Owner's Manual

Operation, Installation, and Maintenance

RYPOS®

Diesel Particulate Filter
with Oxidation Catalyst
RH4XXEL-C

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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.

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.

DO NOT OPERATE YOUR FILTER SYSTEM BEFORE RYPOS COMMISSIONS IT!

An approved commissioning is necessary for you to properly operate your Rypos diesel emission control system. THE WARRANTY PERIOD BEGINS WHEN RYPOS AUTHORIZED PERSONNEL PERFORM AND APPROVE THE COMMISSIONING OF THE RYPOS SYSTEM.

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Revision History

Revision	Description	CO#	Date
G	Initial Release	13-047	3/12/2014
H	Update warranty	14-061	4/29/2014
J	Correct information	14-117	8/29/2014
K	-	-	1/5/2016
L	Add conduit info	15-033	1/8/2016

Pre-Installation Warning

Repairs due to accident, misuse, alteration, misapplication, storage damage, negligence, modification or deviation from installation instructions not authorized by Rypos, Inc. are not covered by warranty. The warranty does not cover repairs for damage caused directly by any of the following conditions, without limitation:

a) Running the engine for any period of time while the Rypos system is unpowered or otherwise inoperative.
b) Failure to heed the Rypos system's warning lamps and take timely action according to the Troubleshooting section of this Operation, Installation and Maintenance Manual.
c) Failure to maintain the Rypos system according to the maintenance requirements stated in this Operation, Installation and Maintenance Manual.
d) Failure to maintain the engine according to the engine manufacturer recommendations and requirements.
e) Installing the Rypos system on an engine or application different from the one specified in the Rypos quotation or submittal package.

The Rypos Warranty can be found at the end of this manual. **THE WARRANTY PERIOD BEGINS WHEN RYPOS AUTHORIZED PERSONNEL PERFORM AND APPROVE THE COMMISSIONING OF THE RYPOS SYSTEM.**

Definitions

Cartridge – the smallest building block with filtration capability, a single strip of filter medium in a metal enclosure.

Element – the individually-switched resistive heating component, two cartridges in series in DC systems.

Filter – the complete diesel particulate filter (DPF) system in an overall metal housing, also called the system.

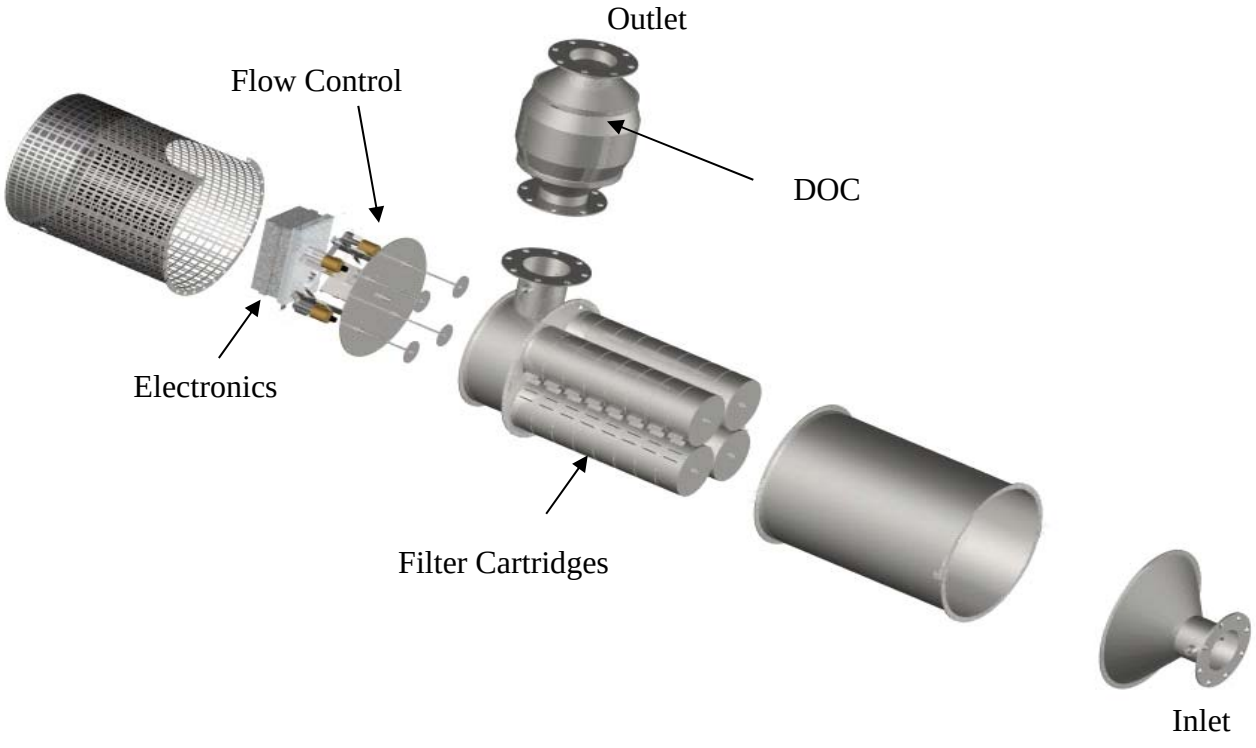
Transformer Power Supply – is used to convert the AC line voltage to lower DC voltages for the Rypos system, usually referred to as the transformer.

Principles of Operation

The Diesel Particulate Filter (DPF) operation of the RYPOS HDPF/C™ (Hybrid Diesel Particulate Filter) RH4XXEL is controlled by one independent microprocessor controller. The controller monitors the backpressure and sequentially energizes the filter cartridges, turning the cartridges into resistive heating elements. Power is taken from the generator set during emergency backup operation. A single transformer provides the required electrical current to heat the filter medium to the temperature required to oxidize the captured particulate matter (PM). During this regeneration cycle, the exhaust flow through the energized filter elements is restricted, to minimize the cooling effect of the engine exhaust. Filter regeneration is performed automatically while the generator is running, without any operator interaction, and completely independent of engine exhaust temperature.

