Optical Vapor Eliminator (US Patent #7000628) Installation and Parts
Before disassembly of any meter or accessory component:

- All internal pressures must be relieved and all liquid drained from the system in accordance with all applicable procedures.
- Pressure must be 0 (zero) psi.
- Close all liquid and vapor lines between the meter and liquid source.

**WARNING**

Failure to follow this warning could result in property damage, personal injury, or death from fire and/or explosion, or other hazards that may be associated with this type of equipment.

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**In the Event of a Large Gas Leak**

- Evacuate the area and notify the fire department.
- Stop the leak and prevent accidental ignition.
- Prevent the entrance of gas into other portions of the buildings. Some gases, such as LPG, seek lower levels, while other gases seek higher levels.
- Evacuate all people from the danger zone.
- See that the gas is dispersed before resuming business and operating motors.

If in doubt, notify your local fire department.

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**In the Event of Small, Contained Gas Leak**

- Stop the leak if you can safely reach the equipment.
- Use the appropriate extinguisher: Class B fire extinguisher, water, fog, etc., depending on the materials.
- If in doubt, call your local fire department.

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**In the Event of Large Fires or Fires That Are Spreading**

- Evacuate the building and notify your local fire department.
- Stop the leakage only if you can safely reach the equipment.

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**Publication Updates and Translations**

The most current English versions of all Liquid Controls publications are available on our website, www.lcmeter.com. It is the responsibility of the local distributor to provide the most current version of LC manuals, instructions, and specification sheets in the required language of the country, or the language of the end user to which the products are shipping. If there are questions about the language of any LC manuals, instructions, or specification sheets, please contact your local distributor.
**Optical Vapor Eliminators (A8302)**

**Materials of Construction**
- **Body:** Anodized Aluminum
- **Solenoid:** Brass

**Pressure Rating**
- Maximum non-shock working pressure: 350 PSI (24.1 BAR)

**Temperature Rating**
- -40° to 160°F (-40° to 71°C)

**Solenoid (S3)**
- **Voltage:** +12 (± 2) VDC
- +24 (± 4) VDC available upon request
- **Current:** 1 Amp maximum

**General Information**
Liquid Controls Optical Vapor Eliminator (A8302) is designed for use with LectroCount® electronic registers and require the use of a solenoid-operated valve. It is constructed to be used with Liquid Controls MA5 and MA7 meters measuring liquid propane gas. Because it is designed with the same mounting dimensions as Liquid Controls mechanical vapor eliminators, the optical vapor eliminator requires minimal plumbing changes in order to retrofit to existing meter installations of the same application. Electronic registers require CPU board part number 81920 for LCR and LCR-II, CPU board part number 81924 for LC³.

**How the Optical Vapor Eliminator Works**
The Liquid Controls Optical Vapor Eliminator removes vapor from the metering system. Removing the vapor from the metering system ensures that only liquid can pass through the meter for measurement.

An optical sensor, installed in the wall of the vapor eliminator housing, activates and deactivates a solenoid valve (S3) located at the top of the vapor eliminator.

When the liquid level is below the optical sensor (and a delivery is initiated) the solenoid valve opens to vent vapor to a supply or storage tank (Figure 1). At the same time, the electronically actuated control valve, located at the meter outlet, closes to stop the flow of product.

As vapor is exhausted and liquid rises over the optical sensor level, the optical vapor eliminator solenoid valve (S3) closes the vent while the electronically actuated control valve opens so that a delivery may begin or continue (Figure 2).

As long as a delivery is active and the liquid level remains at or above the optical sensor, the optical vapor eliminator solenoid valve (S3) remains closed and the electronically actuated control valve remains open. If the liquid level drops below the optical sensor, the optical vapor eliminator solenoid valve (S3) opens to vent the vapor, and the outlet control valve closes blocking product flow.

When the delivery is complete, both the outlet control valve and the optical vapor eliminator solenoid valve close until activated for a new delivery.

