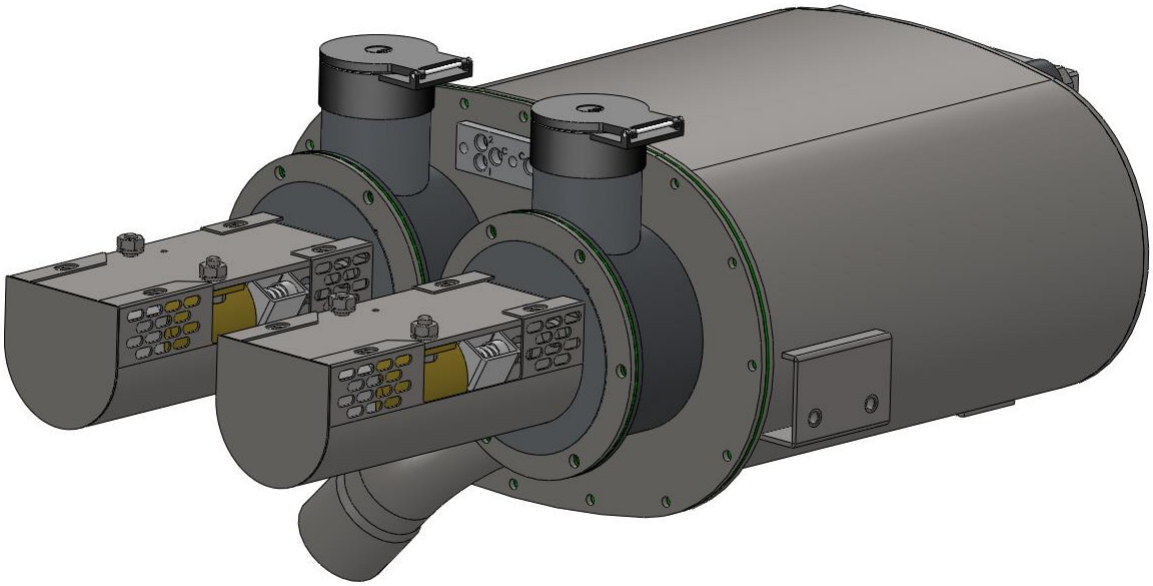
RYPOS DIESEL EXHAUST PARTICULATE FILTER DPF/ULETRU Thermo-King TRU

Manual

Operation, Installation and Maintenance



November 17, 2014

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End User Rights and Responsibilities

Read the entire installation manual and any other documentation relevant to this project prior to installing, modifying, or operating the equipment described here within. Follow safe best practice standards, observe all local, state and federal codes and laws, plus use this manual for proper installation. Failure to do so could result in any combination of poor performance, equipment damage, injury, or potential death.

YOUR RIGHT TO MAINTENANCE INFORMATION

The Air Resources Board requires that Rypos, Inc. provide detailed maintenance information for the diesel emission control system upon delivery to the end-user pursuant to section 2706(h)(2), Title 13, California Code of Regulations, at no additional cost to the owner. If you do not already have this information, contact Rypos at 1-508-429-4552.

THE IMPORTANCE OF ENGINE MAINTENANCE

Proper engine maintenance is critical for the proper functioning of your diesel emission control strategy. Failure to document proper engine maintenance, including oil consumption records, may be grounds for denial of a warranty claim for a failed component of a diesel emission control strategy.

THE IMPORTANCE OF PROPERLY MAINTAINING A DIESEL EMISSION CONTROL STRATEGY

Proper maintenance is critical for the diesel emission control strategy to function as intended. Failure to document proper diesel emission control strategy maintenance, including cleaning and/or ash removal of the system, replacement of consumables, and replacement of broken/failed parts, may be grounds for denial of a warranty claim for a failed component of a diesel emission control strategy.

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Revision History

Revision	Description	CO#	Date
B	**Update Document**	**14-123**	**11/17/14**
C	**Wiring Diagram updated Install instuctions and labels regarding ECU 12v updated**	**17-022**	**10/13/17**

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Installation Information

New CARB Dealer/Installer Requirements:

Pre-Installation Compatibility Assessment Procedures

The following checks need to be made PRIOR to installing a DPF/ULETRU filter onto a TRU unit:

1) Inspect the engine for signs of poor maintenance, (oil leaks, oil filter over 1 year old, oil with more than recommended hours on it, dirty air filter, worn belts, etc)

2) Inspect the tailpipe for signs of oil contamination (is the soot oily? Does it look like grease?)

3) The CARB Executive Order requires a check for oil consumption and the condition of the injectors. An easy, functional way to do this is to inspect the exhaust plume for signs of high PM emissions and oil burning. There should be no visible color to the exhaust during steady speed operation. The DPF/ULETRU will not work on an engine that is producing excessive smoke, which is a sign that the engine may have a stuck injection pump plunger, broken injection pump nozzle, or have excessive oil consumption. All repairs to the engine must be made prior to filter installation.

4) Check the engine hours, if over 25000, please advise the customer that they could have engine related problems in the near future due to the age of the engine and that a filter may not be the best means of compliance.

In order to prevent excessive PM emissions rates, engine emissions-related maintenance, such as injector replacements, air filter replacements and valve adjustments, should be performed in accordance with OEM required maintenance schedules. Such maintenance is necessary to prevent RYPOS DPF/ULETRU system failure and inefficient fuel consumption. **The DPF/ULETRU filter will plug up if the engine is producing visible smoke on a continuous basis.** NOTE: Short smokes puffs seen during start up and speed changes are normal.

Written Statement of Compatibility

If the candidate engine is found to be compatible with the Diesel Emission Control Strategy (DECS), the party conducting the pre-installation compatibility assessment must provide the end user with a written statement stating its compatibility based upon the CARB Executive Order (EO) and the DECS manufacturers pre-installation instructions no later than the date of installation. Dealers/Installers: Please use the form on the next page (copy also at the end of the manual) to document the pre-installation compatibility assessment. This form must be:

1) Signed and a copy given to the customer/end user of the DPF/ULETRU system
2) Signed copy must be sent to Rypos for warranty registration and filing. **Any warranty claims submitted for a system that is not registered with Rypos will be the responsibility of the dealer/installer. The pre-installation compatibility/warranty registration must be on file at Rypos in order to have Rypos warranty coverage.**
3) The dealer/installer must keep a copy of the pre-installation compatibility assessment on file and be able to produce it to CARB upon request.

Pre-Installation Compatibility Assessment and Warranty Registration Form

1) Verify that the engine year and family is listed in the Compatible Engine Models Table
2) Inspect the TRU unit for oil leaks, general maintenance, signs of oil in exhaust, hrs on the oil and oil filter, condition of air filter, color of smoke during steady state operation at both high and low speed)
3) Fill out ALL information below, sign statement, give one copy to the customer and send one copy to Rypos (Warranty coverage for incomplete information will be the responsibility of the installer!)

TRU owner's company name and address: _____

Contact name_____ phone: _____ E-mail_____

Installer's name: _____ phone: _____ E-mail_____

Installation date: _____ TRU readings: Switch on hours_____ Engine hours_____

TRU model name: (SB210, SB300 etc.) :_____(CANNOT BE INSTALLED ON MULTI-TEMP)

TRU serial number: _____ Date in Service: _____

TRU engine serial number (From data label on engine and unit frame):_____

Rypos DPF/ULETRU serial number: **U**___ ___ ___ ___ Date of Manufacture_____

Current ARB #_____ Bosch Alternator Serial number: _____

Statement of Compatibility: "I have inspected the engine for signs of poor maintenance (oil leaks, oil filter over 1 year old, oil with more than recommended hrs on it, dirty air filter, worn belts, etc). I have looked at the exhaust soot for oil content, and I have observed the color of the exhaust both in high and low speed (No color should be visible in steady state operation) and I hereby affirm that the TRU listed above has met ALL of the above compatibility criteria for installation of DPF/ULETRU"

_____ YES, ALL CRITERIA ACCEPTABLE _____ NO, THERE ARE ISSUES WITH THE UNIT THAT MUST BE ADDRESSED BEFORE A DPF/ULETRU MAY BE INSTALLED (LIST ISSUES_____)

Statement of Warranty: "I hereby warrant that the installation of the Rypos DPF/ULETRU is free from defects in workmanship or materials which cause the diesel emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706. The warranty period and the extent of the warranty coverage provided by me must be the same as the warranty provided by Rypos, Inc., and the same exclusions must apply"

SIGNED_____ DATE_____

Rypos Family Name for Verification: CA/RYP/2011/PM3+/N00/TR/DPF01 Customer Copy

OWNERS WARRANTY RESPONSIBILITY

As the engine owner, you are responsible for performing the required maintenance described in your owner's manual. Rypos, Inc. recommends that you retain all maintenance records and receipts for maintenance expenses for your vehicle, engine, or equipment, and diesel emission control system. If you do not keep your receipts or fail to perform all scheduled maintenance, Rypos, Inc. may have grounds to deny warranty coverage. You are responsible for presenting your vehicle, equipment, or engine, and diesel emission control system to a Rypos, Inc. dealer as soon as a problem is detected. The warranty repair or replacement should be completed in a reasonable amount of time, not to exceed 30 days. If a replacement is needed, this may be extended to 90 days should a replacement not be available, but must be performed as soon as a replacement becomes available.

If you have questions regarding your warranty rights and responsibilities, you should contact Rypos, Inc. at 1-508-429-4552 or the California Air Resources Board at 9528 Telstar Avenue, El Monte, California 91731, or (800) 363-7664, or electronic mail: helpline@arb.ca.gov.

Safety First

Safety is paramount for all involved in the installation of the RYPOS DPF/ULETRU. Only work on a TRU that is not hot. If hot or it is running, turn off and allow ample time for it to cool down.

Please make sure you have

- ✓ A secure platform and/or method to reach to the top of the TRU.
- ✓ Proper hand, eye, and foot protection at all times.
- ✓ Disconnect both terminals of the battery. Insulate and protect the terminals.

RECOMMENDED STANDARD TORQUE VALUES FOR STANDARD FASTENERS Torque Values for clean dry threads	
Bolt size – Thread pitch	Torque (ft-lbs)
10-32	3-4
¼ - 20	9 – 11
5/16 – 18	11 – 12

Hand Tools Required

- Terminal Crimper
- Knife or wire stripper
- Air tool w/cutting disk
- Digital multi-meter
- Hand Drill
- Cutting saw/Cutting disc
- Torque wrench
- Set of Torx sockets
- Standard 3/8" drive shallow and deep socket set with 3" and 6" extensions
- Sharpie, or felt tip marker
- Clamp-on current meter with 100A capacity
- Cutting Pliers
- Standard open end/boxed wrench set (ex. ¼" - ¾")
- 9/16" wrench
- Safety glasses and dust mask

Installation

The installation is broken down into the following sections:

1. Initial checks and pre-installation compatibility statement
2. Removal of existing parts and installation of new parts
3. Electrical connections
4. Start up and testing of DPF/ULETRU

Initial Checks

Unless otherwise specified, all instructions are given from the front view of the TRU.

1. Complete the pre-installation compatibility checks and fill out the forms above, sign and give copy to customer and send one to Rypos.
2. Compatible Thermo-King TRU models are: SB190, SB210, SB230, SB300, SB400

   MULTI-TEMP UNITS ARE NOT COMPATIBLE WITH DPF/ULETRU

3. Thermo-King units that are NOT supported by this product include: SPECTRUM, units older than 2003 and anything else not specifically mentioned above.

4. For the RYPOS DPF/ULETRU to operate properly, the proper alternator, alternator pulley, and wiring must be installed in the TRU. The wiring is supplied in the installation kit.

Part Numbers for RYPOS TK Alternator and Belts

Rypos Part Number	Description
175-0017-00-00	Alternator, 120 amp (Bosch AL9120N, Thermo King 45-2258)
775-0005-00-00	Pulley, 2 5/8" OD – (Purchase from Rypos)
Suggested Belts	
780-0004-00-00	Thermo-king belt 78-1341
780-0007-00-00	Optibelt, Super X-POWER M=S, XPA 1132

Rypos strongly recommends using the Rypos and or Thermo-King part numbers supplied above in order to be sure that the Rypos DPF/ULETRU system will work properly.

