



HD Series Installation Instructions

WARNING: ELECTRICAL SHOCK HAZARD. Failure to follow these warnings could result in death or serious injury.

- Before carrying out any work on electrically operated components, make sure they are disconnected from the power supply.
- Before installing the HD Series, disconnect all connections to the vehicle battery.
- Make sure all power connections are tight and secure. Important! When connecting power terminals inside the compressor box unit you **MUST** torque the power post to 11 ft-lb (15.82 Nm).
- All electrical connections should be made by a trained technician.
- **CAUTION: PERSONAL INJURY HAZARD.** Incorrect installation of the HD Series may place the safety of the user at risk. Failure to obey this caution could result in minor or moderate injury.

NOTICE: The HD Series should be installed by a qualified technician.

NOTICE: The connection to the vehicle's electrical system should be protected by a fuse recommended for your system. Please visit www.bluesea.com and click on Circuit Wizard for guidance on properly sizing wires and breakers.

NOTICE: The battery must be capable of supplying the required current and voltage.

- When handling our products, always use protective gloves and protective footwear. The product is made from mostly stainless steel and can have sharp edges that can cut you. The units are also very heavy, so lift with 2 people- never alone, and make sure before lifting that ALL screws are tight when securing the cover. 2 of the screws in the middle on the long sides and 1 on the backside keep the cover from sliding off. It's very important that they are put in and secured before moving. When installing cover screws, make sure unit is level and make sure holes are aligned. Do not force screws. They are stainless steel and will seize.
- Do not add any oil when charging this unit with refrigerant. The compressors are pre-charged with PVE oil.
- If oil leaves the unit during future recoveries, you may add the amount that left the system with more PVE oil. Call us for info on the viscosity. Never add PAG oil or leak dyes that are not compatible with PVE oil. Call us and we can recommend a suitable leak dye. PAG or PAG electric oil will ruin the compressor and void your warranty.
- **Do not reverse polarity.** Damage will result and void your warranty.

Attention: User serviceable parts inside, make sure units can be accessed for future servicing.

Installation: HD Series Air Conditioners

1. Locate the area where the unit will be mounted and double check that there are *NO* obstructions. Make sure that the location allows for the cold air to return easily through the long side of the unit. If the return air cannot easily return into the unit, cooling performance will be limited. The side that has perforated holes and the words “Cruise N Comfort USA” laser cut into it is the intake for return air, DO NOT RESTRICT THIS INTAKE. Make sure the unit is mounted so that the cover can be removed to evacuate, charge and service the system. The evaporator/compressor box needs to be mounted in the area it is cooling. It is not designed to be outside in the elements. Dust, moisture, and heat from outside the vehicle will harm this piece. The condenser is the only component that should be outside. See *Figure 1* for HD unit dimensions and *Figure 2* for recommended placement.

DO NOT LIFT UNIT BY COVER AND DO NOT OPERATE UNIT WITHOUT ALL LINES AND COVER IN PLACE. THE COMPRESSOR IS PRE-FILLED WITH PVE COMPRESSOR OIL. TAKE CAUTION WHEN REMOVING CAPS.

2. The unit has 4 large 3/8” holes punched into the stainless steel plate chassis. We recommend you thru-bolt this unit to the floor using at least 3/8 grade #5 bolts with lock nuts and fender washers. This unit is very heavy at around 70 lbs., so secure it accordingly or injury could result!!!

3. Find a suitable location for the remote condenser. This condenser is not designed to be in front of a radiator. It will block the air flow and cause overheating. The remote condenser must be installed so air can enter the front of the condenser and then is pulled through the fan. It is a good idea to have the fan toward the back of the vehicle, so when traveling down the road, air can easily go through the condenser (see page 13-14). The unit can be mounted standing up with the large port being higher than the small port and the hose exiting out the side not the top. If the condenser is vertical, make sure the unit has at least 5 inches in front of the condenser for proper air flow. If mounting the condenser horizontal, make sure the large #8 port is higher than the small #6 port to keep oil from getting trapped in the condenser (see *Figure 3*). Condenser specifications can be found on *Figures 5 and 6*.

4. Run #6 and #8 refrigerant hoses from the evaporator to the condenser (make sure the little green o-ring’s are inside the fittings). When passing the lines through metal the use of grommets are recommended and the outside dimensions of the hose are below. The included 10 foot long condenser wire needs to be passed through as well and is a 14 gauge 2 conductor wire 0.360 in x 0.162 in. Tighten the 4 fittings first by hand then with 2 open end wrenches. Hold the center pipe on the fitting in place while turning the outside nut, do not let the nut draw the fitting into the hole, the green orange could be damaged. Make sure the fittings on the inside of the HD bulk head do not turn when tightening the hose fittings, always use 2 wrenches- damage to internal lines will result. Do not loop lines or have excessive low points. It is recommended to use the 7 foot hoses we supply. See *Figure 7*. **Always make sure lines are protected from sharp edges. Mc Master-Carr is a great source for the grommets and other miscellaneous items to make your custom installation easier.**

A/C fittings recommended torque settings:

Always use specific torque values. Remember to check fittings and crimps with water soap solution after 1st charge and unit running. Bubbles will show most leaks. Wiggle lines after applying soap to check for good crimp and look for bubbles.

HOSE FITTING CONNECTIONS

RECOMMENDED TORQUE VALUE:

Hose #1 #6 $5/16$ " I.D. , $3/4$ " O.D. HOSE (LIQUID LINE)

Torque: 12 ft/lbs

Hose #2 #8 $13/32$ " I.D. , $29/32$ " O.D. HOSE (HIGH PRESSURE HOSE)

Torque: 16 ft/lbs

5. Run the supplied condenser wire from the evaporator box to the condenser fan. Make the proper connections for the correct condenser (*see Figures 4a, 4b, 4c*), solder together and shrink wrap. Note: electrical connections should be performed by a qualified individual for your safety and the safety of the user.

6. Run the primary power wires with ends crimped and soldered from the A/C unit to the battery. Please use the included terminal boots when connecting the primary power wires to the unit. These must be used to properly insulate these high current terminals from shorts. Be sure to research the correct wire size for the amperage and length of the wire. Install a properly sized fuse or resettable breaker to the positive wire at the positive battery terminal. By using a good quality resettable circuit breaker you can disconnect power to the unit if you will not be using it for awhile. See *Figure 8. We have had good success with Blue Sea products. We have seen other brands trip early and under the rated capacities.*

***Please use the following link for sizing your wiring and circuit protection: [visit http://circuitwizard.blueseas.com/#](http://circuitwizard.blueseas.com/#) for a circuit calculator or download the app for Android or IOS. **Warning!!: Improperly sized wiring circuits or breakers can result in fire, injury or equipment damage. Use a good quality wire.**

7. Connect the manual A/C control unit or optional thermostat to front control plate. See included sheets for thermostat operation.

8. Connect the positive and negative connections to the unit and make sure the main power switch is in the **off** position. Do not remove the compressor's power ring terminals that are already installed. Use the included terminal boot isolators when making the power connection to the main terminal. Tighten nuts securely. Torque power terminals inside the compressor box to 140 in-lb (15.82 Nm).***
Make sure all electric connections are crimped and terminal lugs are tight otherwise fire, injury or equipment damage.

