TABLE OF CONTENTS

INTRODUCTION
Safety ..............................................................2
Overview ........................................................4
Specifications ..................................................5
Dimensions ......................................................5

MAINTENANCE
Bill of Materials .............................................11
Troubleshooting .............................................11

INSTALLATION
Installation Overview ........................................6
Mechanical Installation .......................................6
Electrical Installation .........................................8
LectroCount Shutdown Value Setting .................10

SAFETY PROCEDURES

Be Prepared

WARNING
• Before using this product, read and understand the instructions.
• All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of equipment and/or systems in accordance with all applicable codes and ordinances.
• When handling electronic components and boards, always use proper Electrostatic Discharge (ESD) equipment and follow the proper procedures.
• Make sure that all necessary safety precautions have been taken.
• Provide for proper ventilation, temperature control, fire prevention, evacuation, and fire management.
• Provide easy access to the appropriate fire extinguishers for your product.
• Consult with your local fire department, state, and local codes to ensure adequate preparation.
• Read this manual as well as all the literature provided in your owner’s packet.
• Save these instructions for future reference.
• Failure to follow the instructions set forth in this publication 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.

Observe National and Local Codes

WARNING
Installations must be in full accordance with the the area classification in order to maintain the hazardous location ratings on the product.

WARNING: Explosion Hazard - Substitution of components may impair suitability for hazardous area applications.

WARNING: Explosion Hazard - When in hazardous locations, turn power OFF before replacing or wiring modules.

WARNING: Explosion Hazard - Do NOT disconnect equipment unless power has been switched OFF or the area is known to be Non-Hazardous.

Publication Updates and Translations
The most current English versions of all Liquid Controls publications are available on our web site, 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.

Use of the Liquid Controls Differential Pressure Transducer for monitoring differential pressure across the full flow fuel monitor or water coalescer is not a substitute for industry-standard inspection and maintenance procedures including collection of sump samples from storage, tanker, and filter vessel membrane tests; white bucket tests; and other regularly scheduled preventative maintenance activities for all fueling equipment.
Differential Pressure (∆P) Transducer Overview

The differential pressure (∆P) transducer is specifically designed for aviation fueling systems on refuelers, hydrant carts and stationary systems. The ∆P transducer is compatible with Liquid Controls LectroCount LCR-II and LCR 600 electronic registers.

Ensure the Proper Software is Installed

The differential pressure transducer will only operate with LectroCount LCR-II electronic registers with SR214 operating software installed (version 4.04 or higher) and compatible ticket software installed (such as ST250). It will only operate with LectroCount LCR 600 electronic registers with SR601 software. If the electronic register does not have the proper software installed, do not proceed until the register is flashed with the proper software.

The ∆P transducer monitors the differential pressure (pressure drop) between a point immediately upstream and a point immediately downstream of the full flow fuel monitor or water coalescer. The maximum differential pressure is recorded during a fuel delivery by the LectroCount electronic register. The highest differential pressure reached during the delivery and the flow rate at which it occurred is printed on the delivery ticket, providing a record of the maximum pressure drop.

![Meter Number M80 Aviation 1](M80.png)

Meter Number M80

Aviation 1

Sale Number 09

Time Start 2/05/05 10:23:20

Time End 2/05/05 10:24:20

Start Count 0 Gallons

End Gross Count 1364 Gallons

Gross Delivery 1364 Gallons

Start Totalizer 814000 Gallons

End Totalizer 815164 Gallons

Differential Pressure (DP) 12.4 PSI @ 242.6 GPM

LectroCount electronic registers can be programmed to shut down a fueling when the differential pressure transducer measures a differential pressure that meets or exceeds a programmed differential pressure shutdown value. If the differential pressure reaches or exceeds the programmed shutdown value during a delivery, the delivery will end, and an additional line of text will appear on the ticket as follows:

**OVER-PRESSURE SHUTDOWN**

Maximum ∆P

The differential pressure transducer is limited to a maximum differential pressure of 60 PSID. Differential pressure levels beyond this limit may damage or destroy the differential pressure transducer.

Specifications

Materials of Construction

- Stainless steel (316L)
- Wetted Materials
- Stainless steel (316L), Viton® seals

Applicable Products

- Class 2: Jet Fuel

Pressure Rating

Differential measurement range
- 0 to 43.5 PSID (0 to 3 bar) for rated accuracy
- [60.0 PSID (4 bar) overpressure limit]

Line pressure range
- 0 to 150 PSI (0 to 10.3 bar)

Operating Temperature Range
- -40 to 176 °F (-40 to 80 °C)

Accuracy
- ±0.2% of full scale
- ±0.088 PSID from -4 to 104 °F (-20 to 40 °C)

Power
- 10 to 28 VDC, <4 mA

Communication Protocol
- RS485

Register Compatibility
- LectroCount LCR-II
  - SR214 operating software
  - ST250 ticket software
- LectroCount LCR 600
  - SR601 operating software
  - ST601 ticket software

Environmental Rating
- IP67 (similar to NEMA 4X)

Dimensions

- Cable Length 18 ft.
- 3.54"
- 0.7"
- 5.9"
- 5.12"
- 2.33"
- 1/4"-18 NPT Female Ports
- 1.18"
Installation Overview

1. Install ΔP transducer and piping between a point immediately upstream and a point immediately downstream of the full flow fuel monitor or water coalescer.
2. Wire the ΔP transducer to the LectroCount electronic register.
3. Set the shutdown value on the LectroCount LCR-II or LCR 600.

