

ClearSky Battery Powered AC System

Installation Guide

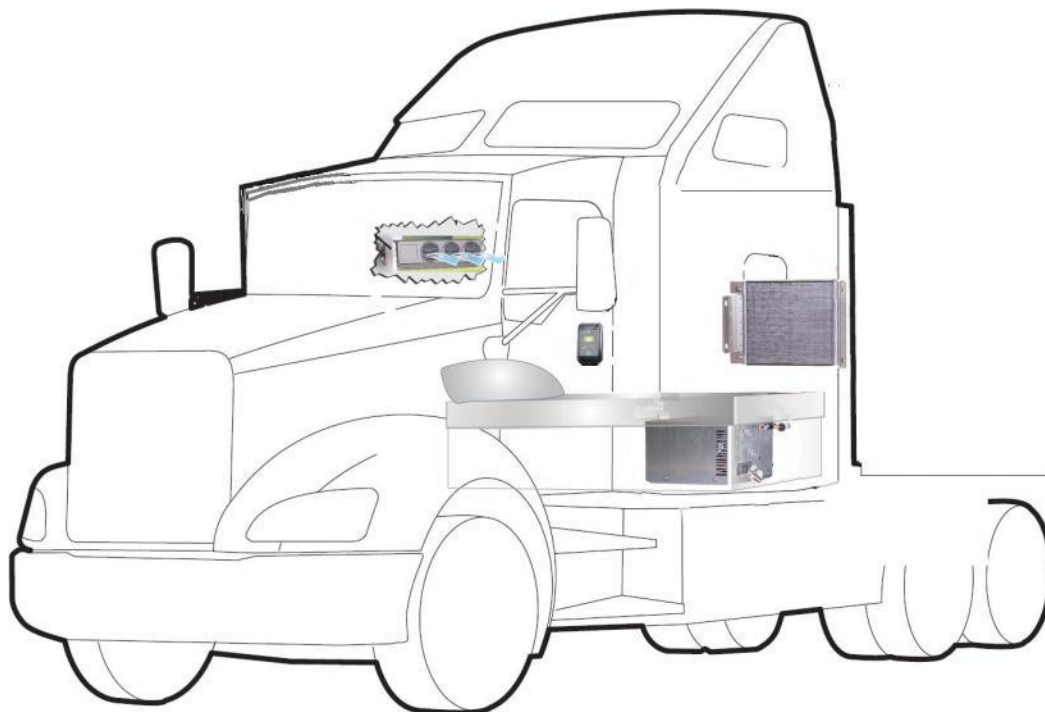


Table of Contents

- Kit Contents..... 1
- Product Overview 1
- Specifications 3
- Warnings and cautions 3
 - Recommendations: 3
- Major Components 4
 - Evaporator 4
 - Compressor Box 4
 - Condenser 5
 - Control Panel..... 6
- Installation 7
 - Component Locations 7
 - Evaporator..... 7
 - Mounting the Evaporator 8
 - Compressor Box 9
 - Mounting the Compressor Box..... 10
 - Condenser 10
 - Control Panel..... 11
 - System Wiring 12
 - Control Panel Wiring..... 13
- Wiring..... 13
 - Battery Box Installation..... 13
 - Battery Wiring..... 13
 - Battery Isolator 15
 - Start Assist..... 15
 - Battery Cables 15
- Hose Assemble Instructions..... 17
- Charging the System 18

Kit Contents

Description	Quantity
Compressor Box assembly, complete	1
Compressor box cooling duct, flexible	5 feet (1.5 m)
Evaporator assembly with mounting kit	1
Condenser Assembly with cover and mesh, ClearSky	1
Control/ Display Panel, ClearSky	1
Wireless remote control with batteries	1
Tube, Double Capillary (Copper) - with Drier/Filter	1
Hose, refrigerant, #6	13 feet (4 m)
Hose, refrigerant, #8	23 feet (7 m)
Insulation, hose	6 ½ feet (2 m) X2
Hose, evaporator drain	13 feet (4 m)
Fitting w/ Clamp, 90° - G8 Line (Compressor "OUT" and Condenser "IN")	2
Fitting w/ Clamp, Straight - G8 Line (Evaporator "OUT")	1
Fitting w/ Clamp, 90° - G6 Line (Condenser "OUT")	1
Fitting w/ Clamp, Straight - G6 Line (Capillary to Drier)	1
Fitting w/ Clamp, 90° - G8 Line (Comp. "IN")	1
Compressor Box Installation Kit	1 bag
Condenser Installation Kit	1 bag
M4.8 x 22 Self Tapping Screws	12
M6 x 16 Self Tapping Screws	4
Power Cable, Battery to Compressor Box, 7AWG with Fuse Holder Assembly	16 feet (5 m) X 2
Power Wire for Application Module with Fuse Holder Assembly	16 feet (5 m)
Power cable, compressor box to evaporator	1
Power cable, compressor box to condenser fan	1
Temperature Probe Cable	1
NTC Thermistor	1
Power cable, compressor box to control panel	1
Safety grate, metal, cooling duct	1
Flange, wall mount, cooling duct	1
Cooling duct clamps	2
Air Grill, black plastic	3
Grommet	3
Anti-Condensate, Prestite	2 ft.
Fuse holder, 200 amp with fuse	2
Battery isolator	1
Cable, 2 AWG, 105C, 600V, red and black	20 feet (6 m) each
Lug, Copper, #2 AWG, 3/8" Bolt	20
Tubing, Heat Shrink, red and black	2 ft black, 3 feet red
Start assist assembly	1
Owner's Guide	1
Warranty Statement	1

