Version 1.4

ALWAYS CHECK FOR THE LATEST VERSION BEFORE INSTALLING YOUR UNIT.

Temptress™ Air Conditioner Kit

Change log

v1.3:07-13-2025 - Added installation instructions for RV version

v1.4: 08-27-2025 - Added instructions for new expansion valve installation and minor clarification on wiring of "Fan" connection on compressor driver board

Installation book

Congratulations. You have just bought the parts to make an efficient, potentially battery-powered air conditioner for your boat, RV, or small off-grid cabin. This manual is specifically for installations on a boat or where there is a supply of water to remove heat from the system.

If you are reading this manual before actually installing it, please check back online and make sure you have the latest manual for your installation. I hope to improve this document. By that token, if you find anything confusing or just plain wrong, please tell me. And, of course, if things go well, I'd also appreciate a note.

This kit contains the difficult-to-obtain parts needed to build and install this unit. In particular, it contains a very efficient compressor that was designed under the U.S. DARPA project to provide battery-powered cooling for the U.S. military and a state-of-the-art titanium condenser.

To complete this kit, you will need to obtain a few more parts and tools that should be available at your local hardware store.

System Overview

This system can be thought of as having two main components connected by refrigeration tubing:

1. **Compressor sled.** This includes the compressor, condenser, and control circuitry.
2. **Air handler.** This contains the air blower, evaporator, expansion valve, and an assembly to catch condensation water that forms on the evaporator during operation.

Kit includes:

- Compressor
- Compressor control circuit board
- Three-phase wires and compressor plug
- Thermal cut-off switch
- Potentiometer
- Seawater condenser (for boat applications) or air condenser and fan (for land applications)
- Filter/Dryer
- Air handler
- Fan Speed Controller
- Thermostat/Humidistat
- 24V Relay
- Voltage converter (12 Volt Model only)
- Refrigeration line fittings
- Necessary Fittings
- Electrical Connectors required for the compressor

Additional parts you will need:

- Copper tubing ⅜" and ¼" equal to the distance between the compressor and air handler (included in the deluxe kit)

- Marine only
    - ⅝” water hose, enough to go from your thru-hull intake fitting to the condenser, then to your outlet thru-hull fitting. (included in the deluxe kit)
    - Hose Clamps for the water hose (included in the deluxe kit)
    - Fittings for water hose
    - Sea water pump (included in the deluxe kit)
    - Sea strainer
- Metallic Tape
- Condensate hose ⅜”OD polypropylene seems to work well.
- R134a Refrigerant (12oz can)
- 30 amp panel mount circuit breaker or panel mount switch and 30 amp fuse.
- 2 - 15 amp fuses with inline fuse holders
- 1 - 1 amp fuse with inline fuse holder
- Supply of 10, 12 and 18 gauge stranded electrical wire & 5 wire thermostat wire

Tools you will need:

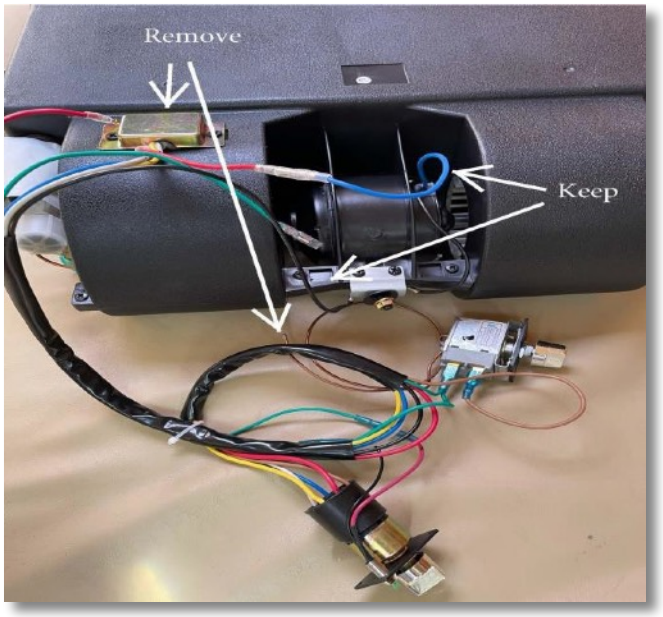
- refrigeration gauges
- thermometer
- vacuum pump
- clamp on DC amp meter
- tubing cutter
- flare tool
- open end wrench set
- wire cutter
- crimp tool
- flat head precision screw driver
- electronic solder and iron (optional)

Installation

I suggest you watch the video series, starting with this INSTALLATION VIDEO, as an introduction to installing your unit.

Prepare the Air Handler

The air handler is mostly pre-assembled. But as it comes, it is not wired properly for efficient cooling.



First, upgrade the fan speed control system:

1. Remove and discard the temperature and speed controllers including the wiring, except for the black and blue wires leaving the fan motor itself.
2. There is a resistor pack that mounts onto one of the fan shrouds with screws. Remove and discard this resistor pack. Cover the hole with metallic tape and screw the cover over the tape.
3. Decide where you will be installing the air handler, so that you have an idea of where to mount the fan speed controller*. If necessary extend the blue and black motor wires. Then:
    a. Connect the blue fan motor wire to the speed controller motor's positive terminal.
    b. Connect the black fan motor wire to the speed controller motor's negative terminal.

**The fan speed controller can be mounted in a location where you can adjust it, or it can be mounted directly onto the air handler, since in normal operation it can be set once and left at that setting. This is up to you how you want to use the unit.*

RV/Tiny Home additional fan speed controller

If you are installing the RV/Tiny Home Temptress air conditioner, the kit includes a second fan speed controller. This controller controls the speed of the condenser fan.

Decide where you will be installing the condenser, so that you have an idea of where to mount the fan speed controller. If necessary, extend the two fan motor wires to where you plan to mount the fan controller for the condenser. Then:

1. Connect the positive fan motor wire to the speed controller motor's positive terminal.
2. Connect the negative fan motor wire to the speed controller motor's negative terminal.
3. Connect a fuse-protected positive wire, which comes from the same relay that provides power to the air handler, to the positive terminal.
4. Connect the negative terminal to the 12-volt ground.

Replacing the expansion value

Remove the plastic caps and rubber stoppers from the Air Handler's gas ports. When you remove the first one you will hear gas escaping. This is normal. The unit was filled with dry nitrogen to check for leaks and maintain a dry, clean interior. The expansion valve that comes with the evaporator is not as efficient as it could be. Thus, we now supply you with an upgraded expansion valve as part of the kit. Here are the steps to replace the expansion valve.

