



Special Public Places Commercial,
Office, Hospital, Restaruant, Coffee
Shop & Etc.



EFFICIENT COOLIN

Unmatched Performance



Introduction

ECO COOLER builds enduring connections with its customers that go beyond merely selling units. Our motto at **ECO COOLER** is to create the best environment for people, helping build a better world to live in.

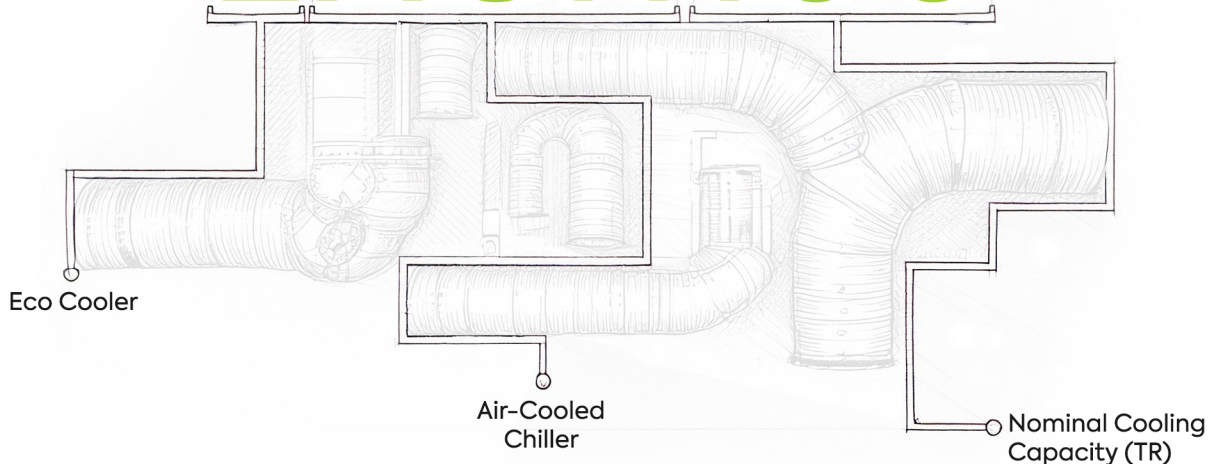
ECO COOLER Air Cooled Chillers, known as the **EACH** series, are designed to perform reliably in all weather conditions, from cold and moderate to hot climates. These chillers are suitable for a variety of environments, ranging from residential buildings to industrial sites with polluted surroundings.

Key features of the **EACH** series include optimum performance, high efficiency, low power consumption, easy installation, and quiet operation.

The **EACH** series offers cooling capacities ranging from 4 TR (14 kW) to 800 TR (2,800 kW). The models are divided into two categories: **STANDARD** (for cold and moderate climates) and **HIGH EFFICIENT** (for hot and tropical climates).

Nomenclature

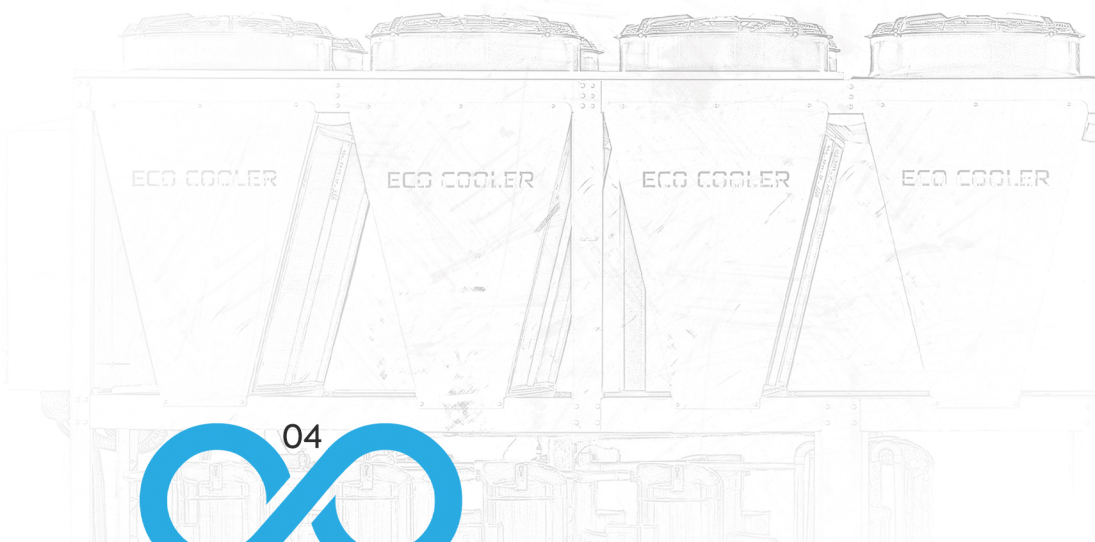
EACH100





FEATURES AND BENEFITS

- Optimized energy efficiency in both full-load and part-load conditions.
- Low operating sound levels achieved through the latest compressor and fan designs.
- Stepped and stepless screw compressors combined with a professional control system to minimize energy consumption and optimize unit performance.
- Compact design for reduced installation space and a smaller footprint.
- One, two, three, or four truly independent refrigerant circuits to ensure outstanding reliability.
- Microchannel technology used in condensers, providing higher corrosion resistance, longer life, and a 30% reduction in refrigerant charge compared to traditional solutions.
- Structure and base made from hot-dip galvanized steel with an electrostatic coating for durability.





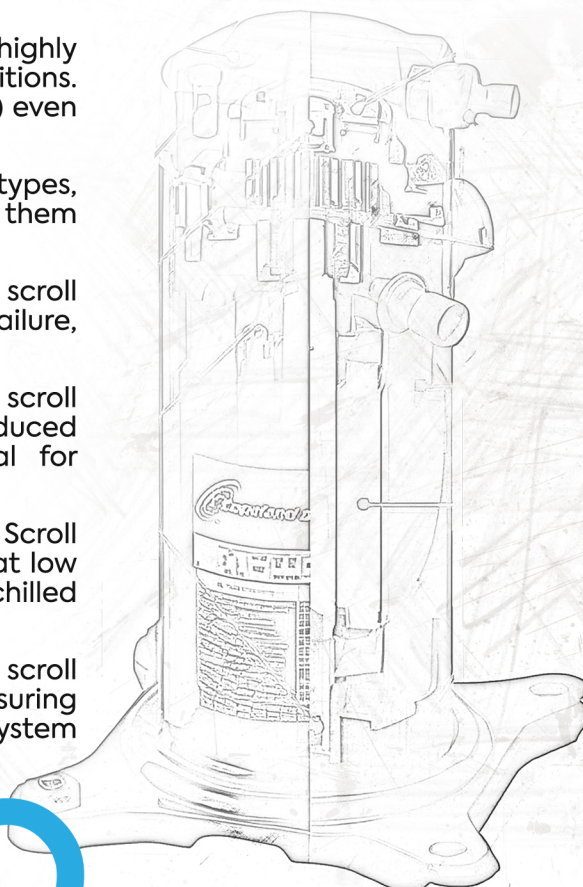
STANDARD SPECIFICATIONS

SEMI-HERMETIC SCROLL COMPRESSOR

Scroll compressors are widely used in chillers due to their efficient and reliable operation. They are a type of positive displacement compressor that utilizes two spiral-shaped scrolls to compress refrigerant.

