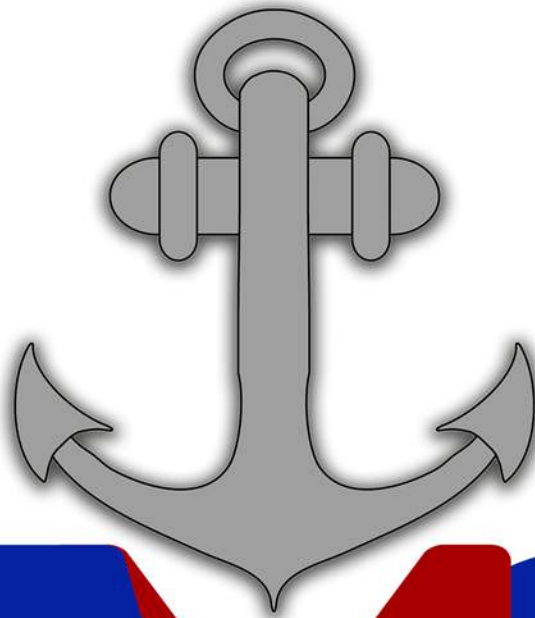


# Refrigerated Chill Plate Guide



**FMS**  
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## Package Contents:

- Chill Plate (with quick connect fittings)
- Condensing Unit (with quick connect fittings and a wiring harness)
- Digital temperature control (with a wiring harness and wired temperature probe)
- Bottle of Nylog Blue refrigeration thread sealant
- Section of 2" PVC pipe to use as a Chill Plate bending assist

## Tools Required:

- Assorted hand tools:
  - Wrenches or channel locks
  - Small flathead screwdriver
  - Others may be required for your installation
- Zip ties
- Spray foam or other sealing component
- Insulation (if area to be cooled is not insulated) (can be a spray or physical insulation such as foam board, styrofoam, or fiberglass)
- Assorted power tools:
  - Drill
  - Hole saw or reciprocating saw
  - Others may be required for your installation

# **Table of Contents**

<b>Overview and Safety</b>	<b>3-4</b>
<b>Installation</b>	<b>5-9</b>
<b>Operating The Unit</b>	<b>9-10</b>
<b>Troubleshooting</b>	<b>11-12</b>
<b>Warranty Information</b>	<b>13</b>
<b>Notes Page</b>	<b>14</b>

# Overview and Safety

## Overview:

The FMS refrigerated chill plate (hereafter referred as RCP) is designed to add cooling to an area that did not already have cooling capabilities or to replace an existing system. It is designed to be as simple as possible for an easy DIY installation. Please read all instructions completely before attempting to install or operate the unit. All refrigerated chill plate units require correct electrical, venting, and mechanical installation for the unit to operate correctly. Improper installation will result in substantial property damage. If you are unsure of your ability to correctly install this unit, consult a local licensed technician for assistance.

## Safety precautions:

### Warning!

**Never attempt to install, repair, or perform maintenance on the unit until the electricity has been disconnected. Altering, cutting, or removing the wiring harness can cause serious injury/death or severe property damage/loss and will void the warranty.**

### Caution!

Never lift the unit with the wiring, copper pipes, or quick connect fittings. None of these were designed to withstand the weight of the unit.

Never use an ice pick or any other sharp object to aid in defrosting the cold plate. Usage of such tools can and will cause damage to the cooling portion of the machine and will void the warranty.

Failure to maintain the condenser coil (radiator by the compressor) and keep it clean can and will cause condenser failure as well as damage to the unit. This is not a warranty repair.

Never install the unit in a non-vented closed off area. Obstructing free air flow can and will cause damage to the unit leading to a malfunction and will void the warranty.

Battery voltage must be high enough for the unit to run. If the battery voltage drops too low from the batteries draining or too small wires, the unit will not operate. Please contact the factory for troubleshooting if the unit will not run and the voltage is above 11.4V DC.

Do not attempt to add additional wires to the wiring harness or add additional components to the unit. Also do not rewire the unit or try to bypass the temperature control. This may damage the unit and will void the warranty.

# Overview and Safety

Do not attempt to add additional wires to the wiring harness or add additional components to the unit. Also do not rewire the unit or try to bypass the temperature control. This may damage the unit and will void the warranty.

If the unit is running off the main batteries make sure to monitor the voltage so that the main engine will start. Failure to maintain a decent battery level may result in the main engine being unable to start. FMS is not responsible for repairs, emergency services, towing, recovery, or any other costs associated with becoming stranded because of the main battery being unable to start the engine.