Product Overview



Condenser

Remote Control



Evaporator

Serial Number Label



Compressor Box



Control Panel



Figure 1 Major Components

Specifications

Voltage	12 VDC
Refrigerant	R134A
Fan Speeds	6
Temperature Control	electronic control with digital control panel plus remote
Temperature range, set point temperature	68 to 82 F (20 to 28C)
Auto-switch off	Shuts down with low batteries voltage (Battery saver 10.8 VDC)
Evaporator weight	11 lbs 7 oz. (5.2 kg)
Condenser weight	15 lbs, 12 oz. (7.1 kg)
Compressors box weight	54 lbs, 5 oz (24.6 kg)

Warnings and cautions

Various warnings are used throughout this manual. Failure to follow these warnings may result in serious injury or death. Be sure to follow all warnings.

Recommendations:

High amp alternator: As there are additional batteries which require charging, it is recommended that the vehicle be equipped with a minimum 200 amp alternator to allow for proper charging of the auxiliary batteries within the vehicle operating time.

Battery: 4 Trojan Overdrive AGM 31 deep cycle batteries or equivalent.

Major Components

Evaporator

The evaporator is a completely self contained unit with 2 variable speed blower fans. The unit is designed to be mounted by hanging or by sitting on top of a shelf. The evaporator is equipped with 3 fully adjustable ports to control and direct the airflow. An optional cover is available for mounting the evaporator through a wall.

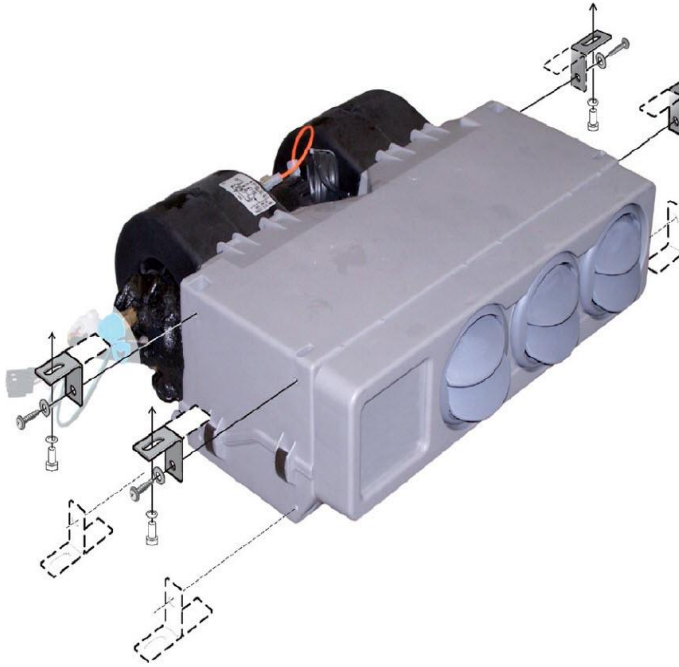


Figure 2 Evaporator

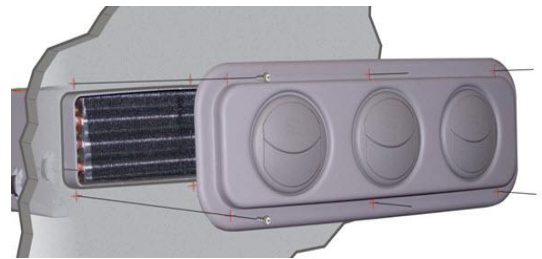


Figure 3 Optional front Cover

Compressor Box

The compressor box contains 2 compressors and the control systems for the compressors. This is designed for mounting under the sleeper bunk. It has been designed for dependable quiet operation. The high and low pressure charge ports are located on the compressor box. The unit contains a cooling fan and a connection to vent the heat from the compressor box to outside of the compartment where it is installed. Typically, this will be vented back into the sleeper area.



Figure 4 Compressor Box

Condenser

The condenser is a self contained unit with the condenser coil, mounting system, and fan. The condenser is designed for mounting on the rear of the sleeper back wall.



Figure 5 Condenser

Control Panel

The control panel allows the driver complete control of the auxiliary cooling system. The control panel allows the selecting of the desired temperature as well as the fan speed. The panel is capable of displaying diagnostic codes for troubleshooting purposes. The system is also equipped with a remote control for ease of operation.



Figure 7 Control Panel



Figure 6 Remote Control

Installation

Component Locations

Due to the variety of different vehicles that this system may be installed in, component location is up to the installer's discretion using the following guidelines.

- Consideration must be given to the routing of hoses and wiring between the various components.
- Hoses and wiring must be properly secured and protected from chaffing or pinching.
- Components should be located to prevent damage during normal operation.
- Components must be secured to prevent injuries to the driver in case of a motor vehicle accident
- Components must be located to allow for sufficient airflow
- Consider serviceability when selecting a mounting location
- All edges must be protected when passing hoses and wiring through body panels
- All openings from the interior to the exterior must be adequately sealed to prevent entrance of exhaust fumes.

Evaporator

The mounting location for the evaporator should be selected to allow the airflow to be directed towards the sleeping area. The evaporator may be mounted by hanging it below a shelf, by placing it on a shelf or by mounting inside a cabinet or closet. If necessary, a panel may be cut and the front of the evaporator may be inserted through the opening using an optional front evaporator cover (not included in the kit). The rear of the evaporator must have sufficient clearance for the refrigerant hoses to be connected and for routing of the wiring. The evaporator has a drain located at the rear. Tubing is attached to the drain and routed to the exterior of the sleeper. The evaporator must be mounted level side to side and tilted towards the rear to allow for proper drainage. The maximum tilt is 10 degrees.