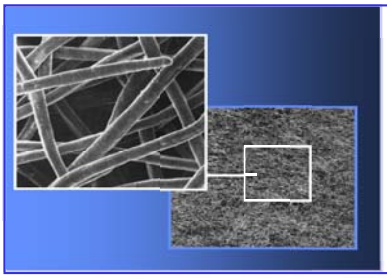
When supplied, the Diesel Oxidation Catalyst (DOC) oxidizes unburned hydrocarbons, carbon dioxide, formaldehyde, and other harmful constituents. The operation is achieved by adding a coating to a bare substrate which will light-off via the exhaust temperature.

RYPOS HDPF/C™: Schematics Depicting Operations



Particulate Filter Medium

The filter medium is made of sintered metal fibers, which are electrically conductive and is capable of capturing the fine particles in the exhaust system. The proprietary filter material is designed specifically to act as both a filter and as a resistive heating element. The filter medium consists of porous sintered layers with different fiber sizes. This medium is designed for maximum PM holding capacity and high filter efficiency.



- o Electro-conductive
- o High porosity
- o Low back pressure
- o Withstands high temperatures (1000^{o}C)
- o Fast heating (low thermal mass)
- o High filtering efficiency

Description of Regeneration Method

Operation Condition Requirements for Regeneration

No specific conditions are required for regeneration, other than a source of electric power to heat the filter elements as required. The maximum line power consumption for normal filter regeneration is 8 kVA; average power is 4 kVA. One 480 VAC or 208 VAC three-phase transformer power supply is used to provide 60 A at 140 VDC to an independent electronic control unit that governs system operation. The transformer must be connected to the generator through circuit protection means specified according to the local electrical code, so that the HDPF/C™ RH4XXEL is powered when the generator is running.

Possible Backpressure Range

The regeneration cycle is initiated by monitoring the average pressure drop across the filter system, which is directly related to amount of particulate matter accumulated by the cartridges. The control strategy is designed to keep this average pressure drop well within the engine specification. The ECU accomplishes this by varying the regeneration rate, i.e., speeding up or slowing down the regeneration cycles. The regeneration rate is a function of the number of filter cartridges cleaned per hour. It takes a fixed duration, approximately two and a half minutes, to heat and clean four cartridges. The interval between regeneration cycles, the ”gap,” can be varied from 10 seconds to 280 seconds to change the number of cartridges cleaned per hour.

The following table provides examples of how the backpressure, the gap and the number of regeneration cycles per hour are related:

Gap (seconds)	Number of Regeneration Cycles/Hour
250	9
150	12
50	19
10	25

The regeneration strategy is designed to keep the average backpressure below 15 inches of H_2O across the DPF.

Description of Backpressure Monitor Including Threshold and Control Logic

During normal operation, the filter cartridges accumulate particulate matter and the measured backpressure rises in accordance with the amount of PM accumulation. The regeneration strategy keeps the backpressure within the engine specification. Engines with higher particulate concentration in the exhaust stream will reach the backpressure set point sooner than engines with a lower concentration of particulate matter. The regeneration rate or the number of regeneration cycles per hour is a function the emissions output, and is controlled by monitoring backpressure. In any event, the regeneration cycle occurs automatically during normal engine operation, and no down time or operator interaction is required for regeneration.

The electronics are designed with diagnostic software that keeps track of and adjusts the system operation. A status panel is installed as part of RYPOS HDPF/C™ to alert the owner/operator. During each startup, the system performs a self-diagnostics test and all lights will flash initially but then turn off. The system continues its diagnostics and can take up to 60 seconds before the test is complete and a light illuminates permanently.

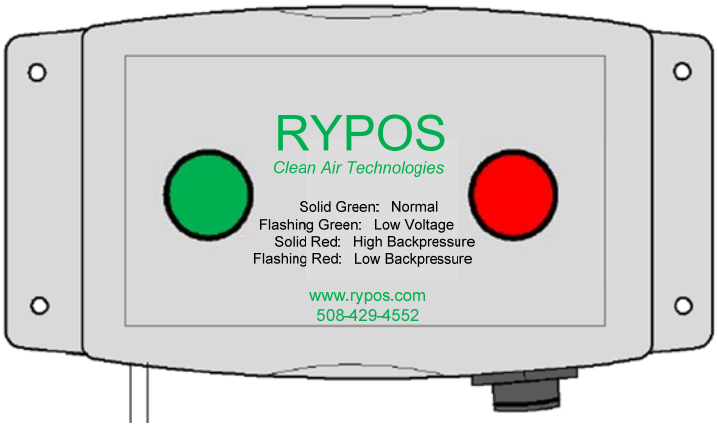


Figure 1: Single Controller Status Panel

- A solid green light indicates the power is ON and the controller is operating properly.
- A flashing green light indicates a problem with the power going to the electronics.
- A red light indicates the backpressure is high.
- A flashing red indicates the backpressure is low.
- No lights while the genset is operating indicate no power is supplied to the electronics.

Electronic Control Adjustments and Offline Filter Cleaning

A factory authorized Rypos technician can connect to the electronic control unit with a laptop computer, monitor the system operation, and, if needed, make adjustments to the settings and alarm points discussed in this manual.

An authorized Rypos technician can assess the system and perform offline cleaning, if necessary, by applying electrical power to each individual stack of filter cartridges when the engine is not running. Using a power supply, each filter stack can be fully cleaned and the filter returned to service in about 3 hours.

Component Swapping

Refer to the installation section when swapping identical components between two RYPOS HDPF/C™ systems.

Operating Environment

The air temperature around all DPF components must be maintained between -40^{0}F and +150^{0}F. Additional heat shielding or insulation may be required between the DPF and other exhaust components to ensure that temperatures stay below 150^{0}F. Conditions not disclosed by customer drawings, or subsequent changes to the genset system, may cause ambient temperatures to go outside the DPF operating limits and damage the DPF.

RYPOS HDPF/C™ RH4XXEL housings are manufactured from 304 Stainless Steel. The system is suitable for mounting outdoors, provided that the ambient air temperature around all components is kept between -40^{0}F and +150^{0}F.

Genset Output Voltage Limits	Regulated between nominal and nominal minus 4% (i.e. nominal = 480 VAC; limits 480-461 VAC)
System Ambient Temperature Limits	-40^0 F – +150^0 F
Weather Conditions	all enclosures designed to NEMA 3R
Ventilation Requirement	The Rypos DPF requires sufficient airflow to maintain ambient temperatures within system limits.
Filter Heat Load Into Environment	Heat load depends on the application. Please contact Rypos for an engineering evaluation.

