



Inert solenoid operated self-priming fixed displacement diaphragm pumps

- High accuracy dispense settings from 8 μ l to 250 μ l
- Low power consumption / minimal heat generation
- Low internal volume
- Positive shut off
- High cycle life - up to 20 million dispense cycles
- Choice of inert wetted materials

Broad range of dispense settings and flow rates

The diaphragm pumps are factory set for discrete outputs ranging from 8 μ l to 250 μ l. The pumps can be cycled at up to 2.0 Hz for the smallest version and 1.6 Hz for the largest version. Flow rates reach up to 25 ml / minute. Depending on the dispense setting, very high accuracy can be achieved with deviations from set-point of less than 1%. For optimal accuracy, the pumps should be used for the transfer of fluids between un-pressurized containers.

Self-priming

At startup, the pump is able to draw air. The suction created by the larger pumps is sufficient to pull liquids from an un-pressurized container located up to 1.3 meters (4' 3") beneath the pump. Once the pump is primed, it is able to generate around 5 psi (0.3 bar) pressure, equating to 3.5 meters (11' 6") of water.

Wide assortment of inert wetted materials available

The pumps provide a non-metallic, inert fluid path for the dispensing of high purity or aggressive fluids. The standard pump body is made of PPS (polyphenylsulfide). Other materials available for the pump body include PTFE, PEEK™ and Delrin®. The elastomers that can be used for the diaphragms and check valves include PTFE, EPDM, and Viton®.

High reliability

The pumps are designed for continuous duty. They are guaranteed for up to 20 million actuations, corresponding to nearly 3,000 hours of continuous use at a 2 Hz cycle rate.

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Specifications

Pump series & weight

The self-priming pumps are offered in four pump series, distinguished by the solenoid shell sizes:

| Valve Series | Shell Diameter | Weight |
|--------------|----------------|----------------|
| 090SP | 0.75 inches | 2 oz. (60 g) |
| 120SP | 1.00 inches | 5 oz. (140 g) |
| 130SP | 1.00 inches | 6 oz. (170 g) |
| 150SP | 1.50 inches | 16 oz. (450 g) |

Electrical

| Valve Series | Voltage | Power @ 70°F (21°C) | Current @ 70°F (21°C) | Effective continuous power at max cycle rate |
|--------------|---------|---------------------|-----------------------|--|
| 090SP | 12 Vdc | 2.6 Watts | 0.22 amps | 0.8 Watts |
| 090SP | 24 Vdc | 2.6 Watts | 0.11 amps | 0.8 Watts |
| 120SP | 12 Vdc | 4.0 Watts | 0.32 amps | 1.2 Watts |
| 120SP | 24 Vdc | 4.0 Watts | 0.16 amps | 1.2 Watts |
| 130SP | 12 Vdc | 4.0 Watts | 0.32 amps | 1.2 Watts |
| 130SP | 24 Vdc | 4.0 Watts | 0.16 amps | 1.2 Watts |
| 150SP | 12 Vdc | 8.0 Watts | 0.66 amps | 3.2 Watts |
| 150SP | 24 Vdc | 8.0 Watts | 0.33 amps | 3.2 Watts |

Lead Wires

All lead wires are Teflon® coated. Different lengths of lead wires and terminal connectors can be provided. Please consult Bio-Chem Valve and Omnifit concerning non-standard lead wire lengths and the addition of terminal connectors.

| Valve Series | Lead wire length | Wire thickness |
|--------------|------------------|----------------|
| 090SP | 15 in. / 38cm | 26 gauge |
| 120SP | 15 in. / 38cm | 26 gauge |
| 130SP | 15 in. / 38cm | 26 gauge |
| 150SP | 15 in. / 38cm | 22 gauge |

Specifications (contd.)

Pressure limits

To attain optimal dispense accuracy, pressure on both the inlet and the outlet side of the pump must be kept between ± 0.5 psi (0.035 bar) and 0 psi (equating to a head of ± 12 in / 30 cm of water).

