Engineering Manual

CCW / CCR

Base Chillers

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Introduction

Creotech Industries Inc. offer an energy efficient, cost effective line of small chillers that range from 2.5 to 30 Nominal Tons in both water-cooled and condenser-less models that are intended for use with a remote air-cooled condenser.

The Base Chiller models use Copeland Compliant Scroll compressors and are available in single compressors, Dual Circuit and tandem circuit compressors. The design incorporates brazed plate evaporators and brazed plate condensers (in the case of water-cooled) and state-of-the-art controls to provide operating efficiency and reliability in a very small package.

Efficiency

- CCZW, CCDW and CTW IPLVs are calculated to ASHRAE 90.1
- Scroll Compressors
- Maximum Capacity Reduction

Reliability

- Durable compressor design
- Standard safety and protection controls

Selection Flexibility

- 21 available sizes
- Factory installed options
- Water or air-cooled condensers
- Factory assembled

Serviceability

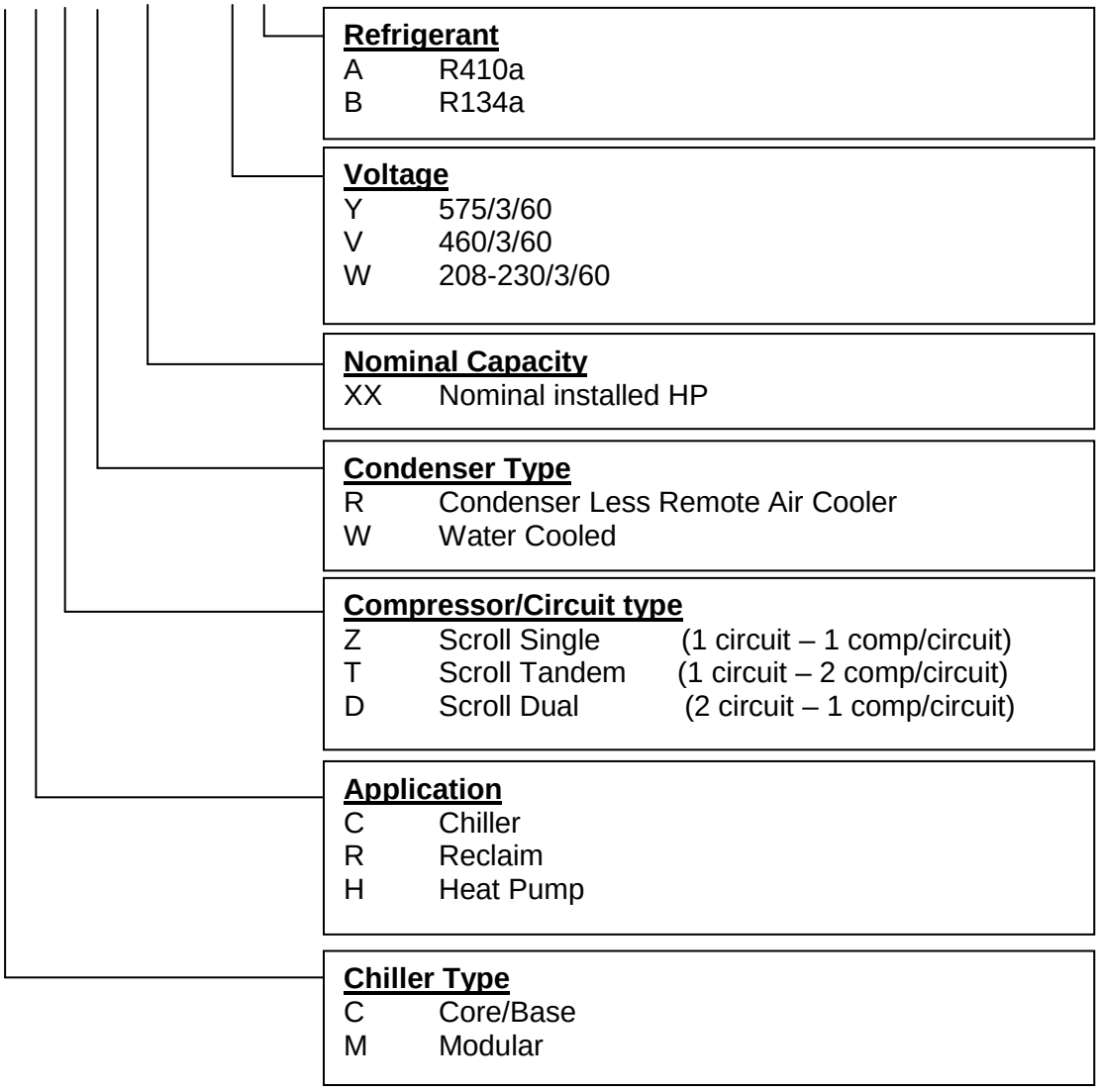
- Easy access components
- Components selected for availability

Full Factory Testing

Chiller model Number Nomenclature

Model Number Nomenclature

CCDW220-YA



Features and Benefits

Standard Unit Configuration

Creotech's Small Chiller packages are factory built and tested with the following standard options;

- Epoxy coated rugged unitary sheet metal base c/w 6" support legs.
- Scroll Compressor (Single or Tandem) c/w;
    - Hi/Lo pressure ports
    - Crankcase Heater
    - Rubber isolation mounts
    - Unitary frame for Tandem compressors
    - Manifold pipe for Tandem compressors
- Liquid line solenoid valve
- Liquid line ball valve
- Sealed filter-drier
- Liquid Line Site Glass
- Thermal Expansion Valve
- Hot Gas By-pass
- Brazed-Plate Heat Exchanger Evaporator (and water-cooled condenser)
- Insulated Suction Line

Remote Units also include;

- Discharge Check Valve
- Refrigerant Isolation Valves

Standard Electrical Controls

- Component overcurrent protection
- Hi/Lo pressure switches
- Freeze stat
- Flow Switch (Evaporator and Condenser—water-cooled)
- Anti-cycling
- Compressor rotation (FI/FO)
- Dry Contacts for Evaporator Pump and either Condenser Pump or AC Condenser
- Remote Alarm Contact

Efficiency

All CZW - CTW Water-Cooled and CZR – CTR Air-Cooled chillers (based on condenser selection) are designed to ASHRAE 90-1 2004 IPLV efficiency levels.

Creotech's Small Chiller design maximizes the operating efficiencies through selection of efficient components matched with each compressor model.

Additional efficiency is available on the Tandem Compressor units by allowing only one compressor to operate during low load conditions. Also, each compressor will operate at lower compression ratios at unloaded conditions with substantial energy savings.

Flexibility

The CZ and CT chillers come in 21 available sizes using both single and tandem scroll compressors with both water-cooled and remote air-cooled alternatives. This allows the capacity to match the load demand more consistently.

The CZW and CTW water cooled chillers are completely factory assembled, piped, wired, tested and shipped as one unit ready for use. The CZR and CTR remote air-cooled chillers are ready for refrigeration piping in the field.

The chillers are equipped with standard options for reliable operation. However other options can be factory installed for customization to the application. Such options are; Water Inlet Strainers, Water Shut-Off Valves, Condenser Water Regulating Valve, and Rotary Non-Fused Disconnect, consult *Optional Features* for a complete list.

The chillers utilize a small foot-print to allow the ability to locate the chiller in most locations.

Reliability

The Scroll compressors are the most advanced and reliable type of compressor in the market. All chillers are factory tested for operation and safety controls checked and calibrated.

High and low refrigerant pressure switches, low temperature thermostat, flow switches (shipped loose), head pressure control valves, liquid receiver (Remote Air-Cooled units) and compressor anti-cycling, all provide protection for chiller operation.

Serviceability

The chillers are designed on a single platform where all the components are accessed easily. Standard off-the-shelve components are used to keep both service costs and component delivery times to a minimum.

Code Approvals

The CZ and CT model chillers are constructed and/or rated with ANSI/ASHRAE 15 Safety Code, C-UL approved electrical components, and TSSA approved assembly procedure.

Unit Description

Refrigerant

CZ-CT units utilize R-410A refrigerant—environmentally friendly (efficient) with no phase-out date.