Mechanical Installation

Installation Notes

- The differential pressure transducer has two ¼"-18 NPT female ports. The transducer is shipped with a protective cap on each port. These protective caps should remain in place until the transducer is ready to be connected to the process lines.
- The transducer ports are marked with a “+” sign and a “-” sign. This designates the high pressure side and low pressure side, respectively. Ensure that the transducer is installed in the correct orientation.
- Ensure that the transducer is installed in a location where it will not be damaged.
- The transducer is provided with a sixteen foot cable. If longer cable length is required, be sure to use compatible wire not smaller than 24 gage.
- Install the transducer with service in mind. Provide ample space for periodic inspection and maintenance.

**Safely Evacuate Piping System**

**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.

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.

To install the ΔP Transducer:

1. Safely evacuate the piping system.
2. Determine the best location for the differential pressure transducer and for the customer-installed process connections to the full flow fuel monitor, water coalescer, or other device to be monitored.
3. Connect each of the process tubes to the full flow fuel monitor (or other device to be monitored). The process tubing must be in compliance with the requirements of the application. It is recommended that the process tubing inner diameter should be at least 1/8" and have a minimum rating of 150 PSI.
4. Mount the differential pressure transducer. Inlet and outlet fittings of the differential pressure transducer are ¼"-18 NPT, female threads.
4.1. Position the differential pressure transducer in an upright orientation.
4.2. The differential pressure transducer connections, the transducer should be mounted upright with the pressure impulse piping horizontal to the fittings as shown to the right. The transducer may be located above or below the full flow fuel monitor.
4.3. Position the differential pressure transducer correctly according to flow direction.
The differential pressure transducer fittings are marked with a “+” sign and a “-” sign to indicate upstream and downstream pressure. Ensure that the “+” sign is oriented so that it is connected to the upstream pressure side tubing and the “-” sign is connected to the downstream pressure side tubing. If the configuration is reversed, the differential pressure reading will be negative.
5. Fill the tube connections from the full flow fuel monitor and the differential pressure transducer with fluid. With the system pressurized, carefully loosen the connection on the inlet side of the differential pressure transducer without removing it completely. Once fluid appears, tighten the fitting. Repeat this procedure for the outlet side.
6. Route the differential pressure transducer cable to the LectroCount register. Register wiring instructions are on the following page.

**Handle the Transducer Ports with Care**

Never attempt to clean out the transducer ports using metal objects. Metal diaphragms located in these ports may become scratched, punctured, deformed, or damaged as a result.
**ELECTRICAL INSTALLATION**

**Electrical Installation**

When ordered as a part of a meter system with a LectroCount register, the ∆P transducer is wired to register at the factory. The ∆P transducer can also be ordered separately and installed onto a meter system already in service.

Connecting the ∆P transducer to a LectroCount register requires the use of an additional board (PN 81944) that mounts directly to the LectroCount register’s CPU board. The 81944 board is compatible with the 840405, 840404, 84040, 81920, 81547-1, and 81547-2 circuit boards; however, the CPU boards must be loaded with the proper software. LCR-II registers require version 4.04 or higher SR214 firmware and ST250 or another compatible ticket software. LCR 600 registers require SR601 firmware. The following wiring instructions apply to all compatible circuit boards.

**To wire the ∆P Transducer to a LectroCount register:**

1. Unplug the J1 and J3 terminal blocks from the CPU board.
2. Remove the screw at the top left corner of the CPU board.
3. Plug the 81944 board into the J1 connectors on the CPU board.
4. Fasten the top left side of both boards to the housing with the screw provided.
5. Plug J3 back into its original place on the CPU board.
6. Plug the J16 terminal block into the 81944 board.

**Take Proper ESD Precautions**

Ensure that you are properly grounded before handling the electronic printed circuit boards.

**Be Careful with the 81944 Board**

When removing the J16 terminal from the 81944 board, hold down the right end of the board to prevent flexing.

**Disconnect Power**

Disconnect the power before working on the CPU board.

**Don’t Flash with 81944 Connected**

When flashing the LectroCount register board, the 81944 board must be removed from terminal J1.

**ELECTRICAL INSTALLATION**

**WIRING THE SHUTDOWN DEVICE**

Typically, a ∆P transducer operates in conjunction with an output control circuit or a shutdown device, such as a valve or a dead-man. The shutdown device must also be wired to the LectroCount register. The shutdown device should draw no more than 1 A.

