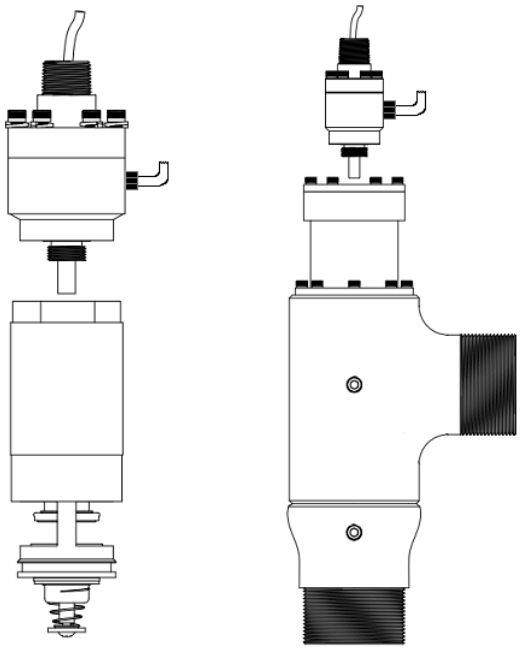
OMNTEC
Advanced Tank Monitoring & Leak Detection

1. Open the camera app
2. Focus the camera on the QR code by gently tapping the code
3. Follow the instructions on the screen to view PDF file

EMLLD

INSTALLATION & OPERATION MANUAL



VAPORLESS
ELECTRO-MECHANICAL LINE LEAK DETECTION

For use with

PROTEUS® OEL8000III-X

Revision 2501

Document No. 550001

OMNTEC® Mfg., Inc. has been certified by DQS Inc. to ISO 9001:2015

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DESCRIPTION

The PROTEUS Electro-Mechanical Line Leak Detection (EMLLD) system is designed to provide compliance with EPA regulations for pressurized piping. The EMLLD system monitors pressure on up to eight unique product lines. The system monitors line pressure via a sensor attached to the VMI LD-2000 or LD-3000 Mechanical Line Leak Detectors (MLLD).

PROTEUS' electronic monitoring of VMI MLLDs provides enhanced environmental protection and increased user-friendliness vs. purely mechanical line leak detection. Upon detection of a possible line release, the system will alarm. The default configuration provides for positive STP shutdown. Thermal issues common with traditional MLLD are prevented by need-based line repressurization during periods of thermal contraction.

PROTEUS EMLLD provides turbine staging to maintain compliance on manifolded piping systems. Control valve management can be used to isolate underground (monitored) segments of piping from aboveground (visually inspectable) piping.

EMLLD is a system option for the OEL8000III-X. This manual should be read in conjunction with the OEL8000III-X Installation Manual.

The EMLLD is a three-part system that includes the components listed below:

- VMI LD-2000 or LD-3000 MLLD mechanical leak detector(s)
- BX-EPS – MLLD piston position sensor(s)
- OMNTEC OEL8000III-X Controller w/ XB-HV Board installed

The EMLLD system includes the following features:

- Automatic fuel line re-pressurization
- Line leak monitoring – up to eight lines
- Turbine staging for manifolded piping systems
- Control Valve management to isolate underground and aboveground piping
- Pressure failure alarm notification
- Full shutdown of the pump when an alarm condition(s) is detected
- Can be programmed for alarm only operation
- Turbine on/off control in response to an authorization signal
- 3 GPH @ 10 PSI testing and logging
- Refer to the OEL8000III-X Installation and programming manual for alarm monitoring and reporting options

INSTALLATION AND WIRING

A. HIGH VOLTAGE WIRING

1. All high voltage wiring must enter the OMNTEC OEL8000III-X on the left side of enclosure (NON-IS Section).
2. All high voltage wiring connects to the high voltage board via eight pin connector plugs.
3. All high voltage field wiring shall be 14 AWG.
4. Power Mains:
    a. The OEL8000III-X EMLLD System requires one dedicated 120-240 VAC 50/60 Hz circuit rated at 15 amperes.
    b. Ground must be connected to earth ground to ensure proper performance of the controller.
    c. See the OMNTEC OEL8000III-X Installation Manual for complete wiring details.

B. AC OUTPUTS (PUMP & CONTROL VALVE)

1. (4) 120-240VAC Outputs per High Voltage Board.
    a. A second High Voltage Board or RB8 can be added if more I/O is required.
2. All AC outputs provided are switched hot.
3. Each output can supply no more than 6 amperes of current.
4. Turbine Outputs:
   If the OEL8000III-X is being used as the site's ATG, the turbine outputs should be wired to an isolation relay block or the turbine contactor.
   If another ATG is being used and the OEL8000III-X is functioning as a stand-alone EMLLD System, the OEL8000III-X turbine outputs must be integrated in a manner that maintains the integrity of the emergency shut-off system.
   See the OEL8000III-X installation and operation manual for complete wiring details.

C. SYSTEM ALARM(S)

1. Audio and visual alarm outputs are provided per product. These can output to separate annunciators. Building Automation Systems (BAS) or similar devices.

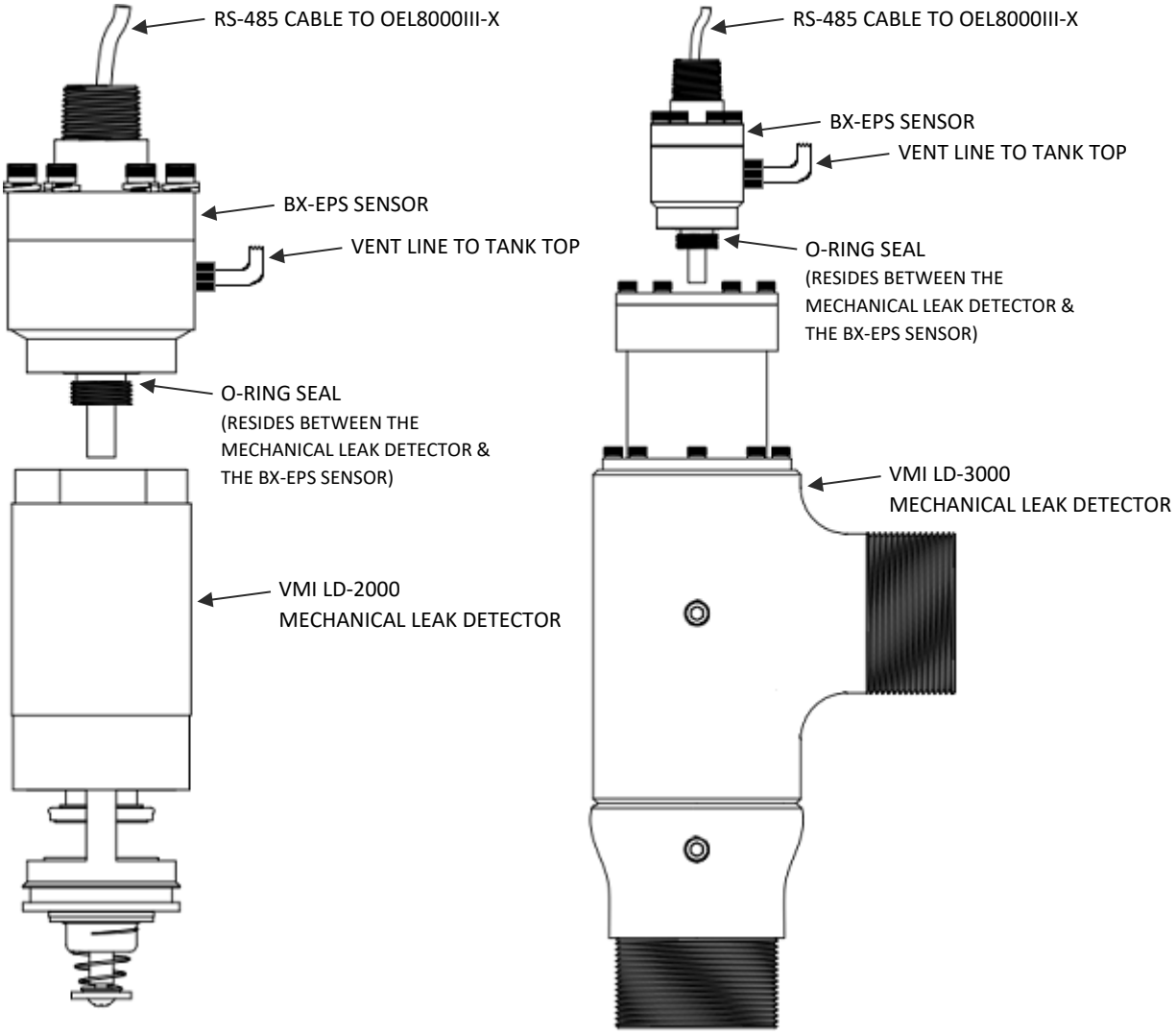
D. AC INPUT(S) (AUTHORIZATION / HOOK SIGNAL)

