Switch |
| 11 | Entering Water |
| 12 | Leaving Water |

Low Operating Cost & Extended Operating Life

This heat pump range is the result of careful design, aimed to optimize the energy efficiency of the unit, with the objective of bringing down operating costs and improving installation profitability, effectiveness and economical management.

The Heat Pump feature high efficiency scroll compressors, large condenser coil surface area for maximum heat transfer and low discharge pressure, continuous fan speed modulation, and a brazed plate evaporator with low refrigerant pressure drops.

Low Operating Sound Levels

Very low sound levels both at full load and part load conditions are achieved by the latest compressor design and by a unique new fan that moves a large volume of air at exceptionally low sound levels and by the virtually vibration-free operation.

Outstanding Reliability

The unit is equipped with hermetic orbiting scroll compressors complete with motor over-temperature and over-current devices and protection against excessive gas discharge temperature, a proactive control logic and are full factory-run-tested to optimize trouble-free operation.

Superior Control Logic

The new controller provides an easy to use control environmental. The control logic is designed to provide maximum efficiency, to continue operation in unusual operating conditions and to provide a history of unit operation. One of the greatest benefits is the easy interface with LonWorks, Bacnet, Ethernet TCP/IP or Modbus communications.

Code Requirements – Safety and Observant of Laws/Directives

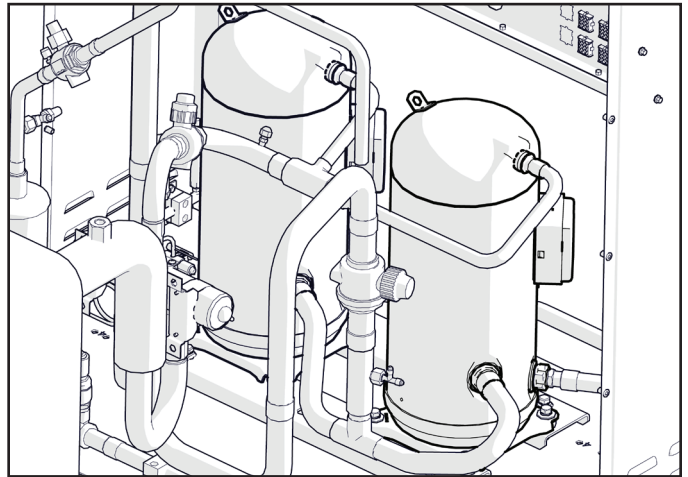
Units are designed and in accordance with applicable selections of the following:

| | |
|---------------------------------|----------------------------|
| Construction of Pressure Vessel | 97/23/EC (PED) |
| Machinery Directive | 2006/42/EC |
| Low Voltage | 2006/95/EC |
| Electrical Compatibility | 2004/108/EC |
| Electrical Safety Codes | EN 60204-1 / EN 60335-2-40 |
| Manufacturing Quality Stds | UNI-EN ISO 9001:2004 |

Cabinet and Structure

The cabinet is made of galvanized steel sheet and painted to provide a high resistance to corrosion. The base frame has an eye-hook to lift the unit for an easy installation. The weight is uniformly distributed along the profiles of the base and this facilitates the arrangement of the unit.

Compressor

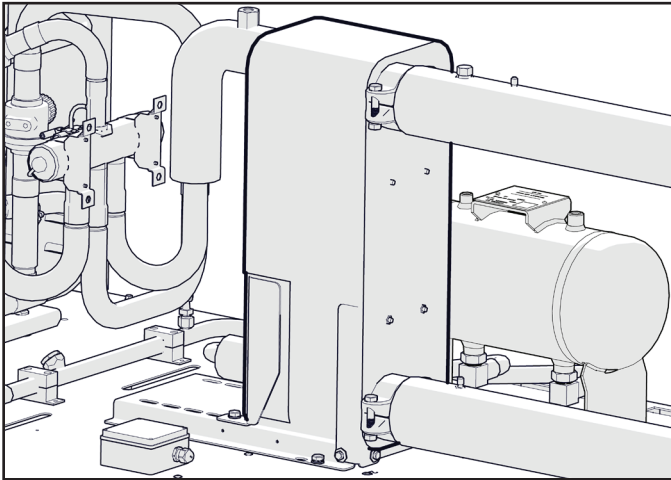


The compressors are hermetic orbiting scroll compressor complete with motor over-temperature and over-current devices. An oil heater, which starts automatically, keeps the oil from being diluted by the refrigerant when the compressor stops. The compressors are connected in tandem on a single refrigerating circuit and are fitted on rubber antivibration mounts and complete with oil charge.

Refrigerant

Units have been optimized to operate with R-410A refrigerant with zero ODP (Ozone Depletion Potential). R-410A has been the logical choice for our multiple scroll chiller because today it is one of the most promising refrigerants in terms of efficiency, stability and environmental impact. R-410A offers a small swept volume, a good heat exchange capacity and leads to reduced component sizes of items such as heat exchangers and tubing.

Evaporator



The unit is equipped with a direct expansion plate to plate type evaporator. This heat exchanger is made of stainless steel brazed plates and is covered with a 0.78 in. (20 mm) closed cell insulation material. The exchanger is equipped with an electric heater for protection against freezing. The evaporator is manufactured in accordance to PED approval.

Condenser

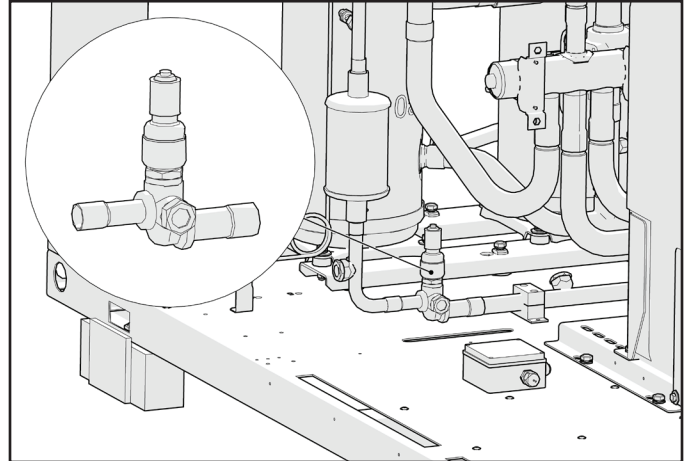
The condenser is manufactured with internally enhanced seamless copper tubes arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminum condenser fins with full fin collars. An integral sub-cooler circuit provides sub-cooling to effectively eliminate liquid flashing and increase cooling capacity without increasing the power input.