9. Connect 4" insulated nonconductive vent hose to unit and run hose to area that is to be cooled. Remember, for best results, the vent should be up high in the area to be cooled. Mount vent or ducting assembly and connect hose. Be sure to use nonconductive hose with a nonconductive fastener because of the close proximity of the main power terminal. Failure to do so could cause a short or fire. For best results, make sure that air from the cooled area can be returned with ease to the A/C air inlet on the front of the unit. The best way of doing this is to mount the unit in the area that is being cooled. By recycling cool air, unit will provide coldest air possible.

*****Do not mount this unit in an engine area or where exhaust and gas fumes can be exposed to this unit. This unit is NOT explosion proof and circulation of exhaust fumes or flammable fumes can be deadly! NEVER operate unit without cover in place and secured!!**

10. Connect 3/8" ID tubing (available at most hardware stores) to the 2 fittings on the sides of the evaporator tray and secure with small hose clamps. Run the tubes to the outside of the vehicle. Make sure lines are not kinked and do not go above the tray. Lines should stay level with drain tubes and go down through floor from there. If the system will be operated in humid environments or bumpy non-level roads, please purchase our condensation drip tray. When using the optional condensation tray, you will still need to still hook up the internal drain tubes and run them into the optional tray to direct water to the tray protect vehicle from water damage.



3/8" OD condensation drain tube 1 of 2



3/8" OD condensation drain tube 2 of 2

11. The unit will now need to be evacuated and charged with R134a Refrigerant by a licensed refrigerant technician. If you feel you can charge the system yourself, a vacuum pump, R134a gauge set and cans of freon can be purchased from Harbor Freight, Amazon or most automotive parts stores. Call us if you would like help with this or see the charging video on our website under the manual and videos tab. Our HD Series hold 2.25 pounds of R134a refrigerant or 3, 12oz cans when using the 7 foot lines we provide. To make communication easy with the person charging the system please print page 22 and give to the technician to avoid confusion. We can also help with this up if you provide them with our phone number.

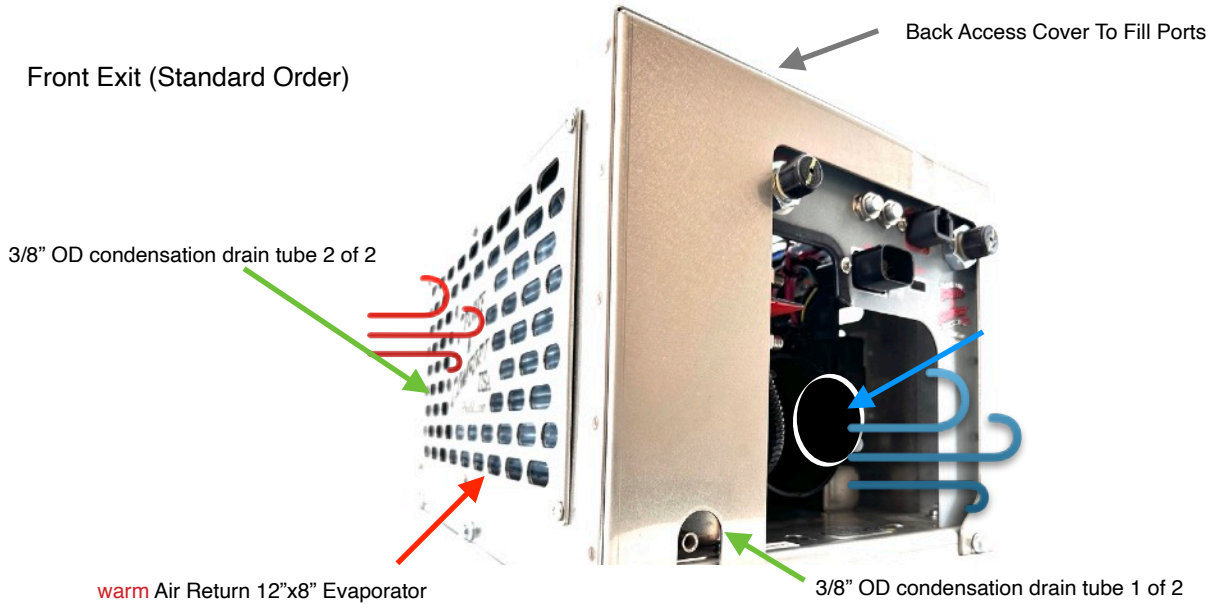
Items not included but required for installation:

- Condenser mounting would require a custom bracketed and/or miscellaneous hardware. We do have a universal condenser mount available-call for details.
- 5/16" Grade 5 or Grade 8 bolts with large fender washers and locking nuts recommended for mounting unit to floor.
- 3/8" ID vinyl hose to hook to the 2 evaporator condensation drain tubes located one on each end of tray. These tubes need to be run outside and always lower than the unit to allow proper drainage.
- Circuit breaker or fuse at battery. Always match circuit protection to the wire it protects. Here is a great article on this. https://www.bluesea.com/support/articles/Circuit_Protection/95/Choosing_Circuit_Protection
- HD-12L 70 AMP
- HD-24L 50 AMP
- HD-48L 30 AMP
- Good quality breakers like Blue Sea or Buss. There are circuit breakers available that look like these manufactures but we have seen them fail at lower than their rated amperages.
 - Please crimp terminals, solder and heat shrink. Protect all positive terminals with included rubber boots. Important! When connecting power terminals inside the compressor box unit you MUST torque the power post to 140 in-lb (15.82 Nm).
 - www.bluesea.com has a great wire size chart that can help you properly size you're wire runs. If you don't feel confident wiring this unit, please seek professional help. Serious injury or death could result from improper installation.
- Suitable insulated ducting:
 - 4" AC Infinity ducting available on amazon.com
 - Trident Insulated Air Conditioning Duct – #470 available at www.tridentmarine.com
 - 4" Thermaflex available at www.Lowes.com or www.HomeDepot.com

Vent / Ducting Tips:

- Do not reduce vent sizes or ducting- or have long runs of ducting.
- It is a good idea to let the air do the traveling.
- Always use insulated ducting when exposed to air- otherwise tubing can sweat and condense water.
- Always allow air to return into the intake easy and let it flow out easy.
- If the unit is installed into a cabinet, then a corresponding hole needs to be cut to let return air into the unit. Short ducting runs of 5 feet each and QTY. 2 - 4" vents are key to success.
- We have Y splitters that attach to the blower output. See our online store for details
- Isolate compressor/evaporator unit from hot components like hot water tanks and electronic equipment.

