



Catalog 634-3

**Trailblazer®**  
**Air-to-Water Scroll Heat Pump**

**Heating & Cooling**  
**Models EWYQ and EWYT**  
**25 Tons**  
**R-410A or R-32 Refrigerant**



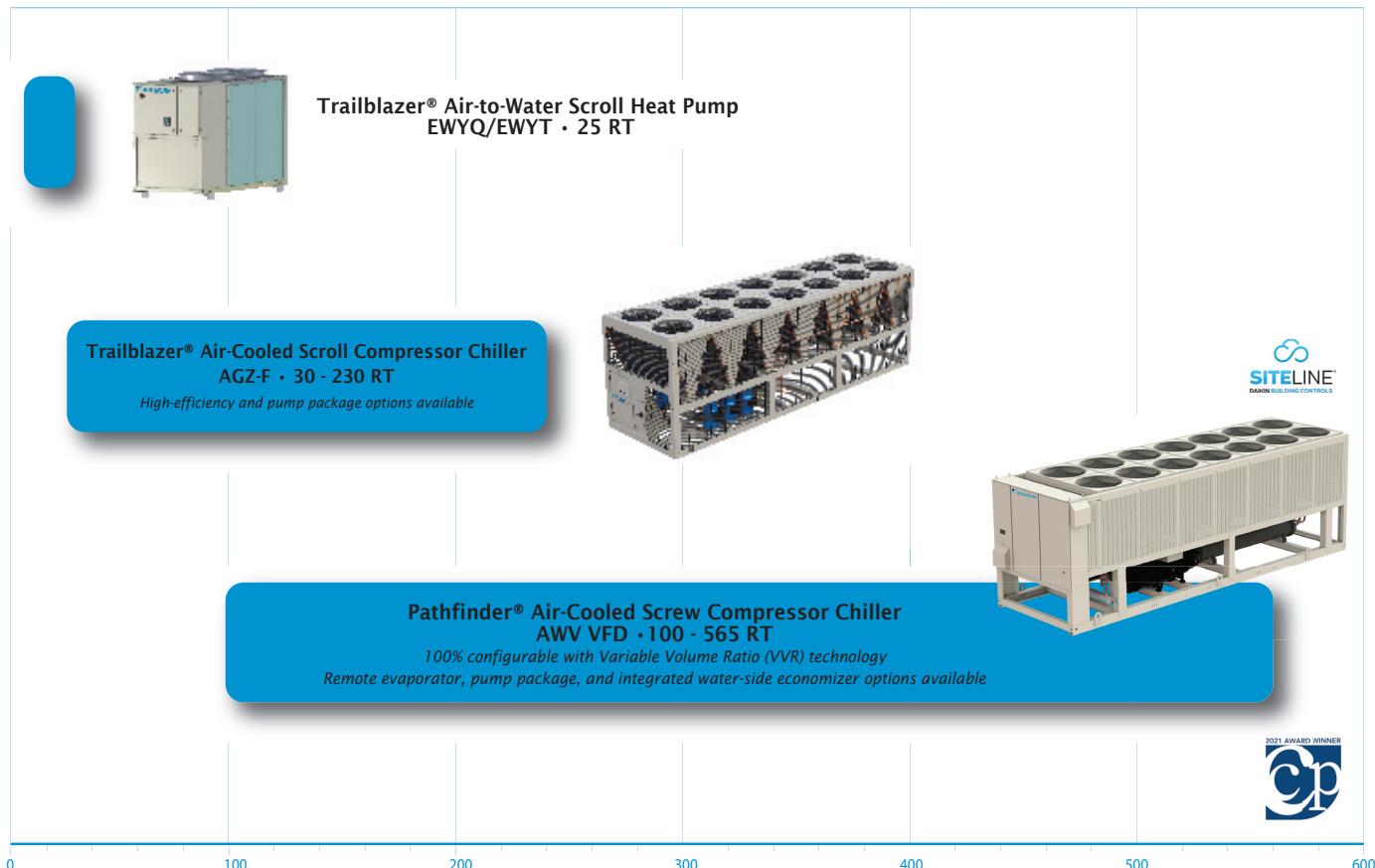
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# Introduction

## Air-Cooled Chiller Products



## Nomenclature

EWYQ075G - X S

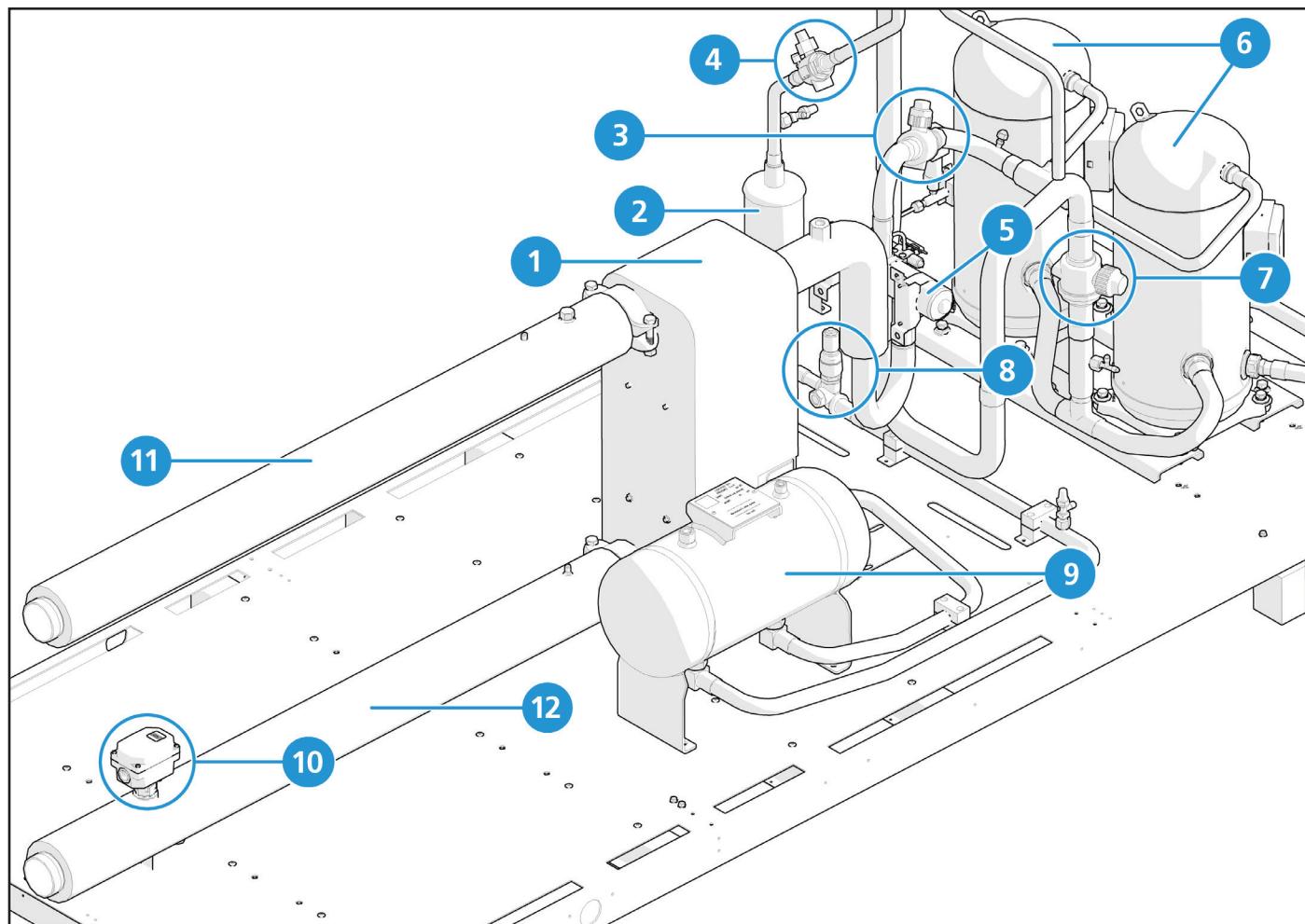
1.	Machine Type	EWY = Air to Water Heat pump
2.	Refrigerant	Q = R-410A T = R-32
3.	Class in kW (Cooling)	Always three-digit code
4.	Model Series	G = Single Circuit
5.	Inverter	No Inverter
6.	Efficiency Level	X = High Efficiency
7.	Sound Level	S = Standard noise R = Reduced noise



