

# 2016-2021+ Micro Fluidics

# Health

## For mankind's well-being

We hope our products are used to improve people's health and happiness. e.g. in blood analyzers, dialysis machines and other medical / diagnostic applications.

# Environment

## Preserve clean air and water for future generations

Our products are installed into many kinds of environment-related applications like water quality analyzers, automotive emissions etc. to protect the environment.

# Technology

## Small, Fast, Highly Accurate

We, as a high-tech fluidic control system manufacturer, always aim to achieve the most advanced technological standards.



Having developed in excess of 5000 different valves over 50 years, Takasago has established itself as a leading manufacturer of valves and other fluidic devices. With this experience and knowledge about fluid-handling and precision control, we can provide our customers with high quality custom-made products. The products listed in this brochure represent only a small part of our product range. Various applications of our products include :

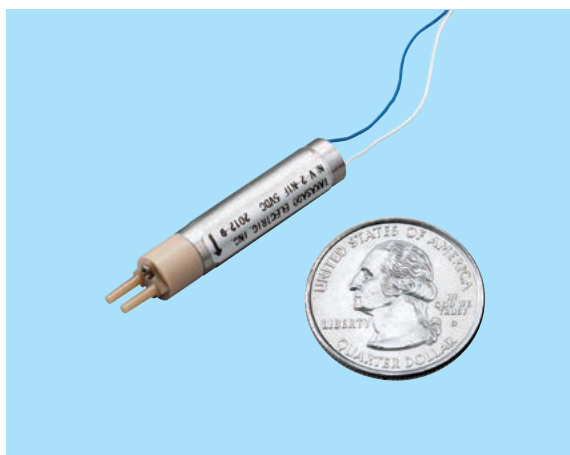
|  |
|--|
| Diagnostic instruments such as clinical chemistry/immunoassay analyzers                |
| Environmental measuring instruments for water, air, flue gas or automotive exhaust gas |
| Analytical instruments including liquid/gas chromatographs                             |
| Medical instruments including dialysis machines  |
| Biotechnology equipment for DNA analysis, cell culture, cell handling, etc.            |
| Semiconductor and LCD manufacturing equipment  |
| Ink-jet printers   |
| Fluid control devices for beverages, etc.  |
| etc.   |

## CONTENTS

|   |             |
|---|-------------|
| <b>■ Miniature Isolation Valves</b>   | p. 4/p. 5   |
| <ul style="list-style-type: none"> <li>• NV/NLV Series</li> <li>• KV Series</li> <li>• Miniature Isolation Valves</li> <li>• EXAK Series</li> <li>• WTE Series</li> <li>• Pumping Volume</li> </ul>   |             |
| <b>■ Diaphragm Valves with High Reliability and Outstanding Inertness</b>   | p. 6/p. 7   |
| <ul style="list-style-type: none"> <li>• EXV Series</li> <li>• STV/CTV Series</li> <li>• Soft-seal</li> <li>• MTV Series</li> <li>• PKV Series</li> <li>• Zero-internal-volume Design</li> </ul>  |             |
| <b>■ Isolation Valves with Universal Pressure Rating</b>  | p. 8        |
| <ul style="list-style-type: none"> <li>• Bellows Isolation Valve WBV Series</li> <li>• Rocker Solenoid Valve RVA Series</li> <li>• O-ring Isolation Valve WEG Series</li> </ul>   |             |
| <b>■ Power Saving Items</b>   | p. 9        |
| <ul style="list-style-type: none"> <li>• Latching Solenoid Valves</li> <li>• Holding Voltage and "Hit &amp; Hold" Circuit</li> </ul>  |             |
| <b>■ Manifold Products and Pinch Valves</b>   | p. 10/p. 11 |
| <ul style="list-style-type: none"> <li>• Standard Manifolds</li> <li>• Custom Manifolds</li> <li>• Multi-layer Bonded Manifold</li> <li>• Bonded PTFE Manifold</li> <li>• Pinch Valves</li> <li>• Molded Quaternary Valve</li> <li>• Chemically Inert Pinch Valve</li> </ul>                  |             |
| <b>■ Various Unique Products Including Slider Valves</b>  | p. 12/p. 13 |
| <ul style="list-style-type: none"> <li>• Solenoid-driven Slider Valves</li> <li>• Solenoid-driven Injection Valve</li> <li>• Proportional Diaphragm Valve</li> <li>• Push-in Fitting Diaphragm Valve</li> <li>• Air Operated Valves</li> <li>• Low Cost Miniature Valve SMV Series</li> </ul> |             |
| <b>■ A Wide Range of Small-sized Liquid Pumps</b>   | p. 14/p. 15 |
| <ul style="list-style-type: none"> <li>• Piezoelectric Micro Pumps</li> <li>• Micro Peristaltic Pump RP-TX Series</li> <li>• Miniature Peristaltic Pump RP-Q1 Series</li> <li>• Pen Type Syringe Pump</li> <li>• 6-channel Pump</li> <li>• Electro-osmotic Micro Pump</li> </ul>              |             |
| <b>■ Microfluidic Devices</b>   | p. 16/p. 17 |
| <ul style="list-style-type: none"> <li>• Microfluidic Chips</li> <li>• Chip Pump ACP/QCP Series</li> <li>• Manually Adjustable Low Pulsation Micro Pump Unit</li> <li>• All-in-one Disposable PDMS Chip</li> <li>• Micro Needle Valve</li> </ul>  |             |
| <b>■ Microfluidic Solution Provider</b>   | p. 18/p. 19 |
| <ul style="list-style-type: none"> <li>• Example of Microfluidic Control Module</li> <li>• Reagent-prefillable Disposable Fluidic Systems</li> <li>• Portable Medium Exchange System</li> </ul>   |             |

# Innovatively Small and Highly Fun

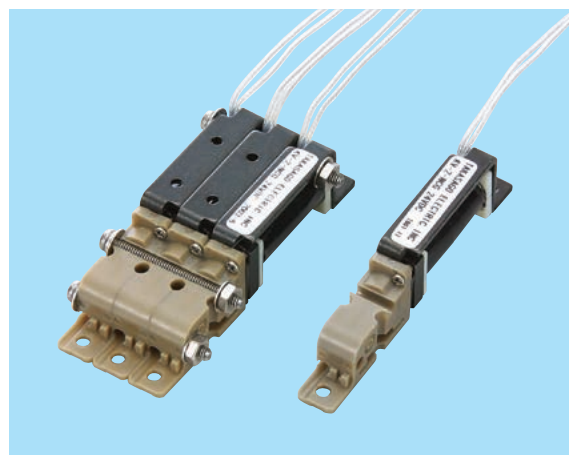
## NV/NLV Series



|                   | NV Series                        | NLV Series  |
|-------------------|----------------------------------|---|
| Dimensions        | $\phi 5.7 \times H 32.5^{*1}$ mm |   |
| Orifice Diameter  | 0.4 mm                           |   |
| Port Connection   | Barb                             |   |
| Pressure          | 0 ~ 100 kPa                      |   |
| Voltage           | 5 VDC, 12 VDC, 24 VDC            | 5 VDC   |
| Power Consumption | 1 W                              | 1.5 W when energized (Latching Solenoid <sup>*2</sup> ) |

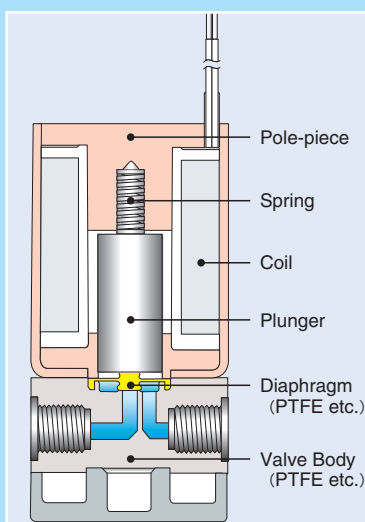
\*1.Dimensions of NV-2-N1G and NLV-2-N1G \*2.Please refer to page 9 on the latching solenoid.

## KV Series



|                   |                       |
|-------------------|-----------------------|
| Dimensions        | W 6 × L 50× H 12.5 mm |
| Orifice Diameter  | 0.8 mm                |
| Port Connection   | O-ring                |
| Pressure          | 0 ~ 100 kPa           |
| Voltage           | 12 VDC, 24 VDC        |
| Power Consumption | 1.8 W                 |

## Miniature Isolation Valves



Our solenoid valve consists of two sections ; one is the valve part made of highly inert plastics like PTFE or PEEK, which opens and closes a flow path. The other is the actuator made of a coil and metallic parts, driving the valve part. In order to preserve the purity of the fluid, a diaphragm is installed between the two sections in our isolation valves. The diaphragm prevents the fluids from flowing into the actuator and protects the metallic parts from being corroded. Also, metal dust generated in the actuator does not contaminate the fluid. This structure is ideal for analytical and diagnostic applications which are sensitive to particles. It is also suitable for handling acids and chemicals which erode metals.

