Model C900
CentraPlex Control Module

INSTRUCTION MANUAL
EMERGENCY POWER FUEL SYSTEMS

Updated: May 21, 2007

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Safety Information
UL Listed. The Earthsafe CentraPlex Control Module is UL listed.

Intended Use. The Earthsafe CentraPlex Control Module is intended for use with diesel fuel 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
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EMERGENCY POWER FUEL SYSTEMS

General Description
The C900 CentraPlex Multi-Function Control Module is designed to monitor and control diesel fuel transfer for emergency power applications. The CentraPlex Module is customized with operating software to provide required operating functions for over 6 common applications:

- Generator Tank Level Control
- Duplex Pump Control
- Fuel Filtration / Polishing
- Multi-Tank Selection Control
- Remote Tank Fill Systems

The CentraPlex Module receives inputs from operating systems including: (a) tank level sensors, (b) leak detection sensors, (c) flow sensors, (d) pressure sensors, (e) pump current sensors, (f) filter water sensors, (g) filter differential pressure sensors, (h) valve position sensors.

The CentraPlex Module operates output devices for the fuel system including: (a) solenoid valves, (b) fuel supply pumps, (c) fuel return pumps, (d) actuated ball valves, (e) actuated butterfly valves.

The control module includes MAN.-OFF-AUTO selector switches for the fuel transfer pump / valves. The manual mode allows the pump / valve to be activated for manual operation or testing. In the auto mode the pump / valve are activated by the conditions of the input sensors.

The CentraPlex Module includes the following elements:

1. Programmable Controller
   The programmable controller provides the control logic for the system and operates system elements with limited current capabilities.

2. Output Control Relays
   The unit includes relays to operate valves, pumps, remote alarms, and to isolate the Controller from these devices.

3. Mode Selector Switches
   The module includes dual MAN.-OFF-AUTO mode selector.

4. Display Screen
   The module includes a display to communicate the operating status of the unit. Different screens are presented based on the specific operating function of the unit. See the operating section of the manual for additional information.

5. Alarm Horn
   The module includes an audible alarm which operates on a auto-shutoff adjustable timer.

6. Emergency Stop
   The module includes an emergency stop button which interrupts the function of the output relays to stop pumps and close valves. The emergency stop button is mechanically maintained with a twist to release function.

7. Communications Link
   The module includes a communication link to allow operating status data to be transferred to other control and monitoring systems.

The control module is operationally tested at the factory. However additional inspection and testing is required at installation to ensure that the unit has not been adversely affected by shipment.
OmniPlex Module

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>136” H x 24” W x 8” D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approval</td>
<td>UL</td>
</tr>
<tr>
<td>Power</td>
<td>120 VAC / 5 A / 60 Hz</td>
</tr>
<tr>
<td></td>
<td>Single or Dual Source</td>
</tr>
<tr>
<td></td>
<td>24 VDC Control Circuits</td>
</tr>
<tr>
<td>Enclosure</td>
<td>NEMA 4</td>
</tr>
<tr>
<td></td>
<td>Color RAL 7035 (Light Gray)</td>
</tr>
<tr>
<td>Environmental</td>
<td>32 to 131 F (0-55 C)</td>
</tr>
<tr>
<td></td>
<td>-20 to 130 F with heater</td>
</tr>
<tr>
<td>Communication</td>
<td>BACnet, Modbus, LON, Metasys</td>
</tr>
<tr>
<td>Processor</td>
<td>AB ML1100</td>
</tr>
<tr>
<td>Other</td>
<td>Isolated Inductive Loads</td>
</tr>
<tr>
<td></td>
<td>5 Amp Output Relays (Typ)</td>
</tr>
<tr>
<td>Options</td>
<td>50 Hz Power</td>
</tr>
<tr>
<td></td>
<td>CE Approval</td>
</tr>
<tr>
<td></td>
<td>Intrinsic Safety Barriers</td>
</tr>
<tr>
<td></td>
<td>Enclosure Heater</td>
</tr>
</tbody>
</table>