A battery may read 12V DC, but that does not indicate it's health. Battery voltage under load or performing a battery check will indicate if a battery is failing or struggling to perform. A battery that is expired or failing may lead to improper voltage being supplied to the RCP and can lead to damage or failure to operate.

The unit will occasionally need to be defrosted and the best way to achieve this is to turn the unit off and allow it to slowly thaw and drain away. To speed up this process the only recommended aid would be a heat gun on low heat or a hair dryer on low. Using any ignition source such as a blowtorch or a lighter could cause the piping to burst and the mixture of oil and refrigerant to ignite causing damage to the unit and personal injury.

## Installation

### Site preparation:

The refrigerated chill plate needs to be mounted in an area where it will physically fit, receive proper ventilation, and be protected from the elements. In addition, you need to ensure proper access for periodic maintenance on the condenser coil.

### 1.) Installing the RCP:

A.) Position the RCP condensing unit on a flat, level surface, capable of supporting the weight of the unit and providing a location to mount it. A fiberglass or plywood shelf may be necessary for mounting the unit so it does not slide when the boat is moving or listing (tilting) side to side. Screw down the RCP condensing unit using the holes in its corners. Make sure the screws will not puncture the boat hull.

# Installation

B.) If a hole is not available for passing the refrigerant pipes from the space being cooled to the RCP, one needs to be cut. The fittings on the refrigeration cold plate determine the size of the hole being cut. It is recommended to cut a large enough hole to pass both fittings through without bending them. Typically, a 2-3" hole is required for this pass through, which can be sealed after the full unit is installed and running.

C.) A location must be selected for mounting. The plate can be fully submerged in water, fully in air, or a combination of submerged in water and exposed to air at the same time. The plate has one or two points where it can be gently bent into a curved shape using the included PVC pipe as a brace. There are holes in the corners to mount the plate to a surface using screws or zip ties. It is recommended to use washers or spacers to keep the plate from being crushed against a hard surface. Before the cold plate is installed the refrigerant piping and fittings need to be passed through the hole cut in the previous step or an already existing pass-through hole. The plate should be mounted on a top or side surface that will not be moved. If it is mounted on a bottom surface cooling performance may be limited and increase the risk of damage to the plate.

### Warning:

**Bending the cold plate must be done gently and carefully. Bending the plate too quickly or too sharply will result in the plate kinking or cracking. This can lead to a leak or the unit not cooling. If the plate is damaged from bending or installation, the repairs will not be covered under warranty.**

D.) Mount the cold plate in the location chosen in the previous step, making sure to not kink the refrigerant pipes or plate. It is recommended to bend the plate before getting it ready for mounting, but if the space being cooled makes that difficult, the plate can be bent at any step in the installation if it is done slowly and is bent as few times as possible. Repeated bending will cause metal fatigue and can cause a leak or a kink leading to the unit not cooling, and the repair will not be covered under warranty.

E.) The digital temperature control comes with a mountable temperature sensor. It needs to be mounted inside the space being cooled and has several considerations to be made. The sensor needs to be mounted a minimum of 4" away from any of the cold plate surface or the condensing unit may short cycle (rapidly turn on and off). The ideal sensor location is on the surface opposite the cold plate (e.g., The cold plate on the north wall and the sensor on the south wall). Make sure the sensor is mounted in a location where it will not be influenced by outside air, such as by a hole, or outside heat sources, such as the sun. The best way to mount the sensor is to use a zip tie about 1/2" back on the wire from the sensor and not letting the sensor touch any surface or the cold plate. Route the other end of the sensor wire with the exposed leads through the hole that the cold plate refrigerant pipes are passed through. The leads will be attached to the digital temperature control.



# Installation

F.) The cold plate and RCP need to be connected so the refrigerant is free to flow. The cold plate and the RCP condensing unit both have a set of quick connect fittings. The fittings are directional and are installed so the refrigerant flow is correct when the fittings are connected. Included with the RCP is a bottle of “Nylog Blue” thread sealant. Coat the threads of each quick connect fitting with a generous amount of the sealant all the way around the fittings. Once the thread sealant is applied, line up each fitting and its matching opposite and prepare to connect them. Start the connection by spinning by hand, and then switch to wrenches as the fitting becomes too tight to continue by hand. Once the fittings get snug, go 1/8 to 1/4 turn further to fully seal the connection. Do this for all the fittings.

