

dynasys

Power For The Long Haul



Installation Guide

This manual was written to assist with the installation of the Hodyon Dynasys APU and HVAC System onto a typical Class 8 truck.

While it is not intended to be specific to a particular make or model, this information will assist the installer with a safe and correct install. Please remember that these trucks can be very diverse and some have modifications. Modifications to the truck may require changes to the installation procedures in this manual. However, the directives in this manual are accepted principals to be observed when installing the Dynasys APU. Please review the entire manual before beginning the installation.

Due to the complexity of the install, it should be attempted only by an experienced technician who has an understanding of both refrigeration and electrical wiring. Also, it is necessary to have the proper tools and equipment to complete this installation.

The first step in the install is to consult with the owner of the truck. This is to confirm proposed locations of all APU components and to discuss any modifications to the truck or existing equipment that may be necessary to complete the installation.





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Definitions and Abbreviations

- **APU** - Auxiliary Power Unit
- **HVAC** - Heating, Ventilating, and Air Conditioning
- **Class 8 Truck** (Heavy Duty Trucks over 33,000 pounds [15,000 kg] as defined by FHWA in the US)
- **FHWA** (Federal Highway Administration)
- **RTV** (Room-temperature vulcanization, a type of rubber that hardens through chemical means instead of heat)
- **CCU** (Cabin Control Unit)
- **ECM** (Engine Control Module)
- **GFI** (Ground Fault Interrupter)
- **VAC** (Volts of Alternating Current)

Installation General Guidelines and Tips

► Pre-Install

- Review the entire manual to better understand where and how components are to be installed.

- Verify that all equipment and tools are available.
- Open the Dynasys packaging to make sure all components are undamaged.
- Review APU component placement with the owner.

► APU Main Cabinet Assembly

- Relocate any existing truck equipment that interferes with the install.
- Place the APU in position utilizing the packaging skid and a floor jack.
- Raise the unit until the mounting holes are flush with the chassis frame rail before tightening.
- Use only the Dynasys supplied mounting hardware (bolts, nuts and washers may be replaced with identical grade and dimension hardware, if necessary).
- Torque the mounting bolts to 75 ft-lbs.
- Make sure the exhaust from the APU is pointing away from the bunk
- Ensure that the fuel shut off handles on both the fuel filter and



the fuel water separator are in the OPEN or vertical position. Please note that the unit will be shipped with these in the OFF position.

A/C Condenser Assembly

- Determine the best location for mounting the condenser on the exterior rear wall of the sleeper.
- Verify all measurements before drilling mounting holes.
- Verify that there is no interference with any existing structures on the truck.
- Protect the truck's finish to prevent damage during install.
- Seal all holes with RTV after mounting the condenser.

HVAC Box

- Determine the best location inside the sleeper, under the bunk, allowing sufficient room to run the flex ducts.
- Verify that there is no interference with any existing truck equipment.
- The box should be mounted directly to the floor using the template (printed on the outside of the HVAC box packaging) as a guide for drilling.

- The three A/C vents should be located to provide maximum air circulation: high, medium and low (use hole saw size 3" for these 3 holes).
- Seal all holes with RTV after mounting the HVAC box.

A/C Hoses and Components

- Install the receiver drier in the direction indicated by the arrow.
- Always lubricate the hose fittings and o-rings with new PAG (100 viscosity) refrigerant oil.
- Hoses should be installed in a manner that allows for vibration and movement.
- Keep hoses from rubbing or chafing against any sharp edges.
- Protective loom or sleeving should be installed over the hoses (this wiring protector can be purchased directly from Hodyon).
- All connections should be tightened securely using two wrenches.

CCU, ECM and Electrical

- Electrical and control wiring should be installed in a manner that allows for vibration and movement.

- Keep wires from rubbing or chafing against any sharp edges.
- Protective loom or sleeving should be installed over the wires (this wiring protector can be purchased directly from Hodyon).
- The CCU should be mounted inside the sleeper and accessible from the bunk.
- Do not mount the CCU where it could be directly affected by an installed vent or direct sunlight.
- Mount the ECM within eighteen inches of the HVAC box and protected from damage.
- Mount the Power Distribution Box on the lower portion of the bunk so that the breakers are accessible.
- The second 120v receptacle can be flush or surface mounted.
- The block heater receptacle should be mounted outside the cab, under the driver's door.