1) Locate the new expansion valve in the kit. It will be in its own box and contain the following parts.
    - Expansion valve
    - Orifice insert
    - Clamp for temperature bulb
    - Adapter to allow you to connect the new expansion valve to the evaporator
    - Insulation tape
2) Remove the existing expansion valve, insulating tape, and temperature bulb from the evaporator.
3) Install the Adapter on the expansion value. Ensure you apply a thin coat of sealant to the male and female sides of the fitting.
4) **Install the orifice insert into the expansion valve**, coat the flare side of the insert with sealant, and screw in the 3/8" female to 1/4" male flare adapter onto the expansion valve.

5) Install the expansion valve. NOTE: The expansion value MUST be installed so that it is vertical. Otherwise, it will not operate correctly.
6) Place the temperature bulb in the exact location as the one you are replacing and use the supplied clamp to secure it in position.
7) Wrap the temperature bulb with the supplied insulating tape.
8) The kit you received may have two o-ring to flare converters. You won't need them with the new expansion valve.

Connect & Install the Air Handler

Some notes about connecting the air handler:

The air handler needs two things: 1) a good source of air from the cabin to be cooled (intake), and 2) a way to blow air from the air handler into the cabin (exhaust). **Make sure that the air handler's supply side (intake) is not blocked from receiving air, or you will have a very inefficient system!**

It is important that the air handler's intake air comes from the space it is cooling.

If you are cooling a bedroom, keep in mind the cool air should blow quite directly onto the sleeping area. If more than one person usually sleeps in this area, arrange it so that the cool air blows on the person who normally likes it cooler. (In our case, the coldest air blows on the husband, and the wife, who sleeps farther from the exhaust, is under a blanket by morning. We are both happy that way.) Thinking about this kind of thing up front can save you power forever.

You will save electrical power and have a more effective system if the space cooled is as small as possible. Consider installing curtains around the bed to segregate that space from the rest of the room.

To connect the air handler:

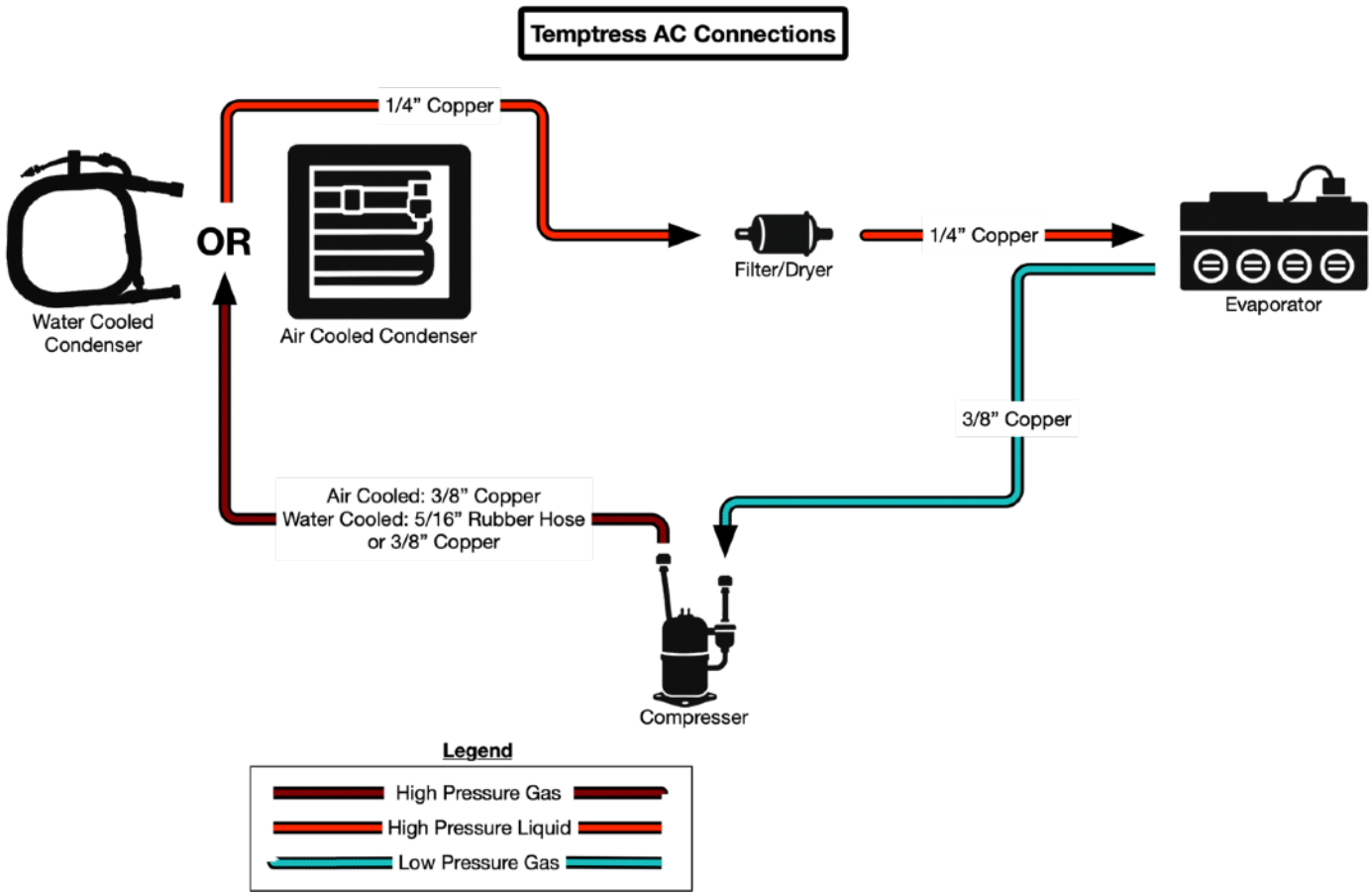
1. Run a good quality ⅜" hose (not the ones that come with the kit) to the bilge. There are two air handler drains located on the bottom rear of the air handler. (Feel free to tee these together into one line.) In many installations, it is acceptable to run the lower water drain to the bilge and plug the other drain. This line will drain freshwater from the humid air away.

To mount the air handler:

Mount the air handler securely to your boat. Use the supplied bracket or fabricate your own.

Component Overview

This diagram will help you understand how the supplied components are connected using either a water-cooled or air-cooled system. It is meant as a high-level overview only, as the detailed fittings and connections are shown in their respective sections of this document.



Prepare the Compressor Sled

In some installations, mounting all the compressor-associated components onto a plate may be practical. In others, the components may be best mounted individually to make the best use of the space available. Either way, the connections are the same.

Notes about Copper Tubing

This kit has been supplied with the necessary fittings that allow you to install the Air Conditioner without having to solder the copper tubing, but if you feel your installation would be served best with solder connections, feel free to use that method where necessary.

