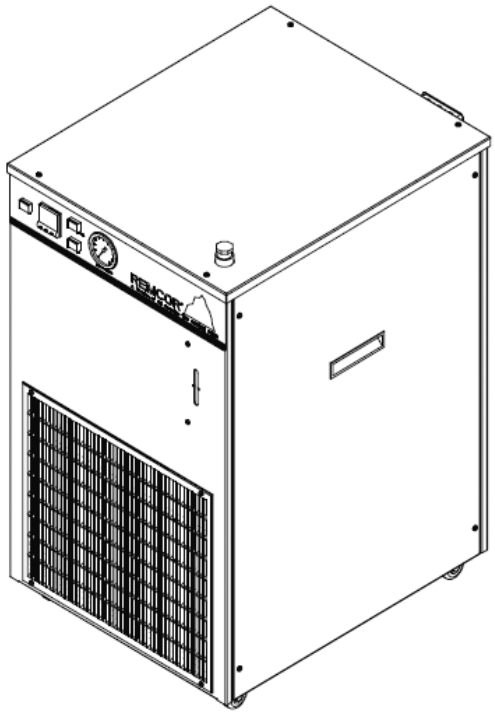
CHILLER

MODELS: CH1001-A

Operator's & Installation Manual



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CH SERIES CHILLER
OPERATOR'S & INSTALLATION MANUAL

The products, technical information and instructions contained in this manual are subject to change without notice. These instructions are not intended to cover all details or variations of the equipment, nor to provide for every possible contingency in the installation, operation or maintenance of this equipment. This manual assumes that the person(s) working on the equipment have been trained and are skilled in working with electrical, plumbing, pneumatic and mechanical equipment. It is assumed that appropriate safety precautions are taken and that all local safety and construction requirements are being met, in addition to the information contained in this manual.

To inquire about current revisions of this and other documentation or for assistance with any Cornelius product contact:

www.cornelius.com

1-800-551-4423

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GENERAL INFORMATION

INTRODUCTION

The Cornelius "CH" Series Recirculating Water Chiller is designed to provide an accurate, reliable, and user-friendly system for cooling a continuous flow of pure liquid and keep that liquid at a constant temperature in various closed loop or tank cooling applications.

The "CH" Series Chiller consists of an air–cooled refrigeration system housed in a sturdy sheet metal frame and cabinet. A standard pump and insulated water reservoir package provides a complete water cooling and circulating system.

The "CH" Series Chiller is designed to operate in a clean laboratory or industrial environment where ambient temperatures range from 40 to100° F (5 to 38° C). With proper installation, operation, and maintenance, the "CH" Series Chiller will provide years of trouble free service.

UNPACKING AND INSPECTION

This unit was thoroughly inspected before leaving the factory and the carrier has accepted and signed for it. Any damage or irregularities should be noted at the time of delivery and immediately reported to the carrier. Request a written inspection report from the Claims Inspector to substantiate any necessary claims. In the event that an immediate replacement is necessary, please contact Cornelius Chiller Sales at 1–800–551–4423.

DESIGN DATA

Table 1. Design Data

		CH1001-A
Cooling Capacity:		
BTU/hr (W) at 80° F (27° C) and 70° F (21° C)		12,000 (3,515)
Compressor Horse Power		1 (.746 kW)
Electrical Data: Voltage/Phase/Hertz/Amperage		230/1/60, 11 Amps
Refrigerant Type:		R134a
Reservoir Capacity (Gal)		6.0 (22.7 liters)
Dimensions:	Depth (inches)	26-1/2 (67cm)
	Width (inches)	22 (56cm
	Height (inches)	38-1/4 (97cm)
Process Connections		3/4-inch FPT (S/S)
Optimum Process Liquid Flow GPM (Liters/Min)		2.4 (9.0)
Condenser Air Flow (CFM)		712

DATA PLATE INFORMATION

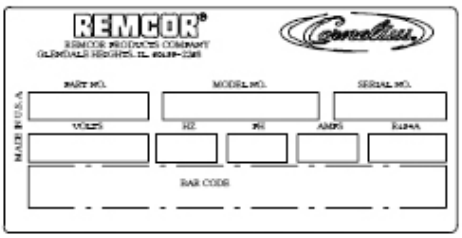

Figure 1. Sample Data Plate

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When servicing a Cornelius Chiller, it is important to note the information contained on the data plate located in the upper rear of the Unit.

If technical assistance is needed, the phone technician will need the Serial Number of your chiller. That information is found on the Data Plate along with the model number, voltage requirement and refrigerant information.

The serial Number is also needed when replacement parts are being ordered or for warranty claims. See CHILLER WARRANTY PAGE.

NOTE: Be sure to include the serial number on any documentation or billing information.