Front Exit (Standard Order)



*Optional Top Exit (Custom Order)

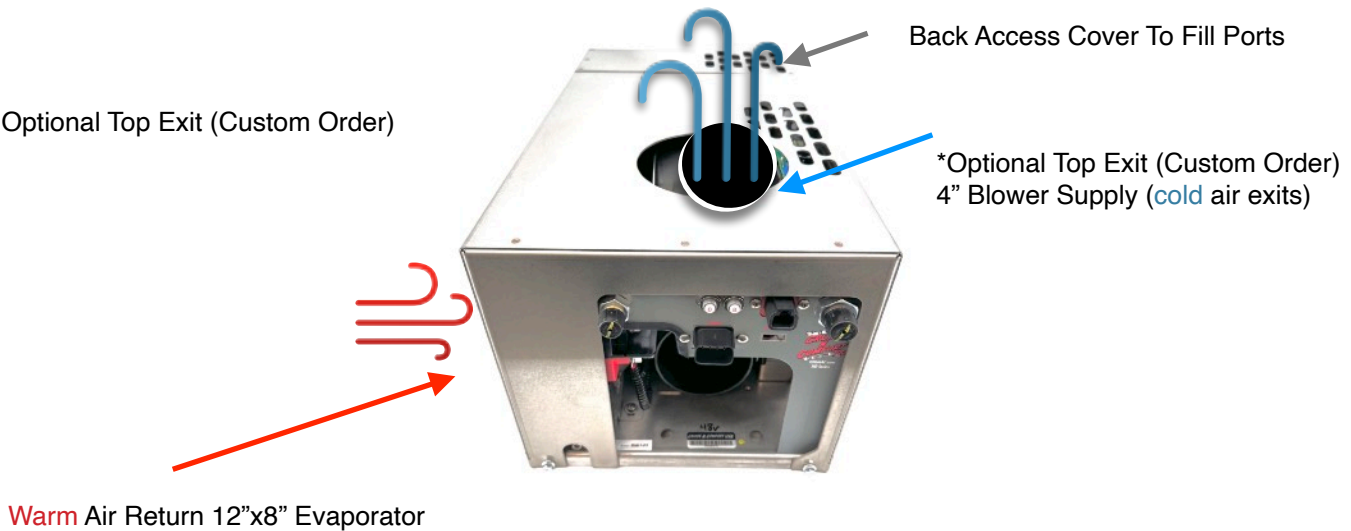


Figure 1: HD Unit dimensions

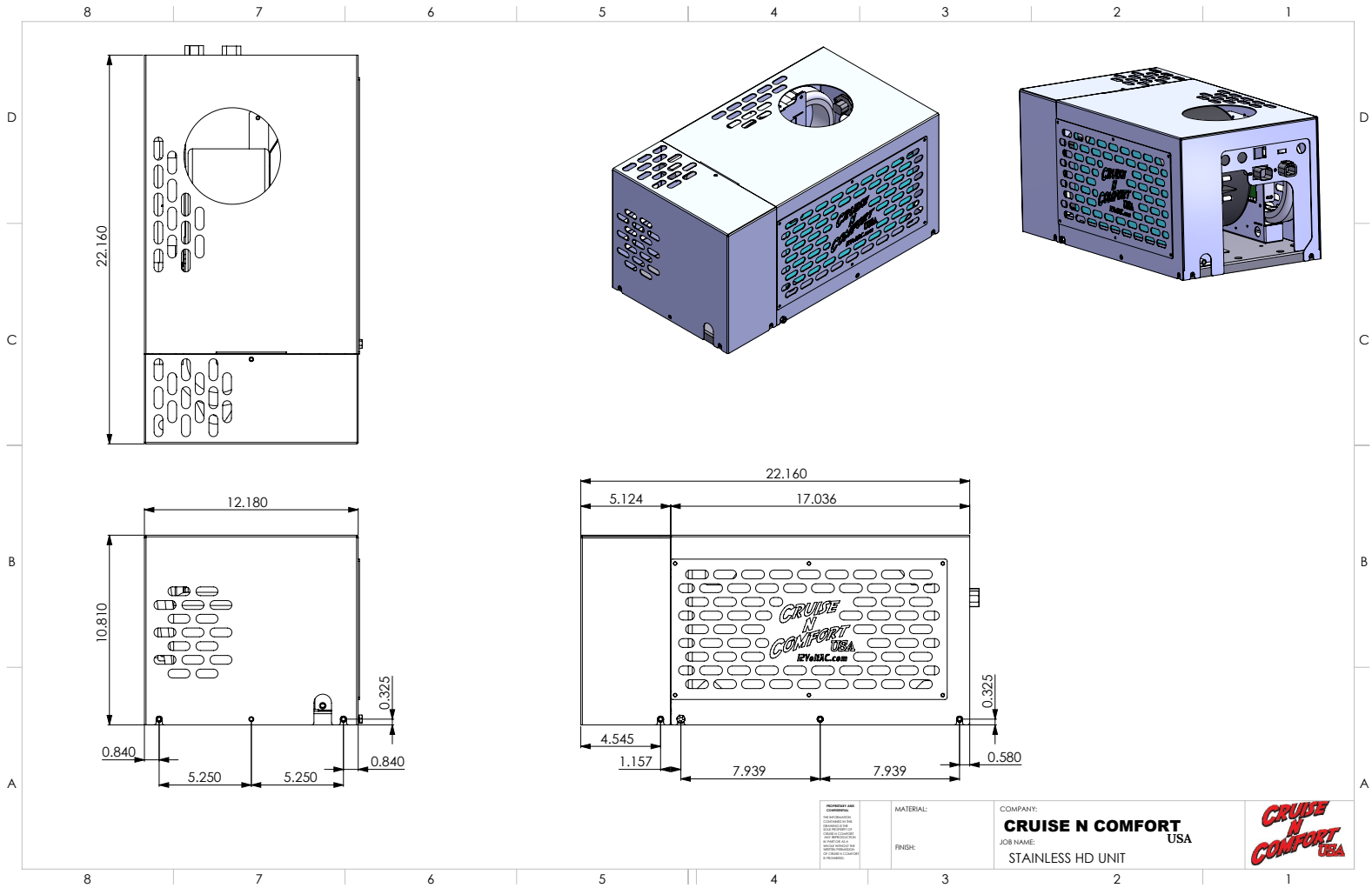
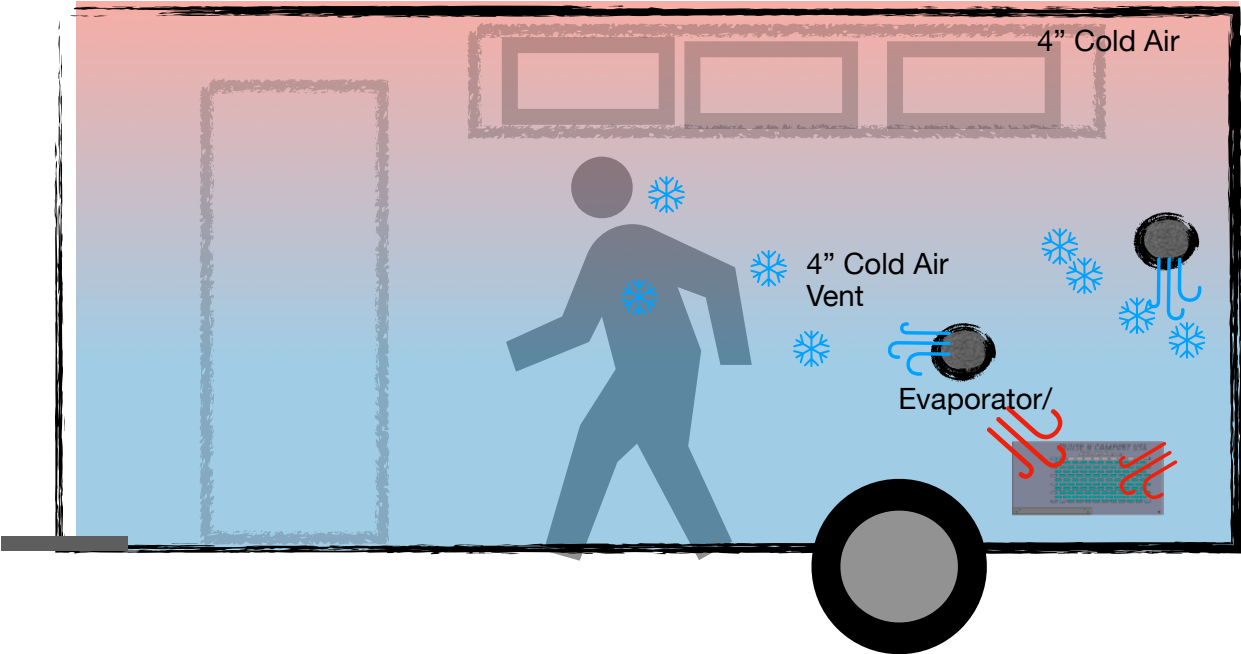


Figure 2: Component placement for the HD- Series in a small trailer/van.