### Warning:

**The fittings are under pressure on both sides. Connecting them too slowly may result in the unit losing its charge and will diminish or eliminate its performance.**

### Warning:

**When tightening the fittings do not let the copper pipe rotate. Only the female end of the fitting should spin, the rest should remain stationary. If the pipe is rotated it can kink, crack, or break, which will result in refrigerant loss or performance loss. If the pipe or fittings are damaged during their installation, the repairs will not be warrantied.**

### Warning:

**Refrigerant is a chemical and should be treated with respect. Refrigerant is denser than the air we breathe and as a result displaces oxygen and can lead to hypoxia in extreme cases. If you are in an enclosed space and release a majority of the refrigerant contained in your RCP there is a risk of injury or death. The refrigerant and oil in the RCP are also flammable and should never be exposed to a spark, open flame, or other ignition source. If the refrigerant is burned there will be an extremely noxious smell in the air. Ventilate the space and move to fresh air briefly to let the burned refrigerant escape. Wash any skin surface that is exposed and if any were to spray into your eyes, wash them out with lukewarm water for several minutes.**

G.) The next step is to find a place to mount the digital controller. It must be able to connect to the wiring harness of the RCP condensing unit and also be able to reach the temperature sensor wires. If there is a hole that needs to be cut where the controller will mount, cut the hole large enough to fit the back of the controller and wiring harness plug through.

H.) Connect the temperature sensor wires to the digital controller in the “sensor” terminals and use a small flathead screwdriver to tighten them. Mount the controller to the location selected in the previous step using the 4 holes in the faceplate.

# Installation

I.) Plug the wiring harness together using the white plug on both the digital controller and the RCP condensing unit. The plug is directional and has only one correct orientation. If the male end of the plug will not insert into the female end, check that the holes line up properly. Make sure the plug seats fully and the clips on each side click into place.

J.) Hard wire the RCP to the 12-volt DC power source. The power source can be a battery or set of batteries, inverter, alternator, or any other source capable of providing a minimum of 10 amps continuous current. Make sure to use a wire gauge thick enough to carry the current to the RCP. See the wire size chart below for recommended wire gauge based on distance between the RCP and the 12-volt power source.

**Wire dimensions DC**

Size		Max. length*		Max. length*	
Cross section	AWG	12V operation		24V operation	
[mm <sup>2</sup> ]	[Gauge]	[m]	[ft.]	[m]	[ft.]
2.5	12	2.5	8	5	16
4	12	4	13	8	26
6	10	6	20	12	39
10	8	10	33	20	66

\*Length between battery and electronic unit

### Warning:

Even though the RCP has a 20 amp fuse in the wiring harness, it is still recommended for a fuse to be located close to the 12-volt power source in case of a short in the wiring between the RCP and the power source. If you are using a battery or battery bank, it is highly recommended to have a physical disconnect for when the RCP is not in use and a voltage monitor to ensure the voltage does not drop too low. If the voltage drops below 10.4 volts DC the RCP will prevent the compressor from running. Be aware that if you are using the main batteries and the voltage drops below 10.4 volts the engine may not start.

K.) Airflow is important for the RCP condenser since it is air cooled and not water cooled. Make sure it has access to fresh air and is not in an enclosed space. If the RCP must be installed in an enclosed space, place an intake and exhaust vent and add a 12-volt vent fan if needed. Contact FMS technical support for assistance with venting.



# Installation

## Warning:

**If the unit is installed in an enclosed space and is not properly vented, the unit will not maintain proper operation and will overheat. This will lead to lower cooling performance and premature component failure. Improper venting will void all warranties!**

L.) Clean up the installation once it is complete. Use zip ties or cable ties to secure any extra wiring. Take care not to add too much strain to the wiring harness or refrigerant piping. Use expanding foam or another insulating material to fill any holes that air can infiltrate in the space being cooled. Make sure the RCP is properly secured and ready to start cooling!

# Operating The Unit

## First power on:

After the installation is complete, a test run of the unit needs to be performed to ensure proper operation. If there is a breaker or other form of power disconnect between the RCP and its 12/24-volt power source, switch it on to send power to the RCP controller and compressor module. If the digital controller does not immediately power up and show numbers, press and hold the power button for 5 seconds to turn on the controller display. Once the display is lit there will be a red dot lit up in front of the word “cool” followed by a small audible click. A few seconds later the fan on the RCP condenser will start spinning and the compressor will engage. The compressor is quiet and only produces a slight vibration, but as the unit runs the plate will become cold and the compressor will also begin to warm up. Wait 5 to 10 minutes and feel the cold plate for a temperature change. The plate may not be ice cold or producing frost, but it should be noticeably colder than the ambient air temperature. You may also hear a “hissing” or “bubbling” noise while the unit is running, which is the refrigerant flowing through the cold plate and producing a cooling effect. Refer to the “troubleshooting” section in this guide if any of the described steps does not occur.