Lubrication Oil Quality and Consumption Rate

The engine should not consume lubricating oil at a rate greater than that specified by the engine manufacturer. Only low ash lubricating oil recommended by the engine manufacturer should be used.

Fuel Requirements

Use diesel fuel with less than or equal to 15 ppm sulfur or a biodiesel blend, provided that the biodiesel portion of the blend complies with ASTM D6751, the diesel portion of the blend has no more than 15 ppm sulfur, and the blend contains no more than 20 percent biodiesel by volume.

Installation

Step 1: The DPF must be bolted to a stable platform, with the installation supports on the round portion of the DPF housing, shown in Figure 2. The DPF is required to be mounted horizontally.

Figure 2: Installation Mount

Step 2: Orientation and configuration are critical components to install the DPF correctly.

a. For end out designs, two of the three solenoid valves must be positioned closest to the ground with the outlet flange located higher than the valves, shown in Figure 3.
b. For side out designs, the outlet flange must be oriented either in the 3 o'clock or 9 o'clock positions as shown in Figure 4. To determine which orientation, the electrical wiring must be located on the ground side of the filter (protruded out the bottom). If the wiring is on the top, the DPF is oriented incorrectly.
c. For top out designs, the outlet flange must be oriented vertically upward as shown in Figure 5.

Note: The 3 o'clock and 9 o'clock side out designs are not interchangeable. The top out design is also not interchangeable with the side out options. At time of sale, the orientation must be determined prior to build release.

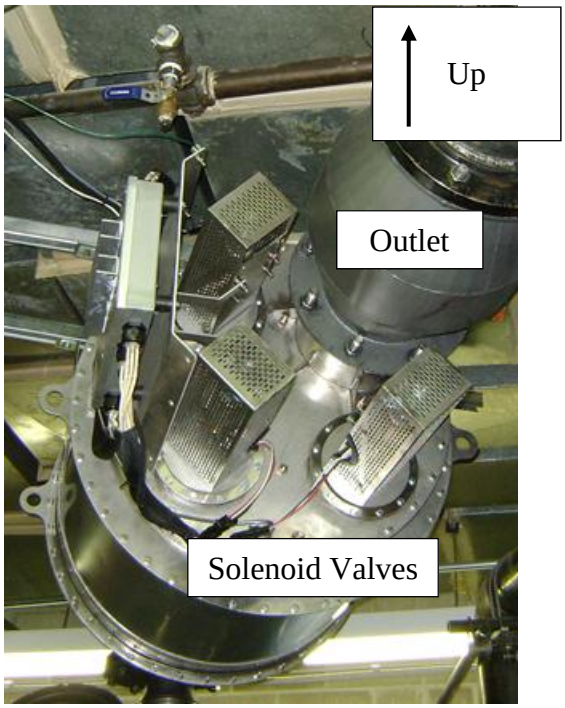


Figure 3: End Out Orientation

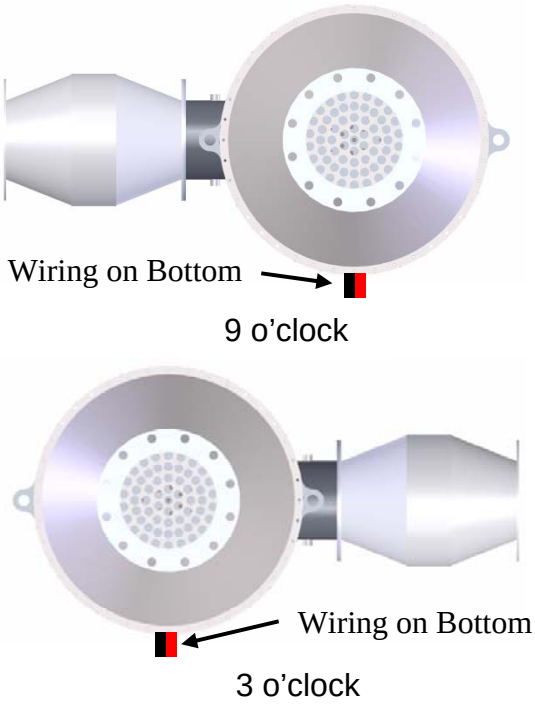


Figure 4: 3 o'clock & 9 o'clock Side Out Orientations (looking at inlet upstream of unit)

Step 3: The DPF is designed to flow only in one direction. The inlet to the RH4XXEL is opposite of the solenoid valves. The outlet is on the same side, either next to the solenoids for an end out configuration or normal to on a side out configuration but closest to the solenoids. See Figure 5 for details.

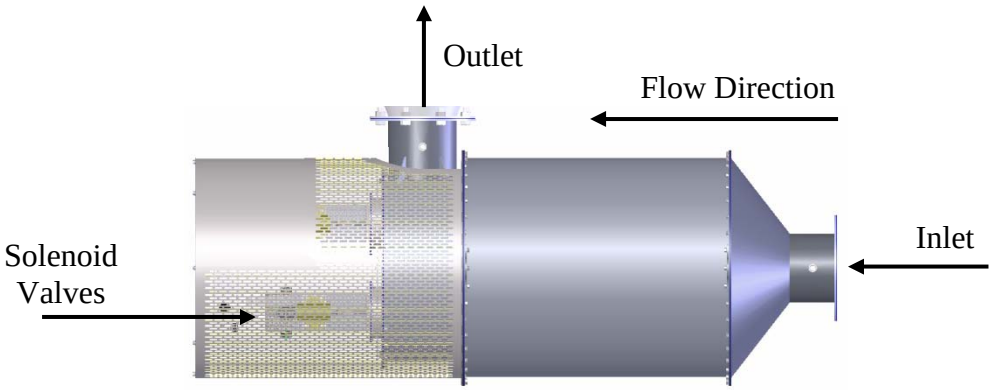


Figure 5: Flow Direction and Inlet/Outlet Identification

Step 4: When applicable, mount the Diesel Oxidation Catalyst (DOC), Figure 6, to the outlet end of the DPF. It is important to install a gasket between the DOC and the DPF flanges.