You will have to make good flares at the ends of your copper tubing to enable you to make solid connections. Flare fittings are easy to make. There is an explanation of the process in the video series and many other places. You should make a few trial flare connections before you attempt the install. You may use the parts from this kit to do so as all the brass parts are reusable. Simply cut off the "flare" end of your copper tubing to attempt the next fitting.

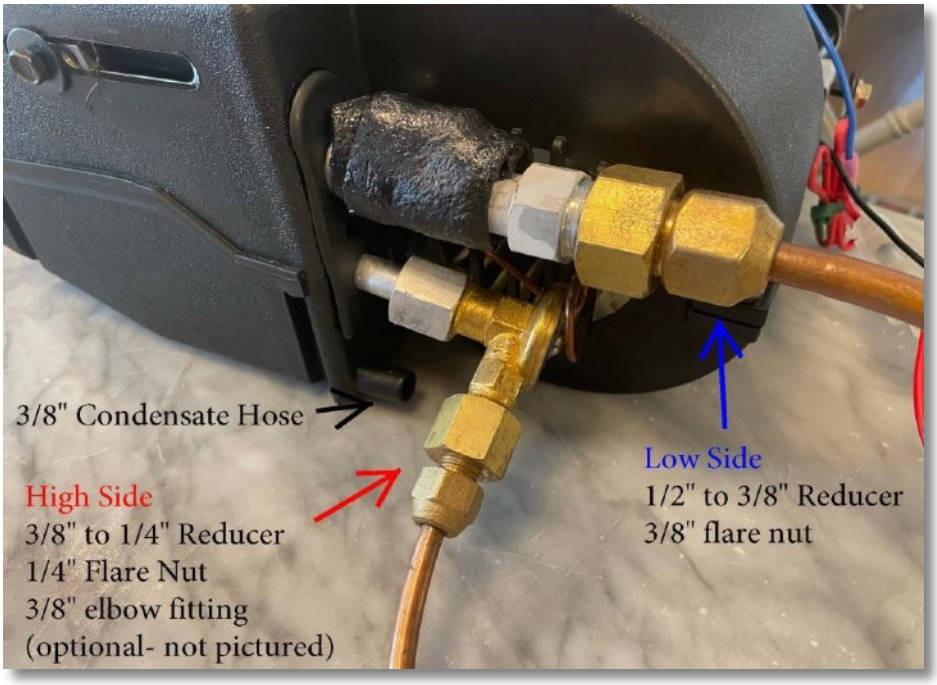
Decide where you will install your compressor and condenser. These components need to be solidly mounted in a place where they will not be exposed to water or sun. The compressor needs to be mounted with its mounting base down and in a place with good air flow. If you have problems with the compressor overheating, you may have to provide a small fan to keep it cool. The condenser can be mounted in any orientation. If the condenser is mounted vertically, its ¼" fitting should be on the lowest side. Mount the compressor control board close to the compressor.

The refrigeration circuit is really quite simple. It has two sides:

- **High-pressure side.** This starts with the smaller tube that runs out of the compressor. It handles the output of the compressor to the condenser, from the condenser to the filter/dryer, and from the filter /dryer to the expansion valve side of the air handler.
- **Low-pressure side.** The line handles the low pressure gas returning from the air handler. It runs from the non-expansion valve side of the air

handler to the compressor vacuum return port.

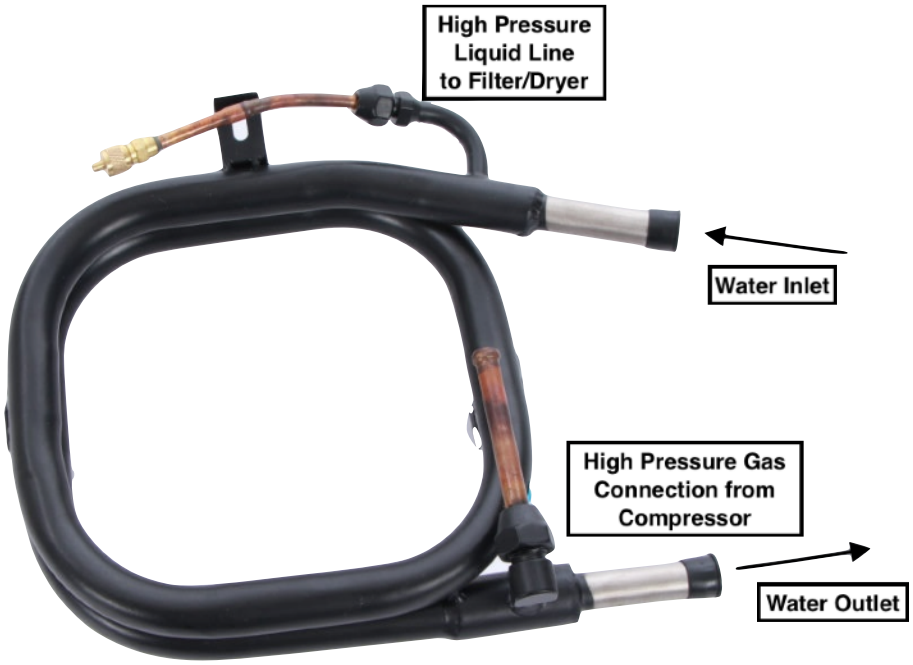
Connecting the Air Handler



Air Handler

Compressor

Marine Heat Exchanger (Condenser) Installation Instructions - Skip this section if you are installing the RV/Tiny Home version.



Marine Condenser

Connecting the High-Pressure Side

The **HIGH PRESSURE SIDE** consists of the following components:

- Evaporator connections:
  - Smaller O-ring to flare adaptor (aluminum) and smaller green O-ring
  - 3/8" to 1/4" reducing nut
  - 1/4" flare nuts for connecting the filter/dryer
- Compressor connections:
  - Marine: Black rubber refrigeration hose (you can use your own copper tubing if your run is too long) to connect to the marine condenser.
  - RV/Tiny Home: 3/8" copper flare nut to connect 3/8" copper tube to the RV/Tiny Home condenser. See the condenser section for more information.
- Filter/dryer
  - 1/4" flare nuts to connect filter/dryer
- ¼" copper tube (runs from the HIGH PRESSURE SIDE of the heat exchanger to the filter/dryer, and then to the HIGH PRESSURE SIDE of the air handler)
- Hardware - 3/8" flare elbow (purchased locally if needed) connected to 3/8" to ¼" flare reducer and four ¼" flare nuts (used at the air handler, filter dryer and heat exchanger)

The **HIGH PRESSURE SIDE** of the tubing is installed as follows.

Note: It may be helpful to install the copper tube prior to flaring the ends to ensure the length is correct the first time.