Unit Arrangements

The Creotech water chillers are completely factory assembled, piped, wired and shipped in one piece, ready for field connection of power, water piping, and refrigerant piping on remote condenser models. Each chiller consists of; compressors insulated brazed plate evaporator and centralized electrical control panel containing all necessary equipment protection and operating controls. Arrangement “CZW/CTW” units come complete with mounted, water-cooled condensers. Arrangement “CZR/CTR” units are provided with optional air-cooled condensers to match unit capacity for remote installation.

All models are single circuited units. The CZ units use a single compressor while the CT units use a Tandem compressor arrangement.

Compressors

The scroll compressors are available in single or tandem arrangements. These rugged hermetic compressors are constructed with an integral cast iron frame, cast iron scrolls, three Teflon® impregnated bearings, and three oil filtration devices for each compressor.

Using scroll tandems provides two steps of capacity modulation. Either compressor can run, depending on the load of the system, resulting in excellent part-load efficiency. Each tandem refrigerant circuit has specially designed oil and gas equalization lines to control oil migration.

This well protected compressor includes a solid-state motor protection module, 4 individual motor-winding sensors, a patented internal discharge temperature sensor, and a patented shutdown feature that prevents reverse rotation. An internal discharge check valve helps prevent shutdown noise and comes standard with high and low pressure taps with Schrader valves, a sight glass and an off cycle crankcase heater.

Units are available in 60-hertz with voltages from 208 to 575 volt.

Evaporator

The evaporator is a compact, high efficiency, brazed-plate type heat exchanger consisting of parallel stainless steel plates, with a design water-side pressure of 435 psig

Evaporators are designed and constructed according to, and listed by, Underwriters Laboratories (UL). They are complete with vent and drain connections for proper priming and drainage of water lines.

Water-Cooled Condensers

The condenser is a compact, high efficiency, brazed-plate type heat exchanger consisting of parallel stainless steel plates, with a design water-side pressure of 435 psig.

Condensers are designed and constructed according to, and listed by, Underwriters Laboratories (UL). They are complete with vent and drain connections for proper priming and drainage of water lines.

Also included is a liquid line shutoff valve and purge valve.

Air-Cooled Condensers

The air-cooled condensers are designed with the CZR and CTR units with vertical discharge fans.

They are packed with features offering tangible benefits to owners:

- Complete range of capacities from 5 to 30 tons
- Circuits matched to chillers
- Direct drive fan motors at 550 & 780 RPM for low sound levels
- Patented floating tube design to eliminate tube sheet leaks
- High efficiency coil and fan motor design
- Internal baffles between all fan cells
- Weatherproof control panel
- G90 painted galvanized steel cabinets
- Single-point power connection
- Independent fusing and contactors for each fan motor
- Integral pre-piped subcooler circuit

Factory Installed Refrigerant Line Components

Each chiller's refrigerant circuit has manual liquid line shutoff valve, solenoid valve, liquid line sight glass/moisture indicator, hot-gas bypass solenoid valve, and thermal expansion valve.

The CZR and CTR models for remote condenser also include head pressure control valve and liquid receiver. Since there is no water-cooled condenser, a high-side pressure relief valve must be field installed in the discharge line.

Part Load Efficiencies

Part load efficiencies and Integrated Part Load Values (IPLV) for CW units are calculated according to the requirements of the latest ARI Standard 550/590-2003 and in reference to ASHRAE Efficiency Standard 90.1. Since most air conditioning systems operate at less than design full load a majority of the time, IPLV is an excellent method for comparing the efficiencies of chillers.

Noise

All Creotech Base chillers are equipped with hermetic scroll compressors with inherently low sound levels.

Electrical Panel

The electrical panel contains a microprocessor controller providing operating and equipment protection controls plus motor starting equipment, factory wired, operationally tested, and ready for operation. Standard components include control transformer with primary and secondary fusing, microprocessor transformers with integral fusing, compressor contactors, overcurrent protection on the standard single-point wiring arrangement and switches for each circuit, pump-down and unit control power. The control panel has a hinged tool-locked door.

Unit Controller

The controller is equipped with a powerful microprocessor and state-of-the art software for precise control of the Base Chillers. The controller has a range of digital and analog I/O's to support a variety of temperature sensors and actuators.

Easy User Interface

The controller features a built-in user interface, allowing the temperature set-points and alarms to be easily monitored and/or adjusted. The integral user interface includes an LCD display screen, graphical status icons and 4 push-buttons.

Capacity Control

The scroll compressors are staged on and off with modulating hot-gas bypass allowing further control of temperature. The compressor is allowed a maximum of 6 starts per hour. The compressors on a tandem assembly include compressor rotation based on FI/FO functionality.

Chiller Protection

The chiller is protected by alarms that shut it down and require manual reset. It is also guarded by limit alarms that limit unit operation in response to any out-of-limit condition. Shut down alarms activate an alarm signal.

Shut Down Alarms

- No evaporator flow
- No condenser flow
- Low refrigerant pressure
- High refrigerant pressure
- Evaporator freeze protection
- Phase voltage protection (optional)

Digital Inputs

- Unit off switch
- Remote On/Off (Optional)
- Flow switch

Digital Outputs

- Shut down alarms
- Evaporator pump
- Condenser pump/or Condenser fan control

Networking

The controller has the (optional) capability to communicate with a supervisor network through a standard RS485 serial line. Several platforms are available such as; SNMP, HTMI, BACNet, Modbus and TCP/IP. Consult factory for your specific BAS requirements

Selection Procedure

System Capacity

Two out of the following three pieces of information must be known in order to properly size a chiller:

1. The required chilled water capacity (tons),
2. The chilled water temperature range (ΔT°F), and
3. The flow (USgpm)

They are related in the following formula:

$$\textbf{Tons} = \frac{\textbf{Flow x } \Delta\textbf{T}}{\textbf{24}}$$

Note: **ΔT** is the difference between the water temperature entering and leaving the chiller.

Enter the two known factors and solve for the third. Please note, if glycol is used or if the system is operating at unusual altitudes, please consult the section titled: *"Performance Adjustment Factors"*.

Select the necessary chiller from the **Tons** determined above.

Condenser Sizing

Once you have the required chiller capacity in **Tons**, you will require the following to size the proper condenser:

1. The entering condenser water temperature, and ***either***
2. The condenser water temperature range (ΔTc °F)

or

The Flow (gpm), they relate in the following formula

They are related in the following formula:

$$\textbf{Condenser Flow} = \frac{\textbf{THR}}{\textbf{500 x } \Delta\textbf{Tc}} = \frac{\textbf{Tons x 30}}{\Delta\textbf{Tc}}$$

Note: - **ΔTc** is the difference between the water temperature entering and leaving the chiller condenser.
- **THR** is the total amount of heat per unit time rejected by the condenser. THR not only includes the heat removed from the circulating water passing through the evaporator, but also the heat added by the compressor when compressing the refrigerant gas.

Use the Performance Data Table to determine the water cooled chiller selection, and the corresponding compressor power input, condenser water flow rate, the EER125 and the THR. The selection procedure is the same for a remote air-cooled chiller. The condensers are pre-selected to perform at ARI conditions for each chiller size. Operating outside of the ARI conditions will change the performance capacity and power input.

Assumptions:
Ratings are based on ARI Standard 550/590-2003.
Ratings in the Performance Tables can be interpolated for any chilled water temperature between 40°F and 50°F (4.4°C and 10.0°C) but cannot be extrapolated.
Chilled water flow are based on a 10°F (5.6°C) chilled water range (2.4 gpm/ton).
The maximum/minimum flow rate is based on a 6°F range as maximum flow and 16°F as minimum flow. The maximum flow is based on pressure drop across the evaporator and problems resulting from very small control bands and limited start-up/shut-off temperature changes. The minimum flow is based on a full load and minimum flow to maintain turbulent flow across the evaporator. The minimum flow rates assume that the flow will be reduced proportionally to the cooling load.
Ratings are based on a 0.0001 fouling factor for the evaporator. For applications using a glycol solution see the tables referring to glycol mix below.
Ratings are based on a condenser flow of 3gpm/ton (10°F, 5.6°C ΔT) and 0.00025 fouling factor.

Altitude Correction Factors

As altitude rises, density of the air decreases. This affects the capacity of the remote air-cooled condenser and thereby decreases the capacity (and power) of the cooling system. For systems located at altitudes significantly higher than sea level, de-rating correction factors should be used. Please consult the table below.