1. Up to (4) 120-240 VAC Authorization inputs (Dispenser Hook Signal) per High Voltage Board.
    a. Typically, one authorization input per product.
    b. A second High Voltage Board may be added if more I/O are required.

E. BX-EPS SENSOR DETAILS & WIRING: REFER TO THE OEL8000III-X INSTALLATION MANUAL

1. All BX-EPS sensor wiring must enter the OMNTEC OEL8000III-X on the right side of enclosure (IS Section).
2. Low voltage intrinsically safe communications wiring connects to the terminal blocks located in the IS Section of the OEL8000III-X enclosure labeled sensor inputs.
3. All low voltage wiring shall be shielded twisted pair with drain wire and a minimum of 22 AWG (EC-4 Cable).
4. The following page illustrates the VMI LD-2000 / LD-3000 & BX-EPS Sensor Assembly.

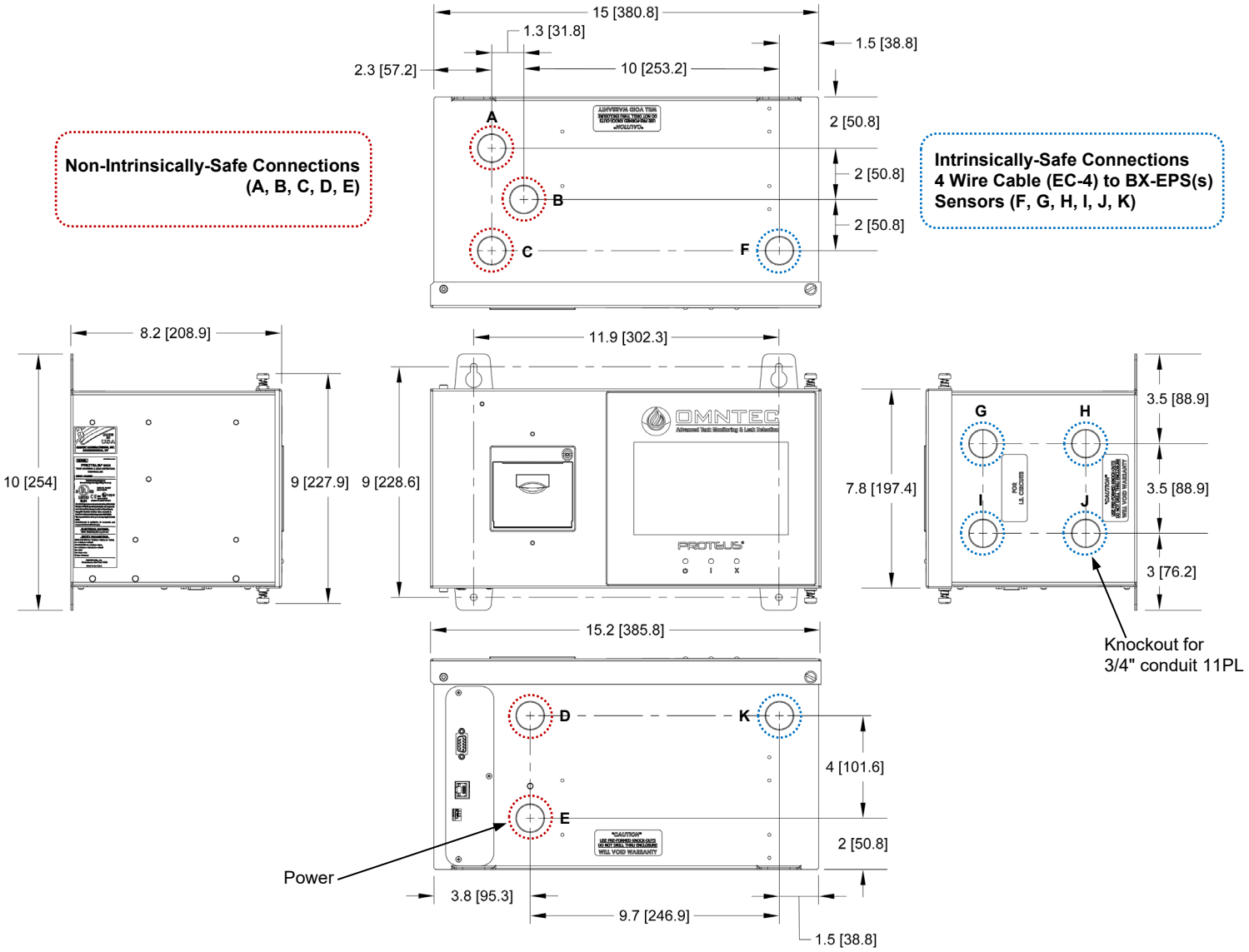
F. VMI LD-2000 & LD-3000 MLLD | BX-EPS SENSOR ASSEMBLY



G. INSTALLATION OF BX-EPS SENSOR(S)

1. Install the provided O-ring on the BX-EPS sensor. Thread the sensor into the vent port of the MLLD until hand tight.
2. Apply a "UL Classified" (QLSR) pipe joint sealing compound (for use with petroleum products) to the provided vent fitting and install in the open port on the side of the BX-EPS sensor.
3. Install copper tubing in the fitting and vent back to tank test port on the submersible pump.
4. Note: When selecting the location of the MLLD(s) that will have a BX-EPS sensor(s) attached. Keep in mind that since the BX-EPS sensor(s) thread into the top of the MLLD, a minimum clearance of five inches is required on the top side of each MLLD to provide the necessary clearance needed for the proper installation of the BX-EPS sensor(s) onto the MLLD(s).