1. Remove the flare nut from the larger side (3/8") of the heat exchanger **using opposing wrenches. Note: *The* condenser connections are sealed and under pressure.**
2. Connect the black rubber refrigerant hose from the **HIGH PRESSURE SIDE** of the compressor to the 3/8" flare connection of the condenser/heat exchanger
3. Cut and flare the end of the ¼" copper tub on the heat exchanger**. IMPORTANT!!! Install the flare nuts on the tube before flaring the tube**
4. Connect the filter dryer to the ¼" tube
5. Cut an appropriate length of copper tubing to run from the filter dryer to the air handler
6. Install as required and flare each end. **IMPORTANT!!! Install the flare nuts on the tube before flaring the tube**
7. Install the smaller aluminum O-ring to flare adaptor and smaller green O-ring on the **HIGH PRESSURE SIDE** of the air handler and secure with the optional 3/8" elbow fitting and/or
8. Attach the 3/8" to 1/4" flare adaptor
9. Connect the filter dryer to the air handler with the ¼" copper tube
10. Tighten all the flare nuts **using opposing wrenches**.
    - ¼" flare 9 ft lbs
    - 3/8" flare 20 ft lbs

Connecting the LOW PRESSURE SIDE

The LOW PRESSURE SIDE consists the following components:

- Larger aluminum O-ring to flare adaptor and large green O-ring
- ⅜" copper tubing (runs from the **LOW PRESSURE SIDE** of the air handler to the **LOW PRESSURE SIDE** compressor.
- Hardware - ½" to 3/8" flare adaptor, two 3/8" flare nuts

Installation of the LOW PRESSURE SIDE

1. Cut the end of the 3/8" copper tube to run from the **LOW PRESSURE SIDE** of the air handler to the **LOW PRESSURE SIDE** of the compressor, install the flare nuts and flare each end.
2. Install the flare nut on each end of the 3/8 tube. **IMPORTANT!!! Install the flare nuts on the copper tube before flaring it.**
3. Install the O-ring and O-ring adapter on to the air hander with the 1/2" to 3/8" flare adaptor **using opposing wrenches.**
4. Connect the air handler to the **LOW PRESSURE SIDE** of the compressor using the 3/8" copper tube.
5. Tighten the flare nuts using opposing wrenches to 20 ft-lbs of torque.

Congratulations! You have just finished the refrigerant plumbing for your air conditioner.

Coolant Pump

The refrigerant is water cooled by pumping sea water through the condenser/heat using a coolant pump. Water is supplied through an underwater thru hull connection and water the is preferable expelled just above the water line to confirm water flow.

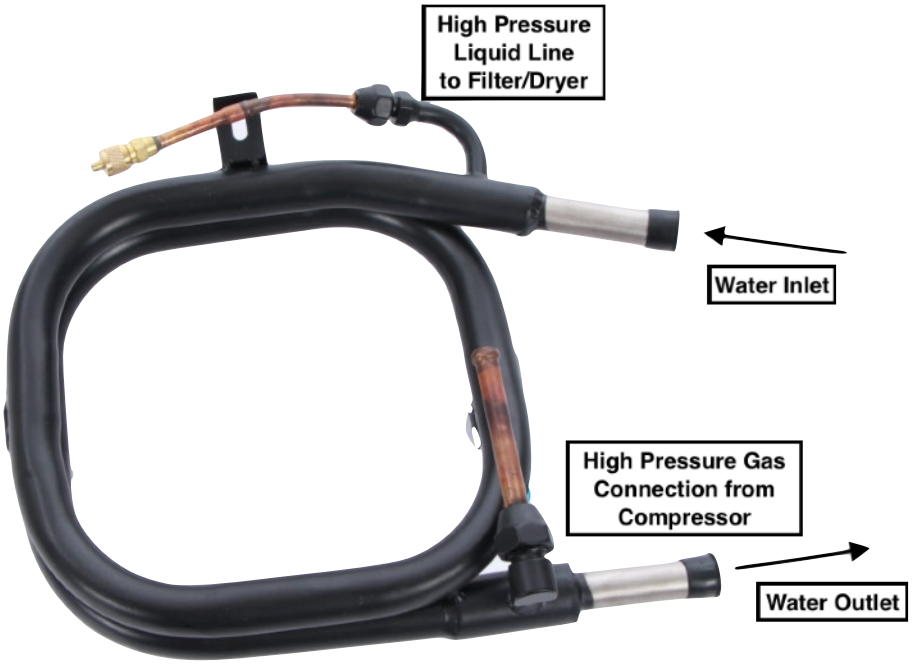
The plumbing consists of a run of ⅝" water hose that runs from your underwater thru hull through a strainer to the input side of the water pump. The water is pumped thru the condenser/heat exchanger and expelled overboard.

Note: All plumbing before it must be installed below the waterline as this is not a self-priming pump.

***TWO* stainless steel hose clamps should be used on each side of every hose connection.**

Test this system by temporarily wiring up the pump and verifying that the water flow rate is strong. If not, look for kinks in the hose or other restrictions. This is how heat is removed from the system; you will never get good performance without enough water flow.

It's important to note that the direction of water flow is essential. This illustration will help you connect the hose correctly.



Marine Condenser

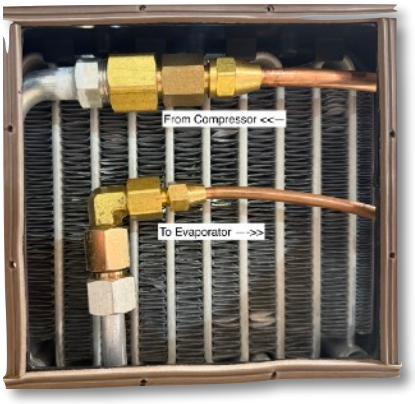
RV Heat Exchanger (Condenser) Installation Instructions. Skip this step if you are installing the marine version.

The purpose of this section of the installation guide is to describe how to prepare the air-cooled condenser for installation. Before you begin, you should decide where you want to install the air-cooled condenser. It shouldn't be any more than 10' away from the evaporator, and be protected from the sun and elements.

1. Position the condenser housing so that the condensation hold is down and the two tube connectors are visible. Now, position the condenser/fan adapter plate and position it over the condenser opening with the raised circle facing you and the word "Top" facing up. Center the condenser/Fan adapter plate over the condenser opening and drill eight 3/32 pilot holes in the condenser housing using the eight condenser/fan adapter plate screw holes as a guide. Note that it helps to use two small clamps to hold the condenser/fan adapter plate in place while you drill the holes in the condenser housing. DO NOT let the drill bit go any deeper than the condenser plastic housing, as you may put a hole in the condenser tubing.

