

# ECONOCHILL

## PRODUCT INFORMATION

### RCU SERIES AIR-COOLED SCROLL WATER CHILLERS

#### 1.5 TONS TO 7.5 TONS – INDIVIDUAL R-410A SCROLL COMPRESSOR



## **PRINCIPLE OF OPERATION**

The ECONOCHILL RCU Series Air-Cooled Process Water Chiller is designed to provide a continuous flow of chilled water in commercial and industrial applications.

The chiller operates by means of a closed-loop refrigeration system, coupled through a high-efficiency heat exchanger to a chilled water loop. The heart of the refrigeration system, the compressor, compresses refrigerant gas, which is then air-cooled by means of vertically-discharging fans blowing ambient air over a specially designed fin-tube condenser. The compressed refrigerant condenses into a liquid as it cools, which flows under pressure through a special modulating valve. The liquid refrigerant expands and cools dramatically as it passes through this valve (referred to as a thermo-expansion valve) into the cold side of a plate heat exchanger; On the other side of the plate heat exchanger circulates a continuous counter-flow of chilled water, which is cooled by the refrigerant. This water circulates through the closed chilled water loop, where it picks up heat, and is returned to the expansion tank to repeat the process. The refrigerant, now a gas, returns to the compressor to repeat the refrigeration cycle.

## **KEY FEATURES**

The RCU Series is manufactured in a wide range of capacities, from 1.5 Tons to 20 Tons. Our focus on efficiency in design has resulted in a machine that is mechanically simple and easy to operate, yet capable of superior heat removal at an efficient electrical consumption rate as low as 0.98 kW/Ton.

The RCU Series is assembled with the highest efficiency components available, such as compliant scroll compressors, high efficiency brazed plate evaporators, high surface area condensers, and efficient centrifugal pumps. The simplicity in the design of the RCU Series yields a machine with fewer components, greater reliability, and a layout that is easy to service. Additionally, great care has been taken to eliminate potential sources of corrosion from the system and help ensure a long service life. Our evaporators, pumps, and expansion tanks are all made of stainless steel and heavy-duty FRP— even the water connections are stainless steel. Every aspect of the RCU Series has been evaluated with an eye toward durability, reliability, and economy, making it possible for us to offer you what we consider to be a robust machine and a remarkable value. We hope that you will agree!

## **MECHANICAL SPECIFICATIONS**

### **General**

Unit shall be assembled on a heavy gauge structural steel base with unit-mounted casters. Unit shall include a hermetic scroll compressor, plate fin condenser coil, fan and motor, brazed plate evaporator, water tank, circulation pump, controls, and a full charge of oil and refrigerant. The ambient temperature operating range shall be between 45°F and 115°F. The chilled water temperature set point range shall be between 45°F and 65°F.

### **Cabinet**

The condensing unit casing shall be constructed of zinc-coated galvanized steel with a weather resistant gloss powder coat finish. Condensing unit exterior surfaces shall be capable of withstanding a 1000-hour salt spray test per ASTM B117. The condensing unit shall be of the frame and panel type of construction which provides complete protection to the condenser coils, and which allows all access panels to be opened or removed without affecting the structural strength of the unit. Fastening screws shall also be of the 1000-hour type.

The structural steel base shall be of heavy gauge structural steel, fully welded, cleaned, primed, finished with a durable, corrosion-inhibiting polyurethane enamel gloss finish coat, and fully enclosed with painted galvanized sheet metal panels.

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## **Refrigeration System**

The compressor shall be a single-speed, suction gas cooled, fully hermetic scroll type with thermal overload protection and protection against elevated discharge gas temperature. A refrigeration filter-drier, sight-glass bulb-actuated thermo-expansion device and suction line accumulator shall be standard. Proportioning hot-gas bypass capacity control with disable option shall be standard. The compressor shall have a voltage utilization range of plus or minus 10 percent of the nameplate voltage. External high and low pressure cutout devices shall be provided.

To protect the compressor against refrigerant migration during off cycles, pump-down control will be standard.

## **Condenser Coil**

The condenser coil shall be constructed of copper tubes mechanically bonded to engineered aluminum fins. The coil shall be pressure-tested to 600 PSIG internal pressure.

## **Evaporator**

The evaporator shall be of the counter-flow brazed plate design, fully insulated, with 316 grade stainless steel plates and copper brazing, pressure tested to 600 PSIG. Nickel brazing or all-stainless steel designs are available.

## **Condenser Fan & Motor**

A direct-drive, statically and dynamically balanced propeller fan with aluminum blades and an electro-coated steel hub shall be used in draw-thru vertical discharge position. A single-phase, direct drive, permanently lubricated permanent split capacitor motor with inherent thermal overload shall be used. The motor shall be of the ball bearing type.

## **Water Tank**

The water tank shall be of a seamless design in heavy-duty FRP, with a lid, sight-glass, drain with valve, and supply and return connections. The tank shall be fully-insulated in 3/8" closed-cell foam.

## **Tank Level Sensor**

Beyond the standard sight glass, a low tank level sensor and amber panel light alerts the operator to a low water condition.