Removal of Existing Parts and Installation of New Parts

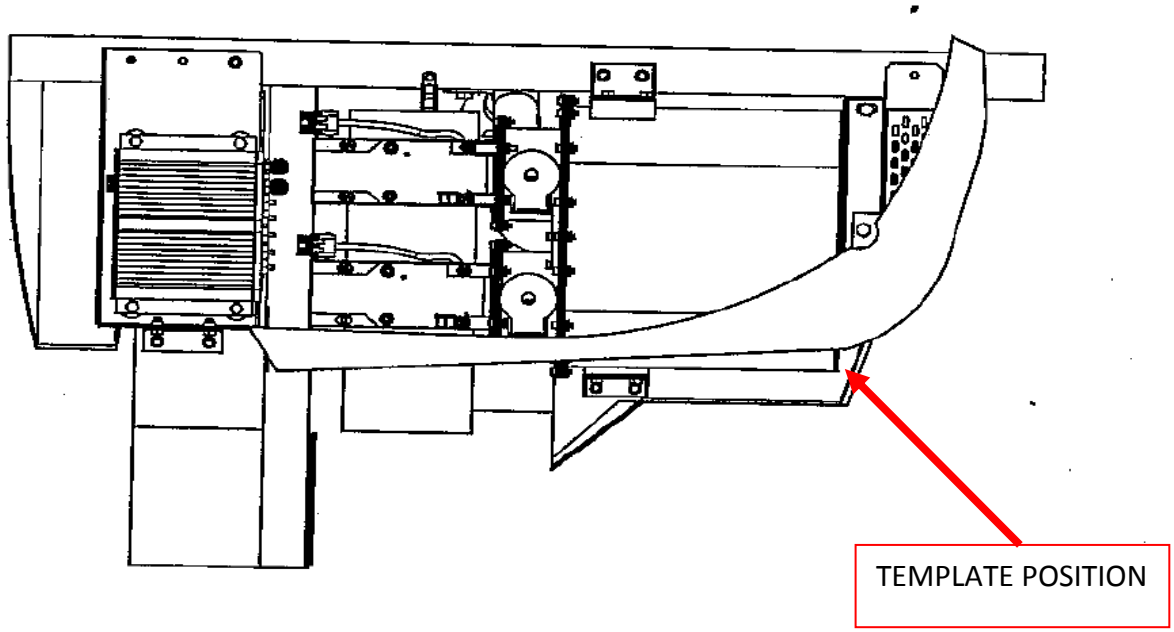
For safety, disconnect both the positive and negative terminals from the battery(s) and protect the battery terminals from accidental contact or falling parts. Remove the front and right side doors from the unit to allow easier access to all areas of the unit while performing the installation. It may not be necessary to remove the large center door, but it may make the installation easier (won't have to repeatedly open and close it)

1. Remove muffler and exhaust pipe: Spraying some penetrating oil (WD40 or similar) onto the exhaust joints before starting will help loosen them up and make disassembly much easier. Unbolt the muffler mounting bolts and the muffler and exhaust pipe clamps and remove the muffler and exhaust pipe. Leave the existing TK flex pipe connected to the engine. Cover the end of the pipe with a cloth or paper cup so nothing can fall down the pipe.
2. Mark the upper cowling using the template provided and a Sharpie or felt tip marker. Cut out the upper right hand corner of the fiberglass material with the shroud still bolted in place. This will provide support while you are cutting. IMPORTANT! Use an appropriate dust mask and safety glasses for this task!

Set the template on top of the unit against the trailer and line up the corner of the template with the edge of the fiberglass opening. Use a marker or sharpie to trace the shape of the template onto the cowling. Then use a saw or cutting disk to cut out the pieces of the cowling as shown.

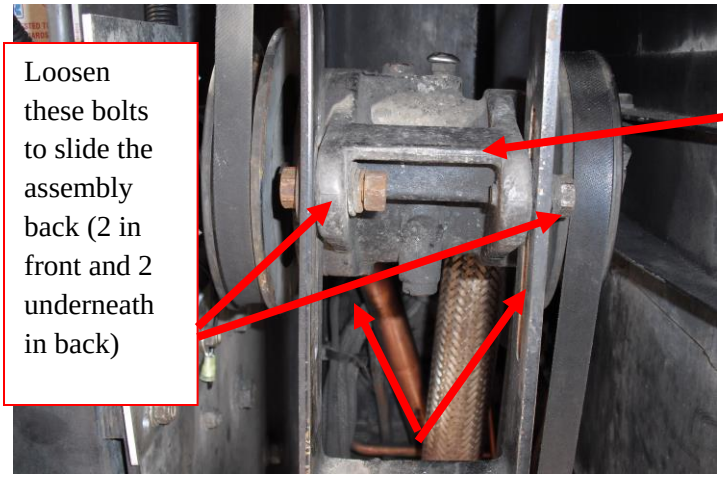
USE NEW TEMPLATE SUPPLIED WITH KIT, MARK COWL AND CUT OUT

Once the pieces have been cut out, remove the cowling from the unit using the Torx sockets and regular wrenches. Set the cowling aside. Remove the 2 bolts/nuts that hold the radiator baffle plate in place and set the plate and bolts/nuts on top of the trailer.



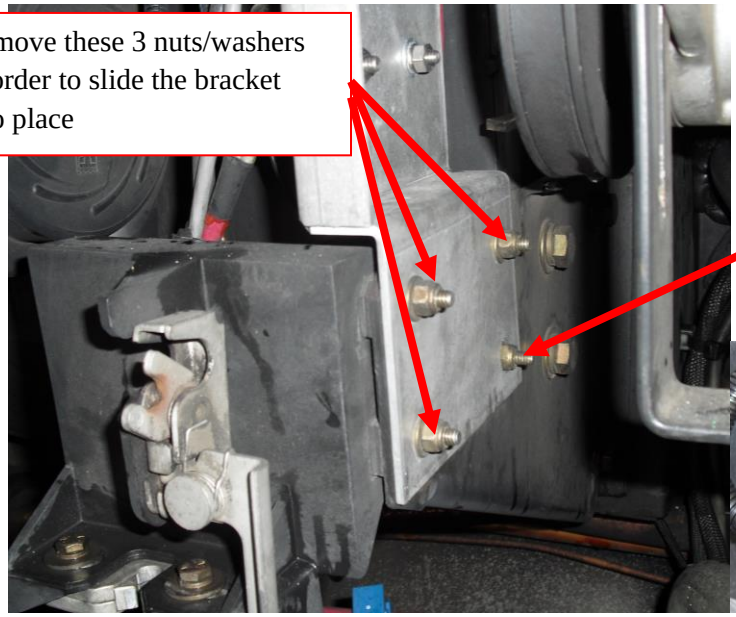
Position of Template on Top Cover

3. Remove the old alternator and belt and install the new Bosch 120 amp alternator along with the new 2 5/8" alternator pulley. If the unit already has a 120 amp alternator, you will still need to change the alternator pulley in order for the system to work properly.



NOTE: Since the large idler assembly is loose, it may be a good time to update all of the belts on the unit.

4. In order to remove the alternator belt, you will need to loosen the large idler pulley assembly and slide it backwards. (see above) There are 2 bolts in front and 2 in back underneath the assembly. Remove the large drive belt (or slide it off of the crank pulley) and then remove and replace the alternator belt. Since the large idler assembly is loose, the customer may want to change the drive belts. If so, do it now.
5. After the belts are installed, slide the idler assembly forward by pulling on the 'handle' firmly to tighten the belts. Check the belts for tension and then re-tighten the 4 bolts that secure the idler assembly in place. Tighten the alternator into position, making sure the belt is tight.

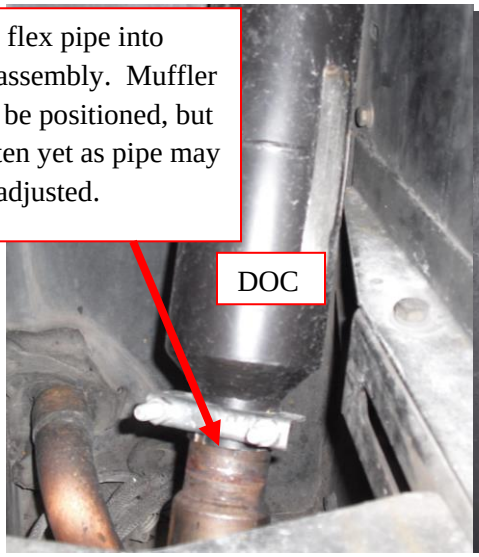


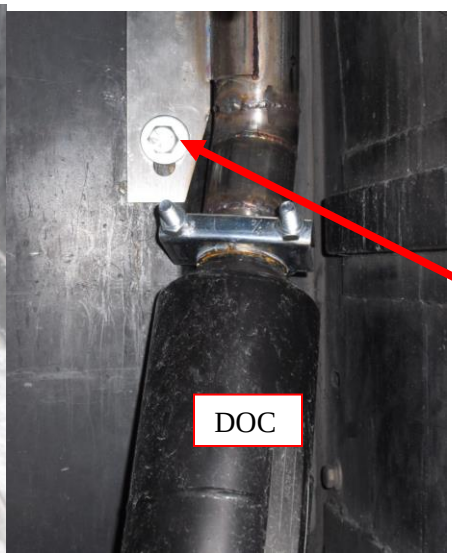
Leave this one alone to keep the latch hardware securely positioned. Bracket has a through hole that fits over the top of this nut

Front view of power solenoid bracket

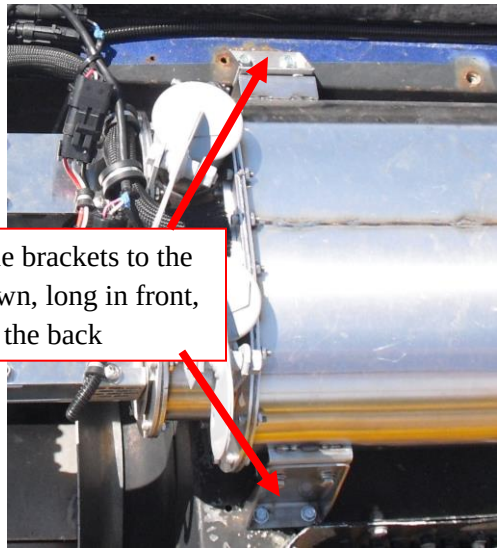
6. Remove 3 of the 4 nuts holding the large door latch assembly in place and install the power solenoid mounting bracket in place as shown. Re-install the nuts and tighten firmly.

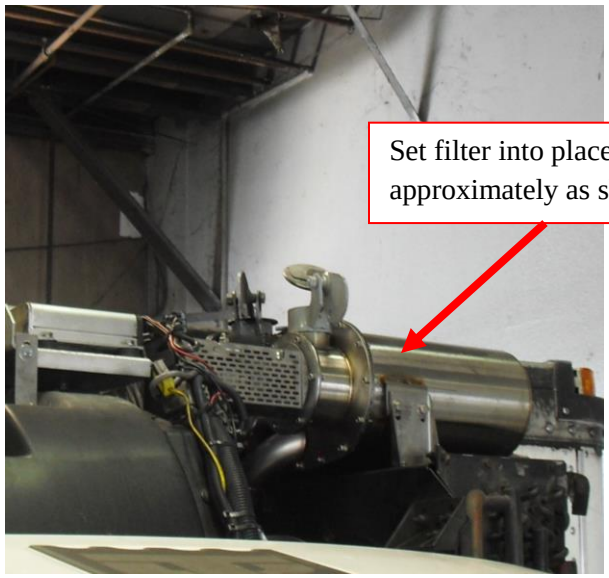
7. Install the DOC/exhaust pipe onto the OEM flex exhaust pipe. Then secure the pipe to the back wall with a bolt at the attachment point shown below.



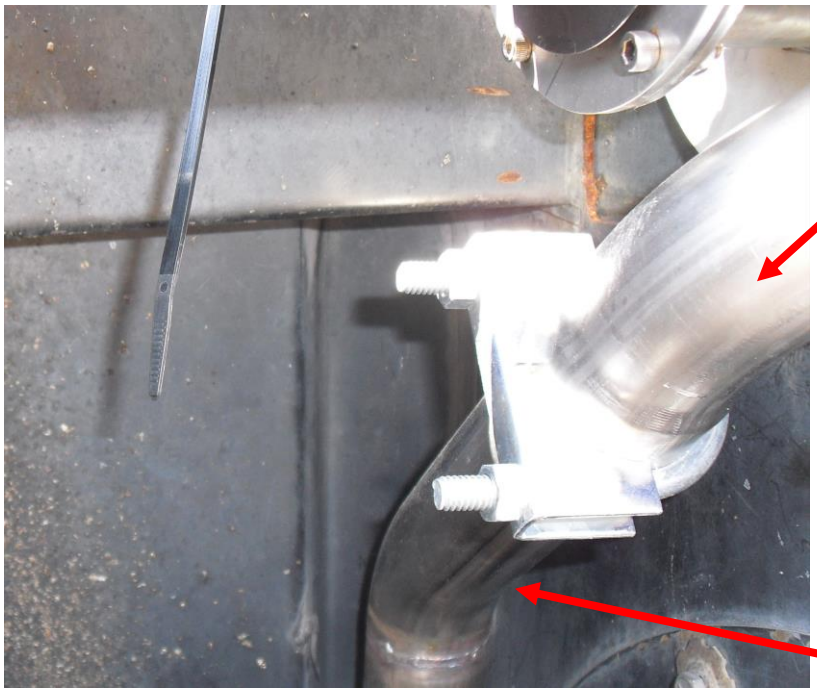


8. Pre assemble the filter mounting brackets onto the filter with the ¼”-20 bolts and washers supplied in the accessory kit as shown below. Set the filter/ECU assembly up on top of the unit approximately as shown below. It is easiest to fold the ECU over on top of the filter and carry the assembly up to the top of the unit.

