

# Gen M2 Duplex Fuel Pump

## Installation, Operation, and Maintenance Guide

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### General Information

#### Notice

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#### 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 diesel exhaust fluid (DEF) systems for emergency 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

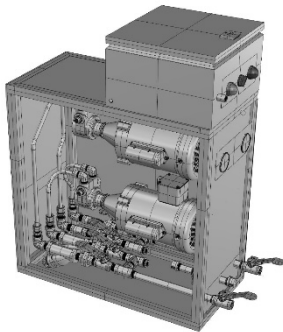
The M2 Duplex Fuel Pump is used to transfer fuel from fuel storage tanks to point of use at generators or boilers.

**Designed for Redundancy:** The pump set is designed for redundancy so that pump performance is monitored and in the event of failure, the alternate pump is activated to satisfy demand. Either pump can be isolated for maintenance while the alternate pump remains in service.

**Smart and Safe Control:** The M2 controller monitors pump performance and activates pumps based on demand from generator day tanks and boilers. The controller includes motor starters with overload relays for safety. Safety disconnect switches are used for pump voltages over 120 VAC.

The controller monitors the system for (a) pump flow, and (b) leak. Pumps automatically alternate on consecutive starts. Pump performance is monitored by current sensors and / or flow sensors. If sensor feedback is not detected within 30 seconds the alternate pump will start.

## Physical Description



1. Enclosure: Lightweight, Compact Enclosure
2. Containment: Base Assembly Liquid Tight to Catch Leaks
3. Control Panel: Electronic Controller and HMI with Motor Starters
4. Visual Gauges: Gauges for Inlet Suction and Outlet Pressure
5. Hose or Pipe Connections: Supply and Return Connections to Fuel Tank.
6. Fuel Transfer Pumps: Positive Displacement Viking Pumps

## Planning the Installation

### Location

1. Location: Locate the Unit as close as practical to the g 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. 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, 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. Operate each pump in manual mode and confirm start and pressure condition. Place the Unit in Auto mode, install jumper wire for remote start input and confirm start.
2. Test the Alarm Functions as noted below:
  - 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	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. Confirm alternate pump start.	

### 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, and Outlet Pressure.

## Troubleshooting

Observation	Troubleshooting
Pump does not start	<ul style="list-style-type: none"><li>• Check power to motor starters and controllers,</li><li>• Check emergency stop,</li><li>• Check motor overloads.</li></ul>
Pump Overload Trip	<ul style="list-style-type: none"><li>• Check relief valve settings.</li><li>• Check for debris in pump head.</li></ul>
Excessive Noise or Vibration	<ul style="list-style-type: none"><li>• Cavitation due to inlet conditions.</li></ul>
Excessive Inlet Suction	<ul style="list-style-type: none"><li>• Check and clean strainer.</li><li>• Check foot valve at tank.</li><li>• Check suction pipe size and vertical lift.</li></ul>
Insufficient Inlet Suction	<ul style="list-style-type: none"><li>• Check for prime in suction piping.</li><li>• Test inlet piping for leaks.</li></ul>
Excessive Discharge Pressure	<ul style="list-style-type: none"><li>• Check for closed valve or other blockage.</li><li>• Check pipe relief valve settings.</li><li>• Check for thermal expansion relief in discharge piping.</li></ul>

## Spare Parts

Spare Parts: Available from Earthsafe.

## 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 M2 Duplex Fuel Pump 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

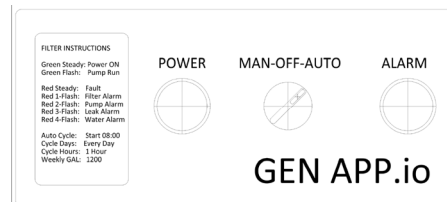
been improperly maintained.

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 C1DP Controller has a micro-PLC to control and monitor the duplex pump operation. The controller includes dual motor starters with overload relay to supply power to the pumps and protect the pump by disconnecting power in an over-amp condition.



**HOA Switch:** The Operator interface includes a selector switch for the pump operation. In the Manual mode the pump activates and runs until de-selected. In the AUTO mode, the pump operates when a remote signal is activated by a day tank, boiler, or generator run signal.

### 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 Pump 1 Alarm
- Red 2-Flash is Pump 2 Alarm
- Multiple Alarms will indicate in Sequence