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.

TAKASAGO ELECTRIC, INC.

Takasago Fluidic Systems

PRODUCT INFORMATION

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.

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.

Technology

Small, Fast, Highly Accurate

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

TAKASAGO ELECTRIC, INC.

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.

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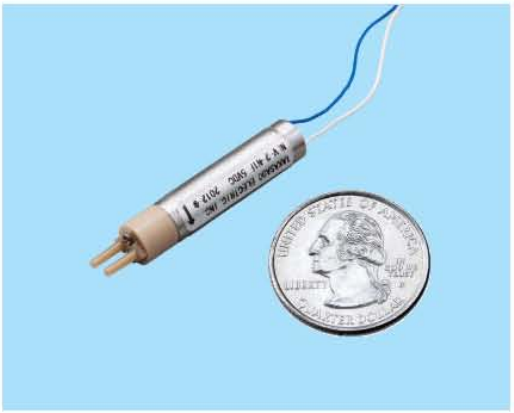
Innovatively Small and Highly Fun

NV NLV Series



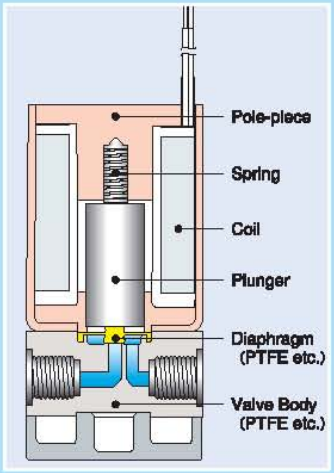
	NV Series	NLV Series
Dimensions (mm)	ϕ5.7 x H 32.5*1	
Orifice Diameter (mm)	ϕ0.4	
Port Connection	Barb	
Pressure	0 ~ 100 kPa	
Voltage	5 VDC, 12 VDC, 24 VDC	5 VDC
Power Consumption	1 W	1.5 W when energized (Latching Solenoid*2)

*1.Dimensions of NV-2-N1G and NLV-2-N1G *2.Please refer to page12 on the latching solenoid.

KV Series

Dimensions (mm)	W 6 x L 50x H 12.5
Orifice Diameter (mm)	ϕ0.8
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 sensitve 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.

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ctional : Miniature Isolation Valves

EXAK Series

Dimensions (mm)	ϕ12× H 48.1
Orifice Diameter (mm)	ϕ0.8
Port Connection	Barb, M5
Pressure	−40 ~ 100 kPa
Voltage	12 VDC, 24 VDC
Power Consumption	0.94 W

WTE Series

Dimensions (mm)	W19 × L11 × H 31.3
Orifice Diameter (mm)	ϕ1
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 9) 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 10) 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 (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 (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	-0.725	0.81	-0.71	0.826	-0.708	0.849
Conventional type (MTV-3R)	COM.	2.346	2.609	2.425	2.604	2.427	2.661
	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 Rel

EXV Series

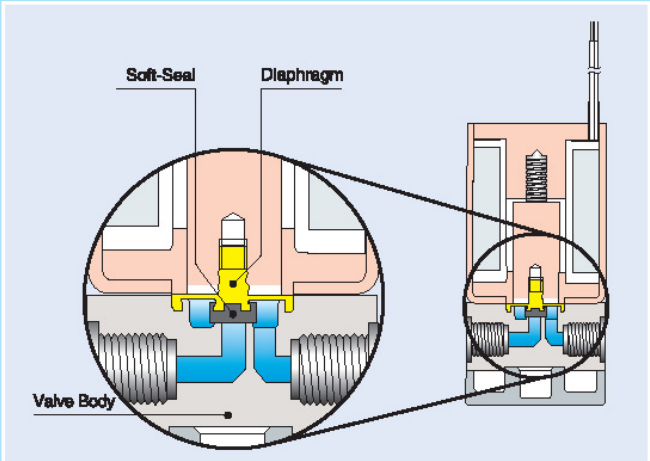
Dimensions (mm)	W 14 × L 25.0 × H 31.7
Orifice Diameter (mm)	ϕ1
Port Connection	Gasket
Pressure	−50 ~ 200 kPa
Voltage	12 VDC, 24 VDC
Power Consumption	2.8 W

STV CTV Series

	① STV Series	② CTV Series
Dimensions (mm)	ϕ20 × H 42.5	ϕ21 × H 59.8 (excluding projection parts)
Orifice Diameter (mm)	ϕ1.2	ϕ1.6
Port Connection	M6, 1/4-28UNF, Barb	
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 (FKM) is also available for the Soft-Seal material.