Condenser Fans

The condenser fans are propeller type with high efficiency design blades to maximize performances. The material of the blades is glass reinforced resin and each fan is protected by a guard. Fan motors are internally protected from over-temperature and are IP54.

Electronic Expansion Valve

The unit is equipped with advanced electronic expansion valves (EEXV) to achieve precise control of refrigerant mass flow. As modern building automation systems require improved energy efficiency, tighter temperature control, wider range of operating conditions and incorporate features like remote monitoring and diagnostics, the application of electronic expansion valves becomes mandatory.



Electronic expansion valves possess unique features: short opening and closing time, high resolution, positive shut-off function to eliminate use of additional solenoid valve, continuous modulation of mass flow without stress in the refrigerant circuit and corrosion resistance stainless steel body.

Electronic expansion valves are typically working with lower difference between high and low pressure side, than a thermostatic expansion valve. The electronic expansion valve allows the system to work with low condenser pressure (winter time) without any refrigerant flow problems and with a perfect chilled water leaving temperature control.

Refrigerant Circuit

Each unit has 1 refrigerant circuit that includes:

- Compressors
- Refrigerant
- Evaporator
- Air Cooled condenser
- Electronic expansion valve
- Charging valves
- High pressure switch
- High pressure transducers
- Low pressure transducers
- Suction temperature sensor

Electrical Control Panel

Power and control are located in the main panel that is manufactured to ensure protection against all weather conditions. The electrical panel is IP54 and (when opening the doors) internally protected against possible accidental contact with live parts. The main panel is fitted with a main switch interlocked door that shuts off power supply when opening.

Power Section

The power section includes compressors and fans protection devices, compressors and fans starters and control circuit power supply.

Unit Controller

Unit controller is installed as standard; it can be used to modify unit setpoints and check control parameters. A built-in display shows chiller operating status plus temperatures of water, refrigerant, programmable values, setpoints. A sophisticated software with predictive logic, selects the most energy efficient combination of compressors and EEXV to keep stable operating conditions to maximise chiller energy efficiency and reliability.

The unit controller is able to protect critical components based on external signs from its system (such as motor temperatures, refrigerant gas and oil pressures, pressure switches and evaporator). The input coming from the high pressure switch cuts all digital output from the controller in less than 50ms, this is an additional security for the equipment.

Fast program cycle (200ms) for a precise monitoring of the system. Floating point calculations supported for increased accuracy in Pressure / Temperature conversions.

Unit controller built-in terminal has the following features:

- 164x44 dots liquid crystal display with white back lighting. Supports Unicode fonts for multilingual.
- Keypad consisting of 3 keys.
- Push'n'Roll control for an increased usability.
- Memory to protect the data.
- General faults alarm relays.
- Password access to modify the setting.
- Application security to prevent application tampering or hardware usability with third party applications.
- Service report displaying all running hours and general conditions.
- Alarm history memory to allow an easy fault analysis.

Control Section Main Features

Control section has the following features:

- Management of the refrigerant circuit capacity
- Full routine operation at condition of:
 - High thermal load
 - High evaporator entering water temperature (start-up)
- Display of evaporator entering/leaving water temperature.
- Display of condensing-evaporating temperature and pressure, suction superheat.
- Leaving water evaporator temperature regulation.
- Compressor and pumps hours counter.
- Display of status safety devices.
- Number of starts and compressor working hours.
- Re-start in case of power failure (automatic / manual).
- Soft load (optimized management of the compressor load during the start-up).
- OAT (outside ambient temperature) reset.
- Start at high evaporator water temperature.
- Return reset (set point reset based on return water temperature).
- Set point reset (optional).
- Application and system upgrade with commercial SD cards.

Safety Device/Logic for each Refrigerant Circuit

The following devices / logics are available:

- High pressure (pressure switch).
- High pressure (transducer).
- Low pressure (transducer).
- High motor winding temperature.
- No pressure change at start.

System Security

The following securities are available:

- Under/over voltage control (available as options).
- Freeze protection.

Supervising systems (on request) - Unit controller remote communication

Unit controller is able to communicate to BMS (Building Management System) based on the most common protocols as:

- ModbusRTU
- LonWorks, now also based on the international 8040 Standard Chiller Profile and LonMark Technology.
- BacNet BTP certified over IP and MS/TP (class 4)
- Ethernet TCP/IP.

Technical Specifications

EWYQ~G-XS

| Cooling Performance | |
|--|--|
| Capacity - Cooling* | 23.58 Tons |
| Capacity Control - Type | Step |
| Capacity Control - Minimum Capacity | 44% |
| Unit Power Input - Cooling (1) | 29.1 kW |
| EER* | 9.72 btu/W.h |
| IPLV | 9.6 btu/W.h--- |
| Casing | |
| Color | Ivory White |
| Material | Galvanised and Painted Steel Sheet |
| Dimensions | |
| Height | 71 in. (1800 mm) |
| Width | 47 in. (1195 mm) |
| Length | 111 in. (2826 mm) |
| Weight | |
| Unit Weight | 2011 lbs. (912 kg) |
| Operating Weight | 2030 lbs. (921 kg) |
| Water Heat Exchanger | |
| Type | Brazed-Plate Heat Exchanger |
| Water Volume | 2.48 gal (9.40 l) |
| Nominal Water Flow Rate | 66.57 GPM (4.20 l/s) |
| Nominal Water Pressure Drop | 2.78 ftH ₂ O (8.30 kPa) |
| Insulation Material | Closed Cell |
| Air Heat Exchanger | |
| Direct Propeller Type | High Efficiency Fin and Tube Type with integral subcooler. |
| Fan | |
| Power Supply | 460-3PH-60Hz |
| Compressor 1 RLA/LRA | 22.4A / 150A |
| Compressor 2 RLA/LRA | 22.4A / 150A |
| Fan PI/FLA (for each fan) | 1400W / 2.9A |
| SCCR | 65 kA |
| Compressor | |
| Type | Scroll |
| Oil Charge | 2.14 gal (8.10 l) |
| Quantity | 2 |
| Sound Level - Details on measurement methods are available in the Sound Data section | |
| Sound Power - Cooling | 85 dB(A) |
| Sound Pressure - Cooling | 68 dB(A) |

| Refrigerant Circuit | |
|-------------------------------|-------------------|
| Refrigerant Type | R410A |
| Refrigerant Charge | 39.7 lbs. (18 kg) |
| Number of Circuits | 1 |
| Piping Connections | |
| Evaporator water inlet/outlet | 3 in. (76 mm) |