\* Certified in cooling mode only



## Features and Benefits



No.	Component	No.	Component
1	Brazed Plate Heat Exchanger	7	Isolation Valve
2	Filter Dryer	8	Expansion Valve
3	Isolation Valve	9	Expansion Tank
4	Isolation Valve	10	Flow Switch
5	Four-way Valve	11	Entering Water
6	Compressors	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, to reduce operating costs, and improve installation profitability, effectiveness, and economical management.

Trailblazer features 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

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

## Superior Control Logic

The new controller provides an easy-to-use control environment. The control logic is designed to provide maximum efficiency, continue operation in unusual operating conditions, and 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 Observance of Laws/ Directives

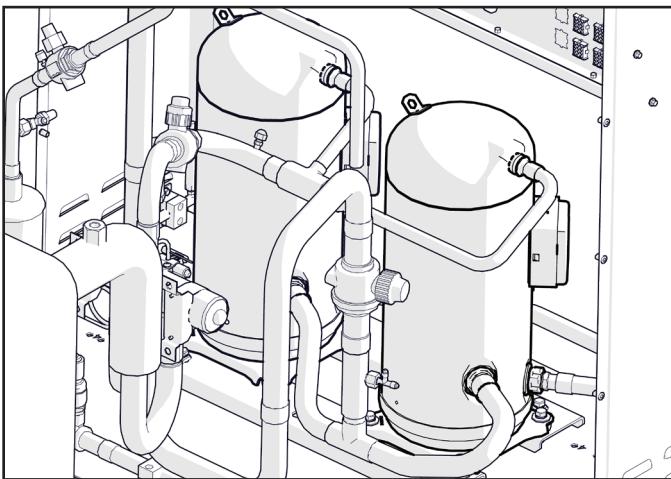
Units are designed in accordance with applicable selections of the following:

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 sheet steel and painted to resist corrosion, and 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, facilitating the arrangement of the unit.

## Compressor



The compressors are hermetic orbiting scroll compressors 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, fitted on rubber anti-vibration mounts, and complete with oil charge.

## Refrigerant

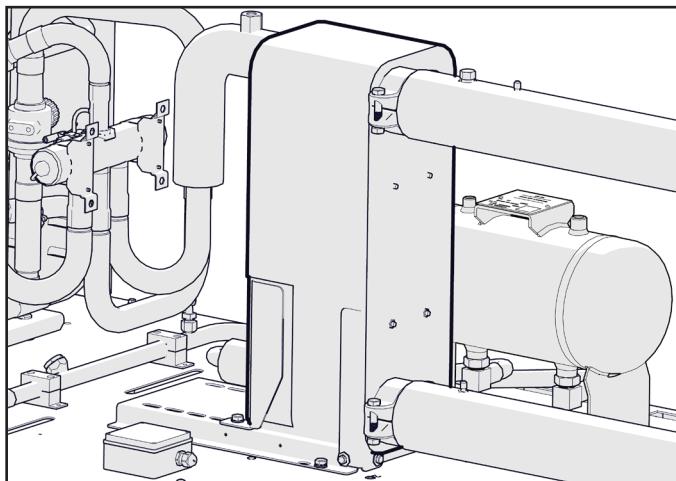
### R-410A

R-410A is promising for its efficiency, stability, and low 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.

### R-32

R-32 is a newer, more efficient alternative to R-410A. R-32 can be up to 12% more efficient than R-410A, and is easier to clean, reuse, recover, and reclaim. Its excellent performance in extreme hot or cold climates and 68% lower GWP (Global Warming Potential) make it an ideal choice for multiple-scroll chillers.

## Evaporator



The unit is equipped with a direct expansion plate-to-plate 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 features an electric heater for protection against freezing, and is manufactured in accordance to PED standards.

## Condenser

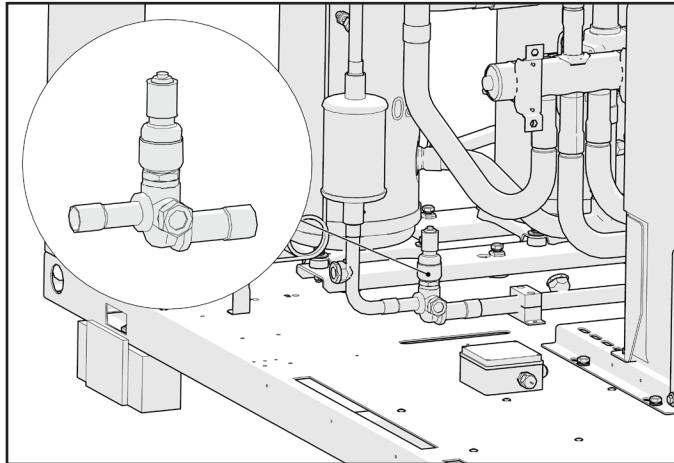
The condenser is manufactured with internally enhanced seamless copper tubes, arranged in a staggered row pattern, and mechanically expanded into lanced and rippled aluminum condenser fins with full-fin collars. An integral sub-cooler circuit provides sub-cooling to effectively eliminate liquid flashing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

## Condenser Fans

The condenser fans are propeller type with high efficiency design blades to maximize performance. The blades are made of 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, and wider ranges of operating conditions, and incorporate features like remote monitoring and diagnostics, using 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 an additional solenoid valve, continuous modulation of mass flow without stress in the refrigerant circuit, and a corrosion-resistant stainless steel body.

Electronic expansion valves can be programmed to work with multiple other unit components, and increase performance and efficiency compared to those of a thermostatic expansion valve. The electronic expansion valve allows the system to work with low condenser pressure (during winter time) without any refrigerant flow problems, and with a perfect chilled leaving-water temperature control.

## Refrigerant Circuit

Each unit has one refrigerant circuit that includes:

- Compressors
- Refrigerant
- An evaporator
- An air-cooled condenser
- An electronic expansion valve
- Charging valves
- A high-pressure switch
- High-pressure transducers
- Low-pressure transducers
- A suction temperature sensor

## Electrical Control Panel

Power and control are located in the main panel, 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 safety interlock switch door that shuts off power supply when opening.

## Power Section

The power section includes compressors and fan-protection devices, compressors and fan starters, and a control-circuit power supply.

## Unit Controller

The 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 water temperatures, refrigerant, programmable values, and setpoints. A sophisticated software with predictive logic, the unit controller selects the most energy-efficient combination of compressors and EEXV 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, and refrigerant gas and oil pressures). The input coming from the high-pressure switch cuts all digital output from the controller in less than 50ms, which is an additional security for the equipment.

