Introduction

Safety Procedures .................................................... 3
General Information ................................................. 4
POD Models ............................................................. 4
Output Signal Resolutions ........................................ 4
Specifications ........................................................... 5
Dimensions .............................................................. 5
Regulatory Compliance Tag Markings ...................... 6

Installation

POD Installation ....................................................... 7
POD Extension Kit Installation ................................. 9
POD Wiring ............................................................. 10
POD Wiring Schematics .......................................... 12
Bill of Materials ........................................................ 13

This manual provides warnings and procedures that are intended to inform the owner and/or operator of the hazards present when using the Liquid Controls Meter on LP-Gas and other products. The reading of these warnings and the avoidance of such hazards is strictly in the hands of the owner-operators of the equipment. Neglect of that responsibility is not within the control of the manufacturer.

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.
General Information

The Liquid Controls Pulse Output Device (POD) converts the rotary motion of the Liquid Controls Positive Displacement Flowmeter into electronic pulses. This allows the meter to interface with a wide variety of electronic monitoring devices and control equipment. The POD operates in standard and bidirectional flow applications.

The POD mounts directly to the front cover of any Liquid Controls meter in place of the packing gland. The motion of the meter’s blocking rotor is magnetically coupled through a stainless steel wall to the electronics compartment of the POD. This eliminates the dynamic seal of the packing gland and isolates the electronics from the process fluid in the meter.

Inside the electronics compartment, an optical shaft encoder converts the rotary motion into a high resolution, two-channel, quadrature square wave. Both outputs are driven by field effect transistors (FETs) and switch from zero volts in the “ON” state to the user’s power supply voltage in the “OFF” state. As supplied from the factory, there is a 2.2KΩ pull-up resistor on each output which can be removed from the circuit in the field to produce a true “open drain” output. As open drain devices, the outputs can sink up to 100 mA in the “ON” state and sustain up to 30 VDC in the “OFF” state.

The electronics compartment also serves as a conduit junction box. The POD has an O-Ring sealed, threaded cover. A screw-down, removable, terminal block on the circuit board facilitates wiring of the unit. With the wiring entrance sealed and the cover in place, the housing has a weatherproof rating of NEMA 4X.

POD Models

There are five POD models available.

POD1
Fork Drive with Buna-N O-Ring, 100 PPR Quad Pulser, 9 to 30 VDC

POD2
Fork Drive with PTFE O-Ring, 100 PPR Quad Pulser, 9 to 30 VDC

POD3
Blade Drive with Buna-N O-Ring, 100 PPR Quad Pulser, 9 to 30 VDC

POD4
Blade Drive with PTFE O-Ring, 100 PPR Quad Pulser, 9 to 30 VDC

POD5
Fork Drive with Buna-N O-Ring, 100 PPR Quad Pulser, 5 to 24 VDC

POD5 is not IECEx approved

Output Signal Resolutions

<table>
<thead>
<tr>
<th>M &amp; MS Series</th>
<th>Meter</th>
<th>PULSES</th>
<th>GALLON</th>
<th>CHANNEL</th>
<th>Channel</th>
<th>Pulse Rate</th>
<th>MAX OUTPUT</th>
<th>MHz</th>
<th>Channel</th>
<th>Channel</th>
<th>Max Flow Rate</th>
<th>GPM</th>
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</table>

For LCR applications using both channels and the rising and falling edge, multiply the pulses per unit and maximum kHz by a factor of four.

POD with PC Board 84120

- EU Directive 2004/108/EC (EMC)
- IEC 61000-4-2
- IEC 61000-4-3
- IEC 61000-4-5
- IEC 61000-4-6
- IEC 61000-4-17
- IEC 61000-4-29
- IEC 61000-6-3
- ISO 7637-2

POD with PC Board 81999

- IEC 606-1 standard

Specifications

Voltage
- 9 to 30 VDC
- POD5 has a 5 VDC minimum but is not IECEx approved

Current Supply
- Maximum 50 mA

Output Signal Resolution
- 100 pulses per channel per revolution, unscaled

Square Wave
- Single channel output
- Channel A or channel B
- Quadrature channel output
- Channel A and channel B