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>PART</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPC910.04</td>
<td>Control Module: 1-4 Functional Units</td>
</tr>
<tr>
<td>PPC910.08</td>
<td>Control Module: 5-8 Functional Units</td>
</tr>
<tr>
<td>PPC910.12</td>
<td>Control Module: 9-12 Functional Units</td>
</tr>
<tr>
<td>PPC910.16</td>
<td>Control Module: 13-16 Functional Units</td>
</tr>
<tr>
<td>PPC910.20</td>
<td>Control Module: 17-20 Functional Units</td>
</tr>
</tbody>
</table>

Calculate the Functional Elements as follows:
+ Number of Fuel Transfer Pumps
+ Number of Generator Day Tanks
+ Number of Bulk Storage Tanks
+ Number of Filtration / Polishers
+ Number of Fill Stations
= Total Functional Elements
Software Versions

The CentraPlex Controller is programmed to operate in a wide variety of fuel system control configurations. The software is selected at the time of purchase and is factory configured, but can be field modified by an Earthsafe technician. The modular software is designed to integrate a variety of operating elements.

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>TYPE</th>
<th>GENERAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS100.01</td>
<td>Gen Tank Refill</td>
<td>Single or Twin Inlet Valve, High Stop Valve or Return Flow Pump, Pump Start Signal to Remote Pumps, Critical Low Output Relay, Common Alarm Output Relay: Leak-High-Low</td>
</tr>
<tr>
<td>OS200.01</td>
<td>Duplex Pump</td>
<td>Start Pump From Day Tank Signal, Submersible or Standard Pumps, Alternate Pump Starts, Monitor Pump Current / Flow and Switch on Fail</td>
</tr>
<tr>
<td>OS300.01</td>
<td>Filter / Pump</td>
<td>Programmable Timer for Filtration Cycle, Start – Stop Pump on Time Cycle, Monitor Filter Pressure and Water</td>
</tr>
<tr>
<td>OS400.01</td>
<td>Single Tank Fill</td>
<td>Single Tank Fill Station, Monitor Tank High Level Sensors, Audible – Visual Alarm, Close Fill Valve at High Level</td>
</tr>
<tr>
<td>OS400.10</td>
<td>Dual Tank Fill</td>
<td>Dual Tank Fill Station, Select Tank To be Filled, Monitor Tank High Level Sensors, Audible – Visual Alarm, Close Fill Valve at High Level</td>
</tr>
<tr>
<td>OS450.01</td>
<td>Multi-Tank Select Dual Tanks</td>
<td>Select Tank for Supply – Return, Operate Supply Pump or Valves, Operate 3 Way Return Valve or Dual FOR Valves, Switch Tanks on Low Level</td>
</tr>
</tbody>
</table>
Enhanced Software Elements

Enhanced Software Versions are available for the CentraPlex Controller. Project Specific documents include detailed information on the specialized operating sequence, wiring diagrams, and operating instructions associated with each version.