Table 1 - Altitude Correction Factors

	1000 ft.	2000 ft.	3000 ft.	4000 ft.	5000 ft.	6000 ft.
Capacity	0.997	0.994	0.991	0.988	0.983	0.978
Power	1.0063	1.0126	1.0196	1.0266	1.0336	1.0406

Ethylene and Propylene Glycol Correction Factors

MCW and MCR units are designed to operate with a leaving chilled fluid temperature from 21°F (-6.1°C) to 60°F (16°C). Leaving chilled fluid temperatures below 40°F (4.6°C) result in suction temperatures at or below the freezing point of water and a glycol anti-freeze solution is required. The use of glycol in the evaporator will reduce the performance of the unit. The reduction in performance depends upon the glycol concentration and temperature. This should be taken into consideration during initial system design.

Creotech Industries encourages a minimum concentration of 25% be provided on all glycol applications. Glycol concentrations below 25% are too diluted for long-term corrosion protection of ferrous metals and corrosion inhibitors need to be recalculated and possibly added to the system. Glycol in the condenser will have a negligible effect on performance because glycol at these higher temperatures will perform with characteristics similar to water.

Table 2 - Adjustment Factor for Ethylene Glycol

Percent E.G.	Freeze Point		Cap.	Power	Flow (GPM)	Pressure Drop
	°F	°C				
10%	26	-3	0.991	0.996	1.013	1.070
20%	18	-8	0.982	0.992	1.040	1.129
30%	7	-14	0.972	0.986	1.074	1.181
40%	-7	-22	0.961	0.976	1.121	1.263
50%	-28	-33	0.946	0.966	1.178	1.308

Table 3 - Adjustment Factor for Propylene Glycol

Percent P.G	Freeze Point		Cap.	Power	Flow (GPM)	Pressure Drop
	°F	°C				
10%	26	-3	0.987	0.992	1.010	1.068
20%	19	-7	0.975	0.985	1.028	1.147
30%	9	-13	0.962	0.978	1.050	1.248
40%	-5	-21	0.946	0.971	1.078	1.366

NOTE: Glycol applications are not included in the ARI certification program.

Evaporator Fouling Factors

As per ARI 550/590-2003, performance tables for chiller evaporators are based on a fouling factor of

$$\frac{0.0001 \text{ feet}^2 \times \text{hour} \times {}^\circ\text{F}}{\text{BTU}}$$

As fouling of the chiller evaporator increases, the heat transfer characteristics of the evaporator decreases. Please contact Creotech Industries for more information.

Selection Example
Water-cooled chiller
Using 30% ethylene glycol, 70% chilled water solution
Chiller water delivery temperature of 44ºF and return temperature of 54ºF
Evaporator flow rate of 720USgpm
Condenser entering water temperature of 85ºF, and **ΔTc** of 10ºF

Determine the chilled water temperature differential, **ΔT**:

ΔT = 54ºF – 44ºF = 10ºF

Determine the capacity of the chilling system required for pure water:

Tons = $\frac{\text{Flow} \times \Delta T}{24} = \frac{720\text{USgpm} \times 10^\circ\text{F}}{24}$ = 300 tons

Increase the amount of cooling required because of the decreased heat transfer of the chilled water solution containing 30% ethylene glycol:

Actual Tons Needed = $\frac{30 \text{ Tons}}{0.972}$ = 308.7 tons

Determine water-condenser flow for complete chilling system

Total Condenser flow = $\frac{\text{Actual Tons X } 30}{\Delta Tc} = \frac{308.7 \times 30}{10}$ = 926USgpm

Determine combination of Creotech modular chillers required

From the *System Selection Table* below, select the appropriate combination of modular chillers. For 308 Tons a 320 ton system would be required consisting of **five (5) MC60W** chiller modules.

Performance Data Water Cooled

Performance data for the Base series chillers with a water cooled condenser. Data shown for various evaporator inlet and outlet conditions

	Evap 50 / 40 °F				Evap 54 / 44 °F				Evap 58 / 48 °F			
Size Unit	Cap (TR)	Work (kW)	EER	THR (kBtu/h)	Cap (TR)	Work (kW)	EER	THR (kBtu/h)	Cap (TR)	Work (kW)	EER	THR (kBtu/h)
Single Circuit												
CCZ025W	2.5	2.1	14.5	37.7	2.8	2.1	15.7	40.2	3.0	2.1	16.9	42.7
CCZ035W	3.4	2.8	14.7	50.7	3.7	2.8	15.9	54.0	4.0	2.8	17.1	57.4
CCZ050W	5.0	4.2	14.4	74.6	5.4	4.2	15.5	79.3	5.8	4.2	16.6	84.2
CCZ060W	5.9	4.8	14.7	87.1	6.3	4.8	15.8	92.3	6.8	4.9	16.6	98.0
CCZ075W	7.3	6.1	14.4	108.8	7.9	6.1	15.5	115.5	8.5	6.1	16.7	122.6
CCZ085W	8.5	6.7	15.2	124.7	9.1	6.8	16.1	132.6	9.8	6.8	17.3	140.7
CCZ100W	10.1	7.8	15.6	148.3	10.9	7.9	16.5	157.7	11.7	7.9	17.7	167.0
CCZ110W	11.1	8.8	15.2	163.5	12.0	8.9	16.1	173.9	12.8	8.9	17.3	184.4
CCZ125W	12.6	10.1	15.0	186.0	13.6	10.2	16.0	197.7	14.6	10.3	17.0	210.0
CCZ150W	14.9	11.9	15.0	219.3	16.0	12.0	16.0	232.8	17.1	12.1	17.0	246.8
CCZ200W	19.1	15.4	14.9	281.8	20.6	15.5	15.9	300.1	22.2	15.7	16.9	319.6
CCZ240W	24.0	19.4	14.8	354.1	25.8	19.5	15.9	376.2	27.7	19.7	16.9	399.8
CCZ320W	31.4	25.2	15.0	462.8	33.8	25.4	15.9	491.7	36.2	25.7	16.9	522.0
Tandem Circuit												
CCT100W	9.9	8.4	14.2	147.6	10.7	8.3	15.4	156.4	11.5	8.3	16.6	166.1
CCT120W	11.5	9.6	14.4	170.7	12.4	9.6	15.5	181.5	13.3	9.7	16.5	193.2
CCT150W	14.6	12.2	14.4	217.3	15.8	12.2	15.5	230.7	16.9	12.3	16.5	245.2
CCT175W	17.0	13.6	15.0	250.1	18.2	13.6	16.1	265.3	19.6	13.7	17.1	281.6
CCT200W	20.3	15.8	15.4	297.3	21.8	15.8	16.5	315.3	23.3	15.9	17.6	334.2
CCT220W	22.2	17.8	15.0	327.7	23.9	17.9	16.0	348.2	25.7	18.0	17.1	369.4
CCT250W	25.0	20.4	14.7	369.8	26.9	20.5	15.7	392.7	28.9	20.7	16.7	417.1
CCT300W	29.5	23.8	14.9	434.8	31.6	24.0	15.8	461.6	33.9	24.3	16.7	489.7
Tandem Circuit												
CCD100W	10.1	8.4	14.4	149.4	10.8	8.3	15.7	158.3	11.7	8.3	16.9	168.2
CCD120W	11.8	9.6	14.7	174.2	12.6	9.6	15.8	184.5	13.6	9.7	16.8	195.7
CCD150W	14.7	12.1	14.5	217.3	15.8	12.1	15.7	230.7	17.0	12.2	16.7	245.2
CCD175W	17.0	13.5	15.1	249.8	18.2	13.5	16.2	265.0	19.6	13.6	17.3	281.3
CCD200W	19.7	15.7	15.1	289.9	21.2	15.7	16.2	307.6	22.7	15.8	17.2	326.2
CCD220W	21.5	17.6	14.7	318.5	23.2	17.7	15.7	338.6	24.9	17.8	16.8	359.4
CCD250W	24.4	20.2	14.5	361.9	26.3	20.4	15.5	384.8	28.2	20.6	16.4	408.8
CCD300W	28.8	23.7	14.6	426.7	31.0	23.9	15.5	453.0	33.2	24.2	16.5	480.9

Note:

Condenser	Temp (F)
Entering Water	85
Leaving Water	95

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Performance Data Remote Air Cooled

Performance data for the Base series chillers with a remote air cooled condenser. Data shown for various evaporator inlet and outlet conditions