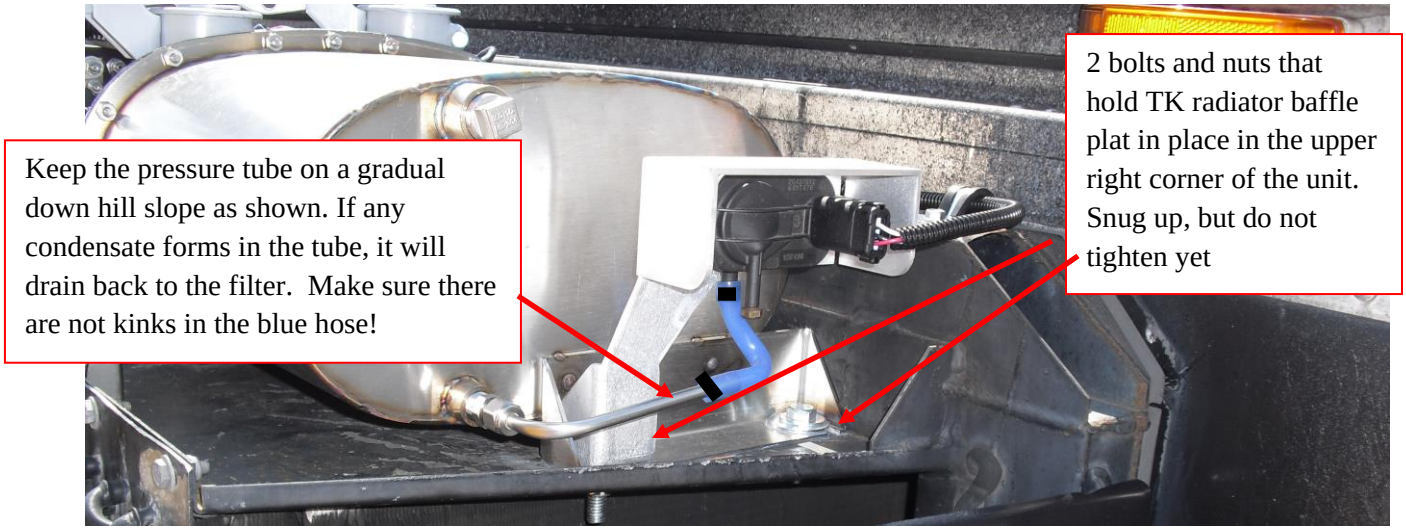




9. Connect the DOC/exhaust pipe to the filter, sliding the pipes together as far as they can go, but do not clamp tightly yet. (Clamp shown in final position after all adjustments made)

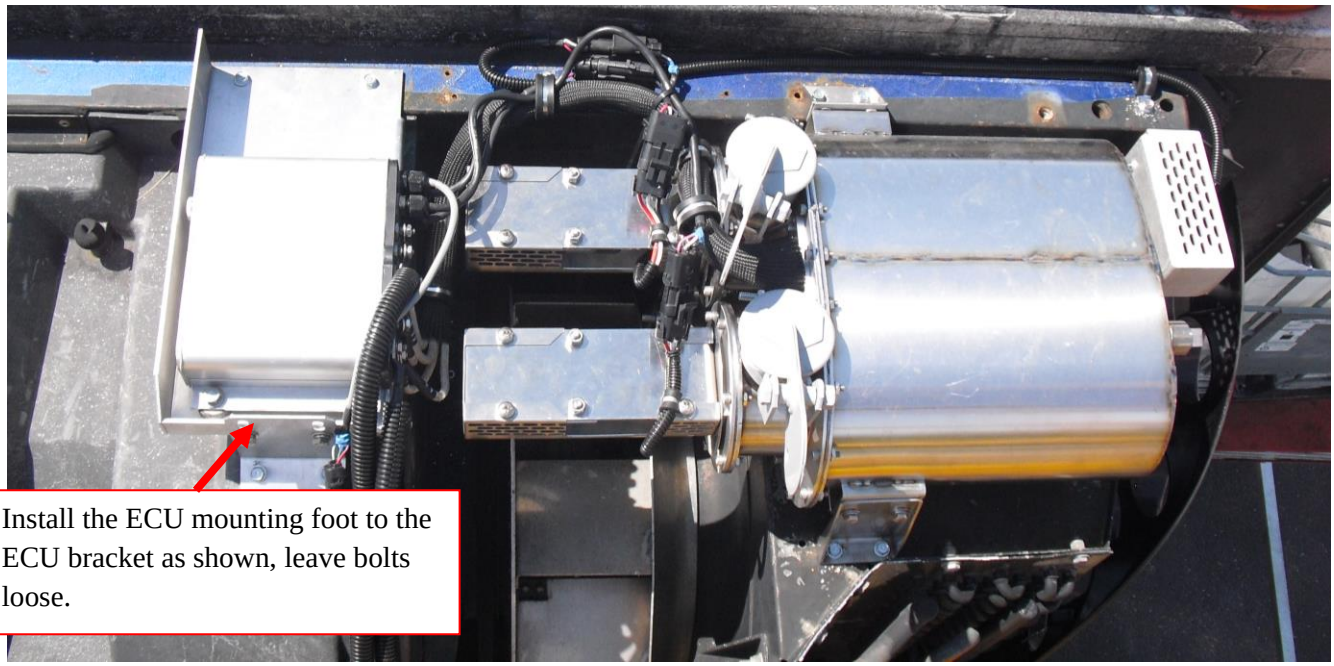


10. Mount the rear plate of the filter and the external pressure transducer bracket, and the TK radiator baffle bracket with the 2 bolts and nuts removed after the cowling was cut. See below. Start the nuts on the bolts, but do not tighten completely yet, as the filter may need to move around a bit to get into final position.

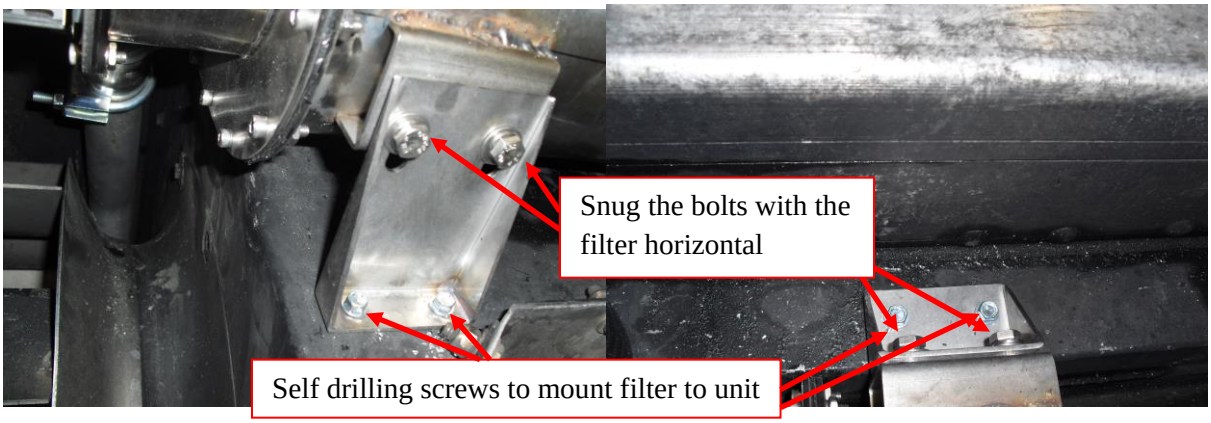


11. Connect the pressure tube to the blue hose as shown and secure with cable ties. Insert stainless steel back pressure tube into compression fitting and tighten with 9/16” wrench.

12. The filter should be sitting almost perfectly horizontal now (as shown in the photo above). If it is not, try adjusting the fit between the exhaust pipe and filter in order to get the filter horizontal. If the filter is horizontal, tighten the bolt holding the DOC /pipe assembly to the back wall of the unit. The filter should look square with the unit as shown below

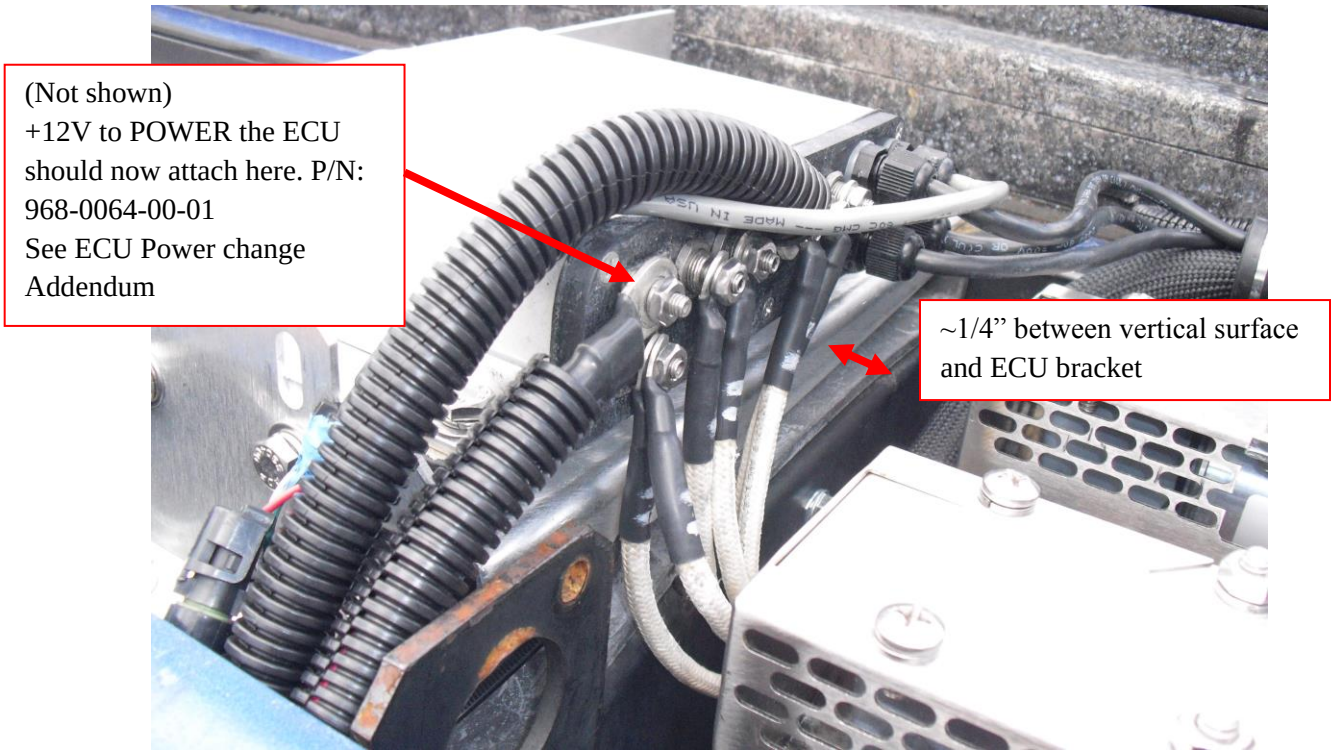


13. When the filter is horizontal, snug the bolt on the mounting brackets so that the bottom of the bracket is sitting flat on the mounting surface, and so that the bracket is up tight to the filter. Tighten the DOC/exhaust pipe mounting screw and make sure filter is still positioned horizontal and square to the unit.

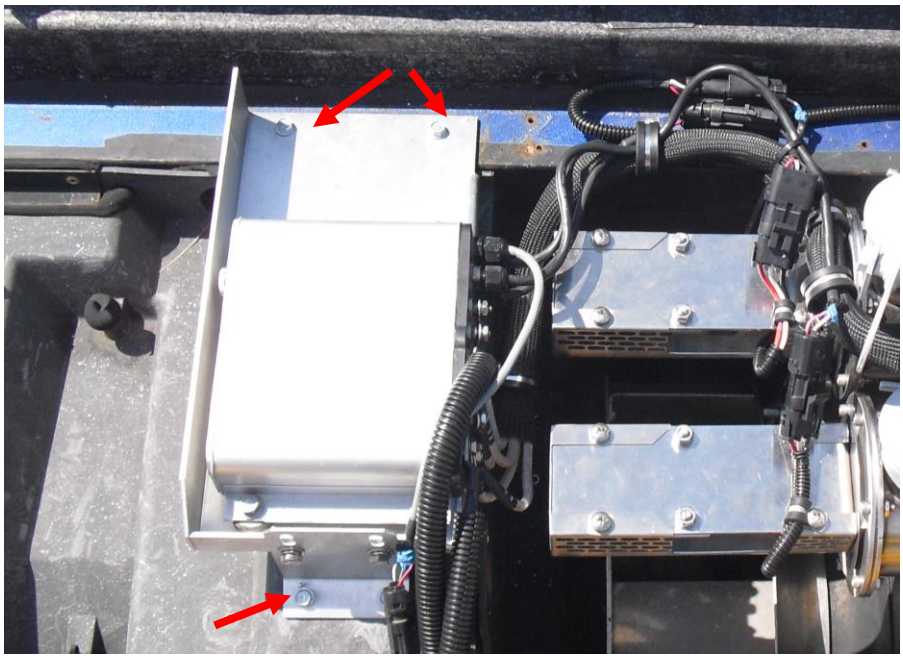


14. Use the self-drilling screws supplied with the kit to mount the filter into position. Tighten mounting bracket bolts to the filter, and install upper exhaust pipe clamp between filter and DOC pipe. Tighten the 2 bolts/nuts that hold the pressure transducer in place at the rear of the filter.

15. Position the ECU so that the ECU mounting bracket is about ¼”behind the vertical surface of the TRU evaporator pod. The wires should be out of the way and not rub against anything.