H. OEL8000III-X PENETRATION LOCATIONS FOR INSTRINSICALLY SAFE & NON INSTRINSICALLY SAFE FIELD CONNECTIONS



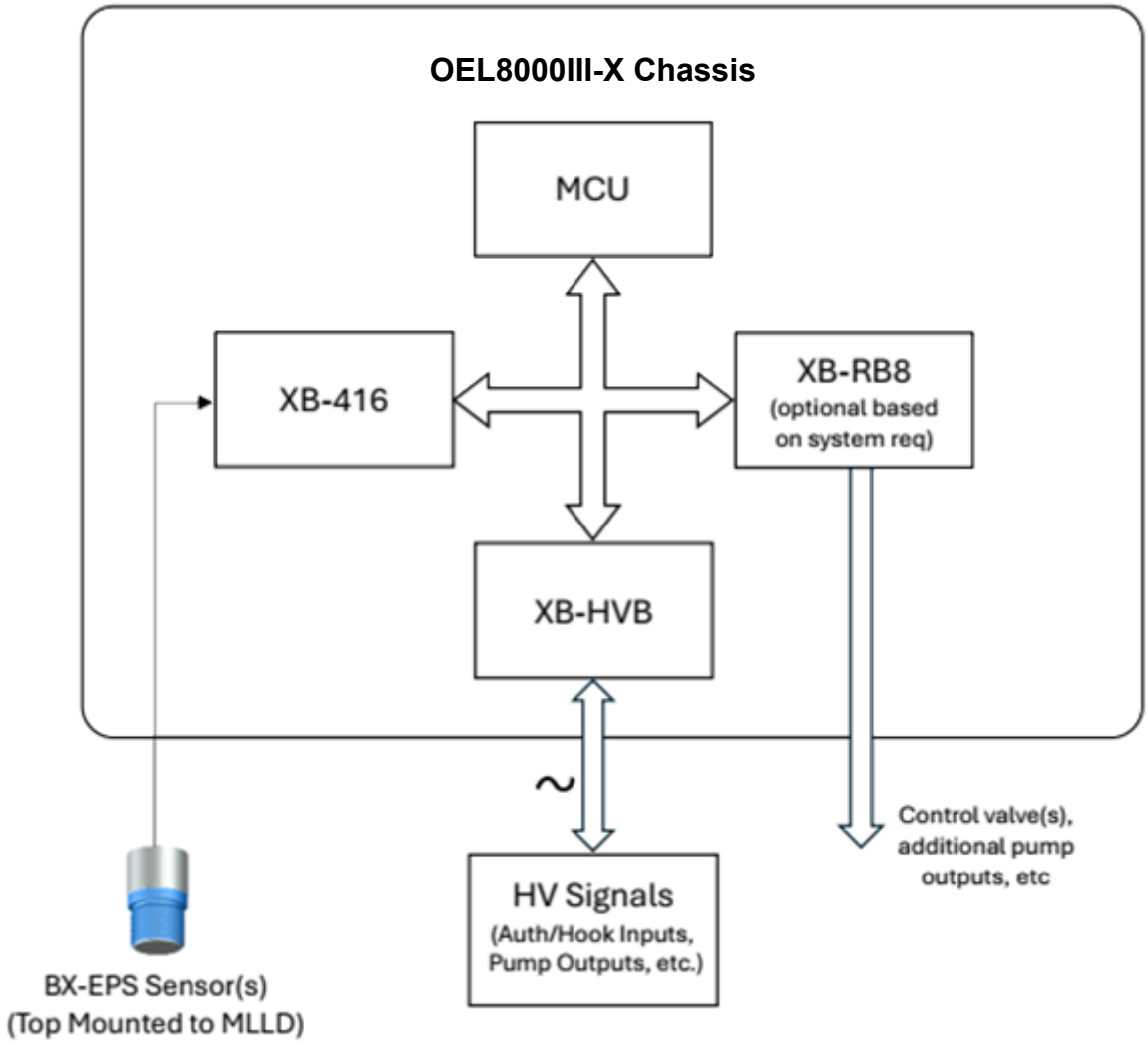
MENU AND PROGRAMMING

Note: Please refer to the OEL8000III-X Programming Manual DOC00008 for information regarding the programming of the device for entering your individual site configuration.

CAUTION

Before proceeding with the Set-up and Programming of the OEL8000III-X - EMLLD System, ensure the circuit breakers for the pumps connected to this system are OFF. Preconfigured software may authorize pump(s) unexpectedly.

SYSTEM BLOCK DIAGRAM



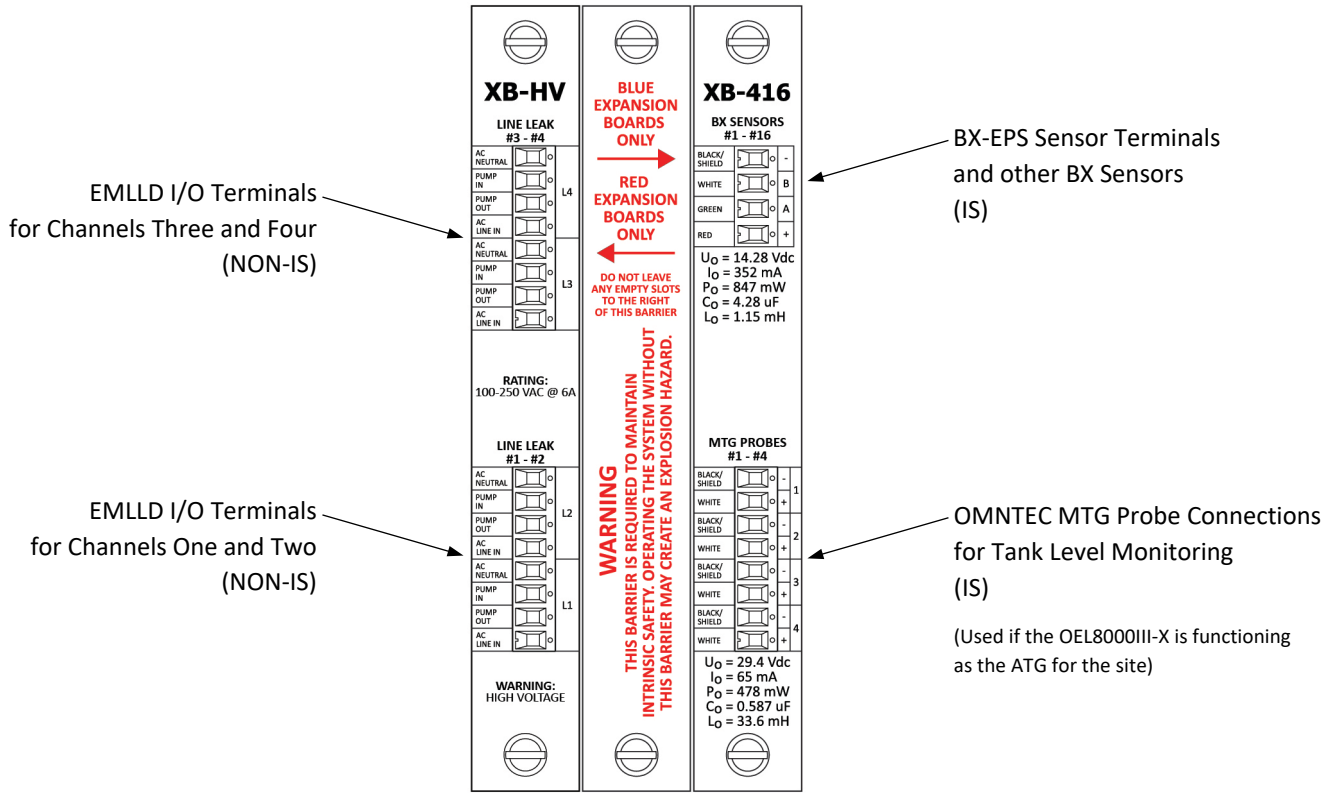
BX-EPS FIELD CONNECTIONS TO OMNTEC OEL8000III-X

The wiring guides on the following pages represent the wiring receptacles located inside of the OEL8000III-X system enclosure. These connections will need to be wired onsite. Please note that not all sites will use all the provided terminations.