	Evap 50 / 40 °F				Evap 54 / 44 °F				Evap 58 / 48 °F			
Size Unit	Cap (TR)	Work (kW)	EER	THR (kBtu/h)	Cap (TR)	Work (kW)	EER	THR (kBtu/h)	Cap (TR)	Work (kW)	EER	THR (kBtu/h)
Single Circuit												
CCZ025W	2.3	2.5	10.8	35.6	2.5	2.5	11.8	38.0	2.7	2.5	12.8	40.4
CCZ035W	3.0	3.4	10.7	48.1	3.3	3.3	12.0	50.9	3.6	3.3	13.0	54.2
CCZ050W	4.5	4.9	11.0	70.5	4.9	4.8	12.1	74.7	5.3	4.8	13.1	79.5
CCZ060W	5.3	5.6	11.3	82.6	5.7	5.6	12.2	87.4	6.1	5.6	13.1	92.5
CCZ075W	6.6	7.0	11.3	102.9	7.1	7.0	12.2	109.1	7.6	7.0	13.1	115.7
CCZ085W	7.6	7.9	11.6	118.6	8.2	7.9	12.5	125.7	8.9	7.9	13.5	133.3
CCZ100W	9.0	9.2	11.8	139.7	9.8	9.2	12.7	148.5	10.5	9.2	13.7	157.6
CCZ110W	9.9	10.3	11.6	154.2	10.7	10.3	12.5	163.7	11.5	10.3	13.4	173.6
CCZ125W	11.4	11.7	11.7	176.3	12.2	11.8	12.4	187.2	13.2	11.8	13.4	198.3
CCZ150W	13.4	13.6	11.8	207.0	14.4	13.7	12.6	219.7	15.5	13.8	13.5	233.1
CCZ200W	17.1	17.6	11.6	264.8	18.5	17.7	12.5	281.9	19.9	17.9	13.4	300.2
CCZ240W	21.5	22.3	11.6	334.0	23.2	22.4	12.4	354.5	25.0	22.5	13.3	376.3
CCZ320W	28.2	29.0	11.7	437.5	30.4	29.1	12.5	464.2	32.7	29.3	13.4	492.5
Tandem Circuit												
CCT100W	8.8	9.8	10.8	139.2	9.6	9.7	11.8	147.8	10.3	9.6	12.9	156.8
CCT120W	10.3	11.2	11.0	161.6	11.1	11.3	11.8	172.0	12.0	11.3	12.7	182.6
CCT150W	13.2	14.1	11.2	206.1	14.2	14.1	12.1	218.5	15.3	14.1	13.0	231.7
CCT175W	15.3	15.9	11.5	237.5	16.5	15.9	12.4	251.8	17.7	15.9	13.4	266.9
CCT200W	18.1	18.4	11.8	279.5	19.5	18.4	12.7	297.0	21.0	18.5	13.6	315.5
CCT220W	19.8	20.7	11.5	308.5	21.4	20.7	12.4	327.4	23.0	20.8	13.3	347.6
CCT250W	22.5	23.5	11.5	350.3	24.2	23.6	12.3	371.4	26.1	23.7	13.2	393.8
CCT300W	26.5	27.3	11.7	411.3	28.6	27.5	12.5	436.6	30.7	27.7	13.3	463.1
Tandem Circuit												
CCD100W	9.0	9.8	11.0	141.0	9.7	9.7	12.0	149.8	10.5	9.6	13.1	159.0
CCD120W	10.6	11.2	11.3	165.2	11.4	11.3	12.1	175.3	12.2	11.3	13.0	185.5
CCD150W	13.2	14.0	11.3	205.8	14.2	14.1	12.1	218.5	15.3	14.1	13.0	231.6
CCD175W	15.3	15.9	11.5	237.3	16.4	15.8	12.5	251.3	17.7	15.9	13.4	266.8
CCD200W	17.5	18.3	11.5	272.3	18.9	18.3	12.4	289.5	20.4	18.3	13.4	307.5
CCD220W	19.2	20.5	11.2	300.5	20.8	20.5	12.2	319.0	22.4	20.6	13.0	338.8
CCD250W	22.0	23.4	11.3	343.6	23.7	23.5	12.1	364.4	25.5	23.6	13.0	386.4
CCD300W	25.9	27.2	11.4	403.2	27.9	27.3	12.3	427.8	30.0	27.5	13.1	454.1

Note:
Condensing Temperature 115 °F
Sub-cooling 10º F
Superheat 15º F

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Electrical

	Nom. Tons	Config	230V/3/60				460V/3/60				575V/3/60			
			LRA	MCC	RLAc	RLAbr	LRA	MCC	RLAc	RLAbr	LRA	MCC	RLAc	RLAbr
CZ025	2.5	Single	73	16.3	11.6	10.4	38	9	6.4	5.8	36.5	5.9	4.2	3.8
CZ035	3.5	Single	83.1	21.4	15.3	13.7	41	9.7	6.9	6.2	33	7.5	5.4	4.8
CZ050	5	Single	123	29.7	21.2	19	62	15.2	10.9	9.7	50	11.6	8.3	7.4
CZ060	6	Single	164	36.2	25.9	23.2	75	17.5	12.5	11.2	54	12.3	8.8	7.9
CZ075	7.5	Single	195	46	32.9	29.5	95	23	16.4	14.7	80	19	13.6	12.2
CZ085	8.5	Single	225	47	33.6	30.1	114	26	18.6	16.7	80	19	13.6	12.2
CZ100	10	Single	239	52	37.1	33.3	125	28	20	17.9	80	20	14.3	12.5
CZ110	11	Single	245	75	53.6	48.1	125	29	20.7	18.7	100	23	16.4	14.7
CZ125	12.5	Single	300	80	57.1	51.3	150	36	25.7	23.1	109	31	22.1	19.9
CZ150	15	Single	340	87	62.1	55.8	173	42	30	26.9	132	37	26.4	23.7
CZ200	20	Single	505	115	82.4	73.9	225	47.5	33.9	30.4	180	38.4	27.4	24.6
CZ240	24	Single	605	133	95	85.3	272	65.4	46.7	41.9	238	54.2	38.7	34.7
CZ320	32	Single	599	171	122	110	310	85	60.7	54.5	239	77	55	49.4
CT100	10T	2x5	246	59.4	42.4	38	124	30.4	21.8	19.4	100	23.2	16.6	14.8
CT120	12T	2x6	328	72.4	51.8	46.4	150	35	25	22.4	108	24.6	17.6	15.8
CT150	15T	2x7.5	390	92	65.8	59	190	46	32.8	29.4	160	38	27.2	24.4
CT175	17.5T	2x8.5	450	94	67.2	60.2	228	52	37.2	33.4	160	38	27.2	24.4
CT200	20T	2x10	478	104	74.2	66.6	250	56	40	35.8	160	40	28.6	25
CT220	22T	2x11	490	150	107	96.2	250	58	41.4	37.4	200	46	32.8	29.4
CT250	25T	2x12.5	600	160	114	103	300	72	51.4	46.2	218	62	44.2	39.8
CT300	30T	2x15	680	174	124	112	346	84	60	53.8	264	74	52.8	47.4