CHILLER INSTALLATION

LOCATION OF CHILLER

THE CHILLER MUST BE LOCATED NEAR A PROPERLY GROUNDED ELECTRICAL OUTLET. THE CIRCUIT SHOULD BE FUSED AND NO OTHER ELECTRICAL APPLIANCE SHOULD BE CONNECTED TO THE CIRCUIT. ALL ELEC The chiller must be located in a well ventilated, indoor area where ambient temperatures will remain above 40° F (5° C) and never increase above 100° F (38° C). To obtain optimum cooling capacity, the ambient temperature should be at or below 80° F (27° C).

It is very important that the air intake and discharge sides of the chiller are not obstructed by other free standing objects. A minimum of two feet of space on all four sides of the chiller will be sufficient to prevent air flow obstructions.

It is also important to direct any hot air discharge from other equipment away from the air intake side of the chiller. Condenser air entering the "CH" unit should be below 100° F (38° C).Condenser air temperatures above 100° F (38° C) can cause the high pressure safety control to shut down the unit.

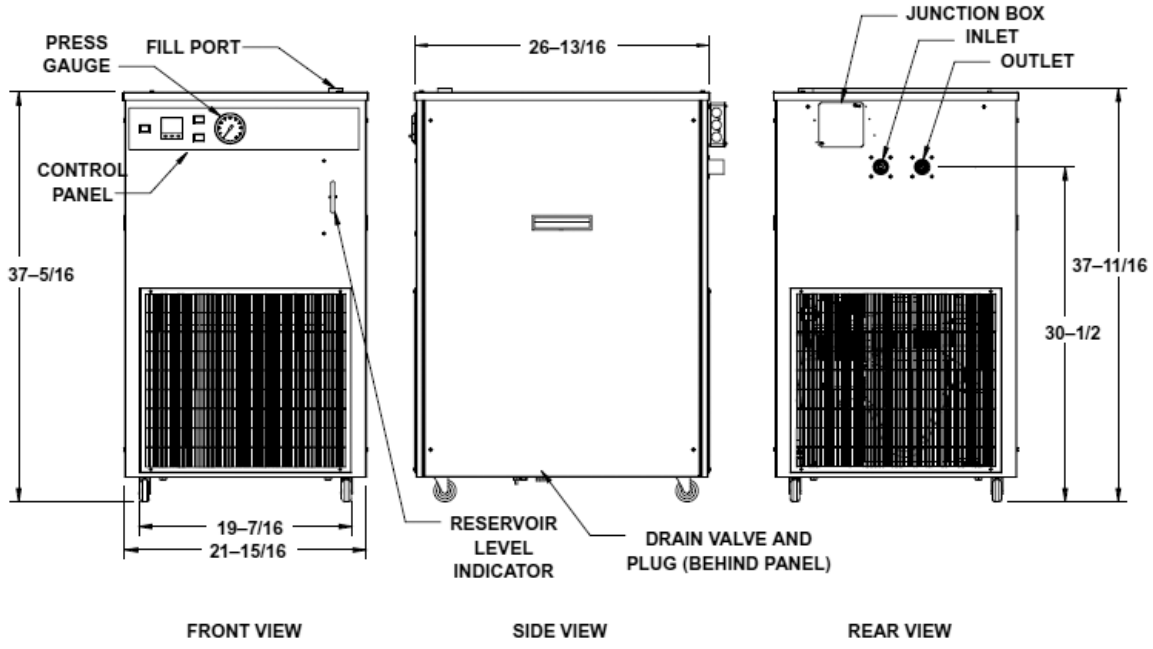

Figure 2. Installation

ELECTRICAL CONNECTIONS

All wiring must conform to the National Electric Code and any applicable local codes. The chiller must be permanently wired by means of electrical conduit to a properly fused disconnect of proper amperage or wired to a properly rated power cord and plugged into an outlet with the appropriate disconnect and amperage rating. The electrical junction box, located on the back panel of the chiller, includes a four terminal strip for power supply connection, as shown in Figure 2 and

The data plate, located next to the junction box, includes the actual voltage, phase, and amerage of the chiller.

CAUTION: On three-phase applications, it is important that the rotation of the pump, when supplied , is correct. Operating the pump in reverse for more than a few seconds will result in permanent pump damage. When the pump is operating, the shaft rotation must match the direction indicated on the pump housing. If the rotation is incorrect, reverse two of the three incoming power leads.

CHILLER OPERATION

CONTROL PANEL

See Figure 3.