By reducing the size of these isolation valves, we have been able to reduce the dead volume, improve the control of the pumping volume, and reduce the installation area, thereby improving accuracy and avoiding wasting chemicals and solvents.

# ctional : Miniature Isolation Valves

## EXAK Series



|                   |                 |
|-------------------|-----------------|
| Dimensions        | φ12 × H 48.1 mm |
| Orifice Diameter  | 0.8 mm          |
| Port Connection   | Barb, M5        |
| Pressure          | −40 ~ 100 kPa   |
| Voltage           | 12 VDC, 24 VDC  |
| Power Consumption | 0.94 W          |

## WTE Series



|                   |                       |
|-------------------|-----------------------|
| Dimensions        | W19 × L11 × H 31.3 mm |
| Orifice Diameter  | 1 mm                  |
| Port Connection   | Gasket                |
| Pressure          | −65 ~ 100 kPa         |
| Voltage           | 12 VDC, 24 VDC        |
| Power Consumption | 1.5 W                 |

## Pumping Volume

The diaphragm produces a pumping effect on the fluid as the valve opens and closes. As some valve models pump several microliters of fluid at one time, the pumping volume forms a negative factor in metering an accurate fluid volume, and also in preventing fluid from dripping from a dispensing nozzle.

Some of the valve models we provide have remarkably small pumping volumes due to their unique internal structures or miniaturized dimensions. The EXAK series has a distinctive design called a "zero-pumping-volume structure" that allows the pumping volume to run 100 times smaller than our standard valves. Rocker valves (page 8) and non-diaphragm inert valves (made of inert materials like stainless steel) have very small pumping volumes due to no volumetric change in the valve chamber during an operation. We also provide slider valves (page 12) with pumping volumes that have been ultimately reduced to an immeasurable level.

unit: μl

| TYPE   | PORT | ON-1   | OFF-1  | ON-2   | OFF-2  | ON-3   | OFF-3  |
|--|------|--------|--------|--------|--------|--------|--------|
| Zero-pumping-volume type<br>(EXAK-3)               | COM. | 0.002  | -0.015 | 0.002  | -0.015 | 0.002  | -0.015 |
|  | N.C. | 0.024  | -0.01  | 0.024  | -0.01  | 0.024  | -0.01  |
|  | N.O. | 0.005  | -0.005 | 0.005  | -0.005 | 0.005  | -0.005 |
| Rocker solenoid type<br>(Low pumping volume model) | COM. | 0      | 0      | 0      | 0      | 0      | 0      |
|  | N.C. | 0.103  | -0.18  | 0.137  | -0.263 | 0.145  | -0.213 |
|  | N.O. | -0.059 | 0.103  | -0.027 | 0.025  | -0.033 | 0.027  |
| Non-diaphragm valve                                | IN   | -0.009 | 0.018  | -0.018 | 0.009  | -0.017 | 0.018  |
|  | OUT  | -0.723 | 0.81   | -0.71  | 0.826  | -0.708 | 0.849  |
| Conventional type<br>(MTV-3R)                      | COM. | 2.346  | 2.609  | 2.425  | 2.604  | 2.427  | 2.551  |
|  | N.C. | 2.63   | 2.317  | 2.481  | 2.293  | 2.521  | 2.34   |
|  | N.O. | 7.238  | 7.373  | 7.443  | 7.395  | 7.506  | 7.388  |

# Diaphragm Valves with High Re

## EXV Series



|                   |                           |
|-------------------|---------------------------|
| Dimensions        | W 14 x L 25.0 x H 31.7 mm |
| Orifice Diameter  | 1 mm                      |
| Port Connection   | Gasket                    |
| Pressure          | -50 ~ 200 kPa             |
| Voltage           | 12 VDC, 24 VDC            |
| Power Consumption | 2.8 W                     |

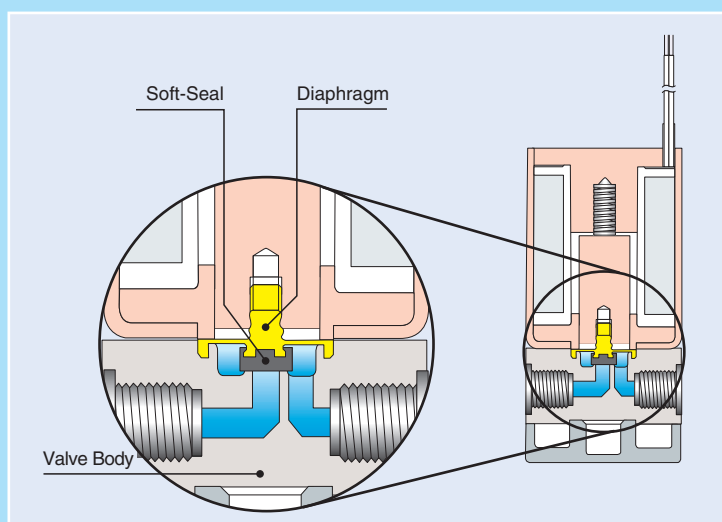
## STV/CTV Series



|                   | ① STV Series                         | ② CTV Series                                    |
|-------------------|--------------------------------------|---|
| Dimensions        | φ20 x H 42.5 mm                      | φ21 x H 59.8 mm<br>(excluding projection parts) |
| Orifice Diameter  | 1.2 mm                               | 1.6 mm  |
| Port Connection   | M6, 1/4-28UNF, Barb, Push-in Fitting |   |
| Pressure          | -50 ~ 200 kPa                        |   |
| Voltage           | 12 VDC, 24 VDC                       |   |
| Power Consumption | 2.5 W                                | 3.5 W   |

\*Manifold-mountable models are also available.

## Soft-seal



Problems can arise with PTFE diaphragm valves when scratches on the seal part of the valve, due to dust or crystals in the fluid, cause the valve to leak. Takasago offers an optional "Soft-seal" to protect the sealing surface from being scratched by covering it with perfluoroelastomer, which is a special elastomer that has outstanding resistance to most chemicals and solvents. The chemical inertness of the perfluoroelastomer is almost equal to PTFE. It has a high reputation for use with chemicals in analytical or semi-conductor industries. FPM is also available for the Soft-Seal material.



# liability and Outstanding Inertness

## MTV Series



|                   |                     |
|-------------------|---------------------|
| Dimensions        | φ26 × H 53.2 mm     |
| Orifice Diameter  | 1.6 ~ 2 mm          |
| Port Connection   | M6, 1/4-28UNF, Barb |
| Pressure          | −90 ~ 300 kPa       |
| Voltage           | 12 VDC, 24 VDC      |
| Power Consumption | 1.9 W, 2.6 W        |

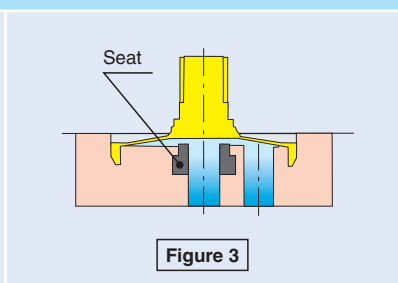
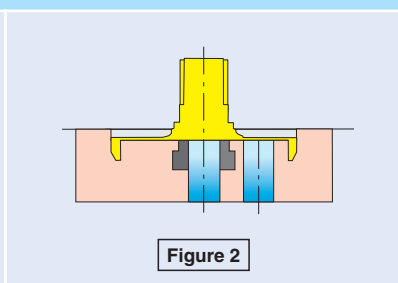
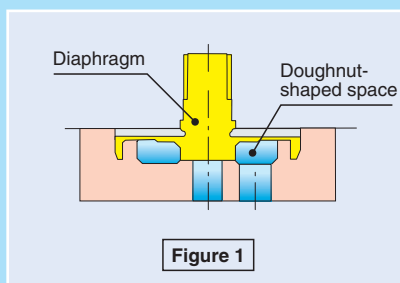
\*Manifold-mountable models are also available.