TAKASAGO ELECTRIC, INC.

iability and Outstanding Inertness

MTV Series

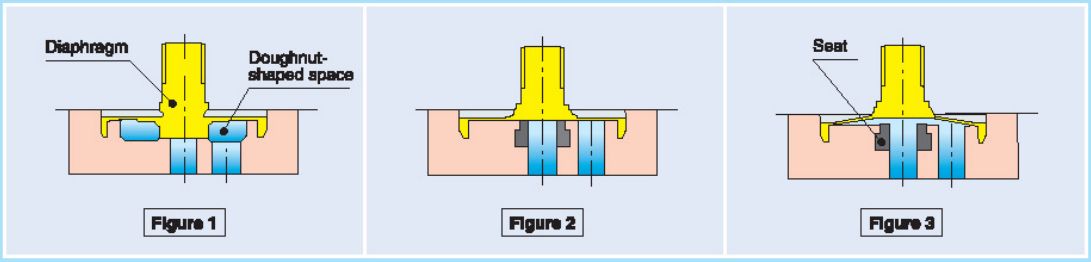
Dimensions (mm)	ϕ26 × H 53.2
Orifice Diameter (mm)	ϕ1.6 ~ ϕ2
Port Connection	M6, 1/4-28UNF, Barb
Pressure	−90 ~ 300 kPa
Voltage	12 VDC, 24 VDC
Power Consumption	1.9 W, 2.8 W

*Manifold-mountable models are also available.

PKV Series

	1 PKV-2	2 PKV-3
Dimensions (mm)	W 43 × L 36 × H 71	W 43 × L 36 × H 62
Orifice Diameter (mm)	ϕ4 ~ ϕ6	
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

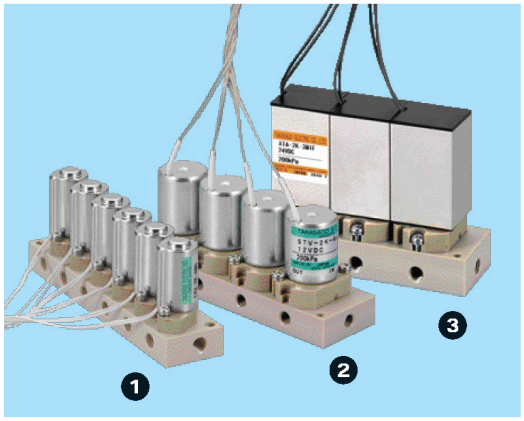


■ Applicable models
- STV Series (2-way type only)
- MTV Series
- MLV Series

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.