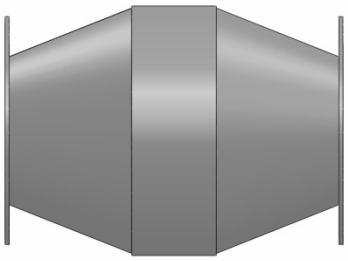


Figure 6: Diesel Oxidation Catalyst

Step 5: The transformer must be mounted on a wall/structure in the vertical direction at least two feet off of the ground/next lowest surface. The wall must be able to handle up to a 150 pound transformer. A wall is defined to be a solid, vertical wall or plate that must cover the entire rear transformer surface.

Step 6: Transformer Mounting and Connections

1. The Rypos supplied transformers are manufactured by more than one vendor and vary slightly in their labeling and connection layouts. Refer to the picture or table column below that matches the transformer being installed
2. The transformer must be mounted on a wall/structure in the vertical direction at least two feet off of the ground. The wall must be able to handle up to a 150 pound ± 10% transformer.
3. Mount the transformer via 3/8" diameter bolts using the existing four slots. See for details.

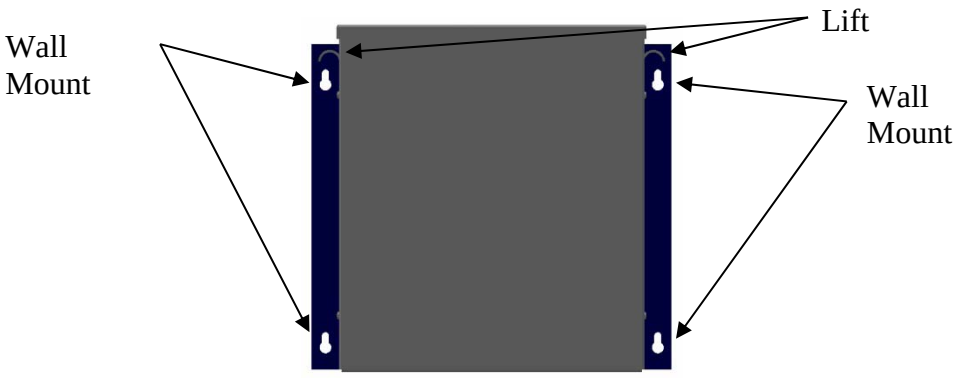


Figure 7: Transformer Mount Positions

1. Once the transformer is mounted, remove the front cover for access to the electrical connections.
2. Connect the AC supply from the breaker/disconnect to the H1, H2, and H3 terminals of the transformer. Follow standard industry practices and code requirements. Transformer MUST be grounded to the building electrical

bonding grid using the ground lug provided. Wiring knockouts are on the bottom of the transformer.

NOTE: Any supply phase can be connected to any one of the H1, H2 and H3 terminals of the transformer input. The H0 or N connection is neutral, and is not a required connection.

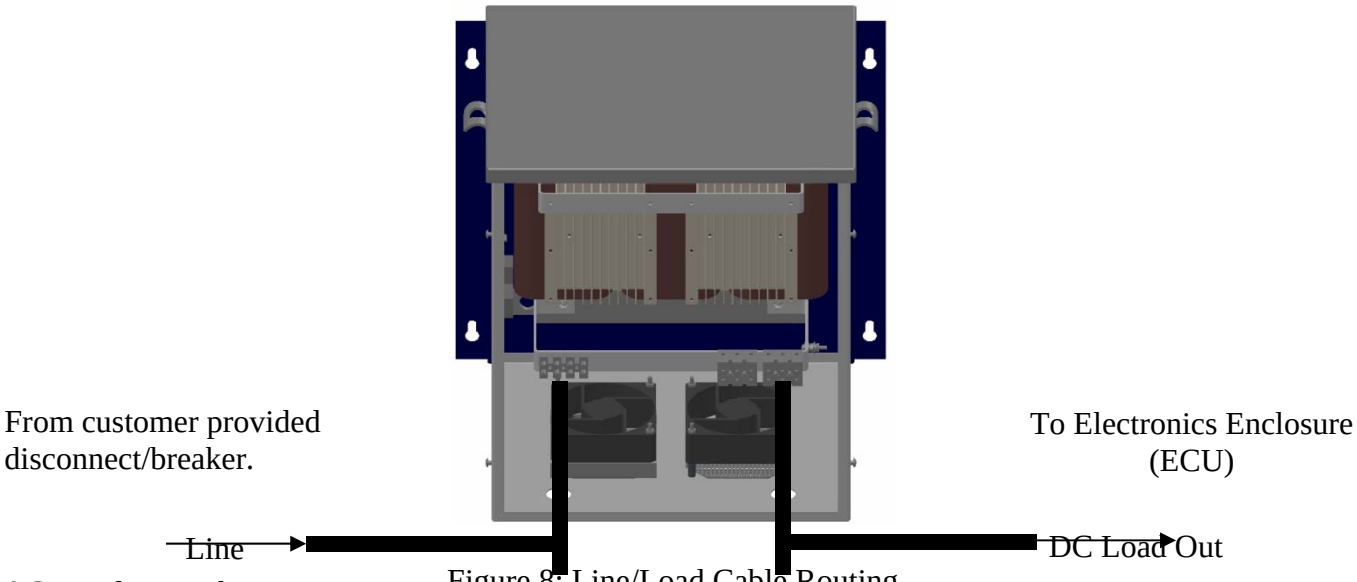


Figure 8: Line/Load Cable Routing

The AC supply must be on when the engine runs, and off when the engine is shut down.