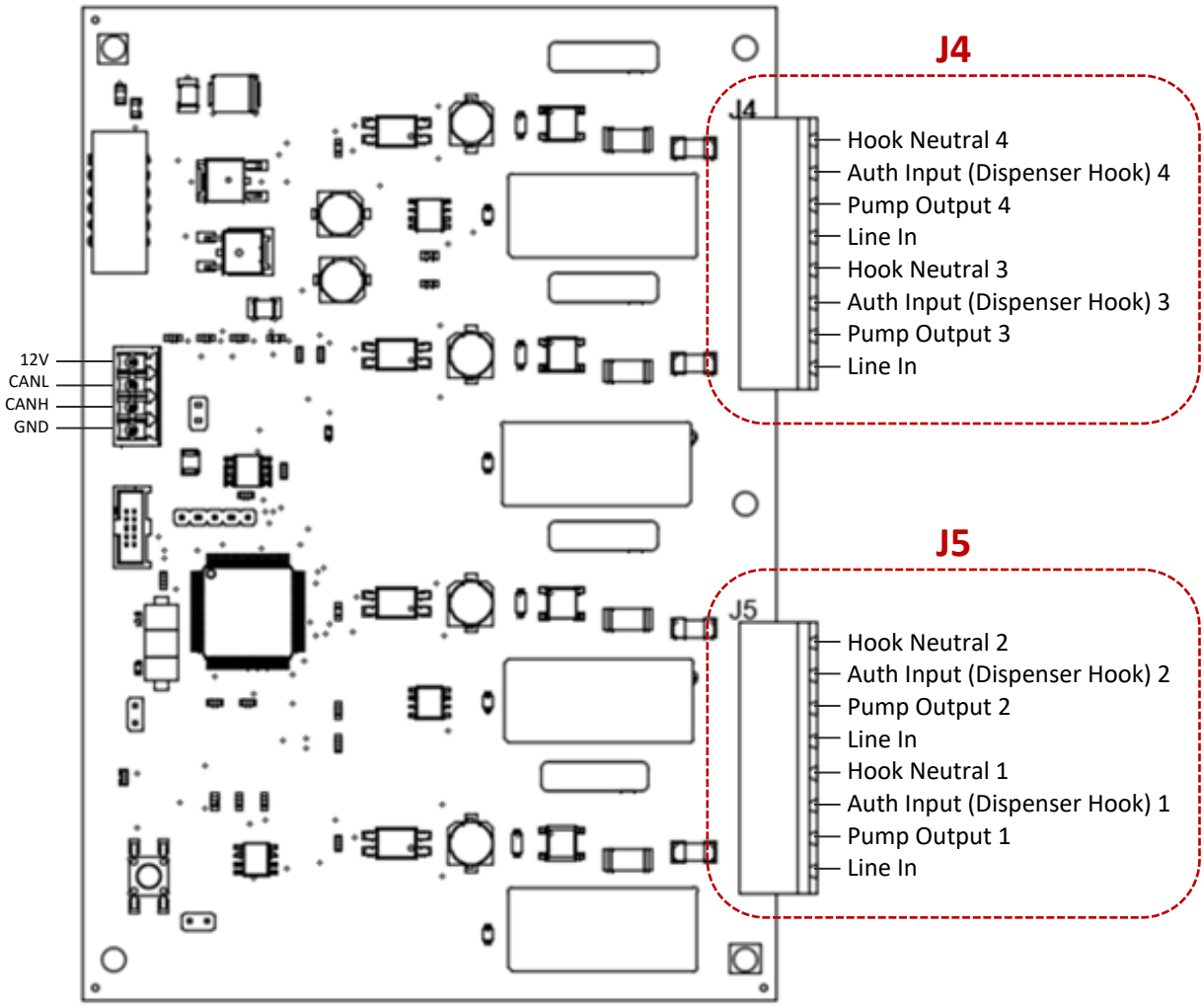
It is the responsibility of the installer to determine which terminals will be used based upon the individual site configuration. Only a qualified electrician familiar with the site should make the electrical connections outlined below. Please contact OMNTEC technical support if you have any questions or concerns regarding the proper field wiring of the EMLLD System.

Note: The following pages outline the various wiring configurations available for the EMLLD System. These field connections are internal to the OMNTEC OEL8000III-X.

The image below illustrates the wire termination points of the OEL8000III-X – EMLLD System (Land wires on terminal plugs).



OEL8000III-X INTERNAL WIRING FOR THE EMLLD SYSTEM



1. Pump Output(s) (Controls the STP and/or Solenoid Valve)
2. AC Line Power (Circuit Breaker Panel)
3. Neutral Connection (Circuit Breaker Panel)
4. Authorization Input (Dispenser Hook Signal)

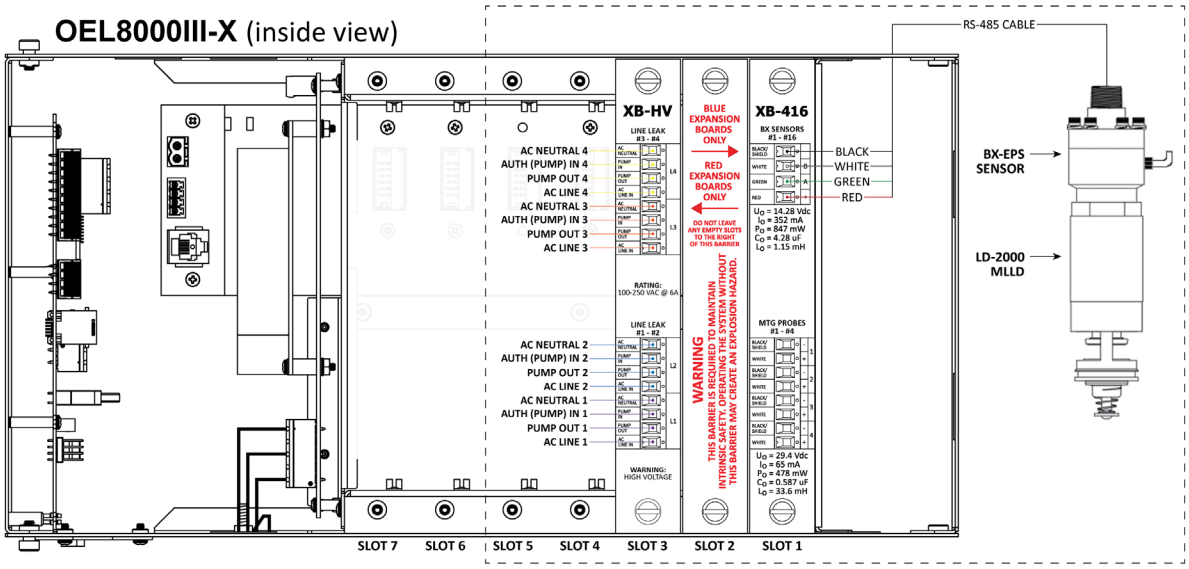
Note: 120 VAC @ 60 Hz is the standard line power supplied to the OMNTEC OEL8000III-X. For additional power options, please consult OMNTEC technical support.