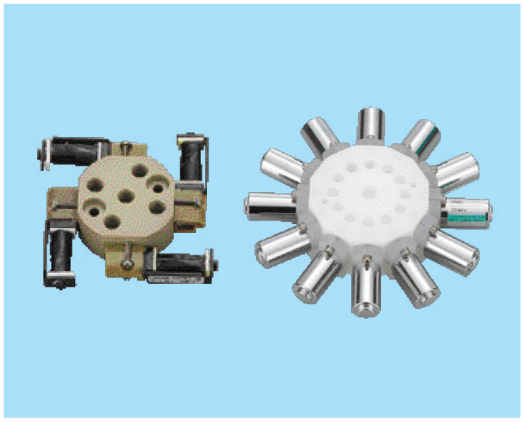
Products to Meet Your

Standard Manifolds



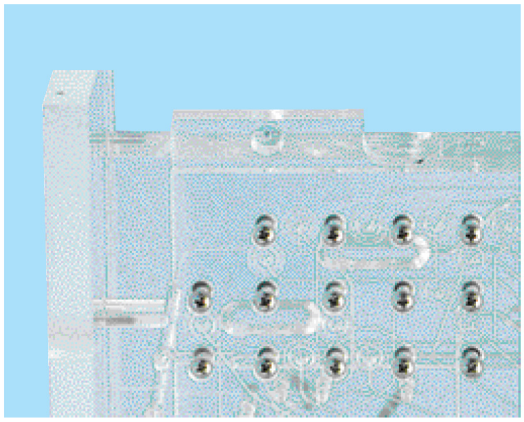
	❶ EXV Series	❷ STV Series	❸ XTA Series
Orifice Diameter(mm)	φ1	φ1.2	φ2
Port Connection	M6, 1/4-28UNF		
Pressure	−20 ~ 200 kPa	−50 ~ 200 kPa	−50 ~ 200 kPa
Voltage	12 VDC, 24 VDC		
Power Consumption	2.8 W x (No. of valve)	2.5 W x (No. of valve)	2.8 W x (No. of valve)
Max. number of valves	6		

Custom Manifolds

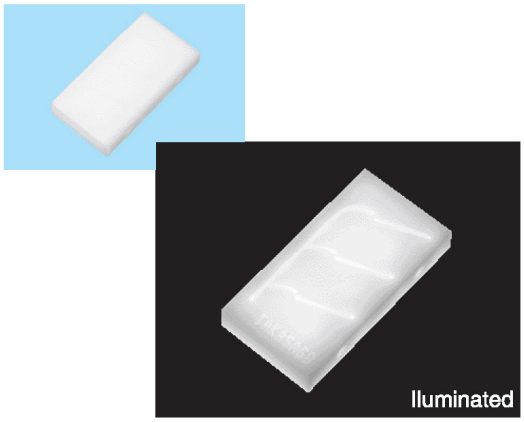


If you wish install valves compactly and connect flow-paths over a short distance, the manifold is the best choice. If you let us know the flow diagram you require, we can design and produce the manifold to meet your requirements. A variety of shapes, materials, and structural methods are available and 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, mpatibility, in this way.

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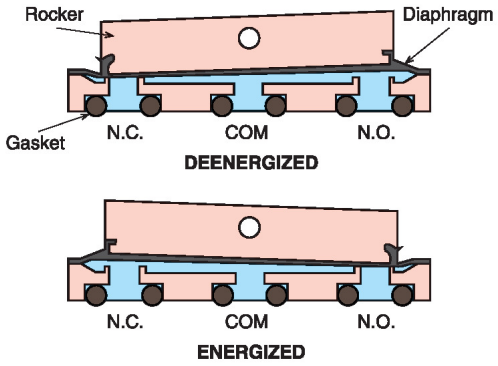
Requirements Flexibly

Rocker Solenoid Valve RVA Series

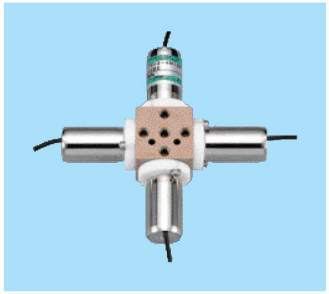
Dimensions (mm)	W 16 × L 27× H 46
Orifice Diameter (mm)	ϕ1.6
Port Connection	Gasket
Pressure	−95 ~ 200 kPa
Voltage	12 VDC, 24 VDC
Power Consumption	3.4 W (Standard) with built-in "hit & hold" circuit (page 13): 0.85 W

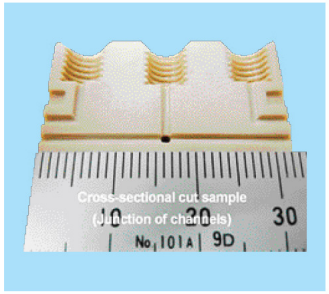
■Cross-sectional Image of Rocker Structure



- 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.

