PURKEYS

A MISSION CRITICAL ELECTRONICS BRAND

SAFEX AUTO EJECT 480 VAC/30 A

INSTALLATION GUIDE

300-112 R2.00

CONTENTS

GENERAL INFORMATION

The SAFEX system allows fleets to safely and easily connect their vehicles to 480 VAC power while at the dock (meeting CARB and other environmental regulations).

The Auto Eject component is an automatic disconnect that detects when the trailer brakes are released and automatically ejects the power cord so the driver does not drive away with shore power still connected.

This guide assumes the 480 V wire connection has already been made at the transportation refrigeration unit (TRU) and run to the rear of the trailer.

If this wiring has not yet been run, please refer to your TRU manufacturer's guidelines for interconnecting to their electric standby system.

Switching From Diesel to Electric and Back

(Details in section: "Enabling Auto Switching on Carrier Vector Units with "SW8" (Software 8)")

Diesel to Electric Standby:

Carrier:

Carrier models running software 8 (SW8) are configurable to auto switch to electric standby when plugged in.

SW8 models will have this decal below the control panel.

Carrier models without this decal may require an additional module to allow automatic diesel to electric transfer. Ask your Carrier dealer or Purkeys/ Mission Critical representative for more information.

Thermo King:

All Thermo King units tested have automatically switched from diesel to electric standby **without need for additional configuration or modules**.

Electric Standby to Diesel:

Note that all TRU manufacturers require the TRU to be switched off before disconnecting power. The Auto Eject is strictly a safety measure which turns off facility power and ejects the plug to prevent drive-aways.

All Carrier and Thermo King models tested automatically switched back to diesel once electricity was disconnected.

Tools Needed

- Drill
- 1/4" drill bit (with lubricating oil) for bracket mounting
- #29 drill bit (with lubricating oil) for gusset mounting
- 7/16" socket and ratchet
- 7/16" wrench
- 1-1/6" wrench for brake pressure switch
- #2 Phillips screwdriver
- 1/4" flat-blade bit for torque screwdriver
- Torque screwdriver capable of reading 25 in-lbs
- Wire cutters
- Wire crimpers
- Heat gun or torch for heat shrink
- Sharp blade

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AUTO EJECT MOUNTING

The Auto Eject system includes a stainless steel 45-degree mounting bracket that accommodates both 8-inch and 6-inch crossmember spacing at the rear of the trailer.

The bracket mounting holes are drilled for the utilization of the included 1/4" mounting hardware.

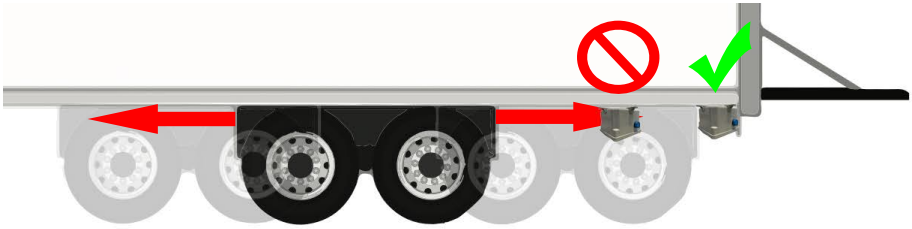
The system should be mounted on the "road-side" of the trailer.

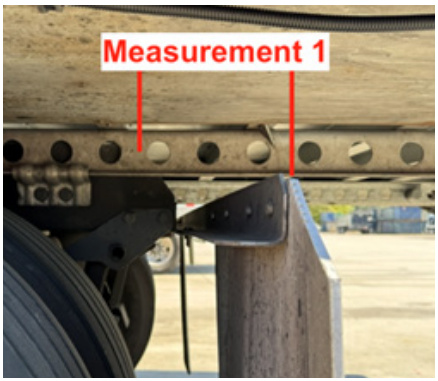
Example mounting:

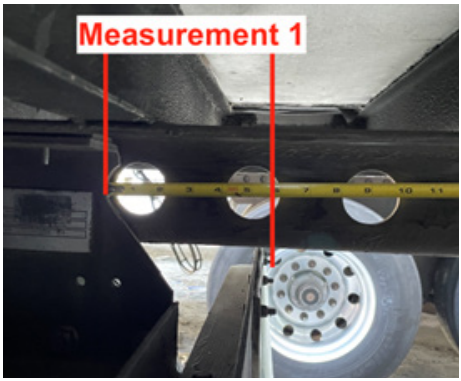
Sliding Axle Considerations:

For trailers with sliding axle assemblies, measure the distance from the back of the mud flap to where the axle assembly would contact the stop bars.

The Auto Eject MUST be mounted far enough behind the stop bars to avoid damage with fully rearward axles.



