Typical Applications

- Industrial
  - Agricultural & Pesticide Spraying Systems
  - On-Site Petroleum Additives
  - Paints, Dyes, Inks, & Pigments
  - Lubricant Dispensing
  - Ferrofluid Dispensing for Speaker Mfg.
  - Hydrogen Fuel Cell Fluid Control

- Electronics
  - Plating Bath Chemical Control
  - PC Board Cleaning Systems
  - CMP & DOD Wafer Processing
  - Flux Coating for Stations & Arrays
  - Semiconductor Chemical Dispensers

- Food, Dairy, & Beverage
  - Aseptic Packaging - Peroxide Dispensing
  - Preservative Treatment of Meats & Poultry
  - Nutrient & Color Addition
  - Brewery Additives
  - Color Addition for Yogurt
  - Cottage Cheese Mg.
  - Candy Coating

FSI 2019 SHOW SCHEDULE

<table>
<thead>
<tr>
<th>Event</th>
<th>Dates</th>
<th>Location</th>
<th>Booth #</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLAS 2019</td>
<td>Feb. 2 - 6</td>
<td>Washington, DC</td>
<td>TBA</td>
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<tr>
<td>VMDA Med Lab</td>
<td>Feb. 5 - 7</td>
<td>Anaheim, CA</td>
<td>TBA</td>
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<td>POTCON 2019</td>
<td>Mar. 18 - 20</td>
<td>Toronto, ON</td>
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<tr>
<td>EMBS Expo 2019</td>
<td>Apr. 14 - 17</td>
<td>Philadelphia, PA</td>
<td>TBA</td>
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<tr>
<td>IE expo</td>
<td>Oct. 1 - 3</td>
<td>Minneapolis, MN</td>
<td>TBA</td>
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<tr>
<td>MEDICA 2019</td>
<td>Nov. 18 - 21</td>
<td>Dusseldorf, Germany</td>
<td>TBA</td>
</tr>
</tbody>
</table>

Solutions for: Medical Diagnostic Analytical Laboratory Process Industrial Instrumentation OEM

- Fluid Metering, Inc.
  - Valves, Drip-Free Operation
  - One Moving Part
  - Precision Dispensing - CV of 0.5% or better
  - Flow Rates from Microliters to 4600 mL/min
  - Positive Displacement up to 200 psig
  - Viscosity Independent - Unaffected by Viscosity of Fluids

Easy Flow Rate Adjustment

- Moving the pump head position changes the piston stroke length and, in turn, the flow rate
- Infinite fine flow adjustments between zero and 100% flow rate
- Flow rate dial indicator 0-4855 for the Q line provides accurate and simple linear calibration (See page 30)
- Flow rate can be changed while pump is operating at rest

For a video animation of how FMI pumps work, visit www.FluidMetering.com

Valveless Ceramic Dispensers & Metering Pumps Since 1959!

- Millions of Maintenance-Free Cycles
- Inert, Corrosion Resistant Fluid path - Ceramic & Fluorocarbon Standard
- Self-pumping to 15 Feet, Vertical Lift
- Instant Reversibility While Running
- Large Selection of Drives - Fluid, Variable, Pneumatic, Stepless, Hazardous Duty and OEM
**Typical Applications**

- **Industrial**
  - Agricultural & Pesticide Spraying Systems
  - On-Site Petroleum Additives
  - Paints, Dyes, Inks, & Pigments
  - Lubricant Dispensing
  - Ferrofluid Dispensing for Speaker Mfg.
  - Hydrogen Fuel Cell Fluid Control

- **Electronics**
  - Plating Bath Chemical Control
  - PC Board Cleaning Systems
  - PC Board Chemicals Control
  - Battery Manufacturing
  - CMP & ECP Wafer Processing
  - Flux Addition for Wave Soldering
  - CMP & ECP Wafer Processing
  - Battery Manufacturing
  - Flux Addition for Wave Soldering
  - Wire Coating for Stators & Armatures

- **Food, Dairy, & Beverage**
  - Aseptic Packaging - Peroxide Dispensing
  - Preservative Treatment of Meats & Poultry
  - Nutrient & Color Addition
  - Brewery Additives
  - Vitamin Addition for Milk
  - Cheese Disperser
  - Candy Polishing

- **Analytical Instrumentation**
  - TOC Analyzer
  - Particle Analyzers
  - Viscosity Instrumentation
  - Titration Equipment
  - Liquid Chromatography
  - Water & Wastewater Monitoring
  - Stack Gas Monitoring
  - Ground Water Monitoring

- **Medical**
  - Contact Lens Mfg. - Monomer Dispensing
  - Dialysis Systems
  - Intravenous & Micropaths
  - Solvent Welding for Disposable Vials
  - Blood Analysis Sample & Reagent Fluid Control

- **Chemical Analysis**
  - Color Additions for Yogurt
  - Vitamin Addition for Milk
  - Water & Wastewater Monitoring
  - Stack Gas Monitoring
  - Ground Water Monitoring

**Valveless Ceramic Dispensers & Metering Pumps Since 1959!**

- **Solutions for:**
  - Medical Diagnostic
  - Analytical Laboratory
  - Process Industrial Instrumentation
  - OEM

**Easy Flow Rate Adjustment**

- Moving the pump head position changes the piston stroke length and, in turn, the flow rate.
- Infinite fine flow adjustments between zero and 100% flow rate.
- Flow rate: Dial Indicator 60-4405.

**ISO 9001 : 2015 Certified**

**www.FluidMetering.com / 1 800.223.3388**

**Valveless Ceramic Dispensers & Metering Pumps Since 1959!**

- No Valves, Drift Free Operation
- One Moving Part
- Precision Dispensing - CV of 0.5% or better
- Flow Rates from Micros to 4600 mL/min
- Positive Displacement up to 200 psi
- Viscosity Independent - Unaffected by Viscosity of Fluids

- Millions of Maintenance-Free Cycles
- Inert, Corrosion Resistant Fluid path - Ceramic & Fluorocarbon Standard
- Self-pumps to 15 Feet, Vertical Lift
- Instant Reversibility While Running
- Large Selection of Drives - Fluid, Variable, Pneumatic, Stepper, Hazardous Duty and OEM

**For a video animation of how FMI pumps work, visit www.FluidMetering.com**
All FMI pumps are modular in design. The Pump Head Modules can be easily removed for cleaning or replaced with a replacement head for use with different fluids. Some customers have separate pump heads for use with each fluid handled by the water heater. When operated together, Pump Drive Modules, Pump Head Modules, and options are assembled, tested, and shipped as one unit.

**Selection Guide for FMI’s Pump Heads**

- **QCSC** Ceramics & PVDF Fluid Path
  - Excellent for general use with acids, caustics and solvents. Recommended for HPLC, Anion, & Alternate Chromatography.
  - Rated at 212°F (100° C) operating, 60 psi (4.2 bar). Avoidable (non-operating) to 240°F (116° C).

- **QCSC-W** Flash-Flush version of QCSC
  - Ideal for sensitive, critical fouling scenarios such as sapphire.
  - Installs main pump fluid from seals and atmosphere.

- **QCSC-WT** “Tight Temp®” Retrofit Kit
  - Designed for applications which require temperature control of the pump head.
  - Rated at 200°F (93° C), 100 psi (6.9 bar).

- **316SS Ceramic & PTFE Fluid path
  - Excellent chemical resistance.
  - Rated at 200°F (93° C), 100 psi (6.9 bar).

- **QCV** For water treatment chemistries such as Soluble Polyphosphates and calcium Sods at 350°F (177° C).

- **QSAN** Sanitary Design
  - Ideal for food, blood and pharmaceutical applications.
  - 316SS, Ceramics & PTFE wetted path for excellent chemical resistance.
  - Easy disassembly for cleaning, no internal threads for 1/4” or 3/8” including.

- **QSAN TC** San-Clamp version of QSAN
  - Quick connect 1” flange for 1/4” to 1” tubing size.

- **RH** Small displacement, self-contained pumps of 1/8” 1/4” 3/8” stroke using compatible fittings for 0 to 100μl/stroke to 360 μl/min.
  - Excellent chemical compatibility. Ceramics and PVDF wetted path.
  - Fully adjustable zero to max.
  - 212°F (100° C), autoclaved up to 240°F (116° C) operating, and pressure to 100 psig.
  - Flow: Ceramic or PVDF standard - other materials available (RHDD, RHHE, RHCH).**

- **316SS, Ceramic & PTFE path
  - Excellent chemical resistance.
  - Rated at 200°F (93° C), 100 psi (6.9 bar).

- **200 PSI high pressure version of QCSC**
  - For Prep/Flash Chromatography.

- **QSAN S** Sanitary Design
  - Ideal for food, blood and pharmaceutical applications.
  - 316SS, Ceramics & PTFE wetted path for excellent chemical resistance.
  - Easy disassembly for cleaning, no internal threads for 1/4” or 3/8” including.

- **QSAN TC** San-Clamp version of QSAN
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- **QCV** For water treatment chemistries such as Soluble Polyphosphates and calcium Soda at 350°F (177° C).
Pump Head Codes & Materials

The table below provides codes and prices for all available Pump Head Modules (PHM). After selecting the appropriate PHM, options can be selected. FMI continues to maintain an extensive inventory for fast shipping. Our Large Inventory has developed the most precise and reliable dispensing and metering pumps available. Our Engineering Team incorporates over 50 years of design experience to meet specific customer & application requirements. With the knowledge and necessary tools, our engineers have developed the most precise and reliable dispensing and metering pumps available.