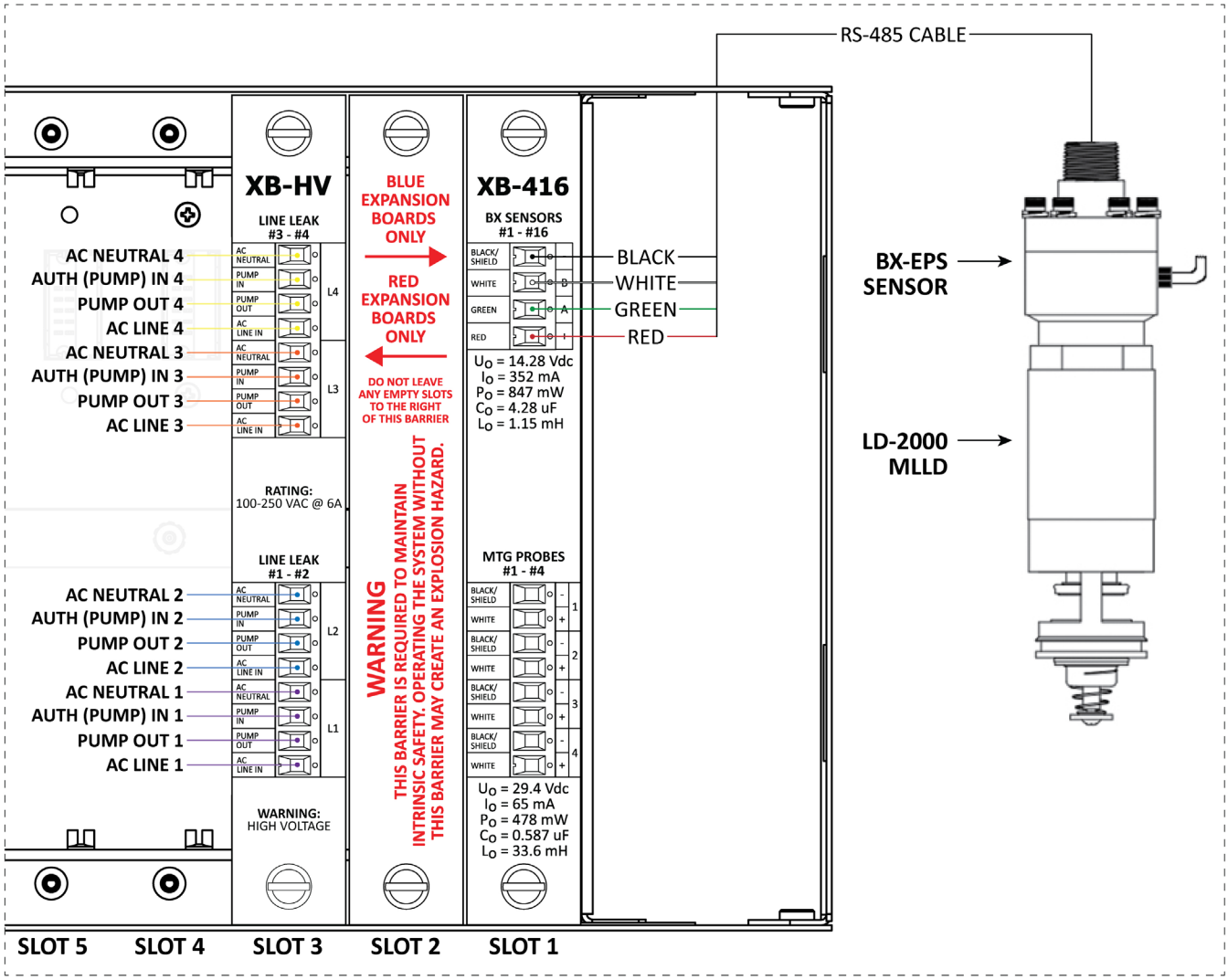
EMLLD WIRING GUIDE FOR THE OEL8000III-X (NON-IS)

J4 CONNECTOR	
PIN	**FUNCTION**
1	Hook Neutral 4
2	Auth Input (Dispenser Handle) 4
3	Pump / CV Output 4
4	Line In
5	Hook Neutral 3
6	Auth Input (Dispenser Handle) 3
7	Pump / CV Output 3
8	Line In

J5 CONNECTOR	
PIN	**FUNCTION**
1	Hook Neutral 2
2	Auth Input (Dispenser Handle) 2
3	Pump / CV Output 2
4	Line In
5	Hook Neutral 1
6	Auth Input (Dispenser Handle) 1
7	Pump / CV Output 1
8	Line In

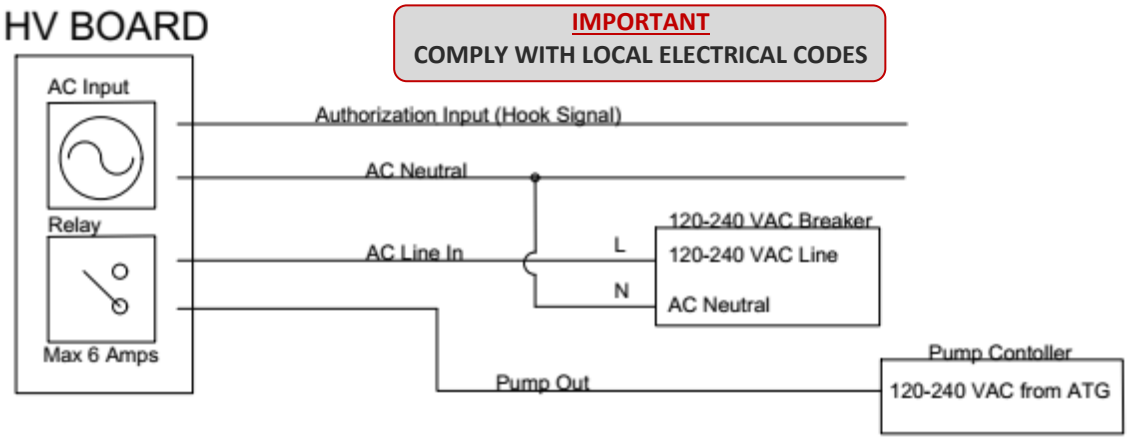
OEL8000III-X BX-EPS SENSOR WIRING (IS)