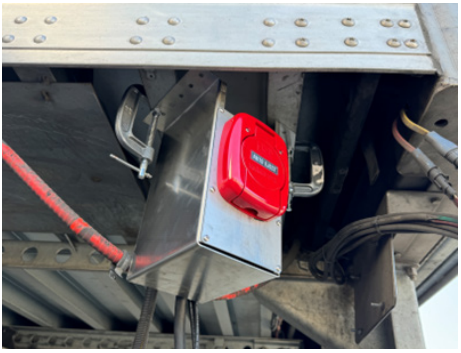




If a suitable mounting location cannot be found, an aftermarket stop bar must be added to avoid potential damage (contact your trailer manufacturer or truck parts supplier for this Optional Accesory).

Alternate mounting solutions may also be used. Please contact Purkeys to ensure your custom mounting solution does not compromise the system warranty.

Step 1: Once a final mounting location is decided, have a helper hold the Auto Eject assembly up to the trailer crossmembers and temporarily clamp into place (be mindful of the cross member center and the diameter of the 1/4" mounting hardware.)



Step 2: Mark four spots for drilling.

Step 3: Remove Auto Eject assembly and drill the four marked holes for the Auto Eject. Utilize lubricating oil to protect drill bits.

Step 4: Once drilled, install the Auto Eject assembly utilizing the included 1/4" bolts, washers, and nuts (7/16" socket and wrench).

AUTO EJECT MOUNTING: TRAILER WITH GUSSET

Some trailers have a hollow gusset allowing for a direct mount of the Auto Eject mounting plate.

See example gusset here:

Step 1: Utilizing the Auto Eject mounting plate as a template, mark the six mounting holes and pre-drill the trailer gusset for mounting.

The holes should be drilled with a #29 drill bit (0.136” diameter).

Step 2: The Auto Eject faceplate can now be installed utilizing #8 – 32 stainless screws.

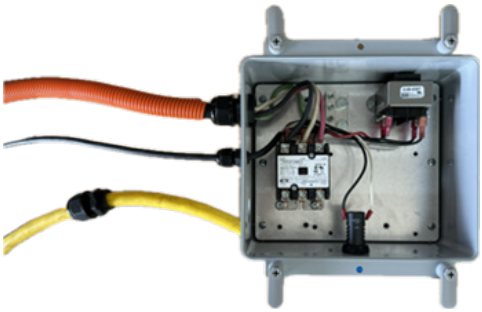
Note that some installs will require trimming of the mounting plate and may not be able to utilize all six mounting holes.

480 V WIRING INSIDE CONTACTOR BOX

Box Access

Step 1: Twist the four lid retaining legs 90-degrees away from the center and remove lid.

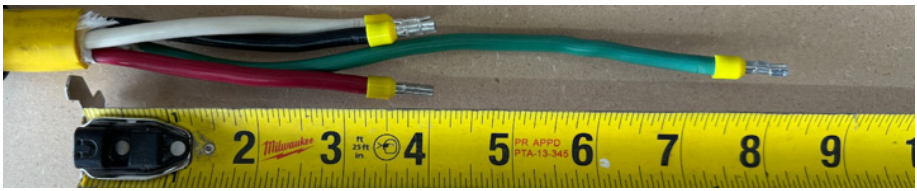
Step 2: Unscrew the strain relief nut from contactor box and carefully slide over the TRU's 480 V wiring.



Wire Preparation

Step 1: Strip 8" of the TRU's 480 V outer jacketing in preparation for connection inside the contactor box.

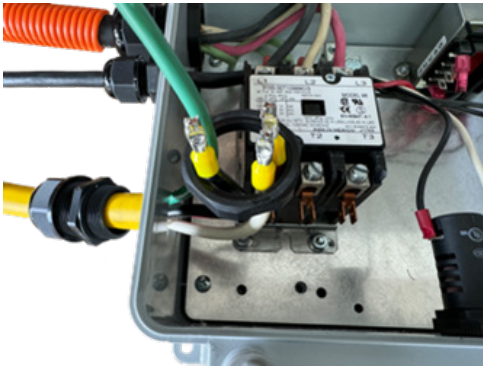
Step 2: Cut the red, white, and black wires down to 4" past the jacketing cut location (leave the green wire at the full 8" length).



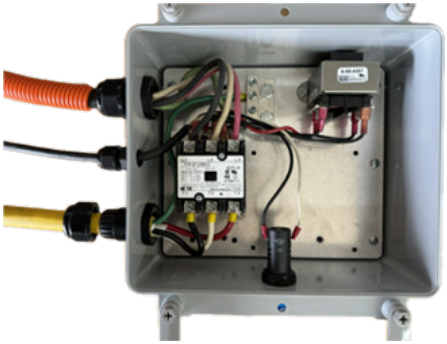
Step 3: Strip all four wires.

Step 4: Crimp the included ferrules onto the wires.