Required Tools and Shop Supplies

Tools

- Typical technician tools

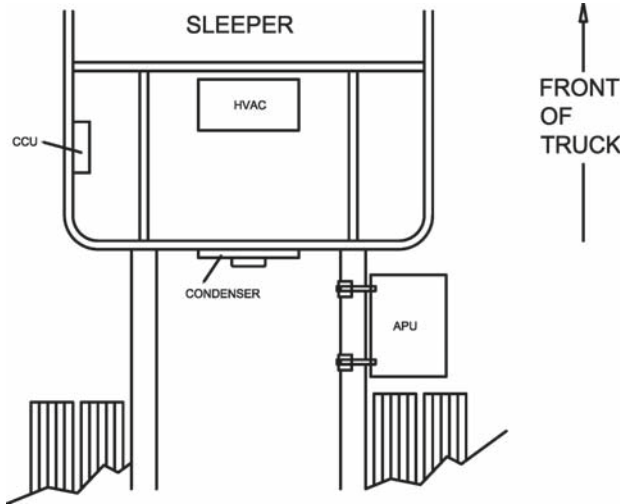
- Pallet jack
- ½" Electric drill and bits
- Heat gun
- Hole saws - 3" dia. 1 ¼" dia. 1 ½" dia.
- Reciprocating or jig saw
- ½" Torque wrench
- Tape measure
- Level
- Caulk gun
- R-134a recovery machine
- Pop nut installation tool (Emhart PNT 210-IP)

Supplies

- R-134a refrigerant
- RTV (silicone)
- Teflon tape
- Wire/hose loom
- Various tie-wraps



Typical Component Layout



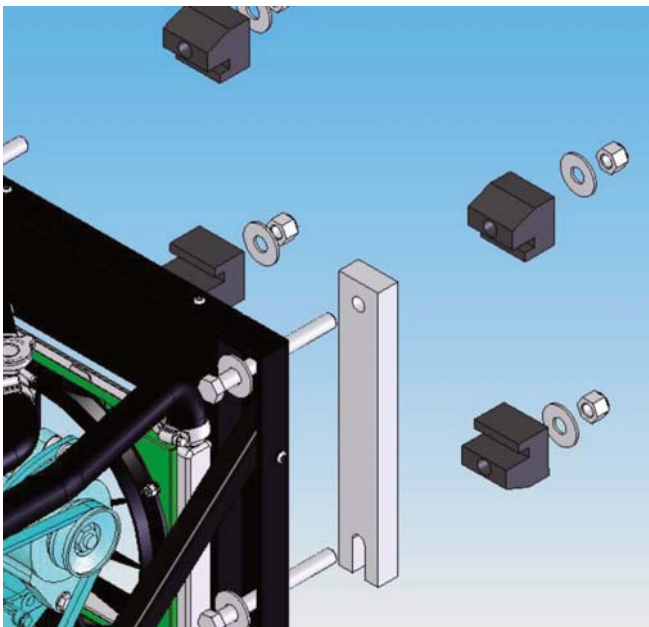
Mounting the Dynasys APU Cabinet Assembly

- 1. Using a pallet jack (or similar device), position the unit against the frame rail and slowly raise it until the upper mounting holes sit approximately 1/8" above the top of the rail. From the inside of