**NOTICE**
A8302 LPG metering systems use materials specifically intended for their application to ensure high performance, longevity and above all safety. Under no circumstances should a system designed for LPG be used to deliver another product without first replacing the necessary metallurgical and seal materials specified for the application. Conversion kits are available from Liquid Controls.

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**Figure 1: Liquid Level below Optical Sensor**

**Figure 2: Liquid Level at or above Optical Sensor**
How the Optical Vapor Eliminator Works

The figures to the right show a cutaway view of the vent port through the solenoid valve.

When the liquid level is below the sensor, the S3 solenoid valve opens and allows vapor through to the vent port (Figure 4). When the liquid level is at or above the optical sensor, the S3 solenoid valve closes the vent path (Figure 5).

The diagram in Figure 6 shows the LectroCount® register logic for a preset delivery. In order to function properly, the optical vapor eliminator must be used in conjunction with a solenoid actuated control valve at the meter outlet.
New Installations
When ordered with a new meter, the optical vapor eliminator is supplied mounted on top of a strainer on the inlet side of the meter. An example is shown in the figure to the right.

A vent line must be connected from the output port of the optical vapor eliminator to a supply or storage tank. This connection is ½” NPT. The vent line must be connected to the supply or storage tank.

The optical vapor eliminator solenoid valve and optical sensor are shipped pre-wired to the LectroCount® electronic register.

Retrofit Installations
Depending on the existing configuration, adding an optical vapor eliminator valve may require modification of the vent piping, modification or change of the outlet valve, and modification or change of the register.

The optical vapor eliminator requires the following components to operate:

- LectroCount® LCR/LCR-II electronic register with internal CPU board 81920 or 84040, LC³ with CPU board 81924, or LCR 600 with CPU board 84040
- Electronically controlled outlet valve

Refer to the manuals accompanying these components for proper installation and configuration.

**WARNING**

**RELIEVING INTERNAL PRESSURE**

All internal pressure must be relieved to zero pressure before disassembly or inspection of the strainer, vapor eliminator and any valves in the system, the packing gland, and the front or rear covers.

SERIOUS INJURY OR DEATH FROM FIRE OR EXPLOSION COULD RESULT IN PERFORMING MAINTENANCE ON AN IMPROPERLY DEPRESSURIZED AND EVACUATED SYSTEM.

Relieving Internal Pressure Procedure for LPG and NH₃ Meters

1. Close the belly valve of the supply tank.
2. Close the valve on the vapor return line.
3. Close the manual valve in the supply line on the inlet side of the meter. If no manual valve exists on the inlet side, consult the truck manufacturer for procedures to depressurize the system.
4. Slowly open the valve/nozzle at the end of the supply line.
5. After product has bled off, close the valve/nozzle at the end of the supply line.
6. Slowly crack the fitting on top of the differential valve to relieve product pressure in the system. Product will drain from the meter system.
7. As product is bleeding from the differential valve, slowly reopen and close the valve/nozzle on the discharge line. Repeat this step until the product stops draining from the differential valve and discharge line valve/nozzle.
8. Leave the discharge line valve/nozzle open while working on the system.

**RETROFIT INSTALLATIONS**

To retrofit an optical vapor eliminator:

1. Remove Old Vapor Eliminator and Baffel Cup
   After the internal pressure has been relieved from the system and the assembly drained of liquid, remove the four bolts and washers used to fasten the vapor eliminator to the top of the strainer. Inspect the O-ring and replace if necessary.

2. Mount the Optical Vapor Eliminator
   Depending on the strainer being used, the optical vapor eliminator may be fastened to the strainer/vapor eliminator in any of four 90° rotational increments. Select the most suitable orientation for the final installation of wiring and vent piping.
   Fasten the optical vapor eliminator to the strainer using the four bolts and washers. Tighten the bolts to a torque of 27 lb-ft (37 Nm).