Wire Connections



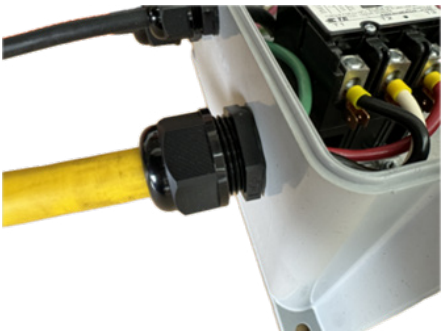
Step 1: Insert wires into contactor box, then slide strain relief nut over all four wires.



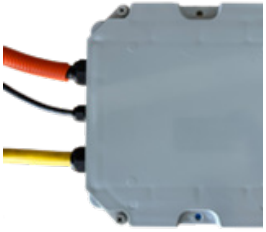
Step 2: Connect ground wire to grounding bar. Tighten utilizing a 5/32" hex bit to 45 in-lbs.

Step 3: Connect wires to T1, T2, and T3 on the contactor assembly. Tighten screws to 25 in-lbs.

a. 480 V wiring is as follows:
   - T1: Black
   - T2: White
   - T3: Red

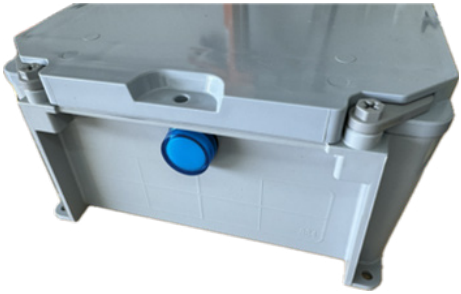


Step 4: Finally, tighten both sides of the strain relief nut ensuring you can see the outer jacketing inside the contactor box.



Step 5: Re-install the lid to the contactor box.

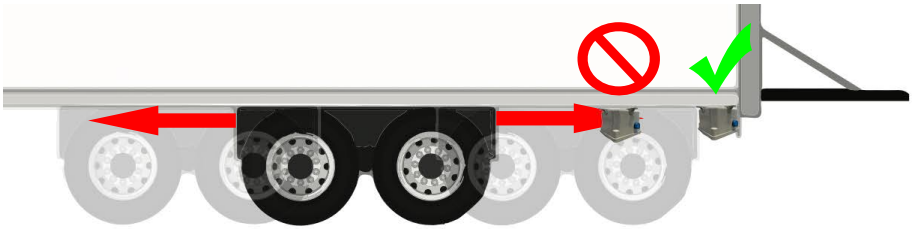
CONTACTOR BOX MOUNTING



The contactor box has four mounting holes sized for 1/4" mounting hardware.

The holes are spaced at 8.9" allowing easy mounting to 8" on-center cross members.

As in the previous step, you will be responsible for finding a location in which the sliding axles and mud flaps will not contact the box (behind stop bars).



The blue light is an indicator which illuminates when the box is powered. Face the light to the road-side.

Have a helper hold the box up to the cross members and mark your drilling location.

You can also utilize extra bolt holes in the Auto Eject mounting bracket if your installation allows.

Drill holes for the contactor box assembly and mount with 1/4" bolts.

Wire management will take place in the final step of this guide.

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BRAKE PRESSURE SWITCH INSTALLATION

The Auto Eject requires a momentary 12 V+ signal to initiate the plug ejection sequence.

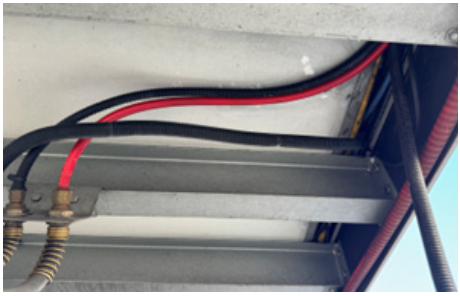
The recommended source of this 12 V+ signal is through the included brake pressure switch.

Installing this pressure switch along the trailers parking brake air line has the benefit of de-energizing the system and ejecting the plug once the driver releases the trailer brakes.

Some trailers will have the red emergency brake air line accessible at the rear of the trailer.

Trailers with sliding axles terminate the nylon emergency brake air line mid-way down the trailer, which then transitions to flexible rubber hose.

Step 1: Find a straight, clean, and accessible section of the nylon parking brake air brake line (red).



Step 2: Once an appropriate location is determined for the brake pressure switch, mark and cut the air brake line with a SHARP, CLEAN BLADE.

DO NOT USE side cutters to cut the air line.

The cut in the nylon brake line must be clean and "square" on the ends to ensure a positive seal.

Step 3: Determine if the trailer's emergency brake line is 3/8" O.D. or 1/2" O.D.

a. Both sizes of DOT approved air brake tee's are included.

Step 4: Assemble the brake pressure switch into the appropriately sized air brake tee.

a. The pressure switch has pre-applied thread sealant.

a. Never use thread seal tape in ABS applications.