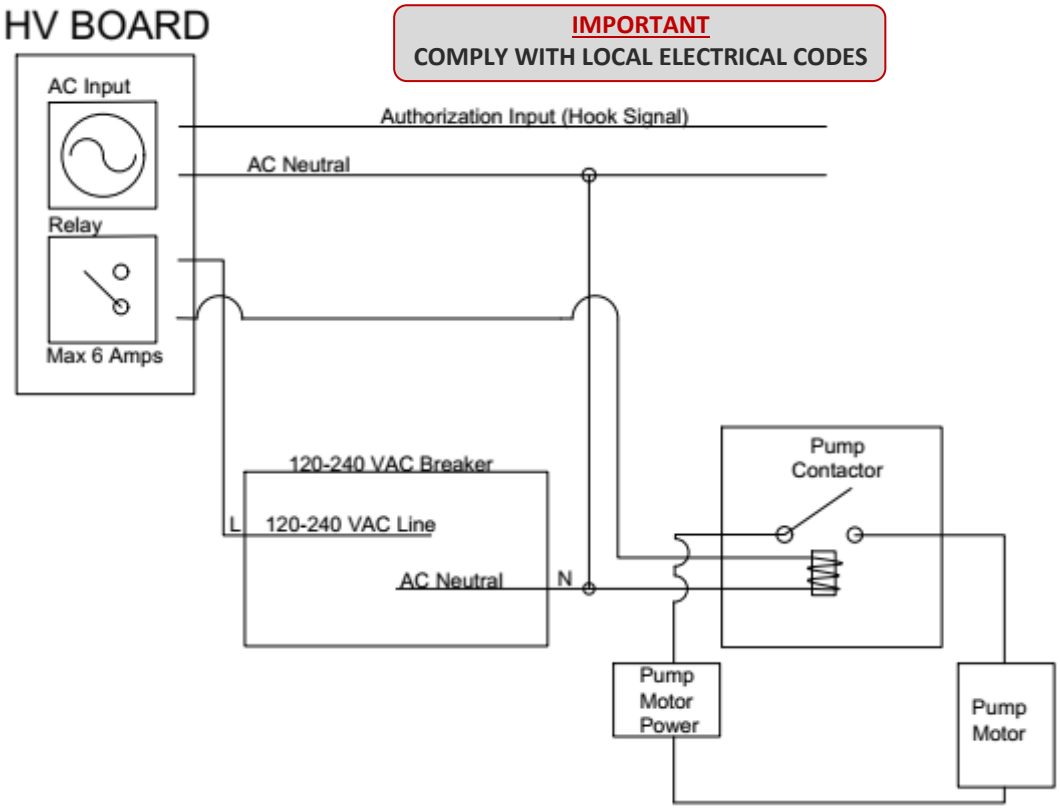


HIGH VOLTAGE BOARD

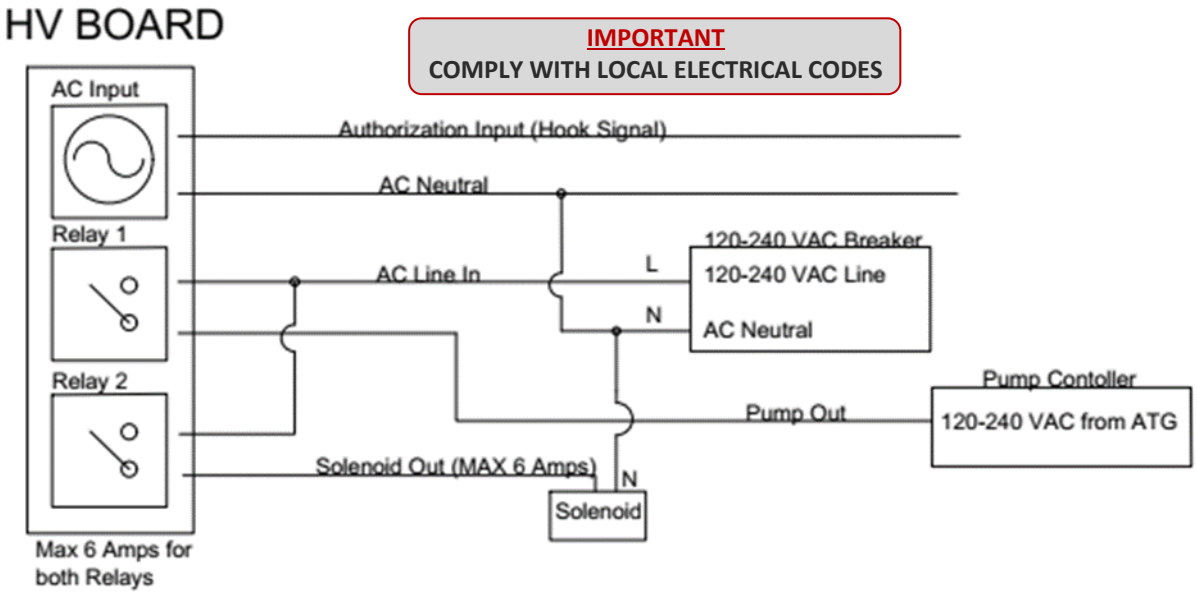
A. HIGH VOLTAGE BOARD TO PUMP CONTROLLER



B. HIGH VOLTAGE BOARD TO PUMP CONTROL RELAY



C. HIGH VOLTAGE BOARD TO PUMP CONTROLLER WITH SOLENOID VALVE



CALIBRATION AND TESTING

A. MEASURING SYSTEM RESILIENCEY

When under pressure all closed piping systems exhibit an elastic response that will force fuel from the line if an opening is provided. The volume of fuel forced from the line is dependent on several factors and must be measured for each installation.

The following statements outline a procedure for measuring the expelled volume, which is referred to as resiliency. This procedure assumes the use of the Vaporless Model LDT-890 Leak Detector Tester to perform this task.

The following procedure assumes no knowledge of the operation of the LDT-890 and therefore details each step of the process. The operation manual supplied with the LDT-890 provides additional information and should be consulted by the technician.

The following procedure measures the resiliency for a single product line. If the site contains multiple products, this procedure must be repeated for each product.

CAUTION

Eye protection required during the calibration & testing process.

1. **POWER OFF**
   Turn off the circuit breaker providing power to the product under test. This is done to prevent the accidental starting of the pump while the line is open in the following steps. Proper lockout/tagout procedures shall be followed for the turbine connected to the line being tested.

2. **INSTALL LDT-890 TEST UNIT**

   WARNING - THE FOLLOWING ASSUMES THE LINE HAS BEEN PURGED BEFORE LDT–890 IS INSTALLED! IF THE LINE HAS NOT BEEN PURGED, DO SO FIRST BEFORE INSTALLING THE LDT-890.

   Select the dispenser at the highest point of the delivery system for the selected product. If there is no elevation difference, select the dispenser furthest from the pump.

3. Set the test unit selector to the PRESSURE STEP TEST position.

   Place the four-way valve in this position whenever the LDT-890 is left unattended.

   CAUTION: You must disable the auto-repressurization function in the OEL8000III-X software prior to proceeding to the next step. Perform this by setting Gross Test to Disabled. See programming manual for details.

4. **POWER ON**
   Turn on the circuit breaker for the turbine for the product under test that was disabled in Step #1.