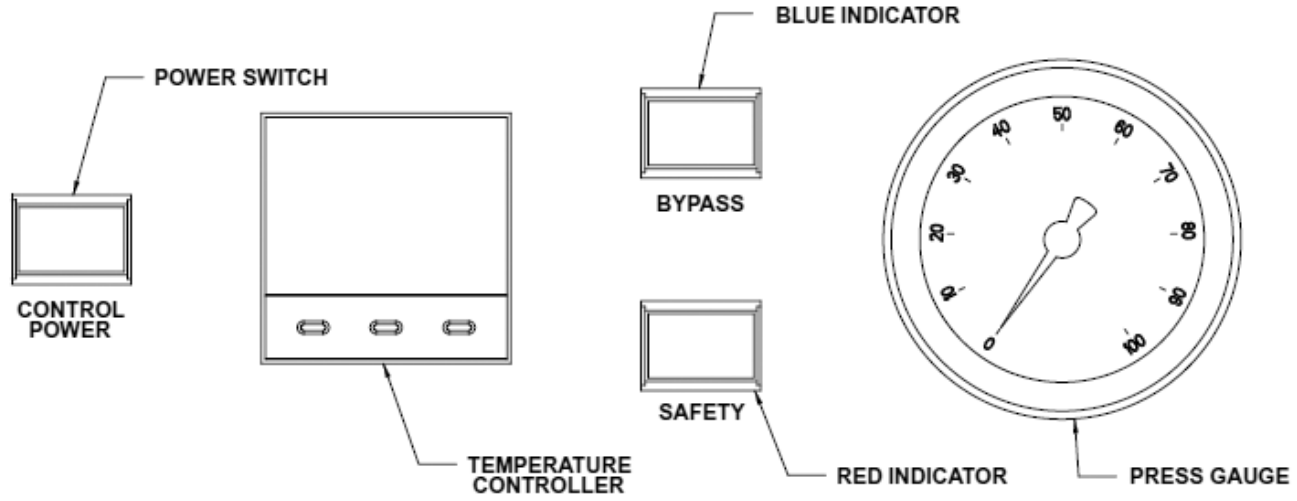

Figure 3. Control Panel

Temperature Controller

The Temperature Controller, shown in Figure 4, uses a PID control algorithm to precisely monitor and control the process set point temperature. The Unit has a large LED readout that displays temperature. For adjusting set point and programming options, see section on TEMPERATURE CONTROLLER OPERATION.

Figure 4. CH1001-A Temperature Controller

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Control Power Switch/Light

A lighted ON/OFF pushbutton switch, shown in Figure 3, is used to switch power to the 24VAC control circuit. The switch illuminates to indicate that the chiller power is present.

Bypass Light (Blue)

A blue light, shown in Figure 3, is used to indicate when the system is operating at a reduced capacity. The light cycles on and off in response to the temperature controller when the system temporarily requires less cooling.

Safety Light (Red)

A red light, shown in Figure 3, is used to indicate that a fault has occurred in the chiller operation. The following conditions illuminate the safety light.

A. High refrigerant pressure.

B. Low process water temperature.

C. Low process water flow (optional, see Optional Equipment section)

High-Pressure Safety

The high-pressure safety, shown in Figure 3, shuts down the compressor and pump when the refrigerant head pressure reaches 240-PSIG for R-134A refrigerant units. The high pressure switch must be reset manually. The switch is located in the electrical box which must be accessed by removing the chiller lid. The high-pressure switch can be re-set by depressing the reset button through the opening in the electrical box cover. If the control opens again, check the setting with a set of refrigeration gauges. If the setting is correct, contact the Cornelius Technical Service Department.

Low-Temperature Safety

The low-temperature safety shuts down the compressor and the pump when the process water temperature drops below 35° F (1.7° C). The switch automatically resets when the water temperature is restored to 38° F (3.3° C). The low temperature control is located in the electrical box.

START UP

WARNING: Never operate the chiller with it's panels removed.

Always use the power switch to turn off the chiller when it is not being used (see Fluid Recommendations page).

Always ensure that all air inlets and outlets are free from obstruction.

Be sure that the reservoir is filled with fluid prior to powering up the unit.

Process Water Flow, Units with Pumpt and Tank (Standard)

Follow standard plumbing practices and local codes in making water connections. The chiller inlet and outlet connections are 3/4". Flexible hose and fittings are recommended for plumbing the system. A No. 20 mesh strainer should be installed on the chiller inlet to prevent foreign particles from entering the system and should be cleaned monthly. Lines should be routed with as few bends as possible. Prevent lines from running near radiators, hot water pipes, etc. Any lengths of tubing that are exposed to high ambient temperatures should be insulated to prevent condensation and/or significant liquid heat loss.

After ensuring that the system is free from the obstruction, that all valves are open, and the reservoir when available is full, push the Control Power switch to the "ON" position. The pump should now be operating.

All chillers with pumps and tank are supplied with a pressure regulating valve on the pump discharge. This valve is preset at the factory to ensure that system pressure does not exceed the capabilities of the pump motor and/or piping. If this valve requires adjustment, please contact the Cornelius Service Group for the proper setting procedure and pressures.

Process water flow can be adjusted via a throttling valve and flow meter installed in the chiller outlet line.

Once the flow has been established, the thermostat can be programmed to the desired set-point.

TEMPERATURE CONTROLLER OPERATION

During normal operation, the process temperature is displayed on the Controller, as shown in Figure 4. Follow the procedure below to adjust the Controller set point:

1. Push and hold the " *" button located at the bottom left corner of the controller. The set point is displayed.
2. While holding the " *" button, press ▲ (" UP") or ▼ (" DOWN") button to raise or lower the set point until the desired value is displayed.
3. Release the " *" button. The display again shows the system liquid temperature. The set point can be viewed at any time by pressing the " *" button.