Step 5: Tighten the brake pressure switch into the tee-fitting utilizing a 1-1/16" wrench.

Step 6: Insert the tee fitting in-line with the freshly cut brake hose.

a. Some installations will require 1"-1.5" of brake hose be removed to insert the tee-fitting.

Step 7: Once the lines are fully inserted, pull the brake line away from the tee to ensure the line is locked in place.

Step 8: Secure the brake pressure switch with the included cushioned clamp and stainless self-tapping screw.

ALTERNATE EJECTION SOURCES

The 12 V+ ejection signal can come from numerous sources.

An alternative configuration would be a weathertight momentary eject button at the front of the trailer near the 7-way and gladhand connections, or near the TRU control panel.

- A momentary button can be run in parallel with the included brake pressure switch, allowing both to initiate the Auto Eject sequence. Additional components required.

12 VDC Wire Connections

Overview

Standby power draw 0.065 A @12 VDC. Ejection power draw 0.35 A @12 VDC (3 seconds). Minimum voltage 8 V.

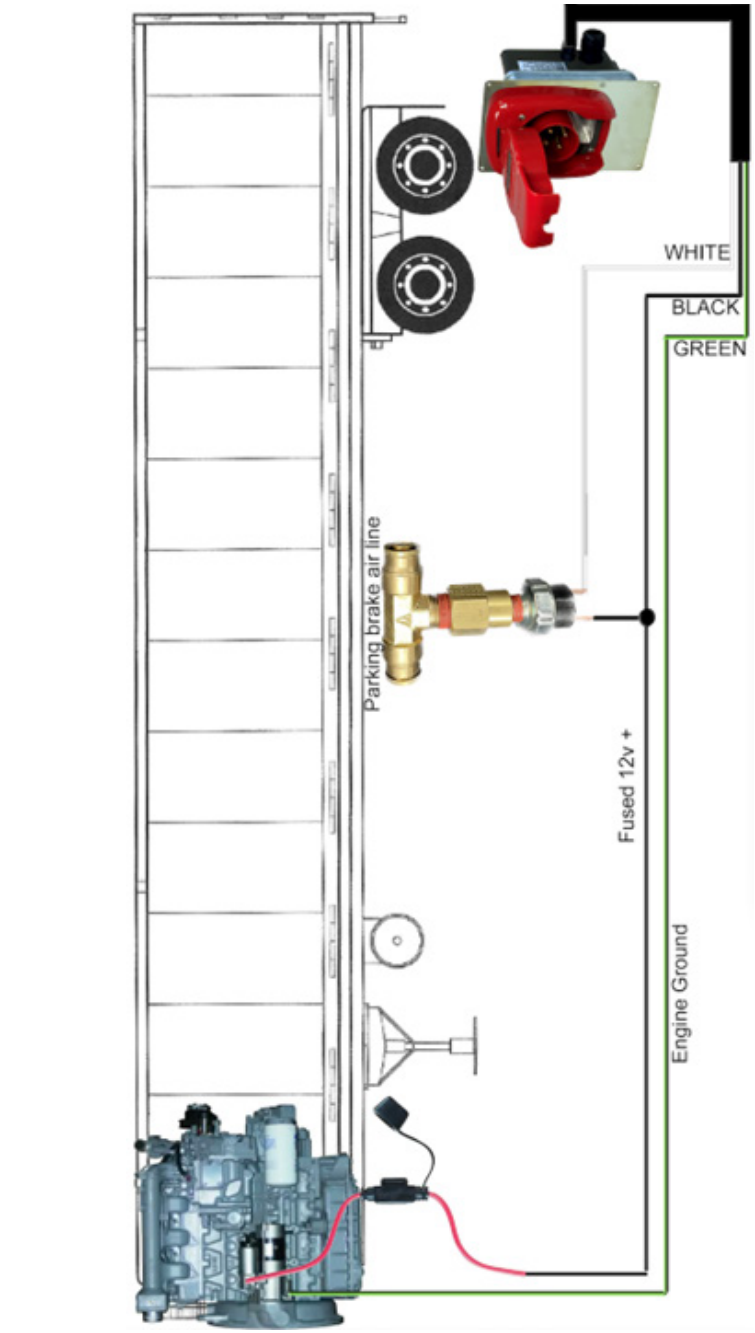
The Auto Eject assembly has an 18 AWG 3-conductor pigtail. The wire coloring is as follows:

- Black: Constant 12 V+ power
- Green: 12 V- / ground
- White: Momentary 12 V + feed to initiate Auto Eject sequence

The bulk 3-conductor wire included will need seven connections in total:

1. 12 V positive (constant) from reefer starter motor.
   a. Alternatively sourced from liftgate batteries.
2. 12 V negative from reefer engine block ground.
   a. Alternatively sourced from liftgate batteries.
3. 12 V power to brake pressure switch connector.
4. 12 V power + eject signal from brake pressure switch connector.
5. White bulk wire to white pigtail wire on Auto Eject.
6. Black bulk wire to black pigtail wire on Auto Eject.
7. Green bulk wire to green pigtail wire on Auto Eject.