## PKV Series



|                   | ① PKV-2                                  | ② PKV-3               |
|-------------------|--|-----------------------|
| Dimensions        | W 43 × L 36 × H 71 mm                    | W 43 × L 36 × H 82 mm |
| Orifice Diameter  | 4 ~ 6 mm                                 |                       |
| Port Connection   | Rc1/8, Rc1/4, 1/8-27NPT, 1/4-18NPT, Barb |                       |
| Pressure          | −50 ~ 200 kPa                            | −50 ~ 100 kPa         |
| Voltage           | 12 VDC, 24 VDC                           |                       |
| Power Consumption | 6 W, 10 W                                | 10 W                  |

## Zero-internal-volume Design



### ■ Applicable models

- STV Series  
(2-way type only)
- MTV Series
- MLV Series

A diaphragm solenoid valve normally has a doughnut-shaped space right under the diaphragm, through which fluids flow to the outlet port (Figure 1). This space, often called a "valve chamber", works as excess internal volume to waste solvents and samples. Fluids tend to stay in this dead space and therefore decrease the purity of each fluid. In addition, air bubbles may be trapped in this valve chamber and can have a negative effect on analytic accuracy. To conclude a valve chamber causes various undesirable results for applications. To overcome these problems, Takasago has designed the Zero-Internal-Volume Valve, in which a special structure is employed to eliminate the valve chamber (Figure 2). On opening, the diaphragm is lifted and the space is formed for the fluid to stream (Figure 3). (Note) This Zero-Internal-Volume structure is patented.

# Isolation Valves with Universal Pressure Rating

## Bellows Isolation Valve WBV Series



High flow with slim size

|                   |   |
|-------------------|---|
| Dimensions        | W 35 × L 33 × H 84.8 mm<br>(excluding hose barbs)                   |
| Orifice Diameter  | 4 mm  |
| Port Connection   | Barbs on both sides, Barb on one side<br>(O-ring on the other side) |
| Pressure          | −90 ~ 300 kPa (Universal)   |
| Fluid Temp. Range | 5 ~ 95 °C   |
| Voltage           | 12 VDC, 24 VDC  |
| Power Consumption | 6 W   |
| Wetted Materials  | PPS, FPM (Optionally EPDM)  |

## O-ring Isolation Valve WEG Series



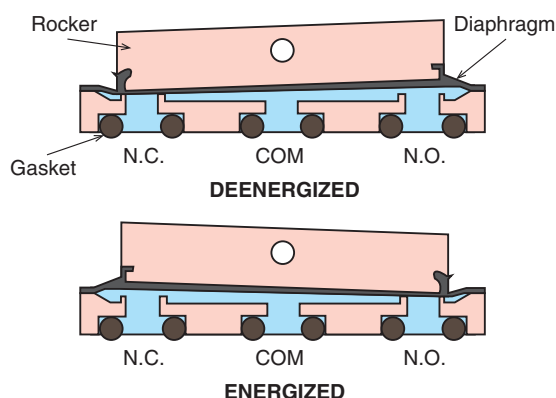
|                   |   |
|-------------------|---|
| Dimensions        | W 21 × L 16 × H 54.4 mm<br>(excluding mounting parts and barbs) |
| Orifice Diameter  | 2 mm  |
| Port Connection   | Hose Barb   |
| Pressure          | −90 ~ 200 kPa (Universal)                                       |
| Voltage           | 12 VDC, 24 VDC  |
| Power Consumption | 2.6 W   |
| Wetted Materials  | PPS, FPM (Optionally EPDM)                                      |

## Rocker Solenoid Valve RVA Series



|                   |   |
|-------------------|---|
| Dimensions        | W 16 × L 27 × H 46 mm   |
| Orifice Diameter  | 1.6 mm  |
| Port Connection   | Gasket  |
| Pressure          | −95 ~ 200 kPa (Universal)   |
| Voltage           | 12 VDC, 24 VDC  |
| Power Consumption | 3.4 W (Standard)<br>with built-in "hit & hold" circuit (page 13) : 0.85 W |
| Wetted Materials  | PEEK (Optionally PPS),<br>Perfluoroelastomer (Optionally FPM or EPDM)     |

### ■ Cross-sectional Image of Rocker Structure



- Width of 16 mm enables efficient mounting of rocker valves on a manifold.
- The rocker moves like a seesaw inside the valve and alternately seals the left and right valve seats.
- COM., N.C. and N.O. ports are all rated to the same operating pressure. Can be pressurized from any direction.
- High pressure models (600 kPa, orifice diameter 0.8 mm) are available.
- Small pumping volume due to no volumetric change in the valve chamber during an operation. Lower pumping volume models are also available.



# Power Saving Items

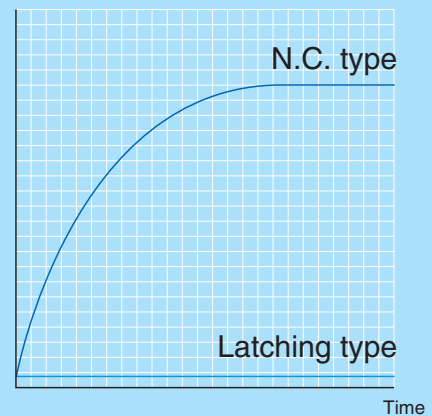
## Latching Solenoid Valves



In the case of a conventional (e.g. N.C. - Normally Closed) solenoid valve, continuous energization is required to maintain open status. The latching solenoid does not require a power supply for the purpose of maintaining open status through the utilization of a permanent magnet. Suitable for applications where the power consumption and the effect of temperature on a fluid is a concern.

|              | Orifice Diameter or Tube Diameter | Valve Type      |
|--------------|-----------------------------------|-----------------|
| ① FLV Series | 0.4 mm                            | Diaphragm valve |
| ② WLB Series | 2 mm                              | Diaphragm valve |
| ③ PL Series  | 1 × 3 mm, 3 × 5 mm                | Pinch valve     |
| ④ EL Series  | 10 × 13 mm                        | Pinch valve     |

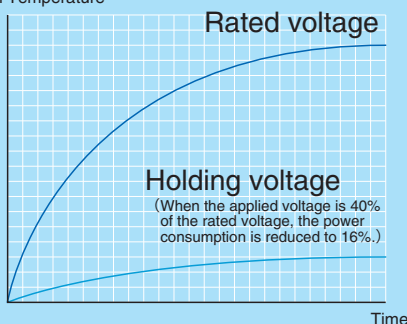
Coil Temperature



## Holding Voltage and “Hit & Hold” Circuit

Once switched to ON-position by energizing at the rated voltage, a solenoid valve can hold the ON-position status even after the applied voltage is dropped to a lower voltage. For example, in case that a 2-way normally closed valve with a rated voltage of 24 VDC is switched to ON-position, it can hold the ON-position even after the applied voltage is dropped to around 10 VDC (Holding Voltage). Using this characteristic, various benefits are achieved, such as low power consumption, reduction of coil heat-generation (see graph below), improvement of response time, increase of operating pressure, minimization of size, etc. This requires you to control the applied voltage. As an alternative to controlling the voltage at the equipment side we can offer you a “Hit & Hold” circuit, which can be simply attached to a valve. This circuit automatically drops the applied voltage to a lower value after a very short period of time (Inrush Time).

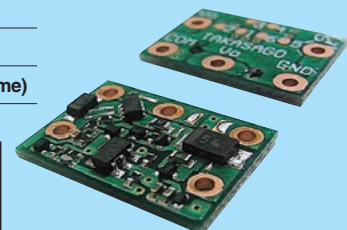
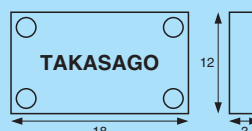
Coil Temperature



### Standard specifications of our “Hit & Hold” circuit

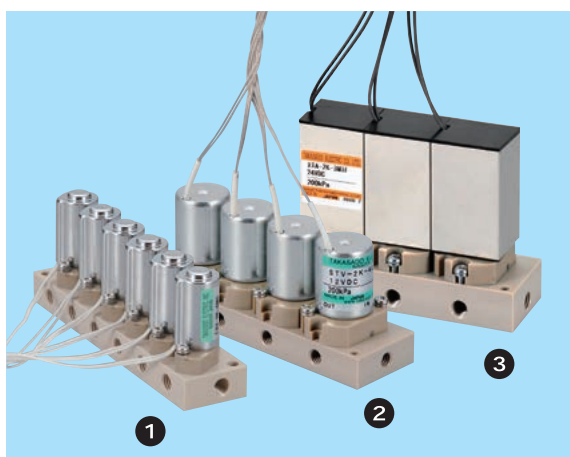
|             |                                   |
|-------------|-----------------------------------|
| Input       | 5 VDC ~ 27 VDC                    |
| Inrush Time | 100 ms, 300 ms                    |
| Output      | 40 % of Input (after Inrush Time) |

