COMPCOOLER

Compact Thermal Regulation Technology

On line Shopping

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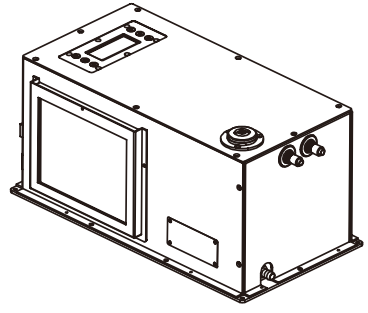
simonsun@compcooler.com

Designed in USA
Made in China

Industrial Micro Refrigeration Chiller Unit

Model: COMP-MRCU-24400-FE (Fully Embedded Chiller Unit)
COMP-MRCU-24400-SE (Semi Embedded Chiller Unit)
COMP-MRCU-24400-FM (Floor Mounted Chiller Unit)

Operation Manual



COMPCOOLER

Compact Thermal Regulation Technology

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Thermal Regulation Technology

Compact Refrigeration Chiller Cooling Unit

- Liquid Chiller Module
- Micro Chiller Unit
- Direct Contact Cooling Unit

Active Thermal Regulation Solutions
for Confined Space and Hot Ambient.

Contents

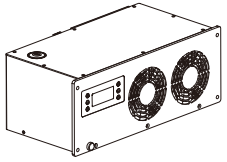
System Description

The Compcooler Micro Refrigeration Cooling Units (MRCU) are designed for industrail cooling applications.

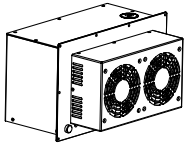
MRCU uses a 24V DC rotary compressor refrigeration system (a.k.a. chiller) to cool liquid (a.k.a. coolant) in a reservoir. A pump circulates the coolant to where it's needed, such as the cooling channel of heat-inducing components. Heat is absorbed by the coolant at the application site and returned back to the chiller unit to be cooled again. This process cotinues in a closed loop as long as the system is powered 'On'.

MRCU delivers 400W cooling capacity. It is powered by either a 110/220V AC wall plug or 24V DC. Temperature control is -5°C to 30°C (23°F to 86°F) with an accuracy of +/-1℃ (2°F). The system is programmable and will automatically operate at the user's preferred temperature set point using the chiller control panel or a remote RS device.

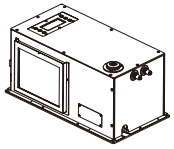
Cooling Unit Styles



Fully Embedded Cooling Unit Unit
COMP-MRCU-24400-FE



Semi-Embedded Cooling Unit
COMP-MRCU-24400-SE



Floor Mounted Cooling
COMP-MRCU-24400-FM

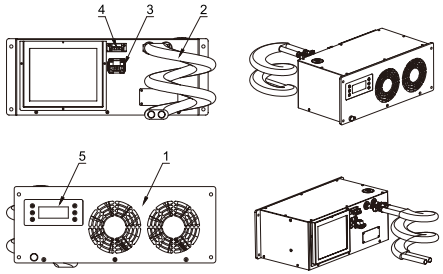
Component List

Item	Part number	Description	Quantity
1	COMP-MRCU-24400	Micro Refrigeration Chiller Unit, 24V, 400W	1
		Signal Cord, 1.5m (5ft)	1
		DC Power Cord, 1.5m (5ft.)	1
2	COMP-ET2M-2F	Extension Tubing, 2m (6ft), 2 female fittings	1
3		Operation Manual	1

Component Description

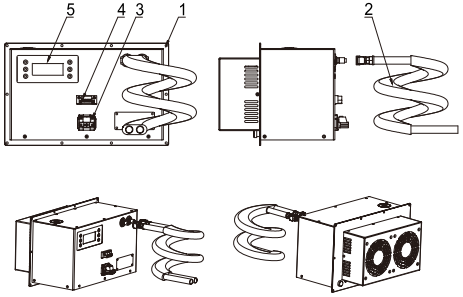
Full Embedded Chiller Unit
Part no. COMP-MRCU-24400-FE