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>TYPE</th>
<th>MODIFICATIONS FROM STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS100.02</td>
<td>Gen Tank Refill</td>
<td>Level Control from Analog Sensor</td>
</tr>
<tr>
<td></td>
<td>% Fill Display</td>
<td>% Fill Display</td>
</tr>
<tr>
<td>OS100.03</td>
<td>Gen Tank Refill</td>
<td>Duplex Inlet Valve or Duplex Supply Pumps</td>
</tr>
<tr>
<td></td>
<td>Dual Inlet</td>
<td>Alternates Valve-Pump each Start or Low Level</td>
</tr>
<tr>
<td>OS100.04</td>
<td>Gen Tank Refill</td>
<td>Dual Inlet Actuated Ball Valves instead of Solenoids Monitor Feedback from Valve and Switch on Fail</td>
</tr>
<tr>
<td></td>
<td>Actuated Valves</td>
<td></td>
</tr>
<tr>
<td>OS100.05</td>
<td>Gen Tank Refill</td>
<td>Single or Twin Inlet Valve Operation</td>
</tr>
<tr>
<td></td>
<td>Duplex Supply Pumps</td>
<td>Operate Duplex Fuel Supply Pumps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate Pumps on Start Monitor Pump Flow / Current and Switch on Fail</td>
</tr>
<tr>
<td>OS200.10</td>
<td>Duplex Pump</td>
<td>Operate Duplex Pumps Select Tank for Supply – Return</td>
</tr>
<tr>
<td></td>
<td>Dual Tank</td>
<td>Operate Supply Valves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate 3 Way Return Valve or Dual FOR Valves</td>
</tr>
<tr>
<td>OS300.02</td>
<td>Pump / Filter</td>
<td>Operate Filter / Pumps on Timed Cycle</td>
</tr>
<tr>
<td></td>
<td>Dual Tank</td>
<td>Select Tank to be Filtered on Alternate Cycles Operated Supply and Return Valves for Selected Tank</td>
</tr>
<tr>
<td>OS300.03</td>
<td>Dual Filter</td>
<td>Operate Remote Pumps for Dual Filter Monitor Dual Filter Status</td>
</tr>
<tr>
<td>OS450.02</td>
<td>Multi-Tank Select</td>
<td>Select Tank for Supply – Return</td>
</tr>
<tr>
<td></td>
<td>3-Tanks</td>
<td>Operate Supply Pump or Valves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate Return Flow Valves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switch Tanks on Low Level</td>
</tr>
<tr>
<td>OS450.03</td>
<td>Multi-Tank Select</td>
<td>Select Tank for Supply – Return</td>
</tr>
<tr>
<td></td>
<td>4-Tanks</td>
<td>Operate Supply Pump or Valves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate Return Flow Valves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switch Tanks on Low Level</td>
</tr>
<tr>
<td>OS400.02</td>
<td>Single Tank Fill</td>
<td>Operate Single Tank Fill Operation Display Tank % Fill</td>
</tr>
<tr>
<td></td>
<td>% Fill Display</td>
<td></td>
</tr>
<tr>
<td>OS400.03</td>
<td>Single Tank Fill</td>
<td>Operate Single Tank Fill Operation Operate Pump for Fuel Transfer</td>
</tr>
<tr>
<td></td>
<td>Pump Flow</td>
<td></td>
</tr>
<tr>
<td>OS400.04</td>
<td>Single Tank Fill</td>
<td>Operate Single Tank Fill Operation Display Tank % Fill Operate Pump for Fuel Transfer</td>
</tr>
<tr>
<td></td>
<td>% Fill Display</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pump Flow</td>
<td></td>
</tr>
<tr>
<td>OS410.02</td>
<td>Dual Tank Fill</td>
<td>Operate Dual Tank Fill Station Display Tank % Fill</td>
</tr>
<tr>
<td></td>
<td>% Fill Display</td>
<td></td>
</tr>
<tr>
<td>OS410.03</td>
<td>Dual Tank Fill</td>
<td>Operate Dual Tank Fill Operation Operate Pump for Fuel Transfer</td>
</tr>
<tr>
<td></td>
<td>Pump Flow</td>
<td></td>
</tr>
<tr>
<td>OS450.02</td>
<td>Multi-Tank Select</td>
<td>Select Tank for Supply – Return</td>
</tr>
<tr>
<td></td>
<td>3-Tanks</td>
<td>Operate Supply Pump or Valves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate Return Flow Valves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switch Tanks on Low Level</td>
</tr>
<tr>
<td>OS450.03</td>
<td>Multi-Tank Select</td>
<td>Select Tank for Supply – Return</td>
</tr>
<tr>
<td></td>
<td>4-Tanks</td>
<td>Operate Supply Pump or Valves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate Return Flow Valves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Switch Tanks on Low Level</td>
</tr>
</tbody>
</table>
Installation Instructions

A. General
1. The system including the control panel, sensors, and devices is designed for ordinary electrical areas, and shall not be installed in hazardous electrical areas.

2. The control panel, external devices, and wiring should be installed by a competent electrician in accordance with National Electric Code requirements and all applicable local regulations.

B. Control Panel
1. Select an appropriate location for the control panel installation. The location should be indoors in a dry and temperature controlled environment. The operating temperature for the control panel is 32 to 104 degrees F (0 to 40 degrees C). The control panel must be protected from severe vibration, extremes in temperature and humidity, rain, and other conditions that could harm computerized electronic equipment.