### Dimensions



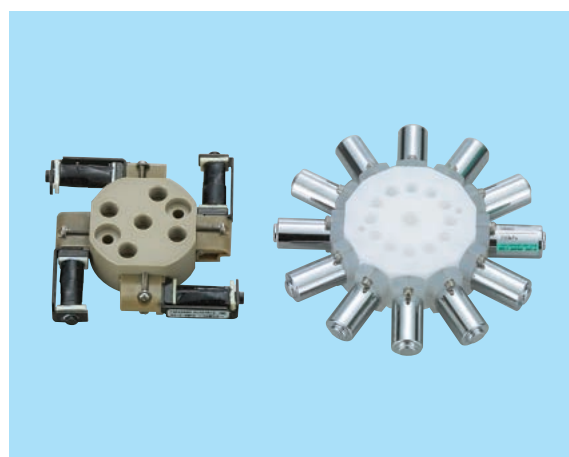
# Manifold Products

## Standard Manifolds



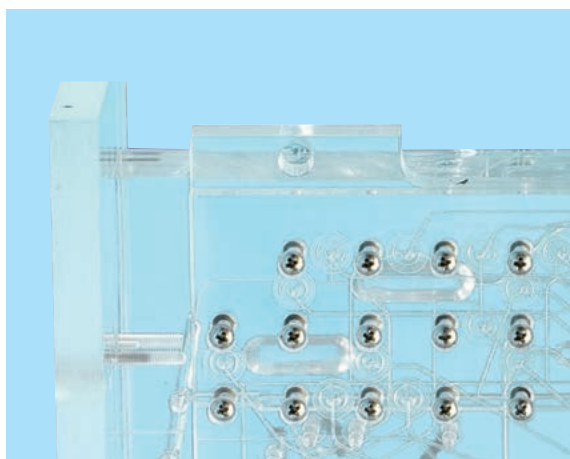
|                       | ① EXV Series           | ② STV Series           | ③ XTA Series           |
|-----------------------|------------------------|------------------------|------------------------|
| Orifice Diameter      | 1 mm                   | 1.2 mm                 | 2 mm                   |
| Port Connection       | M6, 1/4-28UNF          |                        |                        |
| Pressure              | -20 ~ 200 kPa          | -50 ~ 200 kPa          | -50 ~ 200 kPa          |
| Voltage               | 12 VDC, 24 VDC         |                        |                        |
| Power Consumption     | 2.8 W x (No. of valve) | 2.5 W x (No. of valve) | 2.8 W x (No. of valve) |
| Max. number of valves | 6                      |                        |                        |

## Custom Manifolds

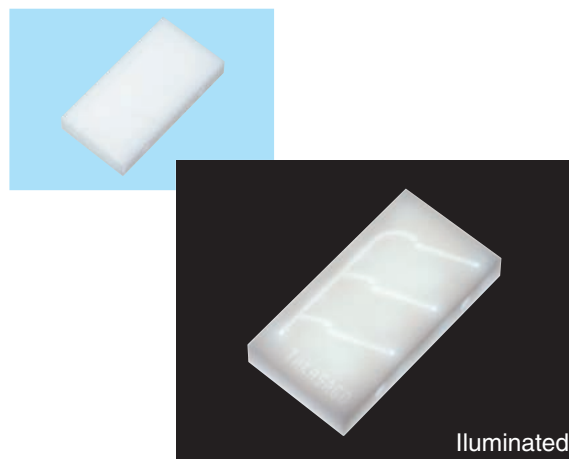


If you wish install valves compactly and connect flow-paths over a short distance, the manifold is the best choice. If you let us know the flow diagram you require, we can design and produce the manifold to meet your requirements. A variety of shapes, materials, and structural methods are available and we are also capable of equipping the manifold with components like pumps. Please contact us for further details.

## Multi-layer Bonded Manifold



## Bonded PTFE Manifold



These multi-layer manifolds are made by bonding layers that have channels engraved on the surface. The result is a highly integrated manifold with freely curving channels that could not be fabricated through a conventional drilling process. The bonding process does not use any adhesive in order to utilize the pure characteristics of each material. Materials available are PMMA, PC, ULTEM®, etc. Only Takasago works with PTFE, the material with a very high chemical compatibility, in this way.

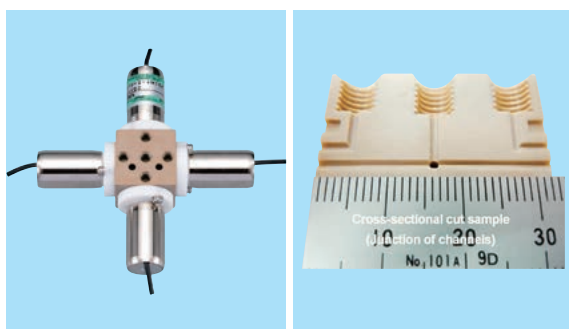
# and Pinch Valves

## Pinch Valves



|                   | ① PE Series     | ② PSK Series             | ③ PMK Series             | ④ PK Series                     | ⑤ NP Series                     | ⑥ EPK Series                 |
|-------------------|-----------------|--------------------------|--------------------------|---------------------------------|---------------------------------|------------------------------|
| Dimensions        | φ14 × H 55.1 mm | φ20 × H 51 mm            | φ26 × H 61.5 mm          | W 40 × L 36<br>× H 65 ~ 88.3 mm | W 40 × L 36<br>× H 65 ~ 88.3 mm | φ64 × H 112 ~ 132 mm         |
| Tube Material     | Silicone        | Silicone, PharMed®       | Silicone, PharMed®       | Silicone                        | Silicone                        | Silicone                     |
| Tube Diameter     | 0.8 × 2.4 mm    | 1 × 3 mm<br>1.6 × 3.2 mm | 0.8 × 2.4 mm<br>1 × 3 mm | 3 × 5 mm<br>6 × 8 mm            | 3 × 5 mm<br>6 × 8 mm            | 10 × 13 mm<br>15 × 19 mm     |
| Pressure          | 0 ~ 100 kPa     | 0 ~ 150 kPa              | 0 ~ 150 kPa              | 0 ~ 50 kPa                      | 0 ~ 50 kPa                      | 0 ~ 50 kPa                   |
| Voltage           | 12 VDC, 24 VDC  | 12 VDC, 24 VDC           | 12 VDC, 24 VDC, 100 VAC  | 12 VDC, 24 VDC, 100 VAC         | 12 VDC, 24 VDC, 100 VAC         | 12 VDC, 24 VDC, 100 VAC      |
| Power Consumption | 2.8 W           | 3 W                      | 4.4 W                    | 10 W                            | 10 W                            | 60 W (intermittent : 5 min.) |

## Molded Quaternary Valve



A quaternary valve, in which the four channels from the valves all join at one point and connect to the common port, requires a high processing accuracy at the junction of the channels. Thus the manifold bases of almost all conventional models, including those of other manufacturers, are manufactured by machining, which results in an increased cost. With advanced molding techniques, TAKASAGO has achieved the molding of this junction in PEEK, enabling us to provide our quaternary valves at prices conventional models cannot match.

## Chemically Inert Pinch Valve

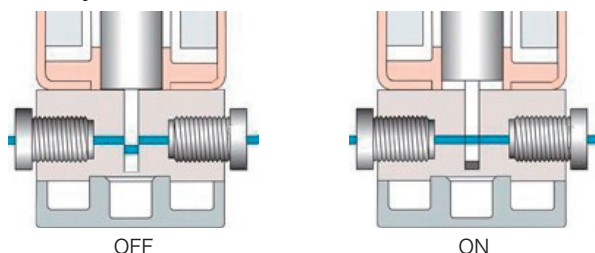


Having threaded ports for plastic tubing, this product looks like an ordinary solenoid valve, but in fact it is a type of pinch valve that uses FPM tubing internally. The valve excels in fluid exchangeability due to its simple flow structure with almost no dead volume. Furthermore, the FPM tubing gives the valve high chemical inertness.

# Various Unique Products

## Solenoid-driven Slider Valves

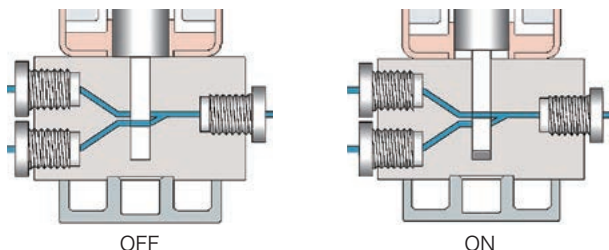
### ● 2-way (N.C.)