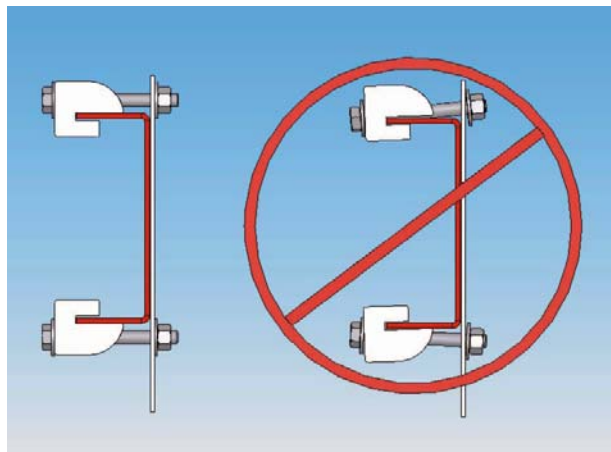
the unit insert one of the supplied grade 8 bolts with a grade 8 flat washer into the top 2 holes and into the bottom 2 slotted holes. Now install a frame clamp with a flat washer and a nylon lock nut on each of the bolts in the manner illustrated on the next page. Do not let the mounting bolts carry the weight of the APU until fully tightened.

- 2. Install the top two frame clamps first; next, add the two bottom clamps.
- 3. Hand-tighten the four nuts evenly so that the mounting face of the APU frame is flat against the frame rail and all hardware is straight. If the APU frame does not sit flush against the frame rail of the truck, optional frame spacers may be required. Make sure the unit is level to the frame rail. Use a torque wrench to fully tighten the assembly. Do not use air tools or impact guns during this process; hand tightening with the correct tools will yield much better results. Torque to 75 ft-lbs. Uneven or over tightening the mounting hardware can cause damage, so exercise caution when performing this step. When installing the unit, slotted holes in all mounting hardware must be on the bottom and all bolts must be properly tightened to 75 ft-lbs using a torque wrench.

- ▶ 4. Double check that all mounting bolts are secure. Then remove the lifting device.



Optional Spacer

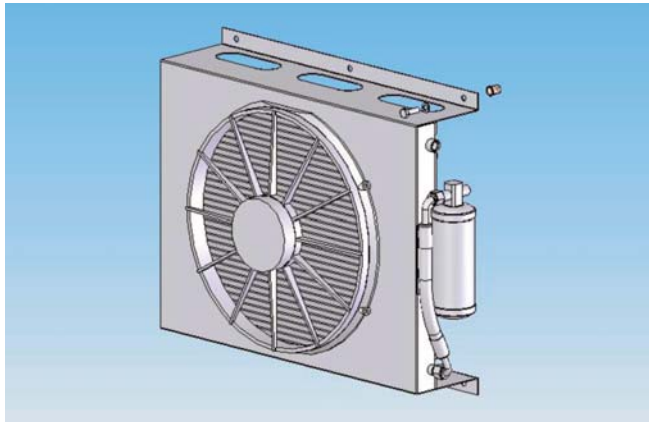


Mounting the Dynasys APU A/C Condenser Assembly

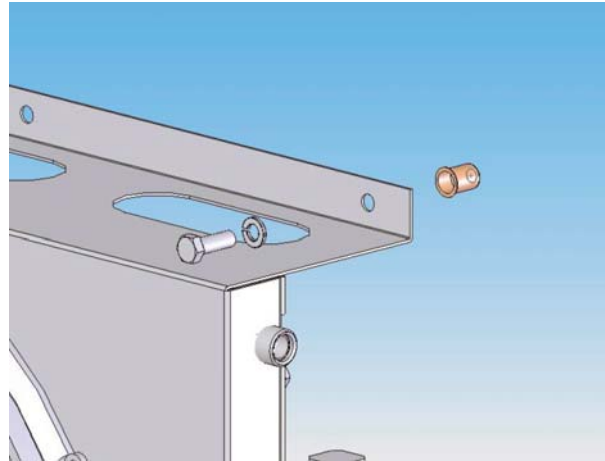
- ▶ 1. The ideal mounting location for the condenser is at the outside rear of the bunk.
- ▶ 2. Make sure that the chosen location is close enough to the HVAC unit that the refrigerant lines will reach the HVAC box when completely installed.



- ▶ 3. Once a location has been chosen, it is necessary to have a second person assist in holding and marking the location of the mounting holes, using the provided template (printed on the outside of the Condenser assembly packaging). Make sure the template is level.
- ▶ 4. Once marked, drill six 17/32" holes.
- ▶ 5. Use the provided POP® nuts and a proper installation tool (Hodyon part #55-1002) to install the nuts in the back panel (see exploded view on the next step).