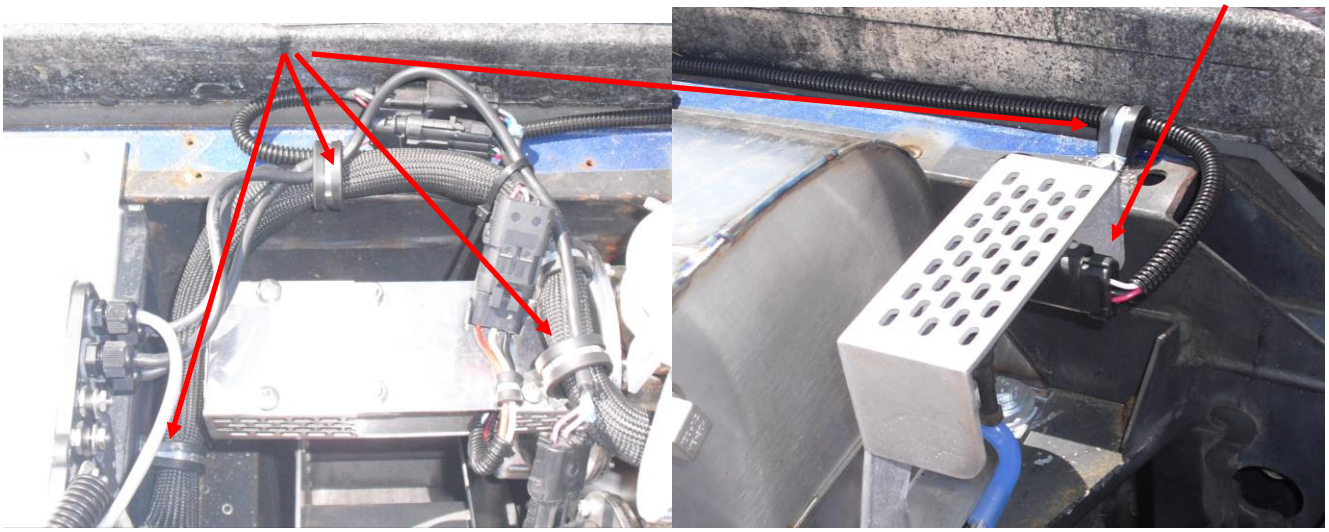


16. Mount the ECU to the frame using the self drilling screws as shown below



17. With the ECU level, mount the front mounting leg to the ECU bracket and to the evaporator pod. Use caution as self drilling screws could strip through the fiberglass pod. Tighten the bolts to the ECU bracket, making sure the ECU is still level.

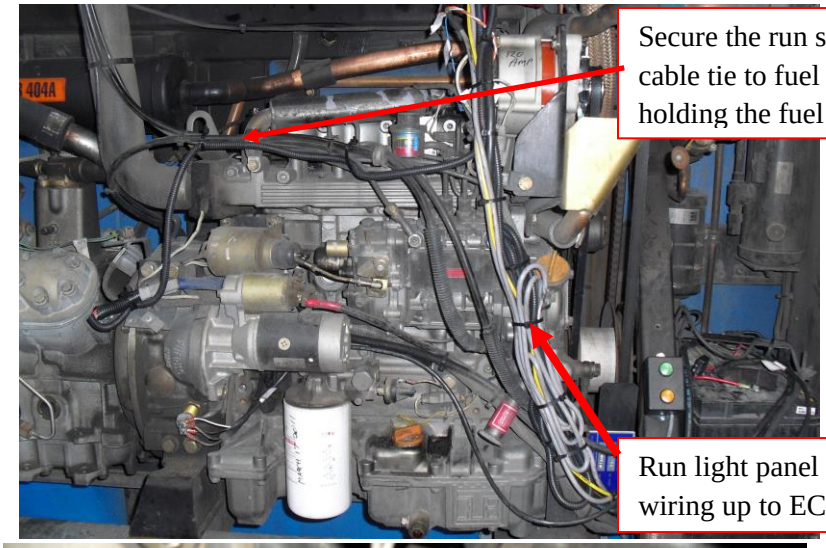
18. Use Adel clamps and self drilling screws to secure the wires on the top of the unit as shown. Plug the pressure transducer connector into the transducer and lock the connector in place.



Electrical Connections:

Most of the wiring for the DPF/ULETRU is done at the factory. Some simple wiring and connections need to be made here.

1. **Run signal**: On the front of the engine identify the fuel shut off solenoid. Plug the Rypos harness in between the solenoid connector and the TK harness as shown on the next page. Route the harness along with the other unit wires and connect the ring terminal end to the power solenoid

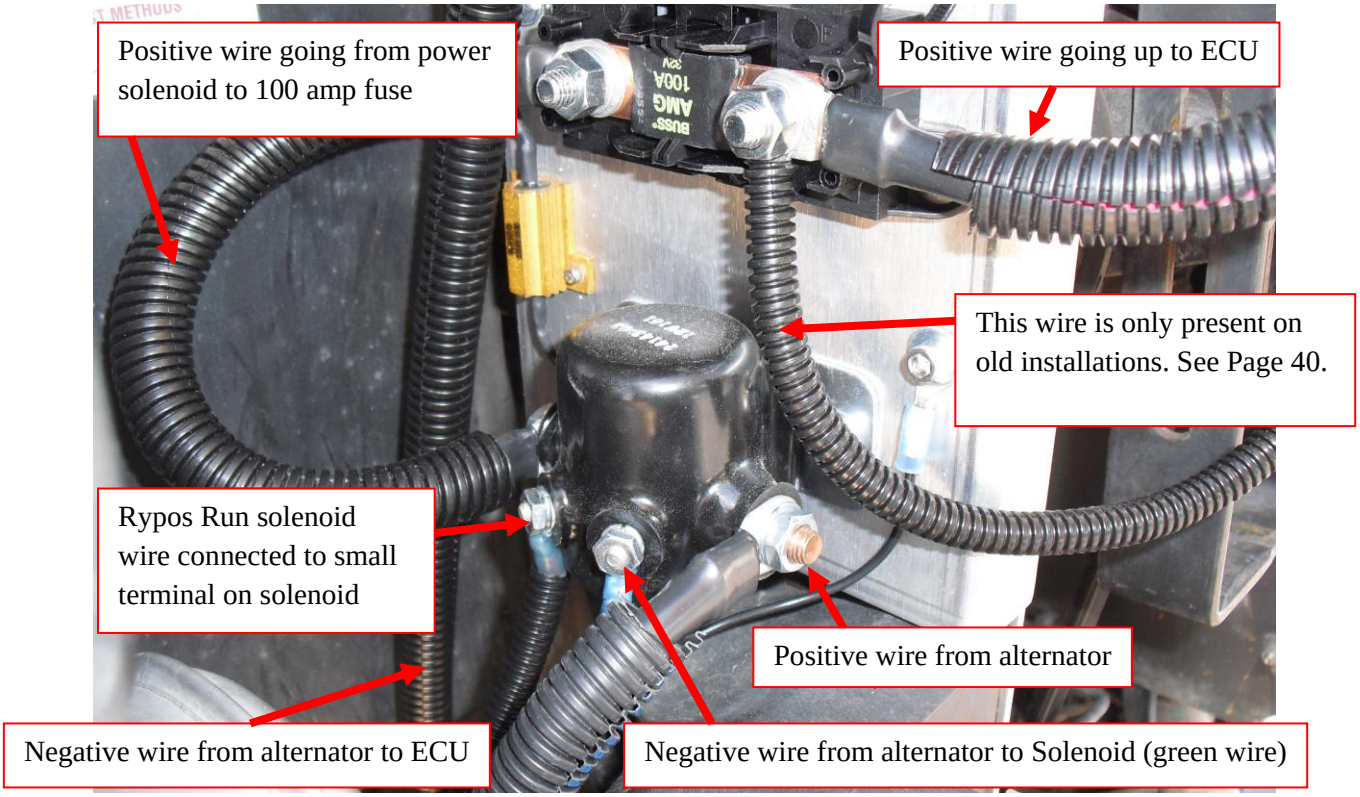


Secure the run signal wire, but Do not cable tie to fuel lines. Tie to the clamps holding the fuel lines, not the lines

Run light panel wires along with unit wiring up to ECU, cable tie in place

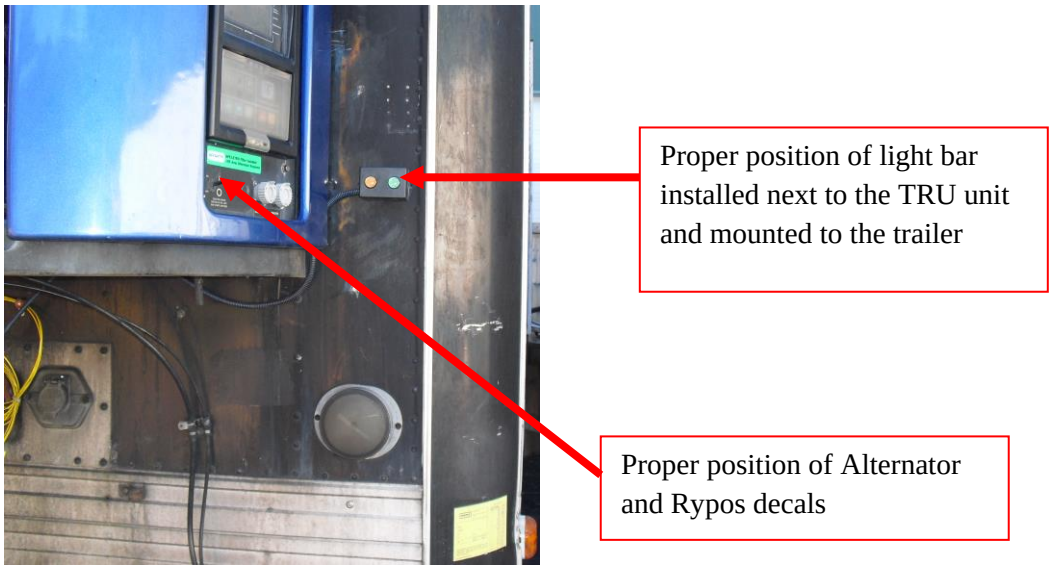
Connect Rypos harness between run solenoid and TK harness

2. **Power Solenoid**:



3. Connect the Rypos ECU negative (black) wire, the Rypos battery negative wire, the green solenoid ground wire, and the TK unit negative wires to the negative post on the alternator (4 wires total).
4. Install the short Rypos positive (red) wire along with the TK positive wire to the alternator. Connect the other end of the positive wire to the large terminal on the power solenoid that is open. (The wire going to the fuse is on the other side).
5. Connect the ECU hi current wire (red) from the outlet side of the fuse up to the ECU. Plug the small wire into the appropriate ECU connector. (see above)
6. Connect the ECU power wire (small) to the power studs on the ECU. Plug the small wire into the appropriate ECU connector. (see page 16)
7. For customers with Electric Standby units, please order Rypos kit number 950-0031-00-00.

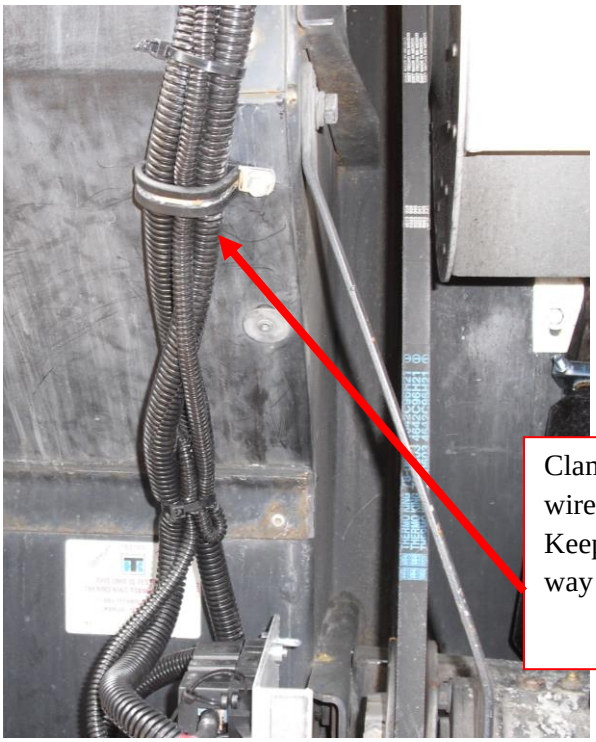
8. **Remote light panel**: The remote light panel is an indicator of system operation. It should be installed on the outside of the unit in the approximate position of a TRU light bar. Mount the indicator light panel with self drilling screws. Then route the wire along with the unit wires up to the ECU. Cable tie to secure the wire along the way. Plug into ECU connection.



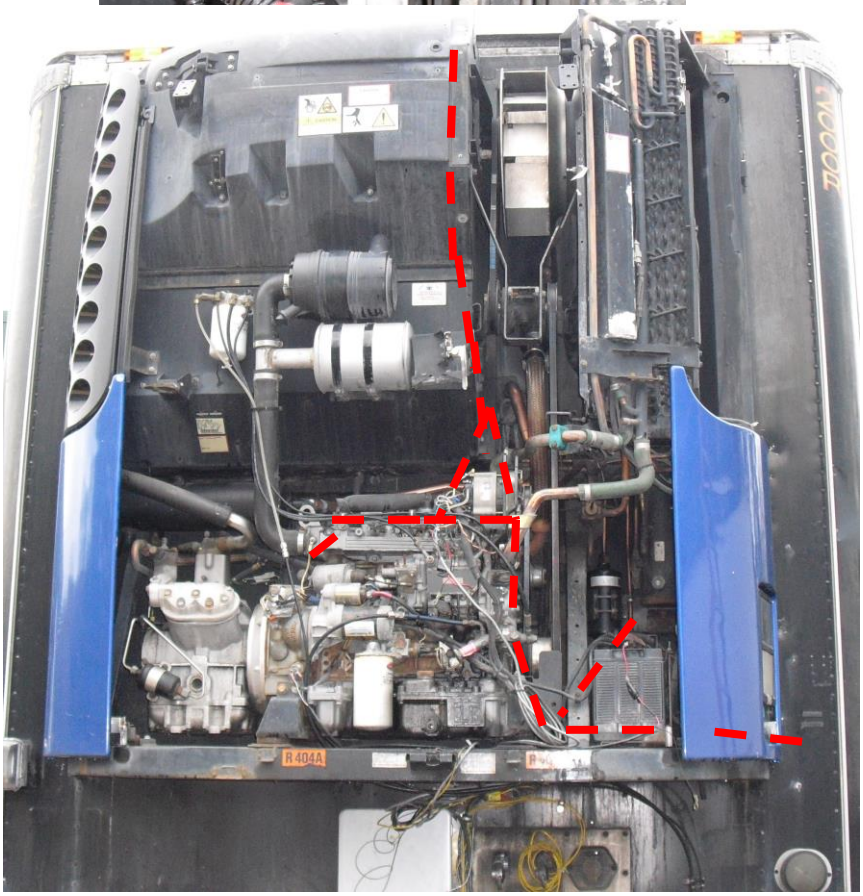
Secure wires going up to the ECU: Secure the wires going up to the ECU and cable tie to adjoining wiring for support. Use and Adel clamp to secure the wires to the evaporator pod in order to keep them out of the way of the fan. Using the supplied cable ties **secure** all wires and cables at this time. See photos below for wire routing and use of clamps to secure wires. (Ref wiring diagram, pg 27)

Use a digital multi-meter to check for any shorts between the positive and negative battery harnesses (ohm out). If a short is found, double check wiring. **Do not proceed until all shorts have been fixed.**

9. Cable ties all remaining wires to secure them and prevent chafing, etc.
10. Connect the Thermo-King harness wire**(s)** to the positive (+) terminal on the battery
11. Connect the following wires to the negative (-) wires to the battery at this time.
    a. Negative Rypos wire from the alternator
    b. Original wires from TK harness



Clamp to secure the wires into this position. Keep them out of the way of the fan.