Figure 8

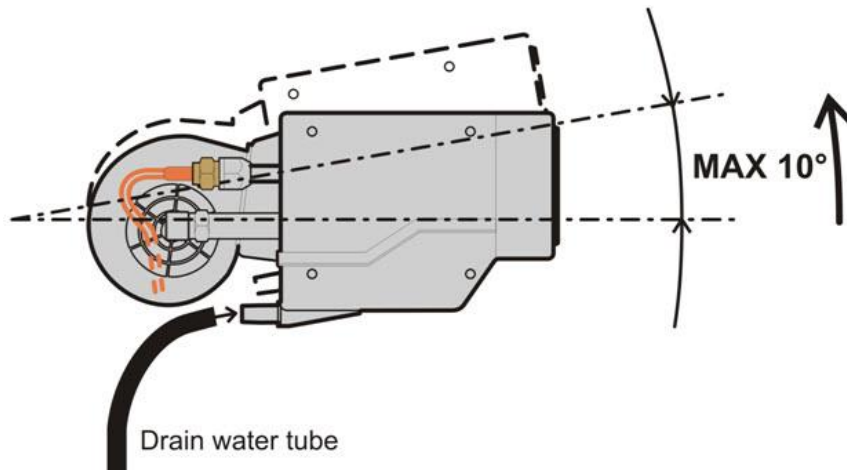


Figure 9

If the evaporator is mounted in an enclosed area, provisions must be made to allow for air return from the sleeper area to the rear of the evaporator. Cooling will be adversely affected if there is not sufficient circulation.

Mounting the Evaporator

Prior to installing the evaporator, a suitable location must be determined to route the refrigerant lines and wiring from the evaporator to the compressor box. When the location has been determined, drill the required holes to allow for the passage of these connections between the evaporator location and the compressor box location. The evaporator can be mounted using the 4 brackets supplied with the kit. Mount the brackets loosely to the evaporator at the desired location then use the assembly to mark the locations for the brackets with the evaporator in the proper location. Using supplied fasteners attach the mounting brackets and mount the evaporator. If access is difficult, it may be necessary to attach the refrigerant lines and wiring prior to mounting the unit.

Refrigerant lines and wiring should be routed behind panels or inside cabinets where possible. The capillary tube should be carefully rolled out to its full length. The tube must be located in such a way that the tube terminates in an accessible location to connect the high pressure liquid hose to the tube. This must remain accessible for service and leak checking. Use care to avoid kinking the capillary tube. The supplied insulation should be installed over the #8 hose between the evaporator and the compressor box. The return hose, harness to the evaporator, and the drain hose should be routed through the same area. Be sure to leave sufficient slack in all hoses and harnesses to allow connection to the evaporator and servicing as required. Using suitable clamps, secure the hoses and wiring to prevent movement and chaffing. Depending on location of the control panel, the harnesses may be installed at this time as well.

Compressor Box

The compressor box must be located within the sleeper area. The normal location would be below the bunk in one of the storage areas. When selecting the location, allow for ease of routing of the wiring and refrigerant hoses from the evaporator to the compressor box and compressor box to the condenser. A suitably sized hole will need to be cut through the floor close to the compressor box to pass through the hoses and wiring. A minimum of 8 inches on each side of the compressor box and 4 inches at the top is required to allow for air circulation.

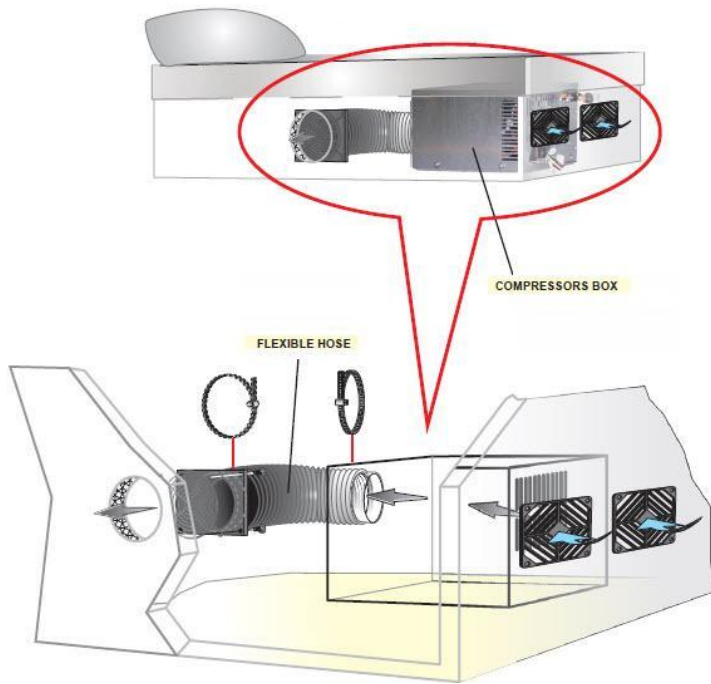
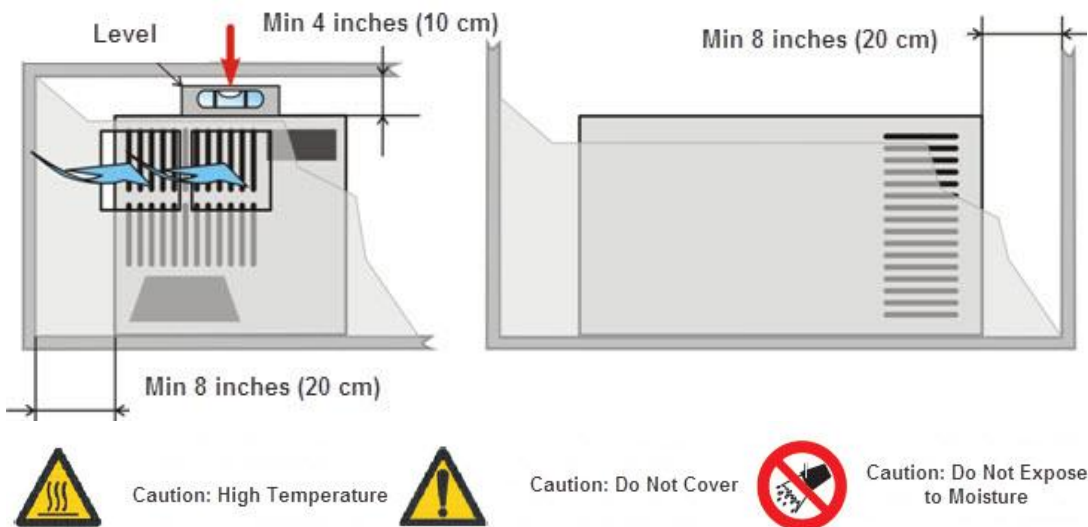