3. Figure 9 & Figure 10 reference the hookups to the AC mains within the two style transformers.

Figure 9: AC connection for transformer built by Pacific Transformer

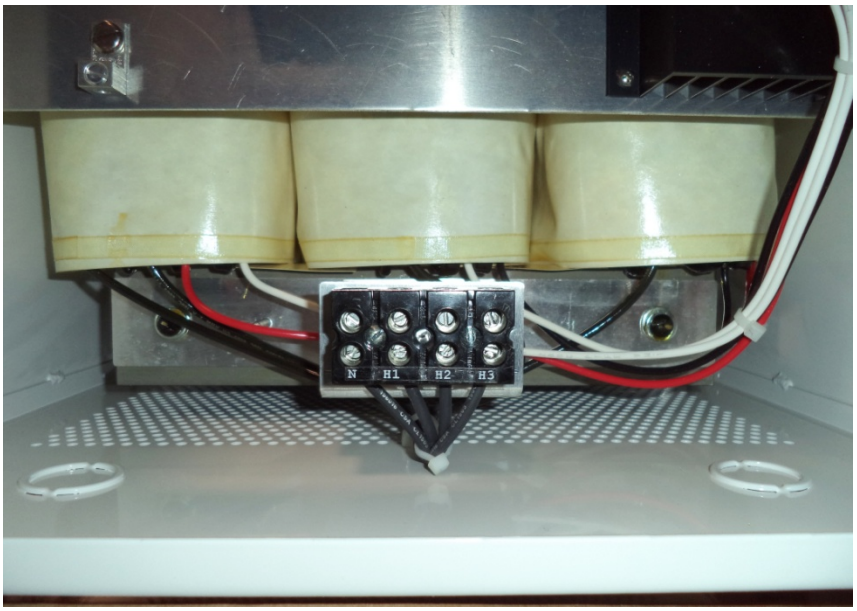


Figure 10: AC connection for the transformer built by TTI

Table 1: AC Source Line Connection to Transformer

Pacific Transformer Connection Label	TTI Connection Label	Function
N	H0	Neutral (optional connection)
H1	H1	Phase 1
H2	H2	Phase 2
H3	H3	Phase 3

4. The AC line in source must be grounded to the provided ground lug.

5. DC Output Cabling-
   a. Refer to Table **2** & Table 3 to select the conduit & wire to make the connection between the transformer and ECU. This connection should be kept as short as possible and in any case less than 30 feet. Table **4** shows the point to point connection between the transformer and ECU. Use Figure 11 & Figure 12 to identify which transformer style is being installed.

Table 2: Recommended Conduit Details

Conduit	Type	Flexible Nonmetallic
	Conduit Type	Flexible
	Flexible Nonmetallic Type	Liquid Tight
	Liquid-Tight Nonmetallic Type	Super Tough (Type B) Conduit
	Operating Temperature Range	0°to 154°F
	Conduit Material	PVC
	Trade Size	1"

Table 3: Recommended Wire Details

Conductors						
Transformer Connection	ECU Connection	Wire Color	Recommended Wire Size* (AWG)	Wire Type	Insulation	Expected Maximum Ampacity
140 VDC high (or 180VDC)	distribution terminal 1	red	6, stranded	THHN	PVC 600V 194^{0}F	60 A
140 VDC low (or 180VDC)	distribution terminal 2	black	6, stranded	THHN	PVC 600V 194^{0}F	60 A
72 VDC	blue terminal	blue	14, stranded	THHN	PVC 600V 194^{0}F	10 A
12 VDC	red terminal	red	16, stranded	THHN	PVC 600V 194^{0}F	500 mA
12 V ground	black terminal	black	16, stranded	THHN	PVC 600V 194^{0}F	500 mA
safety ground	grn/yellow terminal	green	12, stranded	THHN	PVC 600V 194^{0}F	20 A

**Wire size listed in table is a recommendation only. Wire must be sized by a licensed electrician in accordance with the NEC and local electrical codes.*

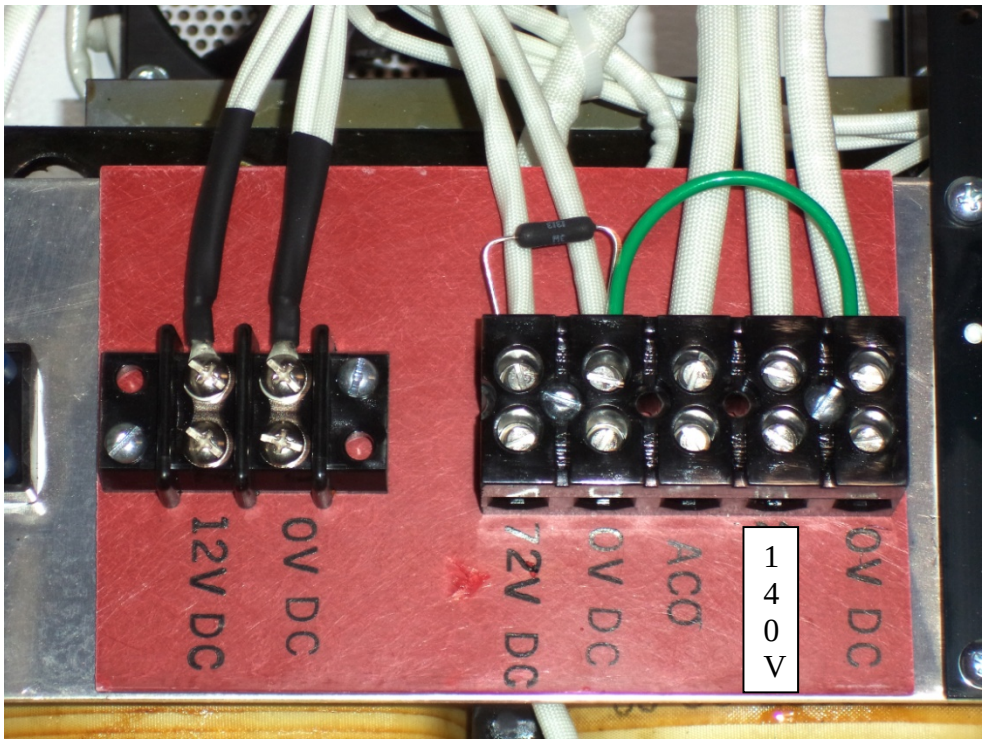


Figure 11: DC output connections for the transformer built by Pacific Transformer