This installation is typical and has been very successful for our customers and van builders. The unit is typically mounted in a cabinet down low or mid height with the front exposed for maximum air return. Then 2 vents are straight out of the unit in short runs with minimal 90 degree angles. Remember that short runs will achieve better flow and 2 vents will help with better circulation. The vents we supply achieve proper flow, any other vents or ducting can reduce this flow and yield undesired results.



Rear Van Garage Space

This is acceptable if the pass thru bulk head door is left open during use to return air to the garage. Another option is to face the return grill to the bulkhead and cut a corresponding hole to the evaporator. You may leave the cut open or use our detachable grill (see pictures below). If you use your own grill, make sure it is at least 16" x 8" and be sure to remove ours for better return air flow.



Garage Area No Bulkhead (open pass through)



Mid Vehicle mid level using the front of the HD cover



Mid Vehicle Low



Upper Cabinet



HD Series Refrigerant Lines

Inside Vehicle

Figure 7:



7 feet #6 hose

7 feet #8 hose

Outside Vehicle

Condenser can be mounted above or below the a/c unit. Can be mounted horizontal or vertical as long as both ports are not at the top or bottom.



Correct horizontal mount big port is higher than small port.



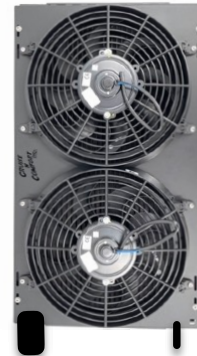
Correct vertical mount big port is higher than small port. Allows refrigerant to come in big port and exit small port.



Incorrect vertical mount big port is higher than small port. Allows refrigerant to come in big port and exit small port.



Incorrect ports at bottom



Incorrect ports at top



Figure 8:

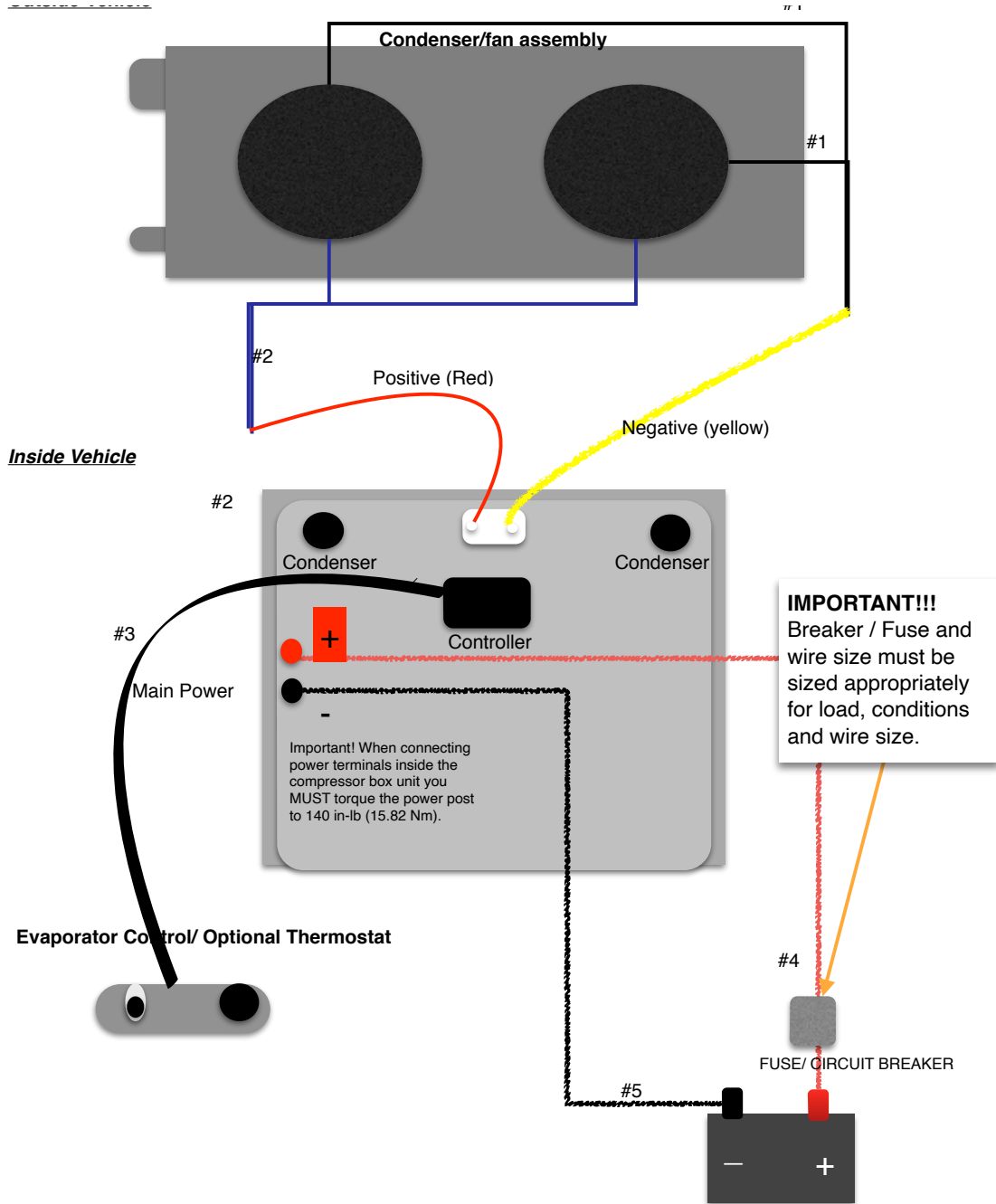
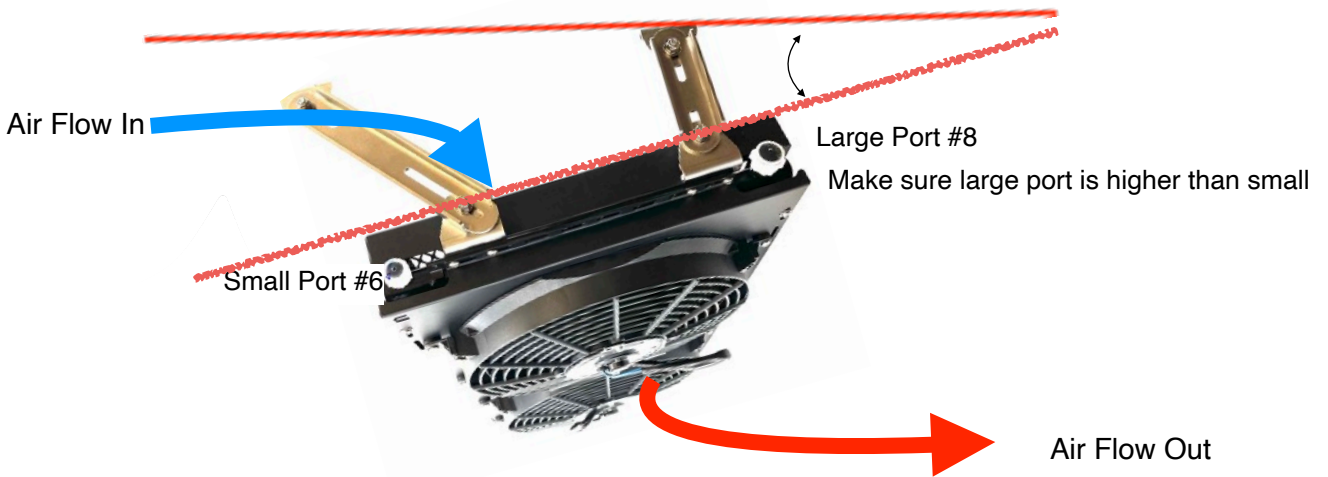


Figure 3: Installation Requirements For Cruise N Comfort USA Remote Condenser



Try to give the unit a minimum of 6 inches around all sides for proper air flow. Do not box this unit in. We use puller fans and hot air will flow out of the back of the fans and return into the front and cause undesired results.