This is a kind of shear valve in which a shutter called a "slider" moves vertically and shuts off the flow path. The pumping volume\* and the dead volume are reduced to almost zero, preventing reduction of accuracy in analysis or fluid dispensation. It features an excellent fluid exchangeability compared to a diaphragm solenoid valve due to its almost linear flow path and very small internal volume.

\*Please refer to page 5 for more details on the pumping volume.

### ● 3-way



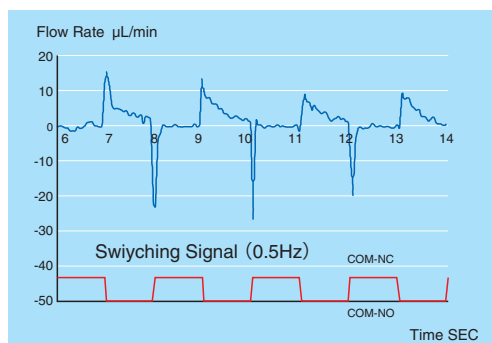
|                    | MTV  | NRV                          |
|--------------------|--|------------------------------|
| Dimensions         | W 39 x L 26 x H 62 mm                      | W 41 x L 38 x H 86 mm        |
| Orifice Diameter   | 0.4 mm                                     | 1.0 mm                       |
| Port Connection    | No. 10-32UNF                               | M6, 1/4-28UNF                |
| Pressure           | 0 ~ 500 kPa                                | 0 ~ 300 kPa                  |
| Voltage            | 12 VDC, 24 VDC                             |                              |
| Power Consumption* | 18 W (intermittent : 45 s*)                | 16 W (intermittent : 2 min*) |
| Wetted Materials   | PTFE, PEEK, AL <sub>2</sub> O <sub>3</sub> | PTFE, PEEK, SiC              |

Patented

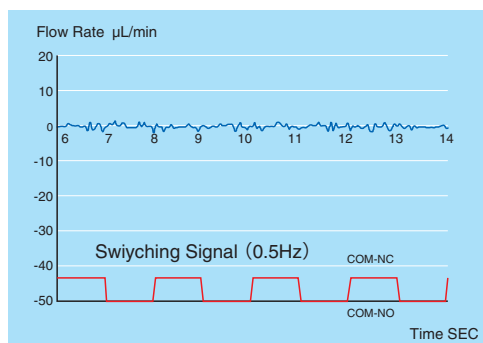
\*Continuous operation possible with a "hit and hold" circuit (page 9)

### ■ Pumping Volume Comparison (Diaphragm Valve vs. Slider Valve)

(Flow rate at the N.C. port when turning a 3-way valve on/off)



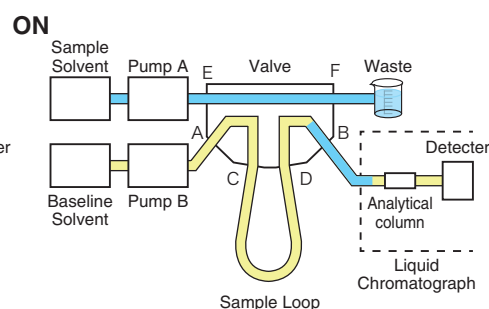
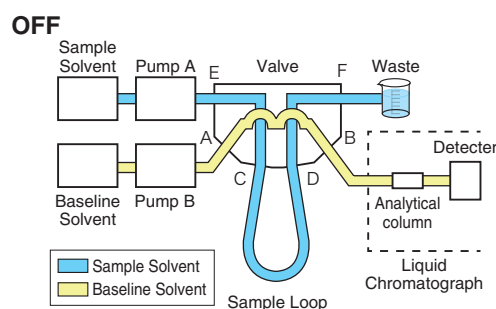
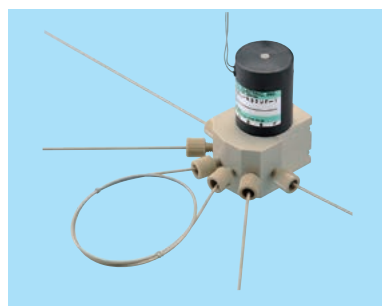
<Diaphragm Valve (KV-3K Series)>



<Slider Valve (MTV-3SL Series)>

These data are provided by Fujii T. Lab, Institute of Industrial Science, the University of Tokyo.

## Solenoid-driven Injection Valve

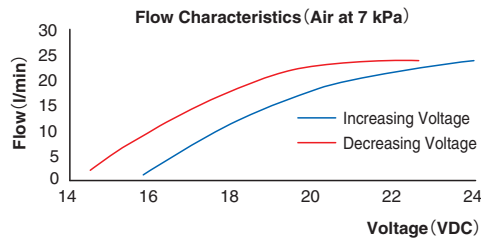


The valve in the photograph is a 2-position 6-port valve that employs the technology of a solenoid-driven slider valve. As the solenoid driven actuator requires no driver or external stepper motor, it is more economical and easier to operate than a conventional motor-driven rotary valve. It is suitable for sample metering/injection in a liquid chromatograph. A 2-position 4-port type injection valve is also available. Please consult with us for details.



# Including Slider Valves

## Proportional Diaphragm Valve



## Push-in Fitting Diaphragm Valve



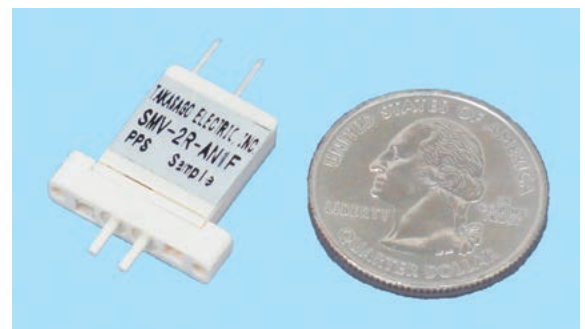
- Just insert plastic tubing into ports and you are connected. No special preparation of the tubing is required, such as enlarging the connection end.
- For disconnection, simply pull out the tubing while pushing in the port ends.
- Applicable to O.D. 2 mm PTFE/PFA tubing.
- High chemical resistance due to PPS, FPM and PTFE wetted materials.
- Integral molding eliminates the concern of leakage between the fittings and the body.

## Air Operated Valves



|                                  | ① PDT                | ② PMDP              |
|----------------------------------|----------------------|---------------------|
| Dimensions                       | φ44.5 × H 52 ~ 67 mm | φ25 × H 42 ~ 49 mm  |
| Orifice Diameter                 | 3 ~ 5 mm             | 2 mm                |
| Fluid Flow Connection            | Rc1/8, Rc1/4         | M6, 1/4-28UNF, Barb |
| Operating Pressure               | 0 ~ 300 kPa          | -90 ~ 500 kPa       |
| Port Connection for air pressure | Rc1/8                | M5, M6, 1/4-28UNF   |
| Air Pressure for actuation       | 300 ~ 600 kPa        | 300 ~ 600 kPa       |

## Low Cost Miniature Valve SMV Series



SMV series valves are driven by a piece of shape-memory alloy, resulting in a compact size, a light weight, low power consumption, and quiet operation. Its simple internal structure allows a significant cost reduction to a disposable level when produced in large quantities.

|                       |  |
|-----------------------|--|
| Dimensions            | W 19 × L 18.4 × t 4*1 mm                   |
| Orifice Diameter      | 0.4, 0.8 mm                                |
| Response Time         | Approx. 600 ms (at 30 °C)*2                |
| Power Consumption     | 0.3 W or less (Constant current operation) |
| Operating Temp. Range | 5 ~ 40 °C                                  |

\*1 Excluding pin terminals and barbs

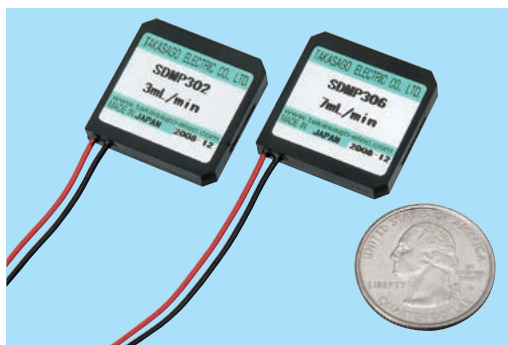
\*2 Response times vary depending on the ambient temperature.

Can be improved by controlling the applied current e.x. PWM, a spike & hold circuit, etc.

Please contact us for details.