Pulse Timing
- Normal 50% on and 50% off

Rise/Fall Time of Pulse
- <5 µs

Output
- Current sinking 100 mA maximum in “ON” state
- V+ supply @ 2.2 KΩ in “OFF” state.
- Optional Open Drain FET (Field Effect Transistor).
- FET rating (drain to source voltage) 30 VDC maximum

Pulse Transmission Distance
- 5,000 feet (1,524 meters)

Pulse Output Fidelity
- ISO 6551 Level A
- API MPMS Chapter 5.5; Level A
- OIML R117-1
- Measurement Canada’s SVM-1

Dimensions

Materials of Construction
- Aluminum Alloy ADC12
- Powder Coat: Corro-Coat PE 74-141 Polyester

Cable Entry
- ½-14 NPT

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

Humidity Range
- 0-100% non-condensing

Shock
- 50 G for 10 ms

Vibration
- 1 G at 10-150 Hz

Electromagnetic Compatibility (EMI, RFI, etc.)
- POD with PC Board 84120
- IEC 801 standard
- ISO 7637-2
- IEC 61000-6-3
- IEC 61000-4-29
- IEC 61000-6-6
- IEC 61000-4-3
- IEC 61000-4-2
- IEC 61000-4-29
- IEC 61000-6-3
- IEC 61000-6-6
- ISO 7637-2
- IEC 61000-6-3
- IEC 61000-4-29
- IEC 61000-6-6
- ISO 7637-2
- IEC 61000-6-3
- IEC 61000-4-29
- IEC 61000-6-6
- ISO 7637-2
- IEC 61000-6-3
- IEC 61000-4-29
- IEC 61000-6-6
- ISO 7637-2

Check Each Shipment

Before installation, check your shipment against the packing list and ensure that no parts are missing. The packing list is inside the red information packet along with the Installation and Operation Manuals.

For additional information, see the Installation and Operation Manuals.
New Installations

When ordered with the flowmeter, the POD comes factory installed on the meter and ready for wiring. Wiring instructions begins on page 10.

**WARNING**

Relieving Internal Pressure

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

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 Remove the Existing Hardware

1. Relieve the pressure from the process piping to the meter.
2. Drain the meter by opening the meter’s drain plugs.
3. Remove the mechanical counter, adjuster, and adjuster drive shaft from the front of the meter.
4. Some meters have a counter adapter bracket which is bolted on. If this is the case, remove the counter bracket by removing the bolts that hold it in place. If the counter adapter bracket is integral to the meter, it cannot be removed. In this case, one of four POD Pulser Extensions will be required.
5. Remove the packing gland mounting screws. Pull the packing gland out of the meter. If the O-Ring does not come out with the packing gland, be sure to remove it from the packing gland well before installing the POD.

Remove Packing Gland Mounting Screws

Packing Gland Removed
Installing the POD
To install the POD onto a flowmeter:

1. Verify that the proper POD Model was obtained by comparing the driver tang on the POD to the driver tang on the packing gland that was removed in Step 5 of Removing Existing Hardware on Page 4. There are two types of packing gland/POD driver tangs: blade type and fork type. Blade type packing glands must be replaced with blade type PODs. Fork type packing glands must be replaced with fork type PODs.

2. Determine the desired orientation of the conduit hub. The hub can be positioned in one of eight possible orientations as shown in the figure to the right.

3. Position the O-Ring over the bottom of the POD as shown to the right.

4. Align the fork style or blade style driver with the drive mechanism in the meter and guide the POD into the opening in the meter cover. When properly aligned, the POD will go in until its mounting flange abuts the meter cover.

5. Rotate the POD to the desired orientation and thread in the mounting screws until they are snug. Using a \( \frac{7}{32} \)" box end wrench, tighten the screws and torque them to 21-25 inch-pounds.

When using a cable gland to seal the wire entrance, any of the eight orientations can be used. However, when using conduit, the hub should face down so moisture that may accumulate in the conduit will drain away from the POD electronics.

Meters with only two packing gland mounting screws are limited to four orientations.