## Normal operation and temperature setting:

1.) Turn on the 12-volt power source for the RCP. If it does not turn on automatically, turn on the RCP digital controller by holding the power button for 5 seconds or until the display lights up with red numbers.

2.) The display shows the temperature from the temperature probe located in the area to be cooled. To see what the controller is set for press the “UP” arrow one time and the temperature setting will show on the screen. Press another button to go back to the live temperature readout. If the setting is not at the desired temp, hold the “SET” button, the one with “S”, until

# Operating The Unit

the display reads “TS”, which stands for “temperature set point”. Press the “SET” button and the set temperature will begin to flash on the screen. Press the “UP” or “DOWN” buttons until the desired temperature is flashing on the display. To save the new temperature setting press the “POWER” button one time to save the temperature and return to the main screen with the live temperature readout. To check that the temperature has been saved press the “UP” button and the set temperature will display on the screen. Press another button to return to the live temperature readout.

3.) If the space to be cooled is not at the temperature it is set for, the controller will activate the RCP. A red light on the left side of the display in front of the word “cool” will light up and indicate that the compressor is being asked to run. There will be a small audible click, then the RCP condenser fan will turn on followed by the compressor. You may hear or feel a small amount of vibration from the compressor and a small hissing noise coming from the cold plate. This is normal and indicates the refrigerant is moving through the system properly.

4.) The RCP will continue to operate until the temperature reaches the controller set point. Once the set point is achieved the RCP condenser fan and compressor will shut down and a built in 5-minute delay will activate inside the temperature controller. This delay is to protect the compressor and maintain reliability and longevity. If the temperature rises above the set point within the 5-minute delay the unit will not run until the 5-minute delay has completed. If the delay finishes before the temperature has risen, the unit will start as soon as the temperature is outside the set point range.

5.) To turn off the unit, press and hold the “POWER” button on the temperature controller for 5 seconds until the screen goes blank. After the display is off disengage the 12-volt power source if there is a disconnect installed between the RCP and the 12-volt power source. This step also will be used if the cold plate needs to be defrosted. Turn off the RCP until any built up ice and frost is melted and drained away. Once the defrost is complete, turn the RCP back on.

6.) As part of routine maintenance on the RCP, make sure to check any dust or debris built up on the RCP condenser and occasionally brush out the fins to ensure proper airflow and system performance. Use a gentle brush and make sure not to bend the fins while cleaning the RCP condenser.

# Troubleshooting

## Unit Is Not Turning On (Display Blank):

- 1.) Check voltage going to the RCP. The voltage must be higher than 11.7 volts DC to operate. If the voltage is too low, charge batteries or check power source.
- 2.) Check the (20 amp) fuse in the wiring harness. If the fuse is blown, check wiring for a short or a wire that has come loose. Replace with another (20-amp fuse) and see if the unit powers on. Warning: do not replace it with a larger or smaller fuse. Doing so may cause damage to the RCP and will void the warranty.
- 3.) Call FMS technical support for additional assistance.

## Unit Is Not Turning On (Display Lit):

- 1.) Check voltage going to the RCP. Voltage must be higher than 11.7 volts DC to operate. If the voltage is too low, charge batteries or check power source.
- 2.) Check to see that the red light next to the word “cool” is lit up on the display.
- 3.) Check the temperature setting on the controller and make sure it is set lower than the temperature probe is reading on the display.
- 4.) Check the RCP condenser fan and see if it is turning. If it is turning, move on to “Unit is not cooling (condenser fan running)”. If it is not turning, try spinning it by hand to see if it spins freely. If it is not spinning freely check to see if there is an obstacle preventing the fan from turning. If there is no obstacle the fan may need to be replaced as the compressor module will not let the compressor run if the fan has failed. If the fan does spin freely, contact FMS technical support for additional assistance.

## Unit Is Not Cooling (Condenser Fan Running):

- 1.) Check the voltage going to the RCP. Voltage must be higher than 11.7 volts DC to operate. If voltage is too low, charge the batteries or check the power source. If you have a multimeter on hand, observe the voltage going to the unit over a several minute period. If the voltage is starting out above 11.7 volts and then is dropping quickly there may be an issue with the power source or the wiring going to the unit. Make sure the wire gauge is large enough to carry the current needed for the RCP. Check the wire sizing chart on the next page for proper wire gauge based on the distance from the power source to the RCP.