Drilling holes in the condenser housing

2. Next, you will now make/install the rubber gasket around the same opening.
3. Cut two pieces of the rubber gasket to 6 1/4" in length for the left and right sides of the condenser housing.
4. Cut two pieces of the rubber gasket to 7 3/8" in length for the top and bottom of the condenser housing.
5. Use the holes you drilled in the condenser housing a guide to place small holes in the rubber gasket for the screws. If you don't do this, there is a good chance the rubber gasket will get caught in the screw and pull the rubber gasket out of place.
6. Attach the self-adhesive rubber gasket to the condenser housing, making sure that there aren't any gaps at the seams and that the holes you made in the rubber gasket line up with the holes you drilled in the condenser housing. The condenser housing should look like this.



Installing rubber gasket on condenser housing

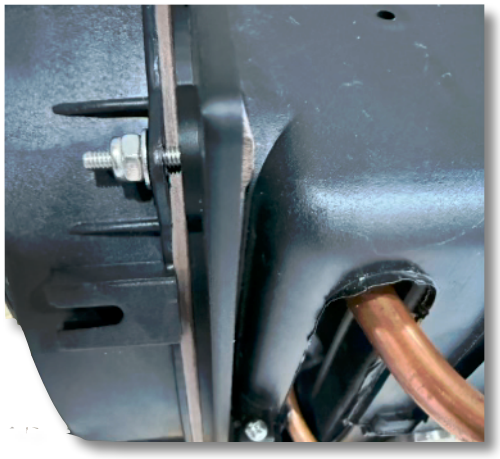
7. Now that we have installed the gasket on the condenser housing, we will install the rubber gasket on the condenser/fan adapter to seal the gap between it and the fan itself.
8. With the raised circle facing you, carefully install the rubber gasket on the raised circle. To make final assembly easier, we will temporarily glue the screw heads in place or place a toothpick in the hole with the screw to secure it in place.

Rubber fan gasket installed

9. With the raised circle facing you, and the word “Top” facing up, place the two #6x3/8” screws on the LEFT side of the condenser/fan adapter and temporary hot melt glue them in place. Making sure you don’t get glue in the Phillips head. Place the six #6x1/2” screws in the rest of the condenser/fan adapter plate hot glue them in place. The reason we use the #6x3/8” screws on the left side is that the condenser tube runs very close to the edge, and we don’t want the screws to puncture it. The next step is to attach the fan to the condenser/fan adapter plate.

Screws glued to condenser/fan adapter plate

10. Place the fan on top of the rubber gasket you just installed and use four #8 bolts, washers, and nylon nuts to fasten the fan to the condenser/fan adapter plate. Tighten the nuts until you start to see the condenser/fan adapter start to bend; then back off the nut until the condenser/Fan plate is no longer disfigured.



Condenser/fan adapter with rubber gasket

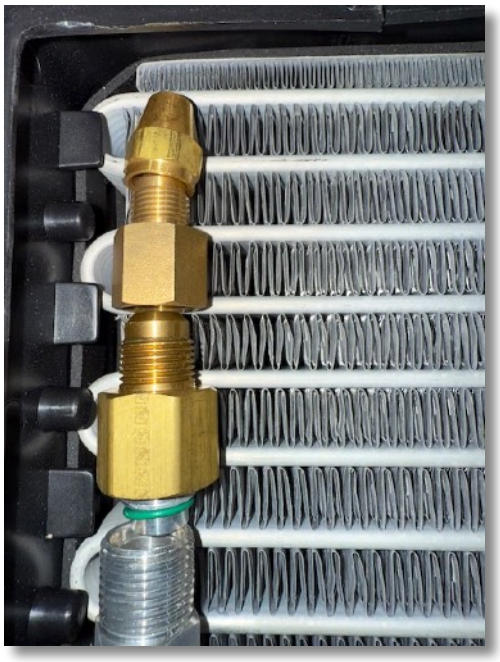
Fan is attached to the condenser/fan adapter.
Fan view

Fan is attached to the condenser/fan adapter.
Adapter view

11. Use some air conditioning foil tape and cover up the opening on the side of the condenser. Make sure the seal is air tight so that the condenser can remove heat from the system.
12. You will notice there is a small drain on the bottom of the condenser. Use the end cover that came with the 3/8’ copper piping to cover the hole.

13. Place the condenser on a table with the fittings side up. Locate the condenser fittings bag and attach the fittings as depicted in the picture. Make sure to lubricate the o-rings and coat the flare fittings with an AC-compatible sealant. Note that the larger diameter o-ring is used on the tube.

1/4" copper tube connects to filter/dryer/evaporator



3/8" tube connects to the high side of the compressor.

14. Now it's time to connect the high and low pressure lines to the rest of the system.

Connecting the High-Pressure Side

The **HIGH PRESSURE SIDE** consists of the following components:

- Evaporator connections:
  - Smaller O-ring to flare adaptor (aluminum) and smaller green O-ring
  - 3/8" to 1/4" reducing nut
  - 1/4" flare nuts for connecting the filter/dryer
- Compressor connections:
  - 3/8" copper flare nut to connect 3/8" copper tube to the RV/Tiny Home condenser. See the condenser section for more information.
- Filter/dryer
  - 1/4" flare nuts to connect filter/dryer
- ¼" copper tube (runs from the HIGH PRESSURE SIDE of the heat exchanger to the filter/dryer, and then to the HIGH PRESSURE SIDE of the air handler)
- Condenser hardware - See photos above

The **HIGH PRESSURE SIDE** of the tubing is installed as follows.

Note: It may be helpful to install the copper tube before flaring the ends to ensure the length is correct the first time.

1. Connect the 3/8" copper tubing from the **HIGH PRESSURE SIDE** of the compressor to the 3/8" flare connection of the air-cooled condenser. Run the copper tubing out of the side of the condenser.
2. Cut and flare the end of the ¼" copper tube on the heat exchanger**.** Run the copper tubing out of the side of the condenser. **IMPORTANT!!! Install the flare nuts on the tube before flaring the tube**
3. Connect the filter dryer to the ¼" tube
4. Cut an appropriate length of copper tubing to run from the filter dryer to the air handler
5. Install as required and flare each end. **IMPORTANT!!! Install the flare nuts on the tube before flaring the tube**
6. Install the smaller aluminum O-ring to flare adaptor and smaller green O-ring on the **HIGH PRESSURE SIDE** of the air handler and secure with the optional 3/8" elbow fitting and/or

7. Attach the 3/8" to 1/4" flare adaptor
8. Connect the filter dryer to the air handler with the ¼" copper tube
9. Tighten all the flare nuts **using opposing wrenches**.
    - ¼" flare 9 ft lbs
    - 3/8" flare 20 ft lbs

Connecting the LOW PRESSURE SIDE

The LOW PRESSURE SIDE consists the following components:

- Larger aluminum O-ring to flare adaptor and large green O-ring
- ⅜" copper tubing (runs from the LOW PRESSURE SIDE of the air handler to the LOW PRESSURE SIDE compressor.
- Hardware - ½" to 3/8" flare adaptor, two 3/8" flare nuts

Installation of the LOW PRESSURE SIDE

6. Cut the end of the 3/8" copper tube to run from the LOW PRESSURE SIDE of the air handler to the LOW PRESSURE SIDE of the compressor, install the flare nuts and flare each end.
7. Install the flare nut on each end of the 3/8 tube. **IMPORTANT!!! Install the flare nuts on the copper tube before flaring it.**
8. Install the O-ring and O-ring adapter on to the air hander with the 1/2" to 3/8" flare adaptor **using opposing wrenches.**
9. Connect the air handler to the LOW PRESSURE SIDE of the compressor using the 3/8" copper tube.
10. Tighten the flare nuts using opposing wrenches to 20 ft-lbs of torque.