- ▶ 6. Raise the condenser assembly into position and install the provided bolts and washers. Be careful not to over tighten the bolts.



Exploded View

Mounting the Dynasys APU HVAC Box

- ▶ 1. Remember to always leave sufficient clearance on all sides of the HVAC unit for proper air flow.

- ▶ 2. Using the template (printed on the outside of the HVAC box packaging), drill the four holes for: the 2 a/c hoses (use 1-1/2" hole saw size), condensation drain tube and condenser fan wiring harness (this also uses a 1-1/2" hole saw size). It is recommended that the holes be piloted with a 3/16" drill bit prior to drilling the final size. After drilling, use a file to remove any sheet metal burrs that remain.
- ▶ 3. Attach the drain tube to the bottom of the HVAC box.
- ▶ 4. Place the HVAC box into the cab of the truck and ensure that the drain hose is located in such a way to allow direct drainage of water and that the hose is not kinked.
- ▶ 5. Feed the condenser fan wire through the proper hole and align the two bulkhead fittings.
- ▶ 6. Do not secure the HVAC unit until you are sure that all connections are correct and fully secured.
- ▶ 7. Attach both refrigerant lines to the bulkhead fittings and run them to where the condenser is mounted. Make sure to lightly lubricate the o-rings and ensure they do not get pinched. Use moderate force to tighten each fitting, being careful to ensure a proper seal, but do not over tighten the fitting. A protective loom

or sleeving should be installed over the hoses (this wiring protector can be purchased directly from Hodyon).

- ▶ 8. Using the two self-tapping screws provided, tighten the HVAC box to the floor of the bunk.
- ▶ 9. Connect the supplied wire harness for the condenser to the HVAC connection and run it, along with the two refrigerant hoses, to the condenser.

Ducting the Ventilation System

▶ **Independent Ducting and Integrated Ducting are the two methods of providing air from the HVAC box to the bunk area. A great deal of thought and consideration should be used before deciding how to perform the vent installation.**

- ▶ 1. Independent Ducting uses separate ductwork included in the Dynasys kit. We recommend this independent ducting method because it provides the least restriction to airflow from the HVAC.
- ▶ 2. Integrated Ducting interconnects the truck's OEM ductwork to the Dynasys HVAC box.



- 3. The Dynasys HVAC unit should be located in such a way that it does not restrict or cover the return air side of the HVAC unit. Ideally the unit should be mounted directly below the bunk with the grill facing 'outward'. This placement of the unit will provide the optimal fresh air inlet to the unit (this opening should be made with a jig saw).
- 4. Install the return air vent as close as possible to the return air side of the HVAC box.

Connection of the A/C Hoses

- 1. Remove the protective caps from hoses prior to installing the hoses to the fittings.
- 2. Make sure the o-rings are in place, and lightly lubricate with clean PAG refrigerant oil.
- 3. Connect the larger (#8) hose to the fitting on the condenser near the top.
- 4. Connect the smaller (#6) hose directly to the drier.
- 5. Connect the other end of the hoses to the appropriately sized bulkhead fittings on the bottom of the HVAC box.

- 6. Make sure the hoses are not stretched too tight and are properly loomed to prevent chaffing (this wiring protector can be purchased directly from Hodyon).
- 7. Proceed to tighten all connections using one wrench to hold the fitting and the other to tighten the hose. Do not over tighten the fittings.

Mounting the CCU

- 1. The ideal mounting location for the control panel is at the head of the bed and about half way between the floor and the ceiling.
- 2. Make sure that the chosen location is close enough to the HVAC unit that the communication cable will reach the power module when completely installed.
- 3. Ensure that vented air does not discharge directly on the CCU, since this will cause it to register a false temperature.
- 4. Once a location has been chosen, it is necessary either to route the cable behind a cabinet or wall or to surface-run the cable, securing it to prevent damage (if it is necessary to run a cable behind the wall, a 1/2" hole is needed).