Key Advantages:

- **High Energy Efficiency:** Scroll compressors are highly energy-efficient, particularly under part-load conditions. They maintain a high coefficient of performance (COP) even at partial loads, leading to significant energy savings.
- **Quiet Operation:** Compared to other compressor types, scroll compressors produce lower noise levels, making them ideal for noise-sensitive applications.
- **Reliable Performance:** With fewer moving parts, scroll compressors have a lower risk of mechanical failure, contributing to increased reliability and longevity.
- **Compact Design:** The compact design of scroll compressors allows for smaller chiller units and reduced installation space requirements, making them ideal for applications with limited space.
- **Enhanced Efficiency at Low Temperatures:** Scroll compressors are designed to operate efficiently even at low evaporating temperatures, making them suitable for chilled water systems requiring lower temperatures.
- **Reduced Vibration:** Thanks to their balanced design, scroll compressors exhibit inherently low vibration levels, ensuring smoother operation and reducing wear on system components.



Standard Specifications

SEMI-HERMETIC SCROLL COMPRESSOR

4. Compact Design: Scroll compressors have a compact design, allowing for smaller chiller units and reduced installation space requirements. This makes them ideal for applications with limited space availability.

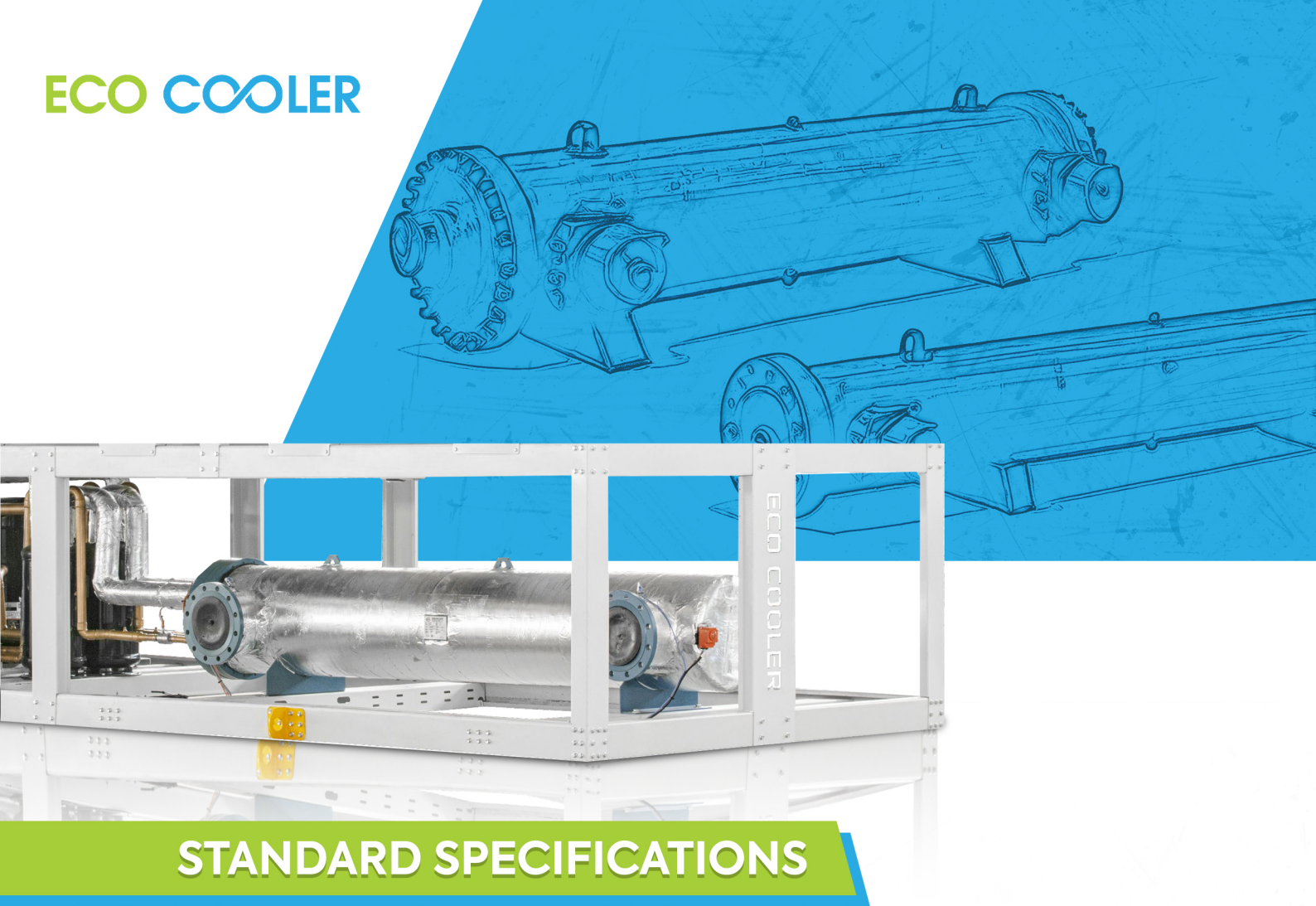
5. Enhanced Efficiency at Low Temperatures: Scroll compressors are designed to perform efficiently even at low evaporating temperatures, making them suitable for chilled water applications that require lower temperatures.

6. Reduced Vibration: Scroll compressors have inherently low vibration levels due to their balanced design, resulting in smoother operation and reduced wear on system components. Overall, scroll compressors offer improved energy efficiency, reliable performance, quiet operation, and a compact design, making them a popular choice for chiller applications.

SHELL AND TUBE LIQUID COOLER

The evaporator is designed as a high-efficiency DX shell & tube heat exchanger, with inner grooved copper tubes that are roller-expanded into the tube sheet. The evaporators undergo testing with a refrigerant side pressure of 30 bars and a water side pressure of 10 bars. A helium leak test is a standard procedure conducted on the evaporators. A guarantee is provided against coolant leaks of up to 2 gr/year. Tests are performed at various pressure levels for multi-circuit evaporators, ensuring prevention of leakage between circuits. The water connections utilize grooved pipes. Each shell of the evaporator includes a vent, a drain, and fittings for temperature control sensors, and is insulated with 3/4 inch equal insulation. To prevent freezing at ambient temperatures as low as -29°C , the evaporator is equipped with evaporator heaters that are controlled by a thermostat.