Looking at the end of the condenser, the small port should ALWAYS be lower than the large port. All of our condensers use a puller fan. When mounting, allow the air as the vehicle goes down the road to enter opposite the fan and let the fan pull the air through the unit and out.

All of our condensers and fans are automotive grade, so they use a sealed dust/water resistant motor.

Please allow at least 6 inches of unobstructed clearance all around unit to allow proper air flow. Inadequate air flow will result in higher current consumption, increased high side pressure and increased current consumption.

*We have universal condenser mounts and rock guards available on our website to help mount and protect this unit.

Things to Consider:

- Included condenser lines have been designed for this system. Custom lines are available for purchase but longer lines can affect the efficiency of the unit. Call for more info.
- Keep away from as much heat as possible... make cool fresh air go in easy and out easy and keep it away from heat sources.....

THIS IS A REMOTE CONDENSER. DO NOT MOUNT IT UNDER THE HOOD IN FRONT OF THE RADIATOR. IT WILL BLOCK THE FLOW. FOR BEST PERFORMANCE IT IS RECOMMENDED TO KEEP CONDENSER LINES AS SHORT AS POSSIBLE AND AWAY FROM HEAT SOURCES.

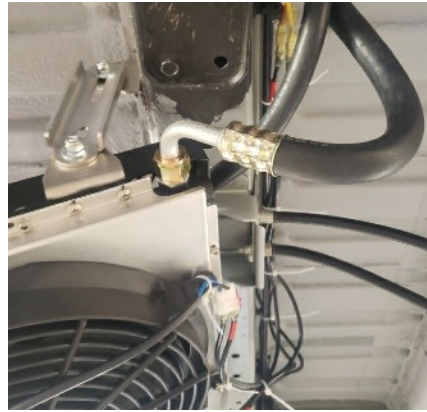
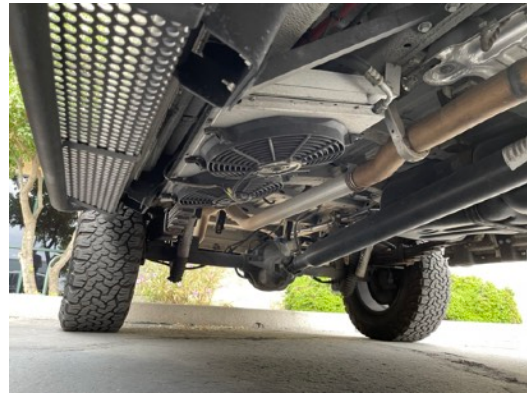


Figure 4: Condenser Wiring

Figure 4a: Single Fan 12 Volt

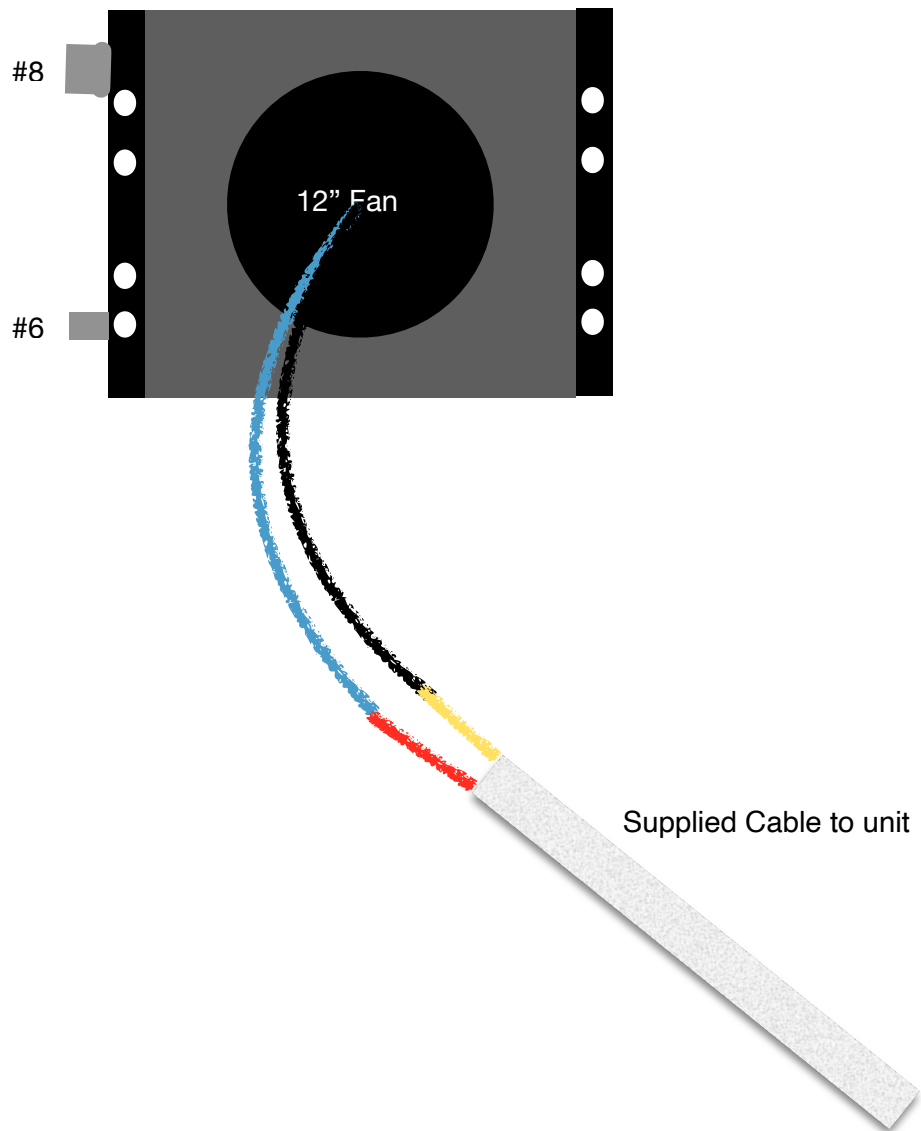
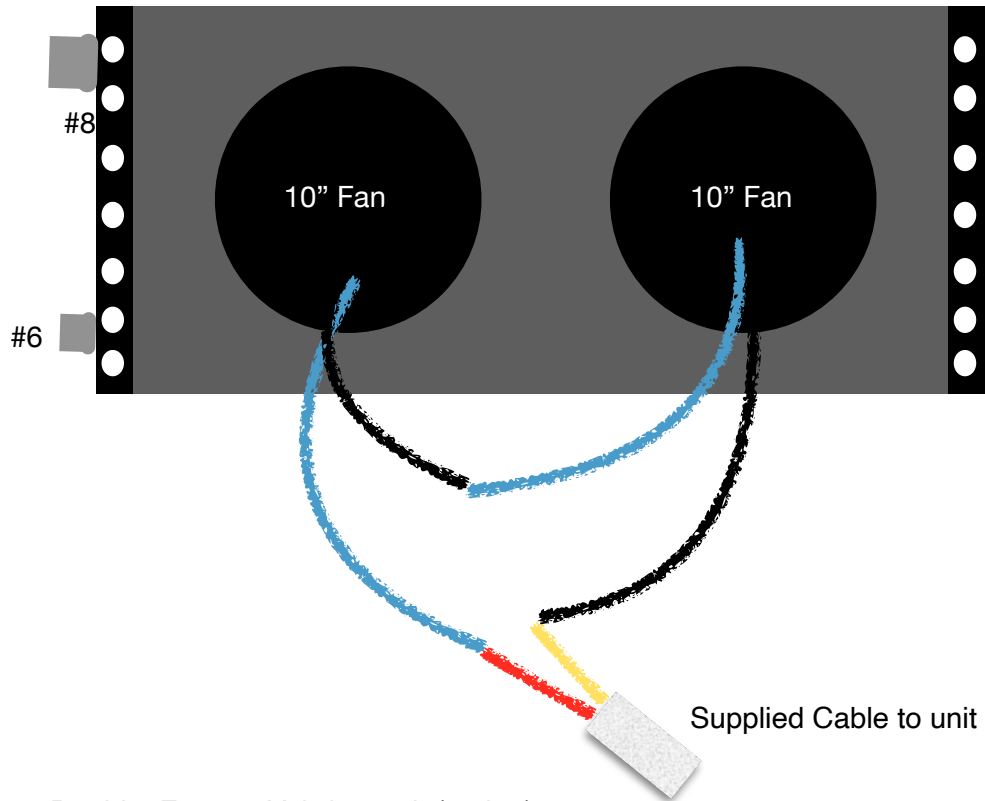