15. You might be tempted to install the condenser/fan adapter plate to the condenser housing now. But it's best to wait until you pressure test the system before you do so. Now let's move on to connecting the proper fittings to the condenser.
16. Once you have tested the system for leaks, you can then install the condenser/fan plate on the condenser. DO NOT RUN THE SYSTEM WITHOUT COMPLETING THE FAN INSTALLATION, OR THE COMPRESSOR WILL OVERHEAT.

Wiring:

The last step is to wire this all up. The components are as follows.

Voltage Converter - 12 to 24-volt converter
12-Volt kit only

Voltage Converter - Only used in 12-volt applications.

Red	12V BUS Pos. (30A fused)
Black (thick)	12V BUS Neg.
Black (thin)	Control Board TB5
Yellow	Control Board TB6

Wiring the Compressor 12-volt system

1. Connect a wire from your 12V power distribution's positive side.

   Note: This circuit must be protected by a fuse or circuit breaker at 30 amps

2. Wire from your 12v power distribution to the step-up voltage converter's 12-volt side. These are the larger black and red wires.

   Note: The 12V wires should be at least 10 gauge, but bigger is always better, especially if the run is long.

3. Run the 12-gauge wires from the smaller black wire to the TB5 (24V GND) and yellow wire to TB6 (24V +) of the compressor control board.

   Note: Protect the positive wire with a 15 amp inline fuse.

Wiring the Compressor 24-volt system

1. Run the 12-gauge wires from the fuse panel ground to TB5 (24V GND) and 24-volts positive from the fuse panel TB6 (24V +) of the compressor control board.

   Note: Protect the positive wire with a 15 amp inline fuse.

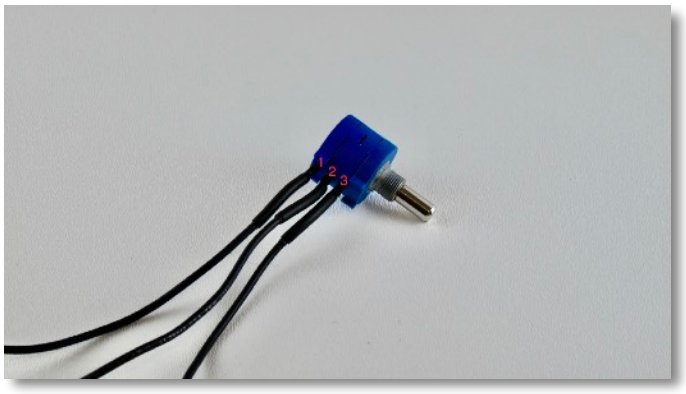
Wiring the Compressor continued.

1. Plug the flat end of the three-phase plug into the top of the compressor with the **wiring oriented toward the colored paint.**

2. Connect the three-phase wires to the Phase A-C pins of the compressor control board, which are located in the center of the board. Match the wire color to the correct color printed on the control board. **NOTE: Do not try to extend the three-phase wires. Doing so will void the warranty and cause compressor issues.**

   Phase A - Black Phase B - Red Phase C – White

3. Connect the coil of your 24v relay (85,86) to the TB7 and TB8 pins of your compressor control board with 18 gauge wire. This will be used later to activate your water pump and air handler fan.
4. Decide where you want to mount your compressor speed potentiometer. Solder 3 18-gauge wires onto it. Wire 1 should be connected to the



SPD (TB14) terminal on the compressor board, wire 2 should be connected to the +GND (TB9), and wire 3 should be connected to +5V (TB10). If you reverse these, it will reverse the direction you turn the potentiometer's dial to speed up the compressor, but everything will still work fine.

NOTE: three wires will be going to pin TB9. You will probably want them to all share the same female spade terminal. That is what the small (0.17") blue spade connector is for.

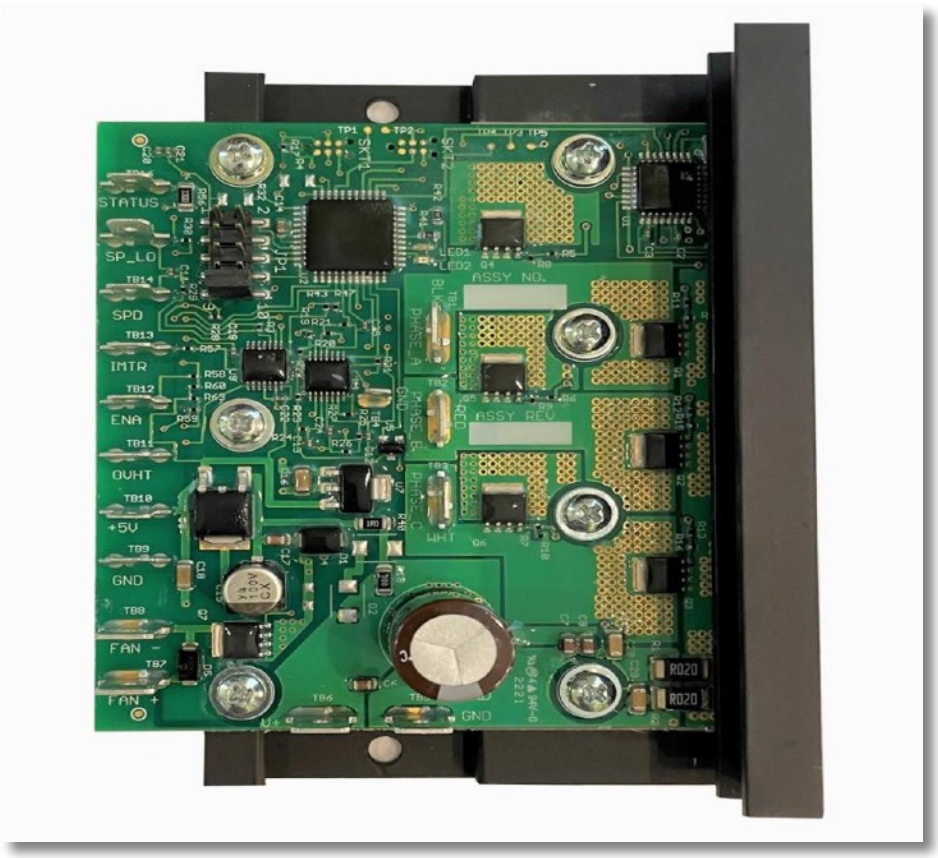
5. Mount the thermal cut-off switch onto your compressor and run one of its wires from it to the TB9 pin of the compressor control board. The other wire goes to the TB11 pin of the compressor control board.
6. Run 2 18 gauge wires from TB9 and TB12 of the compressor control board to your thermostat's activation pins. These wires should go to both the "R H" and "T M" terminals if both temperature and humidity control are wanted.
7. Connect the V- and V+ to 12V distribution panel.