Figure 10



Mounting the Compressor Box

With the location selected for the compressor box, check under the floor to ensure that there are no obstructions for the fasteners or for the opening required for the hoses and wiring. Position the mounting brackets to the compressor box and place the unit in position. Mark the locations of the mounting brackets and the pass through for the hoses and wiring. Remove the unit and drill for supplied mounting hardware and the pass through. Clean the edges of the hole for the wiring and protect the edge with a suitable product to prevent damage to the hoses or wiring. Place the compressor box in position and fasten securely. Cut a suitable sized hole from the compartment where the compressor box is mounted to a location outside of the compartment. Mount the vent flange over the hole and run the vent hose from the flange to the compressor box. Cut another hole and install the supplied grill for return air to the compartment.

Condenser

The condenser is designed to be mounted on the rear wall of the sleeper. Select a location which is free from obstructions and does not interfere with vehicle components such as air lines or lights. Area should be flat to ensure complete contact between the condenser and the rear wall. The condenser should be mounted as high as possible, but consider the location for hose length as well. The condenser must be mounted in the proper orientation with the top up using the supplied hardware.



Figure 11

Control Panel

Locate the control panel in a convenient location for access by the operator. The location should be out of the airflow from the evaporator. Wiring for the control panel should be brought up behind the wall panel and through to the rear of the panel. Attach the control panel using self tapping screws.