Heating Mode

| Heating Performance | |
|------------------------------|------------------------------------|
| Capacity - Heating** | 91.2 kW |
| Unit Power Input - Heating** | 29 kW |
| COP** | 3.12 |
| SCOP** | 3.31 |
| Heat Exchanger Evaporator | |
| Nominal Water Flow rate | 69.74 GPM (4.4 l/s) |
| Nominal Water Pressure Drop | 3.04 ftH ₂ O (9.10 kPa) |

Fluid: Water

(*) Cooling capacity, unit power input in cooling and EER are based on the following conditions: evaporator 53.6°F/44.6°F (12.0/7.0°C); ambient 95°F (35.0°C), unit at full load operation;

(**) Heating capacity, unit power input and COP are based on the following conditions: ambient 44.6°F (7°C); condenser 104.0°F/113.0°F (40.0/45.0 °C), unit at full load operation.

Unit performances are referred to ideal running conditions that are reproducible in laboratory test environment in accordance to recognized industry standards (i.e. EN14511). Weights and dimensions are indicative –For specific values refer to certified drawing issued by factory.

Data are referred to unit with standard options only. For specific information about additional options refer to databook specific section.

Sound Levels

| Hz | Sound pressure level at 1 m from the unit (rif. 2x10 ⁻⁵ Pa) |
|-------------|--|
| 63 Hz | 77.0 |
| 125 Hz | 67.0 |
| 250 Hz | 65.0 |
| 500 Hz | 66.0 |
| 1000 Hz | 63.0 |
| 2000 Hz | 59.0 |
| 4000 Hz | 52.0 |
| 8000 Hz | 45.0 |
| db(A) | 68 |
| Power db(A) | 85 |

Operating Limits

Operation

NOTICE

Operation outside any of the limits shown below may damage the unit. In case of doubt, contact manufacturer's representative.

Figure 1: Operating Limits in Cooling Mode

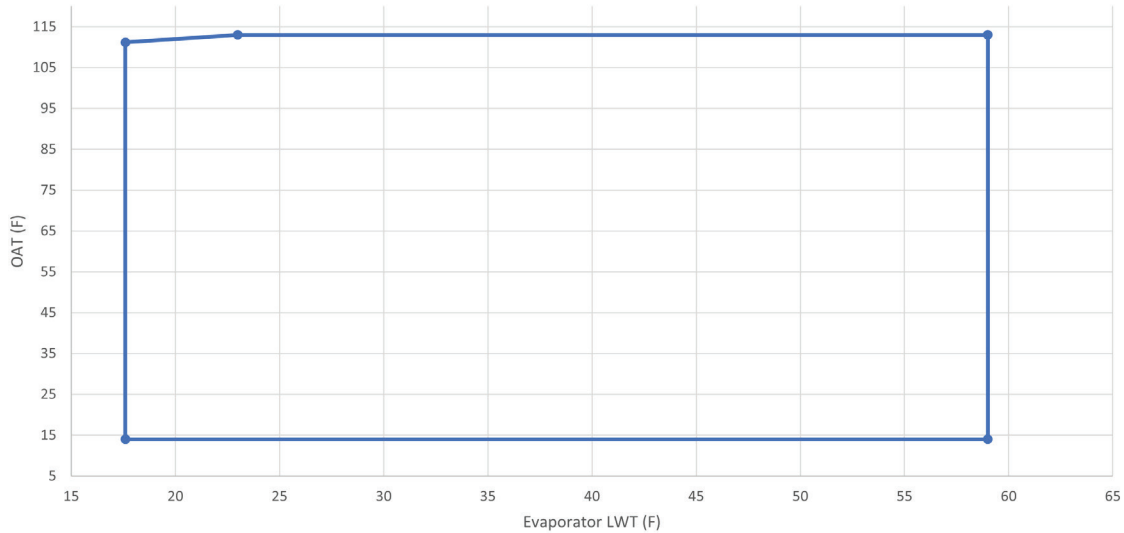
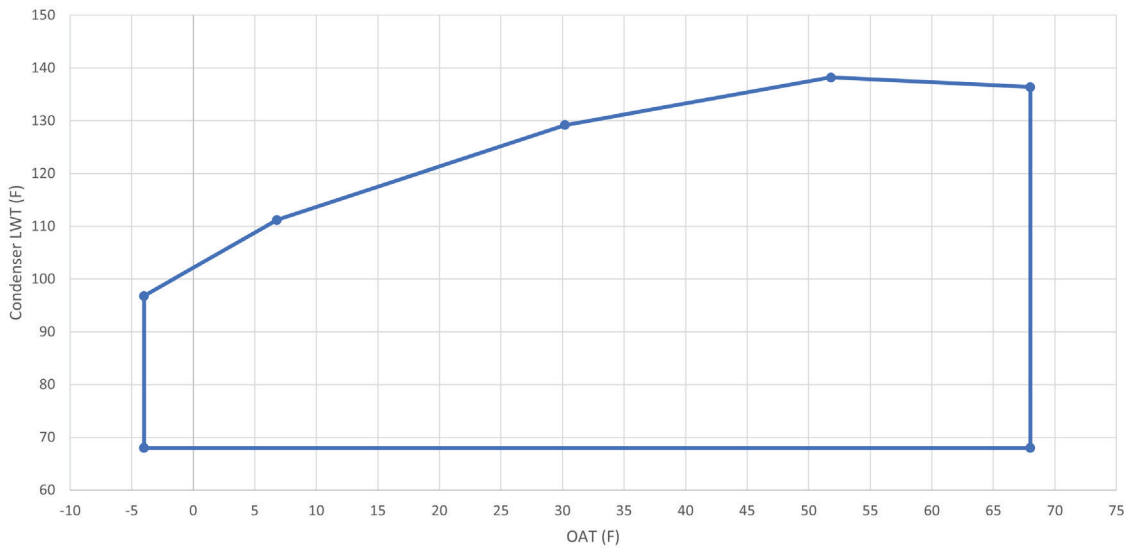


Figure 2: Operating Limits in Heating Mode



NOTICE

The diagrams show the guide lines for the range of operating limits. Refer to the Chiller Selection Software (CSS) for the true operating limits under working conditions for each model.