<table>
<thead>
<tr>
<th>Code</th>
<th>Material</th>
<th>Temperature</th>
<th>Pressure</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>CKC</td>
<td>Ceramic</td>
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<td>SAN</td>
<td>Teflon</td>
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<td>$260</td>
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<tr>
<td>CTC</td>
<td>Zirconia</td>
<td>212°F (100° C)</td>
<td>100 psig (6.9 bar)</td>
<td>$260</td>
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<tr>
<td>ZTC</td>
<td>Zirconia</td>
<td>212°F (100° C)</td>
<td>100 psig (6.9 bar)</td>
<td>$260</td>
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</table>

Selection Guide for FMI’s Pump Heads

<table>
<thead>
<tr>
<th>PHM (PUMP HEAD MODULE )</th>
<th>Materials of Construction</th>
<th>Code</th>
<th>CKC</th>
<th>CSY</th>
<th>SAN</th>
<th>CTC</th>
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<tbody>
<tr>
<td>Available Modules</td>
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<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Pump Head Modules Configuration

The Pump Head Modules can be easily removed for cleaning or replaced with a replacement head for use with different fluids. Some customers have separate pump heads for use with each fluid handled in the single channel. When ordered together, Pump Drive Modules, Pump Head Modules, and options are enumerated, tested and shipped as one unit.

Pump Head Materials Configuration

For prep/flash chromatography, QCSC is recommended for MEK, Acetone, & Methylene Chloride. QCSC-W is the flush gland version of QCSC.

Why FMI

Ultra-Precise Fluid Control...from Microliters to Liters

- Patented “No-Valve” Design
- Eliminates problems and errors caused by valves which leak, hang, lock, and require servicing.
- One Moving Part! Patented “No-Valve” Design
- One moving part eliminating the need for any valves, and eliminates the problem of over- and under-draining.
- Easy Disassembly for Cleaning, no fasteners.
- Excellent chemical compatibility.
- Ceramic and PTFE withstands pressures up to 200 °F (93°C), 300 psig (20.7 bar).
- Quick connect 1” flange for 1/4” or 3/8” internal threads for 1/4” or 3/8” tubing.
- Ideal for food, biotech and pharmaceutical applications.
- Ideal for food, biotech and pharmaceutical applications.
- Excellent chemical compatibility. Ceramic and PTFE withstands pressures up to 200 °F (93°C), 300 psig (20.7 bar).
- Quick connect 1” flange for 1/4” or 3/8” internal threads for 1/4” or 3/8” tubing.
- Ideal for food, biotech and pharmaceutical applications.
- Excellent chemical compatibility. Ceramic and PTFE withstands pressures up to 200 °F (93°C), 300 psig (20.7 bar).
- Quick connect 1” flange for 1/4” or 3/8” internal threads for 1/4” or 3/8” tubing.
Select-A-Pump

- Select the flow and pressure closest to your requirements
- Refer to the pages indicated for information on available models
- Flow rates shown are maximum milliliters per minute
- All FMI pumps are infinitely adjustable from zero to their maximum flow rate

Example
15 ml/min @ 20 psig
The **PDS100** is a precision system capable of dispensing or pumping fluids ranging from 3 μL per dispense or 18 μL/min continuous (Single RH00LF) up to 1536 mL/min (Dual Q3) into pressures ranging from 10 psi to 100 psi (RH).

- All models feature FMI’s patented CeramPump® No-Valve Fluid Control Technology
- Intuitive menu-driven programming uses front panel membrane switches with 2.75" x 1.5" LCD display
- Pump heads are integrally mounted to control unit, which includes precision stepper motors, drivers and programmable electronics housed in a rugged, anodized, aluminum enclosure
- Available in single and dual pump head configurations in all FMI pump head sizes
- Universal Power Input accepts 100-240 V AC 50/60 Hz
- Ideal for process & production single and dual channel dispensing & filling
- Dual pump head configurations can be programmed for independent pump control, great for proportional flow or dilutions

<table>
<thead>
<tr>
<th>Piston Code</th>
<th>Speed (RPM) Standard</th>
<th>Min Dispense (mL/rev)</th>
<th>Max Dispense (mL/rev)</th>
<th>Min Dispense mL/min</th>
<th>Max Dispense mL/min</th>
<th>Single</th>
<th>Dual - Pumps</th>
<th>Pressure (PSIG)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min Dispersal</td>
<td>Max Dispersal</td>
<td>Min (at Minimum Speed)</td>
<td>Max (at Maximum Speed)</td>
<td>Min (at Minimum Speed)</td>
<td>Max (at Maximum Speed)</td>
<td>Maximum Each</td>
</tr>
<tr>
<td>RH00</td>
<td>6</td>
<td>0.003</td>
<td>0.025</td>
<td>0.0180</td>
<td>18.75</td>
<td>0.036</td>
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<td>100</td>
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<tr>
<td>RH0</td>
<td>600</td>
<td>0.003</td>
<td>0.050</td>
<td>0.0180</td>
<td>37.50</td>
<td>0.036</td>
<td>75.0</td>
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<tr>
<td>Q0</td>
<td>600</td>
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<td>0.080</td>
<td>0.0240</td>
<td>48.00</td>
<td>0.048</td>
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<tr>
<td>RH1</td>
<td>750</td>
<td>0.005</td>
<td>0.100</td>
<td>0.0300</td>
<td>75.00</td>
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<td>0.064</td>
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<td>768.00</td>
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</table>

1) Minimum Flow Rates for RH and Q Pump Heads calculated at 6 RPM
2) Maximum Flow Rates for RH Pump Heads calculated at 750 RPM
3) Maximum Flow Rates for Q Pump Heads calculated at 600 RPM

Selectable RS485, 4-20 mA, 0-5 V DC, and 0-10 V DC input for automatic control

LCD Menu Display & Membrane Switches
**PDS100 Programmable Metering Pump**
Dispense, Pump, Mix, Dilute, or Proportion

**Dimensions:**
11 3/4" x 5 1/8" x 6 1/4" wide
(300 x 128 x 159 mm)

**Electrical:**
RS485, 4-20 mA, 0-10 V, 0-5 V interface for connection to process sensors, PLC and PC controllers

**Shipping weight:**
7.5 lb. (3.41 kg)
Variable Speed Pump
Variable Flow Rate to 2300 mL/min

QV / QVG50 / Q2V

- Adjustable from 5 - 50 strokes per minute for QVG50 and 90 - 1800 strokes per minute for the QV, Q2V and RHV
- Quick connect to V300 Controller (included)
- Q2V Ratio-Matic® duplex for proportional metering using a single drive with two pump heads
- Q2V Ratio-Matic® duplex reduces pulsation by 50%

QV/ QVG50

Dimensions:
QVG50: 11" x 5" x 5 3/4" wide
(279 x 127 x 146 mm)
QV: 10" x 4 5/8" x 4 7/8" wide
(254 x 117 x 124 mm)

Shipping weight:
QV: 10 lb (4.5 kg)
V300: 5 lb (2.25 kg)
QVG50: 10 lb (4.5 kg)

RHV
Low Flow
(0 - 180 mL/min)

- Drift-free flow ranges up to 180 mL/min, pressures from -10 to 100 psig
- Easy grip displacement control ring graduated in 450 divisions

RHV Pumps (Includes V300)

<table>
<thead>
<tr>
<th>MAX. Flow/Pressure</th>
<th>Wetted Parts</th>
<th>MAX. Fluid Temp</th>
<th>Complete Pump</th>
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<tbody>
<tr>
<td>ML/MIN</td>
<td>PSIG</td>
<td>BAR</td>
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</tr>
<tr>
<td>90</td>
<td>100</td>
<td>6.90</td>
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</tr>
<tr>
<td>180</td>
<td>100</td>
<td>6.90</td>
<td>Ceramic / PVDF</td>
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<td>45</td>
<td>100</td>
<td>6.90</td>
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</tr>
<tr>
<td>180</td>
<td>100</td>
<td>6.90</td>
<td>Ceramic / Tefzel</td>
</tr>
</tbody>
</table>
**V Variable Speed Controller**

**Ideal for Automated Process Control**

**V300** Variable Speed Controller **QV, QVG50, RHV** and **Q2V** Pump Drive Modules

- Membrane Switches for manual flow rate settings and start/stop functions
- Selectable 4-20 mA, 0-5 V DC, & 0-10 V DC input for automatic control
- Start, Stop & Reverse Flow while maintaining flow settings
- Rugged, Anodized, Aluminum Enclosure designed for both bench-top & wall mounting

Selectable 4-20 mA, 0-5 V DC, & 0-10 V DC input for automatic control for QV, QVG50, RHV & Q2V Pump Drive Modules

**How to Order**

Drive + Pump Head

QV + Q3CKC = Complete pump

### QV/QVG50/Q2V PDM (Includes V300)

<table>
<thead>
<tr>
<th>MAX. Flow (ML/MIN)</th>
<th>Pressure (PSIG)</th>
<th>PDM</th>
<th>Piston Code</th>
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<td>1.25</td>
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<td>QVG50</td>
<td>RH00</td>
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<tr>
<td>2.50</td>
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</tr>
<tr>
<td>4.00</td>
<td>100</td>
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<td>Q0</td>
</tr>
<tr>
<td>5.00</td>
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<td>16.00</td>
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<td>Q1</td>
</tr>
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<td>36.00</td>
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<td>QVG50</td>
<td>Q2</td>
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<td>64.00</td>
<td>25</td>
<td>QVG50</td>
<td>Q3</td>
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<td>50</td>
<td>QV</td>
<td>Q1</td>
</tr>
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<td>Q3</td>
</tr>
<tr>
<td>576*</td>
<td>25</td>
<td>Q2V</td>
<td>Q3</td>
</tr>
</tbody>
</table>