When using a cable gland to seal the wire entrance, any of the eight orientations can be used. However, when using conduit, the hub should face down so moisture that may accumulate in the conduit will drain away from the POD electronics.

Pod Extension Kit Installation

The POD Extension is used when the meter has an integral counter adapter bracket or for high temperature applications. The POD Extension is used to extend the connection away from the meter. There are four POD Extension models available.

- 49754 POD1 or POD5
  Fork Drive with Buna-N O-Ring
- 49756 POD2
  Fork Drive with Teflon O-Ring
- 49757 POD1 or POD5
  Blade Drive with Buna-N O-Ring
- 49759 POD2
  Blade Drive with Teflon O-Ring

Once the existing hardware has been removed as described on Page 4, the POD Extension can be installed.

To install the POD Extension:

1. Verify that the proper POD Extension Model was obtained by comparing the driver tang on the POD Extension to the driver tang on the packing gland that was removed in Step 5 of Removing Existing Hardware on Page 4. There are two types of Packing Gland/POD Extension driver tangs: blade type and fork type. Blade type packing glands must be replaced with blade type POD Extensions. Fork type packing glands must be replaced with fork type POD Extensions.

2. Install the POD Extension using the two screws provided. There are two sets of holes in the POD Extension for these screws; one set is 1 ½” apart and the other is 1 ⅝” apart. Line up the holes with the meter to determine which set to use. Tighten the screws and torque them to 21-25 inch-pounds.

3. Once the POD Extension is in place, the POD may be installed onto the POD Extension. Align the POD Fork Tang with the internal POD Extension Driver. Use the two screws provided to mount the POD to the POD Extension using two of the tapped holes in the POD Extension. Using a ½” box end wrench, tighten the screws and torque them to 21-25 inch-pounds.
When wiring the POD, the wires must enter through the POD’s conduit hub. For explosion proof rated systems (Class I, Div 1), the wiring must be in explosion proof rated rigid conduit, or, for high vibration installations, explosion proof rated braided flexible conduit. The conduit must be engaged five (5) full threads into the female hub on the POD to meet explosion proof requirements.

When installing in a Division 2 location, use either rigid conduit, flexible conduit, or no conduit. When no conduit is used, the instrument cable must be brought into the POD conduit hub using a cable gland to seal the wiring to maintain the Enclosure NEMA 4X rating. Regardless of the type of connection used, thread sealant should be applied to prevent moisture from getting into the POD electrical housing.

**WARNING**

- **North America** - Installations must be in full accordance with the National Electrical Code (US) or the Canadian Electrical Code respectively to maintain the hazardous location ratings on the product.
- **Outside of North America** - Installations must be in full accordance with EN 60079-14 to maintain the hazardous location ratings on the product. Use Ex d certified cable glands only. For ambient temperatures above 70ºC, use field wiring rated 20ºC above the maximum ambient temperature.

**WIRING CABLE**

Multi-wire cable with an overall shield is recommended for POD wiring. If individual wires are used, they must be in a flexible metal conduit and must not be run with any other cables or wires. Use individual wires between 16 and 20 AWG or shielded cable no less than 22 AWG. Cable runs up to 5000 ft (1524 m) are possible, however cable runs over 1000 ft (304.8 m) should use lower AWG wire to reduce the IR voltage drop and the inter-wire capacitance. In addition, long runs may require a lower value pull-up resistor due to the additional cable capacitance that the pulser must drive. Cable that has a metalized foil plastic shield with a drain wire is recommended over cable with woven shields because it is easier to terminate the drain wire type cable.

**TERMINAL BLOCK**

Removing the cover of the POD will expose a 4 position terminal block for connection to the user’s electrical system. The terminal block can be unplugged from the board for ease of wiring. Pull it straight up to remove.

The terminal block screws require a straight blade screwdriver with a tip less than ⅛” wide. Before inserting wires into the terminal block, strip ¼” of insulation off each wire. Turn each terminal screw counterclockwise a few turns to make sure that the wiring slot is fully open to accept wire. Insert the stripped end of the wire and tighten the terminal block screw. Plug the terminal block back into the board if it was removed. Be sure it is properly oriented with the four pins.