1. Mount Hole locations
2. Extension tubing
3. Power connection
4. Signal connection
5. Control panel



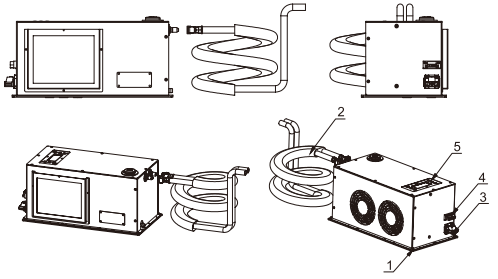
Semi Embedded Chiller Unit
Part no. COMP-MRCU-24400-SE

1. Mount Hole locations
2. Extension tubing
3. Power connection
4. Signal connection
5. Control panel



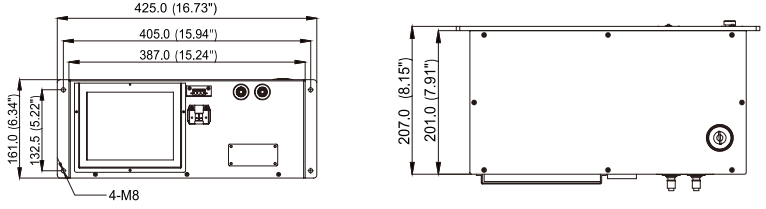
Floor Mounted Chiller Unit
Part no. COMP-MRCU-24400-FM

1. Mount Hole locations
2. Extension tubing
3. Power connection
4. Signal connection
5. Control panel

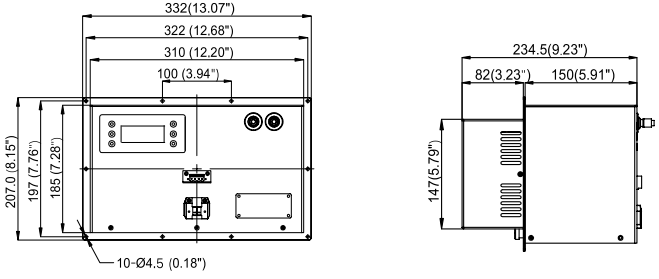


Dimensions, Chiller Unit

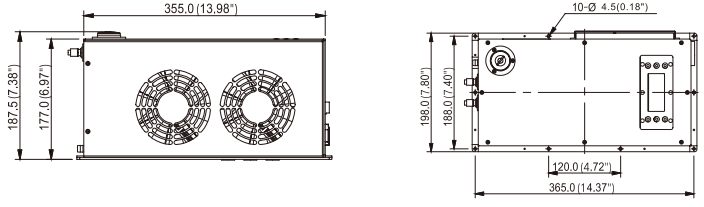
Fully Embedded Chiller Unit
Part no. COMP-MRCU-24400-FE



Semi Embedded Chiller Unit
Part no. COMP-MRCU-24400-SE



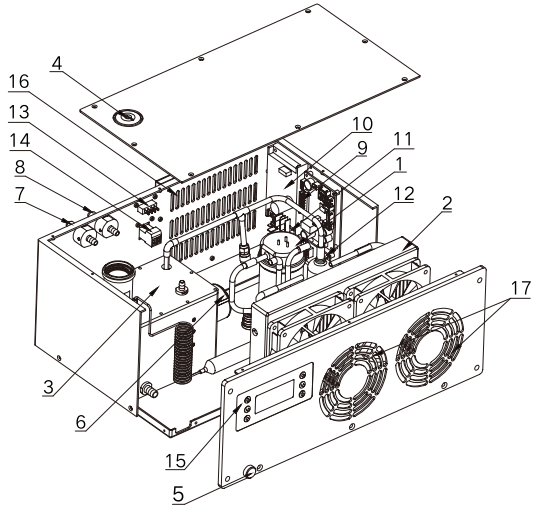
Floor Mounted Chiller Unit
Part no. COMP-MRCU-24400-FM