Figure 4b Dual Fan 12 Volt / 24 Volt (option)
wired series for daytime use in moderate climates or night time use in moderate climates



Double Fan 12 Volt / 24 volt (option)
wired parallel for use in extreme climates (Southwest US).

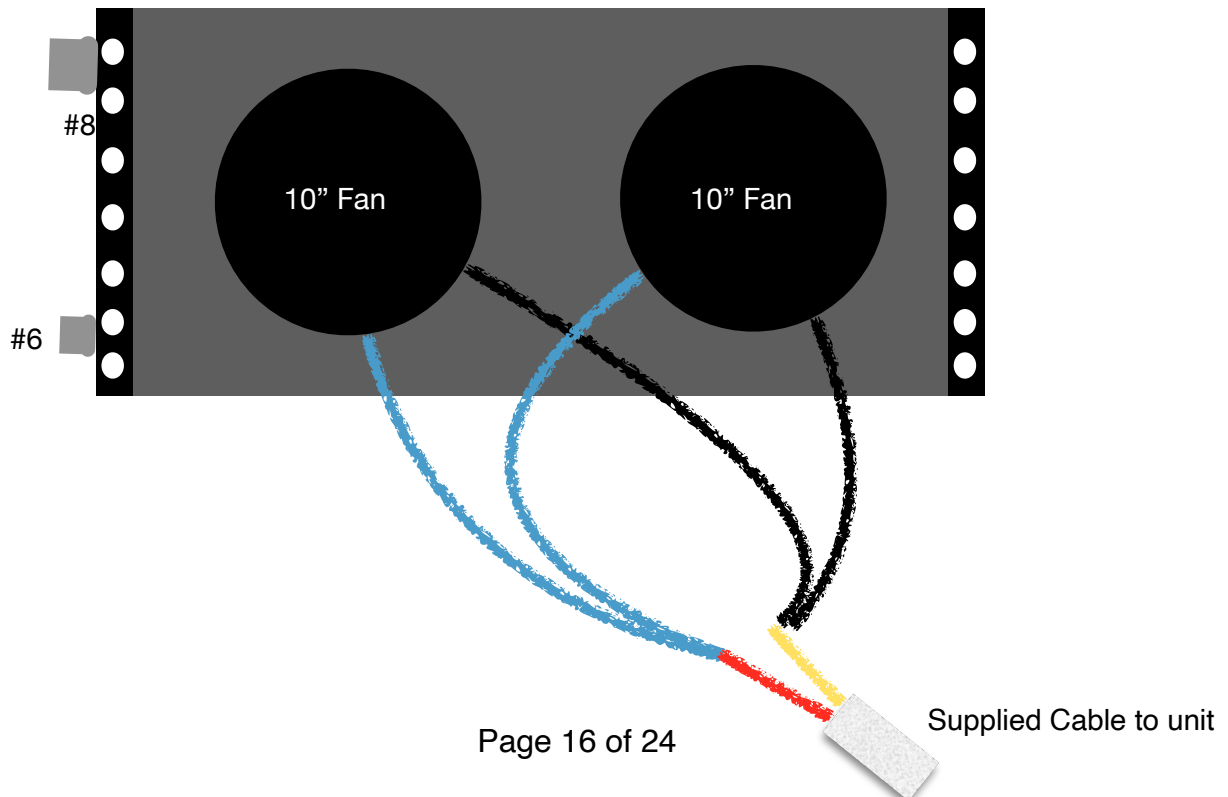
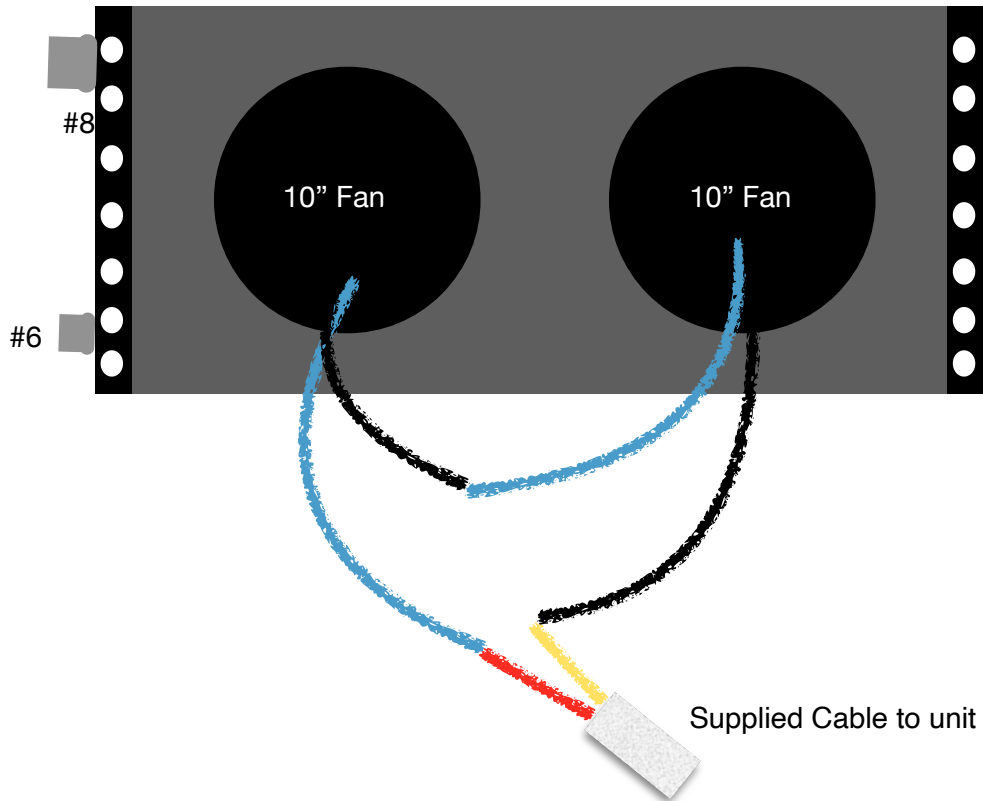