During the pump's up-stroke, suction is created on the inlet. Positive pressure is generated at the outlet during the down-stroke. When the pump is not actuated, it will shut off flow as long as the pressure on the inlet does not exceed the maximum holding pressure. To ensure correct operation, pressure on the inlet side should never exceed 2 psi even when the pump is in the closed position. The check valves in the pump prevent fluid from flowing against the intended flow direction.

| Valve Series | Inlet suction (priming w/air) | Inlet suction (after priming) | Outlet pressure |
|--------------|-------------------------------|-------------------------------|------------------|
| 090SP | 1 psi / 0.07 bar | 3 psi / 0.20 bar | 3 psi / 0.20 bar |
| 120SP | 2 psi / 0.15 bar | 5 psi / 0.35 bar | 5 psi / 0.35 bar |
| 130SP | 2 psi / 0.15 bar | 5 psi / 0.35 bar | 5 psi / 0.35 bar |
| 150SP | 2 psi / 0.15 bar | 5 psi / 0.35 bar | 5 psi / 0.35 bar |

Cycle rates

To operate the solenoid micro pumps, first place the rated voltage over the pump's coil (causing the intake stroke) and then turn the voltage off again (causing the output stroke). To achieve the optimal dispense accuracy, the pump must remain in the on and in the off position for a minimum amount of time. To operate the pumps at less than the maximum cycle rate, the on-time should remain unchanged and the off-time should be lengthened appropriately.

| Valve Series | Minimum on time | Minimum off time | Maximum cycle rate |
|--------------|-----------------|------------------|--------------------|
| 090SP | 150 msec | 350 msec | 2.0 Hz |
| 120SP | 150 msec | 350 msec | 2.0 Hz |
| 130SP | 150 msec | 350 msec | 2.0 Hz |
| 150SP | 200 msec | 400 msec | 1.6 Hz |