- 5. When routing the cables, avoid sharp edges and protect the cable from damage with grommets and/or wire loom.
- 6. Use self-tapping screws to secure the mounting bracket to the wall.
- 7. Plug the provided cable into the back of the CCU and clip the CCU to the bracket. Plug the other end of the cable into the RJ-45 receptacle on the ECM. Plug the other end of the cable into the RJ-45 receptacle on the ECM

Connection of the Fuel Fittings

- 1. Locate the existing supply and return fittings on the truck's fuel tank.
- 2. Remove the existing supply fitting from the tank, install the Dynasys fittings, and check valves as shown on the next page.
- 3. Remove the existing return fitting from the tank, and install the Dynasys fittings as shown on the next page.
- 4. Make sure to use thread sealant on all fittings.
- 5. Using the hose clamps and hose supplied, run the lines from the fuel tank to the rear of the APU.
- 6. Connect the return line to the upper fitting on the APU.

- 7. Connect the supply line to the lower fitting on the APU.
- 8. Tighten all clamps and fittings and check for leaks.
- 9. Ensure that the fuel shut off handles on both the fuel filter and the fuel water separator are in the OPEN or vertical position. Please note that the unit will be shipped with these in the OFF position (see next page).

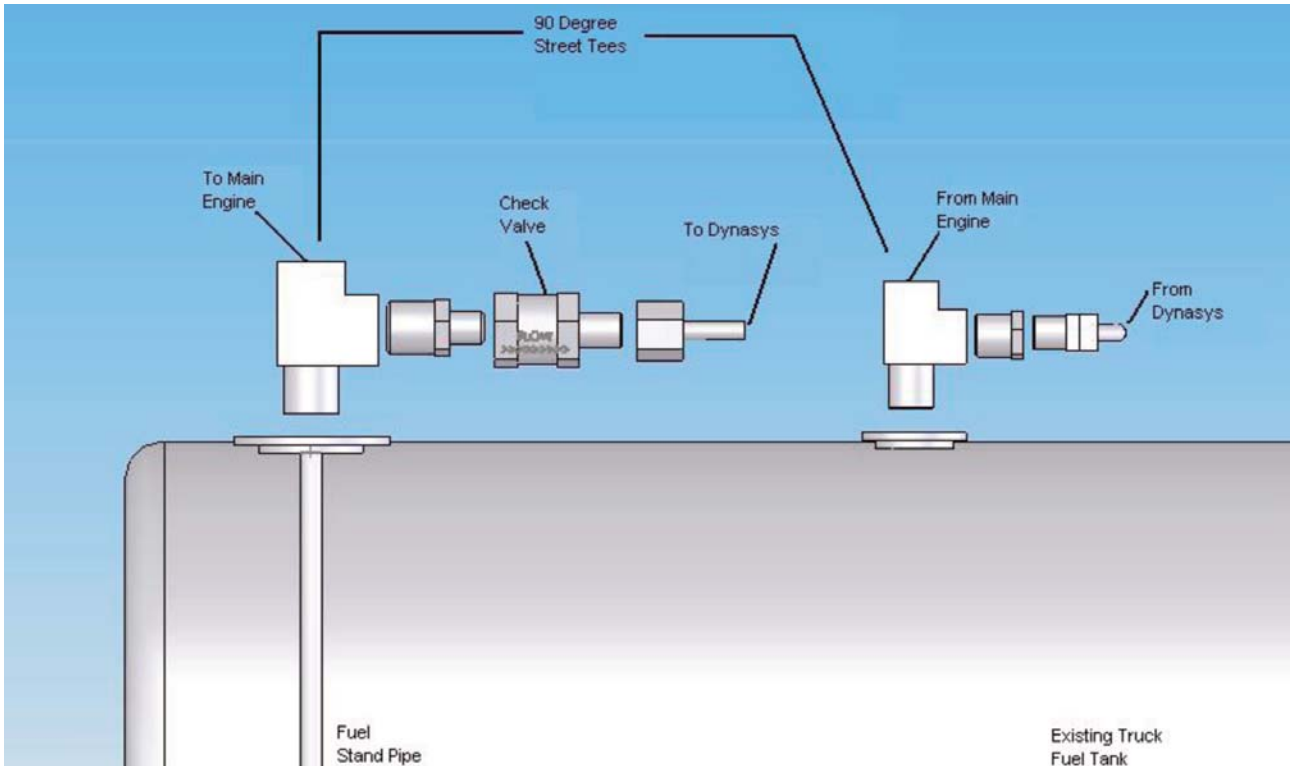
Electrical Connections

Introduction

The Dynasys unit complies with all applicable standards for 120 VAC wiring on a Class 8 truck. All 120 VAC wiring is covered with a bright orange protective loom. The power distribution system conforms to all applicable Federal Motor Carrier Safety Regulations under 393.28. Only qualified electricians should work on this portion of the unit.

Mounting the 120v Power Distribution Box

The installation kit includes a 120v power distribution box with 3 breakers and a GFI receptacle, a remote GFI receptacle, a HVAC cable, and a block heater cable/receptacle. The



maximum total current for all GFI receptacles is 15 amps. The block heater is on a different circuit and it is also 15 amps. The bunk's GFI circuit incorporates two duplex outlet receptacles which support household 120v appliances. The block heater cable has a single grounded outlet that connects to the truck's block heater receptacle (typically located under the driver's door). The main distribution cable from the generator will require a 1-1/2" hole saw size. Block heater to distribution box will require a 1-1/4" size.



Installing the 120v Block Heater Receptacle