(NOTE: It can be convenient to add a switch to one of these wires near the thermostat to allow you to deactivate the air conditioner easily from that location.)

Power the supporting 12V components.

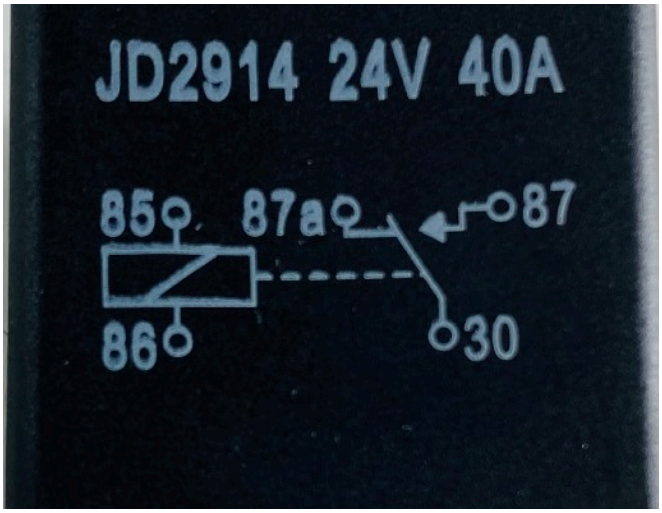
1. Run a 12 gauge wire from the 12 volt positive wire of the voltage converter to the switch side of the relay you just installed. This wire should be fused to 15 amps.
2. From the other side of the relay switch, run a 12 gauge wire to your water pump or condenser fan speed controller and the air handler speed controller's positive supply pin.
3. Run 12 gauge ground wire from these devices to the 12 volt ground side of your voltage converter.
4. Finally, run a pair of 18 gauge wires from the 12V side of the voltage converter through a 1-amp fuse to the power pins of your thermostat.

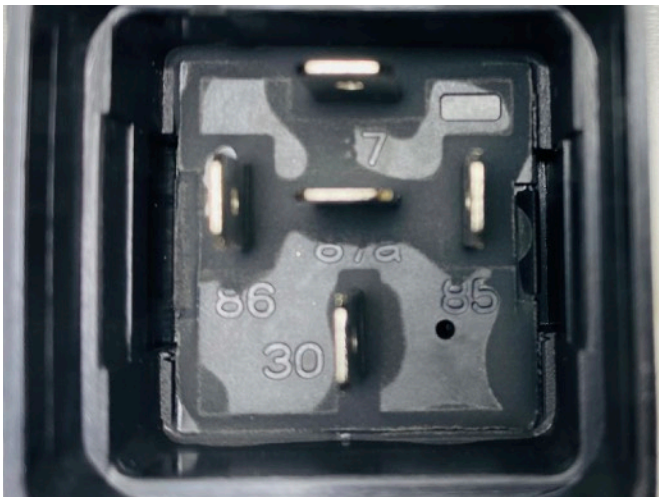
Compressor Control Board (Top to Bottom)



Pin Number	Pin Label	Connects to…
TB16	STATUS	No Connection
TB15	SP_LO	No Connection
TB14	SPD	Black Potentiometer
TB13	IMTR	No Connection
TB12	ENA	Thermostat RH and TM terminals for both temperature & humidity
TB11	OVHT	Thermal Sensor (Yellow)
TB10	+5V	White Potentiometer
T9	GND	Red Potentiometer, Thermostat Activation Pin, Thermal Sensor (Yellow)
TB8	FAN -	Relay 85
TB7	FAN +	Relay 86
TB6	V+	Voltage Converter (small yellow). If you are installing a 24-volt system, this will connect to your 24-volt fuse panel
TB5	GND	Voltage Converter (small black). If you are installing a 24-volt system, this will connect to your 24-volt common ground

Relay





Relay Pinout

85. TB8
86. TB7
87. 12V + Bus terminal
37a. Optional for 24V supply when AC is not active
88. 12V + Bus terminal

30 Water Pump, Air Handler, or condenser fan, depending on installation

Note: The newer relays have five pins. Pin 87a can be used for 24V power when the unit is not active

Congratulations! You've finished the electrical installation.

Charging

This video should help with this process. Temptress AC Charging.

We are going to now charge your air conditioner using the subcool method with r-134a. Your subcool target is 10 degrees F.

First step is to download the SuperCool app to your phone or tablet. This is a really helpful application that will make this process extremely easy. Run this application and on the first screen choose the option "charge a unit". On the next screen choose SubCooling or "TXV" option. Now choose R134a and 10 from the next screen and push "next".

This will bring you to the screen that will walk you through the process once we get started. Just keep entering the reading from the red side of your gauge set into the "liquid line psig" field and the temperature of the ¼" copper tube into the "liquid line temp" field. Push "calculate" and basically do what it says. More on this later.

Vacuuming the system out

Your system has been exposed to the atmosphere during installation. So it is currently full of air and humidity. Both the gasses and water in the air will cause all kinds of problems with the functioning of your air conditioner. So we must start by removing them.

Near your compressor you will find two access ports. One is on the low pressure side and the other is on the high pressure side. Remove the caps from the ports and install your gauge set's blue hose to the low pressure port and it's red hose to the high pressure port. Connect your gauge set's yellow hose to your vacuum pump. Open both valves on your gauge set and turn on the pump.

In time you will see the gauge meters reading a lower and lower pressure. Leave the pump running until you see the pressure go below -30 inches Hg and stay there for at least 30 minutes. Then close both valves and turn off the pump. Closely watch the low pressure needle. If it goes up you either have a leak in your system or you have water in your system that needs more time to evacuate. You may choose to repeat this step. If you see improvement it could be just water but if not:

If you can't manage to hold low pressure in your system you should search for a leak. Hopefully this won't affect you if you carefully installed all your copper tubing. But this leak has to be addressed. I
have a few suggestions. You may be able to hear the leak. Tightening your connections might fix it. You might have to add a bit of gas and either use a refrigeration gas sniffer or soapy water to find the leak. Once you find the leak perform the vacuum operation again.