STANDARD SPECIFICATIONS

SHELL AND TUBE LIQUID COOLER

The evaporator is designed as a high-efficiency DX shell-and-tube heat exchanger, featuring inner grooved copper tubes that are roller-expanded into the tube sheet. The evaporators are tested to ensure durability and reliability, with a refrigerant-side pressure of 30 bars and a water-side pressure of 10 bars. A helium leak test is conducted as a standard procedure.

A guarantee is provided against coolant leaks of up to 2 grams per year. Tests are conducted at various pressure levels for multi-circuit evaporators to ensure there is no leakage between circuits. The water connections utilize grooved pipes, and each evaporator shell is equipped with:

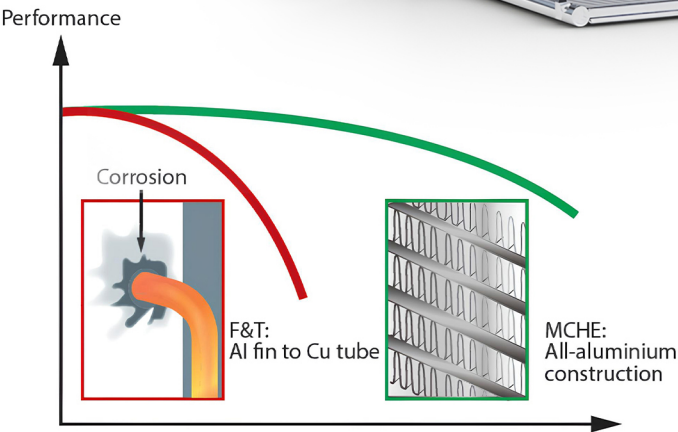
- A vent and a drain.
- Fittings for temperature control sensors.
- 3/4-inch insulation for thermal efficiency.

To prevent freezing at ambient temperatures as low as -29°C , the evaporator is equipped with heaters controlled by a thermostat.



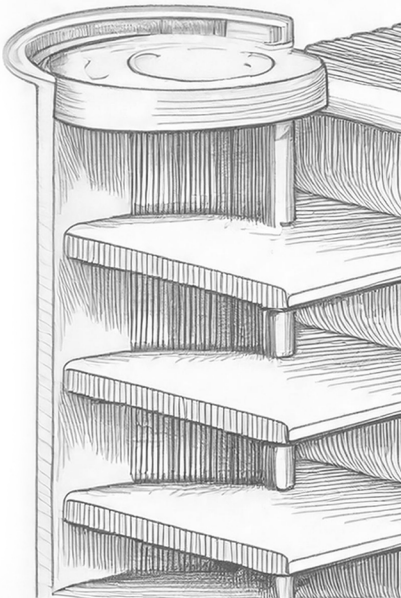
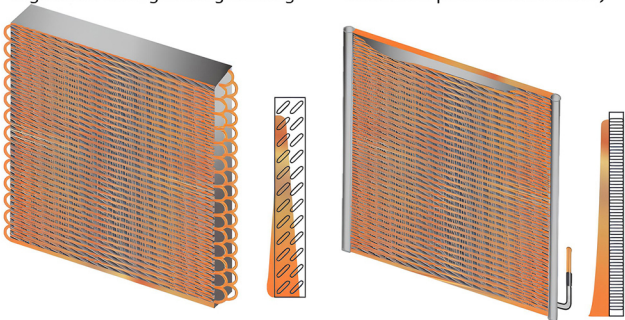
Condensers Coil

The condenser coils utilize microchannel technology, offering several advantages. These coils are constructed using integral NOCOLOK brazing, ensuring low contact resistance and enhanced heat transfer performance. The AL-AL structure eliminates electrical potential differences and significantly improves corrosion resistance.



F&T
dust removal difficult - heat transfer loss
high risk of damage during cleaning

MCHE
dust removal easy
immediate performance recovery



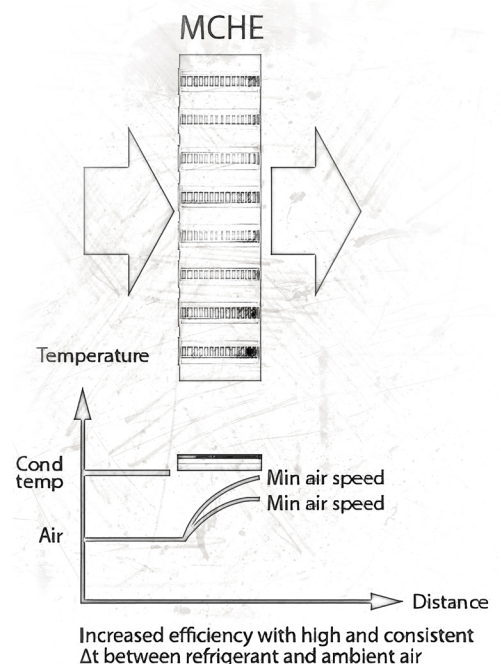
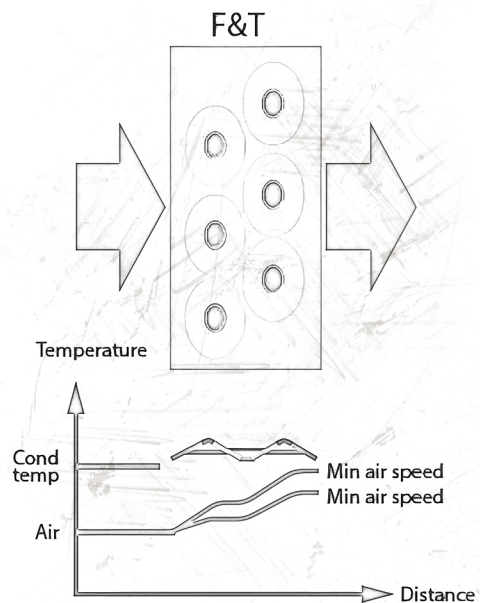
Condensers Coil

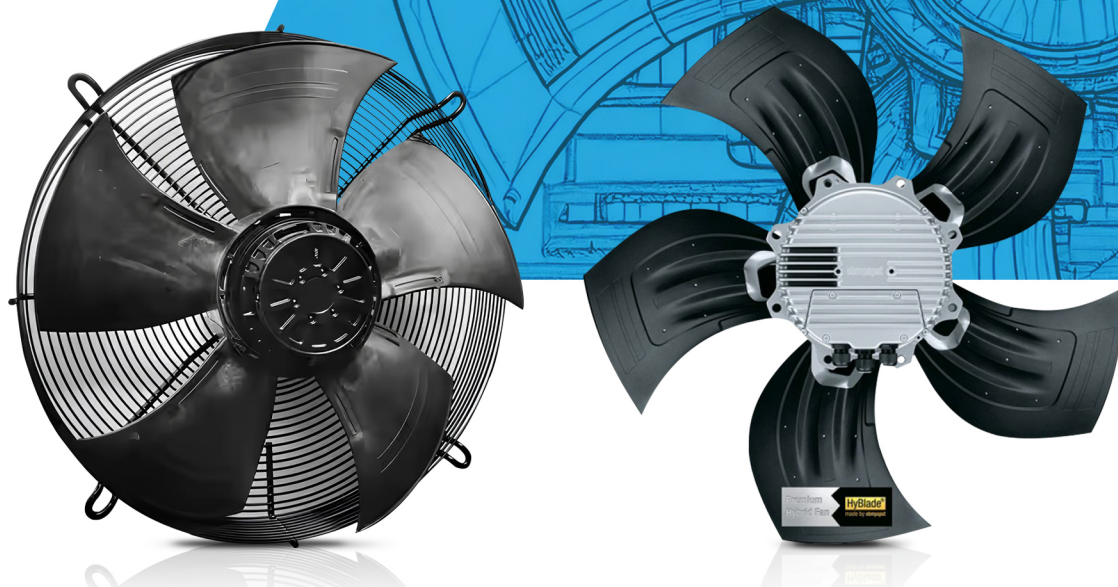
Microchannel condensers represent a significant advancement in heat exchange technology, offering superior efficiency and performance compared to traditional finned-tube coils. These condensers are designed to maximize heat transfer, minimize energy consumption, and enhance overall reliability. Below are the key benefits that make microchannel condensers a preferred choice in modern HVAC systems.