A fast program cycle (200ms) allows for precise monitoring of the system. Floating point calculations are supported for increased accuracy in pressure/temperature conversions.

The unit controller's built-in terminal has the following features:

- 164x44 dot matrix liquid crystal display with white back lighting. Supports Unicode fonts for multilingual use
- A keypad with 3 keys
- Push'n'Roll control for increased usability
- Memory to protect data
- General fault alarm relays
- Alarm history memory to allow for easy fault analysis
- Password-protected settings
- Application security to prevent application tampering or hardware usability with third-party applications.
- Service reports displaying all running hours and general conditions

## Control Section Main Features

The control section features the following:

- Management of the refrigerant circuit capacity
- Full routine operation at condition of:
  - High thermal load
  - High evaporator entering water temperature (start-up)
- Display of entering/leaving water temperature.
- Display of condensing/evaporating temperature and pressure
- Display of status safety devices
- Leaving-water evaporator temperature regulation
- Compressor and pump hour counter
- Number of starts and compressor working hours
- Restart 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 (setpoint reset based on return-water temperature)
- Setpoint reset (optional)
- Application and system upgrade with commercial SD cards

## Safety Device/Logic for Each Refrigerant Circuit

The following safety devices/logics are available:

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

## System Security

The following security options are available:

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

## Supervising Systems (On Request)–Unit Controller Remote Communication

The unit controller is able to communicate to BMS (Building Management System) based on the most common protocols such 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 Models

Cooling Performance	
Capacity–Cooling*	25 Tons
Capacity Control–Type	Step
Capacity Control–Minimum Capacity	44%
Unit Power Input–Cooling (1)	29.1 kW
EER*	9.562 btu/W.h
IPLV	15.27 btu/W.h
Casing	
Color	Ivory White
Material	Galvanized 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 <sub>2</sub> O (8.30 kPa)
Insulation Material	Closed Cell
Air Heat Exchanger	
Direct Propeller Type	High Efficiency Fin and Tube Type with internal 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 (8.1 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	EWYQ = R-410A
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**	10.66 btu/W.h
SCOP**	11.30 btu/W.h
Heat Exchanger Evaporator	
Nominal Water Flow rate	69.74 GPM (4.4 l/s)
Nominal Water Pressure Drop	3.04 ftH <sub>2</sub> 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 at 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 environments in accordance to recognized industry standards (i.e. EN14511). Weights and dimensions are indicative; for specific values refer to certified drawings issued by the factory.

Data refers to units with standard options only. For specific information about additional options, refer to databook-specific sections.

## 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

## EWYT Models

Cooling Performance	
Capacity–Cooling*	21 Tons
Capacity Control–Type	Step
Capacity Control–Minimum Capacity	50%
Unit Power Input–Cooling (1)	28 kW
EER*	10.34 btu/W.h
IPLV	16.207 btu/W.h
Casing	
Color	Ivory White
Material	Galvanized and Painted Steel Sheet
Dimensions	
Height	71 in. (1801 mm)
Width	48 in. (1211 mm)
Length	88 in. (2227 mm)
Weight	
Unit Weight	1684 lbs. (764 kg)
Operating Weight	1702 lbs. (772 kg)
Water Heat Exchanger	
Type	Brazed-Plate Heat Exchanger
Water Volume	1.8 gal (7.0 l)
Nominal Water Flow Rate	57.06 GPM (3.60 l/s)
Nominal Water Pressure Drop	4.7 ftH2O (14.0 kPa)
Insulation Material	Closed Cell
Air Heat Exchanger	
Direct Propeller Type	High Efficiency Fin and Tube Type with internal 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	1.7 gal (6.5 l)
Quantity	2
Sound Level - Details on measurement methods are available in the Sound Data section	
Sound Power–Cooling	83.8 dB (A)
Sound Pressure–Cooling	66.4 dB (A)
Refrigerant Circuit	
Refrigerant Type	EWYT = R-32
Refrigerant Charge	24.25 lbs. (11 kg)
Number of Circuits	1

Piping Connections	
Evaporator water inlet/outlet	3.5 in. (88.9 mm)

## Heating Mode

Heating Performance	
Capacity - Heating**	82.24 kW
Unit Power Input - Heating**	28.22 kW
COP**	11.24 btu/W.h
SCOP**	12.62 btu/W.h

*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 at 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 environments in accordance to recognized industry standards (i.e. EN14511). Weights and dimensions are indicative; for specific values refer to certified drawings issued by the factory.

Data refers to units with standard options only. For specific information about additional options, refer to databook-specific sections.

## Sound Levels

Hz	Sound pressure level at 1 m from the unit (rif. 2x10.5 Pa)
63 Hz	69
125 Hz	68
250 Hz	64
500 Hz	63
1000 Hz	61
2000 Hz	59
4000 Hz	54
8000 Hz	49
db(A)	66.4
Power db(A)	83.8

