Parker LM-Pro
Miniature Linear Motor Proportional Valve

Wide Linear Control Range
Low Power Consumption
Cleaned for Oxygen Service

aerospace
climate control
electromechanical filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding
When you partner with the global leader in motion and control technologies, expect to move your business and the world forward. From miniature solenoid valves to highly integrated automation systems, our innovations are critical to life-saving medical devices and scientific instruments used for drug discovery and pathogen detection. Not to mention, critical to decreasing time to market and lowering your overall cost of ownership. So partner with Parker, and get ready to move, well, anything.
The Parker LM-Pro proportional valve uses a Patent Pending Linear Motor actuation technology that provides exceptional resolution over a longer stroke and lower power consumption than traditional solenoid or voice coil actuation. The LM-Pro proportional valve controllable range allows flow for all ventilator platforms. This new product further solidifies Parker Precision Fluidics market offering for the Respiratory and Anesthesia market.

For more visit: solutions.parker.com/LM-Pro
ppfinfo@parker.com  603 595 1500
The Parker LM-Pro miniature proportional valve provides unparalleled flow control capabilities to meet your OEM application needs. The LM-Pro uses a Patent Pending Linear Motor actuation technology that provides exceptional resolution over a longer stroke and lower power consumption than traditional solenoid or voice coil actuation. With a linear controllable flow range from 0.5 to 540 slpm, pressure capability up to 100PSI (6.9 Bar), and typical power consumption of less than 2 Watts, the LM-Pro is a true, one-size-fits-all proportional valve. This unrivaled performance capability combined with the simplicity of a face-mounted/ported design make the LM-Pro valve an ideal solution for your dynamic flow control needs.

**Markets**
- Respiratory
- Anesthesia
- Patient Therapy

**Applications**
- Ventilators [Gas Blending & Delivery]
- Insufflators
- Anesthesia Delivery
- Pressure and Flow Control

**Product Specifications**

**Physical Properties**

- **Valve Type:** 2-Way Normally Closed
- **Media:** Air, Oxygen, Nitrous Oxide, Carbon Dioxide, Heliox and other medical gases
- **Operating Environment:** 32 to 131°F (0 to 55°C)
- **Storage Temperature:** -40 to 158°F (-40 to 70°C)
- **Length:** 1.57 in (39.9 mm)
- **Width:** 0.72 in (18.3 mm)
- **Height:** 1.44 in (36.5 mm)
- **Porting:** Face Seal to Manifold with integrated FKM seal and optional inlet filter
- **Weight:** 1.29 oz (36.6 g)

**Electrical**

- **Power:**
  - 2.0 Watt Typical
  - 3.0 Watt Maximum
- **Voltage:** 5, 12 and 24 VDC
- **Electrical Termination:** Latching Receptacle
  - JST SM02B-PASS-TB

**Wetted Materials**

- **Valve Element:** Aluminum, FKM Elastomer, Fluorosilicone Elastomer, Stainless Steel

**Features**

- Large linear flow control range spanning 70% of the controllable current rating enabling accurate low and high flow rate control
- Low power consumption: Typical operation under 2 Watts
- Proven performance: Life cycle rated to 100 million cycles
- Face mount porting and optional integrated filter simplifies integration and reduces manifold complexity
- Cleaned for Oxygen Use per ISO15001:2010 and meets ISO10993 Biocompatibility
- Reach and RoHS compliant

**Performance Characteristics**

- **Leak Rate:** *The leakage shall not exceed the above values with Air at a differential pressure of 100 psid (6.9 barg).*
- **Operating Pressure:** See Table 1
  - 0 - 100 psig (6.9 barg)
- **Vacuum:** 0 - 27 in Hg (0-686 mm Hg)
- **Proof Pressure:** 150 psi (10.39 bar)
- **Orifice Sizes:**
  - 0.200 in (5.08 mm)
  - 0.212 in (3.07 mm) effective
- **Hysteresis:** 10% of full scale current (Typical) 15% of full scale current (Maximum)
- **Optional Filtration:** 400 µm
- **Response time:** <10 ms Typical at 20°C
- **Reliability:**
  - 100 Million Cycles at rated pressure and 20°C
  - 0.95 Reliability Factor
  - 95% Confidence Interval

Parker is a registered trademark of Parker Hannifin Corporation. Patent pending with the United States Patent and Trademark Office (USPTO).
**Parker LM-Pro Linear Motor Proportional Valve**

**Typical Flow Curve**

**LM-Pro Model 2**

*Typical Air Flow with 12 VDC Coil*

![Flow Curve Diagram](image-url)

- 100 PSI (6.9 BAR)
- 38 PSI (2.6 BAR)
- 10 PSI (0.69 BAR)

**Flow Rate (lpm)**

**Current (mA)**

0 20 40 60 80 100 120 140 160 180 200 220 240 260 280
Parker LM-Pro  Linear Motor Proportional Valve

Typical Flow Curve

LM-Pro Model 2
Typical Low Flow Control with 12 VDC Coil
Parker LM-Pro Linear Motor Proportional Valve

Typical Flow Curve

Pressure vs Flow Curve
The curve below shows the typical output flow rate at maximum rated current as a function of inlet pressure.