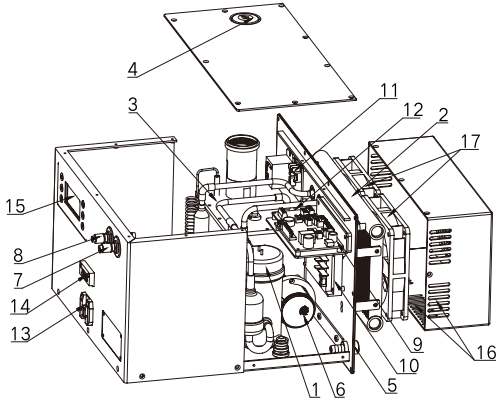
Chiller Unit Callouts

1. Micro refrigeration compressor
2. Condenser
3. Reservoir
4. Filling cap
5. Draining cap
6. Water pump
7. Water Inlet
8. Water outlet
9. Control board
10. Drive board
11. Liquid Level Board
12. Signal board
13. DC Power connector
14. Signal connector
15. Control Panel
16. Fresh air inlet
17. Condenser fans

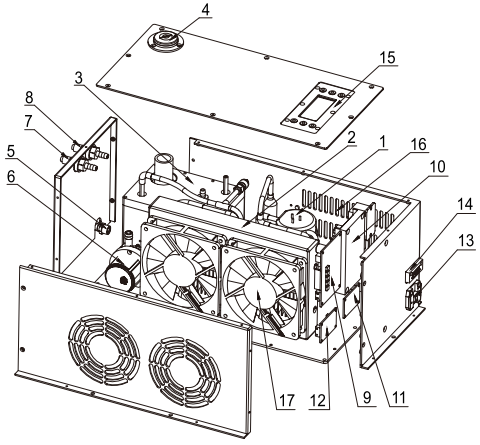
Fully Embedded Chiller Unit
COMP-MRCU-24400-FE



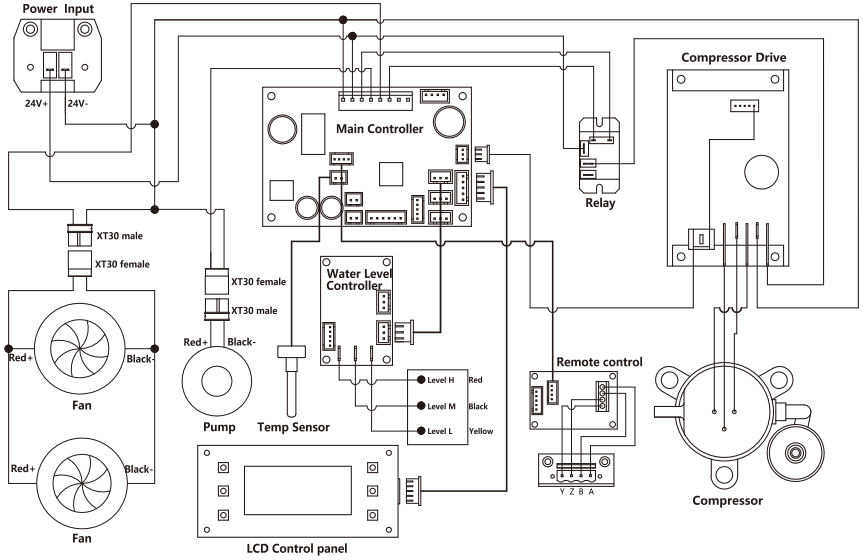
Semi Embedded Chiller Unit
COMP-MRCU-24400-SE



