



HIGH VELOCITY AIRFLOW

CABIN COOL M100

The First Air Conditioning System for Open Air Equipment

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Cabin Cool – Installation Guide

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Receiving, Inspecting and Unpacking the Cabin Cool M100

NOTE: Cabin Cool M100 units are factory assembled and tested prior to shipment.

Units are direct shipped in single boxes or palleted in sets of 5 depending on job specifics.

- ✓ Lift at the designated handhold locations only or fully support from underneath. A shipment may include one or more boxes containing accessories.
- ✓ Before opening the container, inspect the packing crates or boxes for obvious signs of damage or mishandling.
- ✓ Write any discrepancy or visual damage on the bill of lading before signing.
- ✓ Inspect all equipment for any sign of damage caused during transit.
- ✓ Report all visual or concealed damage to the carrier and file a claim immediately.
- ✓ Thoroughly inspect the contents for any visible damage or loose parts.

IMPORTANT

If this procedure is not followed, the shipping company may reject the claim and the consignee may suffer the loss. Do not return the shipment to the factory.

Unit Handling Warning

The system contains a small electric compressor that contains lubrication oil.

If the system is turned on its side, front, back, or top the oil will flow from its internal reservoir.

While there is no danger the oil will leak, you must place the system in its intended orientation with the bottom side down for at least 4 hours before powering on. This will ensure the lubrication oil flows back into its reservoir.

General Description

The Cabin Cool M100 is a self-contained air conditioning unit using R-134a refrigerant. Cabin Cool M100 was designed primarily for ease of installation, operation, and service.

Air is conditioned and continuously discharged through two duct connectors. The duct connectors can have optional flexible ducting attached. The condenser air is discharged through two louvers exiting the back of the unit. The unit has three control features ON/OFF, COOL/FAN, and HIGH/LOW.

Cabin Cool M100 is 27.61" x 12.0" x 8.26". It can be mounted or hung directly to the four corners using 3/8"-16 thread size. Cabin Cool M100 is designed to accept 24 VDC power. Units are available with 12VDC to 24VDC converters or 48VDC to 24VDC converter to accommodate 12VDC, 24VDC, or 48VDC power supplies. Units are hard wired. Cabin Cool M100 unit is designed for a 20°F temperature differential at ambient conditions ranging from 70°F to 110°F.

The Cabin Cool M100 cooling unit is a professional grade, American manufactured, self-contained spot cooling unit. It is designed for easy installation and operation. Cabin Cool M100 uses switch controls and R-134a refrigerant. The entire unit is tested at the factory and shipped as a single package or palleted in sets of 5, 10, or 15. 15 total units can be shipped on one pallet. All components are of high quality, standard commercial grade.

The Cabin Cool M100 system is completely self-contained and includes an integral air-cooled condenser. The unit has the evaporator (or cooling section) and the condenser (or heat rejection section). Each coil shares a common fan to move the air through the coils.

Air passes through the cooling coil and is cooled by the refrigerant inside the coil. This causes any excess humidity in the air to condense and be captured in the drain pan and piped to the condenser pan where it is reevaporated using a serpentine loop.

The Cabin Cool M100 has accessory duct connectors available upon request. This includes 90° or 45° duct connectors and extra flex ducting for directing cool to the operator.

Standard Specifications

The Cabin Cool M100 Unit Contains

- ✓ An externally equalized thermal expansion valve to control the flow of refrigerant into the evaporator coil.
- ✓ An automatic reset high pressure switch to protect the system from high pressures.
- ✓ The unit uses only R-134a refrigerant.
- ✓ Condensate reevaporating serpentine loop for condensate management

The Cabin Cool M100 meets or exceeds its performance target of a 20°F delta temperature for design conditions ranging from 70°F to 110°F. The evaporator and condenser share the same fan capable of 65 CFM through both coils with louvers installed. The fan is a backward motorized impeller. Cabin Cooling M100 utilizes a 24VDC variable speed fan with PWM fan speed control for HIGH/LOW fan speed.

Cabin Cool M100 unit is 16-18 Gage G90 galvanized steel powder coated per UTS1269 Pewter texture.

Evaporator and condenser coils are aluminum fins, copper tubes. Designed with 5mm copper tubes for enhanced performance. The unit uses condensate re-evaporation to remove excess moisture produced by the evaporator. This prevents condensate dripping onto undesired locations.

The inlet air has a filter uses a ¼” reticulated 10ppi foam to prevent dust and dirt from fouling the coils, thereby reducing capacity.

Compressors are self-lubricating, permanently sealed, hermetic reciprocating type compressors, with internal overload protection. Compressors are mounted on rubber-in-shear isolators to reduce noise and vibration.

Electric power is supplied by a hard wired.

General Guidelines

This guide will cover the most common solution and depict custom installs, so that the installer can pick the appropriate way to install the unit to the particular forklift.

The Cabin Cool Personal Comfort Unit has to be securely secured to the forklift. Since all forklifts have custom design features and custom accessory there is no one-installation-fits all solution.

The parts for each install are common easily available off the shelf components. For the appropriate locations there are several factors to account for:

1. The unit should have a minimum impact for the operator's visibility of the surrounding
2. If possible, the unit should be installed within the footprint of the equipment to minimize the possibility of the unit getting hit and damaged
3. The unit must be installed level oriented with the bottom side down.
4. **Rigid support to the front is required. This can be achieved with brackets or rails. You may also mount using top attach points as long as the support is transferred to the bottom of the unit with locknuts or other hardware.**

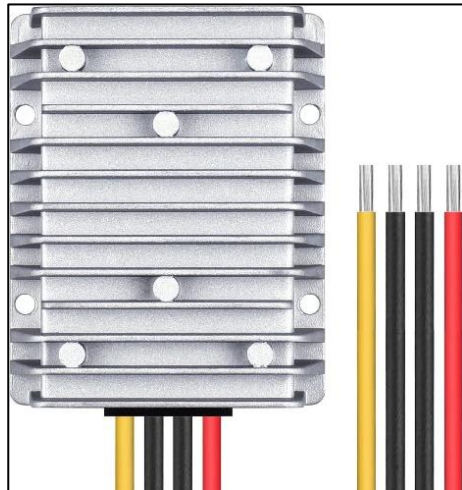
Cabin Cool M100 comes with 3/8-16 threaded weld nut fittings in each corners at the bottom of the unit to ensure a possible mount for any equipment. Cabin Cool M100 can be easily installed with off the shelf supplies.

Electrical Requirements

- Cabin Cool M100 is a 24V system. Input voltage must be 19V to 27V
- Max current at 24V is 22 amps
- Users may install with voltage converters to accommodate equipment with 12V, 48V or other system.
- Non-24V electric systems will require different amperage

Accessories and Optional Equipment

The Cabin Cool M100 unit is designed with 24Vdc components, however 12Vdc or 48Vdc power can be used with the purchase of a 12Vdc or 48Vdc power converter.

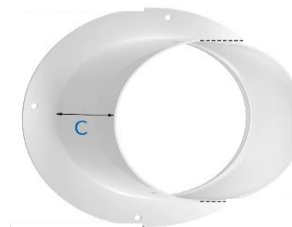


The Cabin Cool M100 is designed with louvers on the condenser side and duct connector flange on the evaporator side. Louvers, duct connector flanged and approximately 12 inches of hard flexible hoses come standard with the unit. Extra flexible duct, 90° or 45° elbows can be ordered as accessories. It is recommended not to exceed 18 flex duct pieces.