Molded Quaternary Valve





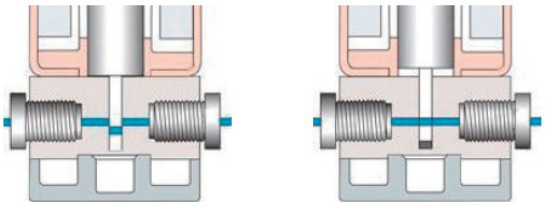
Dimensions (mm)	W 117 × L 117 × H 31
Orifice Diameter (mm)	ϕ1.2
Port Connection	M6, 1/4-28UNF
Pressure	0 ~ 300 kPa
Voltage	12 VDC, 24 VDC
Power Consumption	3.5 W × 4
Wetted Materials	PTFE, PEEK, Perfluoroelastomer

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.

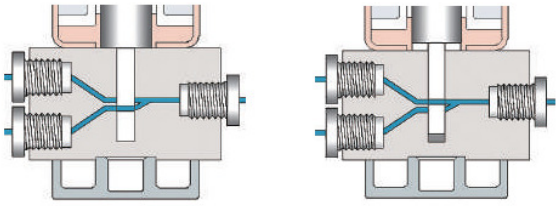
Various Unique Products

Solenoid-driven Slider Valves

●2-way (N.C.)



●3-way



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.

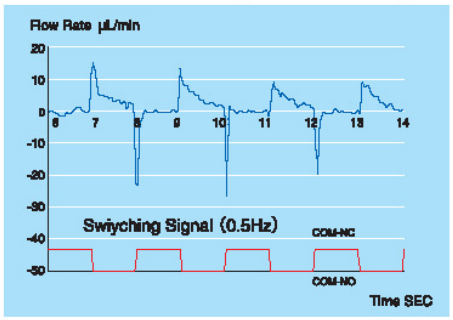
*Please refer to page 5 for more details on the pumping volume.

	MTV	NRV
Dimensions (mm)	W 33 × L 25 × H 62	W 41 × L 38 × H 86
Orifice Diameter (mm)	φ0.4	φ1.0
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*)	18 W (Intermittent : 2 min*)
Wetted Materials	PTFE, PEEK, Al_2O_3	PTFE, PEEK, SiC

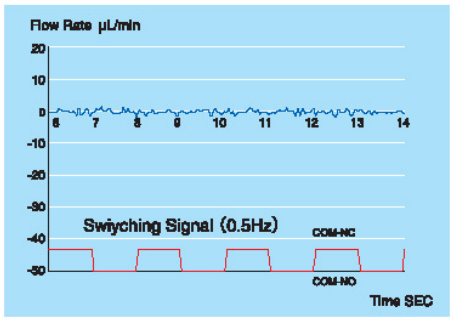
Patented *Continuous operation possible with a "hit and hold" circuit (page 13)

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

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



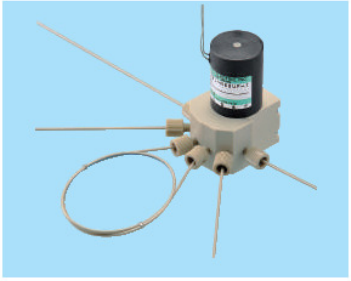
<Diaphragm Valve (KV-3K Series)>

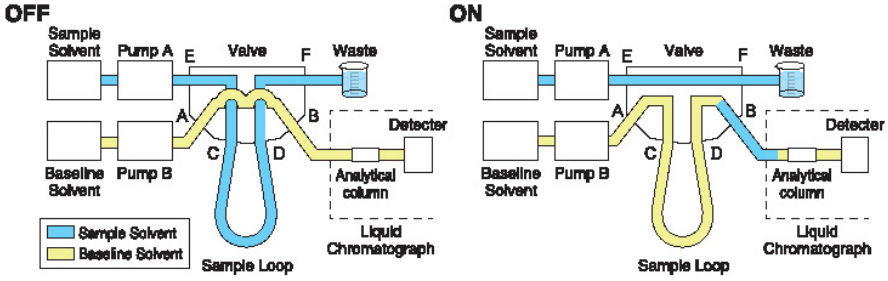


<Slider Valve (MTV-3SL Series)>

These data are provided by Fuji 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.