Floor Mounted Chiller Unit
COMP-MRCU-24400-FM

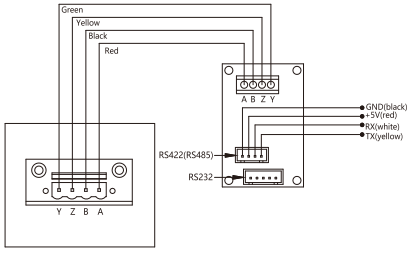


Chiller Control Diagram

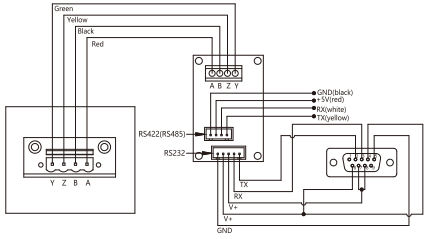


Remote Controller Diagrams

Internal RS connection



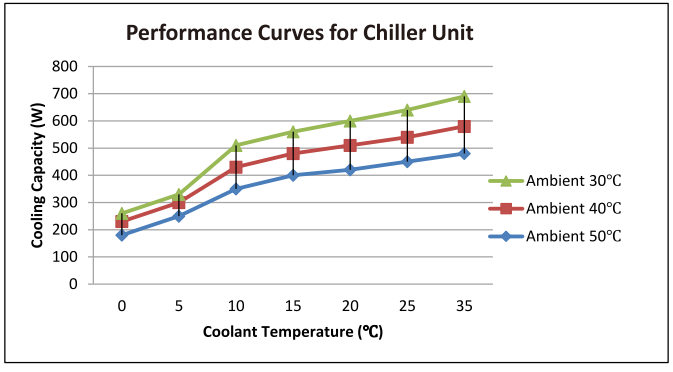
External RS Connection



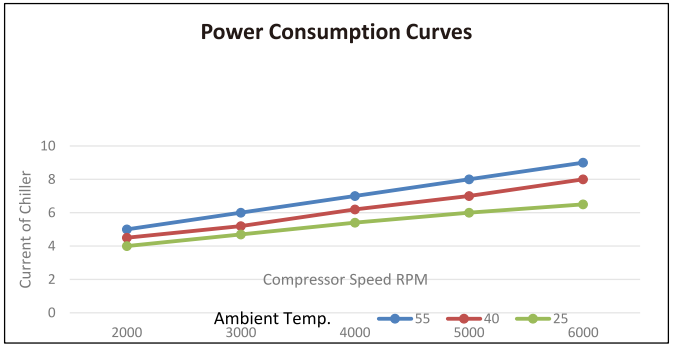
Technical Datasheet

Cooling Capacity (Ambient Temp. 40℃)		W	400
Cooling Capacity (Ambient Temp. 104℉)		Btu	1364
Max Cooling Capacity		W	600
Power Supply		V DC	24-28V
Operation Current		A	12
Max Current		A	15
Max Power Consumption		W	400
Refrigerant	Type		R134a
Temp Control		°C (°F)	-5 to 30 (23-86)
Coolant	Anti-freeze liquid		Yes
Rotary Compressor (Samsung)	Qty	PC	1
	Voltage	V DC	24
	Discharge	CC	2.4
	Speed	RPM	2000-6500
Fan	Qty	PC	2
	Voltage	V DC	24
	Air Flow	CFM	45
Pump	Voltage	V DC	24
	Water flow	L/Min	5
	Lift	M	5
Power Connector	Type	AC	3 pins
		DC	Aero Connector
Operation Ambient	Max	°C (°F)	60 (140)
Storage Temp		°C (°F)	-20 to 70 (-4 to 158)
Noise	Max	dBA	58
Color			White or Black
Dimension	L x W x H	MM	See dimensions, pg. 5
		Inch	See dimensions, pg. 5
Weight		KGS (LBS)	8.2 (18)

Cooling Capacity Performance Curves



Power Consumption Curves (Compressor Speed)



Remote Controller Definitions

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COMPCOOLER Liquid Chiller Cooling Unit
Remote Terminal Unit Specifications
Protocol: RS232, RS422, RS485
BaudRate: 19200bits/s, Asynchronous serial Communication