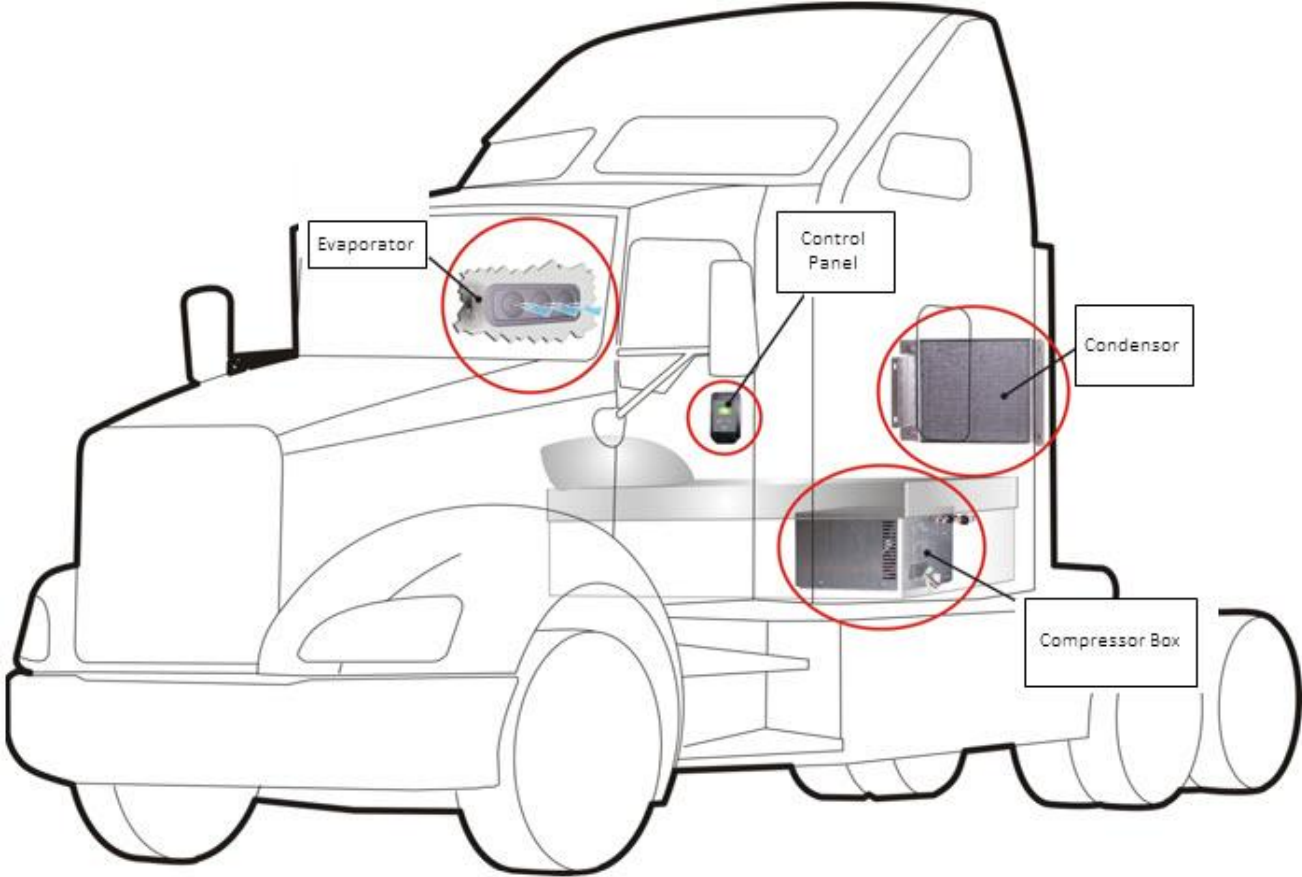
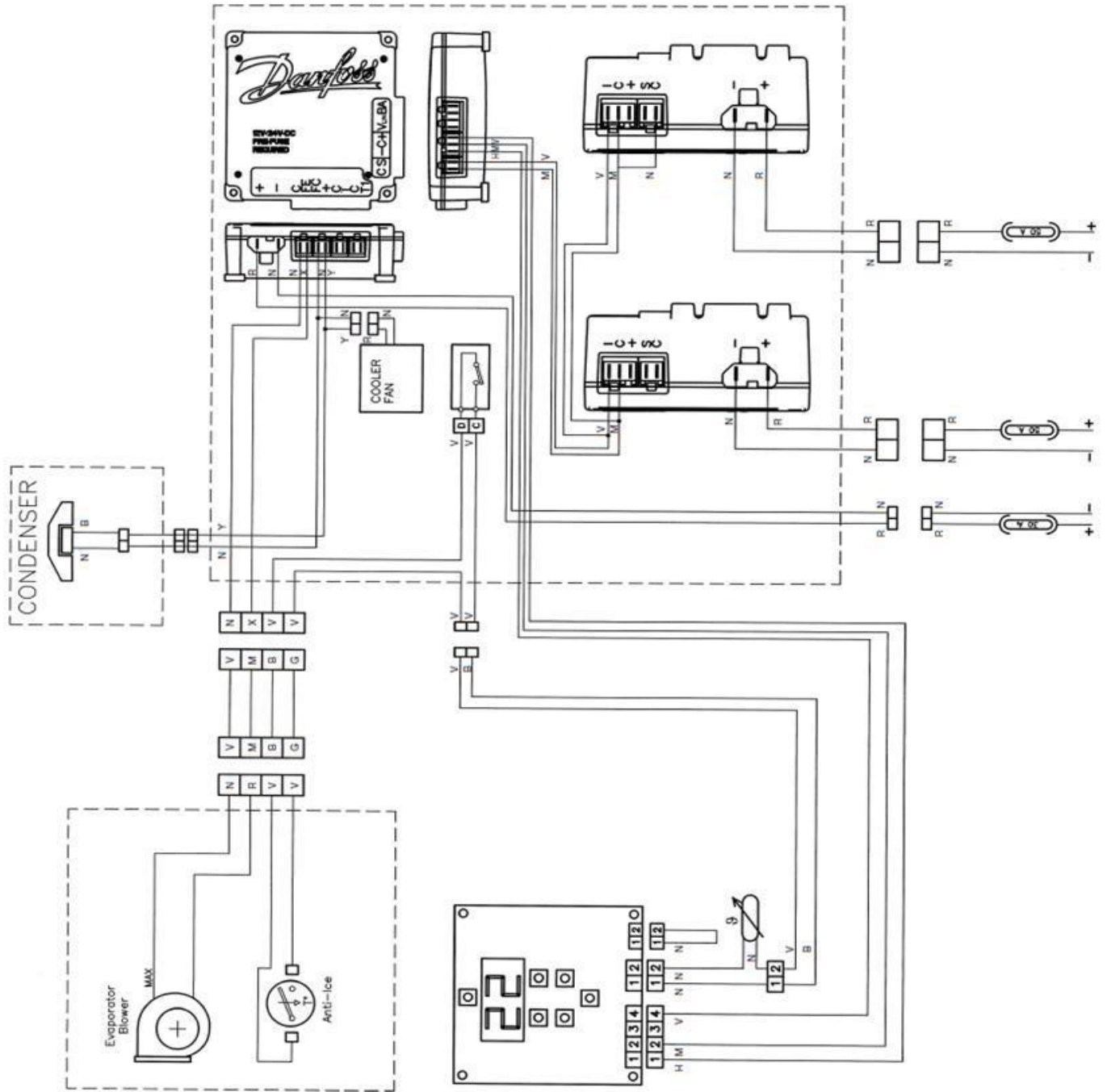


Figure 12

System Wiring



Code	Color	Code	Color	Code	Color
B	White	M	Brown	V	Green
G	Yellow	N	Black	X	White/ Red
H	Grey	R	red	Y	Red/ Black