Note: RLAc is for contactor sizing and RLAbr is for breaker/fuse rating

Physical data Water Cooled

Model CZ – Single Compressor chiller model, Water cooled

Model		CZ025	CZ035	CZ050	CZ060	CZ075	CZ085	CZ100	CZ110	CZ125	CZ150	CZ200	CZ240	CZ320
Nom. Tons		2.5	3.5	5	6	7.5	8.5	10	11	12.5	15	20	24	32
Capacity	kbtuh	33.00	44.40	65.00	75.90	94.70	109.40	130.70	143.50	162.90	191.90	247.20	309.70	405.00
	kW	9.67	13.01	19.05	22.25	27.76	32.07	38.31	42.06	47.75	56.25	72.45	90.77	118.71
THR	kbtuh	40.20	54.00	79.30	92.30	115.50	132.60	157.70	173.90	197.70	232.80	300.10	376.20	491.70
	kW	11.78	15.83	23.24	27.05	33.85	38.87	46.22	50.97	57.95	68.23	87.96	110.26	144.12
Evaporator Flow and Pressure	GPM	6.72	8.88	12.96	15.12	18.96	21.84	26.16	28.80	32.64	38.40	49.44	61.92	81.12
	psi	3.60	3.70	4.50	4.40	4.80	5.10	5.10	5.20	5.10	5.00	4.90	4.20	4.40
	ft hd	8.40	8.63	10.50	10.27	11.20	11.90	11.90	12.13	11.90	11.67	11.43	9.80	10.27
	l/s	0.44	0.58	0.85	0.99	1.24	1.43	1.72	1.89	2.14	2.52	3.24	4.06	5.32
	kPa	25.1	25.8	31.4	30.7	33.5	35.6	35.6	36.3	35.6	34.9	34.2	29.3	30.7
Condenser Flow and Pressure	GPM	8.04	10.80	15.86	18.46	23.10	26.52	31.54	34.78	39.54	46.56	60.02	75.24	98.34
	psi	1.40	1.90	2.00	2.10	2.30	2.30	2.50	2.60	2.70	3.00	3.90	4.90	5.70
	ft hd	3.27	4.43	4.67	4.90	5.37	5.37	5.83	6.07	6.30	7.00	9.10	11.43	13.30
	l/s	0.53	0.71	1.04	1.21	1.51	1.74	2.07	2.28	2.59	3.05	3.94	4.93	6.45
	kPa	9.76	13.25	13.95	14.65	16.04	16.04	17.44	18.13	18.83	20.92	27.20	34.17	39.75
Connection Evap	Water In (MPT)	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	2	2	2
	Water Out (MPT)	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	2	2	2
Connection Cond	Water In (MPT)	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	2	2	2
	Water Out (MPT)	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	2	2	2
Sound	dBA avg	69	71	74	75	77	77	79	80	80	82	87	90	89
	dBA max	74	76	79	80	79	82	84	85	85	87	92	95	94
Weight	(lb)	330	380	390	390	480	600	610	630	690	760	790	840	890
	(kg)	150	170	180	180	220	270	280	290	320	350	360	390	410

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Physical data — Water Cooled

Model CT – Tandem Compressor chiller model, Water cooled

Model		CT100	CT120	CT150	CT175	CT200	CT220	CT250	CT300
Nom. Tons		10T	12T	15T	17.5T	20T	22T	25T	30T
Capacity	kbtuh	128.10	148.70	189.10	218.90	261.40	287.10	322.80	379.70
	kW	10.70	12.40	15.80	18.20	21.80	23.90	26.90	31.60
THR	kbtuh	156.40	181.50	230.70	265.30	315.30	348.20	392.70	461.60
	kW	8.30	9.60	12.20	13.60	15.80	17.90	20.50	24.00
Evaporator Flow and Pressure	GPM	25.68	29.76	37.92	43.68	52.32	57.36	64.56	75.84
	psi	5.30	5.20	5.20	5.00	5.50	5.30	5.30	5.50
	ft hd	12.37	12.13	12.13	11.67	12.83	12.37	12.37	12.83
	l/s	1.68	1.95	2.49	2.86	3.43	3.76	4.23	4.97
	kPa	37.0	36.3	36.3	34.9	38.4	37.0	37.0	38.4
Condenser Flow and Pressure	GPM	31.28	36.30	46.14	53.06	63.06	69.64	78.54	92.32
	psi	2.40	2.60	3.00	3.20	4.10	4.20	5.00	5.50
	ft hd	5.60	6.07	7.00	7.47	9.57	9.80	11.67	12.83
	l/s	2.05	2.38	3.03	3.48	4.14	4.57	5.15	6.05
	kPa	16.74	18.13	20.92	22.32	28.59	29.29	34.87	38.36
Connection Evap	Water In (MPT)	1-1/4	1-1/4	1-1/2	1-1/2	2	2	2	2
	Water Out (MPT)	1-1/4	1-1/4	1-1/2	1-1/2	2	2	2	2
Connection Cond	Water In (MPT)	1-1/4	1-1/4	1-1/2	1-1/2	2	2	2	2
	Water Out (MPT)	1-1/4	1-1/4	1-1/2	1-1/2	2	2	2	2
Sound	dBA avg	77	75	77	80	83	83	83	85
	dBA max	82	80	81	85	88	88	88	90
Weight	Weight (lb)	550	610	970	1050	1050	1120	1140	1240
	Weight (kg)	250	280	440	480	480	510	520	570

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Physical data — Water Cooled

Model CD – Dual Compressor chiller model, Water cooled

Model		CD100	CD120	CD150	CD175	CD200	CD220	CD250	CD300
Nom. Tons		10T	12T	15T	17.5T	20T	22T	25T	30T
Capacity	kbtuh	130.00	151.70	189.40	218.90	254.00	278.20	315.20	371.50
	kW	10.80	12.60	15.80	18.20	21.20	23.20	26.30	31.00
THR	kbtuh	158.30	184.50	230.70	265.00	307.60	338.60	384.80	453.00
	kW	8.30	9.60	12.10	13.50	15.70	17.70	20.40	23.90
Evaporator Flow and Pressure	GPM	25.92	30.24	37.92	43.68	50.88	55.68	63.12	74.40
	psi	1.60	1.80	1.90	2.10	3.40	3.60	3.20	3.00
	ft hd	3.73	4.20	4.43	4.90	7.93	8.40	7.47	7.00
	l/s	1.70	1.98	2.49	2.86	3.34	3.65	4.14	4.88
	kPa	11.2	12.6	13.3	14.6	23.7	25.1	22.3	20.9
Condenser Flow and Pressure	GPM	31.66	36.90	46.14	53.00	61.52	67.72	76.96	90.60
	psi	2.00	2.00	2.20	2.40	2.50	2.70	2.90	3.30
	ft hd	4.67	4.67	5.13	5.60	5.83	6.30	6.77	7.70
	l/s	2.08	2.42	3.03	3.48	4.03	4.44	5.05	5.94
	kPa	13.95	13.95	15.34	16.74	17.44	18.83	20.23	23.02
Connection Evap	Water In (MPT)	2	2	2	2	2	2	2	2
	Water Out (MPT)	2	2	2	2	2	2	2	2
Connection Cond	Water In (MPT)	2	2	2	2	2	2	2	2
	Water Out (MPT)	2	2	2	2	2	2	2	2
Sound	dBA avg	77	75	77	80	83	83	83	85
	dBA max	82	80	81	85	88	88	88	90
Weight	Weight (lb)	550	610	970	1050	1050	1120	1140	1240
	Weight (kg)	250	280	440	480	480	510	520	570

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Physical data — Remote Air Cooled

Model CZ – Single Compressor chiller model, Remote Air cooled

Model		CZ050	CZ060	CZ075	CZ085	CZ100	CZ110	CZ125	CZ150	CZ200	CZ240	CZ320
Nom. Tons		5	6	7.5	8.5	10	11	12.5	15	20	24	32
Capacity	kbtuh	58.30	68.30	85.20	98.70	117.10	128.60	146.90	173.00	221.50	278.10	364.90
	kW	4.90	5.70	7.10	8.20	9.80	10.70	12.20	14.40	18.50	23.20	30.40
THR	kbtuh	74.70	87.40	109.10	125.70	148.50	163.70	187.20	219.70	281.90	354.50	464.20
	kW	4.80	5.60	7.00	7.90	9.20	10.30	11.80	13.70	17.70	22.40	29.10
Evaporator Flow and Pressure	GPM	11.76	13.68	17.04	19.68	23.52	25.68	29.28	34.56	44.40	55.68	72.96
	psi	3.70	3.60	3.80	4.10	4.10	4.10	4.10	4.10	3.90	3.40	3.50
	ft hd	8.63	8.40	8.87	9.57	9.57	9.57	9.57	9.57	9.10	7.93	8.17
	l/s	0.77	0.90	1.12	1.29	1.54	1.68	1.92	2.27	2.91	3.65	4.78
	kPa	25.8	25.1	26.5	28.6	28.6	28.6	28.6	28.6	27.2	23.7	24.4
Connection Evap	Water In (MPT)	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	2	2	2
	Water Out (MPT)	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	2	2	2
Cond Line Sizes ** (ODS, ACR)	Disch.	5/8	5/8	5/8	5/8	3/4	3/4	7/8	7/8	7/8	1-1/8	1-1/8
	Liquid Line	3/8	3/8	3/8	1/2	1/2	1/2	1/2	1/2	5/8	3/4	3/4
Sound	dBA avg	74	75	77	77	79	80	80	82	87	90	89
	dBA max	79	80	79	82	84	85	85	87	92	95	94
Weight	(lb)	343	343	422	528	537	554	607	669	695	739	783
	(kg)	158	158	194	238	246	255	282	308	317	343	361