2. Remove all packaging material. Inspect the control module for damage. Install the panel on a wall or bracket and secure with (4) bolts at the corners. Provide 120 VAC power supply to the control module from a dedicated circuit breaker. Provide conduit openings in the panel suitable for the input and output wiring to external devices.

3. Always disconnect power at the external circuit breaker, using approved lock out / tag out procedures prior to terminating wiring inside the control panel.

C. External Devices
1. The control panel is designed to receive inputs from external sensors, operate external valves and pumps, and supply on/off signals to remote systems. Install external sensors, valves, and pumps per their manufacturers recommendations. Install wiring junction boxes where required to make wiring connections to the devices. Junction boxes should be rain tight where exposed to weather.

D. Conduit Systems
1. The system can be installed using a variety of conduit systems as applicable for the environment and code requirements, including PVC, EMT, IMC, and RGS.

2. Wiring should be separated in conduit systems in conformance with code requirements, and in conformance with the following:
   (a) separate fuel system wiring from wiring for other building systems.
   (b) separate DC wiring from AC wiring in conduits.
   (c) separate AC signal wires from AC power for motor loads.
   (d) separate data wiring for networks from other wiring
   (e) separate Intrinsically Safe wiring for tank gauge sensors.

E. Wiring
1. Use only stranded THHN wiring. Use #14 AWG wiring for signal wiring unless noted otherwise. Use sequential numbering to identify wiring in each conduit to assist in connection and troubleshooting.

2. Network data wiring shall be 8 conductor, minimum 24 gauge wiring with RJ45 connectors.
Field Wiring Diagram
Duplex Pumps
INSTRUCTION MANUAL

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Field Wiring Diagram
Filter / Polisher Pump
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Field Wiring Diagram
Dual Tank Selection
Field Wiring Diagram
Fill Station – Dual Tank
Functional Description:
Generator Tank Level Control – Dual Inlet

Day Tank with Dual Inlet Valves
The control panel monitors the tank level sensors, which are approximately 90% High Level, 85% Fill Stop, 75% Fill Start, 50% Low Level, and 25% Critical Low level. Upon receipt of the Fill Start signal, the control panel closes an output relay to send a pump on / fuel request signal to the remote fuel transfer pump. Simultaneously the lead inlet solenoid valve is energized to open. Upon receipt of the Fill Stop signal, the pump on / fuel request signal ceases, and the inlet solenoid valve de-energizes to close. At Low Level the control panel energizes the lag inlet solenoid valve. The inlet solenoid valves automatically alternate upon starts.

High, Low, and Critical Low Level signals activate and alarm signal and message. The High Level alarm disables the operation of the system in the MAN mode. The system monitors independent Critical High Level, and Tank Leak sensors. Activation of these sensors disable to tank fill operation in either MAN or AUTO mode.

The display indicates: (a) normal or alarm condition, (b) fill active status, (c) alarm indication for critical high, high, low, critical low, and leak alarms, (d) optional % full or gallons. A common alarm output relay and a serial data interface are provided for BMS integration.

Optional Return Flow Pump: In the AUTO mode the pump is activated by the high level signal. The pump operates until the high level signal ceases, plus a 60 second stop delay to prevent short cycling.
Functional Description:
Generator Tank Level Control – High Level Stop Valve

Day Tank with High Stop Valve
The control panel monitors the tank level sensors, which are approximately 90% High Level, 85% Fill Stop, 75% Fill Start, 50% Low Level, and 25% Critical Low level. Upon receipt of the Fill Start signal, the control panel closes an output relay to send a pump on / fuel request signal to the remote fuel transfer pump. Simultaneously the inlet solenoid valve is energized to open. Upon receipt of the Fill Stop signal, the pump on / fuel request signal ceases, and the inlet solenoid valve de-energizes to close.

High, Low, and Critical Low Level signals activate and alarm signal and message. The High Level alarm disables the operation of the system in the MAN mode, and energizes the Normally Open Fill solenoid valve to close. The system monitors independent Critical High Level, and Tank Leak sensors. Activation of these sensors disable to tank fill operation in either MAN or AUTO mode, and energizes the Normally Open Fill solenoid valve to close.