3. Connect the Control Piping/Tubing for LPG
   Make plumbing connections from the 3-way solenoid valve assembly to vapor eliminator and differential valve assembly. Follow the lettered designations in Figure 10.

4. Wire the Solenoid and Sensor to the Register
   Wiring instructions begin on Page 10.

![Figure 7: New Assembly](image1)
![Figure 8: Remove old Vapor Eliminator](image2)
![Figure 9: Orient and Fasten the Optical Vapor Eliminator](image3)
![Figure 10: LPG Plumbing Connections](image4)
![Figure 11: Optical Sensor and Solenoid Valve](image5)
**Wiring**

The electrical installation of the optical vapor eliminator includes connecting the S3 solenoid and the optical sensor to the LectroCount register.

The optical sensor has a 24” cable potted to the inside of the optical sensor assembly at one end. The other end of the cable has a threaded cord grip that fastens into the back of the LectroCount® register.

The S3 solenoid-operated valve requires a 12 AWG, two-wire, braided cable, approximately 24 to 36” in length.

The S3 solenoid-operated valve requires a LectroCount® LCR/LCR-II electronic register with CPU board part number 81920 or 84040 (LC® with 81924). If the LectroCount® does not contain a proper CPU board (LC® with 81924), replacement CPU boards can be ordered.

The 81920 and 84040 CPU board has an additional terminal, J15 (J11 on the LC® 81924 CPU board). The extra terminal vital for operating the optical vapor eliminator, and it is not present on other board models.

**To wire the S3 solenoid and the optical sensor:**

1. **Remove Cable Plug**
   - Loosen and remove the screw from the cover of the S3 solenoid valve cable plug. Remove the cable plug from the solenoid valve coil. Remove the cover from the cable plug housing and then remove the terminal block. Be sure to note its orientation in the housing. Leave the flat gasket in place on the coil.

2. **Connect Cable to Cable Plug**
   - Route one end of the cable through the conduit fitting and into the cable plug housing. Connect the cable wires to the terminal block. Connect the BLACK wire to Terminal 2 and the RED wire to Terminal 1. The terminals are indicated by a small “1” and “2” raised plastic.

**Caution**

Incorrect wiring can damage the optical sensor and the LectroCount® register.

**WARNING**

For North American Installations, the installation must be fully in accordance with the National Electrical Code (US) or the Canadian Electrical Code respectively.
**WARNING**

Before disassembly of any meter or accessory component, ALL INTERNAL PRESSURES MUST BE RELIEVED AND ALL LIQUID DRAINED FROM THE SYSTEM IN ACCORDANCE WITH ALL APPLICABLE PROCEDURES. Pressure must be 0 (zero) psi. Close all liquid and vapor lines between the meter and liquid source.

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Disassembly

The optical vapor eliminator consists of a housing, an optical sensor, and a solenoid-operated control valve. Of these three components, only the solenoid valve is serviceable; however, if any part of the solenoid is damaged, a new solenoid assembly (PN 502011) can be ordered. The optical sensor contains no serviceable parts because the internal components are potted. If the optical sensor fails, the complete assembly must be replaced (PN 81947).

**To disassemble the S3 solenoid:**

1. Loosen the thin hex nut holding the solenoid in place using a 14 mm wrench. Remove the nut and coil from the armature guide post.

2. Remove the plastic bonnet from the armature guide post.

3. Using a screwdriver, loosen the upper left and lower right screws of the valve body. These two screws hold the valve body in place. The upper right and lower left screws fasten the armature guide post and valve body together. Remove the valve body from the optical vapor eliminator housing.

4. Place the valve body on a flat surface. Using a flat blade screwdriver, remove the two screws which hold the armature guide post and valve body together. Lift the armature guide post off of the valve body. There is a plunger and a spring inside the guide post. Inspect the spring for damage.

Tools required:
- Flat blade screwdriver
- 14 mm box end or open end wrench

Disassembly (cont.)