** Line sizes are unit sizes. Consult factory for field line sizing

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Physical data — Remote Air Cooled

Model CT – Tandem Compressor chiller model, Remote Air cooled

Model		CT100	CT125	CT150	CT175	CT200	CT220	CT250	CT300
Nom. Tons		10T	12T	15T	17.5T	20T	22T	25T	30T
Capacity	kbtuh	114.70	133.40	170.40	197.60	234.20	256.80	290.90	342.80
	kW	9.60	11.10	14.20	16.50	19.50	21.40	24.20	28.60
THR	kbtuh	147.80	172.00	218.50	251.80	297.00	327.40	371.40	436.60
	kW	9.70	11.30	14.10	15.90	18.40	20.70	23.60	27.50
Evaporator Flow and Pressure	GPM	23.04	26.64	34.08	39.60	46.80	51.36	58.08	68.64
	psi	4.20	4.20	4.20	4.10	4.40	4.30	4.30	4.50
	ft hd	9.80	9.80	9.80	9.57	10.27	10.03	10.03	10.50
	l/s	1.51	1.75	2.23	2.60	3.07	3.37	3.81	4.50
	kPa	29.3	29.3	29.3	28.6	30.7	30.0	30.0	31.4
Connection Evap	Water In (MPT)	1-1/4	1-1/4	1-1/2	1-1/2	2	2	2	2
	Water Out (MPT)	1-1/4	1-1/4	1-1/2	1-1/2	2	2	2	2
Cond Line Sizes** (ODS, ACR)	Disch.	3/4	7/8	7/8	7/8	7/8	1-1/8	1-1/8	1-1/8
	Liquid Line	1/2	1/2	1/2	5/8	5/8	5/8	3/4	3/4
Sound	dBA avg	77	75	77	80	83	83	83	85
	dBA max	82	80	81	85	88	88	88	90
Weight	(lb)	484	537	854	924	924	986	1003	1091
	(kg)	220	246	387	422	422	449	458	502

** Line sizes are unit sizes. Consult factory for field line sizing

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Physical data — Remote Air Cooled

Model CD – Dual Compressor chiller model, Remote Air cooled

Model		CD100	CD125	CD150	CD175	CD200	CD220	CD250	CD300
Nom. Tons		10T	12T	15T	17.5T	20T	22T	25T	30T
Capacity	kbtuh	116.70	136.70	170.40	197.40	227.10	249.10	284.20	334.70
	kW	9.70	11.40	14.20	16.40	18.90	20.80	23.70	27.90
THR	kbtuh	149.80	175.30	218.50	251.30	289.50	319.00	364.40	427.80
	kW	9.70	11.30	14.10	15.80	18.30	20.50	23.50	27.30
Evaporator Flow and Pressure	GPM	23.28	27.36	34.08	39.36	45.36	49.92	56.88	66.96
	psi	1.30	1.50	1.60	1.70	2.70	2.90	2.60	2.40
	ft hd	3.03	3.50	3.73	3.97	6.30	6.77	6.07	5.60
	l/s	1.53	1.79	2.23	2.58	2.97	3.27	3.73	4.39
	kPa	9.1	10.5	11.2	11.9	18.8	20.2	18.1	16.7
Connection Evap	Water In (MPT)	2	2	2	2	2	2	2	2
	Water Out (MPT)	2	2	2	2	2	2	2	2
Cond Line Sizes** (ODS, ACR)	Disch.	3/4	7/8	7/8	7/8	7/8	1-1/8	1-1/8	1-1/8
	Liquid Line	1/2	1/2	1/2	5/8	5/8	5/8	3/4	3/4
Sound	dBA avg	77	75	77	80	83	83	83	85
	dBA max	82	80	81	85	88	88	88	90
Weight	(lb)	484	537	854	924	924	986	1003	1091
	(kg)	220	246	387	422	422	449	458	502

** Line sizes are unit sizes. Consult factory for field line sizing

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Application and Recommended Installation

Location and Space Requirements

The units are designed for indoor application and must be located in a space where the temperature is 40°F (4.4° C) or above. Provide clearance of 3 ft. (914 mm) on each side and end for piping and to provide space for servicing the unit.

Foundation

Mount the unit on a level concrete foundation. Floors must be strong enough to support the operating weight of the unit. If necessary, use structural supports to transfer the weight to the nearest beams.

Vibration Isolation

Vibration mounts are recommended for upper floor installations or where compressor noises are required to me minimized (next to occupied spaces).

Pipe vibration eliminators may be required for water piping connected to the unit to minimize transmission of water or pump noise into occupied spaces.

System Water Volume

It is important to have adequate water volume in the system to provide an opportunity for the chiller to sense a load change, adjust to the change and stabilize. As the expected load change becomes more rapid, a greater water volume is needed. The system water volume is the total amount of water in the evaporator, air handling products and associated piping. If the water volume is too low, operational problems can occur, including rapid compressor cycling, rapid loading and unloading of compressors, erratic refrigerant flow in the chiller, improper motor cooling, shortened equipment life and other undesirable occurrences.

For normal comfort cooling applications where the cooling load changes relatively slowly, we recommend a minimum system volume of two to three times the flow rate (GPM). For example, if the design chiller flow rate is 120 GPM, we recommend a minimum system volume of 240 to 360 gallons.

For process applications where the cooling load can change rapidly, additional system water volume is needed. A process example would be the cooling of hot metal objects. The load would be very stable until the hot metal is dipped into the water tank. Then, the load would increase drastically.

Since there are many other factors that can influence performance, systems can successfully operate below these suggestions. However, as the water volume decreases below these values, the possibility of problems increases.

Varying Flow through Evaporator

Reducing evaporator flow in proportion to load can reduce system power consumption. Certain restrictions apply to the amount and rate of flow change. The rate of flow change should be a maximum of 10 percent of the change per minute. Do not reduce flow lower than the minimum flow for 6°F ΔT.

Chilled Water Piping

The factory supplied flow switch should be installed in the horizontal piping of the system supply (evaporator outlet) water line.

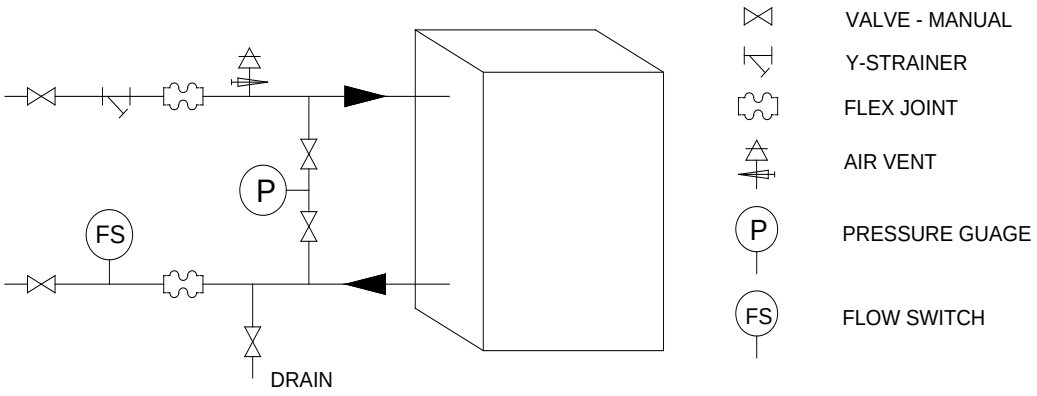
Provide drain connections at low points in the system to permit complete drainage of the system. Locate air vents at the high points in the system to purge air out of the system. Use the vent connections the evaporator to purge air from the water system before unit start-up ensuring adequate flow through the evaporator.

(Note: Install a strainer – 40 mesh – before the inlet to the evaporator – can be factory supplied.)

Flush the system water piping thoroughly before making connections to the unit evaporator. Design the water piping so the chilled water circulating pump discharges into the evaporator inlet.

Install pressure gauges in the inlet and outlet water lines to the evaporator. Measure the pressure drop through the evaporator to calculate proper flow. Vibration eliminators are recommended in both the supply and return water lines.