Benefits of Microchannel Condensers Over Finned-Tube Coils

- 1. Higher capacity per volume:** Smaller tube diameters, more tube holes, and a larger internal surface area result in increased unit capacity.
- 2. Reduced airflow resistance:** The small cross-sectional area minimizes airflow resistance, decreases eddy areas, and lowers noise levels.
- 3. Increased refrigerant circulation:** The parallel arrangement of flat tubes provides a larger refrigerant circulation area.
- 4. Optimized refrigerant phase transition:** Adjustable baffles, both in position and quantity, improve heat transfer and minimize pressure drop.
- 5. Reduced heat exchange resistance:** The structure effectively disrupts the air thermal boundary layer, facilitating better heat exchange.
- 6. Enhanced efficiency:** The waving path design increases the contact area, further improving heat exchange performance.

Overall, microchannel condensers deliver superior performance and efficiency compared to traditional finned-tube coils.



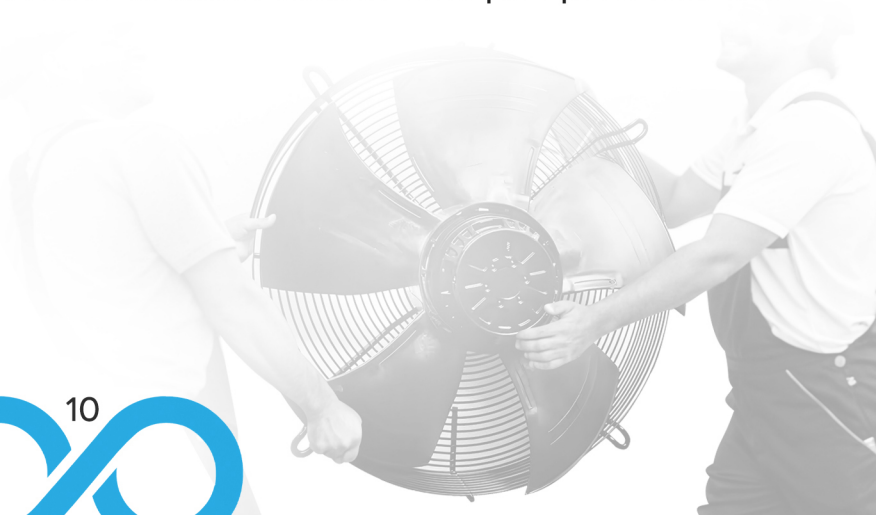


CONDENSER FAN

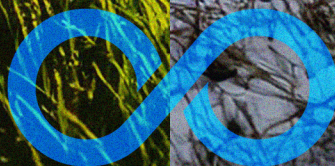
The direct-drive vertical discharge condenser fans are dynamically balanced to ensure smooth operation. These fans are equipped with totally enclosed air-over motors, which provide complete sealing of the motor windings to protect them from exposure to ambient conditions. The condenser fan motors are three-phase, featuring permanently lubricated ball bearings and internal thermal overload protection.

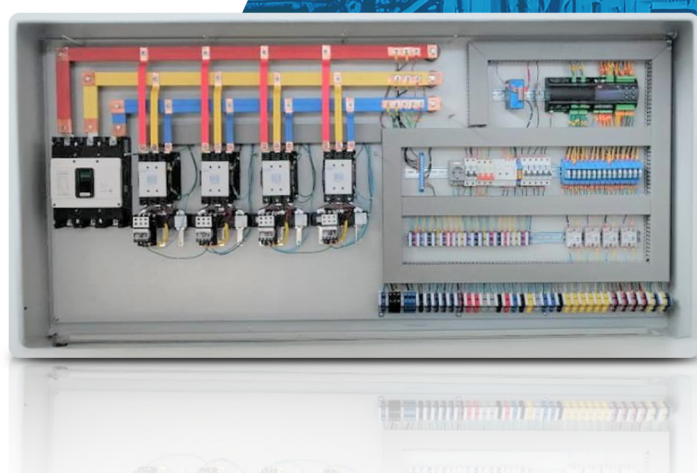
To enhance acoustic performance, the condenser fans incorporate optimized blade designs and utilize external rotor motors that comply with protection class IP54. The winding insulation corresponds to insulation class F, ensuring high electrical insulation capability.

The condenser fans are designed for maintenance-free and low-noise operation. This is achieved through the use of deep groove ball bearings, sealed on both sides and specially paired grease lubricant. These features ensure reliable and quiet performance.



SWIFT SPIN, CONTINUOUS BREEZE.





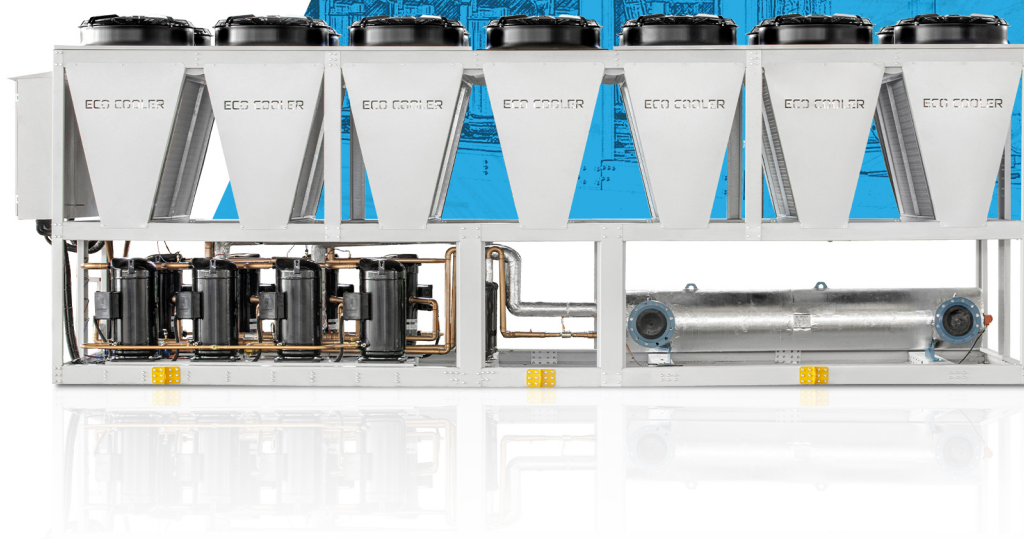
CONTROL PANEL

The control panel of the chillers is equipped with a state-of-the-art controller that is specifically designed to promote energy savings and maximize unit efficiency.

