

LM3 Lube Oil Filter Purification Installation, Operation, and Maintenance Guide

Table of Contents

- General Information
- Safety Information
- General Description
- Planning the Installation
- Installation
- Startup
- Testing
- Operation
- Maintenance
- Troubleshooting
- Spare Parts
- Warranty and Service
- Appendix: Controller Instructions

General Information

Notice

Earthsafe makes no warranty of any kind with regard to this publication, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Earthsafe shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this publication. Earthsafe reserves the right to change system options or features, or the information contained in this publication. This publication contains proprietary information which is protected by copyright. All rights reserved. No part of this publication may be photocopied, reproduced, or translated to another language without the prior written consent of Earthsafe.

Damage Claims

Thoroughly examine all components and units as soon as they are received. If damaged, write a complete and detailed description of the damage on the face of the freight bill. The carriers agent must verify the inspection and sign the description. Immediately notify the delivering carrier of damage or loss. This notification may be given either in person or by telephone. Written confirmation must be mailed within 48 hours. Risk of loss, or damage to merchandise belongs with the buyer. It is the buyers responsibility to file a claim with the carrier involved. Immediately advise Earthsafe of the problem so that we may assist you.

Safety Information

Intended Use. Controls and instrumentation are intended for use with lube oil systems for power generators. The control module and any connected sensors or

devices are intended for operation only within ordinary electrical areas. Use of the module and connected sensors or devices within hazardous electrical areas is prohibited.

Intellectual Property

The equipment and software described herein are the property of Earthsafe Systems, Inc. and are protected by various trademarks and patents.

Safety Information

Safety Notice:

Improper installation, operation, or maintenance may cause serious injury or death and/or result in damage to the unit and/or other equipment. Earthsafe's warranty does not cover failure due to improper installation, operation, or maintenance.

This information must be fully read before beginning installation, operation, or maintenance of equipment and must be kept with equipment. Equipment must be installed, operated, and maintained only by suitably trained and qualified persons.

General Safety Instructions

The following safety instructions must be followed and adhered to at all times.

Before opening any tank fitting, pipe system, pump, or valve be sure that:

- Any pressure in the chamber has been completely vented through the appropriate openings or connections.
- The electrical system means has been "locked out" or otherwise been made non-operational so that it cannot be started while work is being done on the equipment.
- You have obtained appropriate material safety data sheet (MSDS) and understand and follow all precautions appropriate for the safe handling of the material.

Install pressure gauges/sensors at piping and pump connections to the equipment to monitor pressures.

Use extreme caution when lifting the tank and associated equipment. Suitable lifting devices should be used when appropriate.

Avoid contact with hot areas of the tank, pump or equipment. Certain operating conditions, temperature control devices, improper installation, improper operation, and improper maintenance can all cause high temperatures on the pump or equipment.

Protect tanks, pumps and piping systems with pressure relief devices.

The equipment must be installed in a manner that allows safe access for routine maintenance and for inspection during operation to check for leakage and monitor operation.

General Description

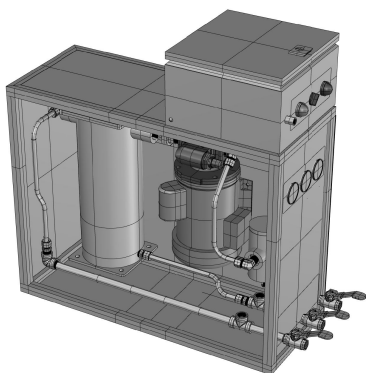
The LM3 Lube Oil Filter Purifier is used to circulate and filter lube oil for generators. The system removes water and particulates from the filter to maintain lube quality during long term storage.

Smart Control: The LM3 is factory set for a daily start time and cycle time to filter the full tank contents every week. The controller allows the user to change set start times and cycle times to accommodate user needs for the application.

Monitoring: The controller monitors the system for (a) high differential pressure at filter, (b) water accumulation in filter, (c) pump flow, and (d) leak.

Easy Maintenance: The unit requires periodic maintenance upon alarm notification for (a) dirty filter change, and (b) filter water drain.

Physical Description



1. Enclosure: Lightweight, Compact Enclosure
2. Containment: Base Assembly Liquid Tight to Catch Leaks
3. Turbine Filter: Multi-Stage Turbine Filter Removes Water and Particulates
4. Control Panel: Termination Box Under Cover with End Wall Interface
5. Visual Gauges: Gauges on End Panel for Inlet, Outlet, and Filter Differential Pressure
6. Hose or Pipe Connections: End Panel Supply and Return Connections to Fuel Tank.
7. Lube Transfer Pump: Lube Transfer Pump Draws Fuel Through Filter.

Planning the Installation

Location

1. Location: Locate the Unit as close as practical to the tank suction connection..
2. Accessibility: The Unit should be located where it is accessible for inspection, maintenance, and repair.