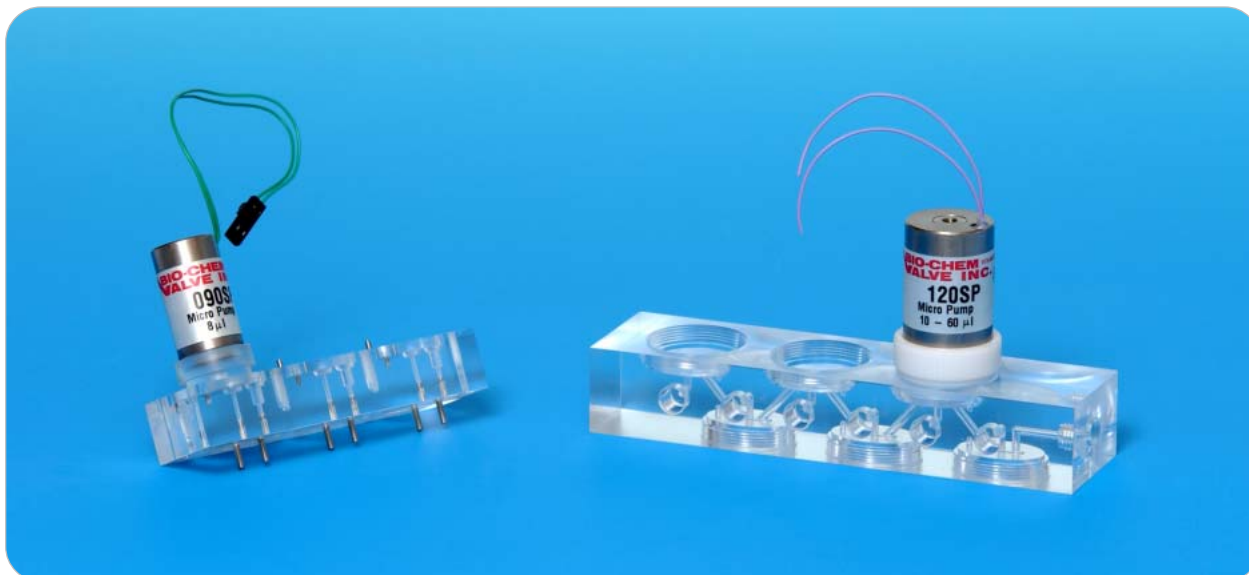
Dispense volume accuracy

| Valve Series | | Minimum setting | Maximum setting | Max flow rate |
|---------------------------|---------------------|-----------------|-----------------|---------------|
| 090SP | Dispense volume: | 8 μ l | 8 μ l | 1.0 ml / min |
| | Set-point accuracy: | +/- 25% | +/- 25% | |
| | Repeatability: | +/- 5% | +/- 5% | |
| 120SP | Dispense volume: | 10 μ l | 60 μ l | 7.2 ml / min |
| | Set-point accuracy: | +/- 4% | +/- 2% | |
| | Repeatability: | +/- 3% | +/- 1% | |
| 130SP & 120SP w/PTFE dia. | Dispense volume: | 10 μ l | 50 μ l | 6.0 ml / min |
| | Set-point accuracy: | +/- 5% | +/- 5% | |
| | Repeatability: | +/- 3% | +/- 1% | |
| 150SP | Dispense volume: | 100 μ l | 250 μ l | 25 ml / min |
| | Set-point accuracy: | +/- 5% | +/- 3% | |
| | Repeatability: | +/- 1% | +/- 0.5% | |

Specifications (contd.)

Manifold mounted pumps

The Bio-Chem Valve diaphragm pumps can be mounted directly on manifolds. Many configurations are possible to meet the specific needs of the application. Please consult with Bio-Chem Valve regarding manifold mounted pump designs.



Ports and tubing

To achieve an optimal dispense accuracy, the tubing should conform to the recommended inner diameters stated below and friction losses should be kept to a minimum.

For more information regarding 1/4"-28 fittings and tubing sets, please consult the Omni-Lok™ Fitting System and Fitting Systems specification sheets.

| Pump Series | Standard ports | Recommended inlet tubing size | Recommended outlet tubing size |
|-------------|----------------------|-------------------------------|--------------------------------|
| 090SP | 1/4"-28 flat bottom | ≥ 1/32" I.D. | ≥ 1/32" I.D. |
| 120SP | 1/4"-28 flat bottom | ≥ 1/32" I.D. | ≥ 1/32" I.D. |
| 130SP | 1/4"-28 flat bottom | ≥ 1/32" I.D. | ≥ 1/32" I.D. |
| 150SP | 5/16"-24 flat bottom | ≥ 1/8" I.D. | ≥ 1/8" I.D. |

Internal volume

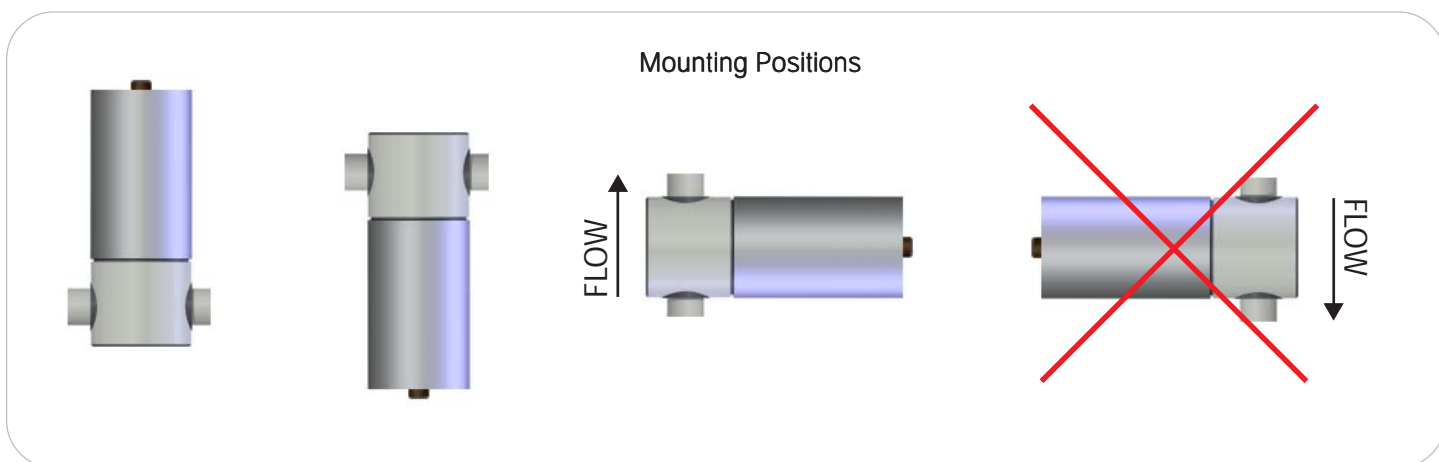
| Pump Series | Internal volume |
|-------------|-----------------|
| 090SP | 130 µl |
| 120SP | 105 µl |
| 130SP | 105 µl |
| 150SP | 710 µl |