X2 12 inch flex ducts



Duct connector flange



45° elbow



90° elbow



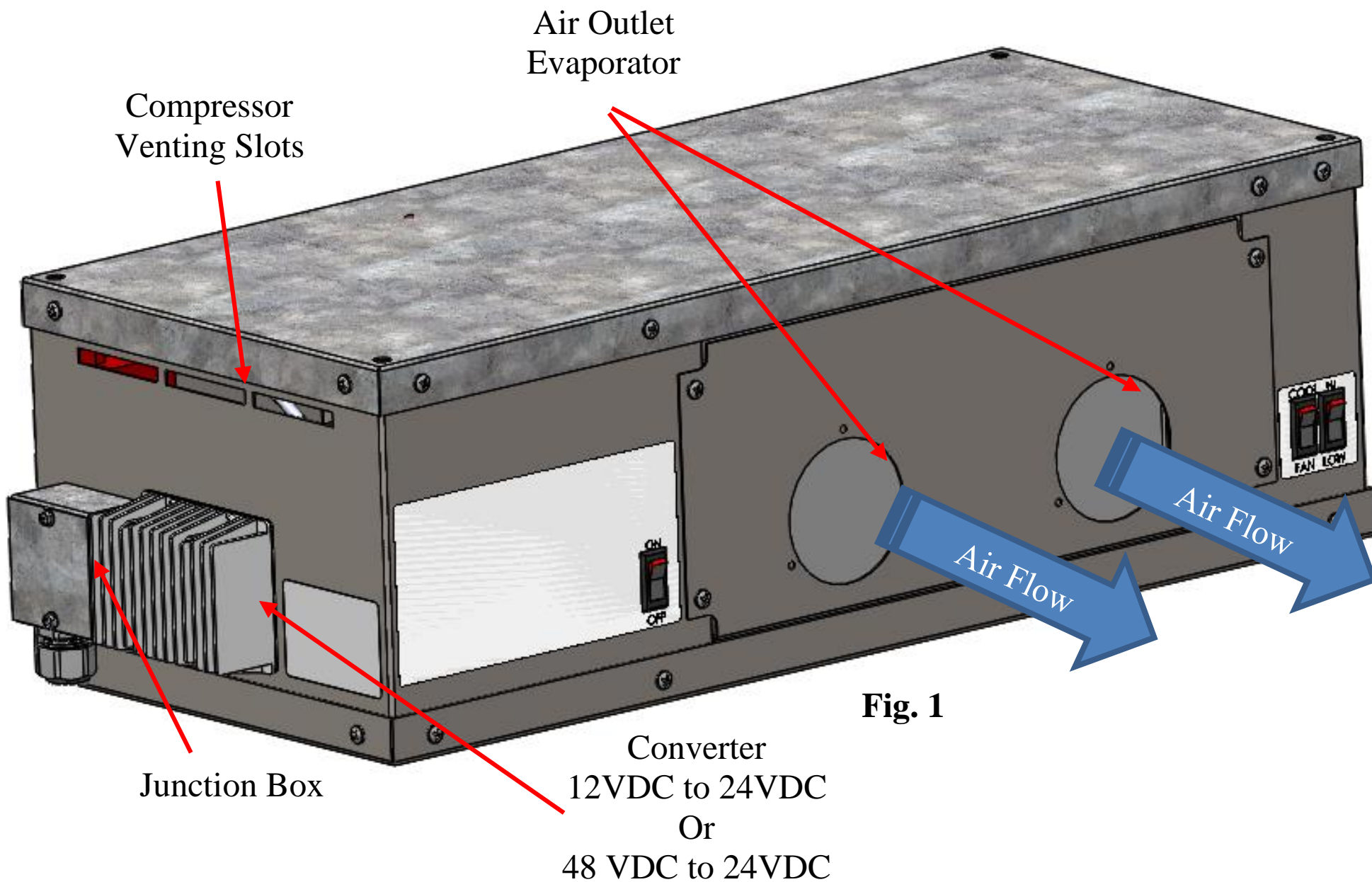


Fig. 1

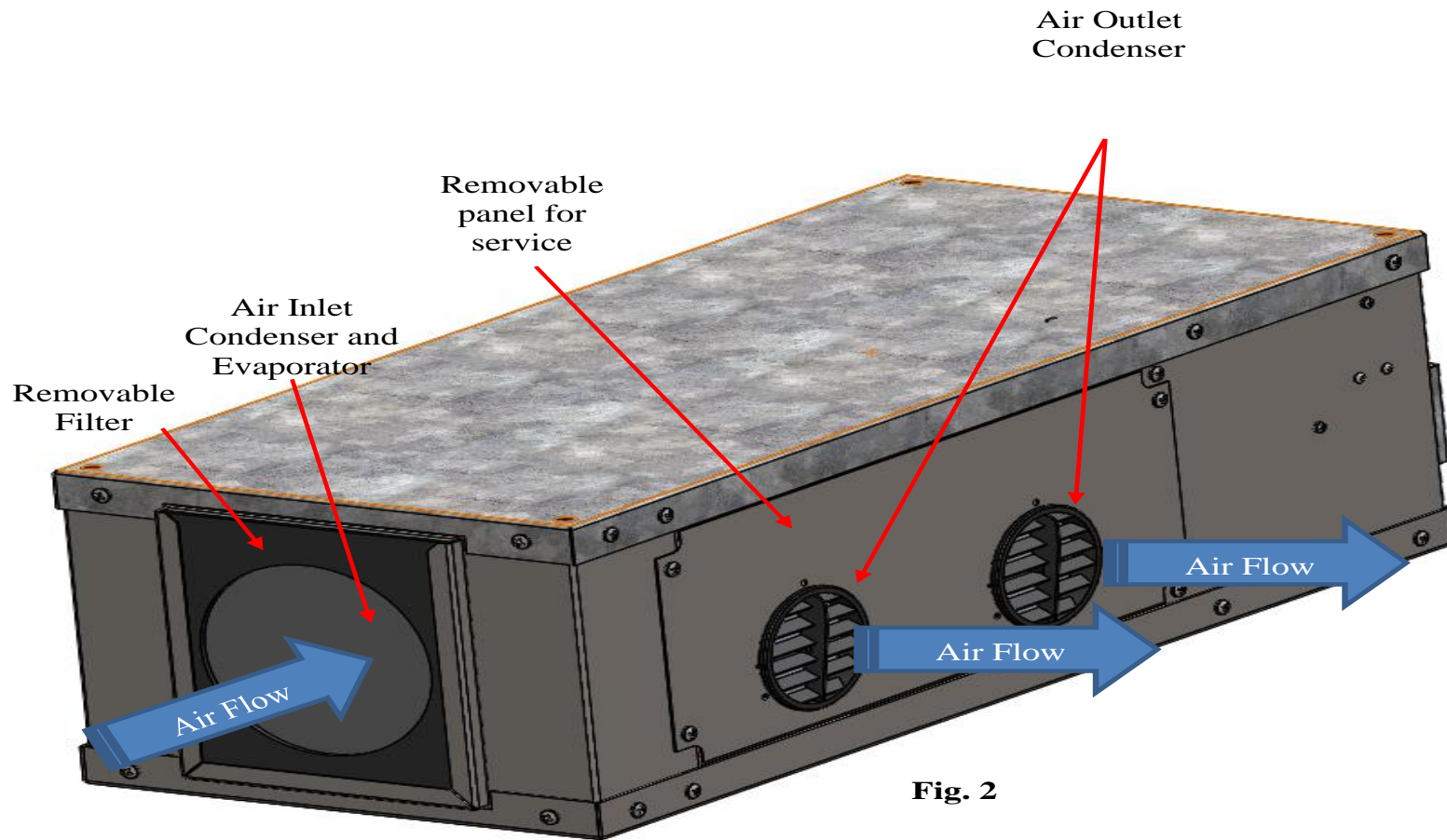
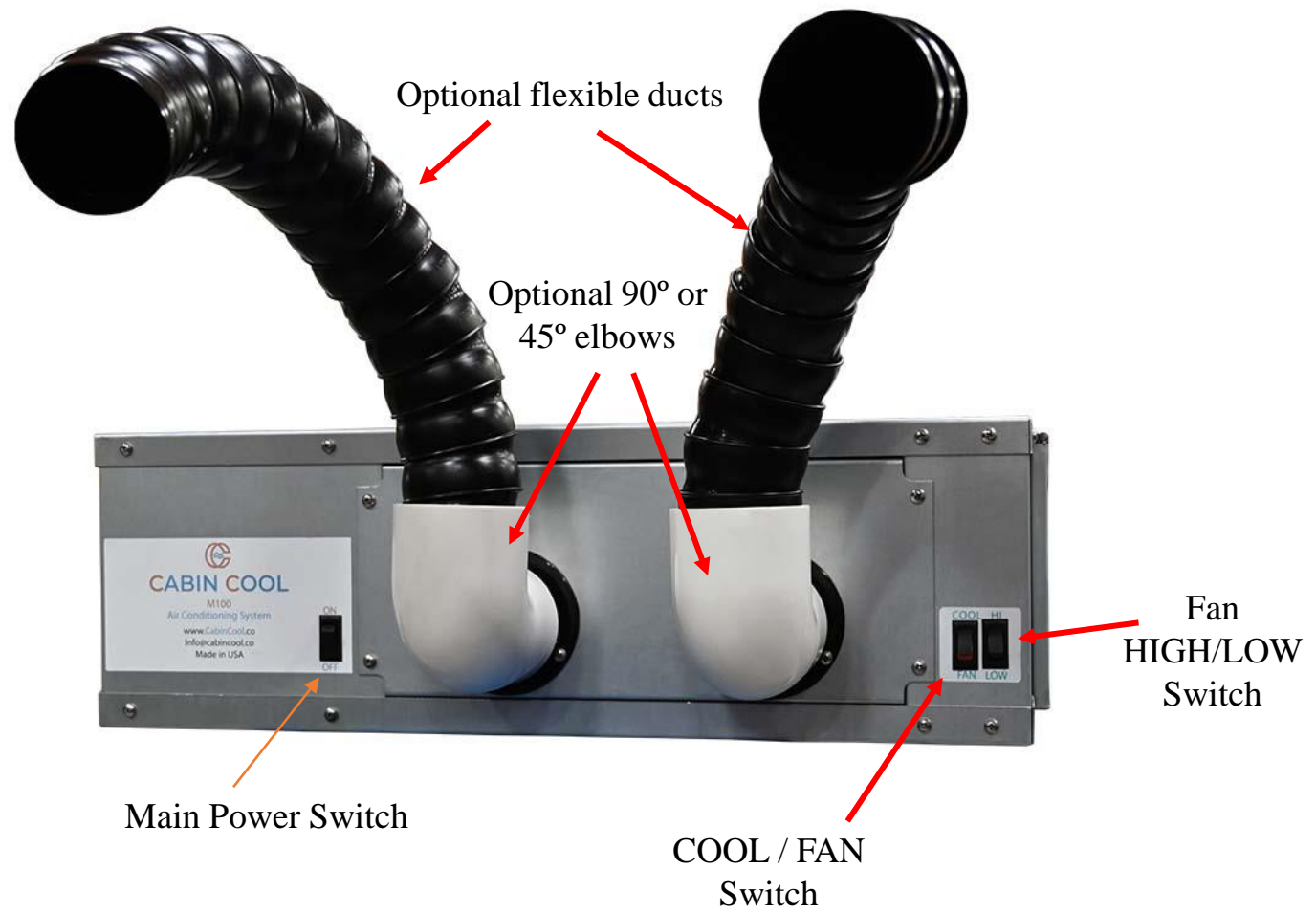
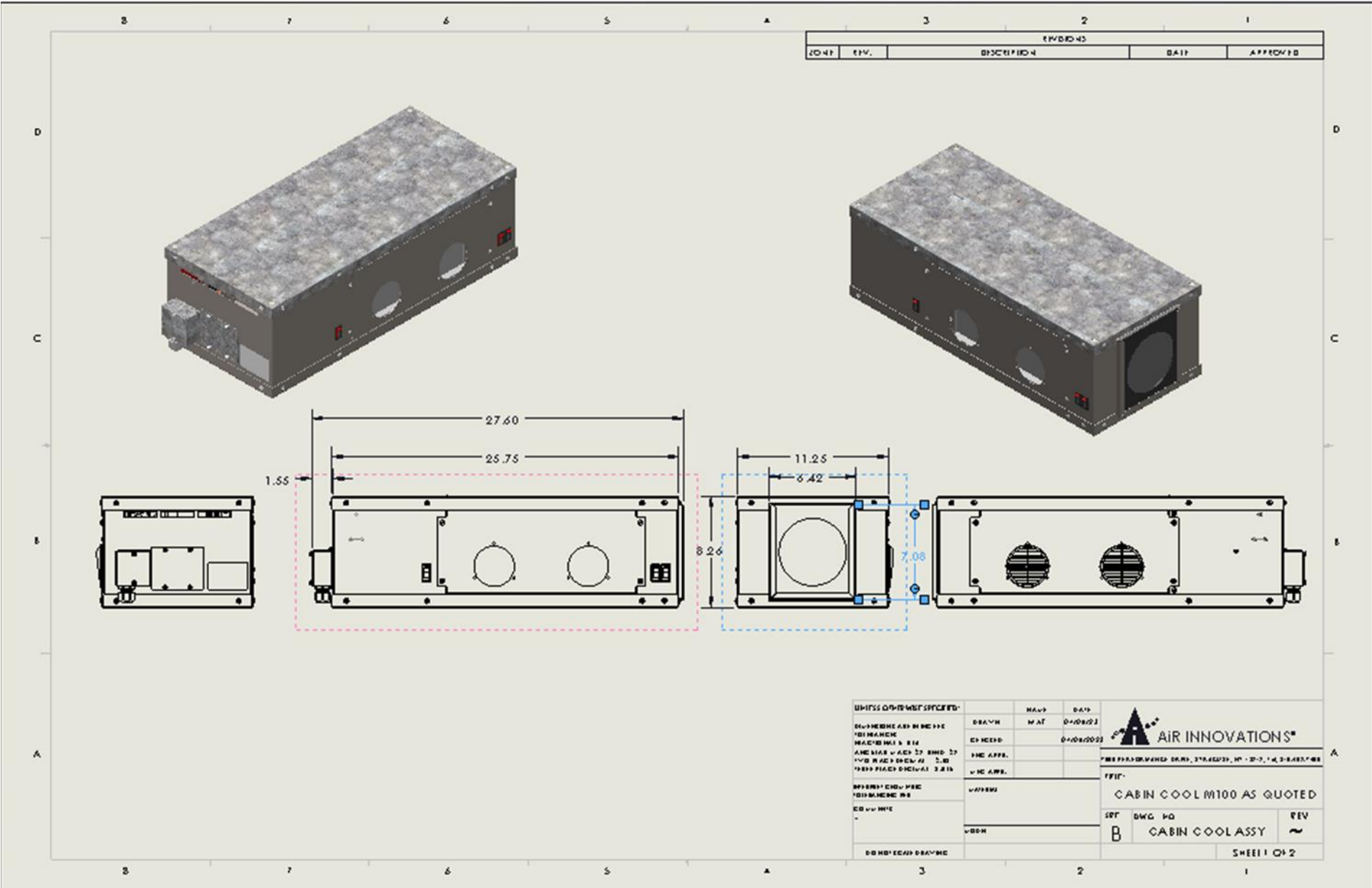


Fig. 2





Cabin Cool M100 Dimensional Data



REVISIONS				
NO.	REV.	DESCRIPTION	DATE	APPROVED

UNLESS OTHERWISE SPECIFIED:	MADE IN	DATE
DRAWN BY: M. AT	USA	01/08/23
ENGINEER: M. AT		01/08/23
DESIGNED BY: M. AT		
CHECKED BY: M. AT		
DATE: 01/08/23		
SCALE: 1:1		
PROJECT: CABIN COOL M100		
DRAWING NO: CABIN COOL M100		
REV: 1		