# A Wide Range of Small

## Piezoelectric Micro Pumps



The SDMP series and the APP series are piezoelectric diaphragm micro pumps. The main features are as follows;

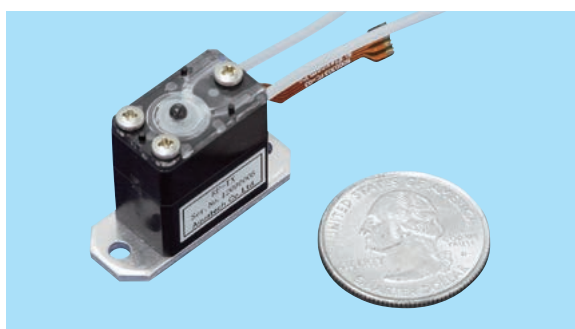
- Small-sized, lightweight and thin
- No metal parts in contact with fluid. The APP-20KG has particularly high chemical compatibility and can be used for wide range of fluids.
- Quiet and low power consumption
- Flow controllable by adjusting drive voltage and drive frequency
- Self-priming

The cartridge-type SDMP320C has a removable pump chamber which can be easily replaced for each fluid.

The SDMP302D/306D is the same as the SDMP302/306 but with a built-in driving circuit. When 2.5-6 VDC is applied, the pump starts operating at a fixed voltage and frequency.

| Model Number                  | SDMP302                        | SDMP306                        | SDMP320                                 | SDMP320C         | APP-20KG                           |
|-------------------------------|--------------------------------|--------------------------------|---|------------------|------------------------------------|
| Type                          | Standard                       |                                | Large Flow                              | Cartridge        | Highly Inert                       |
| Typical Flow Rate             | 3 ml/min                       | 7 ml/min                       | 20 ml/min                               |                  | 15 ml/min                          |
| Typical Pump Pressure         | 40 kPa                         | 45 kPa                         | 35 kPa                                  | 20 kPa           | 25 kPa                             |
| Voltage                       | 60 ~ 250 Vp-p                  |                                |   |                  |                                    |
| Drive Frequency               | 10 ~ 60 Hz                     |                                |   |                  |                                    |
| Typical Suction Load Pressure | -1.0 kPa                       |                                |   |                  |                                    |
| Operating Temperature         | 5 ~ 50 °C                      |                                |   |                  |                                    |
| Wetted Materials              | COC (Cyclic Olefin Copolymer)  |                                | EPDM (Ethylene Propylene Diene Monomer) |                  | PTFE, PEEK, and Perfluoroelastomer |
| Dimensions                    | 25 × 25 × 4.8 mm               |                                | 33 × 33 × 5.5 mm                        | 33 × 33 × 6.9 mm | 33 × 33 × 9 mm                     |
| Weight                        | Approx. 4 g                    |                                | Approx. 9 g                             | Approx. 13 g     | Approx. 17 g                       |
| Input / Output Pipes          | I.D. 0.6 × O.D. 1.2 × L 2.5 mm | I.D. 1.2 × O.D. 2.2 × L 3.5 mm | I.D. 1.8 × O.D. 2.8 × L 5.0 mm          |                  |                                    |

## Micro Peristaltic Pump RP-TX Series



- The world's lowest level of flow for a peristaltic pump on the market: 0.1 ~ 40 µl/min
- A replaceable pump head, which includes tubing.
- Compact size: Dimensions of 33 × 12 × 21.5 mm
- An easy-to-use controller is available upon request. (Sold separately)

| Flow Rate     | 0.1~40 µl/min ±15 %<br>(Water at 25 °C, Pulse speed : 3~1000 pps) |
|---------------|---|
| Tube Material | Silicone or Olefine (I.D. 0.5 mm)                                 |
| Pump Pressure | 30 kPa or more  |
| Motor         | Stepper motor   |
| Voltage       | 3 VDC   |

## Miniature Peristaltic Pump RP-Q1 Series



| Model Number       | RP-Q1-S-P45A-DC3V                     | RP-Q1.2N-P20A-DC3V                    |
|--------------------|---------------------------------------|---------------------------------------|
| Flow Rate          | 0.45 ml/min ±15 %<br>(water at 20 °C) | 0.20 ml/min ±15 %<br>(water at 20 °C) |
| Tube Material      | Silicone (I.D. 1.5 mm)                | Norprene (I.D. 1.2 mm)                |
| Discharge Pressure | 50 kPa                                |                                       |
| Motor              | DC Geared Motor                       |                                       |
| Voltage            | DC 3 V                                |                                       |
| Power Consumption  | 0.12 W                                |                                       |
| Dimensions         | W 12 × L 30 × H 14 mm                 |                                       |

\*This is a product of Aquatech Co., Ltd.

# -sized Liquid Pumps

## Pen Type Syringe Pump



This is a remarkably small syringe pump with an outer diameter of 12 mm and a built-in stepper motor. The theoretical resolution is as small as 0.105 nl at 1/100 micro-step. Different needle lengths and thicknesses are available along with various port connections (ex. screws). The SAP series with the ultra-small outer diameter of 8.8 mm is also available by custom order. Please contact us for details.

### Specifications (Needle Type)

|                        |   |
|------------------------|---|
| Model Number           | SBP-100G-N  |
| Syringe Capacity       | 100 $\mu$ l   |
| Dimensions             | $\phi$ 12 $\times$ L 170 mm<br>(Excluding needle and sensor case) |
| Theoretical Resolution | 0.105 nl at 1/100 micro-step<br>10.5 nl at full step              |
| Wetted Materials       | Glass (barrel), PTFE (tip, seal), Stainless Steel (needle)        |
| Needle Size            | 22G (0.40 $\times$ 0.72) $\times$ L 51 mm                         |

## 6-channel Pump

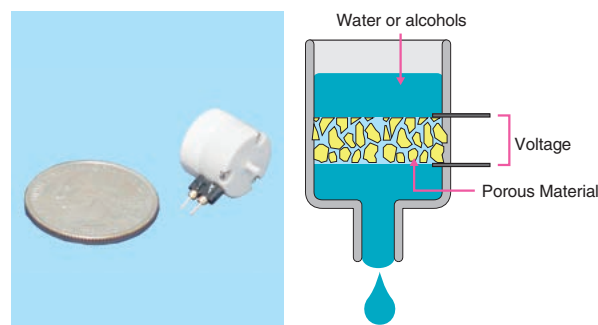


- Capable of simultaneously pumping through 6 lines of tubing.
- The tubing is easily replaceable.

|                    |                                     |
|--------------------|-------------------------------------|
| Flow Rate          | Approx. 0.8 ml/min (per channel)    |
| Tube Material      | Silicone (1 $\times$ 2 mm)          |
| Discharge Pressure | 30 kPa                              |
| Motor              | Geared DC Brush Motor               |
| Voltage            | 3 VDC                               |
| Dimensions         | W 31 $\times$ L 84 $\times$ H 32 mm |

\*This is a product of Aquatech Co., Ltd.

## Electro-osmotic Micro Pump (Under Development)



This pump utilizes an electro-osmotic flow induced by applying an external electric field on a charged solid-liquid interface of narrow channels inside a porous material.

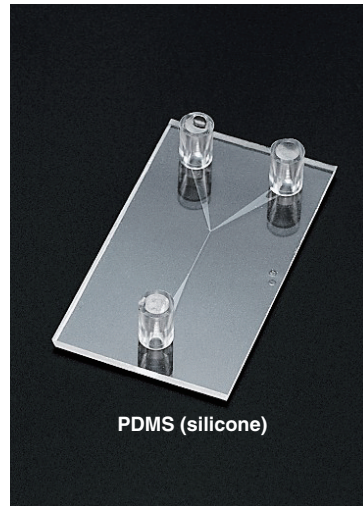
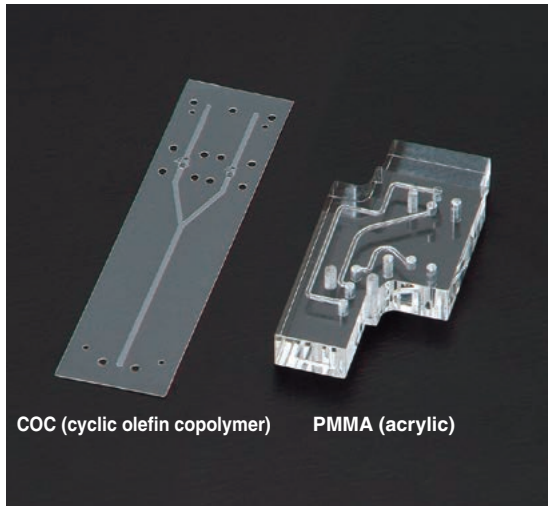
### Features

- Zero-pulsation flow and no operating noise due to no mechanical parts.
- Small size (a few millimeters) and lightweight (a few grams).
- High pressure. Potentially more than 1MPa.
- Adjustable flow. Linearly proportional to applied voltage.