## **Pump**

The water circulation pump shall be of the centrifugal type, in 304 stainless steel, with wear-resistant carbon/silicon-carbide/Viton slip ring seals, close-coupled to a direct-drive open/drip-proof AC motor with over-current protection. Wetted parts shall be insulated with 3/8" closed-cell foam.

## **Controls**

The chiller shall be completely factory wired with necessary controls and contactor pressure lugs or terminal blocks for power wiring. Control wiring shall be on an independently-fused 24VAC control circuit, which includes a control transformer. A 1/32 DIN microprocessor digital LED temperature controller with a tank-mounted type-T temperature sensor shall be standard. The remote control panel option requires field-wiring and cable is not provided unless ordered.

Independent on/off switches will be provided for the pump and the compressor, and a manual push-to-start button will be provided to initiate the pump on start-up.

A unit-installed adjustable paddle-type mechanical flow switch shall be included.

A unit-installed bulb-actuated adjustable thermostat which opens on low temperature shall be included.

## **OPTIONS**

### **Additional Capacities**

In addition to the capacities listed herein, the RCU Series chillers are available in 2, 4, 6, 10, 12.5, 15, and 20 Ton capacities.

### **Bolt-Down Clips**

Bolt-down clips can be substituted for the standard casters.

### **Remote Control Panel**

The standard unit-mounted control panel can be optionally shipped loose for remote installation. Numbered terminal blocks are provided to aid in field-wiring.

### **Low-Temperature Chilled Fluid**

The RCU Series can be optionally configured to operate at reduced capacity down to 15°F leaving chilled fluid temperature.

### **Low-Ambient Head Pressure Control**

Three head pressure control options are available: temperature-based fan speed control, pressure-based fan speed control, and flooded condenser head pressure control. A crankcase heater is standard is included on units equipped with low-ambient head pressure control.

### **High Pressure Pump**

A variety of optional water pump pressure/flow options are available upon request.

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## **Auto-Fill Valve**

A tank-mounted float valve automatically maintains the water level when connected to a water source.

## **Dual-Display Controller**

A 1/4 DIN digital temperature controller provides continuous display of set point and actual water temperature values.

## **Communications**

Digital communications option provides RS-232 or RS-485 serial connectivity to data logging and process control systems. Software is available at an additional cost. Dry contacts for operational or alarm conditions are also available.

## **Ultra-Pure Water Circuit**

A completely non-ferrous and non-cuprous (iron and copper free) coolant circuit is available to handle high purity fluids such as deionized water.

## **Micro-PLC with Touchscreen**

The chiller can be equipped with a micro-PLC and touchscreen and can be configured to communicate with Modbus over Ethernet or DeviceNet over RS-485 (other communications options may be available).

## **STANDARD WARRANTY**

Econochill warrants the RCU Series Chiller to be free from defects in material and workmanship under normal use and service, and we will, within one year from date of initial operation or 18 months from date of shipment, whichever is earlier, repair or replace without cost to the original customer any part, assembly or portion thereof which shall be returned to our factory, transportation charges prepaid, and which our inspection shall show to be thus defective. This warranty does not include labor, material and other costs related to the removal, replacement and transportation of defective parts or components.

Full details of our standard warranty, including optional extended warranty plans, are available upon request.

## **NOTES**

Specifications contained herein are complete and accurate at the time of printing. However, as a result of our program of continuous improvement, these specifications may be subject to change without notice.

Although we can certify the heat removal capacity of our chillers, we cannot certify the heat load placed on the chiller; therefore, it is important to determine this heat load with a high degree of certainty prior to the selection of a chiller. We can offer some assistance in this regard.

Electrical and process mechanical diagrams are available for our chillers upon request.

## **CONTACT INFORMATION**

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## TECHNICAL SPECIFICATIONS – SINGLE COMPRESSOR RCU SERIES AIR-COOLED WATER CHILLERS