The controller set point range has been preset at the factory. The range is 40° F (5° C) to 100° F (38° C). If operation outside this range is required, contact the Cornelius Technical Services Department.

CHILLER MAINTENANCE

⚠ **WARNING: Disconnect electrical power to the chiller to prevent personal injury before attempting any internal maintenance. Only qualified personnel should service the internal components or electrical wiring.**

Condenser

On air-cooled chillers, the condenser fins should be cleaned by blowing compressed air through the condenser from the fan side. Dirt and debris accumulate on the condenser fins over time and this build up can severely reduce the performance of the chiller. Cleaning of the condenser coil fins should be done approximately every three months, depending upon cleanliness of the operating environment.

Pump Motor

The pump motor should be lubricated with thirty drops of SAE 10 oil once a year.

Circulation System

The circulation system should be drained and flushed periodically to avoid build up and a possible flow restriction caused by contaminants.

Filters/Strainers

The "Y" strainer, located inside the unit at the inlet of the pump, should be cleaned periodically depending on the operating environment. If a reduction in flow or cavitation of the pump occurs, remove the strainer, flush it out with water and replace it.

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FLUID RECOMMENDATIONS

Cornelius chillers are designed to operate with water to provide maximum performance for temperatures of 40° F (4.4° C) to 100° F (37.8° C).

Distilled Water	Acceptable
De-Ionized Water (1-5 Meg ohms)	Acceptable
De-Ionized Water (5+ Meg ohms)	Acceptable with Stainless Steel & PVC only (No Copper or Brass)
Propylene Glycol (Lab & Industrial Grade)	Acceptable - 30% Glycol/70% Water (For Applications with Temperatures below 40° F)
Lab & Industrial Grade Ethylene Glycol	Acceptable - 30% Glycol/70% Water (For Applications with Temperatures below 40° F)
Mineral/Hydraulic Oils **(Commercial/Automotive Antifreeze)**	NOT Acceptable (Silicate Rust Inhibitors in Automotive/Commercial anti-freeze damages pump seals and housing which lead to failure.)
Acidic/Basic Solutions (Above 8 or below 6 PH)	Not Acceptable
Mineral/Hydraulic Oils (Viscosity > 50 Centistrokes)	Not Acceptable

For questions regarding special or other fluids contact IMI Cornelius at 1-800-551-4423.

To purchase Lab or Industrial Glycol contact:

IMI Cornelius, 1-800-551-4423 - Part No. 111521000, 5 Gal.

TROUBLESHOOTING

WARNING: Disconnect electrical power to the chiller to prevent personal injury before attempting any internal maintenance. Only qualified personnel should service the internal components or electrical wiring.

If repairs to the chiller must be made, disconnect electrical power to the unit, then shut off the water source.

Trouble	Problem Cause	Remedy
Chiller does not operate, Power Light "OFF".	A. No Power to unit	A. Check main disconnect fuses, wiring and power lead to unit.
	B. Defective Control Power Switch	B. Replace Switch
	C. Defective Control Transformer	C. Replace Transformer
	D. Wrong voltage supplied to unit.	D. Supplied voltage must be within ±10% of nameplate rating.
	E. Blown fuse.	E. F. Replace fuse (1 Amp).

Trouble	Problem Cause	Remedy
Pump does not operate, but Power Light is "ON".	A. Line to or from chiller is restricted.	A. Inspect lines and remove any obstructions.
	B. Internal or external filter is blocked with debris.	B. Remove and clean strainer, then replace.
	C. Pump contactor is defective.	C. Replace contactor.
	D. Damaged pump motor or impeller.	D. Replace pump motor or impeller.
Unit runs continuously, but is not cooling process water enough.	A. Condenser is restricted.	A. Clean condenser.
	B. Unit low on refrigerant.	B. Call service
	C. Inefficient compressor.	C. Call service.
	D. Unit is undersized for application.	D. Call Cornelius chiller sales rep.
	E. Bypass gas valve stuck open.	E. Replace solenoid valve.
Chiller does not operate, but power light is "ON" and red safety light is "ON".	A. Unit is operating under high pressure conditions.	A. Check for dirty condenser fins or obstruction of chiller air intake. Press high pressure manual reset switch. If this problem persist, contact Cornelius Service Department.
	B. Unit is operating under low temperature conditions.	B. Low or now process water flow. Ensure that there is adequate flow through the system plumbing. OR Process water is too cold, below 35° F. Increase thermostat setting or bypass valve stuck open. Replace solenoid valve. Check for proper voltage. OR Defective thermostat, replace.
	C. Unit has experienced low flow condition.	C. Check for obstruction in process water line plumbing.

NOTE: When servicing a Cornelius chiller, it is important to note all information provided on the DATA PLATE located on the upper rear of the unit. If technical assistance is needed, the Cornelius Service Technician will need this information along with any description of the problem(s) you are encountering. The serial no. and other information will also be required when ordering replacement parts and any other Warranty Claims.