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FFIT

CABIN COOL M100 AS QUOTED

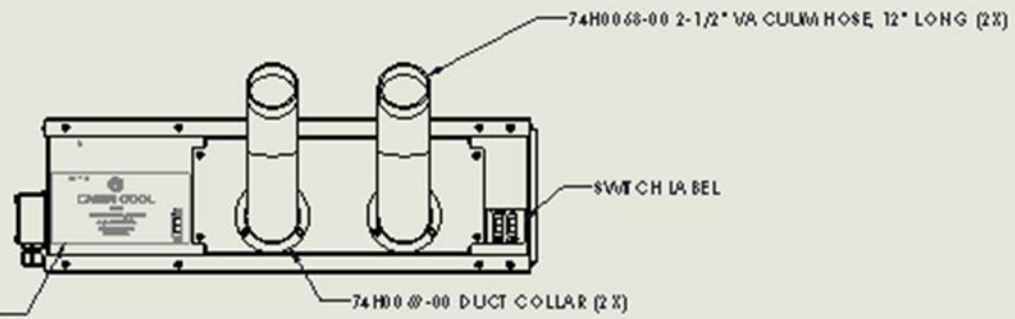
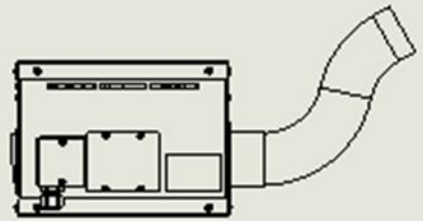
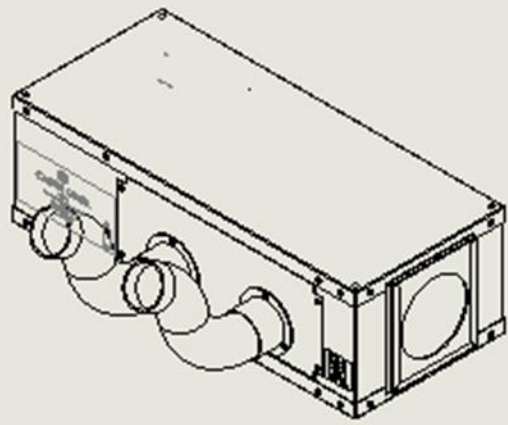
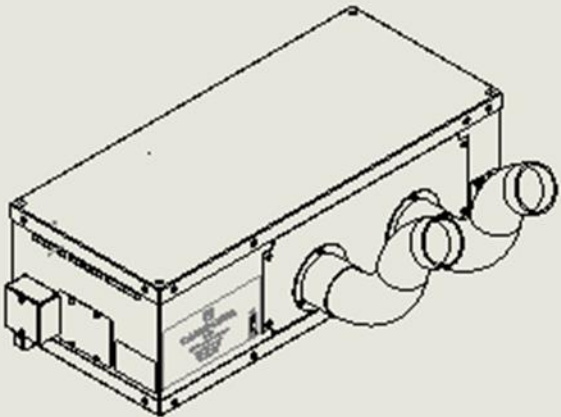
SHEET NO: B

DWG NO: CABIN COOL M100

REV: 1

SHEET 1 OF 2

REVISIONS				
REV#	BY	DESCRIPTION	DATE	APPROVED
-	-	See Sheet	-	-



BRANDING LABEL

SWITCH LABEL

74H0068-00 2-1/2" VACUUM HOSE, 12" LONG (2X)

74H0000-00 DUCT COLLAR (2X)

NOTES:
1. DUCT COLLARS AND HOSES TO BE SHIPPED IN A SEPARATE BOX TO AVOID DAMAGE WHILE SHIPPING

<p>DATE OF THIS REVISION: 01/15/2015</p> <p>DATE OF PREVIOUS REVISION: 01/15/2015</p> <p>REVISION NO: 01/15/2015</p> <p>REVISION BY: J. B. BROWN</p> <p>REVISION DESCRIPTION: 1. ADD PARTS LIST TO DRAWING</p> <p>REVISION APPROVED: J. B. BROWN</p>	<p>REV#</p> <p>BY</p> <p>DATE</p> <p>DESCRIPTION</p>	<p>REV#</p> <p>BY</p> <p>DATE</p> <p>DESCRIPTION</p>	<p>REV#</p> <p>BY</p> <p>DATE</p> <p>DESCRIPTION</p>	<p>REV#</p> <p>BY</p> <p>DATE</p> <p>DESCRIPTION</p>
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B CABIN COOLASSY

SHEET 2 OF 2

Electrical Requirements

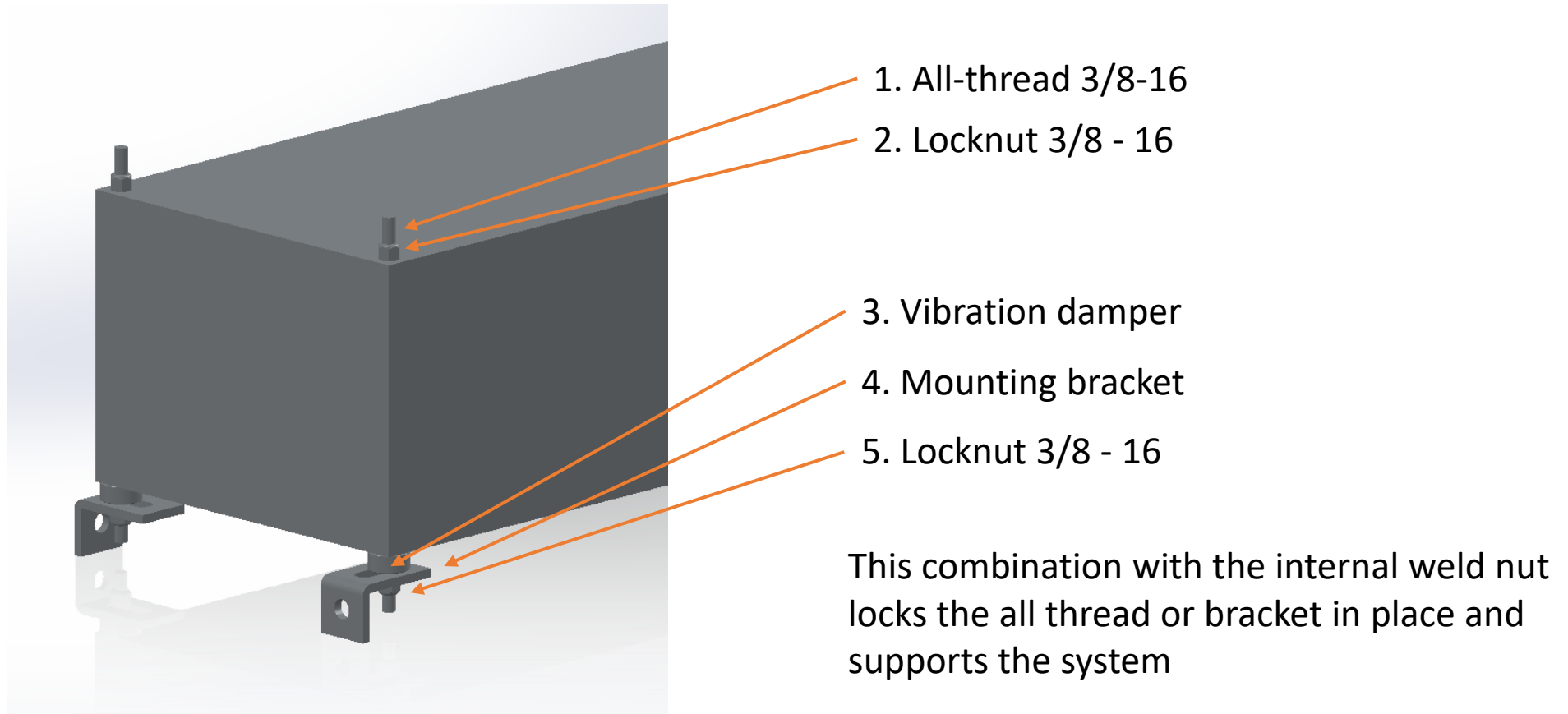
- The system should be provided 600W if needed
- System should be on a relay connected to key switch to prevent battery drain when equipment is not in use
- $W = \text{amps} \times \text{volts}$

System Voltage	Required Fuse
12	50
24	25
48	12.5

General Mounting Note

Cabin Cool M100 has internal welded 3/8-16 nuts in each corner of the unit. Punch holes are located in the top of the unit directly above the weld nut.