Piping

1. Size the supply piping to minimize frictional head loss based on the design flow.
2. Be sure the inside of the pipe is clean before connecting to the Unit.
3. Be sure allowance is made for expansion and contraction of the piping so the tank connections are not stressed by the piping.

Installation

1. Remove packaging and inspect for shipping damage. Note any shipping damage on the shipping ticket and notify Earthsafe within 24 hours of receipt.
2. Set unit at installation location. Use proper handling procedures to avoid damage to the unit.
3. Install anchor bolts at 4 corners. Use 3/8 IN minimum diameter bolts or as required.
4. Connect power to unit control panel. Reference specific installation instructions and wiring diagrams for the control panel.
5. Connect hoses or piping to inlet and outlet. Confirm that field piping is independently supported to avoid stress on the Unit piping connections.

Startup

1. Visually inspect unit installation and associated equipment and piping for proper installation and absence of physical damage.
2. Confirm the electrical connections are correct and that the supplied voltage matches the unit electrical requirements. Confirm that the electrical circuit for the unit is rated for the required Amp capacity.
3. Confirm that all hose and pipe connections are liquid tight.
4. Short sections of hose or pipe may self-prime. Open any inlet and outlet valves. Start the pump in Manual mode. Confirm suction on the inlet gauge. After 10 seconds stop the pump and inspect the unit and associated piping. Operate the pump in Manual mode for up to an additional 30 seconds. If self-prime not confirmed then prime the unit as described in next step.
5. Remove the cover of the unit. Open the top of the filter. Supply diesel fuel into the filter to top of filter chamber. Re-install filter cap. Operate pump in Manual mode, and observe inlet gauge to confirm prime.
6. If the pump does not prime, the cause may be one or more of the following:
 - Suction line air leaks
 - Suction line obstructions or closed valve
 - Suction tube or foot valve in tank is not installed.
 - Suction lift is too great or the suction piping is too small.
 - Anti-siphon or check valve setting in suction line is excessive.
7. After prime, bleed any additional air accumulated in the top of the filter. Confirm that the pump operates consistently without pulsation.
8. Inspect the unit and associated hoses or piping for leaks.
9. Startup accessory equipment in accordance with its written instructions.

Testing

1. Open the Control Panel, and observe the automatic cycle set times. Place the Unit in Auto mode and confirm start and cycle times.
2. Test the Alarm Functions as noted below:
 - Differential Pressure: Operate the pump in manual mode. Gradually close the miniature valve on the back of the differential pressure switch suction side until alarm is generated.
 - Water in Filter: Disconnect the water sensor cable to generate a filter water alarm.
 - Leak: Manually move the leak sensor float to generate a leak alarm.
 - Pump Flow: Disconnect the cable on the pump flow sensor. Operate pump in Manual mode for 60 seconds to generate alarm

Startup Checklist

Item	Description	Confirm
1	Visual inspection of unit and associated equipment for no damage	
2	Unit and associated equipment are clean and clear of debris	
3	Unit is securely anchored at 4 points	
4	Associated piping is supported and does not cause stress on tank or tank fittings.	
5	Hose and pipe fittings are liquid tight.	
6	Electrical connections are properly installed. All electrical devices are in a safe de-energized condition until startup of this equipment is performed in accordance with written instructions.	
7	All required safety items are complete and available in the tank area including personal protective equipment (PPE), MSDS sheets, spill cleanup material. All required safety training has been performed.	
8	Operate unit in Manual Mode. Observe gauges and record: Inlet Suction, Outlet Pressure, Filter Differential Pressure	
9	Leak Test: Operate Pump in Manual Mode. Manually move leak sensor float to activate alarm. Confirm alarm activation and pump stop.	
10	Dirty Filter Test: Operate Pump in Manual Mode. Gradually close the miniature valve on the back of the differential pressure switch suction side until alarm is generated. Confirm alarm activation and pump stop. Record differential pressure value at alarm activation.	
11	Water in Filter Test: Disconnect the water sensor cable to generate a filter water alarm. Confirm alarm activation and pump stop	
12	Pump Flow: Disconnect the cable on the pump flow sensor. Operate pump in Manual mode for 60 seconds to generate alarm. Confirm alarm activation and pump stop	
13	Auto Mode Operation: Open the Control Panel, and observe the automatic cycle set times. Place the Unit in Auto mode and confirm start and cycle times.	

Operation and Maintenance

1. Visually inspect unit periodically for signs of leakage or damage.

2. Visually inspect unit exterior for dirt or engine fluids. Wipe clean as necessary.
3. Observe operation of the unit in Manual or Auto mode. Observe the Inlet Suction, Outlet Pressure and Filter Differential Pressure.
4. Filter Water Removal. If a water alarm is activated. Connect a tube to the water drain connection and place tube discharge in a waste container. Open the water drain valve. Observe flow until fuel is evident. Close the water drain valve, and disconnect tube. Operate pump in Manual mode to confirm alarm clears.
5. Dirty Filter Change: If a Differential Pressure alarm is activated. Connect a tube to the water drain connection and place tube discharge in a waste container. Open the water drain valve. Observe fuel flow into the container. Loosen cover plate of filter and drain filter fuel into container. Close filter drain valve and remove tube. Remove and replace the filter element and associated gaskets. Supply clean diesel fuel to fill filter vessel. Reinstall and tighten filter cover plate. Operate pump in Manual mode to confirm prime. Confirm alarm condition is clear.