* See General Specifications note (pg 35)

**Drive Options**

- Mounting Base (pg.15) Part # -MB
- Dial Indicator (pg.30) Part # -Q485

**V300**

**Dimensions:**

7 1/4” x 5 1/8” x 6 1/4” wide (182 mm x 128 x 159 mm)

**Shipping weight:**

Q2V: 15 lb (6.75 kg)

V300: 5 lb (2.25 kg)

**Electrical:**

Universal Power Input accepts 100-240 V AC 50/60 Hz

**Have questions?**

Chat live with an FMI application specialist at www.FluidMetering.com

- 516-922-6050 • 800-223-3388 • pumps@fmipump.com • www.FluidMetering.com
QP Motorless Pedestal
High Flow - Rugged Duty

- Typically driven by belt, chain or shaft coupling connected to your special motor drive, e.g. air, hydraulic, stepper, etc. Maximum speed 1800 RPM
- Used extensively in laboratory, industrial, and OEM applications for both dispensing & metering up to 2300 mL/min continuous flow
- Minimal torque requirement of 35 inch ounces

QP PMD (PUMP DRIVE MODULE)

<table>
<thead>
<tr>
<th>MAX. Flow/Pressure</th>
<th>PDM</th>
<th>Piston Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML/Stroke</td>
<td>PSI</td>
<td>BAR</td>
</tr>
<tr>
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<td>0.10</td>
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<tr>
<td>0.32</td>
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</tr>
<tr>
<td>1.28</td>
<td>100</td>
<td>6.90</td>
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</tbody>
</table>

Drive Options
- Dial Indicator (pg.30) Part # Q485
- P56C Face Adapter (pg. 29) Part # - P56C
- Masterflex™ Adapter (pg. 29) Part # - RH/M

QP56C - Use your own 56C Motor

- Use your own 56C Motor (5/8" shaft diameter)
- Maximum speed 1800 RPM
Rh Miniature Motorless
Low Flow - High Precision

- 0 to 100 microliters per stroke
- Precision stroke to stroke = 0.5% or better
- Pressures from -10 to 100 psig
- Needs only 17 inch ounces of torque
- Requires only 2 1/4" panel space
- Accommodates standard 1/4" O.D. tubing or 1/4-28 low flow fittings
- 0 to 100% stroke length adjustment for maximum flow rate flexibility while running or at rest
- Linear speed vs. flow rate from 0 to 3600 RPM (360 mL/min)
- Ceramic and PVDF standard wetted materials - also available in Tefzel®

Rh Pumps

<table>
<thead>
<tr>
<th>MAX. Flow/Pressure</th>
<th>Wetted Parts</th>
<th>Complete Pump Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML / Stroke</td>
<td>PSIG</td>
<td>BAR</td>
</tr>
<tr>
<td>0 - 0.025</td>
<td>100</td>
<td>6.90</td>
</tr>
<tr>
<td>0 - 0.05</td>
<td>100</td>
<td>6.90</td>
</tr>
<tr>
<td>0 - 0.10</td>
<td>100</td>
<td>6.90</td>
</tr>
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<table>
<thead>
<tr>
<th>Drive Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masterflex Adapter (pg. 29) Part #: - RH/M</td>
</tr>
<tr>
<td>Adapter for Q (PDM) (pg. 29) Part #: - RH/Q</td>
</tr>
<tr>
<td>Low Dead Volume Pump Head (pg. 28) Part #: - LF for 1/4-28</td>
</tr>
</tbody>
</table>

RHLF

Rh-LF features integrally molded ¼-28 female low dead volume ports. This allows for quick connections to 1/16" & 1/8" O.D. micro bore tubing and fittings (FMI Q661 pg. 28).

Dimensions:
- 2 1/4" O.D. x 3 1/2" (57 O.D. x 89 mm)
- Shaft Extension:
- 5/16" dia. x 3/4" long (8 mm dia. x 19 mm long)
- Shipping weight: 2 lb (0.9 kg)

RH/Q Adapter
See page 29

OEM Version
See page 21
QD High Speed - High Flows
For General Lab and Industrial Use

- Flow rate infinitely adjustable from 0 to 2208 mL/min in either direction
- No valves to clog, hang up or service
- Ceramic and fluorocarbon standard wetted materials
- Drift-free performance
- Convenient multi-position tilt stand for wall or counter mounting
- Rugged, long life, fan cooled, thermally protected, ball bearing motor

How to Order
Drive + Pump Head
QD + Q3CKC = Complete pump

Dimensions:
9 3/4" x 4 3/4" x 5 3/8"
(248 x 121 x 137mm)
Shipping weight:
10 lb (4.5 kg)

Electrical:
115 V AC, 60 Hz, 10,
1.25 amps, 1/25 HP,
1725 RPM, shaded
4 pole, TEFC, sparkless,
thermally protected with
3 prong power cord.
Motor is UL recognized

### QD/QDX PDM (PUMP DRIVE MODULE)

<table>
<thead>
<tr>
<th>MAX. Flow/Pressure</th>
<th>ML/MIN</th>
<th>GAL/HR</th>
<th>PSIG</th>
<th>BAR</th>
<th>PDM</th>
<th>Piston Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>43.13</td>
<td>0.681</td>
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<td></td>
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<td>RH00</td>
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<tr>
<td>86.25</td>
<td>1.3</td>
<td></td>
<td>100</td>
<td>6.90</td>
<td></td>
<td>RH0</td>
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<tr>
<td>138.0</td>
<td>2.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Q0</td>
</tr>
<tr>
<td>172.50</td>
<td>2.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RH1</td>
</tr>
<tr>
<td>552*</td>
<td>8.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Q1</td>
</tr>
<tr>
<td>1242*</td>
<td>18.9</td>
<td>50</td>
<td>3.45</td>
<td></td>
<td></td>
<td>Q2</td>
</tr>
<tr>
<td>2208*</td>
<td>30.0</td>
<td>25</td>
<td>1.72</td>
<td></td>
<td></td>
<td>Q3</td>
</tr>
</tbody>
</table>

* See General Specifications note (pg 35)

### Drive Options
- 230 VAC (50/60 Hz) * Part # -2
- Mounting Base (pg.15) Part # -MB
- Dial Indicator (pg.30) Part # Q485
- Hazardous Duty (pg.13) Part #: QDX

Have questions?
Chat live with an FMI application specialist at www.FluidMetering.com
### QDX Hazardous-Duty Drive

- Flow rate infinitely adjustable from 0 to 2208 mL/min variable in either direction 100 psi
- High flow hazardous-duty motor Class I, Group C, D Class II, Group E, F, G
- Rugged, long life, fan cooled, thermally protected, ballbearing motor
- Fixed Speed

**Electrical:**
115/230 V AC, 60 Hz, 10, 1/3 hp, ball bearing, UL listed & CSA certified motor, 1725 RPM, pigtail leads for conduit connection. Motor is totally enclosed, fan cooled. 6.6 amps @ 115 V AC and 3.3 amps @ 230 V AC

**Dimensions:**
17 3/4" x 6 7/8" x 8 1/2" wide
(451 x 175 x 216 mm)

**Shipping weight:**
43 lb (19.35 kg)

### QP56C - Use your own 56C Motor

- Use your own 56C Motor
- Max 1800 RPM
**Small Solutions**

**RHSY Synchronous Pumps**

The Ultimate in Low Flow Metering Accuracy

- Compact design RH pump with synchronous motor assembly
- Drift-free performance independent of load variations or fluctuations in line voltage
- Micrometer-like fine adjustment using an easy grip flow control ring graduated in 450 divisions
- Choice of 150, 300, and 600 RPM through a simple and safe belt arrangement change
- Forward - Off - Reverse switch for instant flow direction control

**RHSY Pumps**

<table>
<thead>
<tr>
<th>MAX. Flow</th>
<th>Wetted Parts</th>
<th>MAX. Fluid Temp</th>
<th>Complete Pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>@150 RPM</td>
<td>@300 RPM</td>
<td>@600 RPM</td>
<td>Ceramic / PVDF</td>
</tr>
<tr>
<td>7.5 mL/min</td>
<td>15.0 mL/min</td>
<td>30 mL/min</td>
<td></td>
</tr>
<tr>
<td>15.0 mL/min</td>
<td>30.0 mL/min</td>
<td>60 mL/min</td>
<td></td>
</tr>
</tbody>
</table>

RHSY Pumps

Dimensions:
- 5" x 5" x 4" wide (127 x 127 x 102 mm)
- Shipping weight: 4 lb (1.8 kg)
- Electrical: 115 V AC, 60 Hz, 10, .08 amps, with 3 prong power cord

Note: Flow Rates are reduced approximately 18% when Pump Drive Module is operating on a 50 Hz electrical supply.