Table 1: Evaporator - Difference in Temperature Δt at Minimum and Maximum

| | | |
|--------------|--|--------------|
| A Δt | Maximum difference in evaporator water temperature | 14.4°F (8°C) |
| B Δt | Minimum difference in evaporator water temperature | 7.2°F (4°C) |

Application Considerations

⚠ WARNING

Installation and maintenance of the unit must be performed only by qualified personnel who have knowledge with local codes and regulations and experience with this type of equipment.

Do not install the unit in a location where it could be considered dangerous to perform any and all maintenance operations.

Handling

Care should be taken to avoid rough handling or shock due to dropping the unit. Do not push or pull the unit from anything other than the base frame. Never allow the unit to fall during unloading or moving as this may result in serious damage. To lift the unit, rings are provided in the base frame of the unit. Spreader bar and cables should be arranged to prevent damage to the condenser coil or unit cabinet.

Location

The units are produced for outdoor installation on roofs, floors or below ground level on condition that the area is free from obstacles for the passage of the condenser air. The unit should be positioned on solid foundations and perfectly leveled; in the case of installation on roofs or floors, it may be advisable to arrange the use of suitable weight distribution beams. When the units are installed on the ground, a concrete base at least 10 in. wider and longer than the unit's footprint should be laid. Furthermore, this base should withstand the unit weight mentioned in the technical data table.

Acoustic Protection

When noise level must meet special requirements, it is necessary to pay the maximum attention to ensure the perfect insulation of the unit from the support base by applying appropriate vibration-dampening devices on the unit, on the water pipes and on the electrical connections.

Storage

The environment conditions have to be in the following limits:

| | |
|-----------------------------|--------------------|
| Minimum Ambient Temperature | -4°F (-20°C) |
| Maximum Ambient Temperature | 107°F (42°C) |
| Maximum R.H. | 95% not condensing |

Chilled Water Systems

Water Piping

Start-up procedures should confirm that the chilled water piping system had been properly flushed out before being connected to the chiller vessel.

⚠ CAUTION

To prevent damage to the evaporator and potential chiller failure, a supply strainer is required in the inlet water piping which connects to this evaporator. This strainer must be installed prior to operation of the chilled liquid pumps.

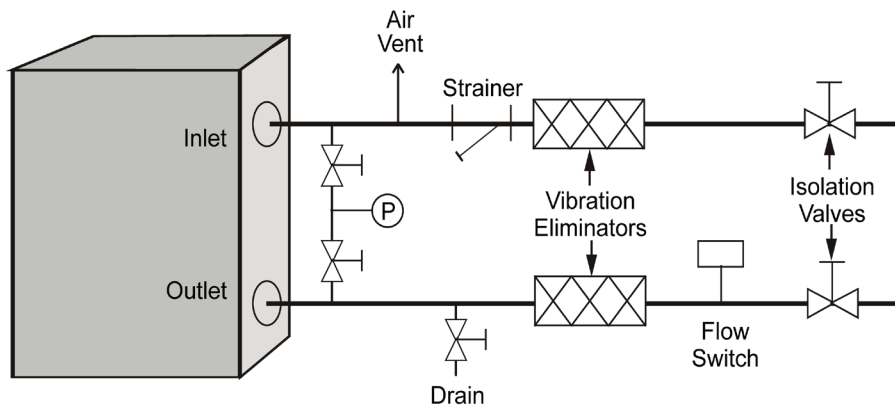
Field installed water piping to the chiller must include:

- A cleanable strainer installed at the water inlet to the evaporator to remove debris and impurities before they reach the evaporator, causing damage. See the [“Inlet Strainer Guidelines” on page 11](#) and the current version of the product installation, operation and maintenance manual on www.DaikinApplied.com for additional details.
- A water flow switch must be installed in the horizontal piping of the supply (evaporator outlet) water line to avoid evaporator freeze-up under low or no flow conditions. A flow switch proves that there is adequate water flow to the evaporator before the unit can start or to shut down the unit if water flow is interrupted. The flow switch is supplied by the factory as an installed component or a field-installed kit shipped along with the unit.
- Piping for units with brazed-plate evaporators must have a drain and vent connection provided in the bottom of the lower connection pipe and to the top of the upper connection pipe respectively, see [“Typical Chilled Water Piping” on page 11](#). These evaporators do not have drain or vent connections due to their construction. Purge air from the water system before unit start-up to provide adequate flow through the evaporator with an air vent located at high point of piping.
- Adequate piping support, independent from the unit, to eliminate weight/strain on the fittings and connections.

It is **recommended** that the field installed water piping to the chiller include:

- Thermometers at inlet/outlet connections of evaporator.
- Water pressure gauge connection taps and gauges at the inlet and outlet connections of the evaporator for measuring water pressure drop.
- An expansion tank or regulating valve to maintain adequate water pressure
- Vibration eliminators in both the supply and return water lines to reduce transmissions to the building.
- Regular water analysis and chemical water treatment for the evaporator loop is recommended immediately at equipment start-up.

Figure 4: Typical Chilled Water Piping



Welded pipe connections are not allowed between the strainer and evaporator due to the chance of slag entering the evaporator

Evaporator may be oriented with connections on a different side than shown.