Troubleshooting

Observation	Troubleshooting
Pump does not start	<ul style="list-style-type: none"> • Check power to motor starters and controllers, • Check emergency stop, • Check motor overloads.
Pump Overload Trip	<ul style="list-style-type: none"> • Check relief valve settings. • Check for debris in pump head.
Excessive Noise or Vibration	<ul style="list-style-type: none"> • Cavitation due to inlet conditions.
Excessive Inlet Suction	<ul style="list-style-type: none"> • Check and clean strainer. • Check foot valve at tank. • Check suction pipe size and vertical lift.
Insufficient Inlet Suction	<ul style="list-style-type: none"> • Check for prime in suction piping. • Test inlet piping for leaks.
Excessive Discharge Pressure	<ul style="list-style-type: none"> • Check for closed valve or other blockage. • Check pipe relief valve settings. • Check for thermal expansion relief in discharge piping.
Rapid Filter Plugging	<ul style="list-style-type: none"> • If initial startup on existing tank use Filthy Tank Kit for Initial cycles of tank contents • Check for biological growth in tank
Excessive Water Accumulation	<ul style="list-style-type: none"> • Check for Rainwater leakage into lube tank

Spare Parts

Spare Parts: Filter Replacement Elements with Gasket Kits

Technical Support

Contact Earthsafe at

tech@earthsafe.com
(312) 226-7600
www.earthsafe.com

1000 W. Crossroads Pkwy.
Bolingbrook, IL 60490

Warranty Statement

Earthsafe Systems, Inc. warrants the product to be the kind and quality described in specification provided herein and to be free from defects in material or workmanship under normal service for a period of 1 year after shipment. Earthsafe obligations under this warranty shall be limited to repair or replacement, at the option of Earthsafe, of parts deemed to be defective upon inspection by Earthsafe. User is responsible for transportation of parts or assemblies to Earthsafe or its authorized repair location where the repairs are to be performed.

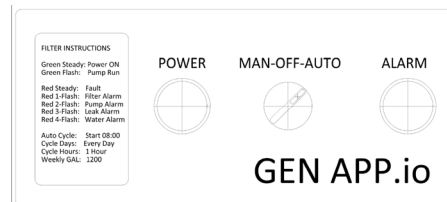
The provisions of the warranty shall not apply to any equipment, part, or accessory which (a) has been improperly specified by buyer, (b) has been improperly stored or handled prior to placing in service, (c) has been damaged or loosened during shipment, (d) has been improperly mounted or connected, (e) has not been operated within the equipment specifications, or (f) has been improperly maintained.

Earthsafe reserves the right to reject warranty claims of any kind for equipment for which it has not received full payment.

This warranty is in lieu of all other warranties, express or implied, and all other obligations or liabilities on the part of Earthsafe. Earthsafe assumes no responsibility or liability for any special, incidental, or consequential damage.

Appendix: Controller Instructions

The C1FP Controller has a micro-PLC to control and monitor the filter polisher operation. The controller includes a motor starter with overload relay to supply power to the pump and protect the pump by disconnecting power in an over-amp condition.



HOA Switch: The Operator interface includes a MAN-OFF-AUTO switch for the pump operation. In the Manual mode the pump activates and runs until de-selected. In the AUTO mode, the pump operates on a timed cycle.

Panel Indicator Lights.

Green Light: The Green Light is steady ON for Power ON and pump standby mode. The Green Light flashes while the pump is operating.

Red Light: The Red Light activates in an alarm condition and flashed to indicate the alarm type.

- Red Steady: Controller Fault
- Red 1-Flash is Filter Alarm
- Red 2-Flash is Pump Alarm
- Red 3-Flash is Leak Alarm
- Red 4-Flash is Water Alarm
- Multiple Alarms will indicate in Sequence

Cycle Start and Cycle Run Times:

The cycle start and run times may be changed by the user. Open the control panel and observe the screen on the Micro-PLC. Press the diamond button to navigate to the Main Screen. Use the Up/Down Arrow Keys to select the following Functions:

1. Set Current Time and Date
2. Set Auto Cycle Type: Daily 5-Day Week, Daily 7-Day Week, or Weekly – 1 Day
3. Set the Run Day of Week, if a Weekly Cycle.
4. Set Run Time Start Hour
5. Set Cycle Time

In each of these screens use the Up/Down Arrow Keys to adjust the displayed Value. Then press the Diamond Key to Return to the Main Menu.