It offers a range of functions, including:

- ✓ Monitoring various operating parameters such as water inlet and outlet temperatures, suction and discharge temperatures, and suction and discharge pressures.
- ✓ Protecting the system from frosting water
- ✓ Stepped or step-less capacity control to adjust the cooling capacity based on the demand.
- ✓ Control over the start and stop of the fans based on pressure conditions.
- ✓ Fan speed adjustment through an inverter, providing flexibility to match the required airflow.
- ✓ Connectivity to a Building Management System (BMS) using the MODBUS protocol, allowing for centralized monitoring and control
- ✓ Maintaining a log of all faults and alarms in the system's history for troubleshooting and maintenance purposes.
- ✓ Compressor hour equalization to ensure balanced usage and prolong the lifespan of the compressors

Overall, the control panel offers comprehensive control and monitoring capabilities, enabling efficient operation and effective management of the chiller system



REFRIGERATION PIPELINE

REFRIGERATION PIPELINE

- **Independent Refrigeration Circuit Per Compressor:**

Each compressor operates on its own dedicated refrigeration circuit for improved reliability and efficiency.

- **Electronic Expansion Valve:**

Used to regulate refrigerant flow to the evaporator, maintaining constant superheat and providing the required cooling capacity.

- **Liquid Line Replaceable Core Type Filter Drier:**

The filter drier ensures that refrigerant circuits remain free of harmful moisture, sludge, acids, and oil-contaminating particles.

- **Liquid Line Moisture Indicator Sight Glass:**

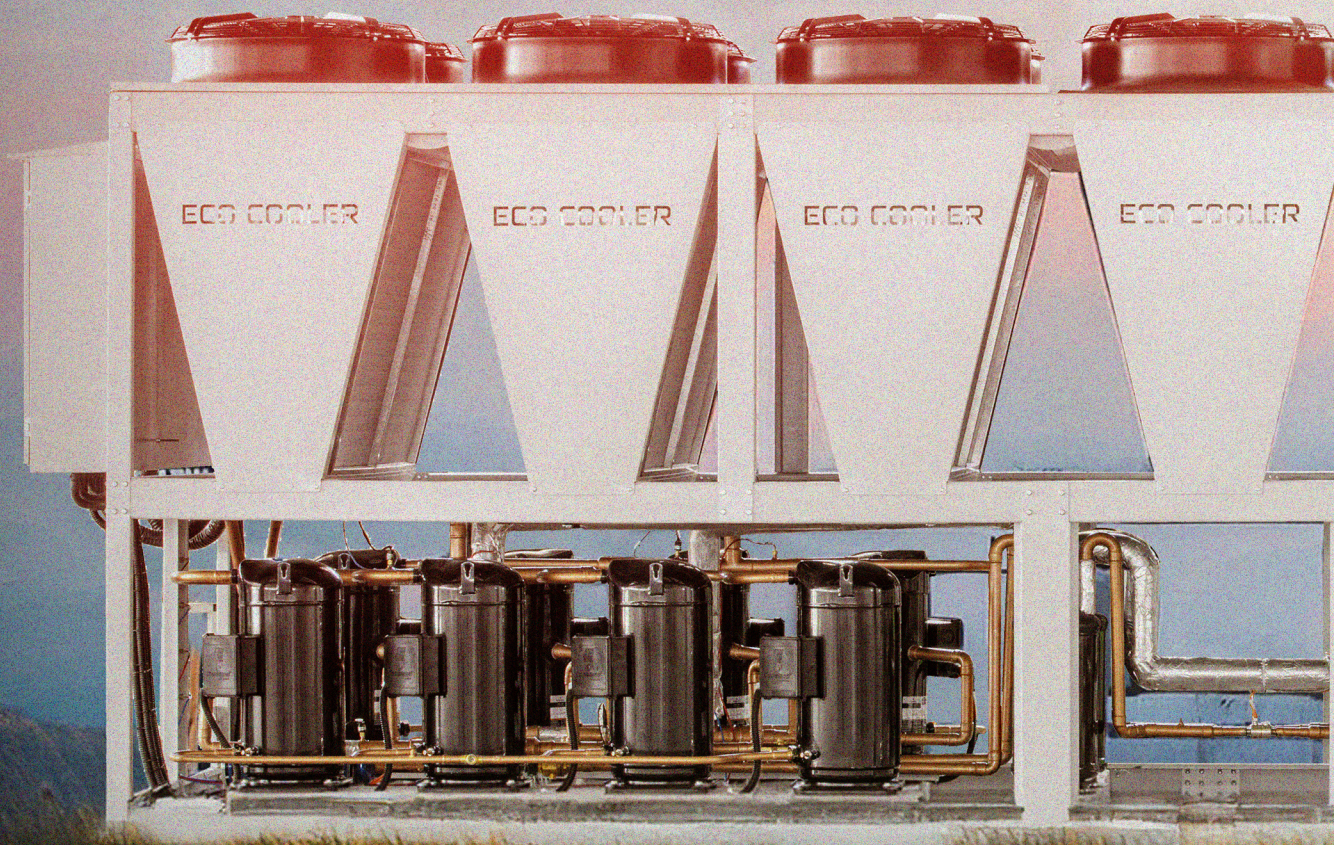
Installed in the liquid line, this sight glass features an easy-to-read color indicator to show moisture content and allows for checking the system's refrigerant charge.

- **Liquid, Discharge, and Suction Line Shut-off Valves:**

These valves control refrigerant flow and isolate sections of the system when necessary.