# Troubleshooting

## Wire dimensions DC

Size		Max. length*		Max. length*	
Cross section	AWG	12V operation		24V operation	
[mm <sup>2</sup> ]	[Gauge]	[m]	[ft.]	[m]	[ft.]
2.5	12	2.5	8	5	16
4	12	4	13	8	26
6	10	6	20	12	39
10	8	10	33	20	66

\*Length between battery and electronic unit

2.) Verify that the compressor is running by placing your hand on it and feeling if it is vibrating. If the compressor is running and the cold plate is not getting colder, contact FMS technical support for additional assistance.

3.) The compressor is quiet under normal conditions, so if it is making loud mechanical noises, contact FMS technical support for additional assistance.

4.) Check around the RCP condenser, cold plate, and quick connect fittings for any signs of oil residue or hissing noises that may indicate a refrigerant leak. Contact FMS technical support for additional assistance.

Warning: if the unit is under warranty, do not make any attempt at repairs without consulting FMS technical support. This will void the warranty on the RCP unit.

### Unit Is Cooling, But Takes A Long Time, Or Doesn't Reach Temperature:

1.) The unit is not able to overcome a large amount of heat intrusion. Based on the location it is installed and the space being cooled, varying performance results will occur. The air temperature, humidity, sunlight, insulation, etc. will all influence how long it takes to cool or will prevent the unit from cooling below a certain point.

2.) Make sure the temperature probe is not being obstructed by an object, exposed to air infiltration, affected by sunlight, etc. that could influence the temperature being detected.

3.) If you are cooling a tank of water, such as in a livewell or baitwell, ensure the temperature probe is fully submerged in the water of the tank so it can react to the changes in the water temperature rather than the air around the tank.

# Troubleshooting

4.) A hand-held meat thermometer or dial thermometer make a great tool for checking that the space being cooled is cooled evenly. Place the thermometer in several places around the space being cooled and compare them to the reading that the digital controller indicates. If the temperatures are within a couple degrees, there should not be much cause for alarm. If the temperatures differ by a large amount, the probe may need to be relocated, recalibrated, or replaced if it is reading incorrectly.

5.) Occasionally the cold plate will need to be defrosted. Check it daily if being used in water and check every 2 to 3 days if being used in air. If the plate has a large buildup of frost or ice it cannot cool the space properly. Ice and frost act like a blanket and prevent cooling from the plate to the medium it is cooling. This will dampen its performance or prevent it from reaching temperature entirely. Turn off the RCP by pressing and holding the power button on the digital controller. You can either wait and let the plate defrost by itself or use a heat gun or hair dryer to speed up the process.

### Warning:

**Do not use any physical tools to assist in the defrost process. Trying to manually remove the ice or frost could lead to a puncture of the plate and the refrigerant leaking from the system. Additionally, do not use any open flame or other ignition source to assist in the defrost. The refrigerant and oil in the RCP unit is combustible and under the right conditions, explosive. If the plate is damaged from an assisted defrost the repairs will not be warrantied!**

If there is any scenario or symptom you are experiencing that is not covered or solved by these troubleshooting steps, please contact FMS technical support for further assistance.



# Warranty Information



We offer a 5-year warranty with every new dehumidifier or A/C unit purchased. The FMS warranty covers defects in materials and workmanship for 5 years from the date the unit is purchased. FMS is the only authorized repair site for FMS products. Contact the FMS office before any work is performed, any unauthorized repairs will invalidate the FMS 5-year warranty.

Thermostats, pumps, digital controls, Refrigerated Chill Plates, and accessories carry a 1-year warranty.

Service needs **within** first 6 months:

Shipping costs to our factory and return to sender are included.

Service needs **after** 6 months - 5 years (from date of purchase):

Customer pays shipping to our factory and FMS pays for return shipping

\*For our clients outside the continental U.S. the 5-year warranty is still valid. However, shipping and handling will be the responsibility of the client to and from the FMS factory.

Limitation of liability:

FMS is dedicated to manufacturing high quality custom marine and dehumidifier units. FMS makes this limited warranty expressly in lieu of all other warranties, expressed or implied, including but not limited to, the expressed warranties of merchantability and breach of any warranty the liability of FMS shall be limited to repairing or replacing the non-conforming goods. In no event shall FMS be liable for any indirect, incidental or consequential damages arising out of any sale or operation of the products sold and/or installed. The purchaser of the unit will hold FMS harmless of any incident caused by the failure of the FMS product up to and including injury or death. And in no event shall FMS's obligation exceed the value of the product(s) sold.