Insulate chilled water piping to reduce heat loss and prevent condensation.



Typical Chilled Water Piping

Condenser Water (CZW and CTW Models)

Be aware of labeling on water cooled condenser. Make water-in and water-out connections accordingly. Head pressure control must be provided if the entering condenser water can fall below 60° F (water regulating valve—factory supplied option). Install a 20-mesh strainer in the condenser inlet line.

Series or Parallel Operation

Consider system pressure drop when designing the water piping. Parallel piped systems have half of the total system flow going through the evaporator of each chiller, reducing the individual unit and total system pressure drop for a two chiller installation.

Series piped evaporators require that the total system water flows through both evaporators. Not only is the pressure drop through each evaporator increased but the pressure drops must be added together to obtain the total evaporator pressure drop. Series piped evaporators normally require larger circulating pumps for the chilled water system.

Electrical Connection

Every chiller requires field installation of the main supply power plus mandatory flow switch interlock and optional pump starter auxiliary contact interlock.

See “Electrical Data” for field electrical hookups. The information shown represents all chillers. Each unit is provided with its specific wiring diagram in the control panel. All wiring must be done according to local and national codes.

Main Power Supply Disconnect Switch

Every chiller with the standard single-point power supply is equipped with compressor overcurrent protection as standard.

A field-supplied and installed remote non-fused disconnect switch is required by NEC/CSA code.

Alternatively, a factory-installed, non-fused disconnect switch with a through-the-door handle is available as an option. The disconnect switch is properly sized for the model and voltage supplied.

Application Limitations

1. Maximum allowable condenser water pressure is 232 psig (1599 kPa).
2. Maximum design saturated discharge temperature (SDT) is 140°F (60°C). SDT=Condensing temperature + discharge line loss.
3. Maximum allowable water temperature to evaporator when not operating is 100°F (37.8°C). Maximum entering water temperature for operating cycle is 90°F (32.2° C) (during system changeover from heating to cooling cycle).
4. Minimum design leaving water temperature from the evaporator without anti-freeze protection is 40°F (4.4°C).
5. Contact your Creotech representative for operation with tower condenser water entering the chiller below 60°F (15.6°C).
6. The maximum altitude for air-cooled condensers is 8,000 feet.
7. Consult factory for ambient operation below -20°F (-28.8°C) for air-cooled applications.

Remote Condenser Refrigerant Piping

Careful design of refrigerant piping is necessary for proper system operation. The refrigerant piping should be designed to accomplish the following:

1. Assure proper refrigerant feed to the evaporator.
2. Provide practical and economical refrigerant line sizes without excess pressure drop. Consult Factory for line size recommendations.
3. Maintain uniform oil return to the compressor under all load conditions.
4. Refer to the latest version of the ASHRAE Handbook for recommended piping practice.
5. Limit the length of refrigerant piping by locating the condenser as close to the chiller as possible. Avoid all unnecessary changes in direction or elevation.

NOTE: Do not run refrigerant piping underground.

Liquid Line

Where there is a vertical lift from the condenser to the chiller, adequate subcooling must be provided to prevent liquid flashing before the expansion valve. A shutoff valve should be installed in the liquid line to allow isolation of the remote condenser.

Discharge line

The discharge line should be trapped at the compressor and looped at the condenser (inverted trap) to prevent liquid refrigerant from draining back to the compressor. Pressure drop should be held at a minimum. The remote air-cooled chiller is standard equipped with a discharge check valve.

Recommended Line Sizing

Consult factory for field sizing of refrigerant lines.

Optional Features

Controls

Network Communication Card
An optional network communication card can be supplied to be used in a N2-based or LonWorks based building automation system.

RS-232 Communication Card
By adding the RS-232 communication card, you can connect an external GSM modem for remote dial-out. This can send SMS (short message service) messages to report and notify alarms and events.

Refrigeration

Head Pressure Control Kit
Head pressure control valves are available for field installation with remote air-cooled chillers.

Low Ambient Kit
The low ambient kit consists of a refrigerant receiver (installed) on the chiller base and the head pressure control kit. This will maintain minimum head pressure to-20ºF ambient temperature.

Remote Air-cooled Condenser
A remote air-cooled condenser matched to the chiller capacity is available as a purchased option.

Electrical

Phase Loss Detection
Factory install phase loss protection can be supplied with fault indication.

Hours of Operation
An hour meter that indicates the number of hours each compressor has run.

CSA certification
The electrical control panel is available with CSA certification.

Disconnect
A through-door, non-fused rotary disconnect switch sized for the chiller capacity.

Water Side

Water Regulating Valve
The water regulating valve is to ensure that the water-cooled condenser head pressure is maintain for safe operation in applications where the condenser water may drop below 60°F.

Y-Strainers
40 Mesh strainer for the evaporator and 20 mesh strainer for the water-cooled condenser are available to protect the evaporator and condenser from contamination.

Isolation/Balancing Valves
Ball valves can be supplied with the chiller to minimize installation requirement.

Mounting Options

Vibration Isolators
Rubber isolation pads are available for noise and vibration dampening application requirements.

Support Legs
The chiller comes standard with 12 3/8” support legs. 18” and 30” legs are available as an option.

Drawings

For Applicable reference drawings find the drawing number bellow. Drawings are located in appendix of manual

General Arrangement Drawing (Dimension Sheet)		
Type	Water Cooled	Remote Air cooled
Single Circuit	11-43021	11-43022
Tandem Circuit	11-43023	11-43024
Dual Circuit	11-43025	11-43026

Piping and Instrumentation Drawing (P&ID)			
Type	Water Cooled	Reversing	Remote Air cooled
Single Circuit	11-44010	11-44013	11-44016
Tandem Circuit	11-44012	11-44015	11-44018
Dual Circuit	11-44011	11-44014	11-44017

Electrical Controls Drawing			
Type	Water Cooled	Reversing	Remote Air cooled
Single Circuit	11-49XX Please review drawing and options shown on it		
Tandem Circuit			
Dual Circuit			

Product Specification

CCZW, CCTW and CCDW Water-Cooled Chiller

PART 1 - GENERAL

1.01 SUMMARY

Section includes design, performance criteria, refrigerants, controls, and installation requirements for water-cooled scroll compressor packaged chillers.

1.02 REFERENCES

Standards/Codes of ARI 550/590-98, ANSI/ASHRAE 15,

ASME Section VIII, NEC, and OSHA as adopted by the State.

Efficiency standards of ASHRAE Standard 90.1.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with contract specifications.

B. Submittals shall include the following:

1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
2. Summary of all auxiliary utility requirements such as: electricity, water, etc. Summary shall indicate quality and quantity of each required utility.
3. Single-line schematic drawing of the power field hookup requirements, indicating all items that are furnished.
4. Schematic diagram of control system indicating points for field connection. Diagram shall fully delineate field and factory wiring.
5. Installation manual.

1.04 QUALITY ASSURANCE

A. Qualifications: Equipment manufacturer must specialize in the manufacture of the products specified and have five years experience with similar equipment and the refrigerant offered.

B Regulatory Requirements: Comply with the codes and standards specified.

1.05 DELIVERY AND HANDLING

A. Chillers 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

The equipment manufacturer’s warranty shall be for a period of one year from date of equipment start-up but not more than 18 months from shipment. The warranty shall cover defective material and workmanship within the above period, excluding refrigerant.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Creotech Industries Inc.

B. (Approved Equal) 2.02

2.02 UNIT DESCRIPTION

Provide and install as shown on the plans factory assembled, factory charged, and factory run tested water-cooled scroll compressor packaged chillers in the quantity specified. Each chiller shall consist of hermetic scroll compressors, brazed plate evaporator, brazed plate water-cooled condensers, control system and all components necessary for controlled unit operation. Refrigerant shall be R-410A.

2.03 DESIGN REQUIREMENTS

A. General: Provide a complete scroll 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. Performance shall be in accordance with applicable ARI Standard.

C. Acoustics: Sound pressure levels for the unit shall not exceed the following specified levels. The manufacturer shall provide the necessary sound treatment to meet these levels if required. Sound data shall be provided with the quotation. Test shall be in accordance with ARI Standard 575.

2.04 CHILLER COMPONENTS

A. Compressors: The compressors shall be sealed hermetic scroll type with crankcase oil heater and suction strainer. The compressor motor shall be refrigerant gas cooled, high torque, hermetic induction type, two-pole, with inherent thermal protection on all three phases.