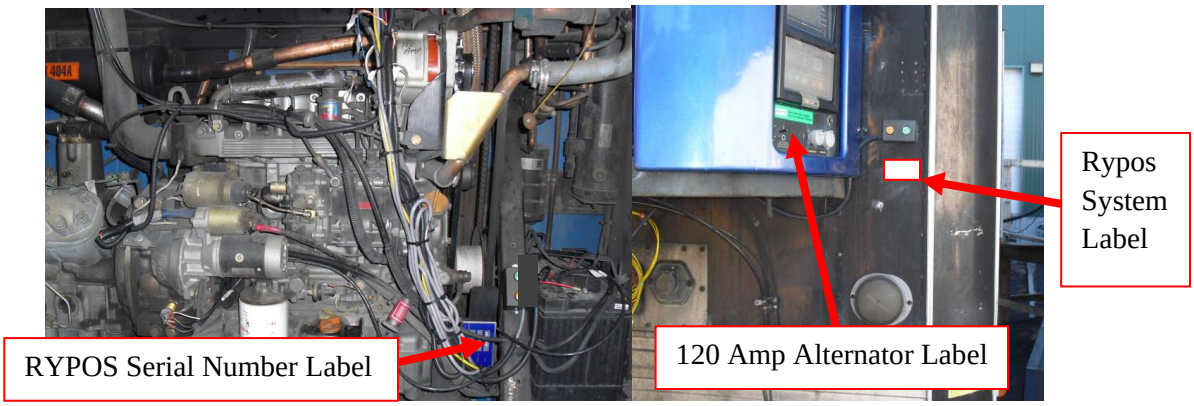
Suggested route for running wires up to the ECU connections.

Start-up and Operation of DPF:

1. Disconnect the speed solenoid (optional) on the TRU unit so that the initial testing of the unit is conducted at low speed. This will make it easier to hear the solenoid actuate and to be able to hear the engine speed change with the load applied by the alternator during regeneration.
2. Turn on the unit switch to start the TRU engine and verify operation of DPF. The green and yellow light on the indicator panel will light up at solenoid engagement. They will then go out for 40 seconds and come back on when the unit starts regeneration.
    a. Green light verified? Circle Yes or No
3. Approximately 40 seconds after start up the DPF will actuate one flow control solenoid and regenerate one filter element. You will be able to hear the solenoid engage, which will shut off exhaust flow to one of the 2 outlet pipes. The filter will then regenerate for the next 3.5 minutes. While the unit is regenerating, check the low speed rpm, it should be at least 1450 rpm during the regeneration, adjust up if necessary.
    a. Write in new low speed during Regen: _____
4. The engine will pick up a few rpm in speed after the regeneration is completed. Approximately 10 seconds after the speed increases, the solenoid will open and exhaust will flow through both pipes again. Shut the unit off, wait for a few seconds and turn on again. The unit will go through the same sequence as above, only this time with the other solenoid, and the flow will be shut off to the other outlet pipe. This check will make sure both solenoids are working properly.
    a. Are both solenoids working properly and the system is regenerating as it should? Circle Yes or No
5. If you have any problems, check out the troubleshooting section for assistance.

Final Checks

1. Double check all connections to make sure they are tight, and make sure all wires are safely supported and cable tied to prevent excessive motion during unit operation.
2. Reinstall the unit doors and upper cowling, re-connect the speed solenoid (if disconnected for testing), and re-tighten the alternator belt.
3. Once everything is complete, place the labels as shown below. Clean the surface with a damp cloth to remove any dirt and wipe dry. Remove tape covering and place the label into position. Press firmly across the entire label to insure good contact. It is suggested to also rivet or use self drilling screws to secure the RYPOS label firmly onto the unit.



4. **<u>Set the automatic defrost timer to 1.5 or 3 hours as this helps maintain good filter health.</u>**

Maintenance Requirements:

<u>Daily or every use:</u>

1) Check the alternator belt tension along with doing all other OEM recommended pre-trip checks
    a. Re-tension belt if loose, or replace if belt is worn.
2) Check indicator light panel to make sure the green light is on and the yellow is off when the TRU is running.

<u>Quarterly or every 500 hours:</u>

1) Inspect alternator belt, re-tighten if belt is in good condition, replace if belt is showing signs of wear/checking/cracking.
2) Conduct complete system checkout per the 'RYPOS SYSTEM CHECKLIST' (page 25) to insure that the system is operating properly and save a copy of the Check List for the maintenance records.

<u>Annual Maintenance:</u>

1) Inspect alternator belt, re-tighten if belt is in good condition, replace if belt is showing signs of wear/checking/cracking.
2) Remove the blue hose from the external pressure transducer and blow air back through it into the filter to make sure the line is clear.
3) Conduct complete system checkout per the 'RYPOS SYSTEM CHECKLIST' to insure that your system is operating properly and save a copy for the maintenance records.
4) Check low speed during Regeneration and adjust to 1450 rpm or greater.
5) Inspect for ash accumulation and follow procedure below if required.

Ash Cleanout Procedure

During the annual maintenance inspection the unit should be checked for ash accumulation. The ash inspection port is located on the right side of the unit (the side near the exhaust inlet pipe).
Ash is considered a hazardous waste material and must be collected using a vacuum with a HEPA filter. Follow the ash handling guidelines as prescribed by CARB at www.arb.ca.gov/diesel/tru/documents/ashguide.pdf.

1. The engine should be off before proceeding.
2. Disconnect the positive terminal from the battery to ensure the unit is not operational.
3. Remove the air cleaner to provide better access to the right side of the unit.
4. Open the ½" NPT port and connect a suitable vacuum cleaner hose.
5. Remove the rain caps from the two exhaust pipes.
6. Close off one of the exhaust ports with a 2" cap or tape.
7. Attach a 2" blower hose to the open exhaust port.
8. Manually open the solenoid valve by moving the plunger away from the body of the unit.
9. Turn on the vacuum and the blower and run for 5 minutes.
10. Repeat the same operation on the other side.
11. Remove all hoses and reattach the rain caps to the exhaust pipes.
12. Put anti-seize on the threads of the NPT port plug and reattach.
13. Reattach the air cleaner.
14. Reattach the positive terminal of the battery.

Rypos Component Swapping and Re-Designation Practices

Rypos has added specific requirements along with the CARB required practices that must be followed if a customer wants to swap components or complete units from one TRU to another. Please visit the Rypos website at: www.rypos.com for more information.

Rypos System Checklist

RYPOS SYSTEM CHECKLIST			Rypos Ser#	_____	Engine hours	_____	SRN, or RMA #
Voltage measurement - use multimeter, check voltage across outlet side of power solenoid and battery ground. Values should be 14.2-14.4V before regen, and 13.0-13.3 during the regeneration							
Current measurement - use clip on ammeter capable of measuring 100A DC, clip on the + wire between the 100A fuse and the ECU. Current should be between 65-75 amps. This check will also troubleshoot a blown fuse							
Voltage across power solenoid measurement - use multimeter, check voltage across the 2 large posts on the power solenoid, should be less than .2V							
SMOKE COMING FROM FILTER OR EXHAUST?		NO (Fill out checklist)	☐		YES (If yes, see below)	☐	
IF ENGINE IS SMOKING BADLY, CHECK AIR FILTER FIRST, IF STILL SMOKING, FIX ENGINE (INJECTION PUMP, NOZZLES, ETC) BEFORE INSTALLING OR REPAIRING A FILTER SYSTEM							
Write in values for Voltage and Current							
TRU SWITCH ON #1	**BEFORE REGEN**	Voltage (~14.2)		Current (~.2)		Voltage across power solenoid (0.2V or less)	
	DURING REGEN	Voltage (~13.3)		Current (~65+)		☐	
Solenoid check - stand back and check rain flaps on unit		front up/ back down	☐	back up/front down	☐		
AFTER REGEN- INDICATOR LIGHTS: (On, off, flashing)			Green	☐	Yellow	☐	
Write in values for Voltage and Current							
TRU SWITCH ON #2	**BEFORE REGEN**	Voltage (~14.2)		Current (~.2)		Voltage across power solenoid (0.2V or less)	
	DURING REGEN	Voltage (~13.3)		Current (~65+)		☐	
Solenoid check - stand back and check rain flaps on unit		front up/ back down	☐	back up/front down	☐		
AFTER REGEN- INDICATOR LIGHTS: (On, off, flashing)			Green	☐	Yellow	☐	
Write in values for Voltage and Current							
TRU SWITCH ON #3	**BEFORE REGEN**	Voltage (~14.2)		Current (~.2)		Voltage across power solenoid (0.2V or less)	
	DURING REGEN	Voltage (~13.3)		Current (~65+)		☐	
Solenoid check - stand back and check rain flaps on unit		front up/ back down	☐	back up/front down	☐		
AFTER REGEN- INDICATOR LIGHTS: (On, off, flashing)			Green	☐	Yellow	☐	
Write in values for Voltage and Current							
TRU SWITCH ON #4	**BEFORE REGEN**	Voltage (~14.2)		Current (~.2)		Voltage across power solenoid (0.2V or less)	
	DURING REGEN	Voltage (~13.3)		Current (~65+)		☐	
Solenoid check - stand back and check rain flaps on unit		front up/ back down	☐	back up/front down	☐		
AFTER REGEN- INDICATOR LIGHTS: (On, off, flashing)			Green	☐	Yellow	☐	
ALL VALUES ABOVE ARE OK, AND AFTER EACH REGEN GREEN IS ON AND YELLOW IS OFF - SYSTEM OK ☐ **MAKE A COPY FOR YOUR RECORDS AND SEND THIS SHEET BACK TO RYPOS IF REQUESTED.** **IF THERE IS A PROBLEM OR YELLOW IS SOLID CONTACT RYPOS FOR NEXT STEPS**							