Inlet Strainer Guidelines

An inlet water strainer kit must be installed in the chilled water piping before the evaporator inlet. Several paths are available to meet this requirement:

1. A factory installed option.
2. A field-installed kit shipped-loose with the unit consisting:
 - Y-type area strainer with 304 stainless steel perforated basket, Victaulic pipe connections and strainer cap, a strainer with perforations no larger than 0.0625" diameter.
 - Extension pipe with two Schrader fittings that can be used for a pressure gauge and flow switch. The pipe provides sufficient clearance from the evaporator for strainer basket removal.
 - 1/2-inch blowdown valve
 - Two grooved clamps
3. A field-supplied strainer that meets specification and installation requirements of the current product installation, operation and maintenance manual on www.DaikinApplied.com.

Connection sizes are listed on installation specific drawings available from a Daikin Applied sales representative.

Space Requirements

It is important to respect the minimum distances which guarantee the best ventilation of the condenser coils. Limitations of space reducing the air flow could cause significant reductions in cooling capacity and an increase in electricity consumption.

To determine unit placement, careful consideration must be given to assure a sufficient air flow across the condenser heat transfer surface. Two conditions must be avoided to achieve the best performance: warm air recirculation and coil starvation. Both these conditions cause an increase

of condensing pressures that results in reductions in unit efficiency and capacity. Moreover the unique microprocessor has the ability to calculate the operating environment of the air cooled chiller and the capacity to optimize its performance staying on-line during abnormal conditions.

Each side of the unit must be accessible after installation for periodic service. Figure 5 shows minimum recommended clearance requirements. Vertical condenser air discharge must be unobstructed because the unit would have its capacity and efficiency significantly reduced. If the units are positioned in places surrounded by walls or obstacles of the same height as the units, the units should follow the minimum recommended clearance requirements shown in Figure 6. In the event the obstacles are higher than the units, the minimum recommended clearance requirements are shown in Figure 7. Units installed closer than the minimum recommended distance to a wall or other vertical riser may experience a combination of coil starvation and warm air recirculation, thus causing reduction in unit capacity and efficiency reductions. The microprocessor control is proactive in response "of design condition". In the case of single or compounded influences restricting airflow to the unit, the microprocessor will act to keep the compressor(s) running (at reduced capacity) rather than allowing a shut-off on high discharge pressure.

When two or more units are positioned side by side it is recommended that the condenser coils are at a minimum distance from one another as shown in Figure 8; strong wind could be the cause of air warm recirculation.

For other installation solutions, consult a Daikin Applied sales representative.

The above recommended information are representative of general installation. A specific evaluation should be done by a contractor depending on the case.