The display indicates: (a) normal or alarm condition, (b) fill active status, (c) alarm indication for critical high, high, low, critical low, and leak alarms, (d) optional % full or gallons. A common alarm output relay and a serial data interface are provided for BMS integration.

Optional Return Flow Pump: In the AUTO mode the pump is activated by the high level signal. The pump operates until the high level signal ceases, plus a 60 second stop delay to prevent short cycling.

Day Tank – Inlet Valve with High Stop

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>OmniPlex Control Panel</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>Tank Level Sensor</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>Leak Sensor</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>High Level Sensor</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>Solenoid Valve NC</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>Solenoid Valve NO</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>Day Tank UL 142</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>Tank Containment</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
<td>Emergency Vent</td>
</tr>
<tr>
<td>41</td>
<td>1</td>
<td>Standard Vent</td>
</tr>
<tr>
<td>42</td>
<td>1</td>
<td>Inspection Port</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>Direct Read Gauge</td>
</tr>
<tr>
<td>51</td>
<td>2</td>
<td>Ball Valve</td>
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<tr>
<td>54</td>
<td>2</td>
<td>Strainer</td>
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</tbody>
</table>

Add for Return Flow Pump Option

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
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<td>1</td>
<td>Pump Control Panel</td>
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<tr>
<td>44</td>
<td>1</td>
<td>Foot Valve</td>
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<tr>
<td>51</td>
<td>1</td>
<td>Ball Valve</td>
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<tr>
<td>52</td>
<td>1</td>
<td>Check Valve</td>
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<tr>
<td>53</td>
<td>2</td>
<td>Flex Connector</td>
</tr>
<tr>
<td>60</td>
<td>1</td>
<td>Pump – Return Flow</td>
</tr>
</tbody>
</table>
Functional Description:
Generator Tank Level Control – Duplex Transfer Pumps

Day Tank with Dual Fuel Supply Pumps
The control panel monitors the tank level sensors, which are approximately 90% High Level, 85% Fill Stop, 75% Fill Start, 50% Low Level, and 25% Critical Low level. Upon receipt of the Fill Start signal, the control panel closes an output relay to activate the lead fuel transfer pump. Upon receipt of the Fill Stop signal, the pump on / fuel request signal ceases, and the fuel transfer pump stops. At Low Level the control panel energizes the lag fuel transfer pump. The fuel transfer pumps automatically alternate upon starts.

High, Low, and Critical Low Level signals activate and alarm signal and message. The High Level alarm disables the operation of the system in the MAN mode. The system monitors independent Critical High Level, and Tank Leak sensors. Activation of these sensors disable the tank fill operation in either MAN or AUTO mode.

The display indicates: (a) normal or alarm condition, (b) fill active status, (c) alarm indication for critical high, high, low, critical low, and leak alarms, (d) optional % full or gallons, (e) pump status. A common alarm output relay and a serial data interface are provided for BMS integration.

Optional Return Flow Pump: In the AUTO mode the pump is activated by the high level signal. The pump operates until the high level signal ceases, plus a 60 second stop delay to prevent short cycling.
Duplex Pump:
The control panel monitors day tanks, gensets, or other systems for a pump on / fuel request signal. The primary / lead pump is started and is monitored for a current sense signal from the motor starter indicating operation. When the pump on / fuel request signal ceases, then the pump shuts down after a 20 second delay that prevents short cycling.

The first pump selected from OFF to AUTO mode is the lead pump and the other pump is the lag pump. Pumps automatically alternate on consecutive starts. The lag pump will start, after a 20 second delay, if the lead pump has an overload alarm or a current sense failure. The 20 second standard delay can be increased to accommodate the operation of line leak detection systems. The audible alarm operates for 60 seconds, or until reset. Alarms are reset by placing the pump selector in the OFF position and returning to AUTO.

The display indicates for each pump: (a) lead / lag status, (b) normal / alarm status, (c) overload alarm condition, (d) current sense fail condition, (e) not-in-auto status, (f) pump run time meter. A common alarm output relay and a serial data interface are provided for BMS integration.
Filter / Polishing Unit

The control panel operates the pump on a programmable timed cycle to circulate fuel from the storage tank through the filter and returning to the storage tank. The unit can be operated with a tank selection system to provide filtration for multiple tank units.