Figure 4c: Double Fan 48 Volt

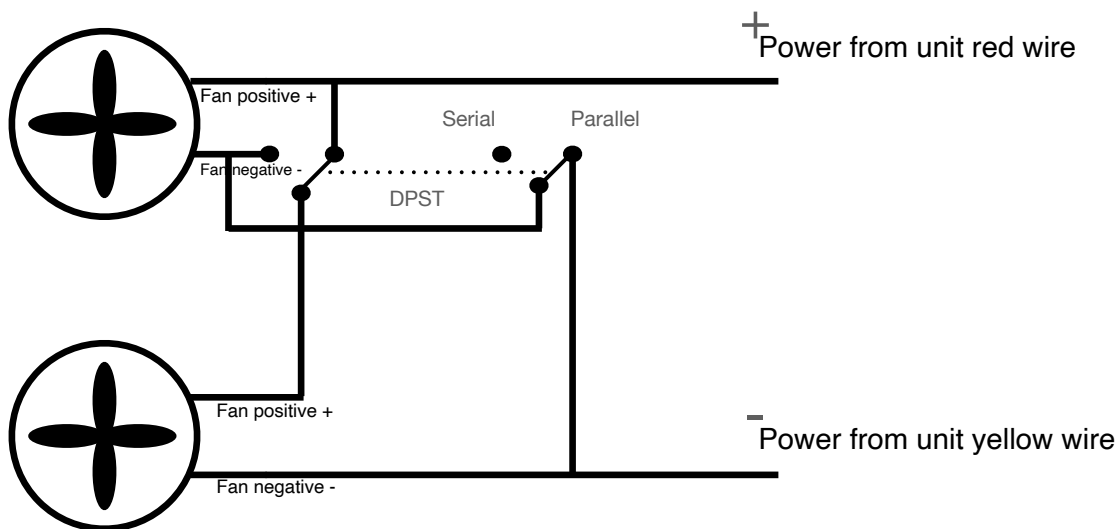
Our 48 volt systems are currently only available with the double fan configuration. The unit is 2- 24 volt fans wired in series.

DO NOT WIRE THESE IN A PARALLEL CONFIGURATION- IT WILL RUIN THE FANS.



If you are interested in building a circuit to switch between series and parallel, here is a schematic on how to do that. Remember to properly size the wires, connectors you choose and fuse any power wires. The relay should be rated to 30 amps and designed for the voltage of your system (12/24 Volt). Digi Key, Mouser, Mc Master-Carr or Grainger may be a good source for the Double Pull Single Throw Relay (DPST). *Please note this option is only good for 12 volt fans on a 12 volt system and 24 volt fans on a 24 volt system. This is currently not an option for our 48 volt systems.

CnC-2020-Drawing-Schematic-Condenser Hi/Lo Switch-12_5_20



12 volt fan wire positive + is blue
24 volt fan wire positive + is red

Figure 5: Single Fan Condenser Specifications



Optional Rock Guard

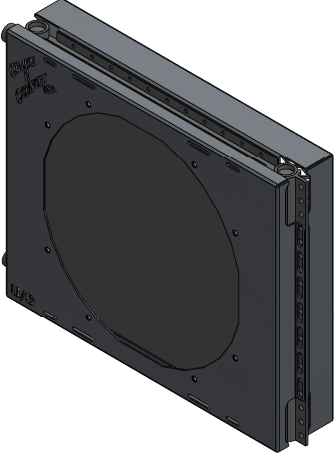
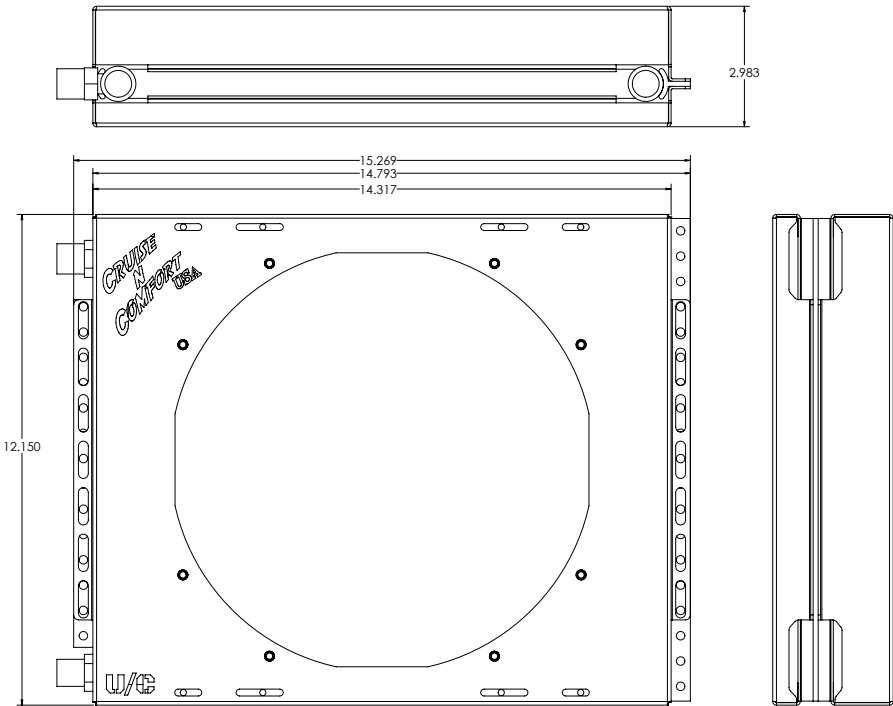
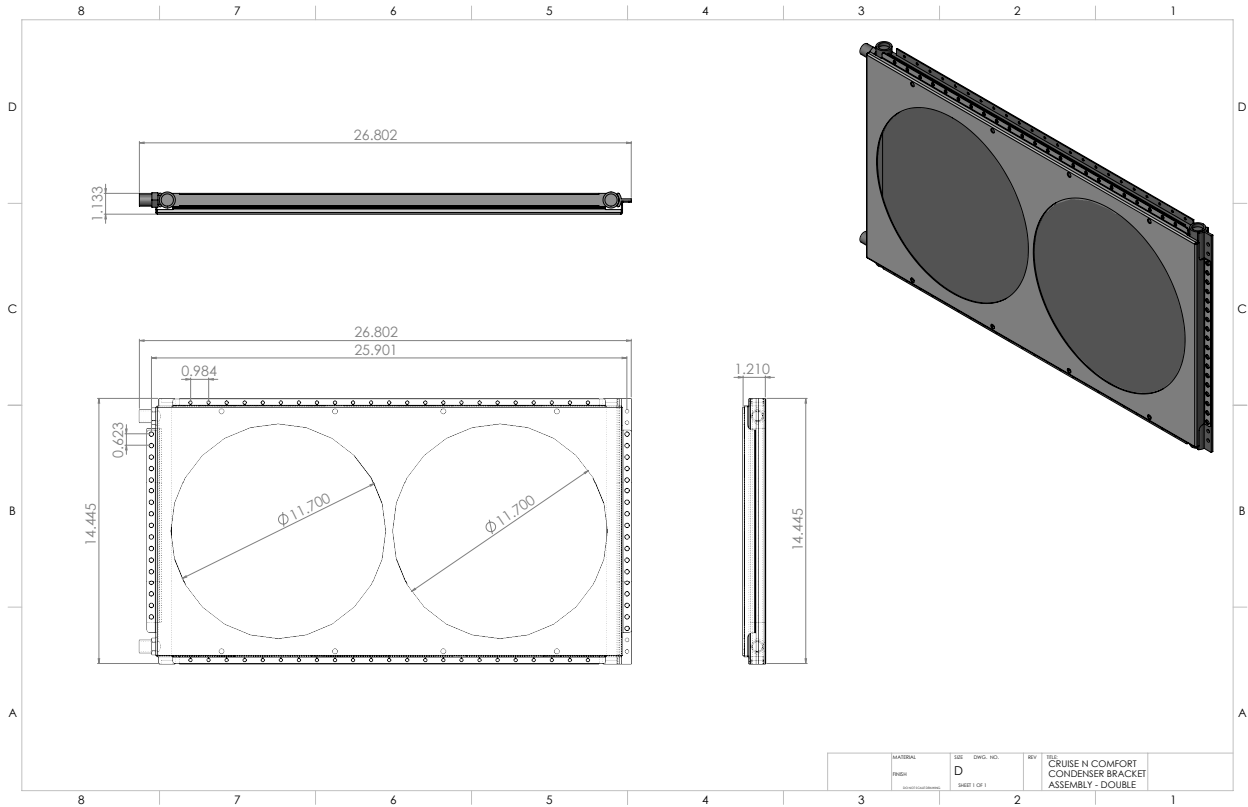