Figure 5: Space Requirements for Service Clearance

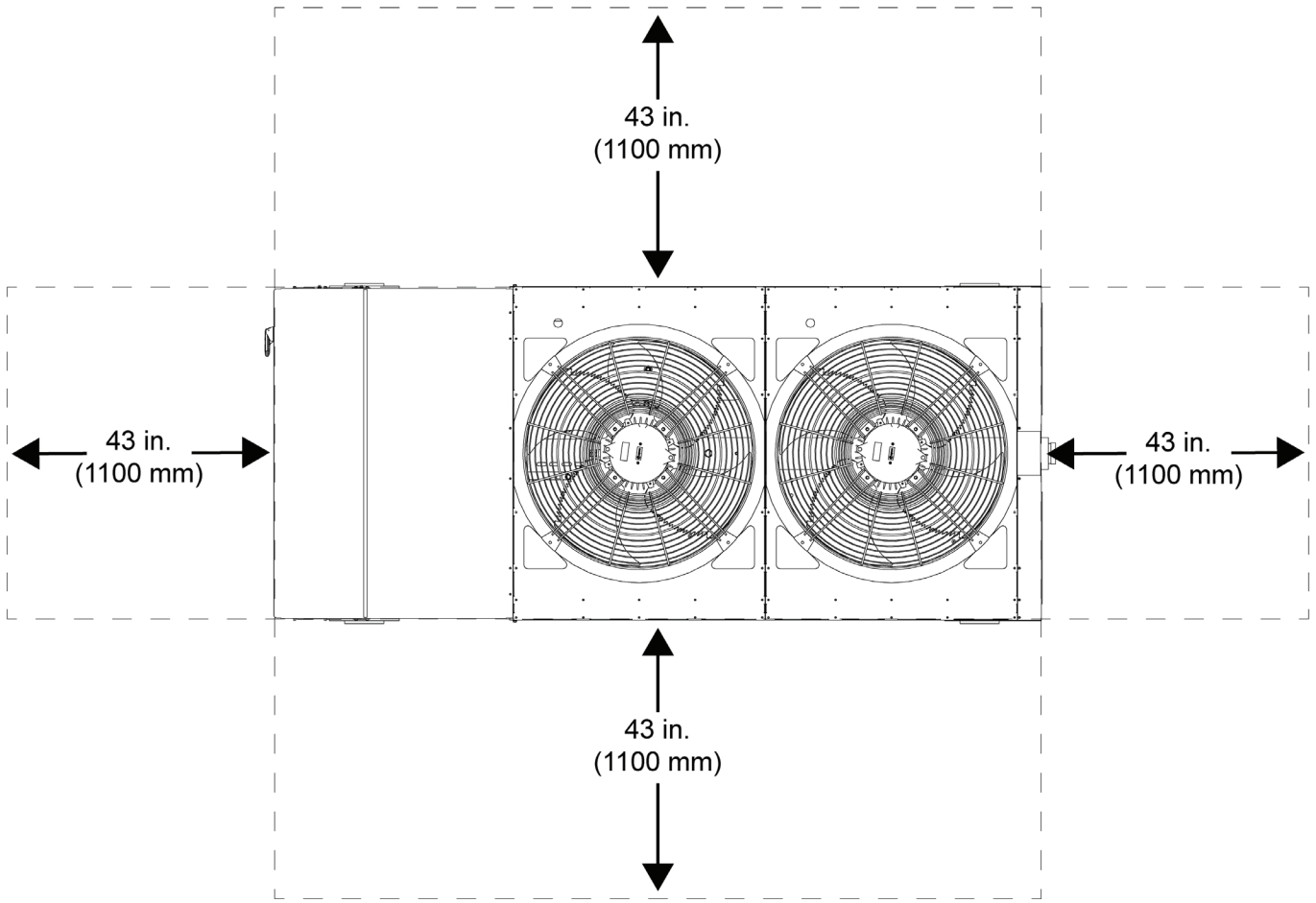


Figure 6: Space Requirements - Installation Surrounded by Walls

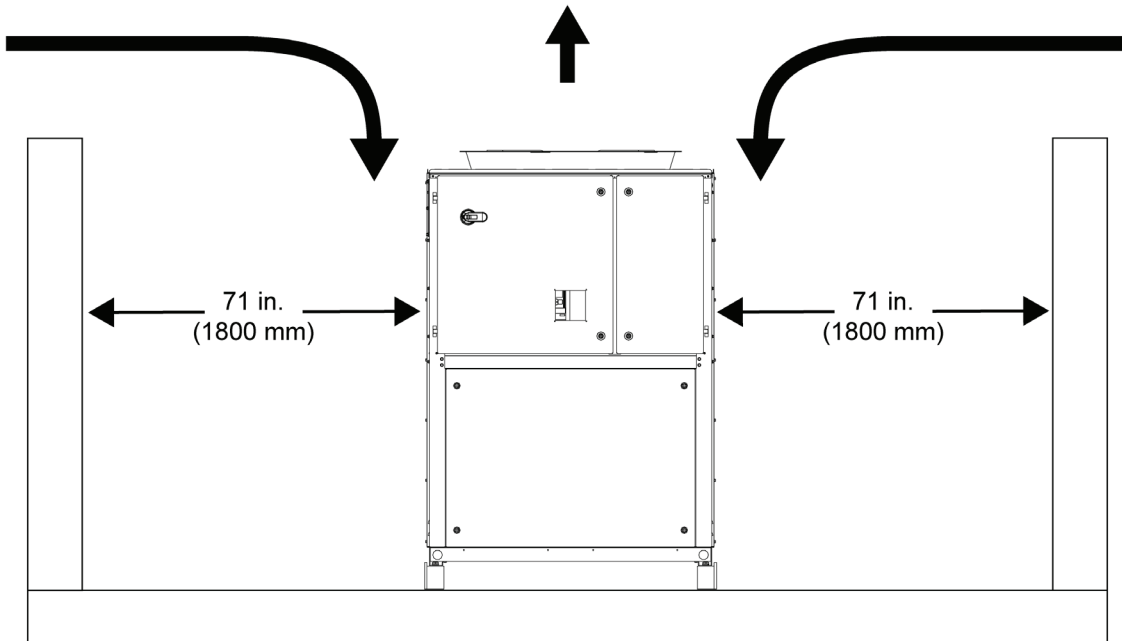


Figure 7: Space Requirements - Installation with Wall Higher than Unit

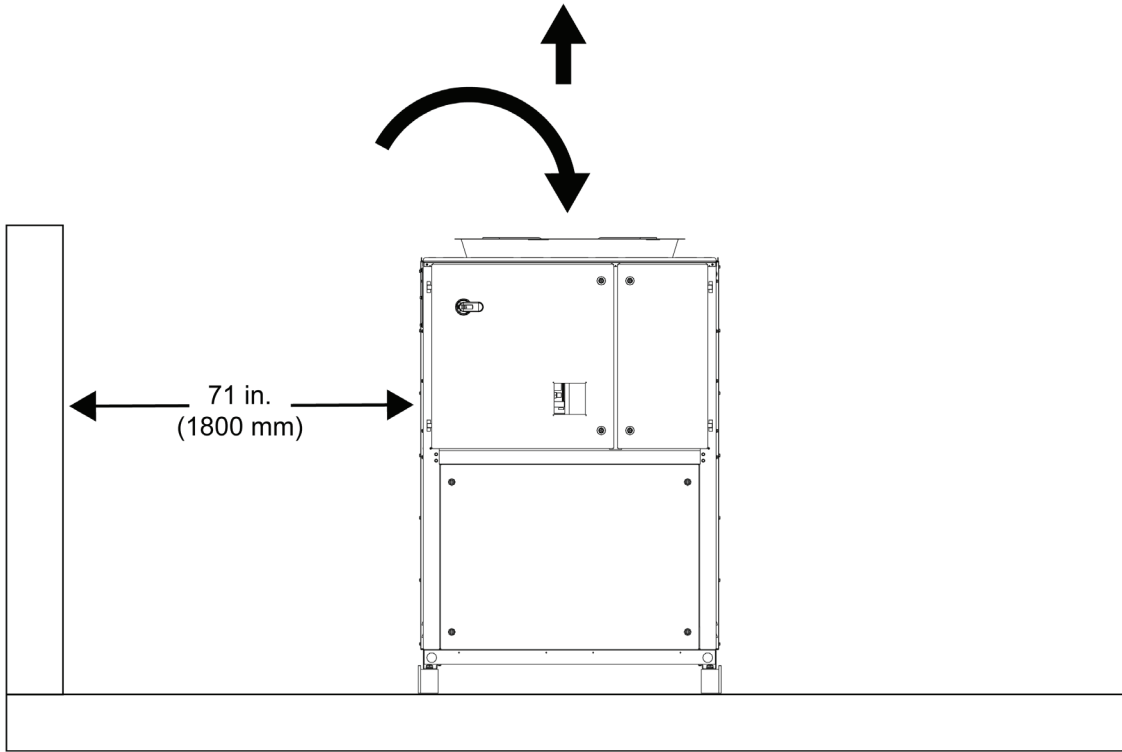
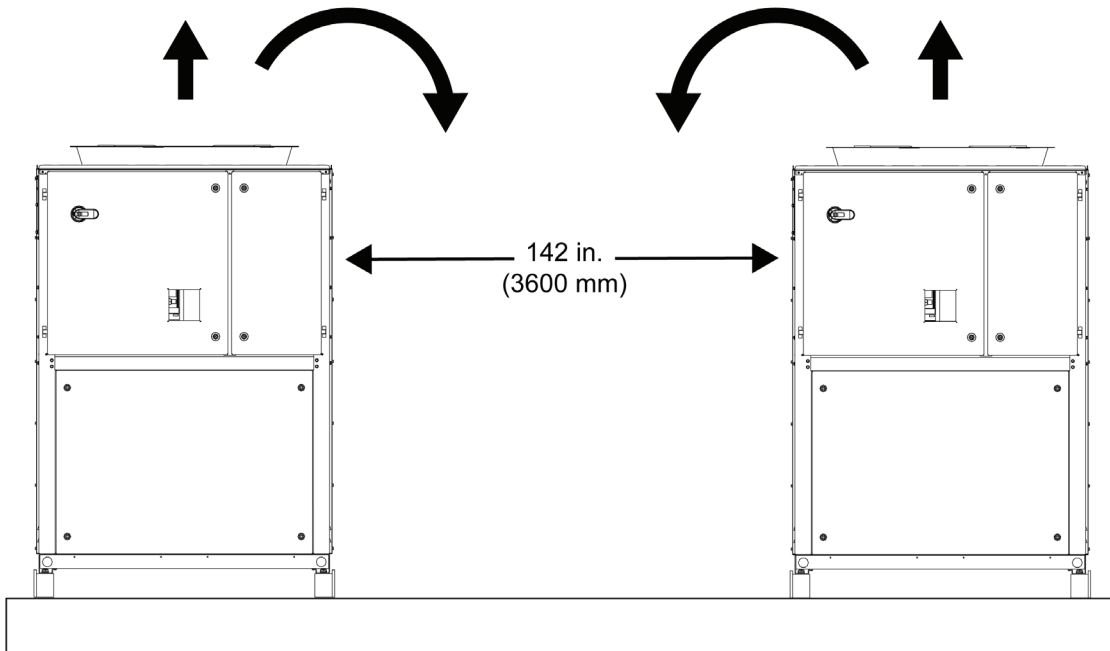