The programmable timer allows setting of the start time / date, the ON cycle time, and the OFF cycle time for the AUTO mode. The programmable timer allows setting of the cycle duration for the MAN mode, to start the pump upon manual initiation and stop it after the defined cycle.

The control panel monitors the filter unit for high differential pressure indicating a need for filter change, and water accumulation. The leak sensor is also monitored and disables the unit from operation in MAN or AUTO mode.

The display indicates: (a) normal or alarm condition, (b) cycle active status, (c) time to start / stop cycle, (d) alarm indication for differential pressure, water accumulation, or leak, (e) pump status. A common alarm output relay and a serial data interface are provided for BMS integration.
**Dual Tank Selection:**
The control panel monitors pump sets for a pump on signal. The panel energizes the FOS and FOR valves from the primary fuel supply tank, and receives an open limit switch signal to prove operation. When the pump on signal ceases, then the FOS and FOR valves from the primary tank are closed.

The first tank selected from OFF to AUTO mode is the lead tank and the other tank is the lag tank. The operation will switch to the alternate tank if a low level signal is received for the primary tank. The low level signal can be generated by an independent sensor, or from a tank level gauge output signal.

The display indicates for each tank: (a) lead / lag status, (b) normal / alarm status, (c) valve open / close status, (d) not-in-auto status. A common alarm output relay and a serial data interface are provided for BMS integration.
Functional Description:

Duplex Filter

Dual Filter Unit
The control panel operates the remote pump on a programmable timed cycle to circulate fuel from the storage tank through the filter and returning to the storage tank. The unit can be operated with a tank selection system to provide filtration for multiple tank units.

The programmable timer allows setting of the start time / date, the ON cycle time, and the OFF cycle time for the AUTO mode. The programmable timer allows setting of the cycle duration for the MAN mode, to start the pump upon manual initiation and stop it after the defined cycle.

The control panel monitors the filter unit for high differential pressure indicating a need for filter change, and water accumulation. The leak sensor is also monitored and disables the unit from operation in MAN or AUTO mode.

The display indicates: (a) normal or alarm condition, (b) cycle active status, (c) time to start / stop cycle, (d) alarm indication for differential pressure, water accumulation, or leak, (e) filter status, (f) pump status. A common alarm output relay and a serial data interface are provided for BMS integration.
Functional Description:
Tank Fill — Standard

Tank Fill Control:
The control panel monitors a high level sensor in the fuel tank and controls the opening of the actuated valve in the fill pipe. The tank to be filled is selected at the control panel. The fill line valve is energized to open, as long as the tank level is less than 85%. The fill valve limit switch provides feedback to the panel, so that when filling multiple tanks only one valve is open at any one time.

Fuel is transferred into the tank until the 85% tank level is reached and an audible alarm is activated. The audible alarm operates for 60 seconds, or until reset. Alarms are reset by placing the tank selector in the OFF position. At 90% fill level the alarm is re-activated and the fill pipe valve is closed. The valve may be opened in the manual mode up to 95%, at which point the valve is closed and disabled.
Functional Description:
Tank Fill — Transfer Pump

Tank Fill Control with Pump:
The control panel monitors a high level sensor in the fuel tank and controls the opening of the transfer pump and actuated valve in the fill pipe. The tank to be filled is selected at the control panel. The pump is enabled and the fill line valve is energized to open, as long as the tank level is less than 85%. The fill valve limit switch provides feedback to the panel, so that when filling multiple tanks only one valve is open at any one time.

The transfer pump is operated by placing its motor starter in the AUTO position. Fuel is transferred into the tank until the 85% tank level is reached and an audible alarm is activated. The audible alarm operates for 60 seconds, or until reset. Alarms are reset by placing the tank selector in the OFF position. At 90% fill level the alarm is re-activated, the transfer pump is disabled, and the fill pipe valve is closed. The transfer pump and fill pipe valve may be operated in the manual mode up to 95%, at which point the pump and valve are closed and disabled.