## Operating Limits

### EWYQ Models

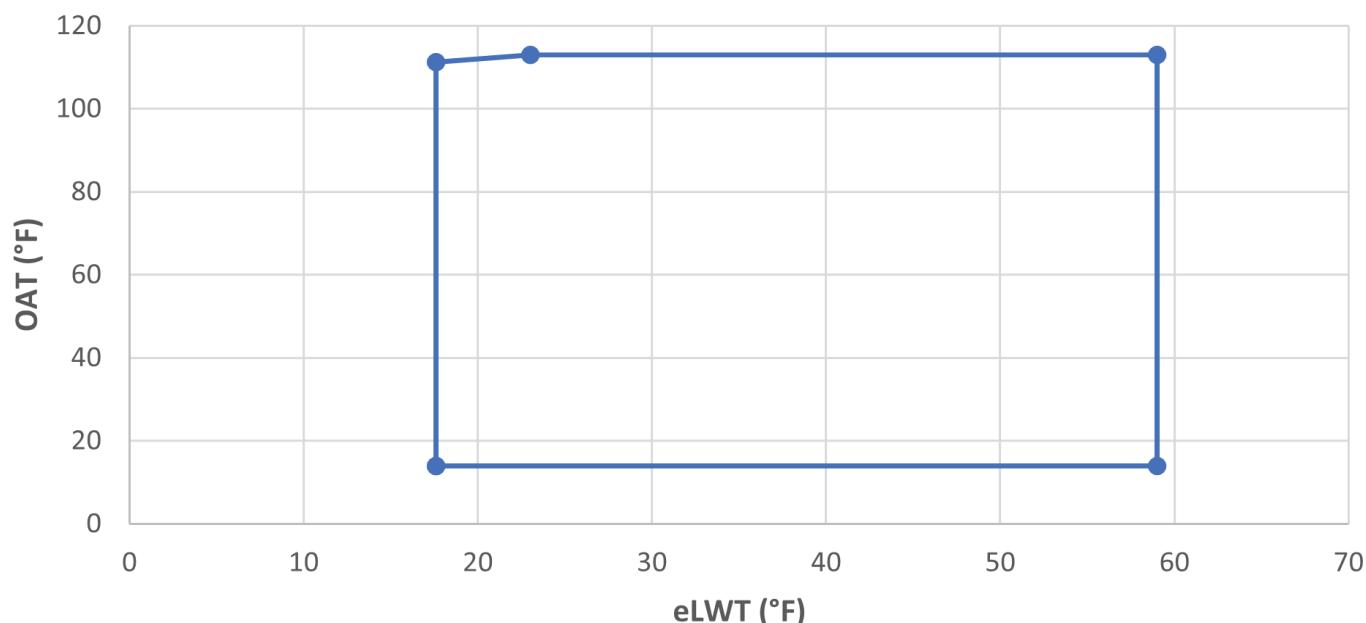
**NOTICE**

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

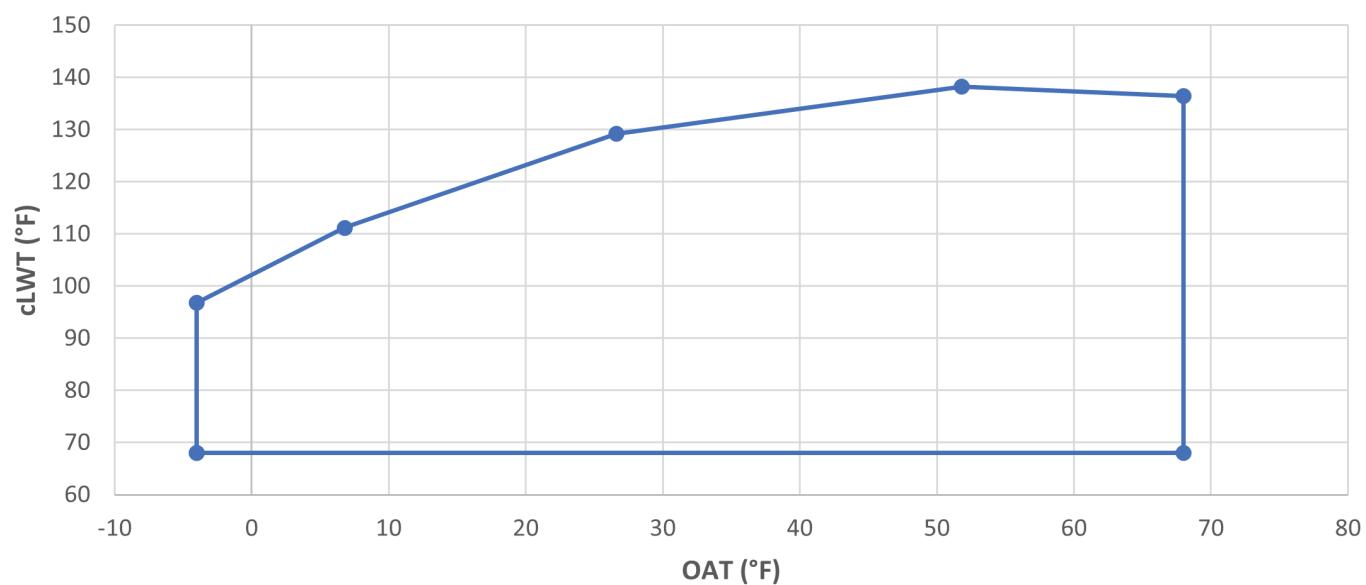
**NOTICE**

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.

**Figure 1: EWYQ - Cooling Mode**



**Figure 2: EWYQ - Heating Mode**



## EWYT Models

### NOTICE

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

### 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.

Figure 3: EWYT - Cooling Mode

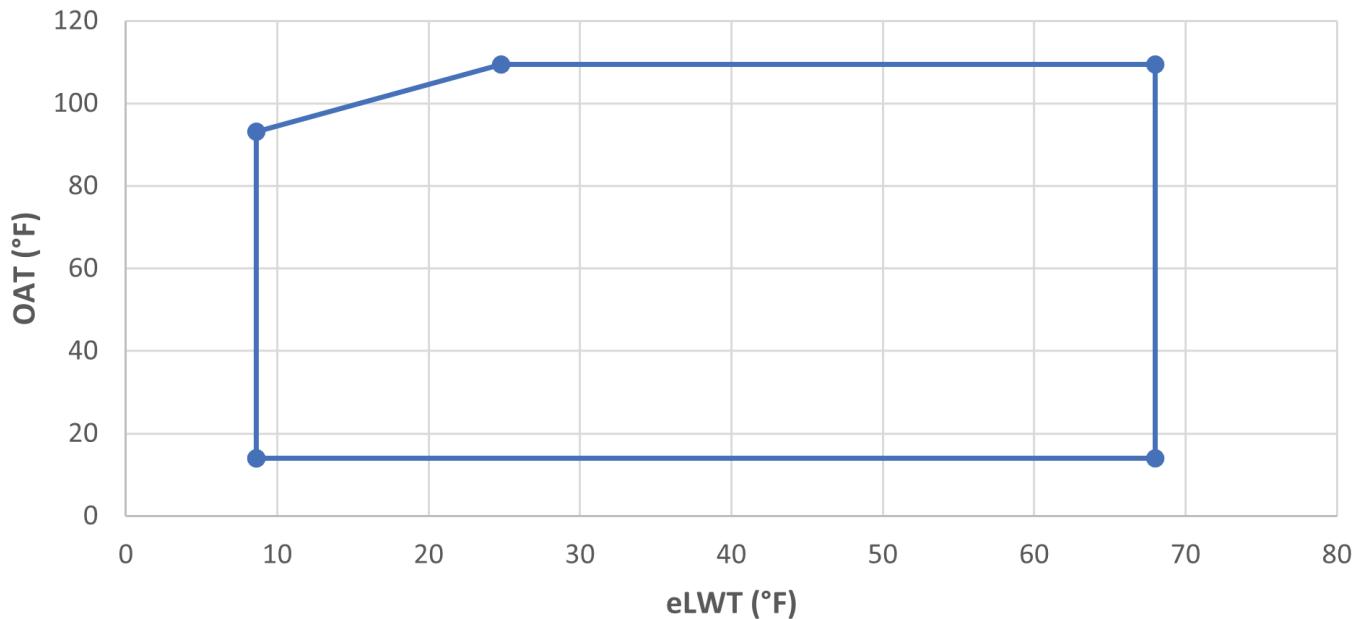
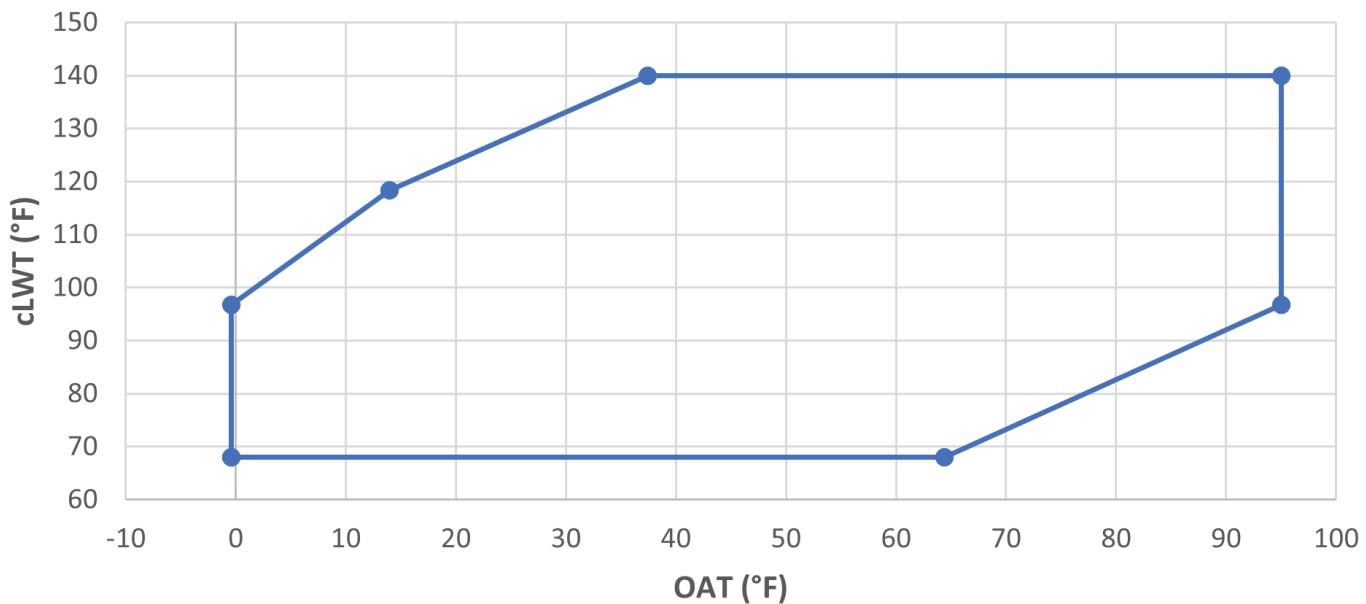