Figure 8: Space Requirements - Minimum Distance Between Units



Engineering Guide Specifications

Air to Water Scroll Heat Pump

Part 1 - General

1.01 SUMMARY

- A. Section includes design, performance criteria, refrigerants, controls, and installation requirements for air to water scroll heat pumps.

1.02 REFERENCES

- A. Comply with applicable Standards/Codes of AHRI 550/590, ANSI/ASHRAE 15, ETL, NEC, and OSHA as adopted by the State.

1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with the specifications.
- B. Submittals shall include the following:
 1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
 2. Single-line schematic drawing of the power field hookup requirements, indicating all items that are furnished.
 3. Schematic diagram of control system indicating points for field interface/connection.
 4. Diagram shall fully delineate field and factory wiring.
 5. Installation manuals.

1.04 QUALITY ASSURANCE

- A. Qualifications: Equipment manufacturer must specialize in the manufacture of the products specified and have five years experience with the type of equipment and refrigerant offered.
- B. Regulatory Requirements: Comply with the codes and standards specified.
- C. Chiller manufacturer's plant must be ISO registered.

1.05 DELIVERY AND HANDLING

- A. Packaged Chillers Only: Chiller shall be delivered to the job site completely assembled and charged with refrigerant and oil by the manufacturer.
- B. Comply with the manufacturer's instructions for rigging and handling equipment.

1.06 WARRANTY

- A. The refrigeration equipment manufacturer's guarantee shall be for a period of one year from date of equipment start-up but not more than 18 months from shipment. The guarantee shall provide for repair or replacement due to failure by material and workmanship that prove defective within the above period, excluding refrigerant.

1.07 MAINTENANCE

- A. Maintenance of the chillers shall be the responsibility of the owner and performed in accordance with the manufacturer's instructions.

PART 2--PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Daikin Applied
- B. (Approved Equal)

2.02 UNIT DESCRIPTION

- A. The chiller will be factory assembled on a robust base frame made of galvanized steel, protected by an epoxy paint. Each chiller shall include as standard not less than: one refrigerant circuit, hermetic type rotary scroll compressors, electronic expansion valve (EEXV), refrigerant direct expansion plate to plate heat exchanger, air-cooled condenser section, R-410A refrigerant, motor starting components, control system and all components necessary for a safe and stable unit operation.
- B. Each chiller shall be factory run-tested to verify operation.

2.03 DESIGN REQUIREMENTS

- A. General: [Packaged Chillers: Provide a complete scroll compressor packaged chiller as specified herein and as shown on the drawings. The unit shall be in accordance with the standards referenced in section 1.02 and any local codes in effect].
- B. Performance: Refer to the schedule of performance on the drawings. The chiller shall be capable of stable operation to a minimum percentage of full load (without hot gas bypass) of 50%. Performance shall be in accordance with AHRI Standard 550/590.
- C. Operating Range: The chiller shall have the ability to control leaving fluid temperature from 17°F to 138°F.

2.04 CHILLER COMPONENTS

A. Compressors:

1. The units shall be equipped with:
 - a. High performance hermetic scroll compressors optimized to work with R410a, with reduced vibration and sound emissions.
 - b. High efficiency values: by high volumetric efficiency in the whole range of application, through the continuous contact between the fixed and the orbiting scroll deleting the dead space and the re-expansion of the refrigerant gas; by low pressure drops due to the absence of inlet and discharge valves and to the uniform compression cycle;
 - c. Reduction of the heat exchange between the gas during suction and discharge due to the separation of gas flows.
 - d. The reduced noise shall be obtained for the absence of the inlet and discharge valves for the uniform compression cycle for the absence of pistons which ensures reduced vibration and pulsation of the refrigerant.
 - e. The engine shall be cooled by the suction refrigerant fluid.
 - f. The terminal shall be contained in a casing with protection degree IP 54.
 - g. The compressors shall be provided with crankcase heater to prevent the dilution of refrigerant and oil the during the stops of the unit.
 - h. Shall be present an electronic thermal protection for the three phases complete with sensors on the stator windings to avoid overheating caused by lack of phase, insufficient cooling, mechanical locks, power supply out of tolerance.
 - i. The compressors shall be connected in tandem on a single refrigerating circuit.
 - j. The compressors shall be fitted on rubber antivibration mounts.
 - k. The compressors shall be provided complete with oil charge.