TROUBLESHOOTING

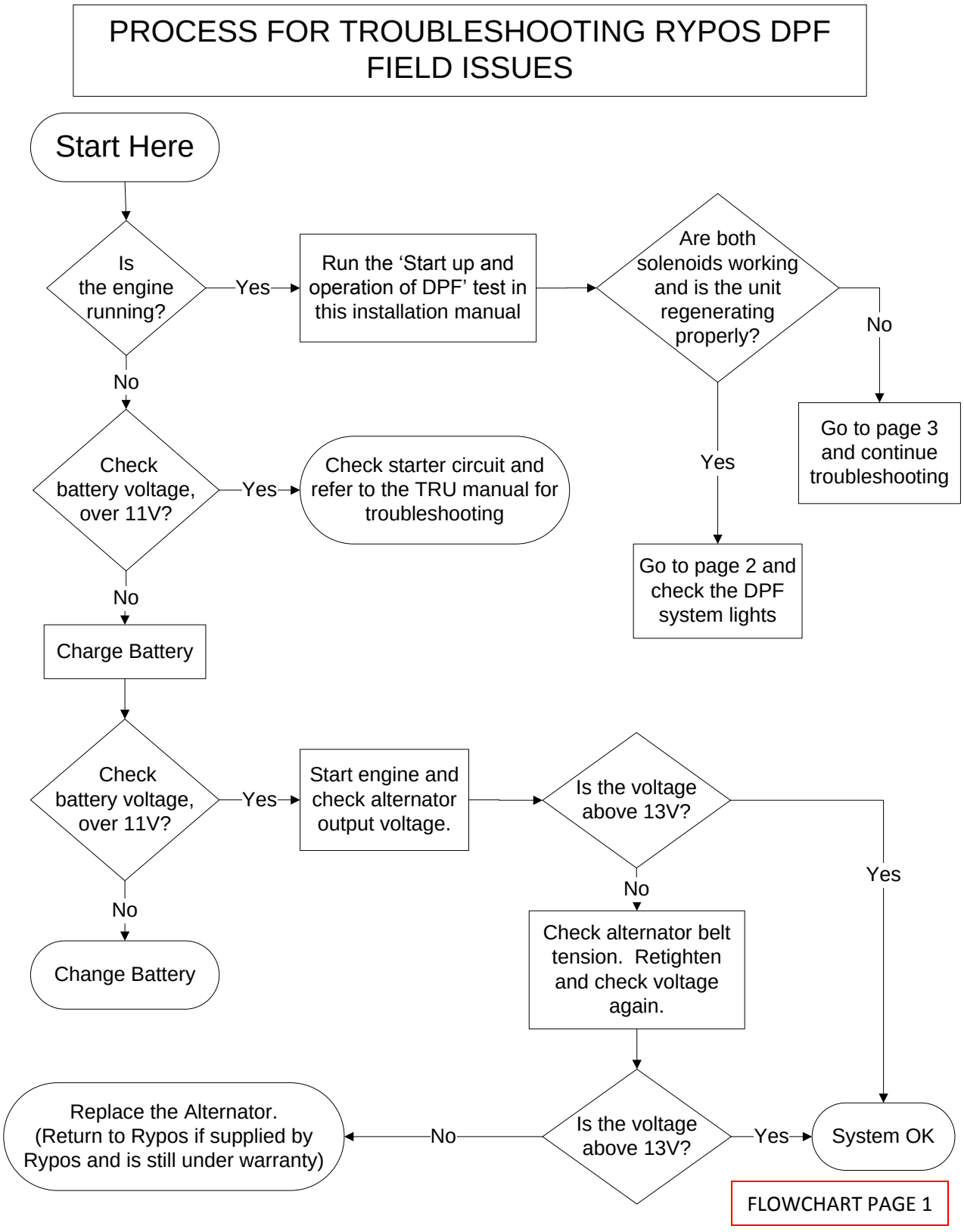
LIGHT BAR CODES

Lamp Mode	System Status	Trouble Shooting	If Problem Persists
Green Solid	System ON, Functioning Normally	Not Required	No action required
Green Flashing	System ON but low voltage condition.	Ensure battery charger or alternator is connected and charging.	See troubleshooting chart below
Green Off	System is inoperable.	Check battery and charging system connections and fuses.	See troubleshooting chart below.
Yellow On Solid	System is in overpressure condition.	Shut down TRU and inspect filter for damage. Perform a manual regeneration procedure. Restart TRU. Run 5 minutes. If lamp remains on perform ash removal procedure. Restart TRU. Run for 15 minutes. If lamp remains on call for service.	See troubleshooting chart below
Yellow Flashing	Low pressure condition.	Check entire TRU exhaust system for leaks and repair/seal as necessary.	See troubleshooting chart below
Yellow Off	System Operating Normally.	No action required.	No action required.