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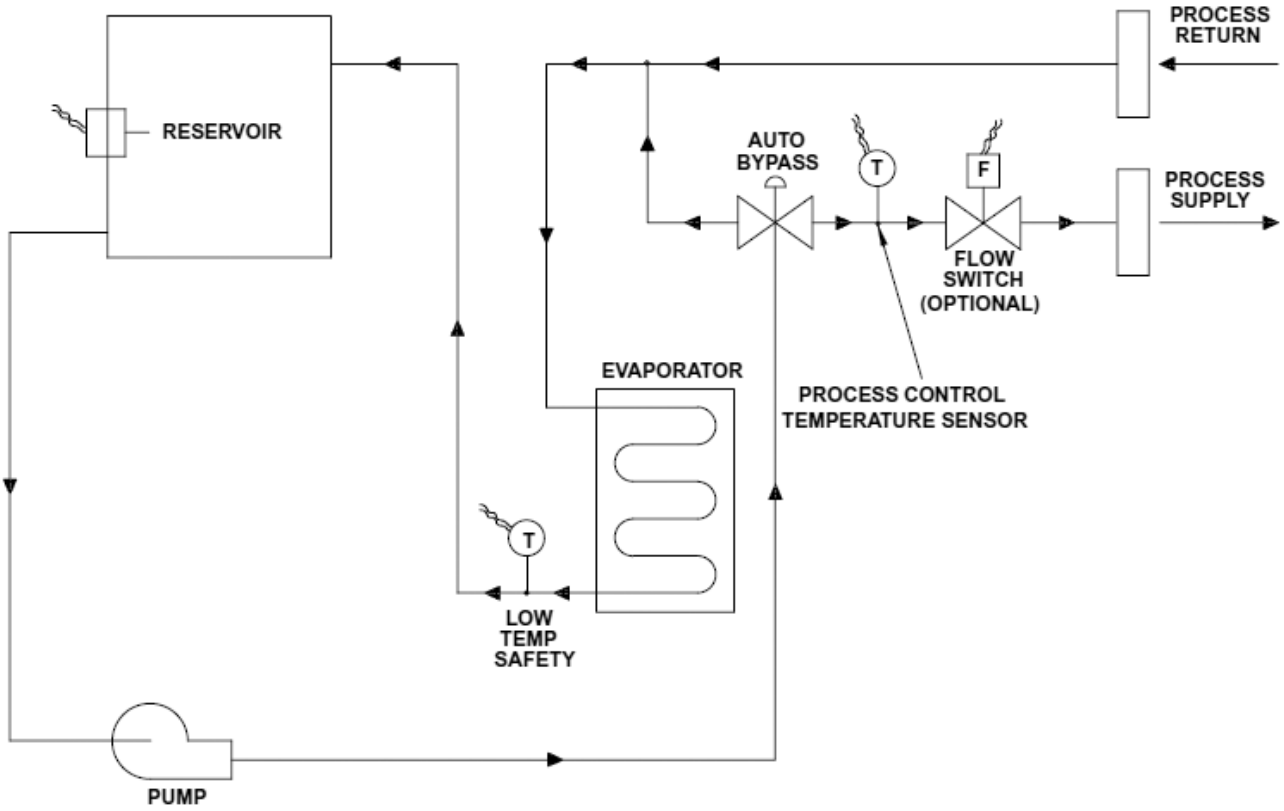