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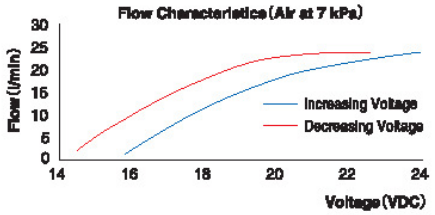
; Including Slider Valves

Proportional Diaphragm Valve



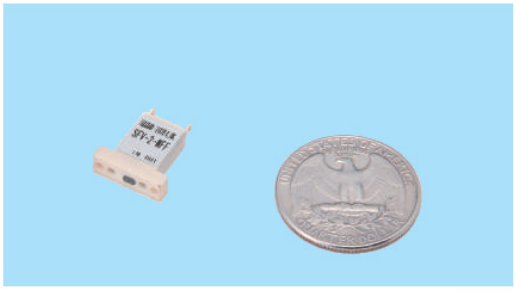
Push-in Fitting Diaphragm Valve

- 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 (FKM) and PTFE wetted materials.
- Integral molding eliminates the concern of leakage between the fittings and the body.

Air Operated Valves

		❶ PDT	❷ PMDP
Dimensions	(mm)	ϕ44.5 × H 52 ~ 67	ϕ25 × H 42 ~ 49
Orifice Diameter	(mm)	ϕ3 ~ 5	ϕ2
Fluid Flow Connection		Rc1/8, Rc1/4	M5, 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 Power Consumption Miniature Valve



Patented

Dimensions (mm)	W 4 × L 16 × H 16.5
Orifice Diameter (mm)	ϕ0.4
Driving Current	250 mA
Operating Frequency	0.5 Hz or less
Power Consumption	0.3 W or less

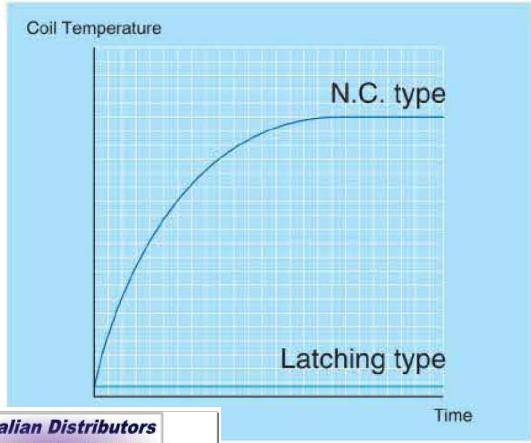
Pinch Valves, Power Sav

Pinch Valves

	1 PE Series	2 PSK Series	3 PMK Series	4 PK Series	5 NP Series	6 EPK Series
Dimensions (mm)	ϕ14 × H 55.1	ϕ20 × H 51	ϕ26 × H 61.5	W 40 × L 36 × H 65 ~ 88.3	W 40 × L 36 × H 65 ~ 88.3	ϕ64 × H 112 ~ 132
Tube Material	Silicone	Silicone, PharMed®	Silicone, PharMed®	Silicone	Silicone	Silicone
Tube Diameter (mm)	ϕ0.8 × ϕ2.4	ϕ1 ×ϕ3 ϕ1.6 × ϕ3.2	ϕ0.8 × ϕ2.4 ϕ1 × ϕ3	ϕ3 × ϕ5 ϕ6 × ϕ8	ϕ3 × ϕ5 ϕ6 × ϕ8	ϕ10 × ϕ13 ϕ15 × ϕ19
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.)