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>OmniPlex Control Panel</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Pump Control Panel</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>Tank Level Sensor</td>
</tr>
<tr>
<td>24</td>
<td>2</td>
<td>Actuated Butterfly Valve</td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td>Fill Station Cabinet - Pump</td>
</tr>
<tr>
<td>52</td>
<td>1</td>
<td>Check Valve</td>
</tr>
<tr>
<td>53</td>
<td>1</td>
<td>Flex Connector</td>
</tr>
<tr>
<td>55</td>
<td>1</td>
<td>Pressure / Vacuum Gauge</td>
</tr>
<tr>
<td>58</td>
<td>2</td>
<td>Butterfly Valve</td>
</tr>
<tr>
<td>63</td>
<td>1</td>
<td>Pump – Fill station</td>
</tr>
<tr>
<td>80</td>
<td>1</td>
<td>Hose Adapter / Cap</td>
</tr>
</tbody>
</table>

Tank Fill System - Pump
Generator Tank Level Control
Refer to Standard Operating Procedures for detailed description of inputs, outputs, and operating logic.

Manual Mode
Place the switch in the manual mode to (a) energize and open the inlet solenoid valves, and (b) generate an output signal for remote pump on request. High level in tank disables this function.

Auto Mode
Place the switch in the auto mode to operate based on inputs from the tank level sensor. (a) Critical Low Level and Low Level activates panel alarm and output relay. (b) Fill Start Level energizes inlet valves to open and generates and output signal for remote pump on request. (c) Fill Stop Level de-energizes to close inlet solenoid valve and ends remote pump on signal. (d) High Level activates panel alarm and remote output relay, disables manual fill mode, and activates relay for high level stop valve or overflow pump.
Duplex Pump Control
Refer to Standard Operating Procedures for detailed description of inputs, outputs, and operating logic.

Manual Mode (Pump 1 or 2)
Place the switch in the manual mode to (a) energize pump motor starter and start pump.

Auto Mode (Pump 1 or 2)
Place the switch in the auto mode to operate pumps based on remote inputs. (a) Start pump when input active from day tank requesting refill, and stop pump when signal ceases. (b) Alternate pumps on successive starts. (c) Monitor input from pump flow or pump current sensor to prove pump, and auto switch to second pump if no signal after 30 second time delay. (d) Monitor pump motor starter for not-in-auto state and indicate alarm.
Filter Polisher Control
Refer to Standard Operating Procedures for detailed description of inputs, outputs, and operating logic.

Filter Pump Manual Mode
Place the switch in the manual mode to energize pump motor starter and start pump. (a) When timer selector switch is in OFF mode the pump will continue until removed from MAN mode. (b) When timer selector switch is AUTO mode, the pump will run through the on cycle set time, and then stop until reset.

Filter Pump Auto Mode
Timer Auto Mode (Lower Selector Switch)
Place the switch in the auto mode, with timer in auto mode, to operate pumps based on timer settings for on/off cycle.

Timer Reset Mode (Lower Selector Switch)
When the selector switch is moved to the OFF position, the timer is reset.
**Tank Fill Control**  
Refer to Standard Operating Procedures for detailed description of inputs, outputs, and operating logic.

**Auto Mode**  
Place the switch in the auto mode to operate based on inputs from the tank level sensor and fill selection switch.

**Fill Start Mode**  
Energizes to open the inlet actuated valve and generates output signal to enable fill pump if used. At 85% fill level, audible alarm is activated. At 90% fill level function is disabled.

**Fill Jog Mode**  
Energizes to open the inlet actuated valve and generates output signal to enable fill pump if used. Resets to OFF position after 10 seconds. At 95% fill level function is disabled.
Dual Tank Fill Control
Refer to Standard Operating Procedures for detailed description of inputs, outputs, and operating logic.

Tank Select Mode (Top Selector Switch)
Select the Tank to be filled.

Fill Start Mode (Mode Selector Switch)
For the selected tank, energizes to open the inlet actuated valve and generates output signal to enable fill pump if used. At 85% fill level, audible alarm is activated. At 90% fill level function is disabled.