Wiring Diagram



Running the Wire

The main 70 ft harness has two connectors on the ends. Run the harness in the following manner:

Step 1: Plug in the main harness 2-pin connector to the brake pressure switch.

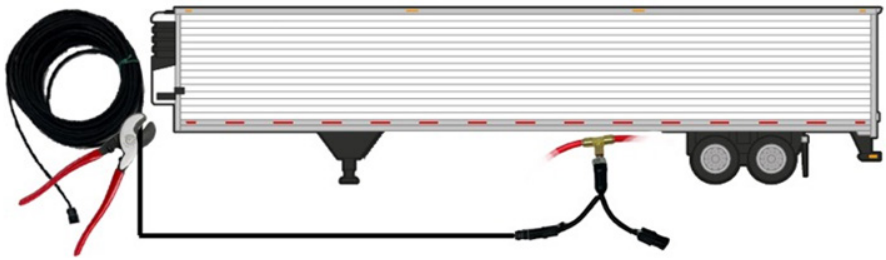
Step 2: Carefully unwind the harness towards your choice of power source (TRU or liftgate batteries).

a. TRU POWER: The wiring must reach the TRU starter solenoid for power.

a. LIFT BATTERY POWER: The wiring must reach the liftgate batteries for power.

Step 3: Once proper length is determined, cut the wire.

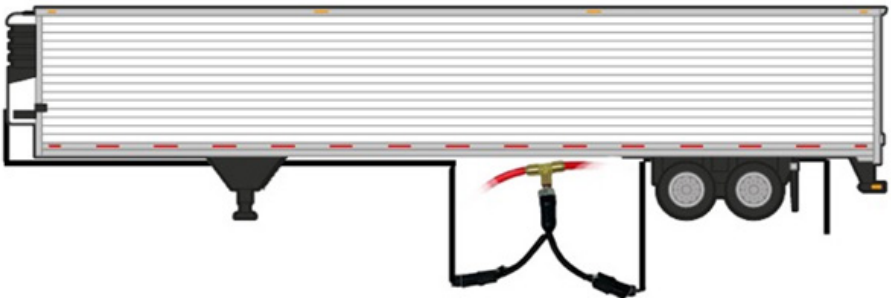
a. The remaining wire will run from the brake pressure switch to the Auto Eject assembly at the rear of the trailer.



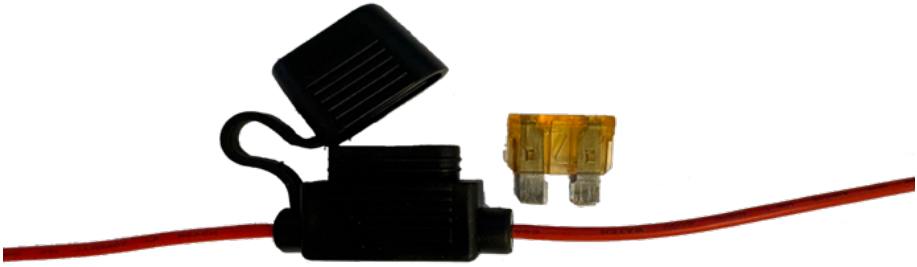
Step 4: Connect the remaining harness to the brake pressure switch and route to the rear of the trailer, dropping it near the Auto Eject assembly.

a. Ensure all wires are routed away from moving parts and secured within the inner channels of the trailer frame.

a. If running wire to TRU for power, utilize a grommet at the front-of-trailer pass-through point.



IMPORTANT: Temporarily remove the 5 A fuse from the inline fuse holder until all wiring is complete.



12 V Connections (without liftgate)

Step 1: Pull wire from the brake switch location through the trailer channels and up to the TRU engine compartment.

a. Ensure the wire is routed away from any moving parts or exhaust components.

a. Utilize grommets and split loom where appropriate.

Step 2: Strip back approximately 12" – 24" of the wire outer jacketing.

Step 3: Cut the white wire at the base of the jacketing. It won't be needed inside the engine compartment.

Step 4: Slide heat shrink over the wire and apply heat.

12 V+

Step 1: Slide a piece of heat shrink over a leg of the included inline fuse.

Step 2: Strip the inline fuse wiring back and **crimp the smaller 3/8" ring terminal** to the wire. The larger 1/2" ring terminal will be used elsewhere.

Step 3: Slide heat shrink over terminal crimp and **apply heat**.

Step 4: **Disconnect the engine battery to prevent accidental arcing.**

Step 5: With 5 A fuse still removed, connect the inline fuse holder to constant 12 V+ at the starter stud.