Figure 4: EWYT - Heating Mode



**Table 1: EWYT Evaporator–Difference in Temperature  $\Delta t$  at Minimum and Maximum**

Description		Temperature
A $\Delta t$	Maximum difference in evaporator water temperature	14.4°F (8°C)
B $\Delta t$	Minimum difference in evaporator water temperature	7.2°F (4°C)

**Table 2: Evaporator–Scaling Factor**

Scaling (m <sup>2</sup> °C / kW)	Refrigeration Capacity Correction	Power Consumption Correction	EER Correction
0.0176	1.000	1.000	1.000
0.0440	0.978	0.986	0.992
0.0880	0.957	0.974	0.983
0.1320	0.938	0.962	0.975

**Table 3: Air Heat Exchanger–Correction Factor at Altitude**

A	0	300	600	900	1200	1500	1800
B	1012	977	942	908	875	843	812
C	1.000	0.993	0.986	0.979	0.973	0.967	0.960
D	1.000	1.005	1.009	1.015	1.021	1.026	1.031
A	0	300	600	900	1200	1500	1800
B	1013	977	942	908	875	843	812
E	1.000	0.989	0.979	0.968	0.957	0.945	0.934
D	1.000	0.998	0.997	0.996	0.995	0.994	0.992

**Legend:**

A = Altitude above sea level (m)

B = Atmospheric pressure (mbar)

C = Refrigeration capacity correction factor

E= Heating capacity correction factor

D = Power consumption correction factor

- The maximum operating altitude is 2000 meters above sea level
- If the unit is to be installed at an altitude of between 1000 and 2000 meters above sea level, contact manufacturer

**Table 4: Minimum percentage of glycol for low ambient air temperature**

Ambient Air Temperature (°C) <sup>1</sup>	-3	-8	-15	-20
Ethylene glycol (%) <sup>2</sup>	10%	20%	30%	40%
Propylene glycol (%) <sup>2</sup>	10%	20%	30%	40%

NOTE: <sup>1</sup> Ambient air temperature which exceeds unit operating limits Water circuits must also be protected in winter even if the unit is not being used.

NOTE: <sup>2</sup> Minimum percentage of glycol to prevent the water circuit from freezing at the indicated ambient air temperature

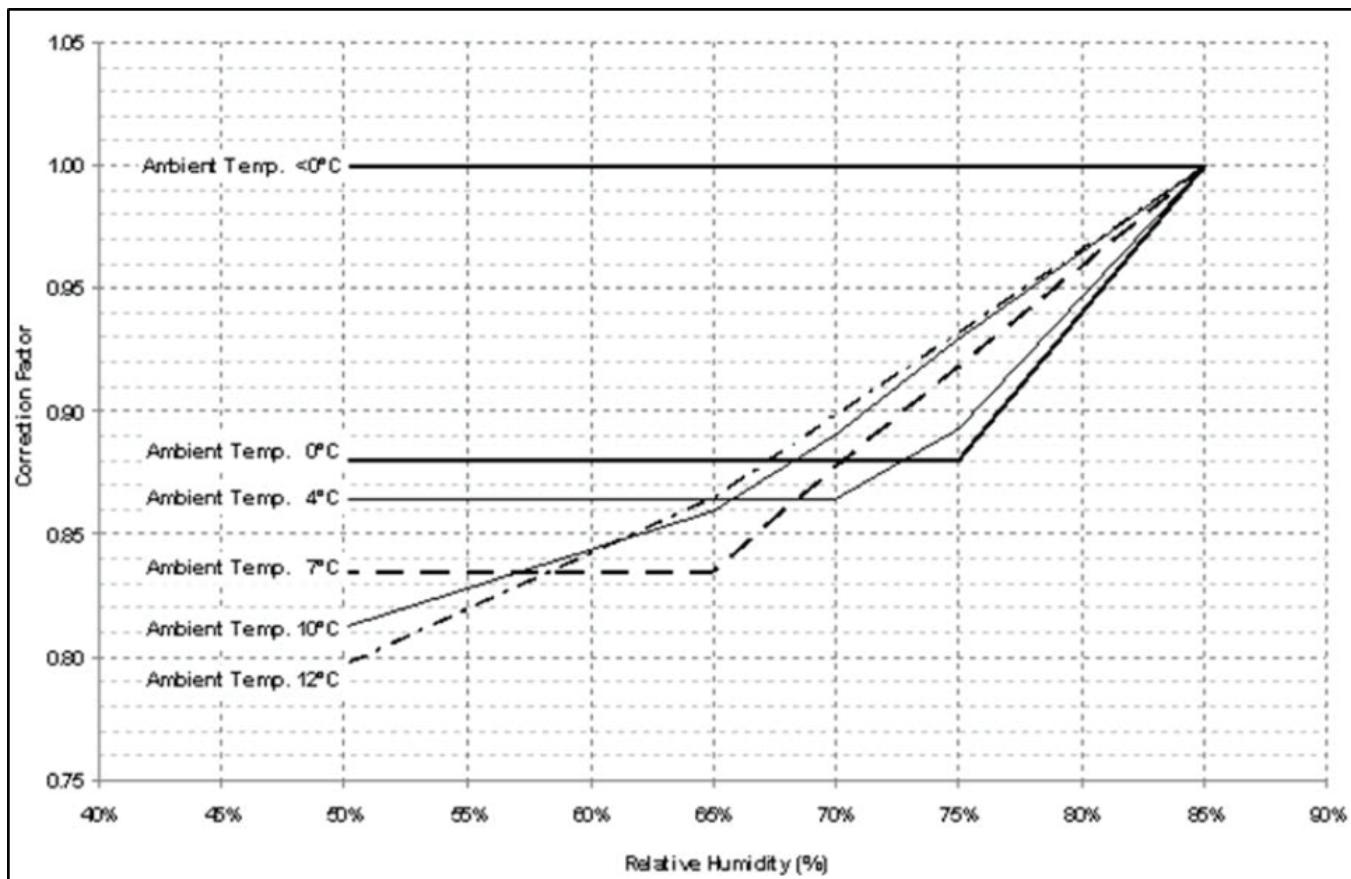
**Table 5: Available Fan Static Pressure Correction Factors –Cooling**

External Static Pressure (Pa)	0	10	20	30
Cooling Capacity Correction Factor (kW)	1	1	0.99	0.99
Unit PI Correction Factor	1	1.01	1.02	1.02
Reduction of MAX Operating Ambient Temperatures (°C)	0	-0.3	-0.5	-1

**Table 6: Available Fan Static Pressure Correction Factors–Heating**

External Static Pressure (Pa)	0	10	20	30
Heating Capacity Correction Factor (kW)	1	0.991	0.972	0.96
Unit PI Correction Factor	1	0.998	0.995	0.994
Increase of MIN Operating Ambient Temperatures (°C)	0	0.5	0.8	1

Figure 5: Heating capacity correction factor for different air temperature at the evaporator inlet with relative humidity conditions



NOTE: The following values shown in the diagram: <0 °C ; 0 °C ; 4 °C ; 7 °C ; 10 °C ; 12 °C, are for ambient temperature.