Control Panel Wiring

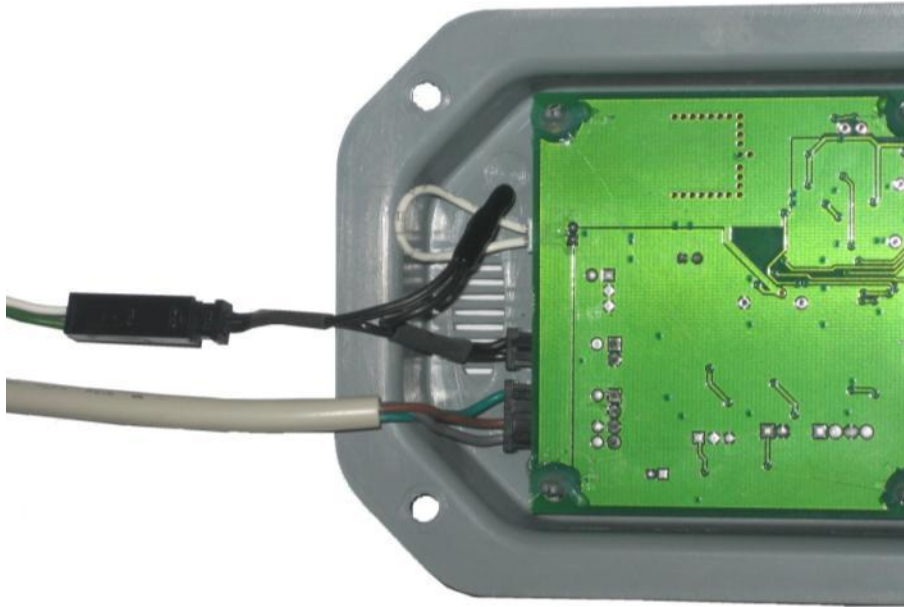


Figure 13 Wiring the Control Panel

Wiring

- Route the evaporator harness from the condenser box to the evaporator.
- Route the control panel harness from the condenser box to the control panel
- Route the condenser fan harness from the compressor box through the pass through hole and to the condenser fan.
- Connect all harnesses and verify all connectors are properly locked.
- Route the 2 pairs of heavy gauge 12 volt cables from the compressor box out the pass through hole and to the battery box location
- Route the 12 volt system supply cables from the compressor box out the pass through hole and to the battery box location

Battery Box Installation

Locate and install the battery box according to the instructions provided with the box.

Battery Wiring

This system is powered by batteries wired in parallel. The use of 4 batteries is recommended to provide sufficient cooling time. With the batteries properly wired, mount the fuse holders in the battery box and connect the positive leads to the positive battery terminals. Connect the negative leads direct to the negative battery terminal. The battery isolator is connected between the system batteries and the truck electrical system.