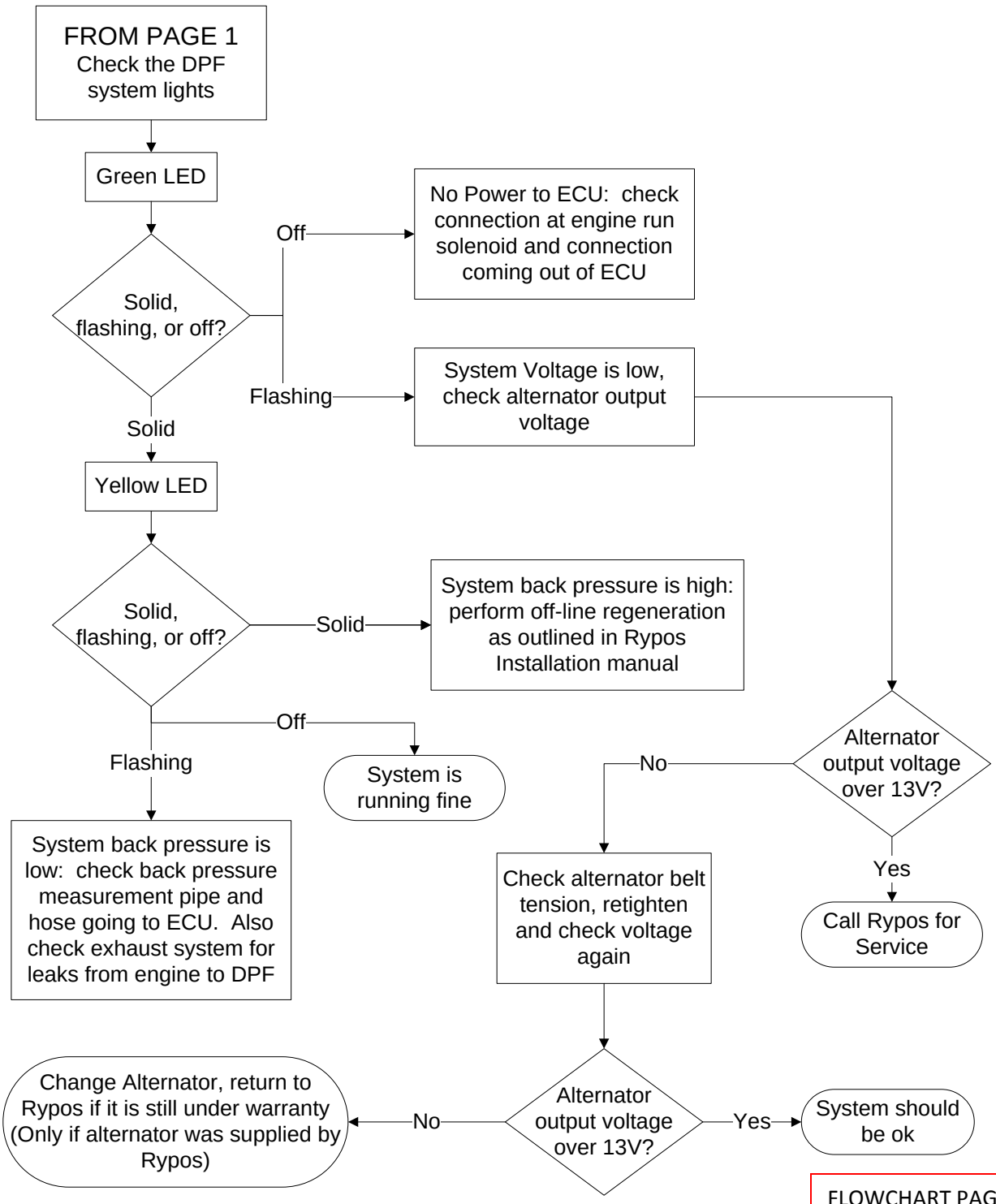
SERVICE UPDATES

Check our website at www.rypos.com for maintenance updates and service bulletins

Troubleshooting Procedure

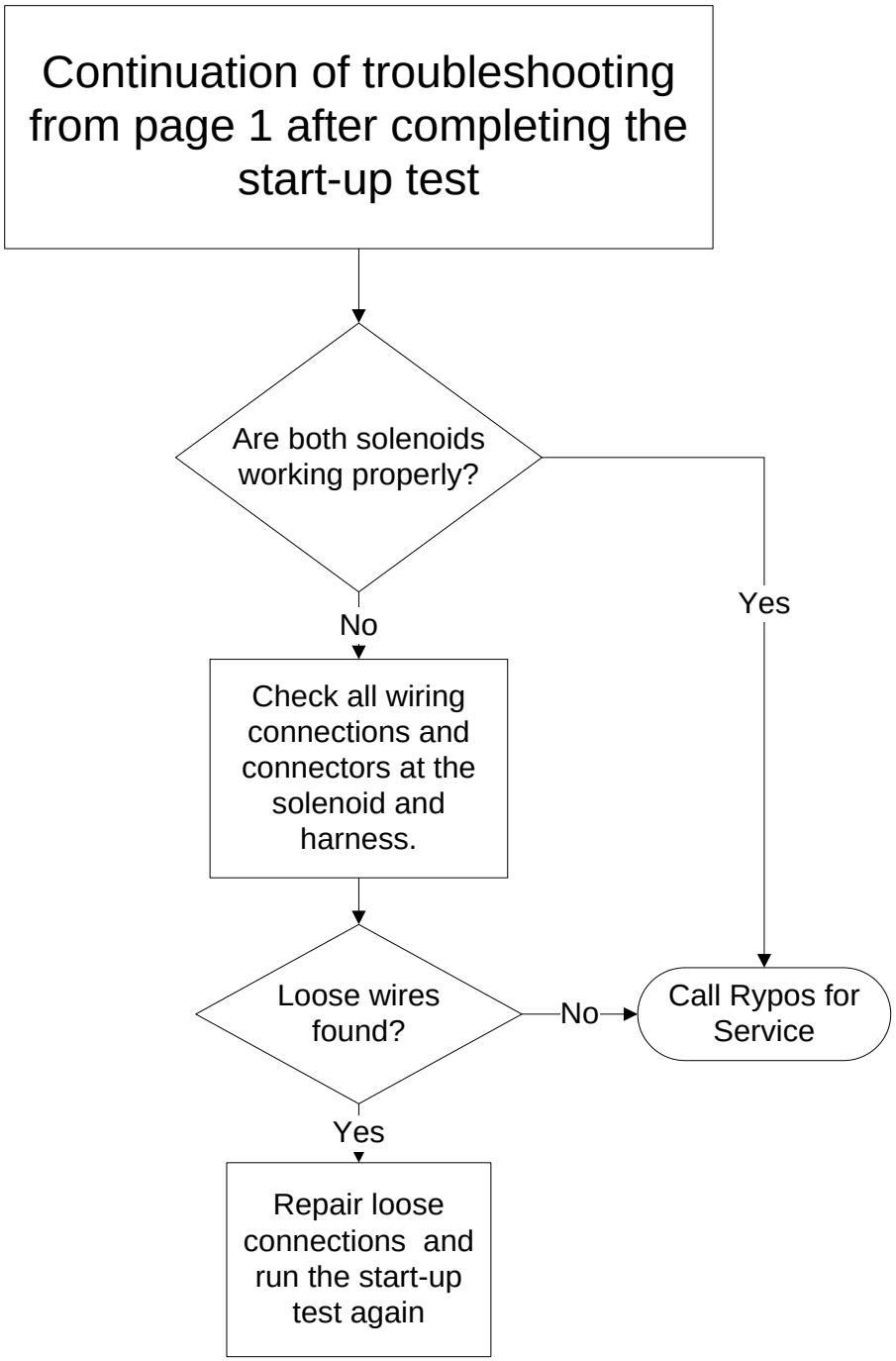


PROCESS FOR TROUBLESHOOTING RYPOS DPF FIELD ISSUES



FLOWCHART PAGE 2

PROCESS FOR TROUBLESHOOTING RYPOS DPF FIELD ISSUES

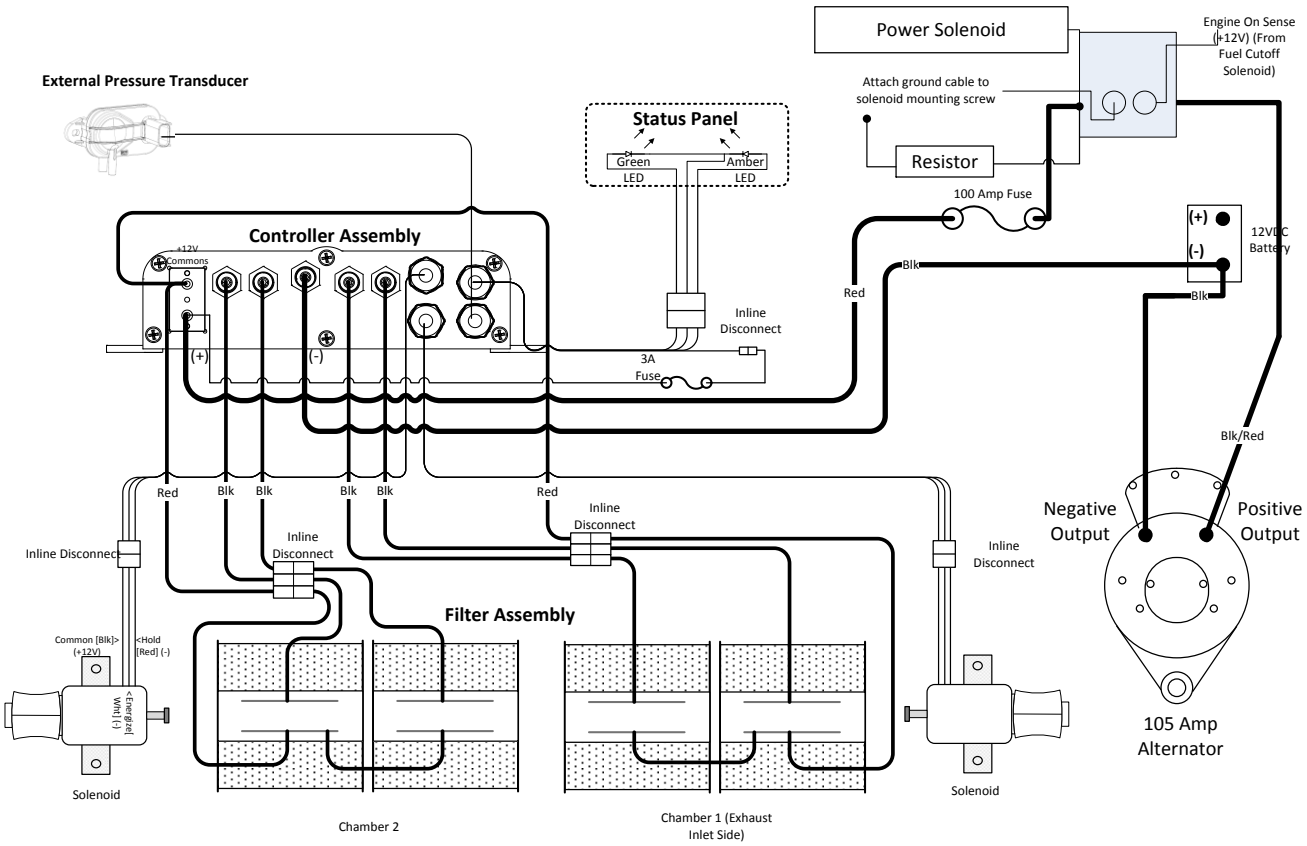


FLOWCHART PAGE 3

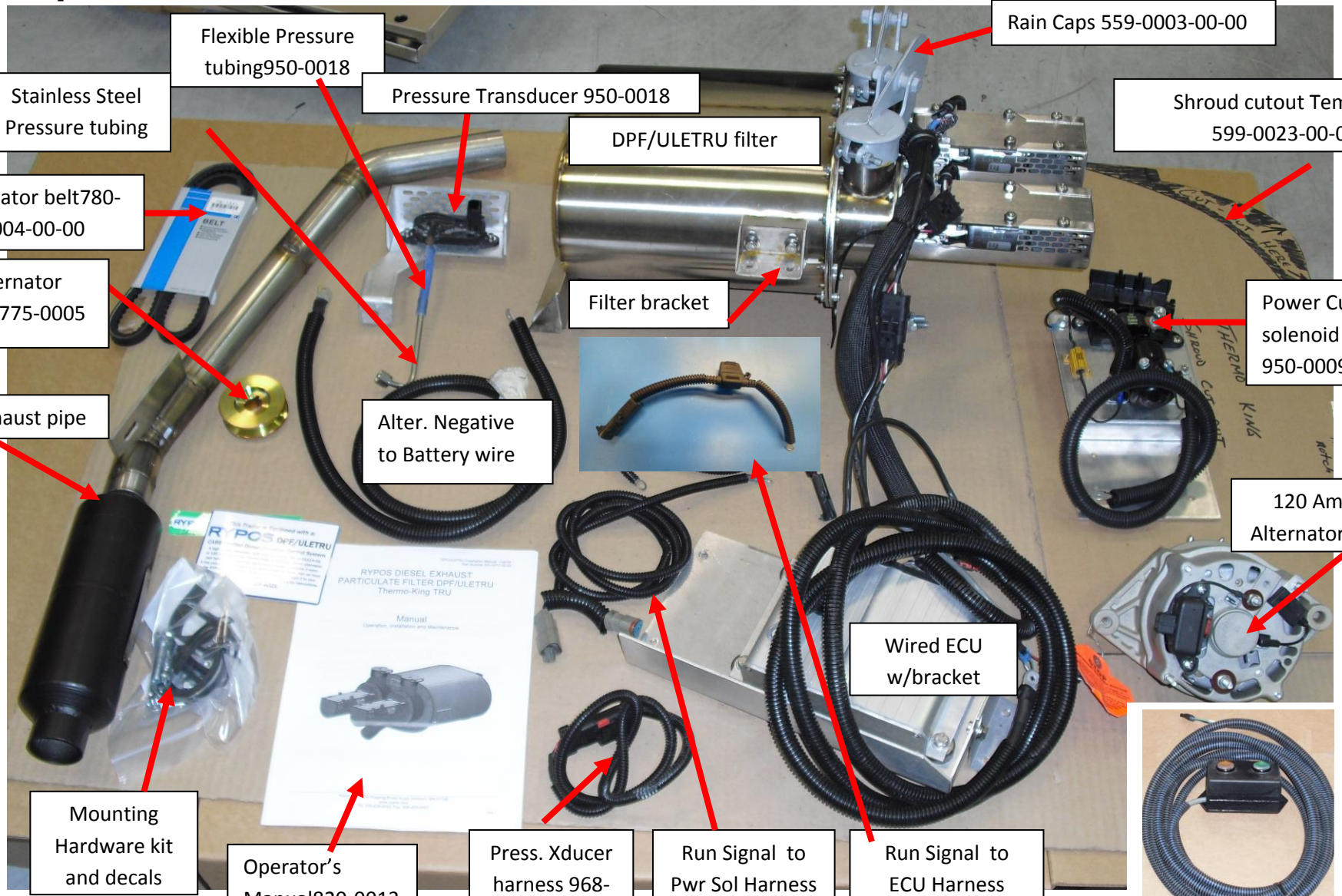
TRU DPF SERVICE PARTS LIST
DPF/ULETRU THERMO KING

ITEM DESCRIPTION	PART NUMBER
ULETRU FILTER CAN ASSEMBLY, TK	960-0045-00-00
ECU ASSEMBLY, W/BRACKET	970-0029-00-00
ECU	970-0007-00-03
ALTERNATOR, 120 AMP BOSCH (AL9120N)	175-0017-00-00
ALTERNATOR PULLEY, 2.625" DIA	775-0005-00-00
ALTERNATOR BELT (THERMO KING)	780-0004-00-00
ALTERNATOR BELT (OPTIBELT)	780-0007-00-00
RAIN CAP 2.0" OD	559-0003-00-00
EXHAUST PIPE W/DOC	559-0012-00-00
CLAMP U-STYLE 1.75" DIAMETER PIPE	598-0003-00-00
CUTTING TEMPLATE, SHROUD	599-0023-00-00
PRESSURE TRANSDUCER ASSEMBLY	950-0018-00-00
IC PRESSURE TRANSDUCER EXTERNAL	161-0004-00-00
FLEXIBLE TUBING 3/8" OD x 3/16" ID SILICONE	737-0001-00-00
TUBE, 304 SS 1/4" OD	597-0017-00-00
VENT COVER FOR EXTERNAL PRESSURE TRANSDUCER	785-0001-00-00
COMPRESSION FITTING	598-0002-00-00
WIRING ASSY, INDICATOR LIGHTS	968-0011-00-03
GROUND WIRE FOR CUTOUT SOLENOID	968-0034-00-00
EXTERNAL PRESSURE TRANSDUCER CABLE	968-0045-00-00
ENGINE RUN SIGNAL CABLE	968-0049-00-00
RUN SIGNAL WIRE, POWER SOLENOID TO ECU	968-0064-00-01
WIRING ASSY, SOLENOID JUMPER WIRE	968-0065-00-00
POWER CUTOUT SOLENOID ASSEMBLY/W BRACKET	950-0009-00-00
MEGA FUSE HOLDER W/ COVER	158-0006-00-00
FUSE 100 AMP	158-0009-00-00
SOLENOID FOR CUTOUT KIT 200A-COATED	551-0011-00-01
RESISTOR ASSEMBLY	968-0066-00-00
POWER SOLENOID TO FUSE WIRE	968-0051-00-00

ULETRU DPF Wiring Diagram



Component Identification – DPF ULETRU Hardware



Compatible Engine Models

Engine Manufacturer	Engine Model Year	Engine Manufacturer's Model Name	Engine Family
Yanmar	2003	4TNE82-ETK	3YDXL1.90D4N
Yanmar	2003	4TNE86-ETK	3YDXL2.09D4N
Yanmar	2003	4TNE86-ETK24	3YDXL2.09D4N
Yanmar	2003	4TNE86-ETKH	3YDXL2.09D4N
Yanmar	2004	4TNV86TK-VM	4YDXL2.09K4N
Yanmar	2004	TK486V	4YDXL2.09K4N
Yanmar	2004	TK486VB	4YDXL2.09K4N
Yanmar	2004	TK486VH	4YDXL2.09K4N
Yanmar	2005	4TNV86TK-VM	5YDXL2.09K4N
Yanmar	2005	TK486V	5DXL2.09K4N
Yanmar	2005	TK486VB	5YDXL2.09K4N
Yanmar	2005	TK486VH	5YDXL2.09K4N
Yanmar	2006	4TNV86TK-VM	6YDXL2.09K4N
Yanmar	2006	TK486V	6YDXL2.09K4N
Yanmar	2006	TK486VB	6YDXL2.09K4N
Yanmar	2006	TK486VH	6YDXL2.09K4N
Yanmar	2007	4TNV86TK-VM	7YDXL2.09K4N
Yanmar	2007	TK486V	7YDXL2.09K4N
Yanmar	2007	TK486VB	7YDXL2.09K4N
Yanmar	2007	TK486VH	7YDXL2.09K4N
Yanmar	2007	4TNV86TK-VM1	7YDXL2.09K4N
Yanmar	2008	4TNV86TK-VM	8YDXL2.09K4N
Yanmar	2008	TK486V	8DXL2.09K4N
Yanmar	2008	TK486VB	8YDXL2.09K4N
Yanmar	2008	TK486VH	8DXL2.09K4N
Yanmar	2008	4TNV86TK-VM1	8YDXL2.09M4N
Yanmar	2009	4TNV86TK-VM	9YDXL2.09K4N
Yanmar	2009	TK486V	9DXL2.09K4N
Yanmar	2009	TK486VB	9YDXL2.09K4N
Yanmar	2009	TK486VH	9DXL2.09K4N
Yanmar	2009	4TNV86TK-VM1	9YDXL2.09M4N
Yanmar	2010	4TNV86TK-VM	AYDXL2.09K4N
Yanmar	2010	TK486V	ADXL2.09K4N
Yanmar	2010	TK486VB	AYDXL2.09K4N
Yanmar	2010	TK486VH	ADXL2.09K4N
Yanmar	2010	4TNV86TK-VM1	AYDXL2.09M4N
Yanmar	2011	4TNV86TK-VM	BYDXL2.09K4N
Yanmar	2011	TK486V	BDXL2.09K4N
Yanmar	2011	TK486VB	BYDXL2.09K4N
Yanmar	2011	TK486VH	BDXL2.09K4N
Yanmar	2011	4TNV86TK-VM1	BYDXL2.09M4N

Warranty Statement

YOUR WARRANTY RIGHTS AND OBLIGATIONS

Rypos, Inc. must warrant the diesel emission control system in the application for which it is sold or leased to be free from defects in design, materials, workmanship, or operation of the diesel emission control system which cause the diesel emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706, and 2710, for the periods of time listed below, provided there has been no abuse, neglect, or improper maintenance of your diesel emission control system, vehicle or equipment, as specified in the owner's manuals. Where a warrantable condition exists, this warranty also covers the engine from damage caused by the diesel emission control system, subject to the same exclusions for abuse, neglect or improper maintenance of your vehicle or equipment. Please review your owner's manual for other warranty information. Your diesel emission control system may include a core part (e.g., particulate filter, diesel oxidation catalyst, selective catalytic reduction converter) as well as hoses, connectors, a back pressure monitor (if applicable), and other emission-related assemblies. Where a warrantable condition exists, Rypos, Inc. will repair or replace your diesel emission control system at no cost to you including diagnosis, parts, and labor.

WARRANTY COVERAGE:

For a 25 to 50 horsepower engine used in a single temperature Thermo King or Carrier transport refrigeration unit application, the warranty period will be 4 years or 2600 hours, whichever occurs first. If any emission-related part of your diesel emission control system is defective in design, materials, workmanship, or operation of the diesel emission control system thus causing the diesel emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706, and 2710, within the warranty period, as defined above, Rypos, Inc. will repair or replace the diesel emission control system, including parts and labor. This coverage also applies to any parts replacements, sizing changes, or adjustments that are required to appropriately match the diesel emission control system to the engine on which it is installed.

In addition, Rypos, Inc. will replace or repair the engine components to the condition they were in prior to the failure, including parts and labor, for damage to the engine proximately caused by the verified diesel emission control strategy. This also includes those relevant diagnostic expenses in the case in which a warranty claim is valid. Rypos, Inc. may, at its option, instead pay the fair market value of the engine prior to the time the failure occurs.

OWNER'S WARRANTY RESPONSIBILITY

As the engine owner, you are responsible for performing the required maintenance described in your owner's manual. Rypos, Inc. recommends that you retain all maintenance records and receipts for maintenance expenses for your vehicle, engine, or equipment, and diesel emission control system. If

you do not keep your receipts or fail to perform all scheduled maintenance, Rypos, Inc. may have grounds to deny warranty coverage. You are responsible for presenting your vehicle, equipment, or engine, and diesel emission control system to a Rypos, Inc. dealer as soon as a problem is detected. The warranty repair or replacement should be completed in a reasonable amount of time, not to exceed 30 days. If a replacement is needed, this may be extended to 90 days should a replacement not be available, but must be performed as soon as a replacement becomes available.

If you have questions regarding your warranty rights and responsibilities, you should contact Rypos, Inc. at 1-508-429-4552 or the California Air Resources Board at 9528 Telstar Avenue, El Monte, California 91731, or (800) 363-7664, or electronic mail: helpline@arb.ca.gov.

THIS WARRANTY IS THE ONLY WARRANTY APPLICABLE TO RYPOS ULETRU SYSTEMS. RYPOS MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. RYPOS SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES EXCEPT AS OTHERWISE PROVIDED HEREIN.

DENIAL OF WARRANTY COVERAGE

1. Repairs due to accident, misuse, alteration, misapplication, storage damage, negligence or modification not authorized by Rypos, Inc. are not covered by this warranty.
2. The warranty does not cover repairs under the following conditions, without limitation:
   a) Failure of the engine owner or operator to heed the Rypos system's warning lamps and take timely action according to the Troubleshooting section of this Operation, Installation and Maintenance Manual.
   b) Failure of the engine owner or operator to maintain the Rypos system according to the maintenance requirements stated in this Operation, Installation and Maintenance Manual.
   c) Failure of the engine owner or operator to maintain the engine according to the engine manufacturer recommended requirements.
3. Except as otherwise provided above paragraph titled WARRANTY COVERAGE, Rypos, Inc. is not responsible for repair of components and/or assemblies which are manufactured or supplied by another manufacturer. Such items may be covered by their manufacturer or supplier.