# 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 maintenance operations.

## Handling

Care should be taken to avoid rough handling or shock. Do not push or pull the unit from anything other than the base frame. Do not 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 unit is produced for outdoor installation on roofs, floors, or below-ground level on the 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 unit is installed on the ground, it should have a concrete base at least 10 in. wider and longer than its footprint. Furthermore, this base should withstand the unit weight mentioned in the technical data table.

## Acoustic Protection

When the noise level must meet special requirements, it is necessary to pay the maximum attention to ensure the correct 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 must be within the following limits:

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

## 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.

Two conditions must be avoided to achieve the best performance: warm air recirculation and coil starvation. Both conditions cause an increase of condensing pressures, reducing unit efficiency and capacity. However, during abnormal conditions, the unique microprocessor is able to calculate the operating environment and the unit's capacity to optimize its performance staying on line.

Each side of the unit must be accessible after installation for periodic service. [Figure 7](#) shows minimum recommended clearance requirements. If the units are positioned in locations surrounded by walls or obstacles of the same height as the units, the units should follow the minimum recommended clearance requirements shown in [Figure 8](#). In the event the obstacles are higher than the units, the minimum recommended clearance requirements are shown in [Figure 9](#).

Units installed closer than the minimum recommended distance to a wall or other vertical riser may experience a combination of warm air recirculation and coil starvation, reducing unit capacity and efficiency. 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 10](#); 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.

## Chilled Water Systems

The pipes must be designed with the lowest possible number of bends and vertical changes of direction. This means installation costs are reduced considerably and system performance is improved.

The water system must have:

1. Anti-vibrating pipes which reduce the transmission of vibrations to the structures.
2. Isolating valves to isolate the unit from the water system of the installation during service operations.
3. Manual or automatic air venting device at the system's highest point and a draining device at the system's lowest point.

4. Neither the evaporator nor the heat recovery device must be positioned at the system's highest point.
5. A suitable device that can maintain the water system under pressure.
6. Water temperature and pressure indicators to assist operators during service and maintenance.
7. A water filter or a device that can remove particles from the liquid and is mandatory at the entry of the evaporator. The filter can be installed at the pump inlet when it is placed on the evaporator water inlet pipe but only if the cleanliness of the water installation between the pump and the evaporator is guaranteed. Any waste in the evaporator will void the unit guarantee.
8. If the unit is being replaced, empty and clean the entire water system before installing a new one. Prior to starting it, carry out adequate tests and chemical treatments of the water.
9. If glycol is added to the water system to provide anti-freeze protection, the performance of the unit will decrease. All unit-protection systems, such as anti-freeze, and low-pressure protection will need to be readjusted to offset the low pressure.
10. Before insulating water piping, check that there are no leaks.
11. Check that the pressure of the water does not exceed the design pressure of the water side heat exchangers and install a safety valve on the water pipe.
12. Fit a suitable expansion tank.

#### **⚠ CAUTION**

To avoid damage, install an inspectionable filter on the water pipes at the entry to the heat exchangers.

## Pipe Insulation

The complete water circuit, including all pipes, must be insulated to avoid condensate from forming and reducing cooling capacity. Protect water pipes from freezing during the winter (using for example a glycol solution or a heating cable).

## Preparing and Checking the Water Circuit Connection

The units have water inputs and outputs for connecting the heat pump to water circuit of the system. This circuit must be connected to the unit by an authorized technician and must comply with all local, state, and national regulations on the subject.

#### **NOTICE**

The components listed below are not included with the unit, but are supplied upon request, also the event their installation is compulsory.

#### **⚠ CAUTION**

If dirt penetrates the water circuit, there could be problems. Therefore always remember the following when connecting the water circuit:

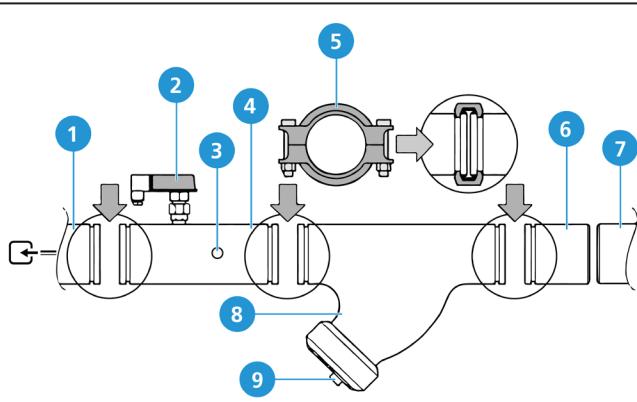
Only use pipes that are clean inside.

Keep the end of the pipe facing downward when removing any burrs.

Cover the end of the pipe when inserting it through a wall to avoid dust and dirt getting in.

Clean the pipes of the system located between the filter and the unit, with running water, before connecting it to the system.

**Figure 6: Water Circuit Connections**



No.	Description
1	Evaporator Water Inlet
2	Flow Switch
3	Water Inlet Sensor
4	Water inlet pipe with flow switch and water inlet temperature sensor
5	Joint
6	Counter-pipe
7	Water Pipe Circuit
8	Filter
9	Filter and Cup

The water in the system must be particularly clean and all traces of oil and rust must be removed. Fit a mechanical filter at the entry of every heat exchanger. Failure to install a mechanical filter can allow solid particles and/or welding burrs to get inside the exchanger. We recommend installing a filter with a filtering mesh with holes not larger than 0.04 in. (1.1mm) in diameter.

The manufacturer cannot be held responsible for any damage to the exchangers if the mechanical filters are not installed.