Connect the block heater receptacle to the power distribution box and route its cable along the frame rail, securing it frequently (any excess should be coiled up and secured with wire ties). Depending on the type of block heater being used, a block heater extension cable may need to be purchased separately to connect it to the Dynasys receptacle provided. Again, block heater to distribution box will require a 1-1/4" size.

Installing the 120v GFI Outlet in the Sleeper

When mounting the 120v GFI outlet, pay close attention to where the 120v appliances are located in the truck (or where they are likely to be located), and position the receptacle close to that area. Secure the 120v outlet mounting bracket. Drill a hole under the bracket and route the GFI outlet cable to the 120v power distribution box. Secure the receptacle to the bracket and ensure that it is firmly mounted.

Installing the HVAC Cable

Connect the HVAC cable to the power distribution box and



route its cable under the bunk to the HVAC unit. Any excess cable should be coiled up and secured with wire ties. Plug the four position connector into the appropriate connector on the HVAC box, ensuring it is clipped on securely.

Installing the Battery Cables with 125 Amp Inline Fuse

A 125 amp inline DC fuse must be installed on the Dynasys positive (+) battery cable. The fuse assembly kit will be supplied with the unit. The Dynasys positive battery cable should be located on a separate battery from the negative cable. The Dynasys positive battery cable should be on an independent post (i.e. there should be no other line or load terminals connected to the same stud as the Dynasys positive battery cable).

- ▶ 1. Install the battery cables on the Dynasys APU Cabinet Assembly and route them to the battery box, ensuring that cables are protected from any hazards that may damage them.
- ▶ 2. Once the cables reach the battery box, find a suitable location to mount the inline fuse. The fuse assembly must be located in an area free of hazards and firmly secured (mounting hardware not included).

- ▶ 3. The positive (red) cable should be connected to a separate battery from the negative (black) cable. Ensure that both battery terminals are clean before connecting the cables.

Installing the Interconnect Cable

The interconnect cable from the APU main cabinet to the ECM /HVAC box will require a 1-1/2" hole saw size. Be careful to pay attention to the proper orientation of the connector. Plug the connector in and using the outer ring and lock the connector in position. Route the other end of the cable to the under bunk area and pull it through the previously drilled 1-1/2" hole. Plug the four Molex connectors into their matching receptacles on the ECM. (8-12-14-16 pin connectors) Now take the 9 pin connector and plug that into the receptacle on the side of the HVAC box, ensuring that it is securely locked into position.