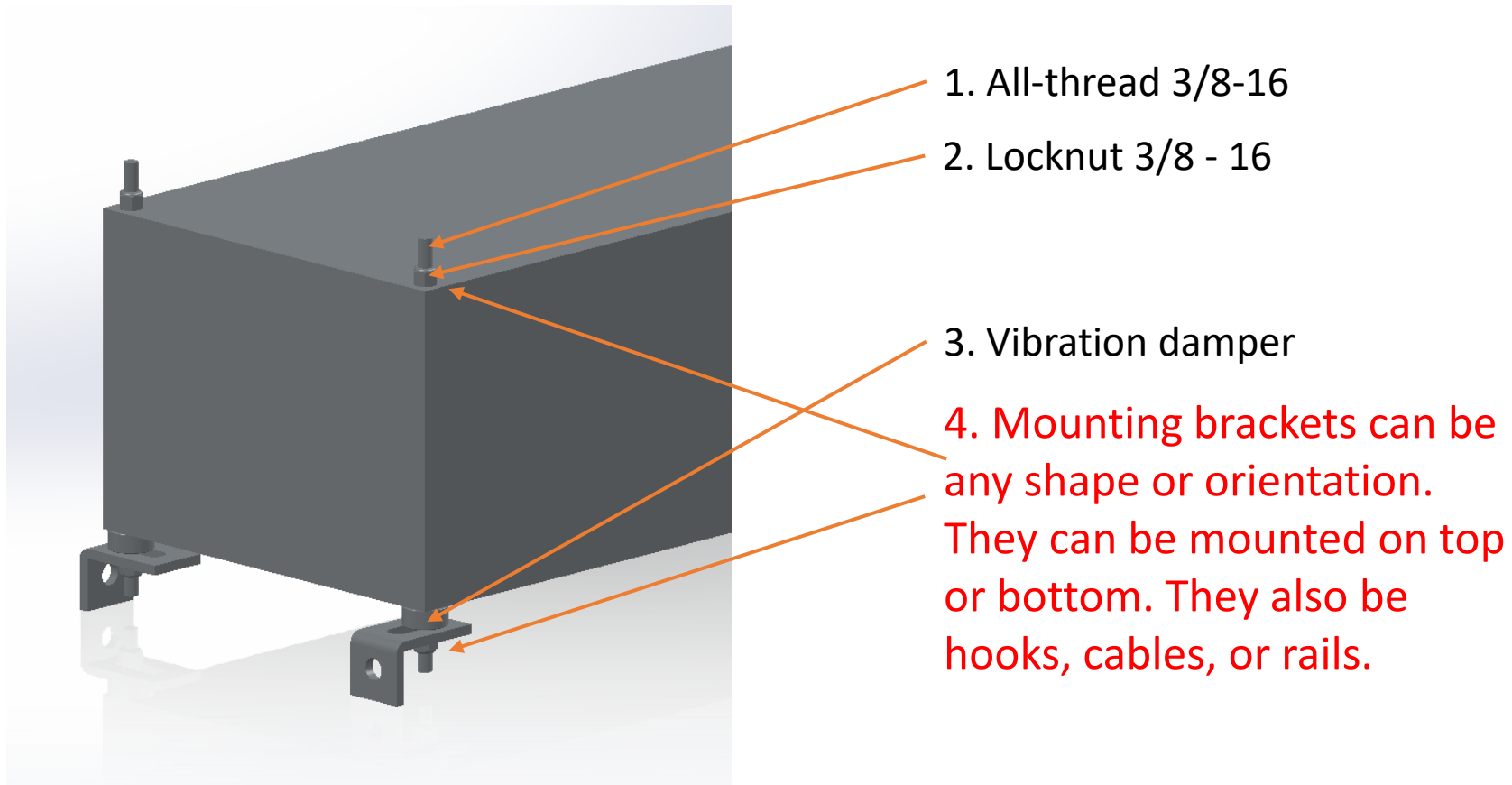
Users have options to mount the system from top or bottom. However, **ALWAYS** use an external lock nut at the bottom to add support to the internal weld nut.



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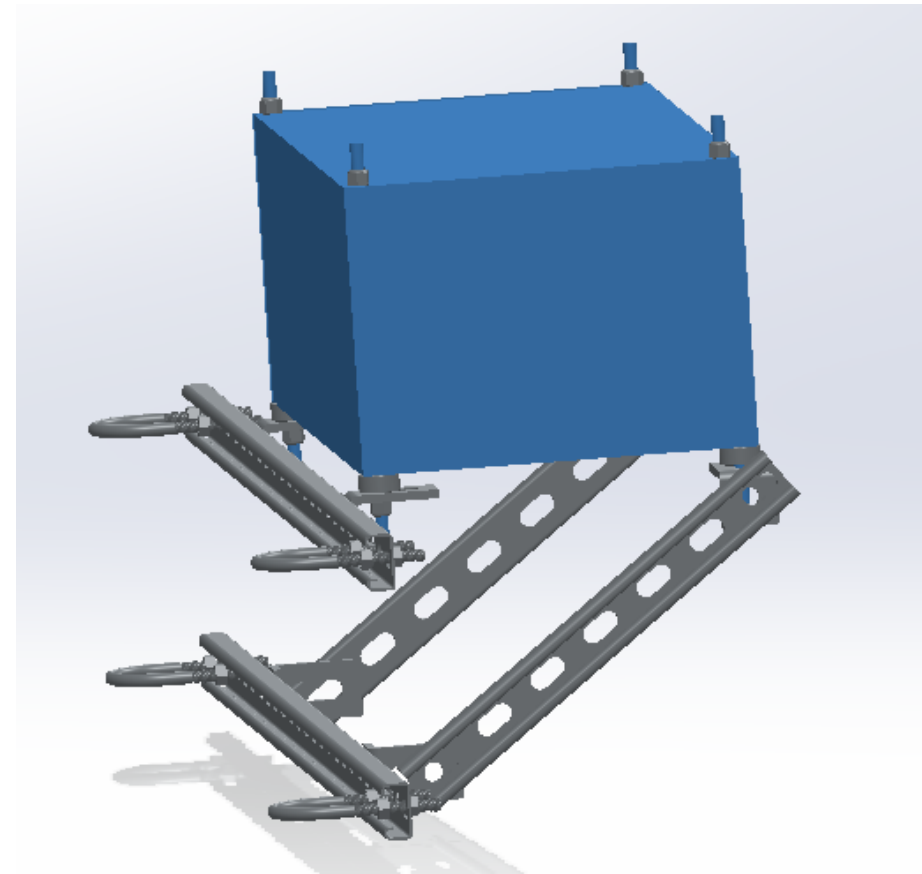
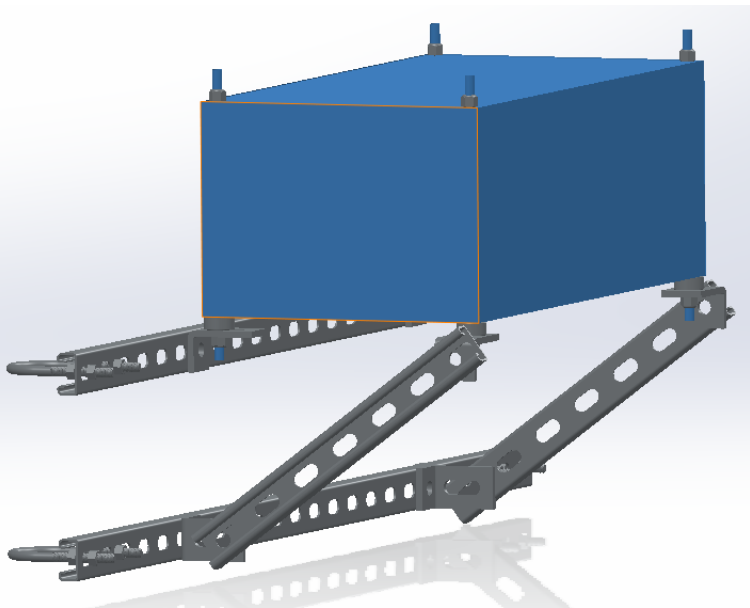
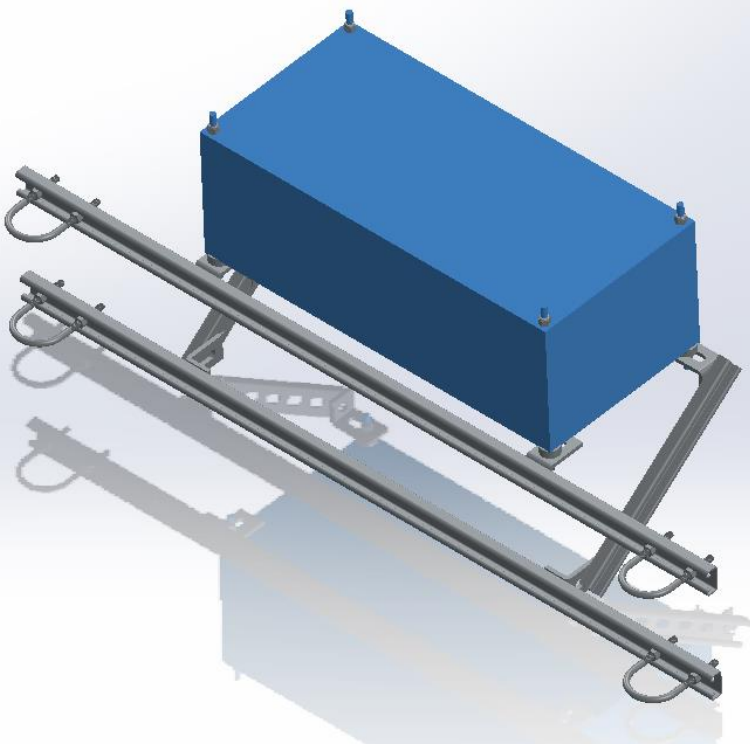
Users have options to mount the system from top or bottom. However, **ALWAYS** use an external lock nut at the bottom to add support to the internal weld nut.