Figure 7: Space Requirements for Service Clearance

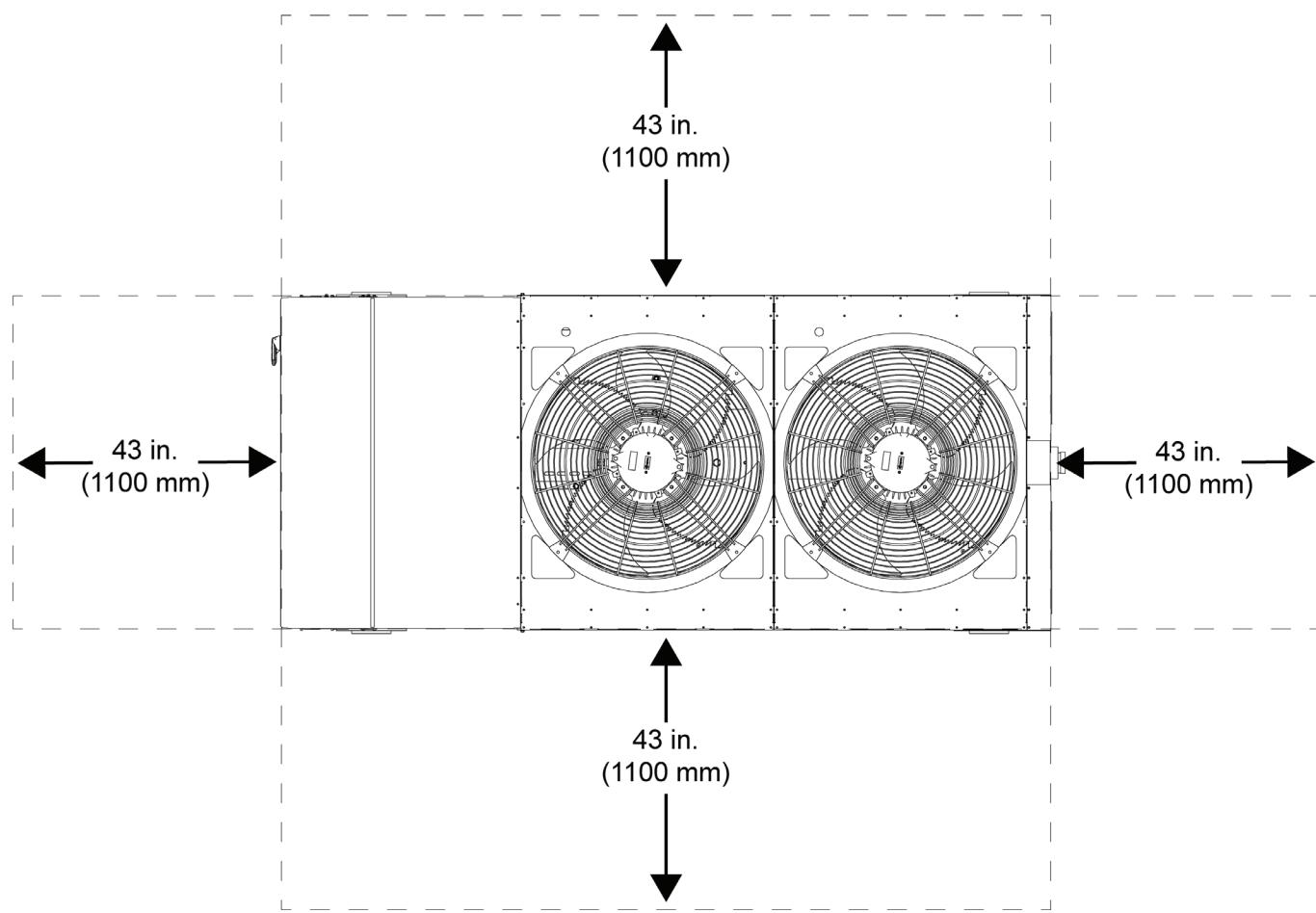


Figure 8: Space Requirements—Installation Surrounded by Walls

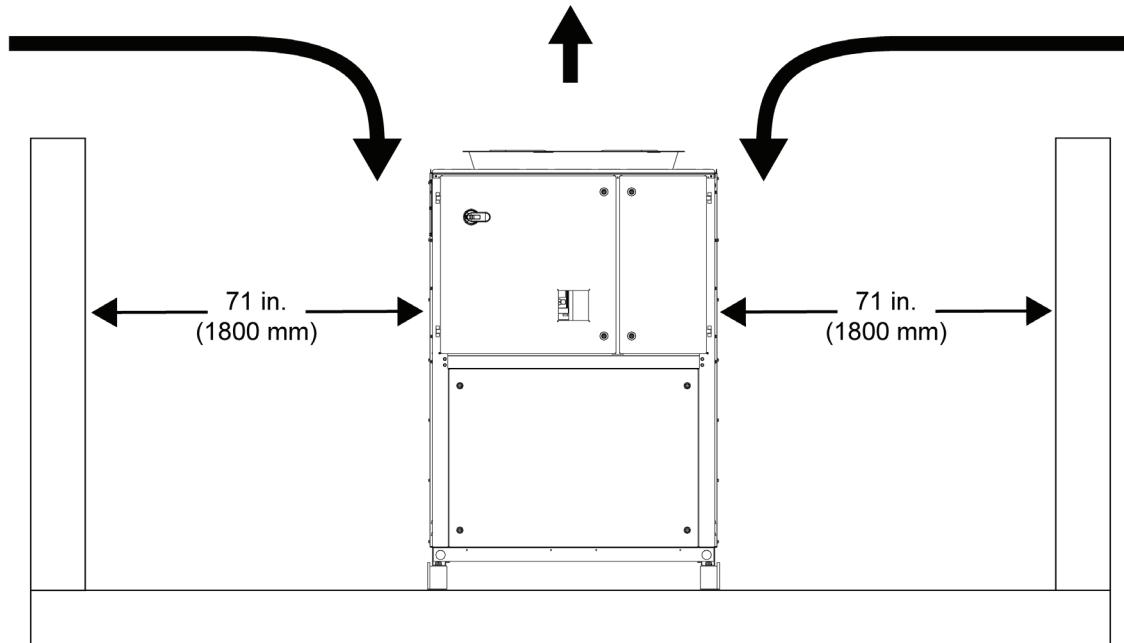


Figure 9: Space Requirements—Installation with Wall Higher than Unit

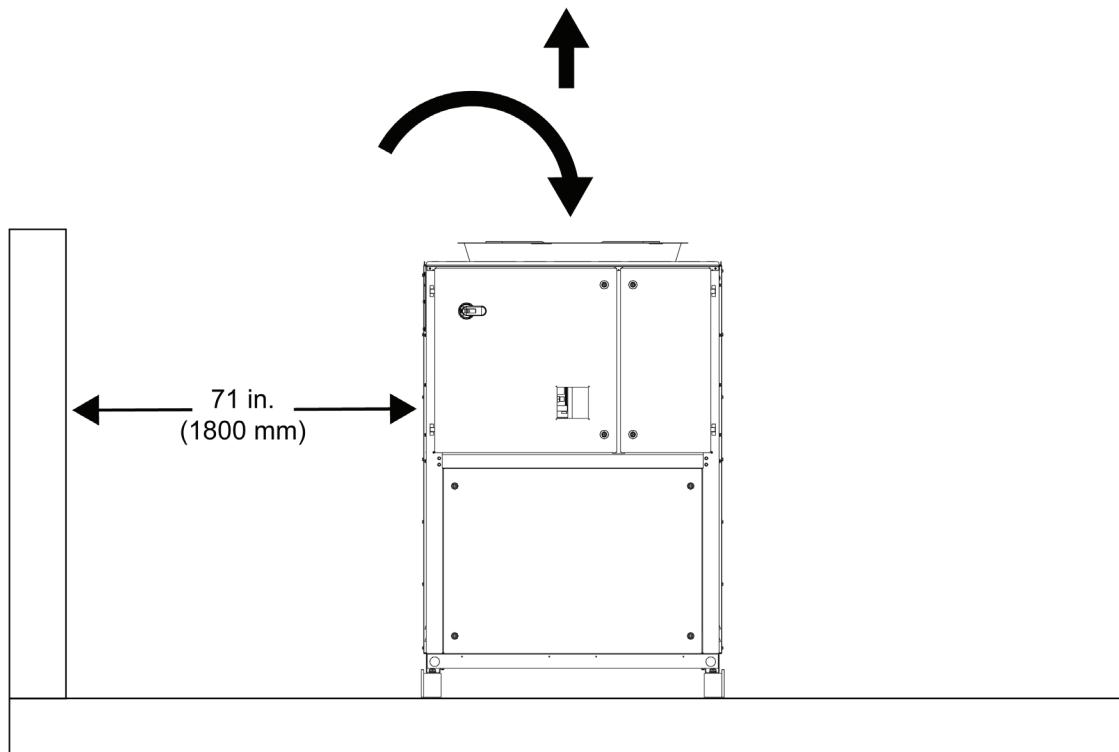
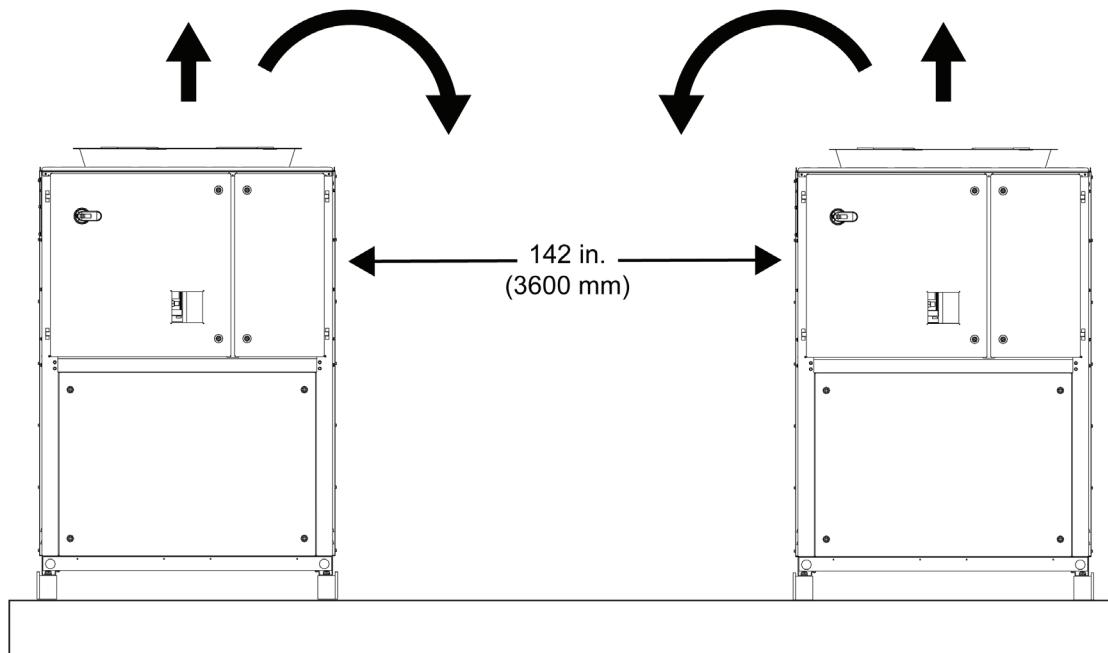


Figure 10: Space Requirements—Minimum Distance Between Units



# 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 must 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 fully delineating 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 of 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 should 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 should be for a period of one year from date of equipment start-up, but not more than 18 months from shipment. The guarantee will 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 will 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 Equivalent)

#### 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 will include the following standard components: 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 or R-32 refrigerant, motor starting components, control system, and all components necessary for a safe and stable unit operation.
- B. Each chiller will be factory-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 must 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 should be capable of stable operation to a minimum percentage of full load (without hot gas bypass) of 50%. Performance will be in accordance with AHRI Standard 550/590.
- C. Operating Range: The chiller will have the ability to control leaving fluid temperature from 17°F to 138°F.

## 2.04 CHILLER COMPONENTS

### A. Compressors

1. High-performance hermetic scroll compressors optimized to work with R410A or R-32, with reduced vibration and sound emissions.
2. 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
3. Reduction of the heat exchange between the gas during suction and discharge due to the separation of gas flows.
4. The reduced noise will 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.
5. The engine will be cooled by the suction refrigerant fluid.
6. The terminal will be contained in a casing with protection degree IP54.
7. The compressors will be provided with a crankcase heater to prevent the dilution of refrigerant, and to oil when the unit stops.
8. The compressors will be connected in tandem on a single refrigerating circuit.
9. The compressors will be fitted on rubber antivibration mounts.
10. The compressors will be provided complete with oil charge.
11. The unit will feature 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.

### B. Evaporator (PHE)

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

### C. Condenser

1. The unit will be equipped with condenser coils constructed with internally finned seamless copper tubes, 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 mitigate the possibility of liquid flashing, and to increase the unit's efficiency by 5% to 7% without increasing in energy consumption.
  - b. The condenser coils will be leak-tested and submitted to a pressure test with dry air.

[Epoxy-coated TIF (tube in fin) Option  
Condenser coils will 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 will be propeller type with glass-reinforced resin blades for higher efficiencies and lower sound. Each fan will be protected by a fan guard.