Installing the Shore Power Kit (Optional)

The Dynasys Shore Power Kit #54-8500 and Battery Charger #54-8501 have a separate user's manual which is included in the packaging for those items.

Start-Up Procedure

It is important that all installation steps have been followed correctly. Double check all of the previous installation steps before performing start-up. If you require assistance in completing any of the following steps, please call 800-289-8282 for technical assistance.

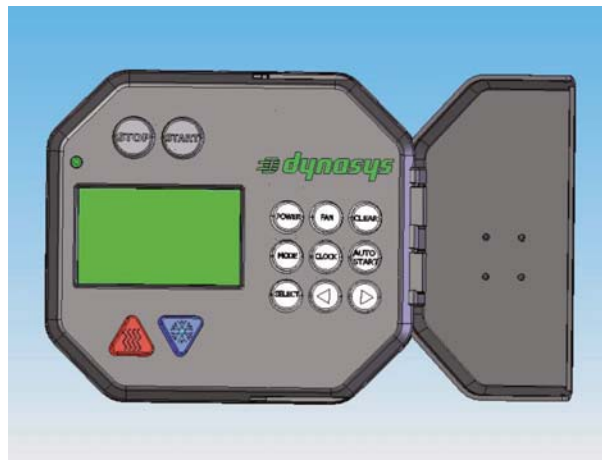
Pre Start-Up Inspection

Before beginning the start-up procedure please do the following:

- ▶ 1. Remove the cover.
- ▶ 2. Ensure that all belts are in good condition and properly tensioned.
- ▶ 3. Check all electrical connections to ensure they are not loose or corroded.
- ▶ 4. Visually inspect the unit for leaks, loose or broken parts, or any damage.
- ▶ 5. Check all engine fluid levels.
- ▶ 6. Replace and secure the cover.

Operational Overview of the CCU

Before beginning the start-up procedure it is necessary to know how to operate the cabin controller. Please refer to the Dynosys Owner's Manual for detailed instructions on the controller.





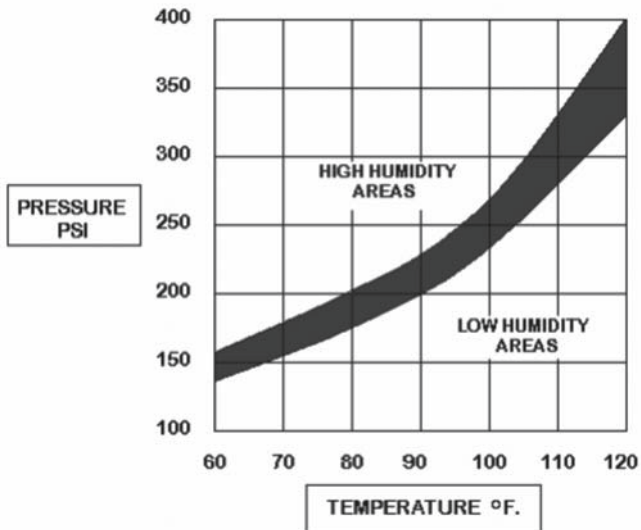
Charging the System with R134a Refrigerant