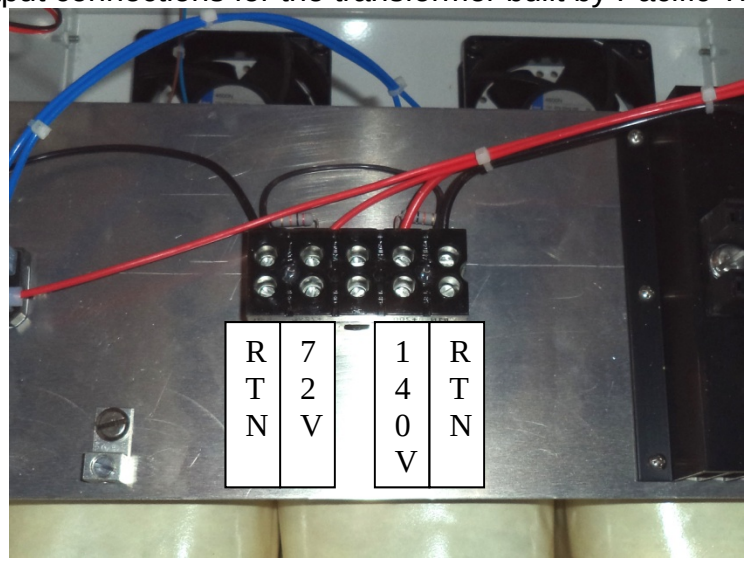


Figure 12: 72V and 140V DC output connections for the transformer built by TTI

Table 4: DC Output Connections

Transformer to ECU Connections				
Pacific Transformer Connection Label	**TTI Transformer Connection Label**	**Recommended Wire* (see table 2&3)**	**Connects to ECU Terminal**	**Note**
140VDC	+140VDC	Red, 6 AWG	140V (+)	
0V DC (adjacent to 200VDC terminal)	RTN (adjacent to +200 VDC terminal)	Black, 6 AWG	140V (-)	
72 VDC	+72VDC	Blue, 14 AWG	72V (+)	
0V DC (adjacent to 72V DC terminal)	RTN (adjacent to 72V DC terminal)	-	-No Connection-	These transformer connections are not used.
12V DC	(Screw terminal @existing Red wire)	Red, 16 AWG	12v (+)	Crimp terminal should be used for this connection. TTI terminal block mounted below small circuit board.
0V DC (adjacent to 12V DC terminal)	(Screw terminal @existing Black wire)	Black, 16 AWG	12V (-)	Crimp terminal should be used for this connection. TTI terminal block mounted below small circuit board.
AC0	-	-	-	This transformer connection is not used.
GND	Unlabeled ground lug	Green, 12 AWG	Chassis Ground	

1. **RH408EL or smaller –** Required wire assemblies are supplied attached to the ECU to accommodate a 30 FT(max) distance between the Transformer and the ECU. Route wires through conduit and attach to transformer as detailed in figure 16 and 17
2. **(RH410EL ONLY).** Wires are to be supplied by the installer at the time of conduit installation. To make the electrical connections from the transformer to the ECU , remove the screws within rectangular 4¼" x 12" cover plate on the bottom of the ECU to access the terminal block connections. See Figure 13.

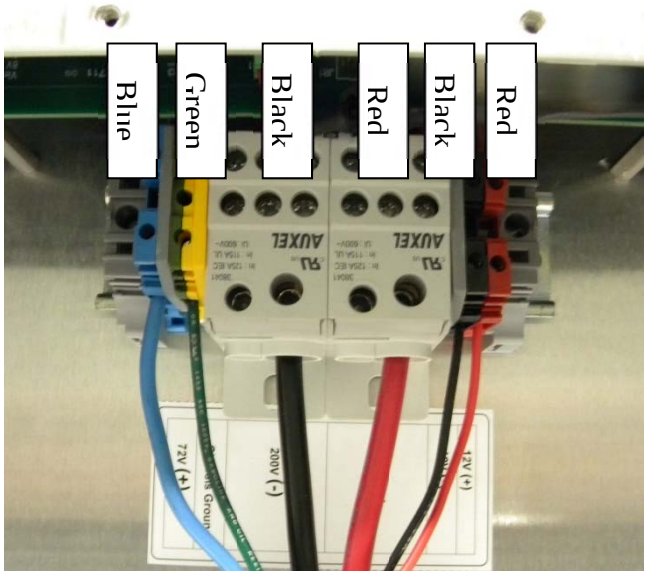


Figure 13: ECU Power Connection

3. Run conduit and wiring between transformer and ECU per tables in step 8, following standard industry practices and code requirements. Confirm proper terminal block connections against Table **4**.
4. Once transformer and ECU wiring has been completed and double checked, re install transformer & ECU covers.
5. The status display panel can be mounted remotely from the HDPF main housing, using either a 15' or 25' wire harness length. Refer to Figure 1 for details.
6. Connect the display panel using the attached wire harness on the display and connect it to the harness exiting the ECU panel. The harness connection is a four pin, rectangular connector and is designed to be water resistant. It can be in the open environment but not immersed in water.

Optional: A separate indicator can also be installed remotely by connecting to the auxiliary connector on the display panel. The details of the connection are in Figure 14 and Figure 15.

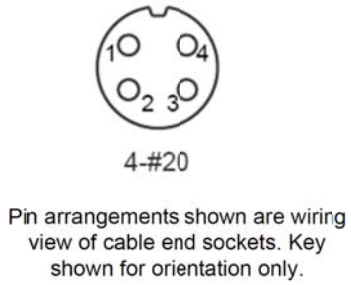


Figure 14: Customer Connector #6282-4SG-3DC Cable End

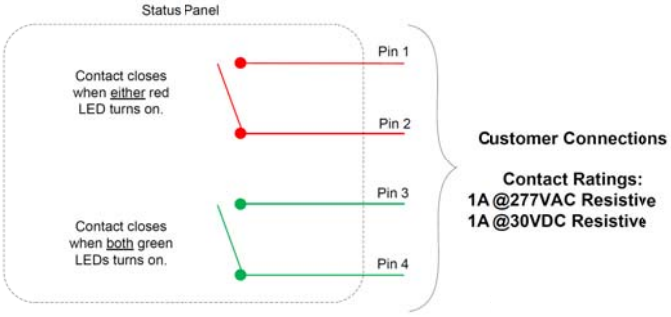


Figure 15: Customer Connection Pin Details

Maintenance Requirements

Responsibility to Maintain Engine

Regular routine engine maintenance as specified by the engine manufacturer's guidelines is required. End–users of Rypos filter systems are responsible for maintaining their engines so that they continue to meet the conditions of the pre-installation compatibility assessment.