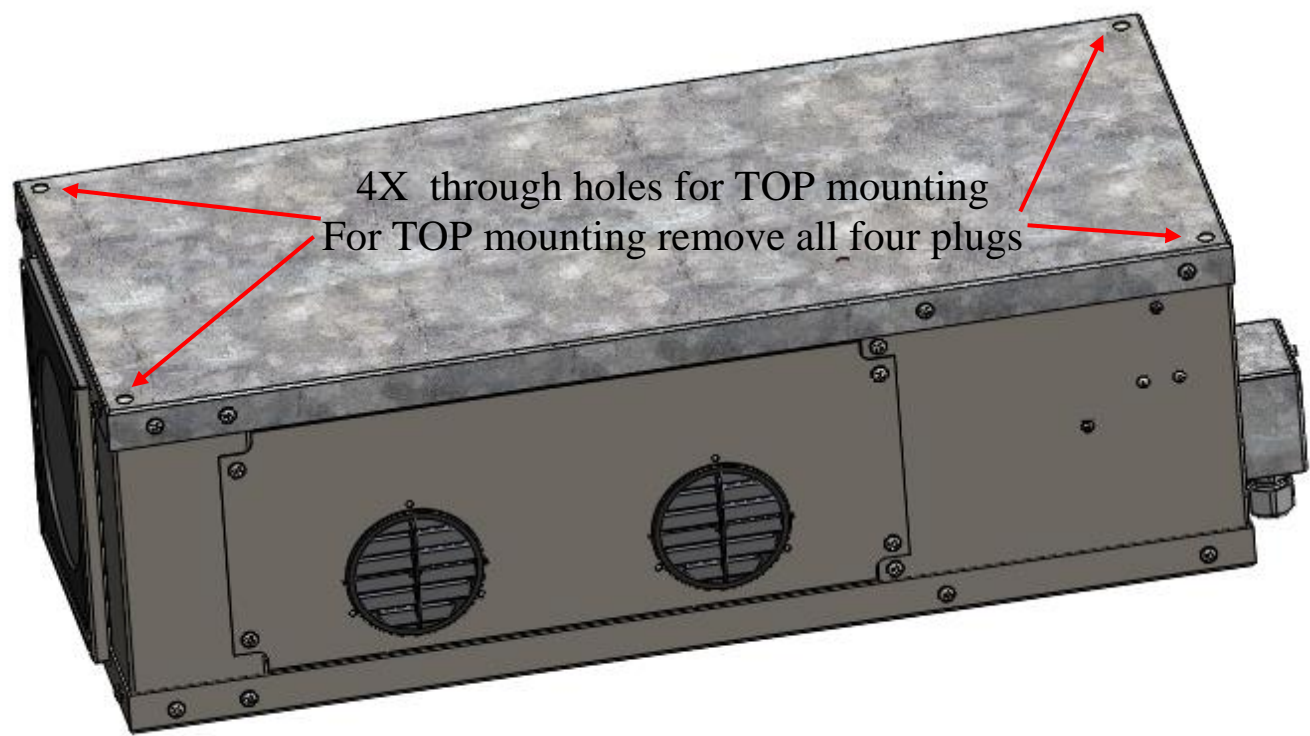
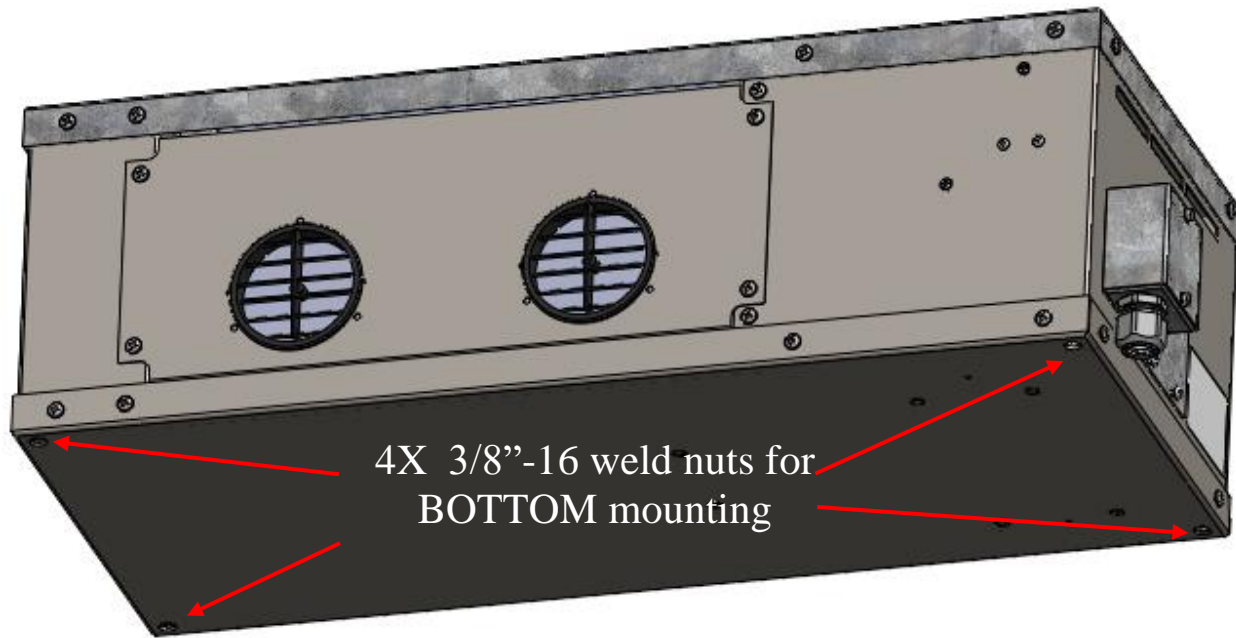


Option1 – Rear Mount diagonal up or down

All parts can be found on McMaster.com and the design is based on standard strut channel system. The U-bolts are available for round or rectangular frame.

The Unit needs to be fully supported and has to include vibration dampening.

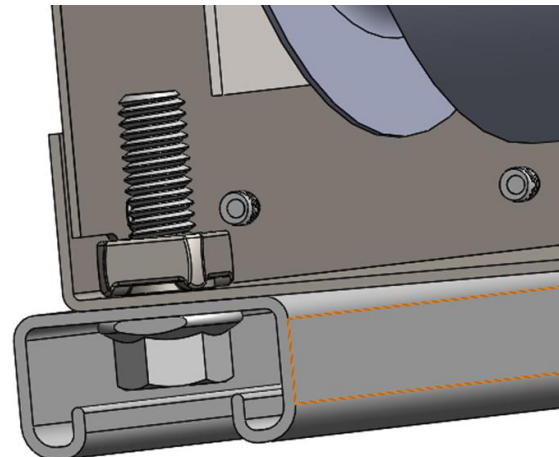




Can be bottom mounting with strut channel and 3/8"-16 bolt in all four corners.