5. The armature guide post is composed of four components: two O-rings, the guide post, and the flange. Inspect these components for damage.

6. The valve body has two O-rings found on the face that butt against the housing. The two O-rings are identical. Inspect them for damage. Inspect the ports for blockage.

Reassembly

1. Place the spring inside the plunger and insert the plunger, spring end first, into the armature guide post. Place the armature guide post assembly on the valve body. Fasten the armature guide post to the valve body. Two holes of the valve body are threaded and two are not. Screw the proper two screws into the threaded holes.

2. Align the solenoid valve body so that the stamped number on the valve body faces in towards the housing assembly (shown in the pictures to the right). The valve body can physically be fastened to the housing assembly in one of two orientations. Only one orientation is correct. With the valve body in the proper orientation, fasten it to the housing. Tighten to a torque of 15 to 18 in-lbs (1.7 to 2.0 Nm).

3. Place the plastic bonnet over the valve body and snap in place.

4. Place the coil over the armature guide post and fasten with the thin hex nut. Tighten the nut with a 14mm wrench to a torque of 4.5 in-lbs (0.5 Nm).

**IMPORTANT!**

If the stamped numbers face away from the housing, the optical vapor eliminator will not function properly. The port will never open.
To replace the optical sensor (PN 81947):

1. Drain the system and relieve all internal pressures.
2. Use a 1" open end wrench to remove the optical sensor from the housing.
3. Replace with new optical sensor. When tightening, do not exceed a torque of 75 in-lbs (8.5 Nm).

⚠️ WARNING

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Optional Sensor

A light coating of grease or anti-seize lubricant should be applied to the threads of the sensor prior to assembly.

Troubleshooting

Excessive liquid flowing out of vent to supply or storage tank.

**SCENARIO 1: Solenoid not closing.**
1. Check S3 solenoid wiring.
2. Measure resistance across S3 solenoid. It should read approximately 15 Ω. If not, replace S3 solenoid.
3. Inspect S3 solenoid for blockage. Refer to disassembly instructions.

**SCENARIO 2: Optical sensor not functioning.**
1. Check optical sensor wiring.
2. Measure resistance between the RED and WHITE wires. Value should be approximately 10kΩ. If not, replace optical sensor.
3. LectroCount® CPU failure. Replace CPU board.

Liquid not flowing though meter during delivery.

**SCENARIO 1: Liquid level not rising in optical vapor eliminator.**
1. Check S3 solenoid. It may not be opening to allow air/vapor to vent.
2. Check S3 solenoid wiring.
3. Measure resistance across S3 solenoid. It should read approximately 15 Ω. If not, replace S3 solenoid.
4. Inspect S3 solenoid for blockage. Refer to disassembly instructions.
5. LectroCount® CPU failure. Replace CPU board.

**SCENARIO 2: Meter outlet valve not opening**
1. Check wiring of the outlet valve S1 solenoid.
2. Measure resistance across S1 solenoid. Value should read approximately 15Ω. If not, replace S1 solenoid.
3. Inspect S1 solenoid for blockage. Refer to the manual that accompanies the valve.

A light coating of grease or anti-seize lubricant should be applied to the threads of the sensor prior to assembly.

### Bill of Materials - Exploded View

**A8302 Optical Vapor Eliminator (LPG)**

- 09357 Connector ¼ NPT
- 07545 Pressure Relief Valve
- 06790 Pipe Plug .250-16 NPT
- 09356 Pipe Tee, Male Run ¼ NPT
- 501520 Air Eliminator Housing
- 09358 Male Elbow ¼ NPT (female)
- 00306 Screw #2 x .19 (4)
- 04486 Flat Washer (4)
- 06851 Screw .375-16 x 1.5 (4)
- 50201 2-Way Solenoid Valve (Available as complete assembly only)
- 71004 Cord Grip ½ NPT
- 81947 Liquid Level Sensor
- 08156 Valve Cable Kit