LIMITATION OF DAMAGES

The performance of repair or replacement of the Rypos ULETRU system or of TRU engine components is the Owner's exclusive remedy under this warranty. Rypos does not authorize any person to assume or create for it any other obligation or liability in connection with the Rypos ULETRU. Except as expressly warranted in the above paragraph titled WARRANTY COVERAGE, Rypos is not responsible for incidental or consequential costs or expenses which the owner may incur as a result of a malfunction or failure covered by this warranty, including but not limited to loss of profits, loss of time, inconvenience, and other costs and expenses.

CARB Identification Number (IDN) Registration

After installing the RYPOS DPF/ULETRU system, the TRU owner may apply for a CARB IDN at:

www.arb.ca.gov/diesel/tru/tru.htm

Pre-Installation Compatibility Assessment and Warranty Registration Form

1) Verify that the engine year and family is listed in the Compatible Engine Models Table
2) Inspect the TRU unit for oil leaks, general maintenance, signs of oil in exhaust, hrs on the oil and oil filter, condition of air filter, color of smoke during steady state operation at both high and low speed)
3) Fill out ALL information below, sign statement, give one copy to the customer and send one copy to Rypos (Warranty coverage for incomplete information will be the responsibility of the installer!)

TRU owner's company name and address: _____

Contact name_____ phone: _____ E-mail_____

Installer's name: _____ phone: _____ E-mail_____

Installation date: _____ TRU readings: Switch on hours_____ Engine hours_____

TRU model name: (SB210, SB300 etc.) :_____(CANNOT BE INSTALLED ON MULTI-TEMP)

TRU serial number: _____ Date in Service: _____

TRU engine serial number (From data label on engine and unit frame):_____

Rypos DPF/ULETRU serial number: **U**___ ___ ___ ___ Date of Manufacture_____

Current ARB #_____ Bosch Alternator Serial number: _____

Statement of Compatibility: "I have inspected the engine for signs of poor maintenance (oil leaks, oil filter over 1 year old, oil with more than recommended hrs on it, dirty air filter, worn belts, etc). I have looked at the exhaust soot for oil content, and I have observed the color of the exhaust both in high and low speed (No color should be visible in steady state operation) and I hereby affirm that the TRU listed above has met ALL of the above compatibility criteria for installation of DPF/ULETRU"

_____ YES, ALL CRITERIA ACCEPTABLE _____ NO, THERE ARE ISSUES WITH THE UNIT THAT MUST BE ADDRESSED BEFORE A DPF/ULETRU MAY BE INSTALLED (LIST ISSUES_____)

Statement of Warranty: "I hereby warrant that the installation of the Rypos DPF/ULETRU is free from defects in workmanship or materials which cause the diesel emission control system to fail to conform to the emission control performance level it was verified to, or to the requirements in the California Code of Regulations, Title 13, Sections 2700 to 2706. The warranty period and the extent of the warranty coverage provided by me must be the same as the warranty provided by Rypos, Inc., and the same exclusions must apply"

SIGNED_____ DATE_____

Rypos Family Name for Verification: CA/RYP/2011/PM3+/N00/TR/DPF01 Rypos Copy

Scan/e-mail to: Registration@rypos.com, or fax to 508-429-4553

Addendum

RYPOS Component Swapping and Re-Designation Practices

Rypos may authorize the component swapping or complete removal of a RYPOS DPF/ULETRU from the original installation to another vehicle or equipment within the end user's commonly owned fleet, provided the following CARB requirements are met and agreed to by the dealer/installer as well as the end user:

CARB Requirements for all component swapping and re-designation practices

1) Any party that removes a verified diesel emission control strategy from a TRU application must remove the verified diesel emission control strategy TRU label. If the RYPOS DPF/ULETRU label cannot be removed whole, it must be destroyed, and a new replacement label must be purchased from Rypos.
2) Any party which re-designates a device to another engine/application which was never previously retrofit with that exact diesel emission control strategy must obtain and properly install an appropriate diesel emission control strategy engine label, which must be purchased from Rypos
3) Any party which removes a verified diesel emission control strategy from a TRU application must ensure that the donating TRU remains compliant with CARB regulations or that the TRU is taken out of service.
4) DPF/ULETRU units which are more than 10 years old based on the month and date of manufacture listed on the device label or devices of unknown age are not legal candidate systems for re-designation to a new TRU.
5) A RYPOS DPF/ULETRU installed on a vehicle or piece of equipment that is re-powered may remain installed provided:

a. The replacement engine meets all the terms and conditions of the diesel emission control strategy Executive Order,

b. The diesel emission control strategy is not more than 10 years old (Based on month and date of manufacture), and

c. The appropriate diesel emission control strategy engine label is Installed on the replacement engine.

6) The installer must agree to honor the original installation warranty and warranty period of the RYPOS DPF/ULETRU. If the installer of either a swapped component or re-designated diesel emission control strategy is not the same as the installer who did the original installation of the diesel emission control strategy, the new installer must assume the installation warranty responsibilities defined in RYPOS DPF/ULETRU Installation Manual for the remainder of the original warranty period or until another installer swaps the component or re-designates the diesel emission control strategy. If the original installation warranty has expired or has less than one year remaining, the installer must issue a new warranty to guard against potential installation defects. The new installation warranty must match the original warranty in the RYPOS DPF/ULETRU Installation Manual except that the minimum period is reduced to one year from the date of installation. Any transfer of a diesel emission control strategy or component by an installer that does not offer this installation warranty is not considered a valid installation.

7) No party shall advertise, sell, lease, or offer for sale or lease, a used verified diesel emission control strategy.

RYPOS Component Swapping Requirements

Rypos may authorize that components of the RYPOS DPF/ULETRU VDECS be moved from the original installation and transferred to another TRU unit, provided the following provisions are met:

1) Identical DPF/ULETRU components that have the same part number may only be swapped between RYPOS DPF/ULETRU systems.
2) The recipient TRU unit must already be fitted with the same RYPOS DPF/ULETRU VDECS
3) The customer/dealer changing the parts provide the following information back to Rypos
    a. TRU Serial number of the unit having the parts removed
    b. The engine hours at the time of the installation the original unit
    c. The engine hours now, before the parts are removed from the existing TRU
    d. The serial number and engine hours of the recipient TRU unit, both at the time of the original RYPOS DPF/ULETRU installation and at the time of the component swap.
    e. A copy of the attached RYPOS System Checklist that has been completed by the customer/dealer during testing of the RYPOS DPF/ULETRU system after the component swap. The customer/dealer will send a copy to Rypos as well as providing one to the customer.
4) Rypos will honor the warranty life of the component being swapped up to 4 years or 2600 hours, whichever comes first. If the customer cannot verify the original installation hours, there is no longer any warranty coverage on the component. If the unit is being serviced by a dealer, the servicing dealer is responsible for providing installation warranty coverage either for the duration of the Rypos warranty, or for a period of one year if the Rypos warranty has expired, as outlined in item 6 in the CARB requirements above.
5) The donor TRU whose component has been moved must remain in compliance with the terms and conditions of the applicable Executive Order and have all diesel emission control strategy components present and functional, or else the TRU must be removed from service according to CARB requirements.

6) The following is a list of components that is acceptable for swapping:
    a. ECU
    b. Power solenoid
    c. Filter system solenoid
    d. Indicator light harness
    e. Run solenoid harness
    f. Alternator (120 amp)
    g. Alternator idler assembly
    h. Exhaust pipe extensions
    i. Rain caps
    j. Exhaust pipe
    k. Back pressure transducer

7) If the list of components is greater than those listed above, the swap should be considered a re-designation and those requirements must be followed.

RYPOS Device Re-Designation Requirements

Rypos will honor the remaining warranty on any unit that has been swapped or re-designated provided the following conditions have been met:

1) Customer/owner contacts Rypos and provides:
    a. Serial number of the unit being moved
    b. The engine hours at the time of the installation the original unit
    c. The engine hours now, before the unit is removed from the existing TRU
    d. Engine serial number and model year of the recipient TRU.
2) Rypos will then confirm that the proposed unit falls within the criteria as outlined in the original ULETRU Executive order and inform the customer of the amount of warranty time left on that specific unit, or if the warranty has expired, Rypos will advise of that as well.
3) An authorized Rypos dealer (or trained service personnel within a fleet) must perform the swap and re-designation.
4) 5) The customer owner must perform the attached Pre-Installation Compatibility Assessment and the TRU unit must have passed all criteria, or the unit must be repaired before a swap or re-designation can be completed. A completed Pre-Installation Compatibility Assessment must be given to the customer and a copy must be sent to Rypos in order for the unit to have continued warranty coverage.
5) All RYPOS DPF/ULETRU components must be inspected for wear, breakage, and functionality. If any component of the system shows excessive wear, or if any component is found not to be working properly, new components must be purchased from Rypos.
6) The dealer/installer provides a letter of installation warranty for a period of 1 year from the date of the swap or re-designation (see CARB requirement item 6 above)
7) The dealer/installer must conduct a complete checkout of the system per the attached RYPOS System Checklist for the applicable unit and submits a copy back to Rypos as well as to the customer. This will insure that the system is working properly at the time the swap or re-designation is complete.
8) Once Rypos receives the completed checklist, they will send a new label (for a nominal fee) that must then be installed onto unit that the ULETRU unit was transferred to.
9) This procedure must be followed in order for the end user to receive continued warranty coverage for the DPF/ULETRU from Rypos.

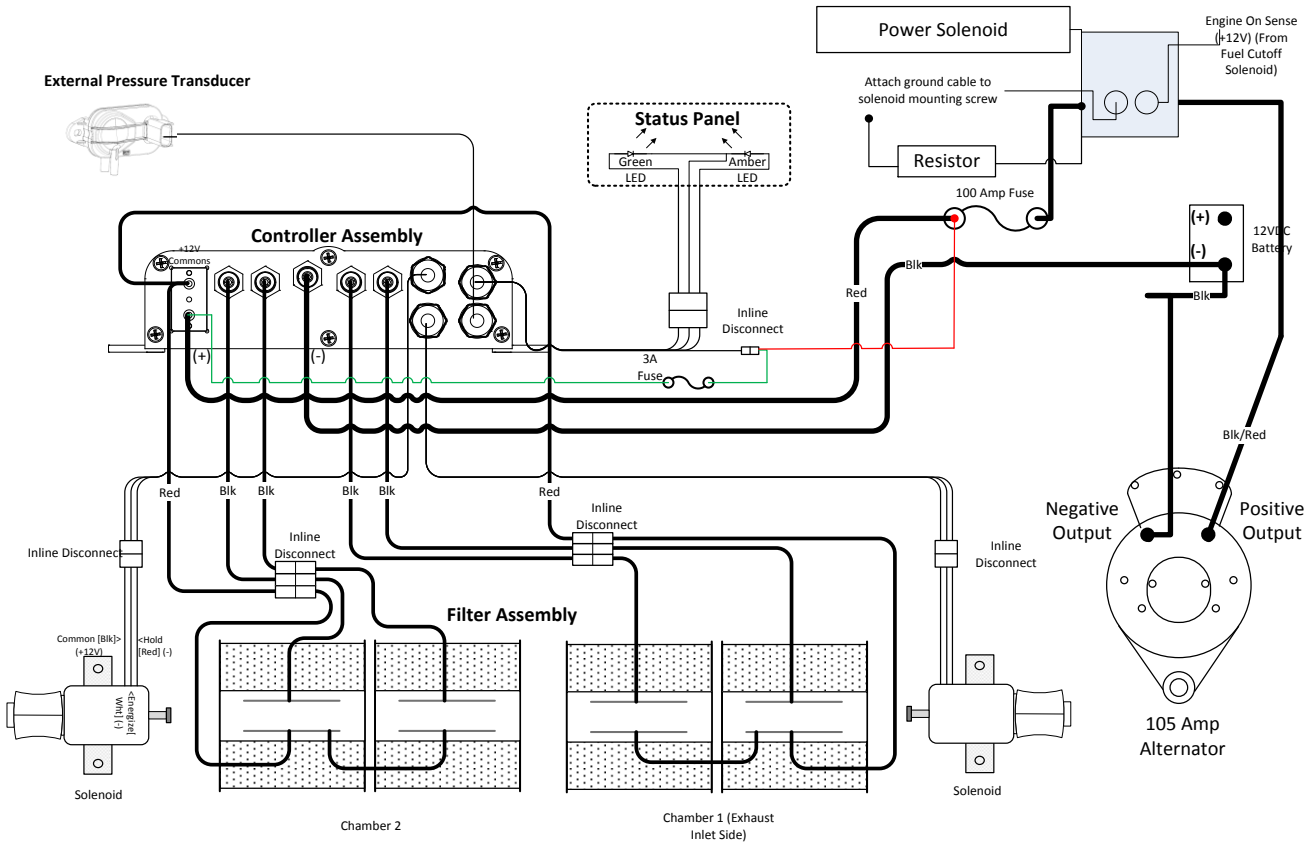
Non-Running Pre-Trip Option

For customers requiring Non-Running Pre-Trip capabilities please contact Rypos to order the Non-Running Pre-Trip Kit part number 950-0031-10-00.

ECU Power Change Addendum

As of 2017 and going forward, the ECU power wire will be altered. The purpose of this change is to make the installation simplier and reduce excess wiring. The old style does not need to be updated. Previous to this change the wire was longer, it connected to the ECU via single pole weather-pak connector and to the 100 amp fuse via 5/16" terminal. After this change the wire will be shorter and attach to the #10 power stud on the back of the ECU (either of the two studs farthest from the cord grips). The part number of the old wire is 968-0064-00-00, the new version is 968-0064-00-01.

In wiring diagram below, the red wire is the old version and the green wire is the new version:



New Version of ECU Power harness.