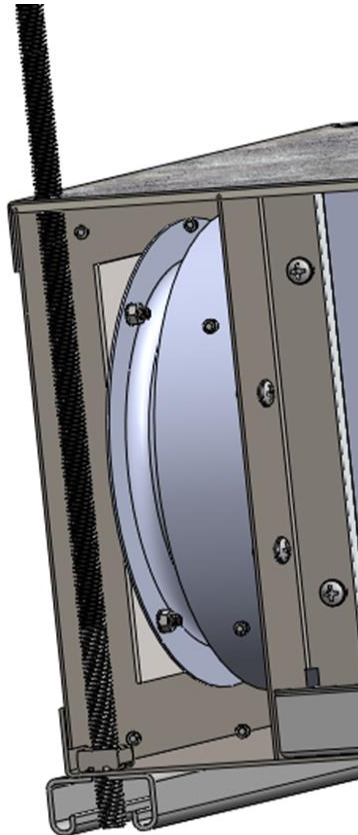
Cross section view shown. Bolt is screwed into nut that is welded to the inside base of unit at all four corners.



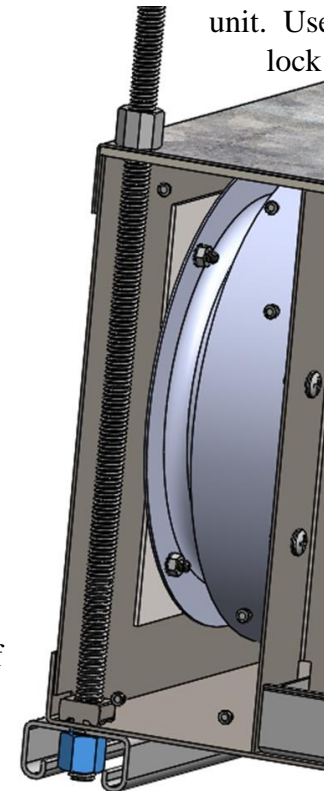
TOP mount use 3/8"-16 threaded rod.
Strut channel can also be mounted on top of unit if desired.



Remove top plugs in all four corners and insert threaded rod through top of unit and thread into bottom weld nut



Thread nut on top of unit. Use washers and lock washers.



Thread nut on bottom of unit. Use washers and lock washers.

Installation Example with 80/20 frame system



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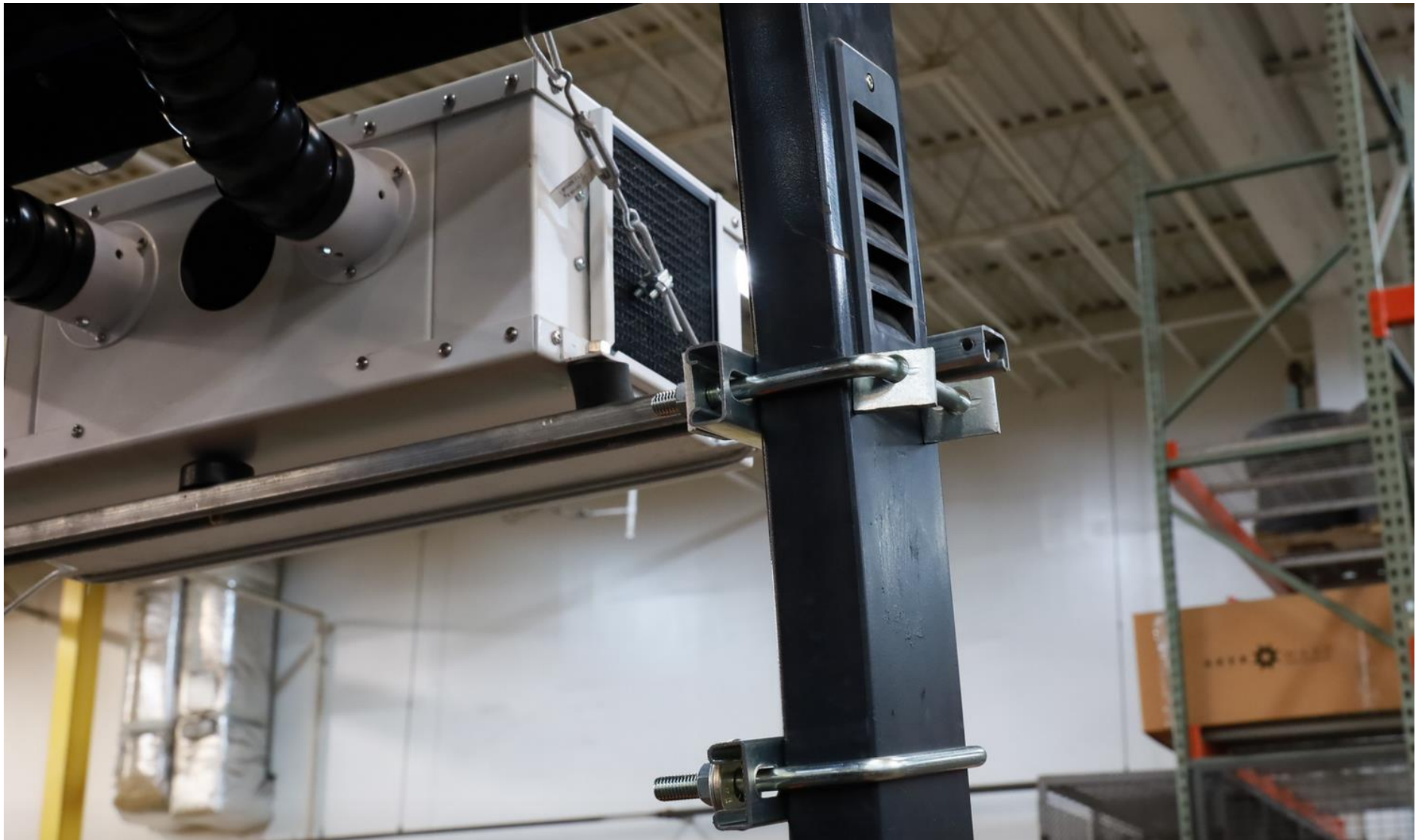


Option 1 – Parts List

Amount	Description	Link
4	Square or Round U Bolts with hardware	https://www.mcmaster.com/products/u-bolts/rr
2	Strut Channel	https://www.mcmaster.com/3310T513/
4	Easy-Position Strut Channel Nuts 3/8-16	https://www.mcmaster.com/3259T117/
4	Corner Strut Channel Bracket	https://www.mcmaster.com/products/strut-angles/
4	Lock Nuts 3/8-16	https://www.mcmaster.com/90630A121/
16	Fender Washers 3/8" – 1.5"	https://www.mcmaster.com/91525A140/

The amount and length of the parts should be determined by the forklift.

Installation Example with standoffs to not interfere with existing parts.



Premade mounting kits are available
Sold by AP Air <https://www.apairinc.com/shopping/?ic=19516>



Other installed Examples

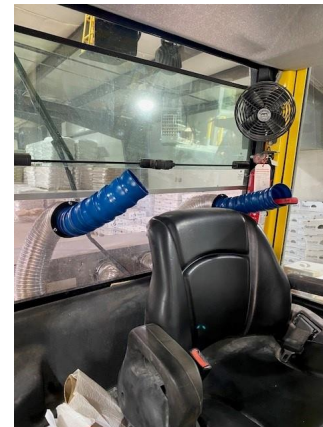


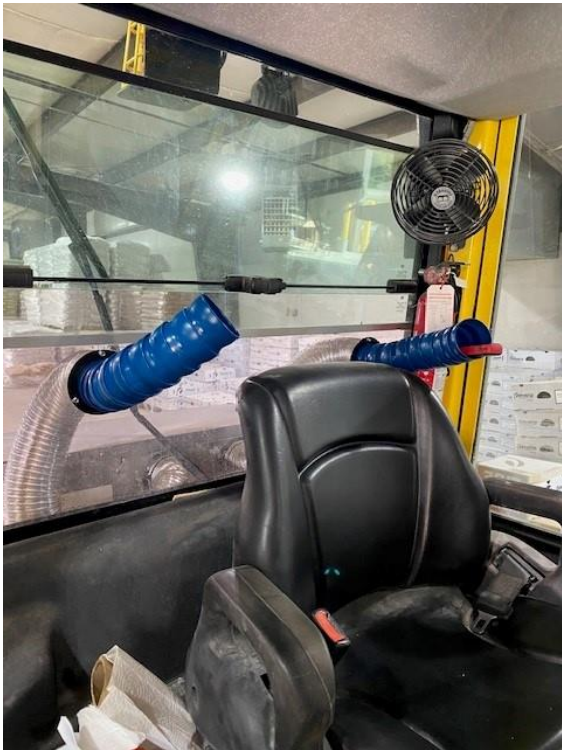
Enclosed Cab Mount

Like all other installations, it is critical that the output hoses are within an arm's reach of the operator and the hoses can be maneuvered such that the cool air can be directed exactly where the user wants.