Latching Solenoid Valves

	Orifice Diameter or Tube Diameter (mm)	Valve Type
1 FLV Series	ϕ0.4	Diaphragm valve
2 WLB Series	ϕ2	Diaphragm valve
3 PL Series	ϕ1 ×ϕ3, ϕ3 ×ϕ5	Pinch valve
4 EL Series	ϕ10 ×ϕ13	Pinch valve



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

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ing Items and Accesories

Example of Custom Pinch Valve

(PL Series, Small Latching Pinch Valve)

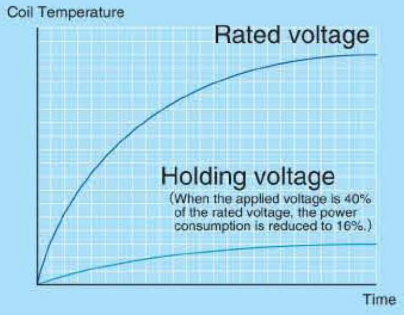
Dimensions (mm)	W 45 x L 29.7 x H 66.5
Tube Material	PharMed®
Tube Diameter (mm)	ϕ3 x ϕ5
Pressure	−55 ~ 80 kPa
Voltage	12 VDC, 24 VDC
Power Consumption	8 W when energized (Latching Solenoid)

ß-Titanium Probes

1. **Non-bending piercing probe**
   Long-lasting due to its shape recovery characteristics with respect to bending (high tensile strength and superior spring characteristics), which contributes to longer life expectancy compared to stainless steel probes.
2. **Non-magnetic**
   Having absolutely no magnetism makes it particularly suitable for analyzers that use magnetic particles, like an immunoassay system.
3. **Finely polished titanium**
   The fine bore polishing (Ra 0.02 at minimum) reduces the carryover of samples (especially proteins), system flushing time and sample loss.

Holding Voltage and "Hit & Hold" Circuit

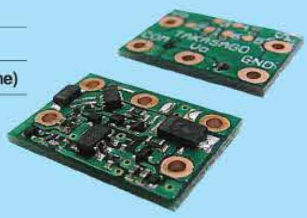
Once switched to ON-position by energizing at the rated voltage, a solenoid valve can hold the ON-position status even after the applied voltage is dropped to a lower voltage. For example, in case that a 2-way normally closed valve with a rated voltage of 24 VDC is switched to ON-position, it can hold 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).



■Standard specifications of our "Hit & Hold" circuit

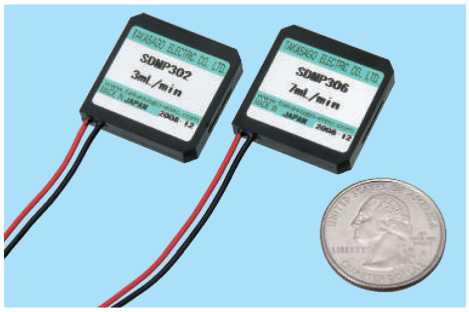
Input	5 VDC ~ 27 VDC
Inrush Time	100 ms, 300 ms
Output	40 % of Input (after Inrush Time)

■Dimensions



A Wide Range of Sma

Piezoelectric Micro Pumps



The SDMP302/306/320 and APP-20KG 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

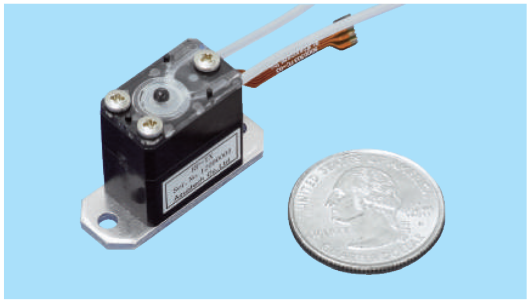
The SDMP302D/306D is the same as the SDMP302/306 but with a built-in driving circuit. When 2.5-6 VDC is applied, the pump starts operating at a fixed voltage and frequency.

Replaceable-cartridge types available upon request.