**PiP Precision Dispenser**

Pipetting, Syringing and Diluting

- Ideal for repetitive and volumetric dispensing of acids, solvents and aqueous solutions
- Can act as a single shot dispenser using the hand/foot switch or as a single metering pump in the continuous mode
- Using a combination of forward and reverse modes, dilutions can easily be accomplished

**PiP Pumps micro π-petter**

<table>
<thead>
<tr>
<th>MAX. Dispense Rates</th>
<th>Complete Pump Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microliters / Revolution</td>
<td>PiPOCKC</td>
</tr>
<tr>
<td>0 - 50 µL</td>
<td></td>
</tr>
<tr>
<td>0 - 100 µL</td>
<td></td>
</tr>
</tbody>
</table>

PiP Pumps

Dimensions:
- 5" x 5" x 4" wide (127 x 127 x 102 mm)
- Shipping weight: 5 lb (2.25 kg)
- Electrical: 115 V AC, 60 Hz, 10, .08 amps, 150, 300, 600 RPM with 3 prong power cord

**Drive Options**

- 230 VAC (50Hz., .04 amp) * Part # -2

**Drive Options**

- Low Dead Volume Pump Head (pg. 28) Part # - LF for 1/4-28

- 516-922-6050  •  800-223-3388  •  pumps@fmipump.com  •  www.FluidMetering.com
QG Low Speed - Low Flows
For General Lab and Industrial Use

- A choice of five different drive speed models
- Ceramic and fluorocarbon standard wetted materials
- Long-life, fan cooled, thermally protected, ball bearing gear motors
- Convenient multi-position tilt stand for wall or counter mounting
- Can be combined with all RH and Q Pump Head Modules
- Flow rate infinitely adjustable from 0 to maximum in either direction

**Note:** The QG6-3, QG6-3MB, QG50-3MB and QG50-3MB configurations are no longer available.

**How to Order**

Drive + Pump Head
QG + Q3CKC = Complete pump

**QG PDM (PUMP DRIVE MODULE)**

<table>
<thead>
<tr>
<th>MAX. Flow</th>
<th>Pressure</th>
<th>PDM</th>
<th>Piston Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML/Min</td>
<td>GAL/HR</td>
<td>PSIG</td>
<td>BAR</td>
</tr>
<tr>
<td>0.15</td>
<td>.002</td>
<td>100</td>
<td>6.90</td>
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<tr>
<td>0.30</td>
<td>.004</td>
<td>20</td>
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<td>0.48</td>
<td>.007</td>
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<td>0.60</td>
<td>.009</td>
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<td>1.92</td>
<td>.030</td>
<td>75</td>
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<td>4.32</td>
<td>.068</td>
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<td>3.45</td>
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<td>7.68</td>
<td>.119</td>
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<td>1.72</td>
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<td>.025</td>
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<td>.031</td>
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<td>108.00</td>
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<td>192.00</td>
<td>2.995</td>
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<td>1.72</td>
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<tr>
<td>512.00</td>
<td>7.987</td>
<td>25</td>
<td>1.72</td>
</tr>
</tbody>
</table>

**Drive Options**

230 VAC (50/60 Hz)* Part # -2
24 VAC (50/60 Hz)* Part # -3
Mounting Base (pg.15) Part # -MB
Dial Indicator (pg.30) Part # Q485

**Dimensions:**
10 3/4" x 4 7/8" x 5 3/4" wide (273 x 124 x 146 mm)

**Shipping weight:**
10 lb (4.5 kg)

**Electrical:**
115 V AC, 60 Hz, 1Ø, 1 amp, 6, 20, 50, 150, 400 RPM, shaded 2 pole, enclosed ventilated, thermally protected, 135°C with 3 prong power cord

Note: Flow Rates are reduced approximately 18% when operating on a 50 Hz electrical supply.

*See General Specifications note (pg 35)
RHB / QB  Direct Current Pumps
For Mobile, Remote & Instrumentation

- 12, 24, and 90 V DC motors with close-coupled R/H/Q Pump Heads
- Widely used to inject discrete quantities of additive fluids into main discharge lines of tank trucks and pest control vehicles
- Ideal for environmental sampling & injection
- Offers the advantage of mechanical adjustment of stroke length, plus electrical control of stroke rate by voltage variation
- Extended motor shaft accepts FMI HES/PRS Rotational Sensors or user supplied rotational sensor (see page 28 for more info)

RHB Pumps

<table>
<thead>
<tr>
<th>MAX. Flow</th>
<th>Pressure</th>
<th>Wetted Parts</th>
<th>MAX. Fluid Temp</th>
<th>Complete Pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML/MIN</td>
<td>PSIG</td>
<td>BAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>100</td>
<td>6.90</td>
<td>212°F</td>
<td>RHB0CKC</td>
</tr>
<tr>
<td>260</td>
<td>100</td>
<td>6.90</td>
<td>212°F</td>
<td>RHB1CKC</td>
</tr>
</tbody>
</table>

QB PDM (PUMP DRIVE MODULE)

<table>
<thead>
<tr>
<th>MAX. Flow/Pressure</th>
<th>PDM</th>
<th>Piston Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML/MIN</td>
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<tr>
<td>45</td>
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<td>RH00</td>
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<td>Q0</td>
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<tr>
<td>180</td>
<td></td>
<td>RH1</td>
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<tr>
<td>576*</td>
<td></td>
<td>Q1</td>
</tr>
<tr>
<td>1296*</td>
<td></td>
<td>Q2</td>
</tr>
<tr>
<td>2304*</td>
<td></td>
<td>Q3</td>
</tr>
</tbody>
</table>

*See General Specifications note (pg 35)

Drive Options
- 24 VDC (3 amps) for RHB Part # -4
- 90 VDC (0.41 amps) for RHB Part # -5

How to Order
Drive + Pump Head QB + Q1CKC = Complete pump

QB Pumps: Rated at 1800 RPM (or approximately 8 volts for 12 V DC models)

Dimensions:
10 1/2" x 5" x 4 1/2" wide
(267 x 127 x 114 mm)
Shipping weight:
8 lb (3.6kg)
Electrical:
12 V DC, 4 amps; 24 V DC, 3 amps; 90 V DC, 0.41 amps, totally enclosed with 6" pigtail leads
Shaft extension: 5/16" dia. x 1" long with flat

Dimensions:
8" x 3 x 3" wide
(203 x 76 x 76 mm)
Shipping weight:
7 lb (3.15 kg)
Electrical:
12 V DC, 4 amps, 2600 RPM, totally enclosed, with 6" pigtail leads
Shaft extension: 5/16" dia. x 1" long with flat

QB PUMPS: Rated at 1800 RPM (or approximately 8 volts for 12 V DC models)
**PD Pneumatic**

For Non-Electric Operation

- Provides a compact, variable speed, air powered drive
- Ideal power alternative when electrical power source not available
- SPD up to 1800 RPM
- GPD up to 400 RPM (See page 15 QG400 for flow rate data)

**How to Order**

Drive + Pump Head

SPD + Q1CKC = Complete pump

**PD PDM (PUMP DRIVE MODULE)**

<table>
<thead>
<tr>
<th>MAX. Flow/Pressure</th>
<th>SPD</th>
<th>Piston Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML/MIN</td>
<td>PSIG</td>
<td>BAR</td>
</tr>
<tr>
<td>45</td>
<td>100</td>
<td>6.90</td>
</tr>
<tr>
<td>90</td>
<td></td>
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<tr>
<td>144</td>
<td></td>
<td></td>
</tr>
<tr>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>576*</td>
<td>70</td>
<td>3.45</td>
</tr>
<tr>
<td>1296*</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>2304*</td>
<td>25</td>
<td>1.72</td>
</tr>
</tbody>
</table>

*See General Specifications note (pg 35)

**Drive Options**

- Dial Indicator (pg.30) Part # -Q485
- Pulse Suppressor (pg.31) Part # 58003

**Dimensions:**
8" x 3" x 3" wide
(203 x 76 x 76 mm)

**Specification:**

- **SPD:** Air requirements
  9-10 CFM at 40 psig
  Air Inlet size: 1/8" (F) NPT

- **GPD:** Heavy-duty gear box
  Air requirements:
  14-16 CFM at 40 psig
  Air Inlet size: 1/8" (F) NPT

**Shipping weight:**
9 lb (4.05 kg)

Have questions?
Chat live with an FMI application specialist at www.FluidMetering.com
Solutions for All Your OEM Applications
Production - OEM - LAB

One Dispenser / Pump
For All Your Applications

Valveless Syringing
Aspirate & Dispense

Fast Prime
Flush & Wash

Sterile Fluid

Aspirate

Air Slug

Sample, Reagent,
or Buffer

Continuous Dispensing

Continuous Metering

Dispense

Precision % CV of
0.5% or better

0-2,000 ul

Fluid

0-2,000 ml/min
Production - OEM - Lab

**STRH** Adjustable Low Flow Stepper Pump

Meter, Dispense, Aspirate, Flush

- Precision **RH** adjustable pump with stepper motor
- Valveless, reversible, self priming
- Ceramic and fluorocarbon, low dead-volume fluid path
- Ideal for prototyping
- Optical sensor

<table>
<thead>
<tr>
<th>Max. Dispense Rates</th>
<th>Wetted Parts</th>
<th>Complete Pump Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microliters / Revolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - 25 µL</td>
<td>Zirconia / PVDF / Ceramic</td>
<td>STRH002KCLF</td>
</tr>
<tr>
<td>0 - 50 µL</td>
<td>Ceramic / PVDF</td>
<td>STRH06CKCLF</td>
</tr>
<tr>
<td>0 - 100 µL</td>
<td>Ceramic / PVDF</td>
<td>STRH12CKCLF</td>
</tr>
</tbody>
</table>