The Electro-osmotic Pump (EO pump) can directly discharge only ethanol, methanol or deionized water. For discharging other liquids, indirect pumping is recommended. Its mechanism is to deliver ethanol through an EO pump towards a separator (ex. a diaphragm or a gasket), driving it by the increased fluid pressure and discharging the target liquid accordingly. We offer indirect pumping units on request.

# Microfluidic

## Microfluidic Chips



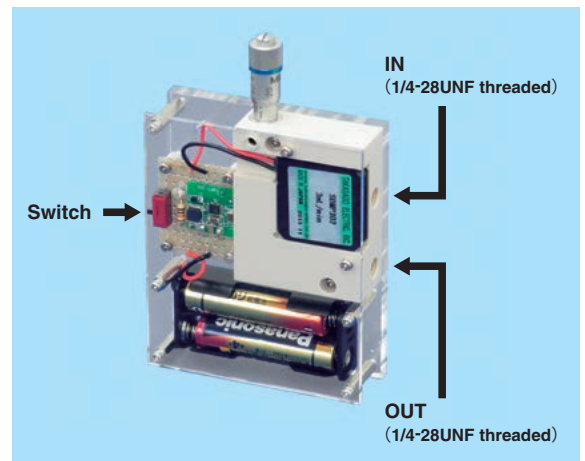
These are chips made by bonding plastic or elastomer layers. The layers can be made by machining for prototypes or injection molding for production. Available in the following materials : PMMA (acrylic) , COC (cyclic olefin copolymer) , PDMS (silicone) , PI (polyimide) , PEN (polyethylene naphthalate) , PC (polycarbonate) , ceramic, etc. In addition to bonding plastic + plastic or elastomer + elastomer, special bonding of plastic + elastomer is also possible.

## Chip Pump ACP/QCP Series



This unit incorporates a planar peristaltic pump into a PDMS chip, where rollers rotate and compress a  $\Omega$ -shaped channel to directly pump the liquid inside. The PDMS chip is replaceable and sterilisable. Flexible flow channel design is possible to include a mixing zone, reagent reservoir, waste tank, etc. in a chip.

## Manually Adjustable Low Pulsation Micro Pump Unit

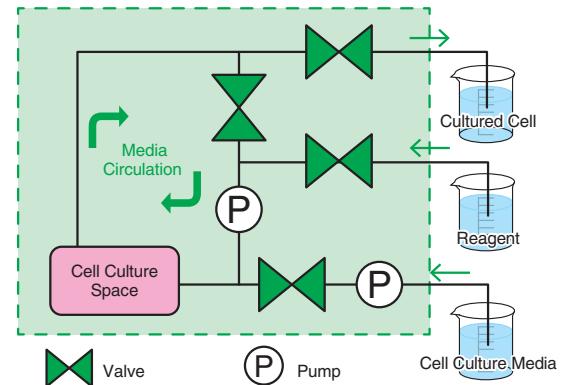
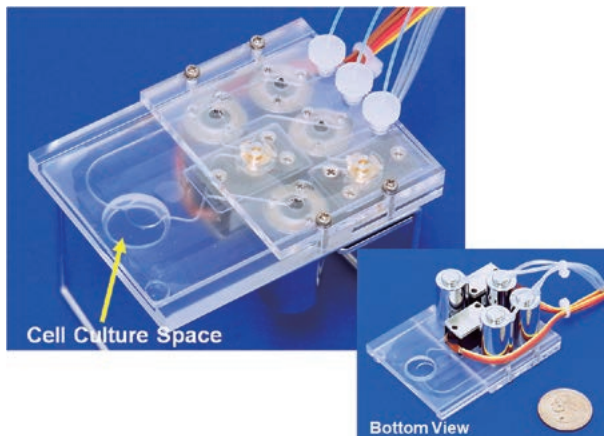


- Suitable for lab-on-a-chip devices, cell culture media circulation, etc.
- Flow from a piezoelectric micro pump is adjusted by a micro needle valve.
- Can adjust flow from sub-microliter level to around 1.5 ml/min.
- Flow pulsation at low flow rates is drastically reduced by the micro needle valve.
- Stand-alone functionality powered by AAA or R03 batteries.
- Compact size: Dimensions of 66 × 25 × 105 mm



# Devices

## All-in-one Disposable PDMS Chip【Under Development】



This all-in-one system on a disposable PDMS chip is a microfluidic module designed for cell culture. It has peristaltic pumps, miniature valves, and a built-in cell culture space which can be observed under a microscope. The replaceable chip is sterilizable before use. A remote controller using an Android application is available for this module upon request.

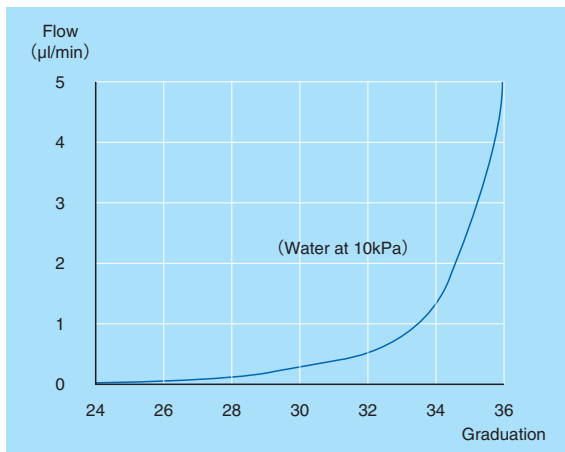
This is just an example of our integrated fluid control systems. Other microfluidic systems can be designed and manufactured in accordance with your requirements.

This system is jointly developed with Aquatech Co., Ltd. and Fukoku Bussan Co., Ltd.

## Micro Needle Valve



### < Example Flow Data\* >

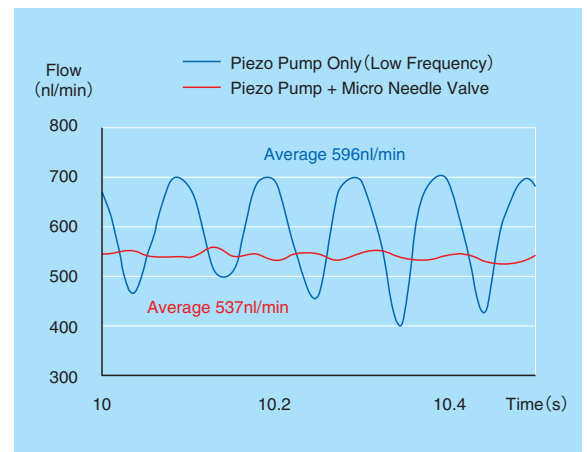


\*Flow-graduation relationship varies according to valve.

- Allows the adjustment of flows below 1 μl/min.
- Reduces flow pulsation.
- Only Perfluoroelastomer and PEEK as the wetted materials.  
(The pin insert type includes stainless steel.)