MODEL	RCU-015A	RCU-030A	RCU-050A	RCU-075A
<b>Capacities – Dimensions – Weights</b>				
<b>Nominal Tons of Refrigeration [1]</b>	1.5 TONS	3 TONS	5 TONS	7.5 TONS
<b>@ 50°F [10.0°C] LWT (KBTU/H, [kW])</b>	16.7 [4.9]	37.0 [10.9]	57.9 [17.0]	87.9 [25.7]
<b>@ 55°F [12.7°C] LWT (KBTU/H, [kW])</b>	18.5 [5.4]	40.8 [11.9]	63.6 [18.6]	95.9 [28.1]
<b>@ 60°F [15.5°C] LWT (KBTU/H, [kW])</b>	20.4 [6.0]	44.6 [13.1]	70.0 [20.5]	104.5 [30.6]
<b>Length (in., [mm])</b>	35 1/2 [902]	44 3/8 [1127]	44 3/8 [1127]	43 [1092]
<b>Width (in., [mm])</b>	27 1/2 [699]	35 1/4 [896]	35 1/4 [896]	34 13/16 [885]
<b>Height (in., [mm])</b>	53 3/8 [1356]	57 1/2 [1461]	67 1/2 [1715]	67 5/16 [1710]
<b>Dry Weight (lbs., [kg])</b>	355 [161]	457 [208]	525 [239]	618 [281]
<b>Operating Weight (lbs., [kg])</b>	533 [242]	855 [389]	924 [537]	1017 [462]
<b>Shipping Weight (lbs., [kg])</b>	617 [280]	798 [363]	866 [394]	961 [437]
<b>Compressor</b>	Copeland Scroll	Copeland Scroll	Copeland Scroll	Copeland Scroll
<b>Refrigerant/Oil</b>	R-410A/POE	R-410A/POE	R-410A/POE	R-410A/POE
<b>Condenser Fan</b>	Axial	Axial	Axial	Axial
<b>Total CFM [L/s]</b>	1775 [838]	3200 [1510]	3500 [1652]	4700 [2218]
<b>Condenser Air Discharge</b>	Vertical	Vertical	Vertical	Vertical
<b>Condenser Coil</b>	Fin Tube	Fin Tube	Fin Tube	Fin Tube
<b>Fin Material</b>	Aluminum	Aluminum	Aluminum	Aluminum
<b>Tube Material</b>	Copper	Copper	Copper	Copper
<b>Evaporator</b>	Brazed Plate	Brazed Plate	Brazed Plate	Brazed Plate
<b>Plate Material</b>	316 Stainless	316 Stainless	316 Stainless	316 Stainless
<b>Brazing Material [2]</b>	Copper	Copper	Copper	Copper
<b>Pump</b>	Centrifugal	Centrifugal	Centrifugal	Centrifugal
<b>Pump Material</b>	304 Stainless	304 Stainless	304 Stainless	304 Stainless
<b>Seal Material</b>	Car/Sil-Car/Viton	Car/Sil-Car/Viton	Car/Sil-Car/Viton	Car/Sil-Car/Viton
<b>Motor Horsepower (hp, [kW])</b>	3/4 [0.56]	1 [0.75]	1 [0.75]	1.5 [1.1]
<b>Motor Type [3]</b>	ODP	ODP	ODP	ODP
<b>Nominal Flow Rate (gpm, [lpm])</b>	5 [19]	9 [34]	15 [57]	23 [87]
<b>Nominal Pressure (psi, [bar]) [4]</b>	35 [2.4]	35 [2.4]	35 [2.4]	35 [2.4]
<b>Water Tank</b>	Heavy-Duty FRP	Heavy-Duty FRP	Heavy-Duty FRP	Heavy-Duty FRP
<b>Water Tank Capacity (gal., [L])</b>	21 [80]	47 [179]	47 [179]	47 [179]
<b>Water Supply Connection</b>	1" FNPT	1" FNPT	1 1/4" FNPT	1 1/4" FNPT
<b>Water Return Connection</b>	1" FNPT	1" FNPT	1 1/4" FNPT	1 1/4" FNPT
<b>Electrical (230-1/230-3/460-3), 60Hz</b>				
<b>Compressor Motor FLA</b>	9.0/--/--	16.9/13.2/6.0	26.3/15.6/7.8	--/25.0/12.2
<b>Compressor Motor LRA</b>	48/--/--	112/88/44	134/110/52	--/164/100
<b>Condenser Fan Motor FLA</b>	0.6/--/--	1.2/1.2/0.6	1.2/1.2/0.6	--/2.2/1.3
<b>Pump Motor FLA</b>	4.9/--/--	6.6/3.2/1.6	6.6/3.2/1.6	--/4.8/2.4
<b>Unit System Total FLA</b>	15/--/--	25/14.4/7.2	35/23.5/11.8	--/31.8/15.9
<b>Minimum Circuit Ampacity</b>	19/--/--	31/15/8	43/25/13	--/40/20
<b>Maximum Fuse Size [5]</b>	25/--/--	40/30/15	55/35/20	--/50/25
<b>Condensing Unit Construction</b>	Galvanized Steel	Galvanized Steel	Galvanized Steel	Galvanized Steel
<b>Condensing Unit Coating</b>	Powder Coat	Powder Coat	Powder Coat	Powder Coat
<b>Structural Base Construction</b>	Mild Steel	Mild Steel	Mild Steel	Mild Steel
<b>Structural Base Coating</b>	Urethane Enamel	Urethane Enamel	Urethane Enamel	Urethane Enamel
<b>Chilled Water Piping</b>	Reinforced Nitrile	Reinforced Nitrile	Reinforced Nitrile	Reinforced Nitrile
<b>Environmental Rating</b>	NEMA 3R	NEMA 3R	NEMA 3R	NEMA 3R

- (1) Heat removal capacity is rated at 90°F [32.2°C] ambient air temperature at sea level, cooling plain water.
- (2) Alternate brazing alloys are available.
- (3) TEFC pump motors available upon request.
- (4) Nominal available water pressure is measured at the chilled water supply connection.
- (5) These values are recommendations only. Always consult NEC guidelines and local codes when sizing a wire or disconnect.
- (6) The specifications contained herein are accurate at the time of printing, but may be subject to change without notice (12/2009).