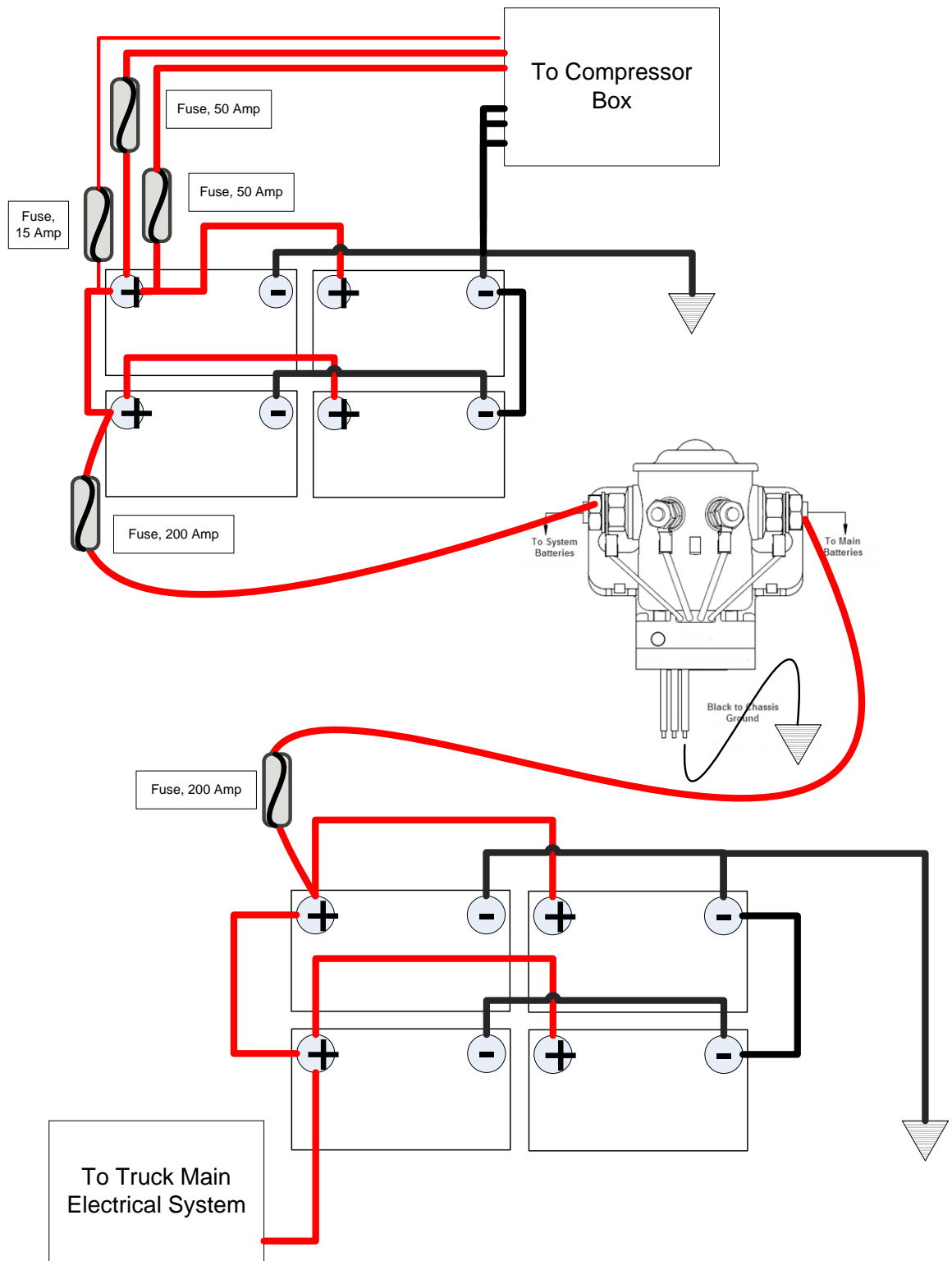


Figure 14 Battery Wiring

Battery Isolator

The battery isolator is an automatic relay. When the battery voltage goes above 13.2 volts on the main battery side of the isolator, the contacts will close connecting the auxiliary batteries to the truck electrical system allowing them to be charged. The isolator does not close immediately to limit the strain on the vehicle charging system. After the main batteries are up to the proper charge level, charging will begin on the auxiliary batteries. When the main engine is shut down, the isolator will remain closed until the main batteries drop below 12.7 volts.

Start Assist

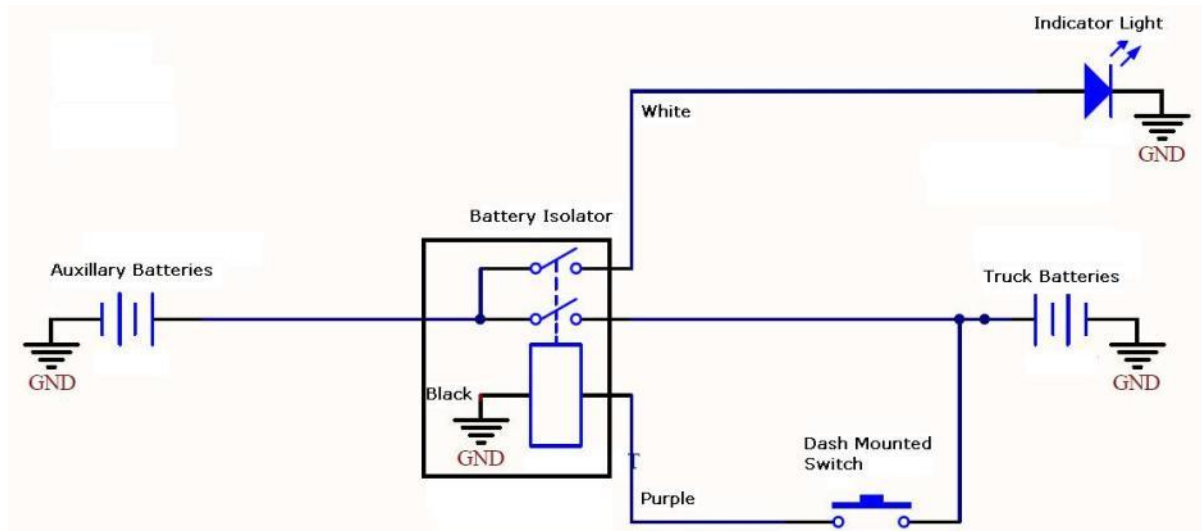


Figure 15

The Start Assist allows the auxiliary batteries to be connected to the main vehicle batteries to provide a boost if the main batteries are too low to crank the engine. A momentary push button switch is mounted on the dash board along with an indicator light. The switch is connected to the vehicle 12 volt positive supply and to the battery isolator purple wire. The indicator light is connected to the white lead from the isolator and to ground. Pressing the switch will activate the battery isolator for one minute. When the time expires, the isolator returns to normal operation.

Battery Cables

All connections to the batteries are made with 2AWG supplied with kit. Terminals must be crimped using the proper tools, Panduit CT-1700, Greenlee K05-1SPGL, or equivalent and all crimped connections must be insulated with heat shrink tubing. All battery wiring should be kept as short as possible to minimize voltage drop.