Specifications (contd.)

Mounting

For mounting clips, rings and flanges, please see the Mounting Accessories and Options specification sheet. Two mounting holes in the body permit bottom mounting in the 120SP series pumps. Please see the dimensional diagrams on the following pages for further information.

The pumps should be installed with the solenoid portion of the pump pointing upwards, downwards, or in a horizontal position with the outlet on top. The horizontal position with the outlet on the bottom could affect the output accuracy.



Adjustable pumps

In cases where the dispense volume for the application is unknown, Bio-Chem Valve offers an adjustable pump designed to be used as an R&D tool by the instrument design engineer to help determine the optimal dispense setting. By turning the shell on the pump, the engineer can compensate for the instrument's friction losses or pressure imbalances. Once the correct pump setting and dispense volume have been determined, the engineer can provide the dispense volume to the factory. This information will be used to manufacture a factory-set (non-adjustable) pump specific to the application.



| Pump Series | Dispense range |
|--------------------|----------------------------|
| 090SP - adjustable | 8 μ l to 12 μ l |
| 120SP - adjustable | 10 μ l to 60 μ l |
| 150SP - adjustable | 100 μ l to 250 μ l |

Aside from the adjustability of these pumps, all other specifications are identical with those stated in this product data sheet for the same pump series.

For part numbers of the adjustable pump versions, please contact Bio-Chem Valve and Omnifit.

Specifications (contd.)

Wetted materials

| Valve Series | Standard materials | Options |
|--------------|--------------------|----------------------------|
| 090SP | Body: | PPS |
| | Diaphragm: | PTFE |
| | Check valves: | Viton®, Perfluoroelastomer |
| 120SP | Body: | PPS |
| | Diaphragm: | EPDM |
| | Check valves: | Viton®, Perfluoroelastomer |
| 130SP | Body: | PTFE |
| | Diaphragm: | PTFE |
| | Check valves: | Perfluoroelastomer |
| 150SP | Body: | PPS |
| | Diaphragm: | EPDM |
| | Check valves: | EPDM |

Ordering Information

| | | |
|---|---|--|
| 1 | Select pump series | 090SP, 120SP, 130SP, 150SP |
| 2 | Indicate voltage | 12 VDC, 24 VDC |
| 3 | Indicate dispense setting (µl) | 8 (090SP), 10, 20, 30, 40, 50, 60 (120SP), 10, 20, 30, 40, 50 (130SP), 100, 125, 150, 175, 200, 225, 250 (150SP) |
| 4 | Indicate body material (See optional materials in chart above.) | 1 (PTFE, 130SP only), 4 (PPS), 5 (PEEK), 6 (Delrin®, 120SP only) |
| 5 | Indicate diaphragm material (See optional materials in chart above.) | E (EPDM), T (PTFE) |
| 6 | Indicate check valve material (See optional materials in chart above.) | E (EPDM), V (Viton®), P (Perfluoroelastomer) |