### < Example of Reduced Pulsation >

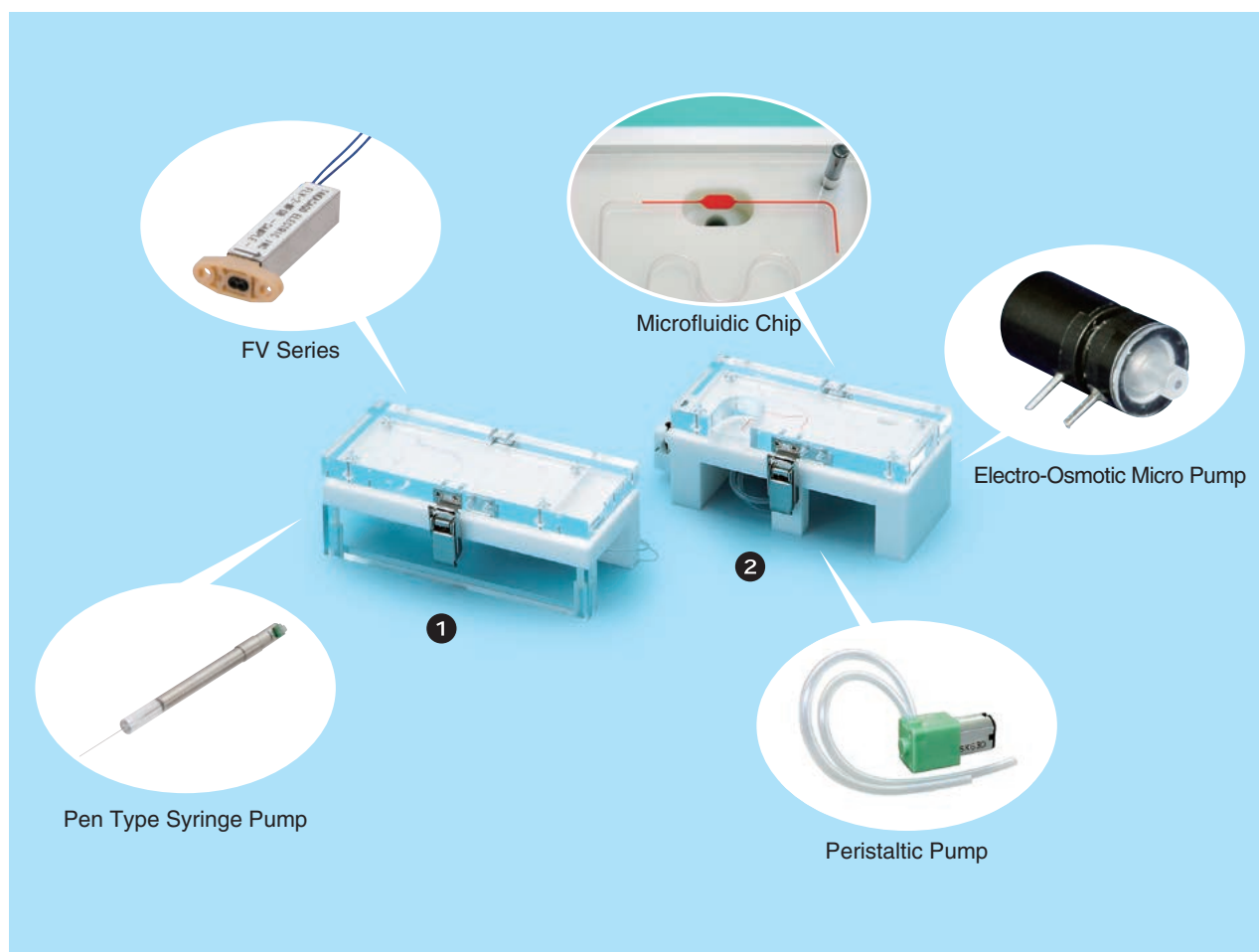
By incorporating a micro needle valve on the discharging side of a piezoelectric micro pump, the significant pulsations created by the low flow operation of a piezoelectric pump are eliminated and a low flow rate with almost no pulsation can be achieved. The graph below is an example of this remarkable reduction in pulsation. Pulsation can also be reduced when combined with other kinds of pumps, such as peristaltic pumps.



## Microfluidic Device Specialist

Microfluidic control devices are our key products. The trend of minimization and modularization is prevailing in markets worldwide. Our products are supplied not only as standalone equipment and components, but also in the form of integrated modules combining such products with other devices. We serve our customers with elegant and sophisticated solutions for various applications; presenting modules of integrated devices designed to solve the particular microfluidic control challenge posed. The below is an example of one such microfluidic control module.

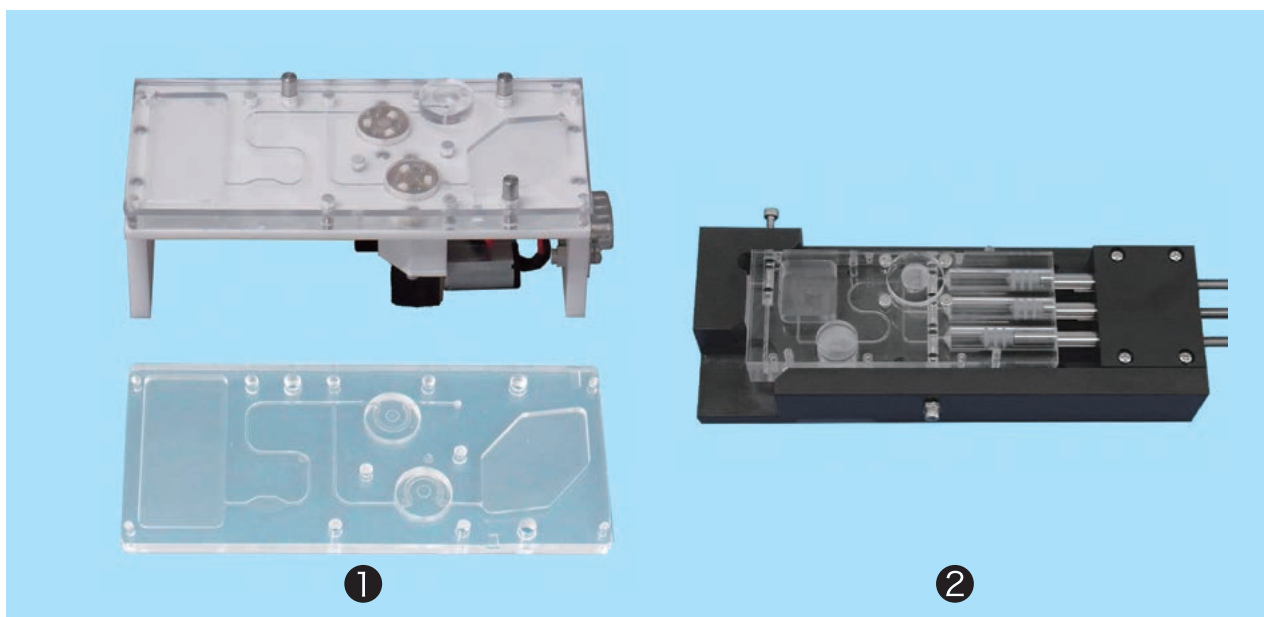
### Example of Microfluidic Control Module



- 1 This is a demo module in which a plastic chip is prefilled with a reagent. It is constructed from a pen type syringe pump and an ultra-small inert 3-way valve.
- 2 This module demonstrates the basic processes including sample introduction, mixing with a reagent, and detection, by using a chip with Y-shaped internal channels. A sample is introduced into the chip by an ultra-small peristaltic pump and, after being metered in accordance with the length of the channel, transported and mixed with the pre-filled reagent by a pair of electro-osmotic pumps. The flow is switched by ultra-small valves. The chip is designed to be disposable and can be easily fixed on the module by the holding plate.

# Solution Provider

## Reagent-prefillable Disposable Fluidic Systems (①Roller Pump Type, ②Syringe Pump Type)



These systems integrate every necessary function of POCT into a single module. Once a reagent-prefilled module is loaded on the system, the pump discharges the prefilled reagent from the reservoir and draws a sample into the module from the sample-in port to mix them together. The module has another closed reservoir for waste, simplifying the disposal of chemicals. Time-consuming tasks are eliminated. Two types of pumps are available as shown in the above pictures: ①Roller Pump and ②Syringe Pump. Customisation is possible to match your requirements.

\* The Syringe Pump Cartridge is jointly developed with Sumigomu Takasago Integrate, Ltd.

## Portable Medium Exchange System



|                            |  |
|----------------------------|--|
| Volume of Medium Exchanged | Approx. 1.5 ml /cycle                            |
| Power Supply               | AA (LR6) battery × 2<br>(for 3 days ~ 7 days)    |
| Wetted Materials           | PC, PP, Silicone,<br>Stainless Steel 304         |
| Dimensions                 | 190 × 225 × 130 mm<br>(including medium bottles) |

This system automates the process of cell culture medium exchange, which is conventionally done by manual pipetting. It can operate continuously for 7 days (Max.) by battery power in an incubator. A standard 6-well plate can be used and the wells can be observed by a microscope while installed in the system. Can be remodeled into a perfusion culture system.



ISO9001 certified at the Japanese head office and the main factory,  
and applicable to:  
Design, development and manufacture of solenoid valves, pinch valves,  
metering pumps and associated accessories.



JIS Q 9100:2009 / AS 9100 C / EN 9100:2009 certified at the Japanese headquarters,  
and applicable to:  
Machining of parts for aviation and space industries.

The contents of this brochure may be changed without prior notice.  
Pharmed® is a trademark of Saint-Gobain Performance Plastics.  
ULTEM® is a trademark of SABIC Innovative Plastics IP B.V.

# TAKASAGO ELECTRIC, INC.



Printed in Jap

|   |  |   |
|---|--|---|
|  <b>HROMalytic</b> +61(0)3 9762 2034<br><b>ECHnology</b> Pty Ltd   |  | <b>Australian Distributors</b><br>Importers & Manufacturers<br><a href="http://www.chromtech.net.au">www.chromtech.net.au</a> |
| Website NEW : <a href="http://www.chromalytic.net.au">www.chromalytic.net.au</a> E-mail : <a href="mailto:info@chromtech.net.au">info@chromtech.net.au</a> Tel: 03 9762 2034 . . . in AUSTRALIA |  |   |