Figure 6:

DUAL FAN CONDENSER OPTION DIMENSIONS




DO'S AND DONT'S

Here are a couple tips and tricks that will help you get more out of your CNC unit:

- Use the vehicle's a/c to help cool the area down. The a/c unit on your van or vehicle is a lot larger in capacity than your CNC unit. By pre-cooling the area, the CNC unit has an easier time maintaining the desired comfort level.
- If the unit cools down the area but the thermostat turns the unit back on or never shuts it off: The air conditioner is operating correctly. It is possible that the insulation is not enough to maintain the temperature in the area.
- Our A/C units will take a long time to cool larger hot areas that have been sitting in the sun. To help the CNC unit cool down the area to be cooled, start the engine and run the factory A/C until desired temperature is reached. If the area to be cooled is pre-cooled, then it will maintain a comfortable temperature depending on solar load & ambient temperature.
- To prevent icing the unit in high temperature and high humid environments, do not run the unit at low blower speeds.
- Divide the front driving area, rear doors and or the sleeping area with a heavy curtain. This along with insulated window shades, helps to keep the heat out of the area that is desired to be cooled.
- Mount the thermostat mid-height in the vehicle and near the return air in the area it is cooling so you get more of an accurate reading (like in your home). Also avoid mounting the thermostat to an outside wall it will get a false reading from a warm wall, direct sunlight, hot equipment or equipment panels.
- Park in the shade as much as possible. This will make a big difference on how easy it is to cool the area.
- When possible, park the vehicle facing east or west, this will decrease the surface area that is heated by the sun.
- Make sure your batteries are full. The higher the voltage, the more the unit cools (i.e., 12.8 VDC vs. 13.8 VDC).
- Insulating the vehicle is very important. Invest in a thermal imaging camera for your smartphone. These cameras are fairly inexpensive and can help you see where your vehicle needs better insulation.
- Current consumptions are nominal. The units can draw more in hot climates or when installed improperly, and they can draw less in cooler climates.
- Please allow at least 6 inches of unobstructed clearance all around condenser unit to allow proper air flow. Inadequate air flow will result in higher current consumption, increased high side pressure and increased current consumption.

DO NOT mount evaporator/ compressor outside the area to be cooled. Dust, moisture and high heat can lead to damage and voiding of warranty.

DO NOT mount evaporator/ compressor in with high heat equipment like inverters, chargers or hot water heaters.

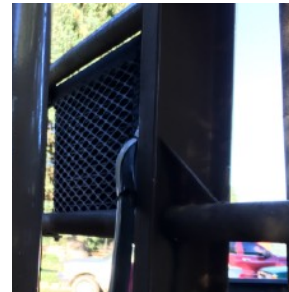
 DO NOT LEAVE CHILDREN OR ANIMALS UNATTENDED. DO NOT RELY ON OUR A/C SYSTEM OR YOUR VEHICLES A/C SYSTEM. IF A FAILURE OCCURRED TO ANY PART OF THESE SYSTEMS INJURY OR DEATH COULD RESULT.



Use only pure R134a refrigerant



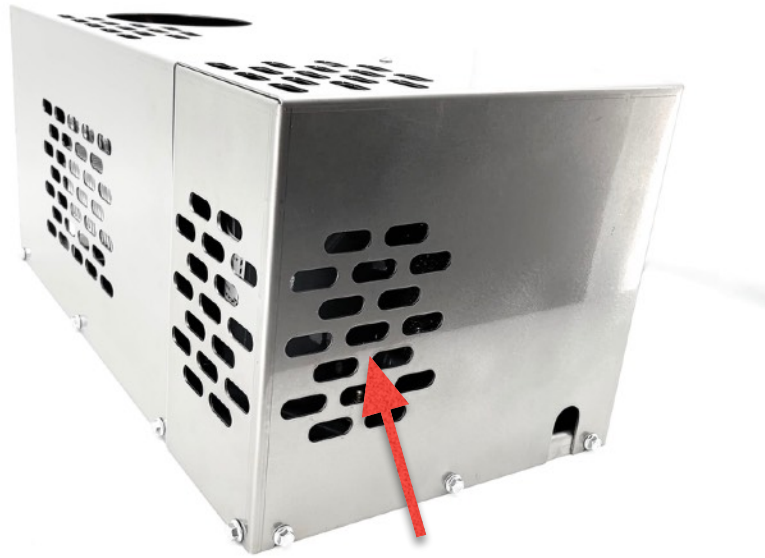
Do not use freon with additives or any cans that say first charge or have oil in them. PAG and other oils will short the compressor. The compressor is pre loaded with 4 OZ of PVE oil before shipment.



Initial Charging:

1. Remove smaller rear cover to expose fill ports.
2. Evacuate unit with vacuum pump and manifold gauge set for at least 20 minutes.
3. Check to make sure system is holding vacuum.
4. Fill with 2.25 lbs. of R134a Refrigerant (no oil charge! No PAG OIL! PAG oil and other additives will ruin the compressor and void the warranty).
5. Run system and make sure condenser fans are operating correctly.
6. once the unit is running you may use a soap and water mixture to check the flexible lines that connect the main unit to the condenser for leaks. Spray the fittings and crimps and look for bubbles.

To charge the unit, simply remove the allen bolt on top of the cover that bolts the 2 pieces together and loosen 1/4 -20 bolts at the bottom



Low and high side charge ports