Terminal transmits the data signal to chiller controller Length: 6

Item	Signal Transmission	Description	D7	D6	D5	D4	D3	D2	D1	D0	
1	Terminal sends data to chiller controller	Data frame head	1	0	0	0	0	0	0	0	0X80H
2		Start /Stop	Communication Start 1	Chiller Start 1	Pump Start 1	Quick Start/Stop 1					
			Communication Stop 0	Chiller Stop 0	Pump Stop 0						
3		Operation mode		Timer	Sleep	Cooling	Heating			Temp Setting +0/-1	
4		Temp setting	2(7)	2(6)	2(5)	2(4)	2(3)	2(2)	2(1)	2(0)	1C
5		Timer and sleep	2(7)	2(6)	2(5)	2(4)	2(3)	2(2)	2(1)	2(0)	
6		Data frame end	0	1	1	1	1	0	0	0	0X78H

Note:

D7; Manual operation of front panel overrisdes remote communication for start / stop commands.

D6; Starts or stops chiller compressor and condensor fans. Does not affect pump operation.

D5; Starts or stops pump and evaperator (air cooling) fans only.

D4; Starts or stops all chiller components.

Chiller controller transmits the data signal to terminal Length 6, transmit time: 500ms

Item	Signal Transmission	Description	D7	D6	D5	D4	D3	D2	D1	D0	
1	Chiller controller send the data to terminal	Data frame head	1	0	0	0	0	0	0	0	0XC0H
2		Chiller status	Chiller ON 1	Pump ON 1	Compressor ON 1	Heating ON 1	Fan ON 1	Pump ON 1	Sensor fault 1	Refrigerant short 1	
			Chiller OFF 0	Pump Off 0							
3		Operation mode		Timer 1	Sleep 1	Cooling 1	Heating 1	Water shortage 1	Water less 1	Temp setting +0/-1	
4		Liquid temp	2(7)	2(6)	2(5)	2(4)	2(3)	2(2)	2(1)	2(0)	1C
5		Timer and sleep	2(7)	2(6)	2(5)	2(4)	2(3)	2(2)	2(1)	2(0)	
6		Data frame end	0	0	1	1	1	1	1	1	0X3FH

Notes:

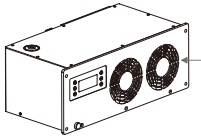
Line 2, D1; Stops chiller for sensor issue.

Line 2, D0; Stops chiller for low refrigerant or no cooling.

Line 3, D2; Stops chiller for low of circulation water.

System Preparation

1. **Installation**; Install the base on a flat surface and in a well-ventilated area. The fresh air inlet and dual fan outlets serve to cool the chiller unit, thus allowing it to operate at maximum performance (reference diagram below). Therefore, allow ample clearance around these features.



Do not block hot air outlet. Allow 250mm (10”) minimum clearance.

2. **Power Connection;** One 24-28V DC power cord is provided with the chiller unit. Reference diagram below for location of power connection point.

The 24-28V DC power cord must be connected to a wall inlet plug with a rating of 110V or 220V AC to 24V DC with a minimum 400W power capacity.

3. **Connect Extension Tubing**; The extension tubes have quick-release fittings on one end. Simply press the button on the fitting to release it from the chiller. Conversely, when connecting the fitting, an audible ’click’ ensures a good connection to the chiller. The other end of the 1/4” ID tubing may be modified with User-supplied fittings that are compatible to the equipment requiring cooling.

4. **Priming the System**; If using the MRCU for the first time, a two-step priming process is required. Before priming, it is imperative to understand the types of liquid to be used with the MRCU.

The MRCU can be set to cool liquid above, or below, the freezing point of water. Accordingly, the type of liquid to be used depends on the programmable temperature setting of the MRCU. Please follow these guidelines for liquid preparation:

- Plain, clean water must be used for temperature settings above 1°C (33°).
- Anti-freeze liquid or Glycol/water mixture must be used for temperature settings below 1°C (33°).
- Deionized water may be used for isolation applications.