In this example, the unit is mounted on the back of the truck. Flexible auto exhaust hoses (available at any auto parts store) are used to convey cooled air from the unit to the glass enclosure.

The supplied collars are used to make the transition from the glass to the flex duct hoses. The installer has the option to also affix a 90° PCV elbow to the end of the duct hose to make directing airflow easier for the user.



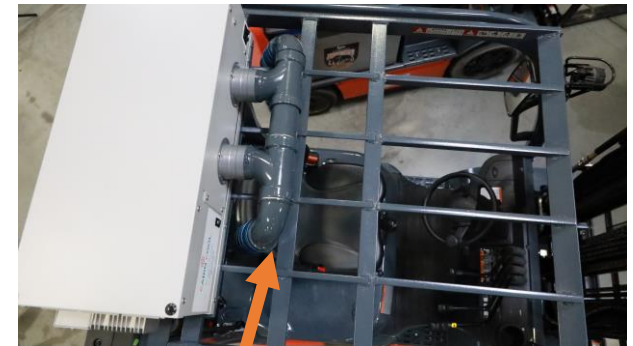


Overhead guard mount

Like all other installations, it is critical that the output hoses are within an arm's reach of and the hoses can be maneuvered such that the cool air can be directed exactly where the user wants.

In this example, the unit is mounted on the overhead guard or roof at the rear of the vehicle.

The installer has the option to fabricate a manifold for the two outlet holes on the unit from PCV plumbing parts (pictured). The installer may also choose to affix a 90° PCV elbow to the end of the duct hose to make directing airflow easier for the user.



Optional Manifold

Option 2 – Strut Channel and Steel Cable Install

Option 2 – Parts List – needs to be updated

Amount	Description	Link
4	Square or Round U Bolts with hardware	https://www.mcmaster.com/products/u-bolts/rr
2	Strut Channel	https://www.mcmaster.com/3310T513/
4	Easy-Position Strut Channel Nuts 3/8-16	https://www.mcmaster.com/3259T117/
4	Corner Strut Channel Bracket	https://www.mcmaster.com/products/strut-angles/
4	Lock Nuts 3/8-16	https://www.mcmaster.com/90630A121/
16	Fender Washers 3/8" – 1.5"	https://www.mcmaster.com/91525A140/



Note the use of turnbuckles to control tension

Note the use of support cables above and below



IMG_0746.JPG

Sequence of operation

Cabin Cool M100 has a main power supply ON/OFF. When the unit is turned on you have the option of selecting COOL/FAN. COOL mode turns the compressor on enabling the air conditioning mode. When COOL is selected there is a two-minute time delay to protect the compressor from short cycling. When the FAN is selected it disables the compressor and runs the fan only. In both COOL or FAN mode you can select HI or LOW fan speed.



Maintenance

Maintenance on Cabin Cool M100 units requires working with high voltage and sheet metal with possible sharp edges. Only qualified personnel should perform maintenance. Some tasks require knowledge of mechanical and electrical methods. Make sure you are familiar with all hazards, general safety related procedures, and safety labels on the unit.



EXPOSURE TO MICROBIAL GROWTH (MOLD) CAN CAUSE SERIOUS HEALTH PROBLEMS

Standing water in drain pans promote microbial growth (mold) that cause unpleasant odors and serious health-related indoor air quality problems. If mold is found, remove it immediately and sanitize that portion of the unit.

The Cabin Cool M100 is designed for minimal maintenance. The refrigerant system is hermetically sealed and requires no maintenance. The fans are permanently lubricated and require no maintenance. Some maintenance to the unit may be required due to dust or dirt in the air stream.

Cleaning the Filters

The condenser/evaporator coil is provided with a reusable, washable air filter. The filter protects the coil from becoming coated or plugged by dust. Frequency of cleaning the filters is based on the amount of dust or dirt generated in the space to be conditioned.

1. Remove the filter covering the face the coil.
2. Wash it under warm water.
3. Shake off excess water.
4. Inspect and clean the face of the coil. **Sharp edges are present on the fins and coils.**
5. Reinstall the filter.
6. Replace the duct collar.

Cleaning the Condensate Drain System

The condensate drain system traps dust and dirt. Clean the drain system twice a year.

1. Shut off the power switch and unplug the unit.
 2. Remove the panel on the evaporator and condenser.
 3. Inspect the drain pan under the coil.
 4. If drain pan appears soiled, pour some hot water along the length of the pan to flush the dirt down the drain tube.
 5. Continue this treatment until the drain appears clean and free of dirt.
 6. Reinstall filter and grille or duct collar.
- Plug in the unit and restart.

Maintenance Schedule

Monthly

(or quarterly depending on experience with individual space)

- ✓ Check filter and drain trap – clean if needed.
- ✓ Check for noise or vibration.
- ✓ Check for short-cycling of the unit – a turning on and off of the compressor unit more than eight times/hour.

Yearly

(in addition to monthly)

- ✓ Replace filters if worn or plugged beyond cleaning.
- ✓ Check evaporator and condenser coils for dirt – use a vacuum with a brush attachment to clean the coils.
- ✓ Clean condensate pan under the evaporator coil by flushing. Be careful to keep the drain pans clear of any and all debris.
- ✓ Inspect cabinet for corrosion or rusting – clean and paint.
- ✓ Inspect for dirt buildup on or inside the unit. Clean unit by vacuuming or wiping it down.
- ✓ Check for loose insulation, fasteners, gaskets or connections.
- ✓ Check the wiring connections and integrity of cords.
- ✓ Examine ducts for any cracks or breach.
- ✓ Maintenance per manufacturer's instructions

Troubleshooting



WARNING

BEFORE PROCEEDING, READ AND UNDERSTAND THE SAFETY INFORMATION CONTAINED IN THE SAFETY SECTION OF THE HEPAIR MANUAL.

IMPORTANT

This section is intended as a diagnostic aid only. For detailed repair or parts replacement procedures, contact a qualified service company. Check the following table for some solutions before calling a service technician.

Typical Start-up Problems	
Possible Cause Loose, improper or defective power connection	Solution Check power, Wire connections and + /
Wrong Voltage supply	Check voltage is supplied correctly with data plate
AC not turning on	A common problem is not waiting long enough for the internal timers to complete their timed delay, or COOL/FAN switch in FAN position

Unit is operating and blows evaporator air, but the supply air is not colder than the return air from the space

Possible Cause	Solution
Compressor not operating Condenser airflow is blocked Clean filter and coil (if needed) High pressure (HP) switch is open	High pressure switch open, (automatic reset) Remove blockage Automatic high pressure reset

Other Miscellaneous Problems

<i>Unit is leaking water</i>	
Possible Cause	Solution
Piping from unit to drain is trapped	Re-pipe to remove external traps
Trap plugged	Clean trap
Condensate pan plugged	Remove blockage and clean
Unit not level	Level with shims
<i>Unit is running properly, but the sound of the unit is objectionable</i>	
Possible Cause	Solution
Noise is from airflow	Redirect airflow Check wires contacting fan blades
Noise rattling	Tubing / wires could be rubbing, Check unit for rubbing components

Basic Troubleshooting

A. Temp Too Low

Possible Causes	Recommended Action
Detective temperature sensor	Check and replace, unit will still function in Fan only mode. AC will not work

B. Temp Too High

Possible Causes	Recommended Action
Defective evaporator/condenser fan	Check and replace defective parts. See wiring schematic and parts list
Dirty condenser coils or filters	Clean coil, Clean or replace filter
Compressor not running	Check power supply and wiring using schematic. Replace components as required

C. Excessive Unit Cycling (More than 8 times per hour)

Possible Causes	Recommended Action
Ambient Air too High	The compressor has an internal temperature protection and will cycle when it gets too hot. Unit will still function, but performance will be degraded.

D. Unit Leaking Water

Possible Causes	Recommended Action
Unit not level	Ensure that unit is level to within 1/4 "end to end" and 1/8" side to side
Too little evaporator air	Check mixture of evaporator air and return air against design conditions. Adjust as required