B. Evaporator: The evaporator shall be direct expansion type with stainless steel plates brazed together. It shall be insulated with 3/4 inch (19mm) closed cell polyurethane insulation and have 435 psi (3000 kPa) water side working pressure.

C. Condenser: The condenser shall be direct expansion type with stainless steel plates brazed together. It shall be designed for 435 psi (3000 kPa) water side working pressure and 435 psig (3000 kPa) refrigerant side pressure.

D. Refrigerant Circuit: Refrigerant circuit shall include a liquid line shutoff valve, replaceable core or sealed filter-drier, sight glass with moisture indicator, liquid line solenoid valve, thermal expansion valve, hot-gas bypass, and insulated suction line.

E. Control Panel: The control panel shall contain a microprocessor controller providing operating and equipment protection controls plus motor starting equipment, factory wired, operationally tested, and ready for operation. Standard components shall include a control transformer with primary and secondary fusing, microprocessor transformers with integral fusing, compressor contactors, overcurrent protection, single-point wiring arrangement and switches for each circuit pumpdown and unit control power. The control panel shall have a hinged tool-locked door.

F. The control system shall stage the compressors based on the setpoint temperature. Equipment protection devices controlled by the microprocessor include motor protection, high pressure, loss of refrigerant, loss of water flow, freeze protection, and low refrigerant pressure. Controls shall include off/on selector switch, chilled water setpoint adjustment, anti-cycle timer, and digital display with water temperature and setpoint, operating temperatures and pressures, and diagnostic messages. The following features and functions shall be included:

1. Critical parameters shall have their own section of control.
2. A soft load function to prevent the system from operating at full load during the chilled water pull down period.
3. Auto restart after a power failure, not requiring external battery backup or auxiliary power for maintaining program memory.
4. Start-to-start and stop-to-start timers to provide minimum compressor off-time with maximum motor protection.
5. Capability of communication with a PC or remote monitoring through a twisted pair RS-485 interface.(Optional)
6. Automatic compressor rotation based on FI/FO requirements will be provided.

7. The controller shall contain the following features as a minimum:

Equipment Protection

The unit shall be protected by alarms that shut the unit down and require manual reset to restore unit operation. Shutdown alarms shall activate an alarm signal.

Shutdown Alarms

- No evaporator water flow
- Low evaporator pressure
- High condenser pressure
- Motor protection system
- Phase voltage protection (Optional)
- Evaporator freeze protection

Digital Inputs

- Unit off switch
- Remote start/stop
- Flow switch
- Motor protection

Digital Outputs

- Evaporator pump; field wired, starts pump when unit is set to start
- Condenser pump; field wired, starts pump when unit is set to start
- Air-cooled condenser; field wired, condenser when unit is set to start

Optional Building Automation System (BAS) Interface

The unit shall be equipped with an optional factory-installed BAS communication module (Optional)

The information communicated between the BAS and the factory mounted unit controllers shall include the reading and writing of data to allow unit monitoring, control and alarm notification as specified in the unit sequence of operation and the unit points list.

G. The following options are to be included:

- Condenser Water Regulating Valve
- Water Isolation Valves
- Y-Strainer for the Evaporator Inlet
- Y-Strainer for the Condenser Water Inlet
- Vibration isolators for field installation per plans.
- Disconnect switch
- Phase loss protection
- Compressor Run Hour Meter
- BAS interface module
- RS-232 Communication

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install in strict accordance with local codes, 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. Provide all appurtenances required to ensure a fully operational and functional chiller.

3.02 START-UP

A. Ensure proper charge of refrigerant and oil.

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

Product Specification

CCZR, CCTR and CCDR Remote Air-Cooled Chiller

PART 1 - GENERAL

1.01 SUMMARY

Section includes design, performance criteria, refrigerants, controls, and installation requirements for water-cooled scroll compressor packaged chillers.

1.02 REFERENCES

Standards/Codes of ARI 550/590-98, ANSI/ASHRAE 15,

ASME Section VIII, NEC, and OSHA as adopted by the State.

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1.04 SUBMITTALS

C. Submit shop drawings and product data in accordance with contract specifications.

D. Submittals shall include the following:

1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
2. Summary of all auxiliary utility requirements such as: electricity, water, etc. Summary shall indicate quality and quantity of each required utility.
3. Single-line schematic drawing of the power field hookup requirements, indicating all items that are furnished.
4. Schematic diagram of control system indicating points for field connection.
5. Diagram shall fully delineate field and factory wiring.
6. Installation manual.

1.04 QUALITY ASSURANCE

A. Qualifications: Equipment manufacturer must specialize in the manufacture of the products specified and have five years experience with similar equipment and the refrigerant offered.

B Regulatory Requirements: Comply with the codes and standards specified.

1.05 **DELIVERY AND HANDLING**

C. Chillers shall be delivered to the job site completely assembled and charged with dry nitrogen by the manufacturer.

D. Comply with the manufacturer's instructions for rigging and handling equipment.

1.06 **WARRANTY**

The equipment manufacturer’s warranty shall be for a period of one year from date of equipment start-up but not more than 18 months from shipment. The warranty shall cover defective material and workmanship within the above period, excluding refrigerant.

PART 2 – PRODUCTS

2.01 **ACCEPTABLE MANUFACTURERS**

C. Creotech Industries Inc.

D. (Approved Equal)

2.02 **UNIT DESCRIPTION**

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2.03 **DESIGN REQUIREMENTS**

General: Provide a complete scroll 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.

Performance: Refer to the schedule of performance on the drawings. Performance shall be in accordance with applicable ARI Standard.

Acoustics: Sound pressure levels for the unit shall not exceed the following specified levels. The manufacturer shall provide the necessary sound treatment to meet these levels if required. Sound data shall be provided with the quotation. Test shall be in accordance with ARI Standard 575.

2.04 **CHILLER COMPONENTS**

Compressors: The compressors shall be sealed hermetic scroll type with crankcase oil heater and suction strainer. The compressor motor shall be refrigerant gas cooled, high torque, hermetic induction type, two-pole, with inherent thermal protection on all three phases.

Evaporator: The evaporator shall be direct expansion type with stainless steel plates brazed together. It shall be insulated with 3/4 inch (19mm) closed cell polyurethane insulation and have 435 psi (3000 kPa) water side working pressure.

Condenser: The condenser coil shall be constructed using seamless de-oxidized, heavy wall, microgroove copper tubes, mechanical expanded in self-spaced, full collared aluminum corrugated plate fins for permanent bond and maximum heat transfer. The fan motors are lubricated, sealed ball bearings rated for 1125 rpm. It shall be designed for 500 psig (3445 kPa) refrigerant side pressure and be provided with 500 psig (3445 kPa) ASME, ANSI B9.1 pressure relief valves.

Refrigerant Circuit: Refrigerant circuit shall include a liquid line shutoff valve, replaceable core or sealed filter-drier, sight glass with moisture indicator, liquid line solenoid valve, thermal expansion valve, hot-gas bypass, liquid receiver and head pressure control sized to operate down to -20°F outdoor ambient.

Control Panel: The control panel shall contain a microprocessor controller providing operating and equipment protection controls plus motor starting equipment, factory wired, operationally tested, and ready for operation. Standard components shall include a control transformer with primary and secondary fusing, microprocessor transformers with integral fusing, compressor contactors, overcurrent protection, single-point wiring arrangement and switches for each circuit pumpdown and unit control power. The control panel shall have a hinged tool-locked door.

The control system shall stage the compressors based on the setpoint temperature. Equipment protection devices controlled by the microprocessor include motor protection, high pressure, loss of refrigerant, loss of water flow, freeze protection, and low refrigerant pressure. Controls shall include off/on selector switch, chilled water setpoint adjustment, anti-cycle timer, and digital display with water temperature and setpoint, operating temperatures and pressures, and diagnostic messages. The following features and functions shall be included:

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interface.(Optional)

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- Y-Strainer for the Evaporator Inlet
- Y-Strainer for the Condenser Water Inlet
- Vibration isolators for field installation per plans.
- Disconnect switch
- Phase loss protection
- Compressor Run Hour Meter
- BAS interface module
- RS-232 Communication

PART 3 – EXECUTION

3.01 INSTALLATION

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