Step 6: Shorten the black 12 V + wire if needed then slide a piece of heat shrink over the wire.

Step 7: Crimp the butt connector to the black wire and the inline fuse assembly.

Step 8: Slide heat shrink over butt connector and apply heat.

12 V-

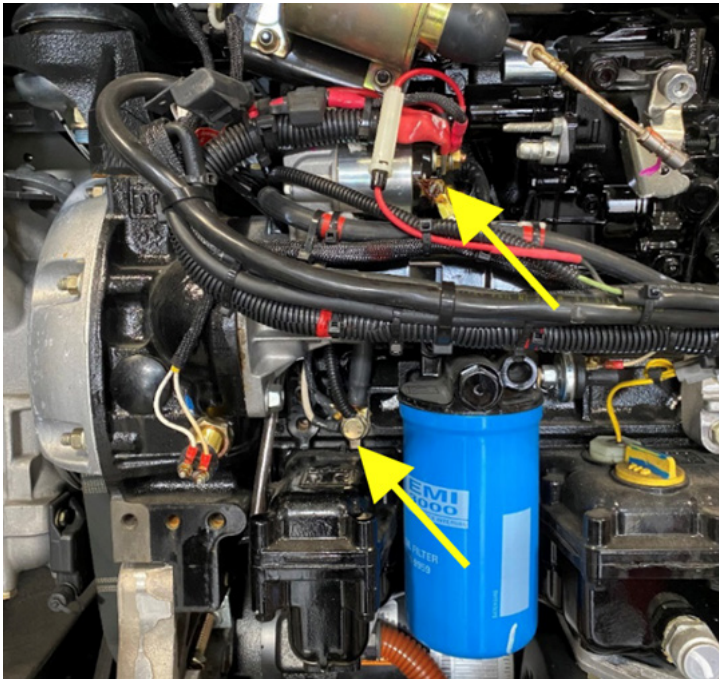
Step 1: Slide heat shrink over the green ground wire.

Step 2: Strip and crimp the larger 1/2” ring terminal to the green wire.

Step 3: Slide heat shrink over terminal crimp and apply heat.

Step 4: Connect the green wire to the engine block grounding point.

12 V Postitive and Ground Connection Examples



12 V Power (with liftgates)

Step 1: Pull wire from the brake switch location **through the trailer channels and into the liftgate battery compartment.**

a. Ensure the wire is routed away from any moving parts.

a. Utilize grommets and split loom where appropriate.

Step 2: Strip back approximately 12" – 24" of the wire outer jacketing.

Step 3: **Cut the white wire** at the base of the jacketing. It won't be needed inside the battery box.

Step 4: Slide heat shrink over the wire and apply heat.

12 V+

Step 1: Slide a piece of heat shrink over a leg of the included inline fuse.

Step 2: Strip the inline fuse wiring back and **crimp the 3/8" ring terminal** to the wire.

Step 3: Slide heat shrink over terminal crimp and **apply heat**.

Step 4: Slide a piece of heat shrink over the black wire.

Step 5: **Crimp the butt connector** to the black wire and the inline fuse assembly.

Step 6: Slide heat shrink over butt connector and **apply heat**.

Step 7: With 5 A fuse still removed, connect the inline fuse holder to **12 V positive battery post**.

12 V-

Step 1: Slide **heat shrink** over the green ground wire.

Step 2: **Strip and crimp** the 3/8" ring terminal to the green wire.

Step 3: Slide heat shrink over terminal crimp and **apply heat**.

Step 4: Connect the green wire to the **12 V negative battery post**.

Auto Eject Connections

Step 1: Cut the excess wire from the brake pressure switch harness at the back of the trailer.

Step 2: Strip back 4” from both the Auto Eject harness and the main 12 V supply harness.

Step 3: Stagger the three wire connections and strip all six wires.

Step 4: Place the large heat shrink over the wire and move away from the splice area to avoid un-wanted shrinking.

Step 5: Place three small heat shrink pieces in preparation for the wire connections.

Step 6: Crimp the three sets of wires together with included butt connectors.

Step 7: Slide heat shrink over the three connections and apply heat.

Step 8: Allow connections to cool, then slide large heat shrink over the connection areas and apply heat.

Step 9: All wire connections are now complete. Replace 5 A fuse into 12 V+ source fuse holder.

Wire Management

Step 1: Your kit includes stainless self-tapping screws and cushioned stainless cable clamps. Utilize these and the included zip ties to secure excess wiring to bottom of trailer.

a. Again, ensure the sliding axles (if equipped) will not contact the wiring when fully rearward.

Step 2: Check that the outer wire jacketing is fully inserted into the Auto Eject and contactor box strain relief nuts and that the nuts are tight.

Step 3: Check that the wiring inside the TRU engine compartment or liftgate battery box is secure.

Step 4: Check that wiring to the brake pressure switch is secure.