Figure 5. Process Water Flow Schematic

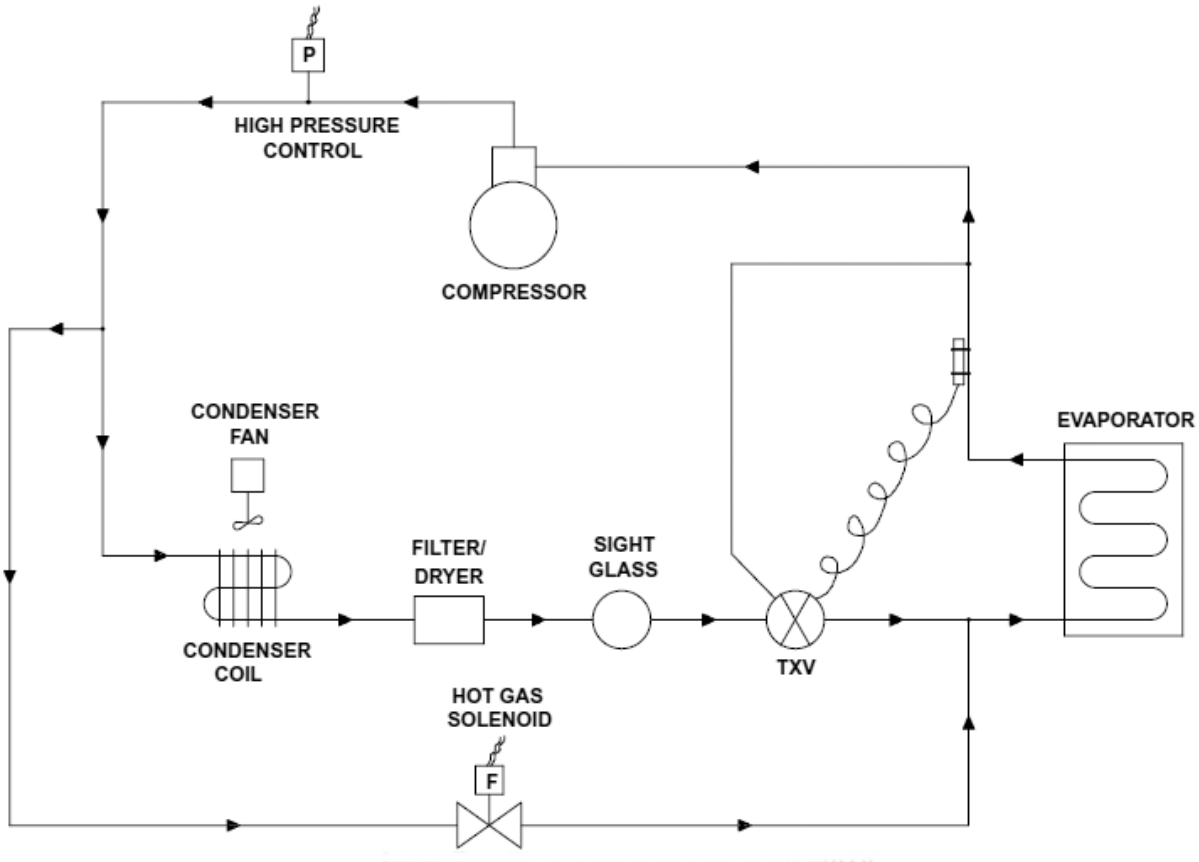

Figure 6. Refrigeration Schematic

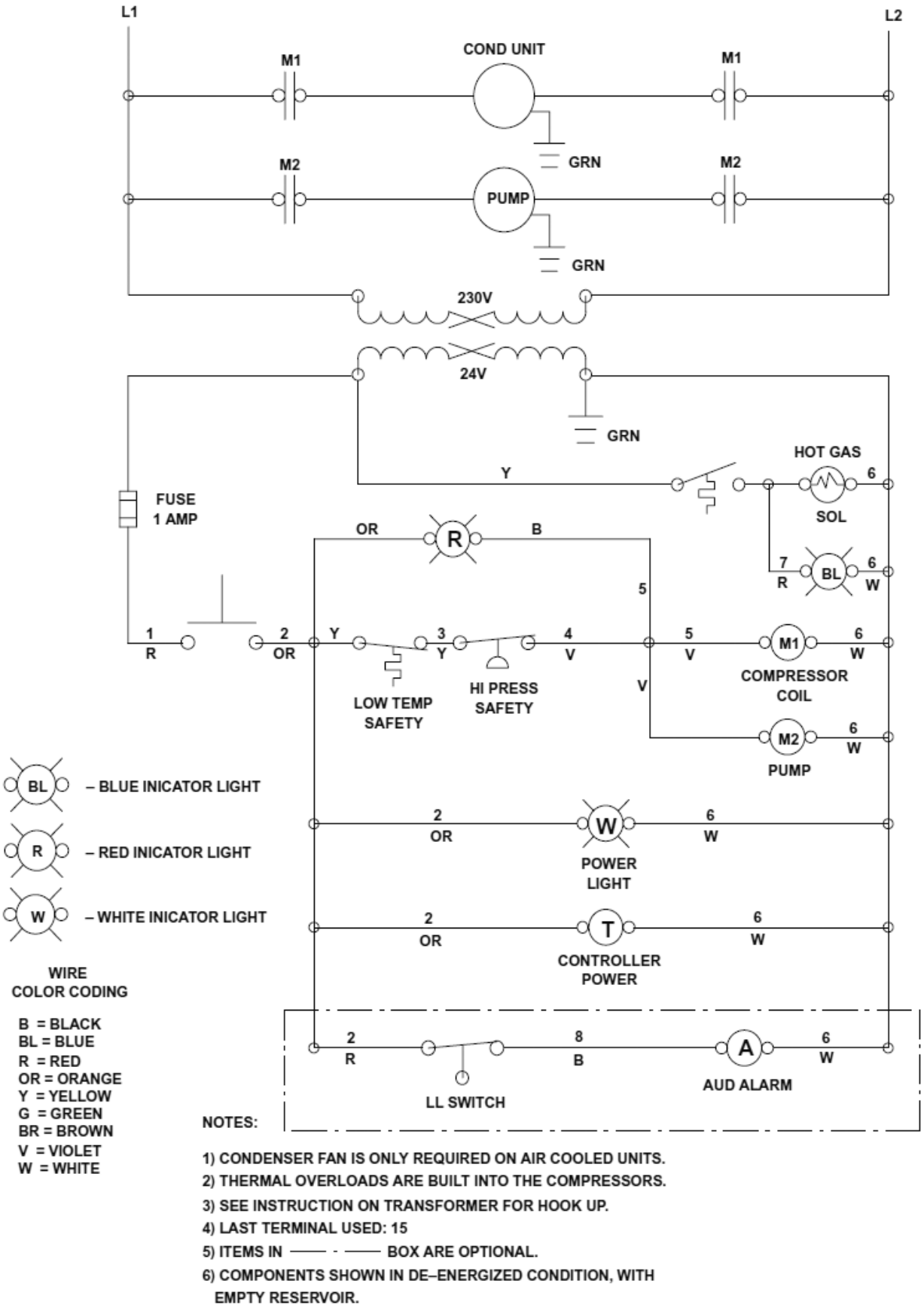