The following simple maintenance of the RYPOS HDPF/C™ RH4XXEL should be performed annually.

System Regeneration

Observe a complete system regeneration and verify the operation of the flow control solenoids.

Note: Prior to initiating a regeneration cycle, disconnect the electrical connection to each differential pressure transducer (DPT). This will allow uniform regeneration cycles at the minimum gap period.

a. *To remove the electrical connection, remove the plate mounted to the perforated cover. This allows access to the DPT connection. Figure16 shows what should be seen after the plate is removed.*

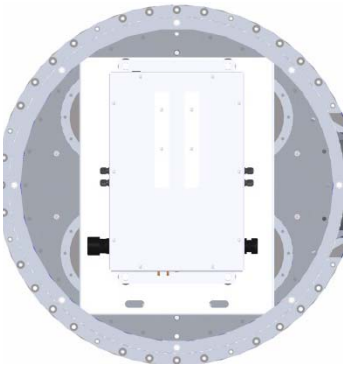


Figure16: Rear View with Perf Cover Plate Removed

b. *Reach behind the ECU mount plate on the top and locate the red lock mechanism. Push downward to disengage the lock. Figure17 and Figure18 show the locked and unlocked positions.*

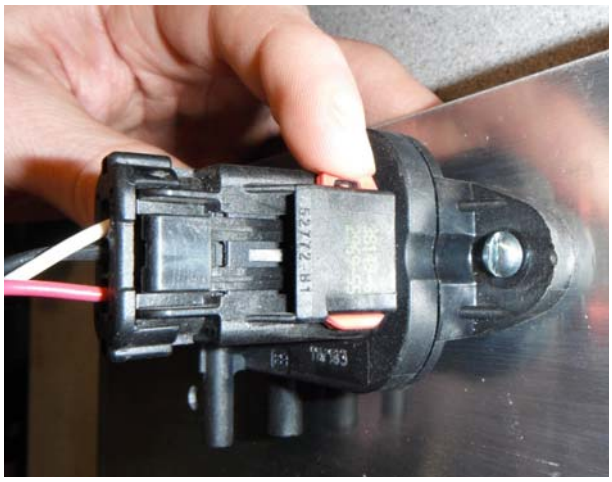


Figure17: DPT Locked Position

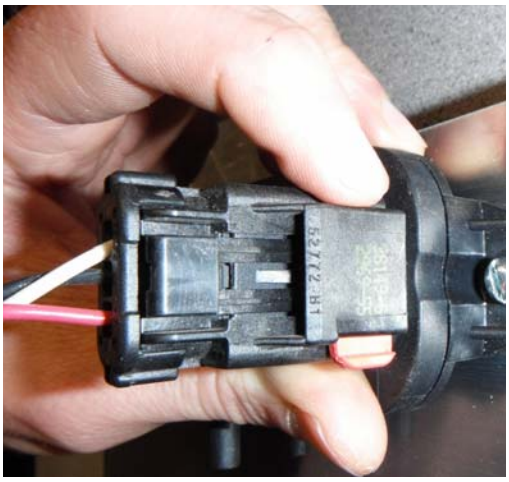


Figure18: DPT Unlocked Position

c. *Depress the button and push away from the ECU. This will remove the DPT connection and allow min gap regeneration. Drape the DPT connector over the ECU mount plate to reconnect later. See Figure19 and Figure20 for details.*

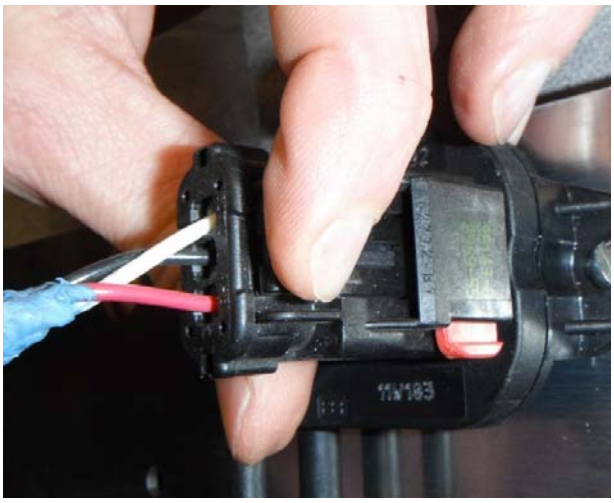


Figure19: DPT Button Release

Figure20: DPT Disconnected

The normal operating profile should be as follows:

a. Power up delay – one minute.
b. Solenoid activates – will remain closed for two and a half minutes.
c. Solenoid deactivates
    a. An idle period from 10 to 280 seconds until the next solenoid is activated.
d. Cycle repeats through all solenoids as long as power is on.

Note: Once the system is finished, reconnect each of the DPT electrical connections.

a. *Reverse the steps used to disconnect the DPT. Rather than pressing down on the red lock mechanism, press the lock upwards to engage it.*

Pressure Transducer Inspection

The pressure transducer should be free of water in the lines. The pressure piping design is self-draining. Visual inspection of the silicone tubing should show no moisture. If moisture is present, disconnect the lines, drain water and then re-connect the lines.

Ash Inspection

Every 1000 hours, with the generator shut down and the power to the filter system OFF, inspect for ash and remove if excessive accumulation is present.

a. Remove the facility inlet pipe from the inlet flange on the RYPOS HDPF/C™ RH4XXEL.
b. Inspect for signs of accumulated ash inside the DPF. A lighted borescope is recommended.
c. If excess ash is found and while the inlet pipe is removed, disconnect the either the inlet cone or the inlet end cap, an example of each shown in Figure21 and Figure22.