System Testing

Full system testing requires a truck and building-mounted Purkeys Auto Safe.

Step 1: Attach truck to trailer.

Step 2: If trailer has sliding axles, test that the axle assembly can travel freely to the rearmost position without contacting the system or wiring.

a. Return axle assembly to original location.

Step 3: Move trailer to a location with Purkeys 480 V Auto Safe.

Step 4: Set the trailer brakes, chock wheels, and plug the Auto Safe into the Auto Eject.

Step 5: Release the trailer brakes and ensure the plug ejects itself.

Step 6: With wheels still chocked, kingpin latched, tractor brakes set, and trailer brakes released, spray soapy water around brake pressure switch fitting(s) to ensure there are no air leaks.

Step 7: Re-set trailer brakes.

Step 8: Turn on the TRU and allow the diesel engine to begin operation.

Step 9: Connect the Auto Safe to the Auto Eject and push “Connect” on the Auto Safe.

Step 10: The TRU control should indicate a diesel shutdown to electric standby timer has begun.

a. If TRU is manufactured by Carrier, see next page for programing info.

Step 11: Allow unit to power off diesel engine and begin electric standby operation.

Step 12: After a few minutes of electric standby operation, release trailer brakes to test Auto Ejection.

Step 13: Re-set trailer brakes and check TRU display. It should display a diesel start timer.

Step 14: Allow TRU to re-enter diesel operation.

PURKEYS

Enabling Auto Switching on Carrier Vector Units with “SW8” (Software 8)

Units with “SW8” have this decal below the control panel.

Once this procedure is complete, the unit will automatically switch between diesel to electric and back to diesel once electricity is disconnected*.

*There is a 180 second countdown timer between switching from diesel to electric and vise-versa.

NOTE: Carrier recommends powering down TRU before disconnecting power or ejecting plug.

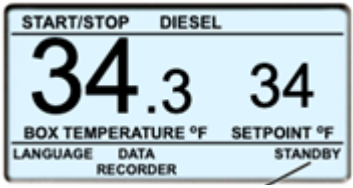
Step 1: With Vector unit powered off, connect electric power to receptacle.

Step 2: Turn unit to Start/Run via control panel toggle switch.

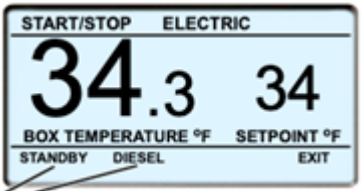
Step 3: Press the Menu soft key until STANDBY is displayed across the lower menu options.

a. Multiple presses may be needed until STANDBY is displayed.

Step 4: Press the soft key below STANDBY to select.



Step 5: Select STANDBY once more. Unit will display STANDBY MODE SELECTED.



Step 6: The following will take place after pressing STANDBY a second time

- 3-seconds: Diesel engine shut down.
- 15-seconds: “STANDBY MODE ENTERED” displayed.
- 50-seconds: Audible alarm
- 60-seconds: Electric motor activates.

Enabling Electric Standby on Older Carrier Vector Units

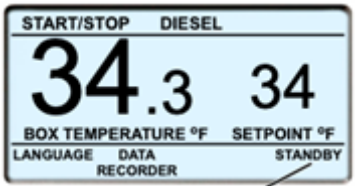
Step 1: With Vector unit powered off, connect electric power to receptacle.

Step 2: Turn unit to Start/Run via control panel toggle switch.

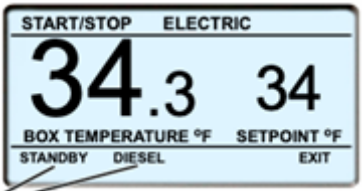
Step 3: Press the Menu soft key until STANDBY is displayed.

a. Multiple presses may be needed until STANDBY is displayed.

Step 4: Press the soft key below STANDBY to select.



Step 5: Press the STANDBY soft key, the STANDBY and DIESEL soft keys will display.



Step 6: Press the STANDBY soft key to place the unit in Electric operation. The unit will stop, the status bar will change to ELECTRIC and the unit will restart in Electric Operation.

Your Carrier dealer can install an optional module to allow automatic switching from diesel to electric. Contact Purkeys or your Carrier dealer for more information.