Figure 7. Wiring Diagram

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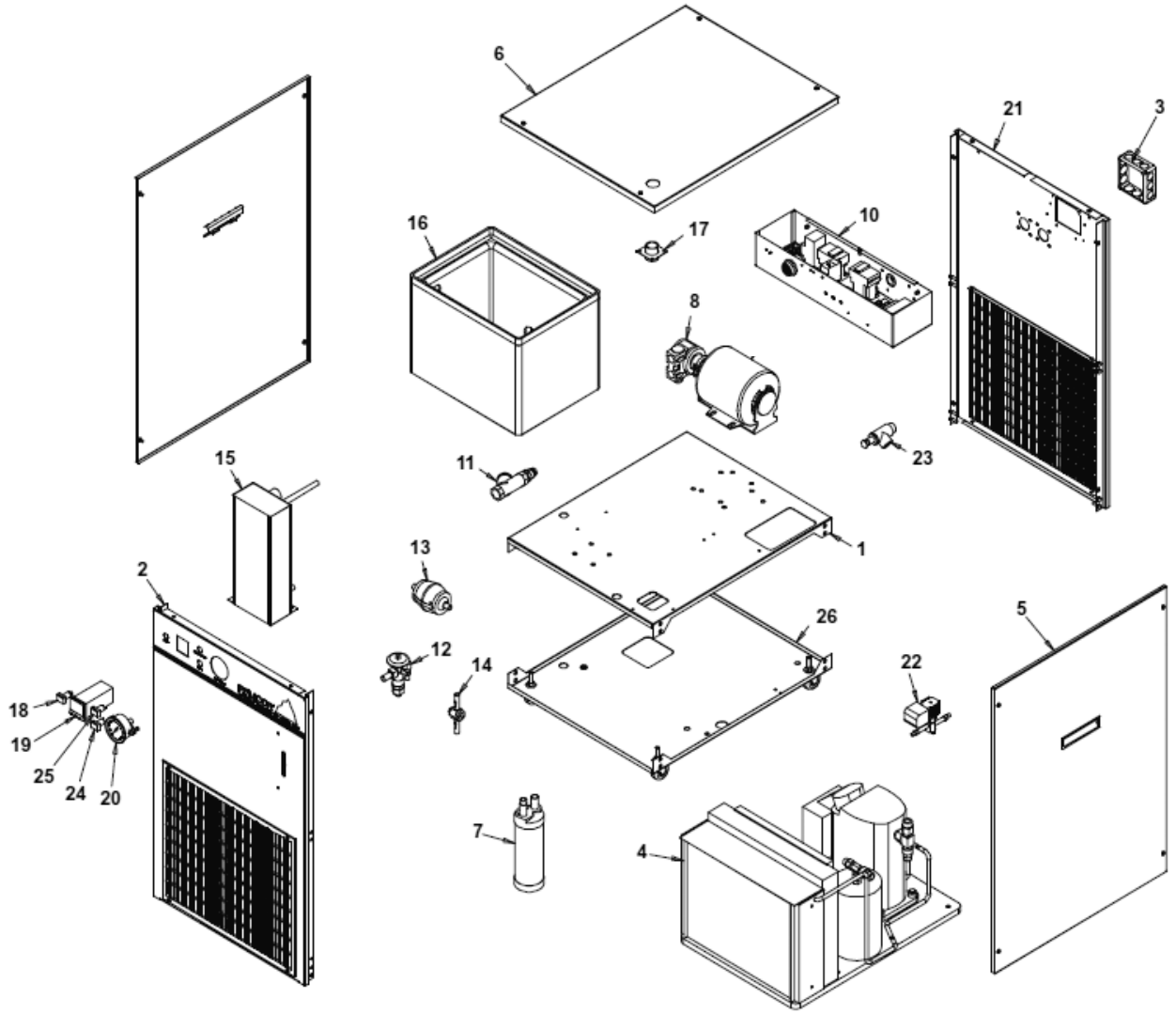