Part Number Example:

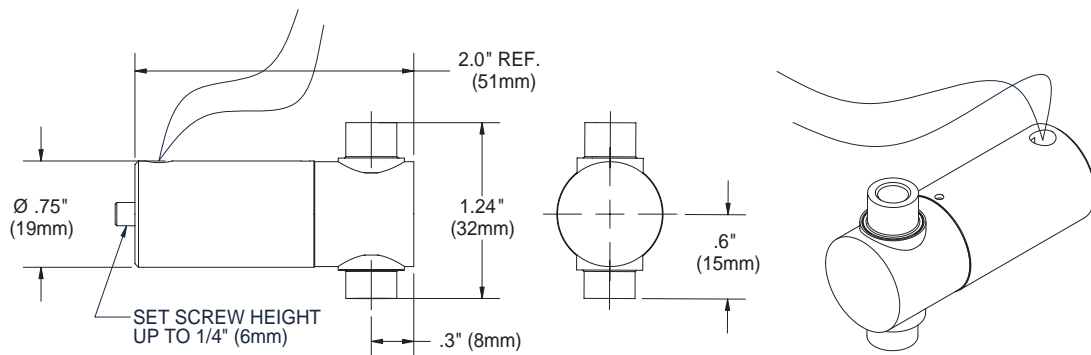
| | | | | | | |
|--------------|-----------|------------------|----------|---------------|--------------------|----------------------|
| 120SP | 24 | 50 | - | 5 | T | P |
| | | | | | | |
| Pump Series | Voltage | Dispense setting | | Body material | Diaphragm material | Check valve material |

Please see our other product specification sheets for the following accessories:

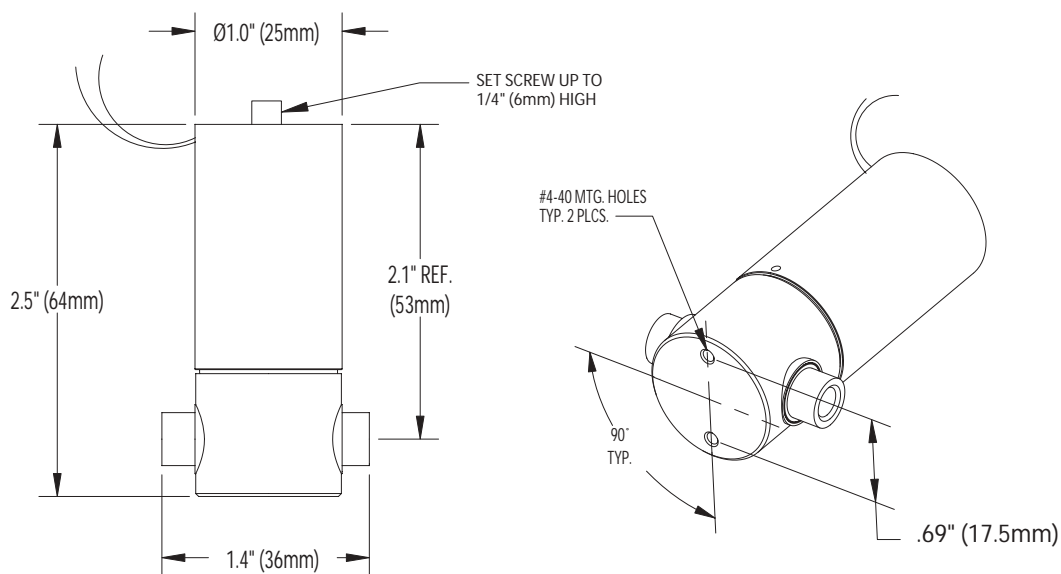
- Omni-Lok™ fittings and tubing sets
- CoolCube™ control module
- Mounting clips

Installation Drawings

090SP



120SP



Installation Drawings (contd.)