5. **SYSTEM PURGE**
   Authorize the dispenser. The pump should start running. On the right-hand pressure gauge of the LDT-890, watch for the pump to achieve operating pressure.

6. Check all connections for leaks. Correct any faulty conditions.

7. With the large beaker (1000 ml) under the LDT-890 discharge port, set the selector to the DISPENSER NOZZLE position. Purge the tester of air by allowing 800 to 1000 ml of fuel to flow into the beaker. Continue until the air spitting has stopped. After purging the LDT-890, set the selector back to the PRESSURE STEP TEST position.

8. **RESILIENCY MEASUREMENT**
   Remove the dispenser authorization. The pump should stop running. Unless there are fault conditions such as a leak or significant thermal contraction, the line pressure should stabilize between 20 – 50 PSI.

9. With the large beaker under the LDT-890's discharge port, slowly move the selector counterclockwise until fuel begins to flow. Monitor the line pressure and when it falls to 8 psi rapidly return the selector to the PRESSURE STEP TEST position.

10. With the flow of fuel stopped, empty the collection beaker.

11. With the small (250 ml) beaker under the LDT-890 discharge port, move the selector to the DISPENSER NOZZLE position. Fuel will begin to flow into the beaker. When fuel stops flowing, return the selector to the PRESSURE STEP TEST position.

12. Note the volume of fuel collected. This volume is referred to as resiliency. Repeat the collection process several times to confirm the resiliency volume.

Note: Depending upon the measured volume, the use of the large beaker may be needed. When possible, the small beaker provides more accurate measurements. The **average of several consecutive samples** is necessary to accurately determine the resiliency volume. Enter resiliency value into EMLLD controller. (See the OEL8000III-X Programming Manual for instructions on how to enter the resiliency value into the software).

B. LEAK DETECTOR TEST – 3 GPH@ 10 PSI

Whether the EMLLD System is fitted to a new installation or retrofit to an existing site, a test of the leak detector must be performed. This is done to ensure that the VMI Leak Detector is operating normally and that the programmed EMLLD delay time is sufficient for the VMI Leak Detector to return to the reset position.

The following statements outline the procedure for testing the operation of the VMI Leak Detector. This procedure assumes the use of the Vaporless Model LDT-890 Leak Detector Tester to perform this task.

The following procedure assumes no knowledge of the operation of the LDT-890 and therefore details each step of the process. The operation manual supplied with the LDT-890 provides additional information and should be consulted by the technician.

1. **INSTALL LDT-890 TEST UNIT**
   If the LDT-890 has not been installed, follow steps 1 through 7 in the procedure outlined under Measuring System Resiliency. This procedure should result in the dispenser being authorized, the pump running, and the repressure cycle being disabled. Refer to the programming manual for the procedure to disable the re-pressurization function.

2. **LEAK CALIBRATION**
   With the large beaker (1000 ml) under the LDT-890 discharge port, set the selector to the CALIBRATE GPH position. Fuel will begin to flow into the beaker

3. The object of the next step is to calibrate the fuel flow from the test unit to the rate of three gallons per hour at 10 psi pressure at the discharge. This specification meets the requirements of the EPA regarding leak rate testing.

   Note: Turn the ORIFICE knob counterclockwise to increase flow and clockwise to decrease flow.
   Turn the PRESSURE knob counterclockwise to reduce pressure and clockwise to increase pressure.

4. The procedure is performed as follows:
   FOR THIS FIRST PRESSURE/FLOW CALIBRATION adjust the regulated pressure using the right-hand knob labeled CALIBRATE PRESSURE. Adjust the pressure on the left-hand pressure gauge to 10 PSI.

5. Using the small beaker (250 ml), collect a sample of fuel over a thirty second interval. If the volume is not 95 ml on the first test, the volume will need to be increased or decreased to create a 95 ml flow in 30 seconds. FOR THIS PORTION OF THE CALIBRATION: First adjust the flow using the left-hand CALIBRATE ORIFICE knob and then adjust the pressure using the right-hand CALIBRATE PRESSURE knob to bring the pressure back to 10 psi on the left-hand gauge.

   Adjust the ORIFICE knob first, turn counterclockwise to increase flow and clockwise to decrease flow.

   Adjust the PRESSURE knob second, turn counterclockwise to reduce pressure and clockwise to increase pressure.

The flow is properly adjusted when 95 ml are collected in 30 seconds. This volume is equivalent to a rate of three gallons per hour at 10 psi. Repeat the procedure until the correct volume of fuel is collected in the specified time.

6. Set the selector to the PRESSURE STEP TEST position and remove the dispenser authorization.

7. **REDUCE LINE PRESSURE TO ZERO**
   With the large beaker under the LDT-890 discharge port, set the selector to the DISPENSER NOZZLE position. Fuel will begin to flow into the beaker. After the reading on the right-hand pressure gauge falls to zero, set the selector to the PRESSURE STEP TEST position.

8. **READ OPERATING PRESSURE**
   Authorize the dispenser. The pump will start running. Watch for the pump to achieve operating pressure as seen on the right-hand pressure gauge. Note this pressure reading on the LDT-890 Test form and then remove the authorization from the dispenser.

9. **REDUCE LINE PRESSURE TO ZERO**
   With the large beaker under the discharge port, set the test unit's selector to the DISPENSER NOZZLE position. Fuel will begin to flow into the beaker. After the reading on the right-hand pressure gauge falls to zero, set the test unit's selector to the GPH TEST position and authorize the dispenser.

10. **3 GPH LEAK DETECTOR TEST**
    With the dispenser authorized, the pump will start running. With the selector in the GPH TEST position a 3 GPH leak has been introduced to the system. On the right-hand pressure gauge watch for the pump to build pressure. If the mechanical leak detector is properly calibrated this pressure should not reach the normal operating pressure previously observed. Note this lower pressure value here. Remove the authorization from the dispenser.

11. **REDUCE LINE PRESSURE TO ZERO**
    Set the test unit's selector to the DISPENSER NOZZLE position. Fuel will flow into the beaker. After the reading on the right-hand pressure gauge falls to zero, set the selector to the GPH TEST position and again authorize the dispenser

12. **LEAK TEST CONFIRMATION**
    With the dispenser authorized, the pump will start running. Again, note that with the selector in the GPH TEST position a three gph leak has been introduced to the system. Watch the right-hand pressure gauge as the pump builds pressure. The pressure should build to the value noted in Step #10 above.

    TECHNICAL NOTE — If on either test, the pressure indicated on the right-hand pressure gauge does not stabilize at the lower pressure, but rather steps through to the higher normal operating value, the leak detector has failed the leak test. Replace or adjust the LD-2000 or LD-3000 to detect the calibrated leak consistently. The BX-EPS Piston Sensor will have to be removed to complete this adjustment. Contact VMI for MLLD adjustment instructions if needed.

    After the MLLD has been replaced or properly adjusted to detect the leak, and the Piston Sensor has been reinstalled, turn the selector to the PRESSURE STEP TEST position. Authorize the pump. Following a short delay, the pressure should step up to the value noted in Step 8. This is the indication that the mechanical leak detector has properly transferred from its leak test position to its full flow position.