Charge with refrigerant

So now you have a system fully evacuated and holding a vacuum. Next step is to add refrigerant to your air conditioner. With both valves of your gauge closed remove the vacuum pump from your yellow hose and connect the yellow hose to a can of R-134a. Open the valve on your refrigerant. There is a bit of air in the yellow hose so loosen the gauge side of the yellow hose to vent some gas and purge the hose.
Tighten the hose again. Now open your low pressure gauge valve and allow refrigerant to flow into your air conditioner. You will see your needles go up and then settle into a new reading.

This is another fine time to check for a leak. Temporally close all the valves and give the system some time. If it holds pressure you probably don't have a leak. Reopen the blue valve and the valve on your refrigeration can.

That's a start. But we need to add a lot more refrigerant into the system. To do this we need to turn on the air conditioner compressor. Before you power things up attach your clamp-on meter around the 24 volt wire going to pin TB6 of the compressor control board. When you turn on the compressor you will see the amount of current that flows into the compressor. This number is adjustable from 0 to as high as 13 amps. The compressor speed can be controlled by turning the potentiometer. The faster you spin the compressor the more power it will use. Once charged the system will operate at whatever speed you choose to run it but it will be most efficient if run at the speed it was charged to. So decide how you think you might want to use your system. (I charged mine at a bit over 7 amps).
CAUTION:

1) DO NOT RUN THE COMPRESSOR WITHOUT FREON IN THE SYSTEM. **THIS WILL DAMAGE THE COMPRESSOR**.

2) DO NOT USE THE POTENTIOMETER AS A MEANS TO START/STOP THE COMPRESSOR. THE POTENTIOMETER SHOULD ALWAYS BE TURNED UP HIGH ENOUGH THAT THE COMPRESSOR RUNS.

<u>If you can't get the amp draw high enough just start with the dial in the middle. Once some gas is in the system the compressor will get a chance to work harder.</u>

Throughout the rest of the charging process you will be most interested in the red needle (high pressure gauge) of your gauge set. This will tell you the pressure of the high side of your system.

Another thing you will have to monitor in this process is the temperature at the beginning of the ¼" copper tube leaving the compressor. Attach your thermometer firmly at this location. It is important that you get an accurate reading of the temperature of the gas leaving the condenser.

Now you can start adding gas in earnest. Turn on your air conditioner. (May have to set the thermostat low and make sure it's in cooling mode -see "Thermostat Overview" below. Also the potentiometer can't be set all the way to low). As the compressor runs it will draw refrigerant from the can into the system. You will see the pressure on your high pressure gauge (red side) go up slowly. (If this process stops make sure your refrigerant can isn't too cold. The warmer it is the faster it will deliver gas) You
will also see the temperature of the ¼" copper tube rise. As your system runs you will notice that the amp draw will go up. This is because it takes more power to compress the growing amount of gas in your system. Just dial your potentiometer down to maintain the current setting you choose above.

Periodically enter these values into the SuperCool app and if it says "ADD REFRIGERANT" keep going. If it says "ACCEPTABLE" you can stop but I suggest you add until your "Actual Superheat" field reads 10. If you miss the correct charge and the app says "REMOVE REFRIGERANT" close your refrigerant can valve and open the blue hose at the gauge to vent refrigerant from your system.

This is basically it. Once you get the right amount of refrigerant in your system just close off your blue gauge valve and let your system run for some time. It might take a while for things to settle in and it's possible you might need to slightly adjust the amount of gas in your air conditioner.

Once you are happy with the charge in your system, close the valve on the can of refrigerant and remove the hoses. Don't be concerned that gas leaks out (especially for the red hose). Just remove them quickly. The venting gas is from your gauge hoses, not the actual air conditioner. Put the caps back on the access ports and your system is charged.

Operation

Thermostat Overview

Humidity & Temperature Settings

The thermostat that comes with this kit can be set to turn the air conditioner on either due to high ambient temperature and/or high humidity. (There are times when the outside temperature goes down at night to the point that this unit would be off, but the humidity caused by sleeping in a small closed off cabin becomes uncomfortable. Setting both the temperature and humidity limits makes for a comfortable night and saves power by allowing you to choose higher temperature limits than would otherwise be pleasant.)

Use an External Fan

To save battery power, I suggest you keep a fan on yourself running low all night to circulate the air. It's surprising how comfortable you can be in a room only cooled to a few degrees below ambient temperature, as the air from the air handler is not only cool, but much drier. In fact, much of the energy used by the system goes to condensing water out of the air. An air conditioner needs to remove the water from the air before it can drop the temperature a significant amount. If you hear your system working and feel the air is cool coming out of the air handler but the room temperature isn't going down, just wait. The unit is working hard to remove water. Once it gets the place dry enough, the temperature will likely start going down again.

Thermostat Operation

There are two buttons on the left side of the thermostat display.

- The bottom button controls when the thermostat turns off the air conditioner.
- The top button controls when the thermostat turns the air conditioner back on.

Both of these values may be set by pressing the button until the display blinks, then using the top button to raise the setting and/or the bottom one to lower the setting. Waiting a few seconds while not pressing any buttons causes the thermostat to go back to normal operation mode.

Temperature Settings

The top button setting must be set to a higher temperature than the bottom button temperature, or the thermostat goes into heater mode (we don't want this). If you have it set correctly, the display will show a 'C' (for cooling mode) to the left of the current temperature.

Humidity Settings

The humidity is set much the same way. Again the top button setting must be set higher than the bottom button setting to put the unit into dehumidify mode. If you have it set correctly, the display will show a 'd' (for dehumidification) to the left of the current humidity level .

Recommended Values

I find it very comfortable setting the top (turn-on) temperature to 29.2C and the bottom (turn-off) temperature to 28.5C. I set the top (turn-on) humidity to 79.5% and the bottom (turn-off) humidity to 76.9%. This is a good starting point. Feel free to adjust to your needs and power availability.

Expectations / Getting the Most from Your A/C

This is a very small, energy-efficient air conditioner, meant to cool one small cabin or room, and to be powered off of batteries when you go to bed to give you a restful and cool place to sleep.

This system won't cool your whole boat or RV. In fact, it will have to work extremely hard to cool one cabin during the heat of the day with the sun beating down on your hull, unless you have good insulation. It can be run during the day, but don't be surprised if it never cycles off.

If you want to get more from this device for less power, curtaining off unused areas can be a good idea. In our installation, we sometimes pull a curtain to just cool off one bed, turn on the AC unit and take a "siesta" break during the hottest part of the day. We usually reserve this for when there is plenty of solar power available. I don't suggest you live your life under air conditioning, but this system allows you to take a break from the heat to watch a movie, take a nap, or do other activities that are normally uncomfortable in the high heat. In this way, it can drastically improve your quality of life.