DO NOT use salt water, caustic, corrosive, or flammable fluids as these will damage the PCCU and void the warranty.

Priming Steps:

Step 1:

a. Remove the filler cap from the top of the MRCU.
b. Using a funnel, fill the reservoir with liquid until full.
c. Connect the chiller to the equipment requiring cooling using the extension tubes.
d. Connect the chiller to a power source using the supplied cable.
e. Press the 'Pump' button on the control panel to start circulation and allow it to run for 1 minute. This allows the liquid to circulate in a closed loop between the chiller reservoir and the equipment.
f. Turn off the pump.

Step 2:

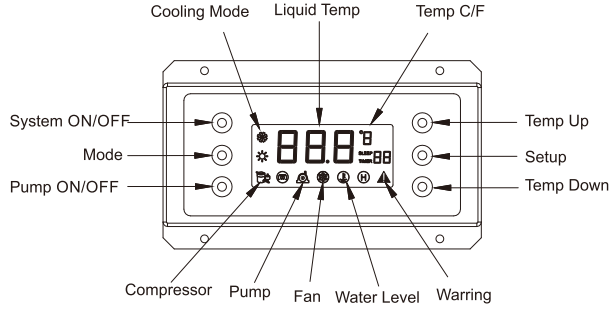
a. Using a funnel, fill the reservoir until full. This is required since some of the liquid has been used to fill the extension tubes, cooling device during Step 1 of the priming process.
b. Replace the reservoir cap.

5. **Pre-Testing**; With the unit attached to the power, turn the power switch on. Using the control panel, ensure 'Pump" is off. Press "System" on to start refrigeration and use the "Temp Up/Down" buttons to set the desired cooling temperature. The temperature should come down in a few minutes and remain at that temperature in standby mode.

   Note: This refrigeration unit has a temperature control feature that stops cooling when the liquid reaches a temperature 3℃ (6℉) below the User setting and begins cooling when the liquid reaches a temperature 1℃ (2℉) above the User setting.

System Operation

1. **Equipment Connection**; Connect the extension tubing to the chiller unit and to the equipment requiring cooling. An audible 'click' ensures a good connection.
2. **Power Connection**; Connect the chiller unit to a power source 24-28V DC.
3. **Start Refrigeration**; Turn the power switch on. Using the control panel, ensure 'Pump" is off. Press "System" on to start refrigeration.
4. Temperature Setting: Use the 'Up' and 'Down' buttons on the control panel to set the desired temperature for the circulation liquid. The liquid temperature will go down to the set point in minutes.



Note: Setting is completed when the number stops blinking. The steady number shows the current liquid temperature. Indicator shows the ON/OFF status of refrigerator, pump and water level.

5. **Start Pump**: Press the 'Pump' button on the control panel to start or stop circulation. Ensure the extension tubing is connected in a closed loop between the chiller and equipment before circulation begins. Make sure no kinks exist in the extension tubes. Otherwise, flow and cooling performance will be impeded.

Chiller Control Panel - Start Modes

The chiller has two optional start modes; Manual (EP0) and Auto (EP1). The Manual Mode requires the User to turn on the refrigeration process, coolant circulation and temperature setting each time the chiller is connected to a power source. Auto Mode automatically starts the refrigeration process and coolant circulation at the preset temperature point once connected to a power source.

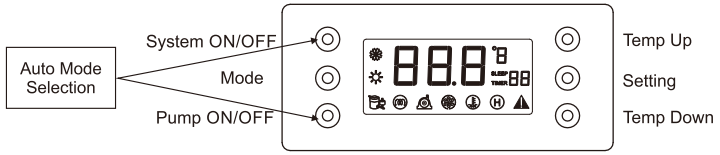
Following are instructions for programming these two start modes. Reference control panel diagram below for location of applicable setting buttons.

Manual Mode (EP0) – after connecting the chiller to a power source, turn the power switch 'On'. Follow these steps for setting up the chiller in Manual Mode:

1.Press the 'System' button to start refrigeration.
2.Press the 'Pump' button to start coolant circulation.
3.Press the 'Temp Up/Down' buttons to set the desired cooling temperature.