13. **AUTO-REPRESSURE TEST**
    Remove the dispenser authorization. With the large beaker under the discharge port, set the selector to the DISPENSER NOZZLE position. Fuel will flow into the beaker. After the reading on the right-hand pressure gauge falls to zero, set the selector to the PRESSURE STEP TEST position.

    Return to the OEL8000III-X console and re-enable repressurization function. Perform this by setting Gross Test to Enabled. Reset the EMLLD system using the touchscreen interface to initialize the repressure cycle. The pump will start running. Immediately return to the dispenser.

    On the right-hand pressure gauge of the LDT-890, verify that normal operating pressure has been achieved. If the REPRESSURE RETRIES has been set to one or more cycles, the system may cycle one or more times to reach the normal operating pressure (full pump pressure).

14. At the end of the pump REPRESSURE cycle, the EMLLD will automatically turn off the pump. IMMEDIATELY AFTER THE PUMP SHUTS OFF, set the selector on the LDT-890 to the GPH TEST position. This will introduce a 3 GPH leak to the system. This leak may be introduced with the pump running during the REPRESSURE CYCLE AS LONG AS THE LEAK DETECTOR HAS STEPPED THROUGH TO THE FULL FLOW.

    On the right-hand pressure gauge of the LDT-890, verify that the pressure falls due to the 3 GPH leak. If the proper delay has been entered, the pressure should fall to zero before the next Repressurization Cycle is started.

15. At the end of the delay timing cycle, the EMLLD will automatically turn on the pump. Pressure will begin to build but should stop at the value observed in Step 10 indicating that the leak detector has found the 3 GPH leak. If the REPRESSURE RETRIES is set to two or more cycles, the EMLLD controller will retest one or more times. The EMLLD controller should recognize the line leak after the cycles are completed, shut down the STP, and alarm. This successfully completes the EMLLD test. Programming the system to operate in an “Alarm Only” mode is also available. This mode does not offer turbine shutdown if a line leak is detected by the system.

16. **DISCONNECT LDT-890 TEST UNIT**

     Perform OSHA lockout/tagout procedures for the turbine’s supply power.

17. With the large beaker under the LDT-890 discharge port, set the selector to the DISPENSER NOZZLE position and bleed off fuel until the reading on the right-hand pressure gauge is zero.

18. Remove the LDT-890. Before re-energizing the pump, ensure system is returned to tight status.

19. **FULL SYSTEM OPERATION**
    Turn on the power breaker. If necessary, press the RESET touchscreen icon on the OEL8000III-X to reset all active product channels. This completes the test procedure. The EMLLD system integration is now fully functional.

TECHNICAL SPECIFICATIONS AND NRTL APPROVALS

A. The EMLLD System has been designed to operate in the following environmental variables.

1. **Altitude:** 0 to 2,000 meters above sea level (0 to 6,561 feet above sea level)
2. **Temperature:** 0 to 120 degrees Fahrenheit (-17 to +48 degrees Celsius)
3. **Relative Humidity:** 10% to 90% RH
4. **Supply Voltage:** Shall not vary more than 10% from 120/240 VAC to the OEL8000III-X

B. The following information for the supply circuit breaker and supply wire shall be observed:

1.  The OEL8000III-X shall be supplied with 120-240 VAC at 50/60 Hz power originating from an approved circuit breaker rated not more than 15 amperes. We recommend that the supply power circuit breaker be as close to the OEL8000III-X as possible. The approved supply circuit breaker shall also function as the power disconnect for the OEL8000III-X. Additionally, the supply circuit breaker shall be properly marked as being the disconnection device for the OEL8000III-X.

2. Whether it be EMT, Flexible or Liquid-Tight conduit. Only metallic core type conduit shall be used when installing the device. This will provide a proper ground path for safety.

3.  The conductors supplying power to the OEL8000III-X high voltage boards shall be sized at 14 AWG (minimum) stranded THHN or equivalent wire. With a temperature rating of 60 degrees Celsius (minimum). Use Copper Conductors Only.

Note: Refer to the wiring guide on page #9 of this manual.

C. The following information applies to the relay control circuit of the EMLLD:

1.  The relay control circuit shall not exceed 240 VAC and 6 amperes. The relay control circuit is designed to be an output to a pump controller or similar device. This output may also connect to the coil of a pump contactor. The relay output shall not be used to directly drive a pump under any circumstances.

2.  The conductor to the EMLLD relay circuit shall be sized at 14 gauge (minimum) stranded THHN wire. With a temperature rating of 60 degrees Celsius (minimum). Use Copper Conductors Only.

D. The following information applies to the EMLLD system:

1.  The EMLLD may be damaged if used in any other manner not described in this manual. Additionally, the protection provided by the equipment may be impaired.
2. There are no user serviceable parts contained within the OEL8000III-X enclosure. If the unit malfunctions, it must be returned to the manufacturer for diagnosis, repair, and/or replacement

E. OMNTEC OEL8000III-X NRTL APPROVALS

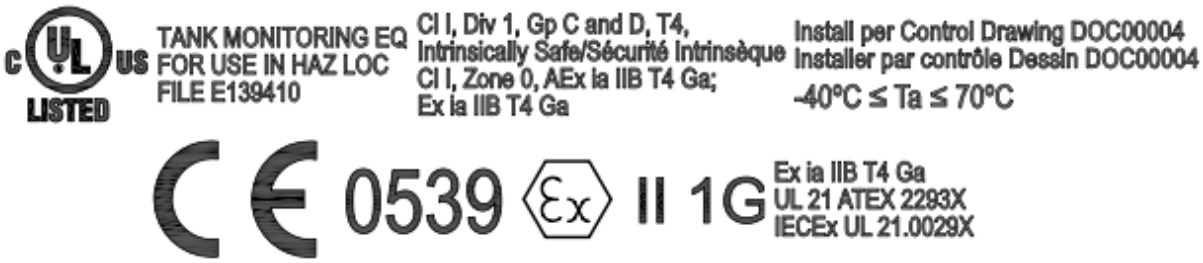
- UL508, 18th Ed.
- UL913, 8th Ed.
- UL60079-0, 7th Ed.
- UL60079-11, 6th Ed.
- CAN/CSA C22.2 No. 157-92, 2012
- CAN/CSA C22.2 No. 60079-0:19, 4th Ed.
- CAN/CSA C22.2 No. 60079-11:14, 2nd Ed.
- CSA C22.2 No. 14, 13th Ed.

- **Reference:** UL File E139410 (Volume #1, Section #4)

F. BX-EPS SENSOR NRTL APPROVALS

- UL913, 8th Ed.
- UL60079-0, 7th Ed.
- UL60079-11, 6th Ed.
- CSA-C22.2 No. 60079-0:19, 4th Ed.
- CSA-C22.2 No. 60079-11:14, 2nd Ed.

- **Reference:** UL File: E139410 (Volume #1, Section #5)



SITE RESILIENCY RECORDING

Record the measured resilience for each product line for future reference below.

- **Product Line #1: _____ ml**
- **Product Line #2: _____ ml**
- **Product Line #3: _____ ml**
- **Product Line #4: _____ ml**
- **Product Line #5: _____ ml**
- **Product Line #6: _____ ml**
- **Product Line #7: _____ ml**
- **Product Line #8: _____ ml**

Notes: _____

_____

_____

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_____

_____

Manufactured by:

OMNTEC Manufacturing, Inc.
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