ENGINEERED FOR EXCELLENCE,
BUILT TO
LAST



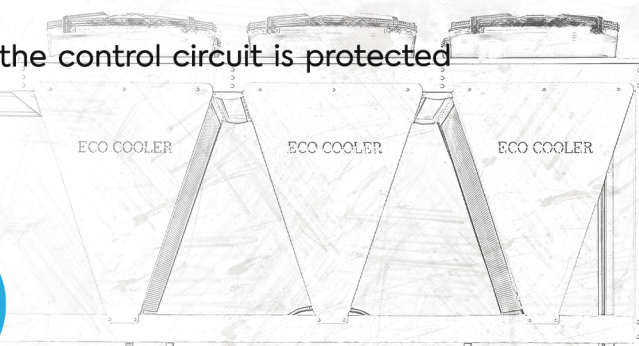


OPTIMAL COOLING, MINIMAL ENERGY



Refrigeration Pipeline

- **Discharge, Suction, and Liquid Line Pipes:** All pipelines are sized to minimize pressure drop and maintain the proper velocity, ensuring efficient oil return.
- **Liquid Injection Kit:** Used for cooling the compressor at high discharge temperatures.
- **Compressor Part Winding Start:** Allows for proper operation of the compressor windings during startup.
- **Compressor In-Built Protection Device:** Provides internal protection to the compressor for safe operation.
- **Starter:** Operated by the control circuit, the starter provides power to the compressor motors. It is rated to safely handle both the Rated Load Amperage (RLA) and Locked Rotor Amperage (LRA) of the motors.
- **Crankcase Heaters:** Each compressor is equipped with an immersion-type crankcase heater that operates when the compressor is de-energized. This protects the system against refrigerant migration, oil dilution, and potential compressor failure.
- **High-Pressure Switch:** Provides additional safety protection in the event of excessive discharge pressure.
- **Low-Pressure Switch:** Provides safety protection in the event of very low suction pressure to prevent water freezing.
- **Unit On-Off Switch:** Allows for manual switching of the unit's control circuit.
- **Indicator Lights:** LED lights indicate when the unit is powered on, when the menu is being adjusted, and when faults occur due to trips on safety devices.
- **Under Voltage and Phase Protection:** Protects the chiller against low incoming voltage, single phasing, phase reversal, and phase imbalance by de-energizing the control circuit.
- **Fan Motor Circuit Breaker:** Protects each pair of condenser fan motors.
- **Compressor Circuit Breaker:** Protects the compressor from overload and short circuits. If tripped, the breaker cuts off the power supply to the compressor and controls the circuit through auxiliary contacts. These breakers are equipped with a thermal adjustable switch for precise overload settings.
- **External Overload Relay for Each Compressor:** Provides additional protection against overload conditions.
- **Control Fuse for Short Circuit Protection:** Ensures the control circuit is protected from potential short circuits.





OPTIONAL FEATURES

- ✓ **Water Flow Switch:** Paddle Type Field Adjustable Flow Switch For Water Cooler Circuits, Interlock Into Safety Circuits So That The Unit Will Remain Off Unit Water Flow Is Determined.
- ✓ **Unit Mounting Spring Isolators:** These Housed Spring Assemblies Have A Neoprene Friction Pad On The Bottom To Prevent Vibration Transmission.
- ✓ **Compressor Silencer Box:** Reduces The Compressor Operating Noise And Keeps The Compressor Clean.
- ✓ **Copper Fins/tubes Condenser Coils:** For Seashore Salty Corrosive Environments.
- ✓ **Pre-coated Aluminum Fins Condenser Coils (Mhg):** For Seashore Or Acid-corrosive Environments.
- ✓ **Building Management System (Bms):** Modbus, Bacnet, And Canbus Protocol
- ✓ **Non-fused Main Disconnect Switches:** De-energize Power Supply During Servicing/repair Works As Well As With Door Interlock.
- ✓ **Evaorator Heater Tape:** Prevent Freezing Up Of Water On Low Ambient.
- ✓ **Ground Current Protection:** Additional Protection For The Compressor In The Case Of Abnormal Current Leakage.

Technical Data

UNIT MODEL (EACH)		3	4	5	7	10	12	15	20	25	30	35	40
COOLING CAPACITY*	RT	3.77	4	5.54	7	11	11.8	15.9	22	23.4	30.5	34.5	44.1
	kW	13.2	13	19.4	26	38	41.4	53	75.4	89.1	106.8	120.9	154.4
POWER INPUT (kW)		5	5	7	7	15	12.1	18.1	27.8	28.4	32.1	39.6	58.6
TOTAL EER (W/W)		2.6	2.6	2.8	2.4	2.6	3	2.9	2.7	3	3	3	2.7
COMPRESSOR		Scroll											
QUANTITY (No.)		1	1	1	1	1	1	2	2	3	3	3	4
OIL GRADE		POE RL32-3MAF											
OIL CHARGE PER COMPRESSOR (Liter)		1.66	1.66	3.38	3.25	3.25	3.38	3.38	3.25	3.25	3.25	3.38	3.25
CAPACITY CONTROL (STEPPED)		1						2		3			4
CONDENSER TYPE		MICRO CHANNEL											
CONDENSER QTY (No.)		1	1	1	1	1	2	2	2	4	4	4	6
TOTAL FACE AREA (m²)		0.5	0.5	2	1	1	2	2	2	4	4	4	6
CONDENSER FAN		Propeller Direct Driven , 500mm dia , 890 rpm			Propeller Direct Driven , 630mm dia , 890 rpm			Propeller Direct Driven , 800mm dia , 910 rpm					
FAN QTY (No.)		1	1	1	1	1	1	1	1	2	2	2	3
AIR FLOW RATE (m³/h)		6000	6000	6000	11000	11000	11000	22500	22500	45000	45000	45000	67500
MOTOR POWER FAN (kW)		1.1	1.1	1.1	1.3	1.3	1.3	1.9	1.9	3.8	3.8	3.8	5.7
EVAPORATOR		Direct Expansion Shell & Tube											
EVAPORATOR QTY (No.)		1											
WATER FLOW RATE (m³/h)		2	2	3	4	6.5	6.4	8.2	11.7	13.9	18.7	18.7	24
WATER VOLUME PER COOLER (Liter)		5.9	5.9	5.9	7.1	8.7	10	16.2	18.5	27.4	27.4	27.4	34.7
WATER CONNECTION SIZE (IN /OUT) DIAMETER (mm)		38	38	38	38	50	50	63	63	76	76	76	76
EXPANSION VALVE		Electronic											
POWER REQUIREMENT		400V/3PH/50Hz											
REFRIGERATION CIRCUITS (No.)		1	1	1	1	1	1	1	1	1	1	1	2
APPROXIMATE WEIGHT (kg)		590	590	620	643	667	327	402	419	648	660	663	892
DIMENSION	HEIGHT (m)	1.5	1.5	1.5	1.5	1.5	2.59	2.59	2.59	2.59	2.59	2.59	2.59
	WIDTH (m)	1.32	1.32	1.32	1.32	1.32	1.27	1.27	1.27	1.27	1.27	1.27	1.27
	LENGTH (m)	1.05	1.05	1.05	1.05	1.05	0.97	0.97	0.97	1.94	1.94	1.94	2.91

*Capacity rating are based on Standard ARI-590/550 conditions of: (95) 35 ambient/ (44.6) 7 Leaving Chilled Water Temperature / (9) 5 Inlet-Outlet Water Temperature Difference/ 0.018 m²./kW (0.0001 ft². h. /Btu) Fouling Factor.

*ECO COOLER reserves the right to modify technical information at any time without prior notice.