- ▶ 1. Connect a suitable gauge manifold to the suction and discharge service ports located under the cover on the HVAC box.
- ▶ 2. Connect the service line of the gauge manifold to a vacuum pump
- ▶ 3. Open the gauge manifold and vacuum pump valves.
- ▶ 4. Start the vacuum pump and evacuate until system reaches 27" of vacuum.
- ▶ 5. Once the system reaches 27" of vacuum, continue to vacuum for an additional 15 minutes.
- ▶ 6. Close the vacuum pump valve, switch off the pump, and monitor the gauge for pressure rise. If the vacuum level does not hold at the prescribed pressure, proceed to check the system for leaks.
- ▶ 7. If vacuum level remains at 30" for 10 minutes, the system is ready to be filled with 2 lbs, 12 oz (2.75 lbs) of R-134a refrigerant.
- ▶ 8. Close manifold valves and remove evacuation equipment.
- ▶ 9. Connect the refrigerant bottle to the gauge manifold and place it on a scale (or use a recovery and recharging system that can accurately measure the refrigerant).
- ▶ 10. Open the refrigerant bottle valve for liquid and purge the charging line.
- ▶ 11. Keep the low pressure side valve of the manifold gauge closed. Open the high pressure side.
- ▶ 12. Add refrigerant until reaching the maximum 2 lb. 12 oz of R-134a. If the unit will not accept 2 lb. 12 oz of R-134a, then proceed with steps 13-16 below.
- ▶ 13. Close the refrigerant bottle valve and high side valve of the gauge manifold.
- ▶ 14. Run the unit it reaches approximately 70° F and maintains discharge pressure at least 150psi. Partially block off the air intake to the condenser if necessary.
- ▶ 15. Open the low side valve of the gauge manifold and the refrigerant bottle, and add refrigerant slowly, 1 oz at a time until a full charge is achieved.
- ▶ 16. Close the refrigerant bottle and gauge manifold valves.
- ▶ 17. Leave the unit running for 15 minutes to stabilize.
- ▶ 18. Remove the gauge manifold.
- ▶ 19. Reinstall the service caps and replace the cover.

► **High Pressure / Temperature Readings**

High temperatures and pressures are approximate.

Readings within 10-15% of the chart will deliver acceptable performance.



► **Low Pressures/Temperature Readings**

Common low side pressure will be 15-40 PSI depending on the ambient temperature.

Testing the HVAC System

It is important that all installation steps have been followed correctly. Double check all of the previous installation steps before performing start-up. If you require assistance in completing any of the following steps, please call 800-289-8282 for technical assistance.

Testing the 120v GFI Outlets

Using a multi-meter set to Volts AC, check the two outlets and see that they are both measuring approximately 120 Volts.

Installation Checklist and Warranty Registration

After completing installation of the Dynasys unit, the installing dealer must complete the Installation Checklist and file a warranty registration. The Installation Checklist



is only to be completed at the time of inspection by authorized technicians. A checklist is included with each unit in its documentation or available at: www.hodyon.com/auxiliarypower/installationchecklist.aspx

Please note: no warranty will be activated on the Dynasys unit until the installation checklist and warranty registration are filed with Hodyon.

Operational Safety Precautions

Before performing any service, maintenance or repairs you must disconnect the Dynasys from its battery source. In the recommended installation configuration, the Dynasys shares the battery bank with the truck's main engine. After disconnecting the battery cables, check the battery posts inside the engine cabinet to confirm there is no voltage to the APU.

Safety Cover Switch

It is critical that this safety cover switch on the APU is never deactivated or bypassed; failure to comply may result in serious injury.

The safety cover switch is designed to prevent the Dynasys APU from starting when the engine cover is loose or has been removed. When the switch is open, the cover has been removed or is loose. When the switch is closed the cover is down. The switch is located at the front of the engine enclosure in the lower right hand corner of the APU Cabinet Assembly.

Auto-Start Automatic Start/Stop Feature

Remember that a properly functioning Dynasys is capable of starting independently of its operator. With the Auto-Start feature, battery voltage, temperature, and time of day can all cause the Dynasys engine to start. Please see the cabin controller unit operating instructions for further information on the Auto-Start feature. You must deactivate this feature prior to refueling.

Starting Aids

Do not use aerosol types of starting aids such as ether. Such use could result in an explosion and personal injury, and will render the warranty null and void.

► **Starting with the Cover Off**

Some installation or repair/diagnosis procedures require that the APU is started with the engine cover off. Do not deactivate or bypass the safety cover switch. Instead, have another individual assist by manually holding the safety cover switch down in the closed position for the duration of the procedure. As with any running engine, extreme caution is recommended.

► **Inspection of the Safety Systems**

The safety systems on the Dynasys APU should be examined/ tested whenever maintenance is performed on the APU to ensure that they are in good condition and proper working order.

► **Contact Us**

If you do not fully understand this safety information, contact Dynasys Technical Support Department toll free at (800) 289-8282 before proceeding with the operation or service of this APU.