Auto Mode (EP1) – the original default setting for the chiller is Manual Mode. Follow these steps for switching to Auto Mode:

1.Press the "System" and "Pump" buttons simultaneously for at least 3 seconds. The control panel will blink two modes; "EP0" and "Ep1".
2.Press the "Mode" button to select 'EP1' mode.
3.Setting is completed when the mode stops blinking.
4.Turn off the power. The system will now default to the Auto Mode "EP1" when power is restored.



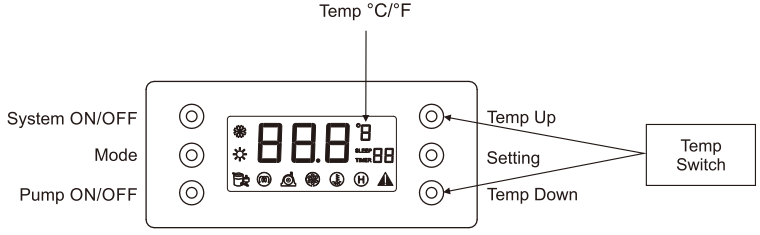
Note: The user can physically remove the electrical connection of the pump to the control panel and add his own separate power cord just for the pump. If the system is running in Auto Mode, the user still can adjust the temperature up or down using the temp buttons.

Caution: when programmed for Auto Mode 'EP1' the system will start the refrigeration and circulation process once power is connected. To prevent leakage and coolant spills, ensure the extension tubes are connected securely to the chiller and the cooling appliance (e.g.: garment, cooling pad or other device). COMPCOOLER suggests the User pre-test the system in the Manual Mode, then switch to Auto Mode.

To switch from the Auto Mode back to the Manual Mode, simply repeat the steps for programming the Auto Mode and select 'EP0' for Manual Mode.

To switch between Celsius and Fahrenheit follow these steps. Reference control panel diagram below for location of applicable setting buttons and icon displays.

1.Press the "Up" and "Down" buttons simultaneously for at least 3 seconds. The control panel will blink two icon options for '°C' and '°F'.
2.Press 'Temp Up' or 'Temp Down' to make selection.
3.Setting is completed when the selection stops blinking.



Maintenance

1. **Cleaning**; Several parts of the MRCU may require cleaning as follows:

   a. **Chiller Unit**; The protective metal housing of the chiller box may be cleaned with a damp cloth and alcohol-based cleaning solution**.**
   b. **Reservoir**; Remove the drain cap from the side of the chiller unit and drain the liquid. If the liquid contains anti-freeze, contain and discard this liquid according to your local regulations. Replace the drain cap and remove the filler cap on the topside of the chiller unit. Refill the reservoir with a solution of clean water, disinfectant and/or scale remover. Allow that to dwell for 10 minutes and drain again. Leave the drain cap off and allow the reservoir to dry completely. Replace the drain cap before next use.
   c. **Condenser**; To keep the PCCU at optimum cooling capacity, the condenser should be kept free of dust and dirt**.** To check if cleaning is necessary, open the side panel and remove the fans. If cleaning is required, use 50-100psi compressed air to clean the contamination.

Note – always use protective eyewear when cleaning with compressed air.

2. **Charging Refrigerant**; (not recommend for uncertified operator)

   If the cooling capacity has been decreased due to lack of refrigerant, the MRCU will need to be recharged by a licensed refrigeration specialist using 150g of R134a refrigerant. The refrigerant charging port is also found behind this side panel.

Storage

1. Disconnect the power cord.
2. Disconnect the extension tubing.
3. Empty and clean the reservoir by following instructions under the Maintenance section 1.b.
4. Pack the unit for storage.
5. Restart: after long term storage the MRCU reservoir should be flushed using a solution of clean water and 5% detergent. Follow Priming instruction number 5 under the section for System Preparation and allow this solution to circulate for 10 minutes with a cooling garment or cooling pad connected. Then empty the detergent solution and refill with the proper operating liquid according to the same priming instructions.