Technical Data

UNIT MODEL (EACH)		40	45	50	55	60	65	75	80	85	90	95	100	105
COOLING CAPACITY*	RT	44.1	44.1	59.5	59.5	59.5	62.8	75.4	75.4	91.4	91.4	94.8	97.4	111.2
	kW	154.4	154.4	208.4	208.4	208.4	220	264	264	320	320	332	340.8	389.4
POWER INPUT (kW)		57	57	73	73	73	73	93.7	93.7	112	112	113	109	134
TOTAL EER (W/W)		2.7	2.7	2.9	2.9	2.9	3	3	3	2.9	2.9	3	3.2	2.9
COMPRESSOR		Scroll												
QUANTITY (No.)		4	4	4	4	4	4	8	8	8	8	8	8	6
OIL GRADE		POE												
OIL CHARGE PER COMPRESSOR (Liter)		6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
CAPACITY CONTROL (STEPPED)		1						8						
CONDENSER TYPE		MICRO CHANNEL												
CONDENSER QTY (No.)		6	6	6	6	6	6	12	12	12	12	12	12	12
TOTAL FACE AREA (m²)		6	6	6	6	6	6	12	12	12	12	12	12	12
CONDENSER FAN		Propeller Direct Driven , 800mm dia , 910 rpm												
FAN QTY (No.)		3	3	3	3	3	3	6	6	6	6	6	6	6
AIR FLOW RATE (m³/h)		67500	67500	67500	67500	67500	67500	135000	135000	135000	135000	135000	135000	135000
MOTOR POWER FAN (kW)		5.7	5.7	5.7	5.7	5.7	5.7	11.4	11.4	11.4	11.4	11.4	11.4	11.4
EVAPORATOR		Direct Expansion Shell & Tube												
EVAPORATOR QTY (No.)		1												
WATER FLOW RATE (m³/h)		24	24	32.4	32.4	32.4	34.2	44.2	44.2	49.8	49.8	51.7	53	60.6
WATER VOLUME PER COOLER (Liter)		34.7	34.7	34.7	34.7	34.7	34.7	98.5	98.5	93	93	93	93	139.8
WATER CONNECTION SIZE (IN /OUT) DIAMETER (mm)		76	76	100	100	100	100	125	125	125	125	125	125	150
EXPANSION VALVE		Electronic												
POWER REQUIREMENT		400V/3PH/50Hz												
REFRIGERATION CIRCUITS (No.)		2	2	2	2	2	2	2	2	2	2	2	2	2
APPROXIMATE WEIGHT (kg)		1000	1000	1600	1600	1600	1600	2300	2300	2300	2300	2300	2300	2500
DIMENSION	HEIGHT (m)	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59
	WIDTH (m)	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
	LENGTH (m)	2.5	2.5	3.45	3.45	3.45	3.45	5.5	5.5	5.5	5.5	5.5	5.5	6.3

*Capacity rating are based on Standard ARI-590/550 conditions of: (95) 35 ambient/ (44.6) 7 Leaving Chilled Water Temperature / (9) 5 Inlet-Outlet Water Temperature Difference/ 0.018 m²./kW (0.0001 ft². h. /Btu) Fouling Factor.

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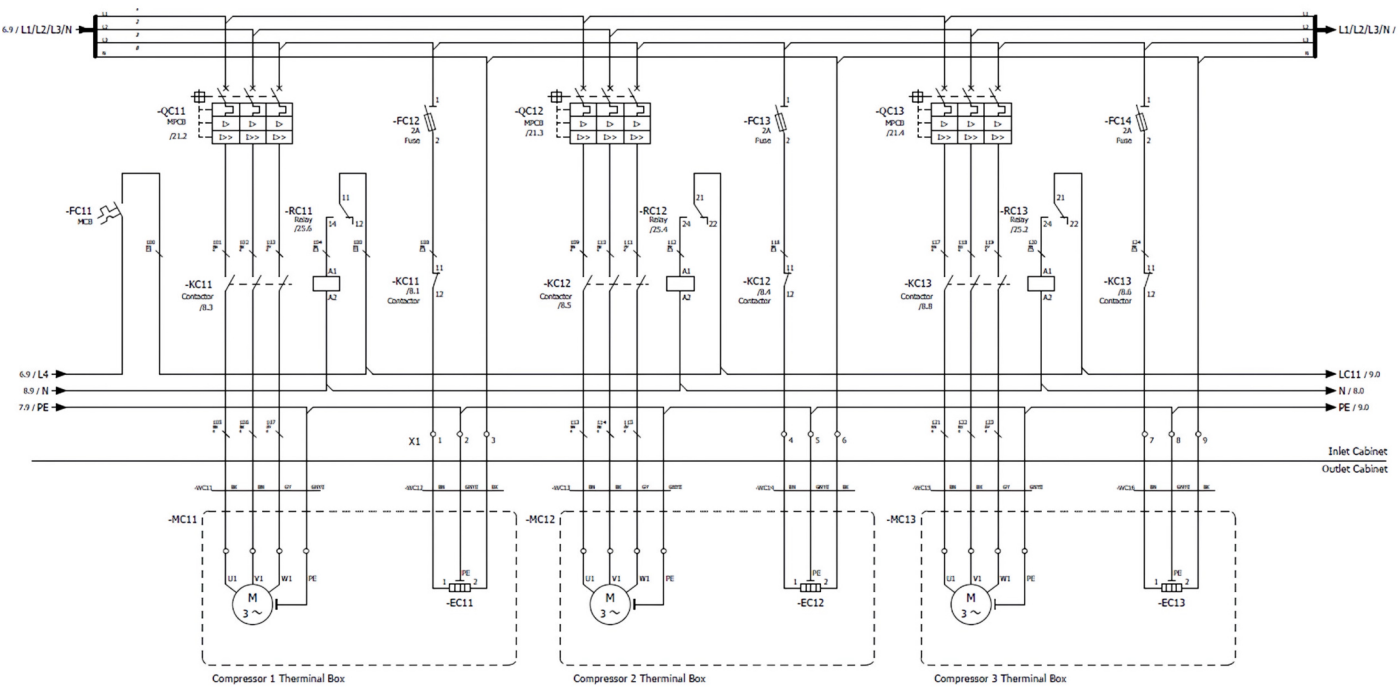
UNIT MODEL (EACH)		105	110	115	120	125	130	135	140	150	160	170	180	190	200
COOLING CAPACITY*	RT	111.2	111.2	115.9	121	125	137	137	142	151	183	183	183	192	192
	kW	389.4	389.4	403.2	424	438	480	480	498	528.1	640	640	640	673	673
POWER INPUT (kW)		134	134	135	146	145	168	168	168	179	225	225	225	221	221
TOTAL EER (W/W)		2.9	2.9	3	2.9	3	2.9	2.9	3	3	2.8	2.8	2.8	3.1	3.1
COMPRESSOR		Scroll													
QUANTITY (No.)		6	6	6	8	8	6	6	6	8	8	8	8	8	8
OIL GRADE		POE													
OIL CHARGE PER COMPRESSOR (Liter)		6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
CAPACITY CONTROL STEPPED			8		8		6	6			8			8	
CONDENSER TYPE		MICRO CHANNEL													
CONDENSER QTY (No.)		12	12	12	12	14	14	14	14	8	10	10	10	10	10
TOTAL FACE AREA (m ²)		12	12	12	12	14	14	14	14	16	20	20	20	20	20
CONDENSER FAN		Propeller Direct Driven , 800mm dia , 910 rpm													
FAN QTY (No.)		6	6	6	6	7	7	7	7	8	10	10	10	10	10
AIR FLOW RATE (m ³ /h)		135000	135000	135000	135000	157500	157500	157500	157500	180000	225000	225000	225000	225000	225000
MOTOR POWER FAN (kW)		11.4	11.4	11.4	11.4	13.3	13.3	13.3	13.3	15.2	19	19	19	19	19
EVAPORATOR		Direct Expansion Shell & Tube													
EVAPORATOR QTY (No.)		1													
WATER FLOW RATE (m ³ /h)		60.6	60.6	62.8	66	68.2	74.7	74.7	77.5	82.2	99.6	99.6	99.6	104.9	104.9
WATER VOLUME PER COOLER (Liter)		139.8	139.8	139.8	139.8	139.8	130.8	130.8	130.8	121	121	121	121	212.5	212.5
WATER CONNECTION SIZE (IN /OUT) DIAMETER (mm)		150	150	150	150	150	150	150	150	150	150	150	150	200	200
EXPANSION VALVE		Electronic													
POWER REQUIREMENT		400V/3PH/50Hz													
REFRIGERATION CIRCUITS (No.)		2	2	2	2	2	2	2	2	2	2	2	2	2	2
APPROXIMATE WEIGHT (kg)		2500	2500	2600	2700	3100	3100	3100	3100	3700	3700	3700	3700	3900	3900
DIMENSION	HEIGHT (m)	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59
	WIDTH (m)	1.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27	2.27
	LENGTH (m)	6.3	6.3	6.3	6.3	7.3	7.3	7.3	7.3	5.25	5.25	5.25	5.25	5.25	5.25