  - a. The air discharge will be vertical and each fan must be connected 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 will have an internal protection from over-temperature.

### D. Refrigerant Circuit

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

### E. Electrical Control Panel

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

### F. Unit Controller

1. The controller will be used to modify the unit setpoint and to check control parameters.

- a. A built-in display showing chiller operating status, plus temperatures of water, refrigerant and air, programmable values, and 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 and to maximize 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, and refrigerant gas and oil pressures). The input coming from the high pressure switch cuts all digital output from the controller in less than 50 ms; this will be an additional security for the equipment. The units will be provided with an automatic control for condensing pressure, which ensures operation at low external temperatures to maintain condensing pressure.
- d. Fast program cycle (200 ms) 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 will guarantee the following minimum functions:
  - a. Optimized management of the refrigerant circuit capacity and compressor load during start-upSoft 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, and suction superheat for each circuit
  - e. Leaving-water evaporator temperature regulation
  - f. Compressor hour counter
  - g. Display status of safety devices
  - h. Number of starts
  - 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
  - m. Set point reset (optional, based on return-water temperature)
  - 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. Hourly run meter
  7. Safety interlock switch door
  8. Master-slave sequencing control: allows connection up to four units in order to coordinate chillers working as a bigger unit with multiple circuits
  9. Victaulic evaporator kit: a hydraulic joint with gasket for easy water connection.
  10. Coil guards
  11. Suction and discharge line shut-off valve 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 an over-pressure disconnecting safety device, insulated with a non-toxic dielectric mix without PCB or PCT.
  13. High-level communications interface: the chiller will be able to communicate to BMS (Building Management System) based on the most common protocols such 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***

Now that you have made an investment in modern, efficient Daikin Applied equipment, its care should be a high priority. For training information on all Daikin Applied HVAC products, please visit us at [www.DaikinApplied.com](http://www.DaikinApplied.com) and click on Training, or call 540-248-9646 and ask for the Training Department.

### ***Warranty***

All Daikin Applied equipment is sold pursuant to its standard terms and conditions of sale, including Limited Product Warranty. Consult your local Daikin Applied Representative for warranty details. To find your local Daikin Applied Representative, go to [www.DaikinApplied.com](http://www.DaikinApplied.com).

### ***Aftermarket Services***

To find your local parts office, visit [www.DaikinApplied.com](http://www.DaikinApplied.com) or call 800-37PARTS (800-377-2787). To find your local service office, visit [www.DaikinApplied.com](http://www.DaikinApplied.com) or call 800-432-1342.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to [www.DaikinApplied.com](http://www.DaikinApplied.com).

Products manufactured in an ISO Certified Facility.