Fill Jog Mode (Mode Selector Switch)
For the selected tank, energizes to open the inlet actuated valve and generates output signal to enable fill pump if used. Resets to OFF position after 10 seconds. At 95% fill level function is disabled.
Multi-Tank Selection Control
Refer to Standard Operating Procedures for detailed description of inputs, outputs, and operating logic.

Tank Manual Mode
(a) Energizes to open the FOS supply valve for the selected tank, and (b) energizes the 3 way return flow valve (or dual 2-way return flow valves) to open to the selected tank. First tank in manual mode disables the function for the second tank.

Tank Off Mode
Closes the FOS supply valve for the selected tank

Tank Auto Mode
Enables the automatic selection of the tank. Upon receipt of remote pump on signal: (a) energizes to open the FOS supply valve for the selected tank, and (b) energizes the 3 way return flow valve (or dual 2-way return flow valves) to open to the selected tank. (c) switches to alternate tank upon receipt of low level signal.
## Troubleshooting

<table>
<thead>
<tr>
<th>MODE</th>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>RESPONSE</th>
</tr>
</thead>
</table>
| General       | 1.01 | Display not Active               | Check circuit breaker status  
Check panel internal breaker  
Check display latch to processor |
|               | 1.02 | No outputs active                | Check Emergency Stop position                                                                     |
|               | 1.03 | Select outputs not active        | Check wire terminations at panel  
Check wire terminations at device  
Check output relay continuity |
| Gen Tank Refill| 2.01 | Low Level Alarm  
Critical Low level Alarm | Check auto mode selected  
Check emergency stop position  
Check for closed manual inlet valves  
Check inlet solenoids energized  
Check pump active signal  
Check low sensor input |
|               | 2.02 | High Level Alarm                 | Check inlet solenoid closed  
Check inlet solenoid not leaking  
Check fill stop sensor input |
|               | 2.03 | Leak Alarm                       | Visually inspect for source                                                                     |
| Duplex Pump   | 3.01 | Pump did not start               | Check auto mode selected  
Check emergency stop position  
Check motor starter power on.  
Check motor starter auto position  
Check motor starter overload  
Check on request input |
|               | 3.02 | Pump start but no flow           | Check for closed manual valves  
Check pump prime |
| Filter Polisher| 4.01 | Pump did not start or  
Pump start but no flow | Check pump items above |
|               | 4.02 | Filter pressure alarm            | Confirm high pressure / change filter  
Check pressure sensor |
|               | 4.03 | Filter water alarm               | Open valve to drain filter water  
Check water sensor |
|               | 4.04 | On/Off cycle error               | Check selector switch positions  
Check emergency stop position  
Check set points for start and cycles |
| Tank Fill     | 5.01 | Valve does not open              | Check wire terminations at panel  
Check wire terminations at valve  
Check selector switch positions  
Confirm no high level  
Check emergency stop position  
Check output relay for continuity |
|               | 5.02 | Valve or level position error    | Check wire terminations at panel  
Check wire terminations at sensors |
| Multi-Tank Select| 6.01 | Valve does not open              | Check wire terminations at panel  
Check wire terminations at valve  
Check selector switch positions  
Confirm no high level  
Check emergency stop position  
Check output relay for continuity |
|               | 6.02 | Valve or level position error    | Check wire terminations at panel  
Check wire terminations at sensors |
Maintenance Instructions

<table>
<thead>
<tr>
<th>ITEM</th>
<th>MAINTENANCE</th>
<th>SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operate selector switches to manual or test position</td>
<td>30 day intervals</td>
</tr>
<tr>
<td>2</td>
<td>Open panel and check for water seepage or excessive condensation</td>
<td>30 day intervals</td>
</tr>
<tr>
<td>3</td>
<td>Remove sensors and activate to confirm system function</td>
<td>Annually</td>
</tr>
</tbody>
</table>

Spare Parts
Spare parts are available worldwide from local Allen Bradley parts distributors. Locate local distributor information at www.ab.com
Technical Support / Warranty Service

Technical Support
Contact Earthsafe at

(630) 794-5100
(630) 794-5106 Fax

www.earthsafe.com

1312 Marquette Drive, Unit J
Romeoville, Il 60446

Warranty Statement
Earthsafe Systems, Inc. warrants the tank level controls 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.