0.121” (3.07 mm) orifice
Parker LM-Pro Linear Motor Proportional Valve

Pneumatic Interface

Parker LM-Pro Manifold Mount

Mechanical Integration
Dimensions

Parker Parker LM-Pro Basic Valve Dimensions
Parker LM-Pro  Linear Motor Proportional Valve

Electrical Interface

Electrical Requirements

Table 2

<table>
<thead>
<tr>
<th>Rated Voltage</th>
<th>Nominal Coil Resistance at 20ºC</th>
<th>Control Current at Maximum Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 VDC</td>
<td>6 Ω</td>
<td>555 mA</td>
</tr>
<tr>
<td>12 VDC</td>
<td>24 Ω</td>
<td>280 mA</td>
</tr>
<tr>
<td>24 VDC</td>
<td>148 Ω</td>
<td>115 mA</td>
</tr>
</tbody>
</table>

Installation and Use

Typical Valve Set-up

Valve Electrical Control

Basic Control:
The Parker LM-Pro valve can be controlled by either voltage or current; however, it is highly recommended that current control be employed to ensure the most repeatable valve flow performance.

PWM Control:
For PWM control, the signal applied to the valve should have a frequency of 5 kHz or greater. Optimum frequency will be application dependent.
**Parker LM-Pro** Linear Motor Proportional Valve

**Installation and Use**

**Suggested Parker LM-Pro Current Driver Schematic**

This simple current driver circuit draws only 1 mA at the input control (0-5VDC) and provides control for any LM-Pro valve configuration regardless of valve voltage or resistance.

Table 3 (below) describes the recommended R1 and R2 resistor values based upon the full shut-off current.

**Table 3: Selectable Resistor Values for a Low Current (1 mA) LM358-Based Current Driver**

<table>
<thead>
<tr>
<th>Valve Drive Voltage Input (VDC)</th>
<th>Valve Coil Voltage, Resulting (VDC)</th>
<th>Nominal Coil Resistance @ 20°C (Ohms)</th>
<th>Input Current for Full Flow (mA)</th>
<th>R1 (Ohms)</th>
<th>R2 (Ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>7</td>
<td>6</td>
<td>555</td>
<td>3920</td>
<td>499</td>
</tr>
<tr>
<td>12</td>
<td>14</td>
<td>24</td>
<td>280</td>
<td>3920</td>
<td>237</td>
</tr>
<tr>
<td>24</td>
<td>26</td>
<td>148</td>
<td>115</td>
<td>4320</td>
<td>102</td>
</tr>
</tbody>
</table>
Parker LM-Pro  Linear Motor Proportional Valve

Installation and Use

Manifold & Dimensions & Design

Not shipped with valves.
Parker Precision Fluidics recommends 24 in-oz (17 N-cm) of torque for the screws.
**Parker LM-Pro** Linear Motor Proportional Valve

**Ventilator Inspiratory Flow**

- Filtered/Pressure Regulated Air Source
- Flow Control Valve *Parker LM-Pro*
- Check Valve
- Mass Flow Sensor
- Oxygen Sensor
- Auto Calibration Valve *Parker X-Valve*
- Flow Control Valve *Parker LM-Pro*
- Pressure Relief Valve
- Check Valve
- To Patient Circuit
- To Atmosphere

**Ventilator Expiratory Flow**

- Flow Control Valve *Parker LM-Pro*
- Auto Calibration Valve *Parker X-Valve*
- Mass Flow Sensor
- Pressure Sensor
- To Atmosphere
- From Patient Circuit
Parker LM-Pro  Linear Motor Proportional Valve

Accessories

12.5” Adapter Wire Leads
290-006061-004

Single Station Manifold
890-001184-001

Screw #2-56 x 3/4”
Socket Head Cap Screw
191-000112-417
(see valve mounting recommendations above)

Manifold O-Ring (FKM)
190-007063-001
(supplied with valve)

Optional Filter
195-000291-001

Ordering Information

<table>
<thead>
<tr>
<th>Sample Part ID</th>
<th>Description</th>
<th>Options</th>
<th>Accessory</th>
</tr>
</thead>
<tbody>
<tr>
<td>937</td>
<td>- 02: 200 SLPM at 38PSIG</td>
<td>290-006061-004</td>
<td>** Not supplied with the valve.</td>
</tr>
<tr>
<td>937</td>
<td>12: 24 OHM</td>
<td>890-001184-001</td>
<td>** Not supplied with the valve.</td>
</tr>
<tr>
<td>937</td>
<td>0: Aluminum</td>
<td>190-007063-001</td>
<td>** Supplied with the valve.</td>
</tr>
<tr>
<td>937</td>
<td>0: No Wire Leads</td>
<td>191-000112-417</td>
<td>** Not supplied with the valve. See Valve Mounting Recommendations above</td>
</tr>
<tr>
<td>937</td>
<td>0: No Wire Leads</td>
<td>195-000291-001</td>
<td>** Supplied if selected option.</td>
</tr>
</tbody>
</table>

NOTE: In order to provide the best possible solution for your application, please provide the following requirements when contacting Applications Engineering:

- Media, Inlet & Outlet Pressures
- Minimum Required Flow Rate
- System Supply Voltage
- Media & Ambient Temperature Range

Learn More at: solutions.parker.com/LM-Pro

Please click on the Order On-line button to configure your Parker LM-Pro Proportional Valve (or go to www.parker.com/precisionfluidics/LM-Pro). For more detailed information, visit us on the Web, or call and refer to Parker LM-Pro Performance Spec. 790-002627-001.

Parker Hannifin Precision Fluidics Division reserves the right to make changes. Drawings are for reference only.

For more information call +1 603 595 1500 or email ppinfo@parker.com
Visit www.parker.com/precisionfluidics