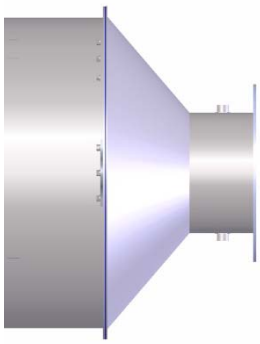


Figure21: Inlet Cone Assembly

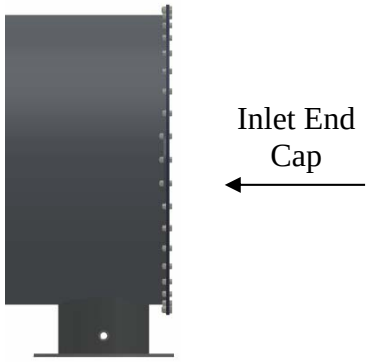


Figure22: Inlet End Cap

d. Remove and dispose of ash according to local, state and federal guidelines.
e. Reinstall the inlet assembly. A new gasket is required and a new set of hardware is recommended to reconnect the inlet to the DPF housing body. Call Rypos at (508) 429-4552 to order replacement parts.
f. Reconnect the inlet pipe to the inlet flange on the RYPOS HDPF/C™ RH4XXEL.

Ash Removal Criterion

Ash accumulation is observed routinely during the required 1000 hour ash inspection. Ash removal is required if the depth of ash in the filter housing causes the ash accumulation to visibly touch any filter cartridge. Excessive ash accumulation may also be detected between 1000 hour inspections if the filter system red indicator lamp illuminates solid. If the high backpressure causing the red lamp cannot be explained by

other means, ash inspection should be performed. If ash removal is required, the filter system should also be assessed for offline cleaning.

Troubleshooting

** Note: During each startup, the system performs a self-diagnostics test and all lights will flash initially but then turn off. The system continues its diagnostics and can take up to 60 seconds before the test is complete and a light illuminates permanently.*

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 to the electronics.	Verify +12v connection to the transformer.	Call for service.
Green OFF	System is inoperable.	Check circuit breaker to the transformer and the connection from the transformer to the electronics.	Call for service.
Red ON Solid	System is in overpressure condition.	Turn off genset and inspect DPF for damage. Remove inlet access panel and inspect for ash accumulation. Perform ash removal procedure. Restart DPF and run for 15 minutes. If light remains ON call for service.	Call for service
Red Flashing	Low pressure condition.	Check entire exhaust system for leaks and repair/seal as necessary. Inspect pressure tubing from DPF to the controllers.	Call for service.
Red OFF	System Operating Normally.	No action required.	No action required.

Reading and Resetting the Backpressure Monitor

If the status panel indicator lamp is illuminated solid red, the system is experiencing high backpressure. Occasional, momentary high backpressure during regeneration is a normal result of flow control. If the red indicator lamp latches on continuously under all operating conditions, it can be reset by a factory authorized Rypos technician using the serial communication port of the Electronic Control Unit.

Contact for Replacement Components

For any replacement components please contact **Rypos Inc.** at 508-429-4552.

Limited Warranty On New Rypos HDPF/C™ Filters Used In Backup Diesel Generators and Pumps

Warranty Statement

WARRANTY RIGHTS AND OBLIGATIONS

RYPOS, Inc. warrants 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 specified in the Rypos quotation or submittal package, for the periods of time listed below, provided there has been no abuse, neglect, or improper maintenance of your diesel emission control system or equipment, as specified in the owner's manual. Please review your owner's manual for information about proper use and maintenance. Your diesel emission control system includes a particulate filter, hoses, connectors, a back pressure monitor, 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 50 horsepower or larger engine used in a stationary backup generator or pump application, the WARRANTY PERIOD will be 1 year 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 specified in the Rypos quotation or submittal package, within the warranty period, as defined above, Rypos, Inc. will repair or replace the diesel emission control system, including parts and labor. This also includes relevant diagnostic expenses in the case in which a warranty claim is valid.

INSTALLATION WARRANTY

If Rypos installs your diesel emission control system, Rypos warrants that the installation is free from defects in workmanship or materials that cause the diesel emission control system to fail to conform to the emission control performance level specified in the Rypos quotation or submittal package. The warranty period and the extent of the warranty coverage for the installation is the same as the warranty on the diesel emission control system itself, and the same exclusions apply.

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 engine, and diesel emission control system to a Rypos dealer as soon as a problem is detected.

If you have questions regarding your warranty responsibilities, please contact Rypos, Inc. at 1-508-429-4552

REPAIRS

To obtain warranty repairs, you must request the needed repairs within the WARRANTY PERIOD from Rypos or an authorized Rypos service outlet. Only new genuine parts or remanufactured parts or components supplied or approved by Rypos will be used. Rypos may, at its discretion, replace rather than repair components. A reasonable time must be allowed to perform the warranty repair. Repairs will be performed during normal business hours.

LIKE REPLACEMENT SYSTEM

A system supplied by Rypos as a replacement for a system still under warranty will assume the identity of the system being replaced and be entitled to the remaining warranty coverage of the system being replaced.

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. Without limiting the generality of the foregoing, this warranty does not cover repairs for damage caused by any of the following conditions, without limitation:
   a) Running the engine for any period of time while the Rypos system is unpowered or otherwise inoperative.
   b) Failure to heed the Rypos system's warning lamps and take timely action according to the Troubleshooting section of this Operation, Installation and Maintenance Manual.
   c) Failure to maintain the Rypos system according to the maintenance requirements stated in this Operation, Installation and Maintenance Manual.
   d) Failure to maintain the engine according to the engine manufacturer recommendations and requirements.
   e) Installing the Rypos system on an engine or application different from the one specified in the Rypos quotation or submittal package.

2. Except as otherwise provided in the 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.

BEGINNING OF THE WARRANTY PERIOD

THE PERIOD OF WARRANTY COVERAGE OF A RYPOS DIESEL EMISSION CONTROL SYSTEM BEGINS WHEN RYPOS AUTHORIZED PERSONNEL PERFORM AND APPROVE THE COMMISSIONING OF THE RYPOS SYSTEM. For example, any repairs due to operation of the Rypos system, or of the engine on which it is installed, prior to its approved commissioning will not be covered by this warranty.

LIMITATION OF DAMAGES

The performance of repair or replacement of the Rypos HDPF/C™ system 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 HDPF/C™. 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.

THIS LIMITED WARRANTY IS THE ONLY WARRANTY APPLICABLE TO RYPOS HDPF/C™ AS USED IN BACKUP DIESEL GENERATORS AND PUMPS. 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 INCIDENTAL OR CONSEQUENTIAL DAMAGES AS DESCRIBED ABOVE.

4/15/2014