Troubleshooting

Symptom	Resolution
TRU displays “Power Failure Mode” after Auto Ejecting.	Normal operation. Power was disconnected from TRU.
TRU will not enter electric standby.	• Ensure TRU is powered on. • Check TRU display to see if there is an active “diesel to electric standby” timer. • See previous notes regarding Carrier programming. **Older Carrier models will need to be manually put into standby mode each time unless additional module is installed by Carrier dealer.** • Check that blue light is illuminated on both Auto Safe and Auto Eject contactor box. If light doesn’t illuminate when holding “Connect”, check the building’s circuit breaker. • If blue “Connect” light illuminates on Auto Safe while holding button, check that blue light also illuminates on Auto Safe contactor box. If not, check plug and receptacle for debris and that plug is fully inserted.
Unit connects and powers TRU, but will not Auto Eject.	• Check for debris around black center ejector mechanism inside receptacle. • Check that source voltage is above 8.5 V • Remove and check 5 A fuse with OHM meter. Replace if necessary. • Check that power and ground connections are clean and free of corrosion. Clean if necessary. • Have a helper press in the small brass pin inside the Auto Eject receptacle (3-o-clock position). While pressing pin, release the trailer brakes. The center ejector should extend and retract. If noise is heard inside Auto Eject but no extension of ejector, replace Auto Eject • If no sound or movement, proceed to next step.

Symptom	Resolution
Unit connects and powers TRU, but will not Auto Eject (continued).	• Check for wiring damage or air leaks at brake pressure switch. Repair if necessary. • Unplug connector from brake pressure switch and check for 12 V between the black and green wires from power source. If fuse and ground connections are good, but no voltage at connector, replace wire. • If good voltage found at pressure switch plug, carefully apply voltage to the brake pressure switch harness that goes to the Auto Eject. 12 V+ to white and black, 12 V- to green. If plug ejects, pressure switch is faulty. Replace brake pressure switch. • If all steps above fail, remove heat shrink from main brake pressure switch harness to Auto Eject harness at rear of trailer. Apply 12 V+ to the black and white wires and 12 V- to the green wire. If unit still fails to eject, replace Auto Eject.

PURKEYS

INSTALLATION RECORD

Date installed:

Installed by:

Site address:

Dock number (if applicable):

PURKEYS

LIMITED COMMERCIAL WARRANTY POLICY

MCE Purkeys FE, LLC (hereafter "Purkeys"), warrants each product to be free of defects in material or workmanship under normal use and service. This warranty is for the benefit of Original Equipment Manufacturers, Dealers, Warehouse Distributors, Fleets, or other End Users (hereafter "Customers") and covers products manufactured and/or branded by Purkeys and sold new to Customers either directly by Purkeys or by its authorized dealers, distributors, or agents. The length of the Warranty Period is 36 months. Products from other manufacturers, that are branded by said manufacturer, will carry the manufacturer's original stated warranty.

The warranty period commences on the in-service or install date and is not transferable. Failure to provide the in-service or install date on the warranty claim form will cause the warranty period to begin on the date the part was manufactured, or date of sale recorded on the original sales invoice, whichever is earlier.

A completed warranty claim form should accompany all parts submitted to Purkeys for consideration for repair or replacement under warranty. The submitted claim form should contain all of the information required. Lack of a properly or fully completed claim form will result in delay or denial of warranty claim. Claims must be submitted no later than 30 days after part is removed. An RMA# should be requested prior to returning any product for warranty consideration. Please contact the Purkeys' Warranty Department to request an RMA# at warranty@purkeys.net and to provide your warranty claim information.

This warranty does not apply if, in sole judgment of Purkeys, the product has been damaged or subjected to accident, faulty repair, improper adjustment, improper installation or wiring, neglect, misuse, or alteration or if the product failure is caused by defects in peripheral vehicle components or components attached to the Product or failure of a part not manufactured by Purkeys.

This warranty shall not apply if any Purkeys product is used for a purpose for which it is not designed or is in any way altered without the specific prior written consent of Purkeys. ANY product alleged by a Customer to be defective must be inspected by Purkeys as a part of the warranty claims process in order to confirm that the part has failed as a result of a defect in material or workmanship.

Transportation for products and parts submitted to Purkeys for warranty consideration must be prepaid by Customer. Repaired or replaced products and or components will be returned to Customer pre-paid by Customer or "freight collect" to the address provided by Customer in the warranty claim form. No charge will be made for labor or material in effecting such repairs.

The Warranty provided by Purkeys hereunder is specifically limited to repair or replacement of the Product as Purkeys deems most appropriate in its sole discretion. No labor reimbursement will be provided. Purkeys neither assumes nor authorizes any other person to assume on its behalf any other warranty or liabilities in connection with Purkeys products. The Warranty does not apply to fuses or other "consumable" or maintenance items which are or may be a part of any Purkeys product.

THIS WARRANTY DOES NOT APPLY TO LOSS OF VEHICLE OR EQUIPMENT, LOSS OF TIME, INCONVENIENCE, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. PURKEYS SPECIFICALLY DISCLAIMS AND SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES arising out of or from the use of Purkeys products by the Customer.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, INCLUDING COMMON LAW WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, AND ANY OTHER EXPRESS OR IMPLIED WARRANTIES. ALL OTHER SUCH WARRANTIES ARE SPECIFICALLY DISCLAIMED.

This Limited Commercial Warranty Policy supersedes all previous Warranty Policies issued by Purkeys.


WATT Keeps You Trucking