Components Renewal

Open the side panel to replace the fans and pump if damaged. The refrigerant charging port is also found behind this side panel.

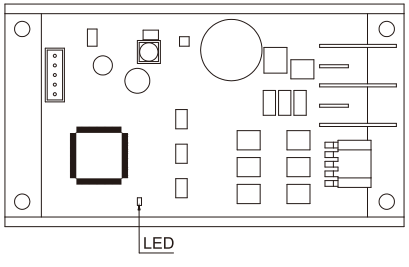
Cautions

1. Ensure power source is 24-28V DC before connecting MRCU.
2. Repetitively cycling the MRCU within a short period of time using the 'System On/Off' button will adversely affect the refrigeration system and power consumption.
3. Do not block the air inlet and outlet. It may lessen cooling performance or worse yet, cause the compressor to overheat.
4. Ensure equipment to be cooled is connected to the MRCU before starting the pump. Otherwise, leakage will occur.
5. Use anti-freeze liquid if temperature setting lower than 1℃.
6. Do not operate the MRCU close to a heat source or in ambient temperatures greater than 60℃ (140°F).
7. Do not operate the MRCU in wet or submerged conditions.
8. Stop operation and disconnect power if high vibration or abnormal noise is observed.
9. Always use protective eyewear when cleaning the PCCU with compressed air.
10. Use a rubber pad (not supplied) when assembling the metal frame of the MRCU to the desired level surface. The rubber will help to dampen vibration and noise when in use.

Troubleshooting

Problem	Possible Cause	Solution
No cooling	Compressor locked, Overheat protection, Low Voltage	See below diagram
	No liquid circulation	Check if pump is turned on and cooling device is connected, and no kinks or blockage exist.
	Power connection	Check connection of refrigeration unit to power source. Replace power cord if loose / damaged.
Low cooling capacity	Low heat exchange rate for evaporator	Check liquid level inside reservoir. Replenish if low.
	Low refrigerant level	Check if air from condenser outlet is hot. Air should be hot for normal operation. Recharge refrigerant R134a if needed.
	Low voltage	Check unit input voltage (not the voltage of power supply). Operation voltage should greater than 24.5V DC.
No liquid flow	Pump is Off	Turn pump on.
	Problem with quick fitting connection between unit and garment	Check that quick fitting connection on extension tubes are connected properly and not blocked or broken.
	Pump blocked	Disassemble the pump from chiller unit and clean if blocked.
Faulty temp sensor	No feedback; reference P1 fault code on remote controller	Check if sensor connection on the control board is loose or replace the sensor.

Compressor Issues: Compressor malfunctions can be analyzed by counting the number of LED flashes.



LED Flash Count	Type of Errors
1	Compressor locking or overloaded
2	Disconnection of compressor line or an error of sensing current
3	Short-circuit on motor parts or over-current
4	Abnormal DC voltage
5	Overheating of the controller

Safety

Warning: It is important to become thoroughly familiar with the operating characteristics of the Compcooler Refrigeration Chiller Unit. It is the owner's responsibility to assure proper User training of the cooling system including component knowledge, system preparation, system operation and maintenance. Disregarding this warning can result in injury to the operator and severe mechanical damage to the unit.

Warranty

Compcooler warrants this product to be free from defects in workmanship and materials, under normal residential use and conditions, for a period of one (1) year from the date of shipment. Shipping and handling fees are to be paid for by the customer. The manufacturer agrees, at its option during the warranty period, to repair any defect in material or workmanship or to furnish a repaired or refurbished product of equal value in exchange without charge (except for fees for shipping, handling, packing, return postage, and insurance which will be incurred by the customer). Such repair or replacement is subject to verification of the defect or malfunction and proof of purchase as confirmed by showing the model number on original dated sales receipt.

Certifications