**STQP** Adjustable High Flow Stepper Pump

- Precision, variable displacement **Q** Pump with integral stepper motor
- Accommodates all **Q** style pump heads and **RH** pump heads (with **RH/Q** adapter)
- Ideal for OEM applications where accurate & frequent displacement changes are expected
- Available in **ST2QP Duplex Ratio:Matic**® configurations
- Ideal for prototyping
- Can be driven by FMI’s **ICST-02**, or a variety of commercially available stepper driver boards

**ICST-02** Stepper Control

- Programmable control for all FMI Stepper Pumps
- Extensive dispense & metering capabilities
- Multiple input and output connections
- RS 232 Serial Port for PC connection
- MS Windows® programming software included
- Compact size: 2.0" x 3.1" x 1.6" high (51 x 79 x 41 mm)
OEM Dispensers / Pumps
High Precision Stepper Motor Pumps for OEM Applications

- Ceramic and fluorocarbon fluid path
- Displacement of 0 to 1280 microliters (1.28 mL) per revolution
- Excellent chemical resistance
- 1.8° stepper motors with opto sensors

Low Flow \textit{STH}

<table>
<thead>
<tr>
<th>Microliters / Revolution</th>
<th>Wetted Parts</th>
<th>Complete Pump Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 25 \mu L</td>
<td>Zirconia / PVDF / Ceramic</td>
<td>STH00ZKCLF</td>
</tr>
<tr>
<td>0 - 50 \mu L</td>
<td>Ceramic / PVDF</td>
<td>STH0CKCLF</td>
</tr>
<tr>
<td>0 - 100 \mu L</td>
<td>Ceramic / PVDF</td>
<td>STH1CKCLF</td>
</tr>
<tr>
<td>0 - 200 \mu L</td>
<td>Ceramic / PVDF</td>
<td>STH2CKC</td>
</tr>
</tbody>
</table>

High Flow \textit{STQ}

<table>
<thead>
<tr>
<th>Microliters / Revolution</th>
<th>Wetted Parts</th>
<th>Complete Pump Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 320 \mu L</td>
<td>Ceramic / PVDF</td>
<td>STQ1CKC</td>
</tr>
<tr>
<td>0 - 720 \mu L</td>
<td>Ceramic / PVDF</td>
<td>STQ2CKC</td>
</tr>
<tr>
<td>0 - 1280 \mu L</td>
<td>Ceramic / PVDF</td>
<td>STQ3CKC</td>
</tr>
</tbody>
</table>

\textbf{Brushless DC Pump}

Instrumentation Pump for Wash & Fluid Transfer

- 24 V brushless DC motor
- Fixed displacement, factory calibrated to your specifications
- Compact design with integral electronics

\textbf{Sub-1 Pump}

Sub-Microliter Dispensing Pump

- Patent pending Adjustable Dual Eccentric bushings for precise flow calibration
- Dispense volume as low as 1 \mu L / stroke
- Four pump heads available
**STF1-9** Valveless 400μL Dispensing Pump

Ideal for OEM Metering & Dispensing Applications

- Compact design
- Larger piston allows higher dispense / metering rate
- 9 pump drives and 4 pump heads - 36 possible configurations

**STF** Fixed Displacement Pump

Ideal for waste, wash, and flush fluid control in medical instrumentation

- Economical design with fixed displacement link
- Precision stepper motors with opto sensors
- Available in 25μL, 50μL, 100μL, & 200μL versions or custom
- Isolation gland available for crystallizing fluids

**STH2** 200μL STH Pump

Ideal for reagent dispensing in clinical chemistry applications

- Extended dispense and flow range in a compact OEM design
- Precision, high-torque stepper with opto sensor
- High performance, extended-life, seal configuration

**H-W** Isolation Gland Pump

Miniature OEM pump with isolation gland ideal for low volume fluid control of crystal forming fluids

- Easily handles saline, slurries, particulates and abrasives
- Isolates main process fluid from seal area & atmosphere
- Barbed fittings provide quick connections to gland ports
ST2RH Low Flow Adjustable

Ideal for high throughput production dispensing in the manufacture of disposable medical components

- Dual variable displacement RH pumps with integral stepper motor
- Each pump head is independently adjustable using easy-grip flow control ring
- Ideal for precision low volume dispensing of solvents, adhesives, lubricants, electrolytes, and more
- Ratio:Matic® proportional dispensing of ratios up to 100:1

ST2H Low Volume Fixed Displacement

Compact, dual channel fluid control ideal for OEM medical & analytical instrumentation

- Fixed displacement for dual channel or proportional fluid control
- Proportional fluid control ideal for mixing and diluting
- Each pump head individually factory calibrated to your specifications
- Accommodates all combinations of H piston sizes for dispense ratios up to 100:1

ST2QP High Flow Adjustable

- Dual STQP high flow pump heads for proportional metering using a single stepper motor
- Each pump head displacement is independently field adjustable
- Accommodates all combinations of Q pump sizes

ST2Q Fixed Displacement

- Dual STQ high flow fixed displacement pump heads for proportional metering using a single stepper motor
- Each pump head displacement is factory calibrated
Special Pumps

Intelligent Programmable Pump

- FMI’s **STH Stepper Pump** with integral programmable driver
- Driver provides servo control of a stepper pump
- 5 programmable inputs, 2 programmable outputs
- Multiple programming platforms including Visual Basic, C/C++, Delphi, Lab VIEW
- Analog 0-5 V, RS-232 serial, CANopen protocol supported

**CL1, CL2 CHLORITROL**

Valveless Hypochlorite Injection

**The Pump that Never Loses Prime!**

The Chloritrol is the solution for sodium hypochlorite injection. Totally new patented technology & field tested, perfect for high and low demand applications, including Ultra Low Volume.

- No valves or diaphragms to service
- No loss of prime... Ever!
- Ability to prime against 125 psi line pressure
- Months of “no touch” service = fast payback
- Low energy consumption
- Protective enclosure, space-saving wall mount design
- **C100A** Variable speed DC controller accepts 4-20 mA control signal

**Dimensions:**
15 1/2" x 13 3/8" x 6 3/4"  

**Shipping weight:**
18.6 lbs. (8.4 kg)

Electrical: 0-90 V DC
Specialty Pumps

**PDS100 Smooth-flo**
Valveless Pulse-Free Dispensing & Metering System

The Smooth-flo **PDS100** is a unique valveless dispensing and metering system which utilizes dual FMI pumps, precisely synchronized, to eliminate pulsation typically present in other piston pump designs.

- Pulse-Free fluid delivery down to 15 μL/min continuous flow
- Precision dual stepper control, factory calibrated for your flow range
- RS485, 4-20 mA, 0-5 V, 0-10 V electronic control interface for connection to process sensors, PLC and PC control systems
- Rugged, anodized aluminum enclosure is suitable for wall mounting or bench top installations
- Includes tubing, fittings, and configuration instructions for Smooth-flo operation
- Universal Power Input accepts 100-240 VAC, 50/60 Hz

**PDS100 SF Smooth-flo**

<table>
<thead>
<tr>
<th>Dispensing (mL/Rev.)</th>
<th>Metering (mL/min.)</th>
<th>MAX. Flow/Pressure</th>
<th>PDM</th>
<th>Piston Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min.- Max.</td>
<td>Min.- Max.</td>
<td>PSIG BAR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0025 - 0.050</td>
<td>0.015 - 10</td>
<td>60 4.12</td>
<td>PDS-100 SF</td>
<td>RH00</td>
</tr>
<tr>
<td>0.005 - 0.10</td>
<td>0.03 - 20</td>
<td></td>
<td>RH0</td>
<td>RH00</td>
</tr>
<tr>
<td>0.008 - 0.160</td>
<td>0.048 - 32</td>
<td>20 1.38</td>
<td>Q0</td>
<td>RH00</td>
</tr>
<tr>
<td>0.01 - 0.20</td>
<td>0.06 - 40</td>
<td>60 4.12</td>
<td>RH1</td>
<td>RH00</td>
</tr>
<tr>
<td>0.032 - 0.64</td>
<td>0.192 - 128</td>
<td>20 1.38</td>
<td>Q1</td>
<td>RH00</td>
</tr>
<tr>
<td>0.072 - 1.44</td>
<td>0.432 - 288</td>
<td></td>
<td>Q2</td>
<td>RH00</td>
</tr>
<tr>
<td>0.128 - 2.56</td>
<td>0.768 - 512</td>
<td></td>
<td>Q3</td>
<td>RH00</td>
</tr>
</tbody>
</table>

1) Minimum dispense volume per rev. is the total output for 2 identical pumps set at 5% of maximum displacement

2) Maximum dispense volume per rev. is for 2 identical pumps set at maximum displacement

3) Minimum continuous flow rate is the total output for 2 pumps set at 5% of maximum displacement operating at 6 RPM

4) Maximum Flow Rate is for 2 identical pumps set at maximum displacement at 200 RPM

Pulsation reduced 92 - 96% for **Q** Pump Heads and 93 - 96% for **H** Pump Heads.
Example: Pulsation for a **PDS-100** with **Q1** Pump Heads at 150 RPM is reduced by 97%.
Pump Heads

**W, WT** Isolation Gland Pump Heads
- For saline, slurries, abrasives, particulates, anaerobics, and crystal forming fluids. For temperature to 212° F
- Isolates main pumped fluid from seal area and atmosphere
- 2 extra ports for gland “barrier” - liquid or gas
- For Q1/Q2CKC, Q3CKC, & CSC Pump Head Modules