Figure 8. Cabinet Section Exploded View

Table 1. Cabinet Section

Item No.	Part No.	Name
1	620028005	Base, Pump/Tank
2	620028001	Panel, Front
3	620043210	Electrical Junction Box
4	620604501	Condensing Unit
5	620028003	Panel, Side
6	620028004	Lid, Chiller
7	620604302	Accumulator
8	32357	Pump
	187483000	Clamp
	32382	Motor
10	620306708	Electrical Box Assy
11	41331	Y-Strainer
12	61003	TXV
13	60686	Filter Dryer

Table 1. Cabinet Section

Item No.	Part No.	Name
14	60687	Sight Glass
15	620602503	Evaporator Assy
16	620603201	Foamed Reservoir
17	22870	Fill Port (3/4-in. SS Coupling)
18	620313205	Switch, Power
19	620602701	Controller, Temperature
20	620701209	Gauge, Pressure
21	620028002	Panel, Rear
22	620602703	Solenoid Valve, Hot Gas
	620602704	Solenoid Coil, Hot Gas
23	40646	Bypass Valve, Water
24	620315101	Indicator, Red
25	620315102	Indicator, Blue
26	620028007	Base, Refrigeration

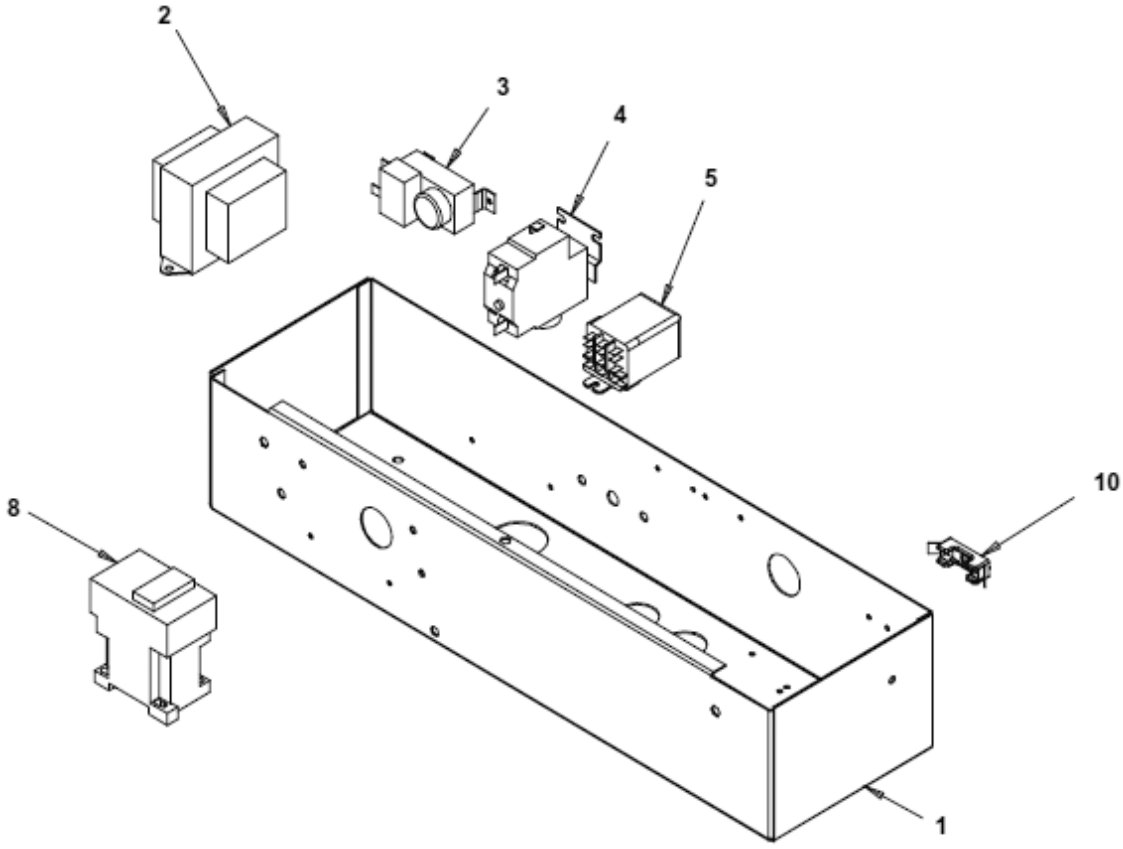

Figure 9. Electrical Box Assemby, Exploded View

Table 2

Item No.	Part No.	Name
1	620028012	Enclosure, Electric Box
2	32829R	Transformer
3	31001	Safety, Low Temp
4	60501	Safety, High Pressure
5	33082	Pump/Relay
8	620305902	Compressor/Contactor
10	31407	Fuse Block

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WARRANTY

IMI Cornelius Inc. warrants that all equipment and parts are free from defects in material and workmanship under normal use and service. For a copy of the warranty applicable to your Cornelius or Wilshire product, in your country, please write, fax or telephone the IMI Cornelius office nearest you. Please provide the equipment model number, serial number and the date of purchase.

IMI Cornelius Inc.

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