*Capacity rating are based on Standard ARI-590/550 conditions of: (95) 35 ambient/ (44.6) 7 Leaving Chilled Water Temperature / (9) 5 Inlet-Outlet Water Temperature Difference/ 0.018 m²./kW (0.0001 ft². h. /Btu) Fouling Factor.

*ECO COOLER reserves the right to modify technical information at any time without prior notice.

Typical Electrical Wiring Diagram

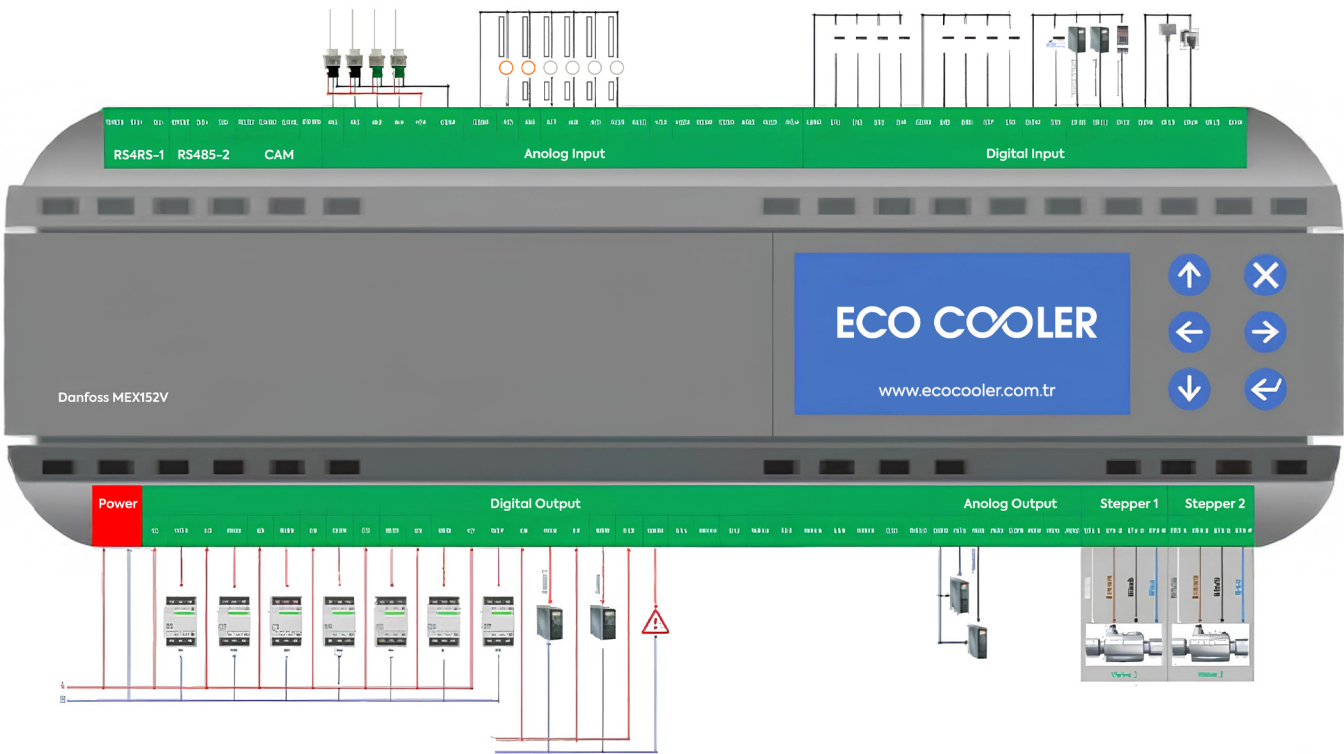
A typical electrical wiring diagram for a scroll air-cooled chiller shows the connections for key components like the compressor, fan motors, sensors, and control panels. It details the power and control circuits, including overload protection and grounding, ensuring proper energy flow and safe operation. The diagram is essential for troubleshooting, maintenance, and optimal chiller performance.



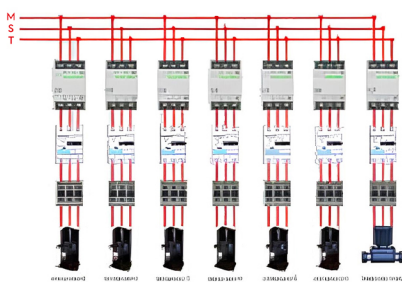
Typical Wiring Diagram

Ventilation systems rely on advanced electrical circuits to ensure a comfortable environment and healthy airflow. Provides a detailed overview of all system connections. The Control Circuit manages system operations, while the Power Circuit ensures the necessary energy flow. The harmonious operation of these components is crucial for an efficient and safe ventilation system.

Control Circuit



Power Circuit





Thank you

FOR CHOOSING US FOR CLEAN AIR AND COMFORTABLE LIVING SPACES.

We will always strive to provide the best for your health.

ECO COOLER

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