The LectroCount register depends on the shutdown device to end the delivery. If the differential pressure meets or exceeds the shutdown differential pressure value programmed into the LectroCount register, the register signals the shutdown device, and the shutdown device ends the delivery. If no shutdown device is present and the shutdown value is met, the LectroCount register will stop registering the fueling and print out a delivery ticket, but fuel will continue to be dispensed.

**To wire the ∆P Transducer to a LectroCount register (cont.):**

7. Remove the wires for the J1 terminal block and connect them to their corresponding terminals on the J16 terminal block on the 81944 board.
   - Black to J16 terminal 30
   - Blue to J16 terminal 29
   - Yellow to J16 terminal 28
   - Orange to J16 terminal 27
   - Brown to J16 terminal 26

8. Route the ∆P transducer cable through a cable gland in a port on the back of the LectroCount register. Secure the cable gland. LC recommends running the cable through weatherproof conduit.

9. Connect the four ∆P transducer wires to terminals J3 on the CPU board and J16 on the 81944 board, and connect the shield/ground wire to the ground screw inside the housing.
   - Black to J3 terminal 46
   - White to J3 terminal 51
   - Yellow to J16 terminal 57
   - Blue to J16 terminal 58

10. Run the red jumper wire (provided with the ∆P transducer kit) from the J6 terminal 32 to J16 terminal 59 (+5 V).

11. Route a two wire cable from the shutdown control device through a cable gland in a port on the back of the LectroCount register. Secure the cable gland. LC recommends running the cable through weatherproof conduit.

12. Connect the two wires from the shutdown control device to terminal block J13, terminals 14 and 15.

**To wire the shutdown control device to a LectroCount register (cont.):**

1. Route two wires (AWG determined by device) cable from the shutdown control device through a cable gland in a port on the back of the LectroCount register. Secure the cable gland. LC recommends running the cable through weatherproof conduit.
   - Brown to J14 terminal A
   - Red to J14 terminal B

2. Connect the two wires from the shutdown control device to terminal block J13, terminals 14 and 15.
Programming the ∆P Shutdown Setting

Programming the ∆P Shutdown Setting on the LCR-II:
1. Remove the switch plate from the selector switch.
2. Rotate the selector switch to the six o'clock position, the calibration mode.
3. Press the SELECT button until the display reads “dP XX.X”. XX.X represents the current differential pressure shutdown setting.
4. Press the INCREASE button to set the first (far left) digit to a number no greater than “5”.
5. Press SELECT to move to the next digit to the right. Press INCREASE to set this digit to the desired value. Continue until all three digits are set.
6. Press SELECT to set the new differential pressure shutdown value. When the selector switch is rotated clockwise out of the calibration mode, this new setting will appear on the printed calibration ticket.

Disabling the Shutdown Setting
To monitor the differential pressure without shutting down a delivery, set the differential pressure shutdown value to “00.0”. The LectroCount LectroCount register will continue to monitor the differential pressure and print the maximum differential pressure and flowrate values on the delivery ticket.

Viewing the ∆P Reading - LCR-II
To view the differential pressure reading during a delivery, simply press the SELECT button three times with the selector switch in the RUN position. This will scroll through flowrate, temperature and then differential pressure. After five seconds, the display will return to the current delivery total.

∂P Default & Maximum Setting
LectroCount registers are factory set with the default value of 15.0 PSID. The maximum value that can be set is “59.9”.

Global Shutdown Value
Regardless of the differential pressure shutdown value programmed, the system will force a shutdown if the differential pressure exceeds 60 PSID. This feature cannot be disabled.

Troubleshooting

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>PROBABLE CAUSE(S)</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential pressure is registering a negative value.</td>
<td>1. Differential pressure transducer is installed backwards.</td>
<td>1. Reverse the process connections to the differential pressure transducer.</td>
</tr>
<tr>
<td>Delivery ends shortly after it starts.</td>
<td>1. Differential pressure is at or above the differential pressure shutdown value.</td>
<td>1. Check the device being monitored. It likely requires maintenance, such as a filter change.</td>
</tr>
<tr>
<td>2. Differential pressure shutdown setting is set too low for application.</td>
<td>2. Reprogram the differential pressure shutdown setting. See page 10 for instructions on setting the differential pressure shutdown.</td>
<td></td>
</tr>
<tr>
<td>Differential pressure meets or exceeds the differential pressure shutdown setting, but the delivery does not end.</td>
<td>1. Faulty output control shutdown circuit.</td>
<td>1. Check the output control circuit connection. This output is activated when the differential pressure shutdown setting is reached or exceeded during a delivery. Refer to page 9 for details.</td>
</tr>
<tr>
<td>2. No output shutdown circuit is installed.</td>
<td>2. Install an output shutdown circuit following the instructions on page 9.</td>
<td></td>
</tr>
<tr>
<td>Differential pressure remains at “0” during a delivery.</td>
<td>1. Differential pressure transducer has failed.</td>
<td>1. Reverse the process connections to the differential pressure transducer.</td>
</tr>
<tr>
<td>2. Differential pressure transducer has failed.</td>
<td>2. Replace the differential pressure transducer.</td>
<td></td>
</tr>
</tbody>
</table>