**H-W** Isolation Gland Pump Heads
- Easily handles saline, slurries, particulates and abrasives
- Isolates main process fluid from seal area & atmosphere
- Barbed fittings provide quick connections to gland ports

**CSC-W** Stainless Steel
- Gland design temperature to 350° F
- Pressure to 100 psig
- Ceramic piston and liner in 316SS case
- Main flow 1/4" NPT female; Gland ports: 10-32 female

**SAN** Sanitary Pump Heads
- Ideal for accurate and dependable handling of discrete fluid streams in sanitary applications
- No internal threads or blind holes to harbor bacterial growth
- Easily dismantles for scrubbing, brushing, & sterilization
- 316 SS and Teflon® fluid surfaces highly resistant to chemical and biological attack
- Ideal for food, dairy, brewery, pharmaceutical & biotech applications
- Tri-Clamp Flange Kit (see page 29 for more info)

All Stainless Steel Version available with SS Port Nuts, Tube Adapters & Carrier - “SAN-S”
SAN-TC Tri-Clamp Sanitary Pump Head

- **SAN** Type Sanitary Pump Heads with 316 SS Tri-Clamp flange fittings
- Tri-Clamp fittings are an industry standard for applications which require “quick-connect” fittings for easy sanitizing and/or sterilization
- 1" Flange will accommodate both 1/2" and 3/4" standard tube sizes
- Ideal for food, beverage, biotech, and pharmaceutical process applications

Q1CSC-200 200 PSI Q Pump Head

- Increases the operating pressure up to 200 psi for applications requiring flow rates up to 500 mL/min (Consult factory for drive selection)
- Ideal for medium pressure liquid chromatography
- New, high performance, extended-life seal configuration

CSC-WT High Temperature

- For maintaining process fluid temperatures and pumping viscous fluids
- High temperature to 350°F
- Accepts 2 standard 1/4" x 1" cartridge heaters & thermocouple
- Pressure to 100 psig
- Ceramic piston and liner in 316 SS cylinder case
- Main flow 1/4" NPT female ports; Gland Ports 1/8" NPT female

Q1CV & Q2CV PVC Pump Head

- Offers superior chemical resistance for metering concentrated water treatment chemicals
- Extended pressure range of 125 psi
- Wetted parts of ceramic and PVC
**Options**

**LF 1/4-28 Low Flow Pump Heads**

- For low flow (under 50 mL/min), and zero dead volume applications
- Direct connection to 1/4-28 low flow fittings
- **RH-LF & Q-LF** pump heads feature integrally molded 1/4-28 female low dead volume ports. This allows for quick connections to 1/16" or 1/8" O.D. micro bore tubing and fittings such as **FMI Q661**.
- Add suffix “LF” after Pump Head configuration
  
  * polypropylene case

**Q661 Small Bore Tubing Kit**

- 1/4-28 Fittings and 1/16", 1/8" O.D. Teflon Tubing
- Designed for all LF Pump Heads and to complement the **FMI R479** and **R412-5K**, the Small Bore Tubing Kit has a flangeless design that eliminates the need for special tools and assures leak-free, zero dead volume connections.

  - Tefzel® and Teflon® wetted surfaces

---

**Hall Effect Electrical Specification**

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>Supply Voltage (VDC)</th>
<th>Supply Current (mA max.)</th>
<th>Output Type</th>
<th>Output Voltage (V)</th>
<th>Output Current (Max.)</th>
<th>6&quot; Leadwires</th>
</tr>
</thead>
<tbody>
<tr>
<td>HES-6</td>
<td>4.5 TO 24</td>
<td>10.0</td>
<td>Sink</td>
<td>0.4</td>
<td>40mA</td>
<td>22 gauge teflon insulated</td>
</tr>
</tbody>
</table>

*Life: Indefinite*

**Order:** HES-6

**Proximity Type Rotational Sensor**

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>FORM</th>
<th>CONTACT RATING</th>
<th>MAX RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRS-1</td>
<td>SPST-N.O.</td>
<td>10 Watts, Max.</td>
<td>1000</td>
</tr>
</tbody>
</table>

*Life: 50 Million Operations at 5 VDC, 10 mA*

**Order:** PRS-1
QP/M & RH/M FMI Masterflex® Kits
Enhance your Existing Masterflex Pump Drives

- Move to state-of-the-art valveless piston technology
- Extend operating pressure to 100 psig
- Improve your long term Performance
- Add precise mechanical flow adjustment to your L/S™ drives
- Ceramic and fluorocarbon standard wetted materials
- Installs in minutes to your L/S™ standard pump head, L/S™ EASYLOAD™ pump head, or directly to any L/S™ drive
- Flow rates from microliters to 768 mL/min

QP56C Adapter Kit

- Adapter Kit for easy hook-up to your NEMA 56C FACE Foot Mount motor
- Kit includes Pump Drive Module QP, adapter, coupling and hardware

Order: KIT # QP56C

RH/Q Adapter

- Adds versatility to your RH pump head by adapting it to any Q pump drive
- Simple installation of adapter to RH pump head using only 3 screws
- Pump assembly can easily be slipped onto the Drive Module in seconds without tools

Order: KIT # RH/Q

Tri-Clamp Sanitary Pump Heads

- Easily changes barbed fittings supplied with SAN to SAN-TC type
- 1" Flange will accommodate both 1/2" and 3/4" standard tube sizes
- Kit consists of 316 SS Tri-Clamp flange and Teflon port seal

Order: KIT # 400576 (Q1 & Q2)
        KIT # 400577 (Q3)
Accessories

R479 Low Flow Isolation Kit

- Low flow adapter for stainless steel Q pump heads (except SAN)
- Isolates stainless steel cylinder case from process fluid for maximum chemical inertness
- 1/4-28 female thread provides minimal system dead volume
- Typically used with FMI Q661 Small Bore Tubing Kit
- Ideal for chromatography applications when used with PD-60-LF Pulse Dampener (max 65 psi)
- For flows up to 50 mL/min and pressures to 100 psig

Kit #R479 Consisting of four ferrules, two adapters & assembly/removal tools

#R478 Consists of ten spare ferrules

Q485 Dial Indicator Kit

- Ultra-precise flow adjustment for Q pumps
- Responds to the slightest adjustment of the Q pump adjusting knob
- Each increment on direct reading dial represents 1/1000 of maximum flow
- Easily attaches to all Q Pump bases
- Can be ordered with pump or separately

Kit # Q485

Low Flow Barb Adaptors for 1/16" & 1/8" I.D. Tubing

Threaded 1/4-28 UNF fitting to PVDF barb bottom sealing, rotating adaptors consisting of a white nylon 1/4-28 fitting with 5/16" hex nut and PVDF (fluid path) insert barb.

#110873A for use with 1/8" (3.2 mm) I.D. tubing. Pkg. of 10

#110874A for use with 1/16" (1.6 mm) I.D. tubing. Pkg. of 10

#110847-01 for use with 1/8" flexible tubing connection to isolation gland stainless steel "Q" Pumps
**PD-HF In-Line Pulse Suppressor**
*(For High Flow Applications)*

- For high flow systems of 50 mL/min or greater and stroke rates higher than 150 rpm against head pressures of 10 to 65 psig
- Unique encapsulated polyethylene bellows design that eliminates tubing vibrations and cavitation problems
- Easy to connect 1/4" compression fittings
- Best results when installed on both suction and discharge lines

**Corrugated Teflon® Tubing Pulse Suppressor**
*(For High Flow Applications)*

- Highly flexible no-kink tubing for high flow, (50 mL/min or greater), high pressure (100 psig) applications
- Eliminates cavitation and mechanical stress
- Best results when used on both suction and discharge lines
- Slips over 3/8" barbed fitting, 3/8" I.D. x 12" long

**Tubing Adaptors**

For Plastic Case Pump Heads - The integrally molded port fittings on the standard FMI Type K pump heads accept all 1/4" O.D. tubing. For other tubing arrangements, special port adapters are required.

- **#R412-0K** Adaptor for 1/8" I.D. tubing
- **#R412-1K** Adaptor for 1/4" I.D. tubing
- **#R412-2K** Adaptor for 3/8" I.D. tubing
- **#R412-6K** Adaptor for 1/2" I.D. tubing
- **#R412-5K** Adaptor for 1/4-28 ferrule fittings
- **#H476-K** Adaptor for 1/8" O.D. tubing
- **#110949** Adaptor for 6 mm O.D. tubing

Stainless steel adaptors are used with FMI Type S pump heads.