B. Evaporator (PHE)

1. The units shall be equipped with a direct expansion plate to plate type evaporator.
2. The evaporator will be made of stainless steel brazed plates and shall be linked with an electrical heater to prevent
3. Freezing down to -18°F (-28°C) ambient temperature, controlled by a thermostat and shall be insulated with flexible, closed cell polyurethane insulation material (20 mm thick)
4. The evaporator will have 1 refrigerant circuit.
5. The water connections shall be treated type connections as standard to ensure quick mechanical disconnection between the unit and the hydronic network.

6. The evaporator will be manufactured in accordance to PED approval.

C. Condenser

1. The unit shall be equipped with condenser coils constructed with internally finned seamless copper tubes and arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminum fins with full fin collars for higher efficiencies. The space between the fins is given by a collar that will increase the surface area in connection with the tubes, protecting them from ambient corrosion.
 - a. The condenser coils will have an integral subcooler circuit that provides sufficient subcooling to effectively eliminate the possibility of liquid flashing and increase the unit's efficiency with 5% to 7% without increasing in energy consumption.
 - b. The condenser coils shall be leak-tested and submitted to a pressure test with dry air [Epoxy coated TIF (tube in fin) Option Condenser coils shall include baked epoxy coating providing 10,000+ hour salt spray resistance (ASTM B117-90)]
2. The condenser fans used in conjunction with the condenser coils, shall be propeller type with glass reinforced resin blades for higher efficiencies and lower sound. Each fan shall be protected by a fan guard.
 - a. The air discharge shall be vertical and each fan must be coupled to the electrical motor, supplied as standard to IP54 and capable to work to ambient temperatures of -4°F (-20°C) to 149°F (65°C).
 - b. The condenser fans shall have as a standard an internally protection from over-temperature.

D. Refrigerant Circuit

1. The unit shall have one refrigerant circuit.
2. The circuit shall include as standard: electronic expansion device piloted by unit's microprocessor control, liquid line shut-off valve, sight glass with moisture indicator, charging valves, high pressure switch, high and low pressure transducers.

E. Electrical Control Panel

1. Power and control shall be located in the main panel that will be manufactured to ensure protection against all weather conditions.
2. The electrical panel shall be IP54 and (when opening the doors) internally protected against possible accidental contact with live parts.
3. The main panel shall be fitted with a main switch interlocked door that shuts off power supply when opening.
4. The power section will include compressors and fans protection devices, compressors and fans starters and control circuit power supply.

F. Unit Controller

1. The controller will be installed as standard and it will be used to modify unit setpoint and check control parameters.
 - a. A built-in display will show chiller operating status plus temperatures of water, refrigerant and air, programmable values, setpoints.
 - b. A software with predictive logic, will select the most energy efficient combination of compressors, EEXV and condenser fans to keep stable operating conditions to maximize chiller energy efficiency and reliability.
 - c. The controller will be able to protect critical components based on external signals from its system (such as motor temperatures, refrigerant gas and oil pressures, correct phase sequence, pressure switches and evaporator). The input coming from the high pressure switch cuts all digital output from the controller in less than 50ms, this will be an additional security for the equipment. The units will be provided with an automatic control for condensing pressure which ensures the working at low external temperatures to maintain condensing pressure.
 - d. Fast program cycle (200ms) for a precise monitoring of the system.
 - e. Floating point calculations supported for increased accuracy in P/T conversions.

G. Controller main features

1. Controller shall guarantee the following minimum functions:
 - a. Optimized management of the refrigerant circuit capacity and compressor load during start-up (Soft Load).
 - b. Full routine operation at condition of:
 - high thermal load.
 - high evaporator entering water temperature (start-up).
 - c. Display of evaporator entering/leaving water temperature.
 - d. Display of condensing-evaporating temperature and pressure, suction superheat for each circuit.
 - e. Leaving water evaporator temperature regulation.
 - f. Compressor hours counter.
 - g. Display status of safety devices.
 - h. Number of starts and compressor working hours.
 - i. Re-start in case of power failure (automatic / manual).
 - j. OAT (Outside Ambient temperature) Reset.
 - k. Start at high evaporator water temperature.
 - l. Return Reset (Set Point Reset based on return water temperature).
 - m. Set point reset (optional).

- n. Application and system upgrade with commercial SD cards.

2.05 ACCESSORIES AND OPTIONS

- A. The following accessories come standard on basic units:
 1. Direct on line starter (DOL).
 2. Double setpoint - dual leaving water temperature setpoints.
 3. Electronic expansion valve.
 4. Ambient outside temperature sensor and setpoint reset.
 5. General fault contactor.
 6. Hour run meter.
 7. Main switch interlock door.
 8. Master/Slave – sequencing control that allow to connect up to 4 units in order to coordinate the operation of the chillers working as a bigger unit with multiple circuits.
 9. Evaporator victaulic kit-Hydraulic joint with gasket for an easy and quick water connection.
 10. Coil guards.
 11. Suction and Discharge line shut-off valve- Installed to facilitate maintenance operation.
 12. Capacitors for power factor correction-devices that increase the power factor of the unit. The capacitors are “dry” self-regenerating type with over pressure disconnecting safety device insulated with a no toxic dielectric mix without PCB or PCT.
 13. High Level Communications Interface. The chiller shall be able to communicate to BMS (Building Management System) based on the most common protocols as:
 - a. ModbusRTU.
 - b. LonWorks, now also based on the international 8040 Standard Chiller Profile and LonMark Technology.
 - c. BacNet BTP certified over IP and MS/TP (class 4).
 - d. Ethernet TCP/IP.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.
- B. Adjust and level chiller in alignment on supports.
- C. Coordinate electrical installation with electrical contractor.
- D. Coordinate controls with control contractor.
- E. Install a field-supplied or optional manufacturer-supplied strainer in the chilled water return line at the evaporator inlet that meets manufacturer perforation size specifications.

3.02 START-UP

- A. Provide testing and starting of machine, and instruct the Owner in its proper operation and maintenance.



Daikin Applied Training and Development

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