**WIRING CONFIGURATIONS**

The wiring configuration used depends on the system needs. Check the input requirements of electronic controls to determine single channel or quadrature output. The POD can be wired using only one of the two channels (Channel A or B) if the flowmeter has flow in only one direction. To detect both forward and reverse flow, both channels, which are in quadrature to each other, must be used. Channel A will lead Channel B by 90º in one flow direction and Channel B will lead Channel A in the reverse direction. Quadrature is required in most Weights & Measures approved installations.

**POD Voltage Output clockwise rotation**

- **Channel A**
  - V+ Supply
  - 0 V
  - 0
  - One Cycle

- **Channel B**
  - V+ Supply
  - 0 V
  - 1
  - 0

*The diagram below shows the voltage output for a clockwise rotation of the Pulse Output Device (POD) with Channel A leading Channel B. For reverse flow applications (counterclockwise) Channel B leads Channel A.*

**SIGNAL OUTPUT**

The diagram below shows the voltage output for a clockwise rotation of the Pulse Output Device (POD) with Channel A leading Channel B. For reverse flow applications (counterclockwise) Channel B leads Channel A.

**CONVERSION TO OPEN DRAIN OUTPUT**

As supplied by the factory, the POD has a 2.2 KΩ pull-up resistor to the positive power supply on each output transistor. The unit can be modified in the field to provide true Open Drain (Open Collector) outputs if desired.

To modify the POD to Open Drain outputs:

1. Turn off power to the unit and remove the cover by turning it counterclockwise.
2. Loosen the three circuit board mounting screws using a Philips screwdriver. Remove the entire circuit board assembly from the POD housing.
3. With a small tip soldering iron, remove the R4 and R5 resistors.
   - Carefully, apply heat to one pad of the resistor.
   - When the solder melts, push the resistor off the circuit board with the tip of the soldering iron.
   - Remove the second resistor using the same method.
4. Reassemble the unit.
Single Channel Applications  SP4000, SP3850, IT400

**Wiring Guide**
1. Use metallic conduit with individual wires or use 3 conductor, 22 AWG, shielded cable.
2. Strip 1½” off of outer sheathing. Remove exposed shield and drain wire and then tape.
3. Strip ¾” insulation from each conductor and connect to the terminal blocks.

<table>
<thead>
<tr>
<th>Description</th>
<th>POD: J1 Terminal</th>
<th>SP4000, SP3850, IT400 Terminal</th>
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</thead>
<tbody>
<tr>
<td>Power</td>
<td>20 (12VDC)</td>
<td>T1 (12VDC)</td>
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<tr>
<td>Channel A or B</td>
<td>21 or 22</td>
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<tr>
<td>DC Ground</td>
<td>23</td>
<td>12</td>
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<tr>
<td>Shield Wire</td>
<td>No Connection</td>
<td>Earth Ground Screw</td>
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**Power Source Requirement**
An isolation source and overcurrent protective device rated 5A max must be installed in the power circuit. If a 5A max isolation source and overcurrent protective device is not available, a Class 2 power source must be used.

Dual Channel Quadrature Applications  LECTROCOUNT® LCR®, LCR-II®, LC³, LCR 600

**Wiring Guide**
1. Use metallic conduit with individual wires or use 3 conductor, 22 AWG, shielded cable.
2. Strip 1½” off of outer sheathing. Remove exposed shield and drain wire and then tape.
3. Strip ¾” insulation from each conductor and connect to the terminal blocks.

**BIL OF MATERIALS**

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<th>POD Assemblies</th>
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# BILL OF MATERIALS

## POD Extension - Fork Drive
**Models 49754 & 49756**

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<th>Description</th>
<th>Part #</th>
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<td>4</td>
<td>Dowel Pin</td>
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<td>O-Ring, Teflon (Model 49756)</td>
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<td>Mag Bearing</td>
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<td>Fork Driver</td>
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<td>Fork Drive Shaft</td>
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* N/S = Not for Sale

## POD Extension - Blade Drive
**Models 49757 & 49759**

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* N/S = Not for Sale