- **#R412-1** Adaptor for 1/4" I.D. flexible tubing
- **#R412-2** Adaptor for 3/8" I.D. flexible tubing
**Typical Flow / Dispense Data**

### Precision Test - 25 µL / stroke

- **Dispense Precision Test**: 0.5 percent

<table>
<thead>
<tr>
<th>DATA POINT NUMBER</th>
<th>VOLUME (MICROLITERS / STROKE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24.98</td>
</tr>
<tr>
<td>2</td>
<td>24.97</td>
</tr>
<tr>
<td>3</td>
<td>25.02</td>
</tr>
<tr>
<td>4</td>
<td>25.07</td>
</tr>
<tr>
<td>5</td>
<td>25.06</td>
</tr>
<tr>
<td>6</td>
<td>25.08</td>
</tr>
<tr>
<td>7</td>
<td>25.06</td>
</tr>
<tr>
<td>8</td>
<td>25.08</td>
</tr>
<tr>
<td>9</td>
<td>25.06</td>
</tr>
<tr>
<td>10</td>
<td>24.99</td>
</tr>
</tbody>
</table>

**Total**: 250.37

- **Avg**: 25.04
- **Std.Dev.**: 0.04
- **C.V.**: 0.17

### Life Test - 50 µL FMI Pump

- **Dispense Precision**: 0.5 percent

<table>
<thead>
<tr>
<th>SERVICE LIFE (DISPENSES IN MILLIONS)</th>
<th>PUMP PRECISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>3.85</td>
<td>0.2</td>
</tr>
<tr>
<td>7.71</td>
<td>0.4</td>
</tr>
<tr>
<td>15.42</td>
<td>0.6</td>
</tr>
<tr>
<td>23.13</td>
<td>0.8</td>
</tr>
<tr>
<td>30.83</td>
<td>1.0</td>
</tr>
<tr>
<td>38.54</td>
<td>1.2</td>
</tr>
<tr>
<td>53.96</td>
<td>1.4</td>
</tr>
<tr>
<td>69.38</td>
<td>1.6</td>
</tr>
<tr>
<td>84.80</td>
<td>1.8</td>
</tr>
</tbody>
</table>

**PUMP PRECISION**: 0.5 percent

### Definitions

- **Precision**: Repeatability and degree of variation of a set of values
- **Accuracy**: How close the average value is to the true value
- **FMI Pumps**: Accurate & Precise

Contact Information:
- 516-922-6050
- 800-223-3388
- pumps@fmipump.com
- www.FluidMetering.com
Performance curves shown below are applicable to the “Q” line of metering pumps.

**QD-2CKY**
- Maximum Flow: 1.2 SCFH
- Maximum Pressure: 17.5 Psig
- Maximum Vacuum: 17 in.Hg
- Piston: Ceramic
- Cylinder Liner: Carbon

**PERFORMANCE FLOW CURVES:** Typical flow “curves” for FMI LAB PUMPS with **CSC** pump heads handling water at a pump setting of 100% full stroke. Internal fluid slip (decrease in flow with increased pressure) is lowest at 100% stroke and increases as stroke displacement is decreased. Always select a pump with maximum output nearest your actual requirement.

**Flow Rate (mL/min)**
- **QD-1CSC**
  - LIQUID: Water @ 70 deg.F
  - FLOW @ 0 PSIG: 552.0 cc/min.
  - FLOW @ 100 PSIG: 550.5 cc/min.
  - STROKE: 100%
  - FLOW VARIATION @ 100 PSIG: 0.4%

- **QG150-1CSC**
  - LIQUID: Water @ 70 deg.F
  - FLOW @ 0 PSIG: 48 cc/min.
  - FLOW @ 100 PSIG: 46 cc/min.
  - STROKE: 100%
  - FLOW VARIATION @ 100 PSIG: 4.2%

Performance Curve shown represents a test run on an FMI LAB PUMP handling ambient air at 70 °F with CKY Pump Head Module.
Materials of Construction

FMI fluid contact components are fabricated of carefully selected materials. Each one has discrete characteristics of physical strength, abrasion resistance, and dimensional stability under varying conditions of pressure, temperature, and resistance to attack by certain chemicals. Since no one material possesses all of the characteristics required to handle all chemicals under all possible conditions, FMI offers a selection of materials of construction for each pump component that fluids contact during the pumping process. These components and materials are identified below by code designation, common usage names and trade names. General characteristics are as follows:

C - Ceramic*
Ceramic is used in most of the pumps for piston and/or cylinder liners. Ceramic pistons may be used with ceramic and carbon cylinder liners. Ceramic cylinder liners can only be used with ceramic pistons. Sapphire hard, fused crystalline Ceramic Al2O3, excellent chemical resistance, thermal stability and mechanically resistant to common abrasives.
*Caution: Subject to binding or freezing when stored after improper cleaning - brittle and subject to fracture under sudden impact loading - not suitable for very “dry” fluids such as hexane.

Z - Zirconia*
YTZP® pistons for H00 ceramic liners in very low dispense/flow apps.
*Caution: Subject to binding or freezing when stored after improper cleaning - brittle and subject to fracture under sudden impact loading - not suitable for very “dry” fluids such as hexane.

K - Fluorocarbon PVDF
Fluorocarbon PVDF, is used for some cylinder cases and tubing fittings. Autoclavable @ 240°F maximum. Good chemical tolerance to most fluids.
Caution: Sensitive to degrading effects of some organic solvents, esters, and ketones.

S - Stainless Steel 316
Stainless Steel 316 is used for some pistons, cylinder cases and/or tube fittings. Not to be used as piston with ceramic cylinder liner. Excellent chemical, and physical strength characteristics.
Caution: Subject to attack by some halides, strong acids, and bases - subject to surface abrasion and wear in piston application.

Y - Carbon
Carbon is used for some cylinder liners. Suitable for use with stainless steel and ceramic pistons.
Hard crystalline stage, ingot sintered, pure carbon chemically resistant to most commonly used fluids.
Caution: Sensitive to strong oxidants and all abrasive materials.

T - ETFE
Fluoropolymer E-TFE - Used for cylinder cases in some FMI pump head modules. Excellent chemical resistance to most acids, bases and solvents. Autoclavable @ 240°F maximum.

Rulon® AR, Saint-Gobain
Fluorocarbon, filled PTFE - Used for lip seals in some FMI pump heads. Excellent chemical resistance, - physically soft, resilient and wear resistant - abrasive to soft metals and should therefore not be used with “S” pistons in high stroke rate applications.

Rulon®J, Saint-Gobain
Fluorocarbon, filled PTFE - Used for lip seals in some FMI pump heads. Good chemical resistance, sensitive to some organic solvents, strong acids and bases - physically soft, resilient and non-abrasive.

PTFE
Fluorocarbon PTFE - Used for seals and fittings in some FMI pump head modules - excellent chemical resistance characteristics - soft, pliable, easily cut, nonstick surface chemically stable over wide thermal range, dimensionally sensitive to temperature change - not suitable for structural components.

Application Tips

PRESSURE: In most FMI pump models, motor starting torque is the limiting factor in the stated pressure rating. Fluids such as oils, creams and gels that are good lubricants are more easily pumped than aqeous or “dry” fluids and therefore require less motor torque and may be pumped against pressures considerably greater than those given in the rating charts.

All pump head components are designed to withstand backpressures up to 100 psig at room temperatures, though pump heads with fluorocarbon cylinder cases may exhibit some loss of pumping capacity at pressures over 60 psig.

ACCURACY: FMI pump accuracy is based on a simplified positive displacement mechanism. The valveless design provides a precision of better than 0.5% when handling medium viscosity fluids (50 to 500 centipoise). Aqueous solutions and light solvents work well but may exhibit some sensitivity (fluid slip) to variations in discharge head pressure. Gums, gels and non-abrasive semi-solids are handled with a high degree of accuracy... a direct result of the valveless design.

Viscous, tacky solutions, semi-solids and heavy slurries which tend to resist (cavitate) suction flow into a pump head can be handled with ease by selecting an FMI pump employing a relatively slow reciprocation rate.

The principal flow rate deviations of an FMI pump are fluid slip and stroke repetition rate. These two factors in turn are related to load factors such as viscosity, differential pressure, and drive motor voltage. When these two factors are controlled, the FMI pump will handle most fluids with reproducibility of better than 0.5%.

GAS PUMPING: Due to the valveless design of the FMI pump “CKY” and “CSY” pump heads are able to perform accurate gas transfers. With no valves to introduce random compression errors, gas sample flow in bagging, scrubbing and transit operation can be accurately preset based on actual piston displacement.

IMPORTANCE OF CLEAN FLUIDS: While a certain amount of caution must be exercised in the use of abrasive fluids in any metering pump, the “CKC” and “CSC” tend to be more tolerant of suspended solids than other metering pumps. To assure fluid compatibility, consult the Materials of Construction information above.

FOR BEST PUMPING RESULTS: Select an FMI pump having a maximum flow rating as near to the desired flow rate as possible.
How To Order

1. Determine your flow rate in mL/min and your pressure requirements in psig
2. Check that the drive power fits your application, i.e. AC, DC, stepper, etc.
3. Check the Piston Size Code for your flow rate and select a Pump Drive Module plus options
4. Go to page 4 and select a Pump Head Module (PHM) compatible with your fluid and application

Example

Q PUMP DRIVE MODULE + Q OR RH PUMP HEAD MODULE = COMPLETE PUMP ASSEMBLY

Pump Drive: QD +Option(s): Q485 Cost: ________ $______
      Cost: + Option: $______
      Cost: $______

Pump Head: Q-1CKC Option(s) W Cost: ________
      Cost: + Option: $______
      Cost: $______

Cost: $_____ = Total Cost: $______

*GENERAL SPECIFICATION NOTES FOR ALL PUMPS
1. Physical characteristics of your pumped fluid may affect the rating/capacity relationships shown in the performance tables for each FMI pump
2. The maximum flow rates shown in the tables are for H₂O at 2 psig
3. Flow rates are infinitely variable from zero to maximum capacities shown
4. Pumping capacities are reduced approximately 18% when the Pump Drive Module is operating on a 50 Hz electrical supply
5. Fluorocarbon cylinder cases (Q line only) are rated for a maximum pressure of 60 psig or the lower pressure shown in the charts
6. 3/8" I.D. tubing or greater is required for flows higher than 500 mL/min
7. 1/2" I.D. tubing or greater is required for flows higher than 1200 mL/min

Have questions?
Chat live with an FMI application specialist at www.FluidMetering.com

Have a question?
Click here

• 516-922-6050 • 800-223-3388 • pumps@fmipump.com • www.FluidMetering.com
**FMI Terms & Conditions**

**FMI LIMITED WARRANTY**

FMI products are manufactured to a high level of mechanical precision from materials that are resistant to attack by many corrosive chemicals. These products, however, may be self-destructive when used with non-compatible fluids or when located in physically hostile environments or when operated under non-specification voltage or pressure conditions.