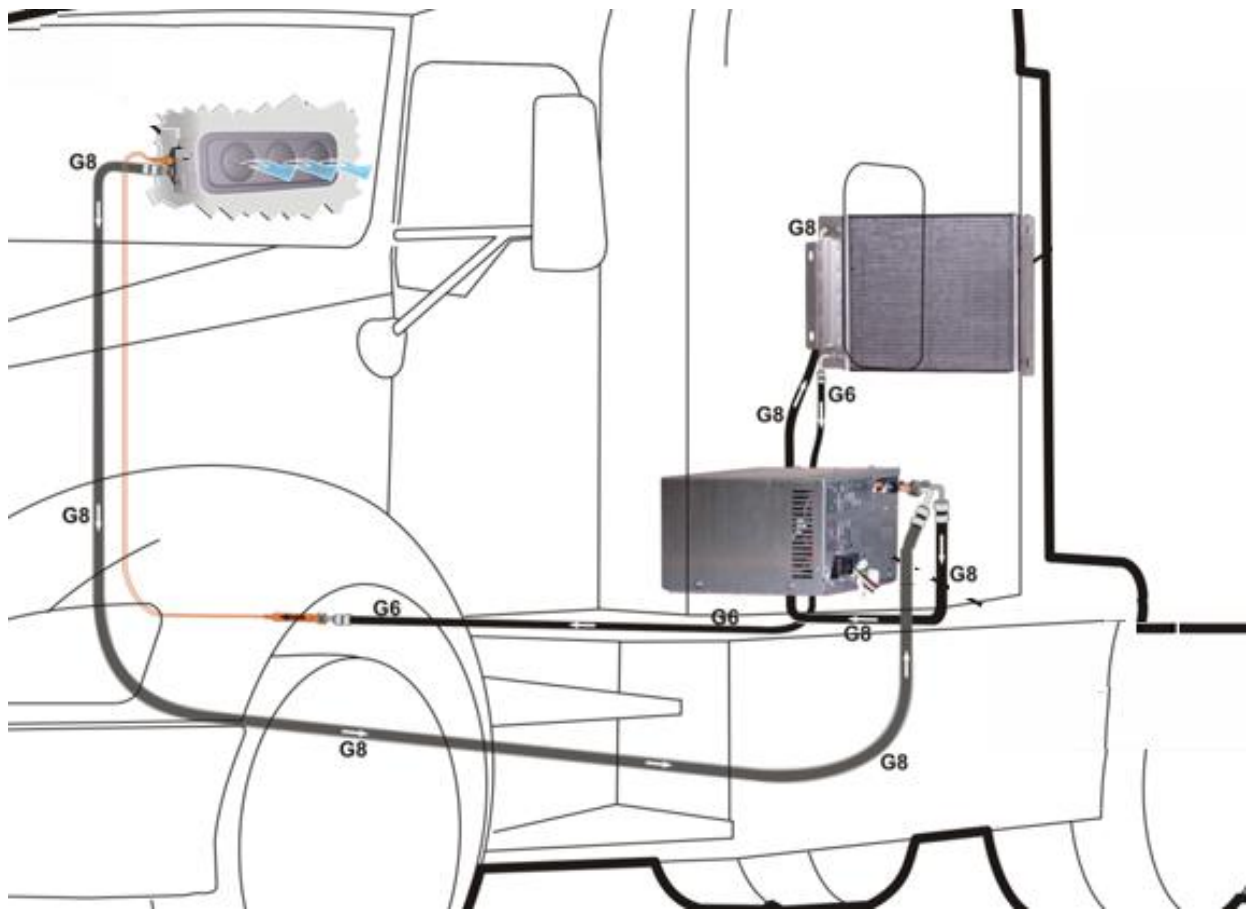


Figure 16 Refrigerant Hose Routing

NOTE:

All refrigerant connections must have the proper o-rings in place and lubricated with the proper oil. The compressor and condenser are slightly pressurized to prevent moisture from collecting in the components. Do not remove the plugs from the compressor box until all other connections have been made and properly tightened. Connections to the compressor box will be made last.

Refrigerant hoses must be routed to ensure that there are no sharp bends or kinks in the lines. From the capillary tube, route the #6 hose through the sleeper and out the pass through hole to the condenser. The section of #8 hose within the sleeper must be insulated with the provided insulation sleeve. Hoses may be cut to length as required for the installation. See hose assembly instructions for the proper assembly of the fittings to the hose. Route the hose to avoid any sharp edges or pinch points that may occur due to cab movement.

NOTE: the hose length cut from the #6 hose must be measured to calculate the required charge of Freon for the system

Route a length of #8 hose from the evaporator to the inlet of the compressor box and cut to length. The fitting at the compressor box includes the low pressure charge port. Do not connect the hose at this time. Route a second hose from the outlet of the compressor box out the pass through hole and to the condenser. The fitting at the outlet from the compressor box includes the high pressure charge port. Assemble the fittings to each end. Route the hose and secure them with suitable mounting clamps.

Route the drain hose from the evaporator out the pass through hole, secure it outside of the cab and terminate it.

Hose Assemble Instructions

1. Cut the hose to the proper length using a suitable tool. Ensure the hose is cut square.
2. Place the clamp on the hose with the locator tab touching the end of the hose.



3. Insert the fitting into the hose until the bead contacts the end of the hose.



4. Using the proper crimping pliers, crimp each clamp. Note: There will be a slight gap in the clamp due to spring back of the clamp. Failure to crimp the clamp properly may result in a loss of the refrigerant.



Charging the System

When all refrigerant hose connections have been made, the system must be pressurized using dry Nitrogen. Connect a suitable charging manifold to the high and low pressure ports. Connect a source of Nitrogen to the charge manifold and pressurize the system to 200 psi. Close the charging valves and observe the pressure. If there is any drop in pressure, check all connections using a suitable leak detecting solution.

Once it has been verified that there are no leaks, draw a vacuum on the system until the vacuum achieves 500 microns. Calculate the amount of Freon required from Table 1 below. Minimum charge is 0.89 lbs / 14.31 oz.

Charge the system with R134A vapour through the low pressure charge port. When the system stops accepting Freon, turn the system on and set the temperature below ambient temperature to continue charging.

When the proper amount of Freon is charged, turn off the manifold valves. Allow the system to run while verifying the operating pressures.

When proper operation has been verified, disconnect the charging manifold and install the caps to the charge ports.

Record the charge weight of R134A on the compressor box using a permanent marker in a visible location.

Table 1 R134A Capacity

Total #6 Hose length (ft)	Hose Removed (ft)	R134a charge (lbs)	R134a charge (oz)
13	0 ft	1.11	17.64
12	1 ft	1.07	17.09
11	2 ft	1.04	16.53
10	3 ft	1.00	16.00
9	4 ft	0.97	15.43
8	5 ft	0.93	14.87
7	6 ft	0.90	14.32

Place the owner's Guide and the Warranty Statement in the truck's cab.

Register the unit through the Impco Ecotrans warranty portal.