FMI, therefore, warrants only as follows:

Each pump has been test operated with water prior to shipment from the factory. The qualifying performance of each pump is recorded by serial number in a permanent record of the company. The Goods shall be free of liens, are new and unused, and perform in accordance with the published or agreed written specifications and be free from defects in materials and workmanship for a period of one year from FMI’s invoice date. Goods not meeting specifications may be returned to FMI, freight prepaid, for repair or replacement at FMI’s discretion. Prior to any such return, Customer must request and receive written approval from FMI. If, upon examination, FMI determines that abusive practices, non-compatible fluids or destructive environment of operation or a combination of these factors is responsible for improper performance of the product, all labor and materials costs involved shall be at the expense of the customer. All such returns shall be redelivered Ex Works, Syosset, NY. Warranty returns may not be used to offset amounts owing for past or future deliveries.

FMI is not liable for special, indirect or consequential damages that may result from use, failure or malfunction of the product and any recovery against FMI may not be greater than the purchase price paid for the product. No person or entity is authorized to change the terms of this warranty.

**PRODUCT STANDARDS**

FMI products are certified and sold to comply with written FMI specifications. Only FMI is authorized to modify product claims and specifications. Products are subject to change without notice.

**RETURNS FOR CREDIT**

Standard FMI catalog products under most circumstances, may be returned to the FMI factory for credit when still in unused condition, packed in original shipping cartons, and meets current product specifications. All such returns, must have prior FMI customer service authorization before returning. A restocking charge of 15% of original invoice price will be made on each to cover related restocking costs.

**PRICES**

Prices are subject to change without notice and prior to order confirmation.

**QUANTITY DISCOUNTS**

Quantity discounts on standard catalog products purchased in units of ten or more are available. Contact FMI sales department for details.

**QUOTATIONS**

Prices quoted in writing will remain in effect for 30 days or any other time period stated in the written quotation.

**MINIMUM BILLING**

Minimum billing for FMI products is $75.00 domestic and foreign invoice value per order, net of shipping costs and any applicable discounts regardless of price list value of order.

**ORDERS**

Orders placed for Goods cannot be cancelled and will be shipped and invoiced by FMI per the confirmed delivery schedule. FMI is not responsible for delays beyond its control, including but not limited to, component shortages, delays by its vendors, labor disputes, weather delays or military actions.

All goods are delivered Ex Works, Syosset, NY at which time title and risk of loss shall pass to the Customer.

**FREIGHT POLICY**

FMI will assist Customer with arranging transportation via pick-up, prepay and bill, or freight collect. Goods will be packed for domestic shipment unless other packaging arrangements have been mutually agreed upon in writing. All shipping costs and any special packaging are the responsibility of the Customer. Insurance is the responsibility of the Customer. All claims for damaged merchandise should be made with Customer’s delivering carrier or insurance company.

**PAYMENT TERMS**

Open Account terms - 1% 10 days, net 30. International Sales - cash in advance. Credit Card Payments are accepted, Visa, Master Card, AMEX and Discover. Quoted prices are subject to change for payment terms other than those listed above. All bank charges related to wire transfers and ACH payments are the customer’s responsibility.

**OPEN ACCOUNT PRIVILEGES**

Customers may establish an open account status by presenting FMI evidence of prompt payment history including: a) three general credit references, b) one or more bank references, c) Fluid Metering, Inc. reserves the right to obtain a credit report from a national reporting agency.

FMI Customer Service Representatives and Technical Support Staff are available Monday through Friday from 8:00 a.m. to 5:00 p.m. EST. You can also FAX your specifications 24 hours a day to 516-624-8261 or Email us at: pumps@f mipump.com
Pump Head Materials Configuration

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<tr>
<th>Wetted Parts</th>
<th>RH</th>
<th>QCSC-W</th>
<th>QCSC-WT</th>
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<td>QCSC01</td>
<td>QCSC02</td>
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<tr>
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<td>QCSC-WT</td>
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<td>Washer/Tubing</td>
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Available Modules

Fluid Metering pumps are modular in design. The Pump Head Modules can be easily replaced and/or modified.

Selection Guide for FMI’s Pump Heads

**QCSC** Ceramic & PTFE Flat Path
- Excellent for general use with acids, caustic, caustic media, and applications requiring for MIL-X, Acetone, & Methanol cleanup.
- Rated 212°F (100°C) operating, 60 psi (4.1 bar), Autoclavable (non-operating) up to 240°/110°C.

**QCSC-W FLUSH** Flat version of QCSC
- Ideal for sensitive, critical filtering solutions such as laboratory.
- Installs entire pump flow path from seals and catastrophic failure.

**QCSC-WT** "HI TEMP" Gapless Sealed Pump Heads
- Designed for applications, which requires temperature control of the pump head.
- Accepts standard 1/4" tube cartridge heaters & 1/8" O.D. thermocouples. Pump head also includes a shut-off isolation gland.
- Rated 350°F (177°C), 100 psi (6.9 bar)
- Excellent chemical compatibility. Ceramic and PTFE wetted path.
- Fully adjustable zero to max.
- 212°F (100°C), sealed up to 240°F (116°C) (in operating), and pressure to 100 psig.
- Flat Flow: Ceramic and PTFE standard - other materials available (VITON, HNBR, BUNA, FKM).

**QCSC-020** 200 psi high pressure version of QCSC
- For Prep/Flash Chromatography

**QANS** Sanitary Design
- Ideal for food, biotech and pharmaceutical applications.
- 316SS, Ceramic and PTFE sealed for excellent chemical resistance.
- Easiest assembly for cleaning, no internal threads for 1/4" or 3/8" fitting.

**QANS-C** 3 clamp version of QANS
- Quick connect 1" flange for 1/4" to 1" tubing easy.

**QCW** For water treatment chemicals such as Sodium Hypochlorite and caustic Soda 50°F to 135°F

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For more information see the options page.
Typical Applications

**Electronics**
- Paint Bath Chemical Control
- PC Board Cleaning Systems
- Battery Manufacturing
- CMP & EDA Wafer Processing
- Flux Adhesive for Wave Soldering
- Wire Cooling for Stators & Armatures
- Semiconductor Chemical Dispensers

**Food, Dairy, & Beverage**
- Aseptic Packaging - Peroxide Dispensing
- Preservation Treatment of Meats & Poultry
- Nutrient & Color Addition
- Biochemistry Additions
- Color Additions for Filler
- Cattle Disease Mfg.
- Candy Polishing

**Industrial**
- Agricultural & Pesticide Spraying Systems
- On-Site Petroleum Additives
- Paints, Dyes, Inks, & Pigments
- Lubricant Dispensing
- Peristaltic Dispensing for Speaker Mfg.
- Hydrogen Fuel Cell Fluid Control

**Medical**
- Contact Lens Mfg. - Monomer Dispensing
- Dialysis Systems
- Hematocrits & Men&Paps
- Solvent Mixing for Disposables
- Blood Analysis Sample & Reagent Fluid Control
- Clinical Chemistry Instrumentation

**Analytical Instrumentation**
- ESI-Interferance
- Particle Analyzers
- Ion Chromatography & Ion Chromatography
- Liquid Chromatography & Water & Wastewater Monitoring
- Blood Gas Monitoring
- General Water Monitoring

**FMI SHOW SCHEDULE**

<table>
<thead>
<tr>
<th>Event</th>
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<th>Location</th>
<th>Booth #</th>
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<td>Feb. 2 - 6</td>
<td>Washington, DC</td>
<td>Booth # C50</td>
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<tr>
<td>Medica West</td>
<td>Mar. 13 - 15</td>
<td>Anaheim, CA</td>
<td>Booth # 216</td>
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<td>May 14 - 17</td>
<td>Tokyo Big Sight</td>
<td>Booth # 3002</td>
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<tr>
<td>Medica UK</td>
<td>Aug. 22 - 25</td>
<td>Moscow, Russia</td>
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</tr>
<tr>
<td>MD&amp;M West</td>
<td>Nov. 18 - 20</td>
<td>Washington, DC</td>
<td></td>
</tr>
</tbody>
</table>

**ISO 9001 : 2015 Certified**

**Valveless Ceramic Dispensers & Metering Pumps Since 1959!**

- No Valves, Drift-Free Operation
- One Moving Part
- Precision Dispensing - CV of 0.5% or better
- Flow Rates from Microliters to 4600 mL/min
- Positive Displacement up to 100 psi
- Viscosity Independent - unaffected by fluid viscosity

**Easy Flow Rate Adjustment**

- Moving the pump head position changes the piston stroke length, and, in turn, the flow rate
- Infinite fine flow adjustments between zero and 100% flow rate
- Flow rate Dial Indicator 40 0495 for the flow line provides accurate and simple linear calibration (see page 30)
- Flow rate can be changed while pump is operating at rest

**SLAS 2019**

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**FLUID METERING, INC.**

Valveless Metering Pumps and Dispensers

Over 59 Years of Precision Fluid Control

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