	SDMP302	SDMP306	SDMP320	APP-20KG
Pump Type	Piezoelectric diaphragm pump			
Typical Flow Rate	3 ml/min	7 ml/min	20 ml/min	15 ml/min
Typical Pump Pressure	40 kPa	45 kPa	35 kPa	25 kPa
Voltage	60 ~ 250 Vp-p			
Drive Frequency	10 ~ 60 Hz			
Typical Suction Load Pressure	-1.0 kPa			
Operating Temparature	5 ~ 50 °C			
Wetted Materials	COC (Cyclic Olefin Copolymer) EPDM (Ethylene Propylene Diene Monomer)			PTFE, PEEK, and Perfluoroelastomer
Dimensions (mm)	25 × 25 × 4.8		33 × 33 × 5.5	33 × 33 × 9
Weight	Approx. 4 g		Approx. 9 g	Approx. 17 g
Input / Output Pipes (mm)	I.D. 0.6 × O.D. 1.2 × L 2.5	I.D. 1.2 × O.D. 2.2 × L 3.5	I.D. 1.8 × O.D. 2.8 × L 0.5	

*The specifications above are based on sine wave drive. Flow rate and pump pressure are larger if driven by Takasago Standard wave.

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 % (Water at 25 °C, Pulse speed:3~1000 pps)
Tubing 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 % (water at 20 °C)	0.20 ml/min ±15 % (water at 20 °C)
Tubing 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 (mm)	W12 × L30 × H14	

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

TAKASAGO
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ll-sized Liquid Pumps

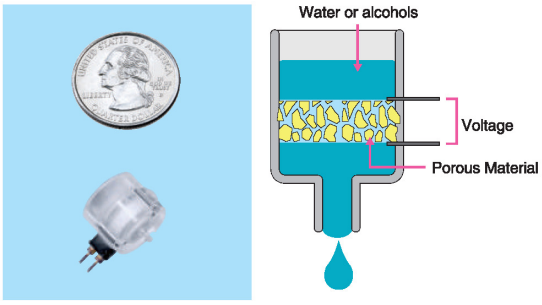
Pen Type Syringe Pump

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	**100μl**
Dimensions (mm)	**φ12 × L 170 (Excluding needle and sensor case)**
Theoretical Resolution	**0.105 nl at 1/100 micro-step 10.5 nl at full step**
Wetted Materials	**Glass(barrel), PTFE(tip, seal), Stainless Steel(needle)**
Needle Size	**22G (I.D. 0.40 × O.D. 0.72) × L 51 mm**

Electro-Osmotic Micro Pump [Under Development]

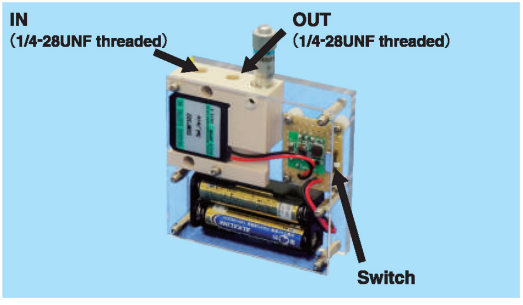


This pump utilizes an electro-osmotic flow induced by applying an external electric field on a charged solid-liquid interface of narrow channels inside a porous material.

Features

- Zero-pulsation flow and no operating noise due to no mechanical parts.
- Small size (a few millimeters) and lightweight (a few grams).
- Adjustable flow. Linearly proportional to applied voltage.

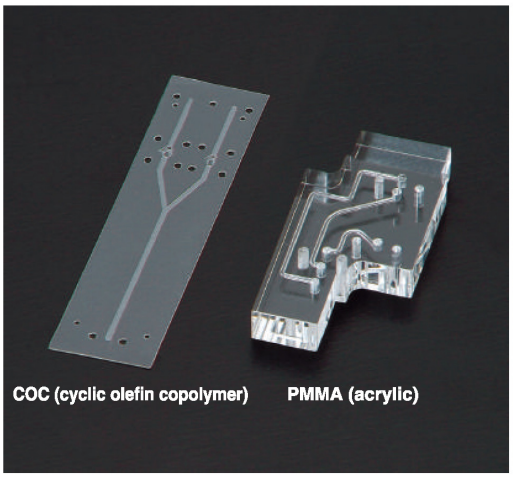
Manually Adjustable Low Pulsation Micro Pump Unit

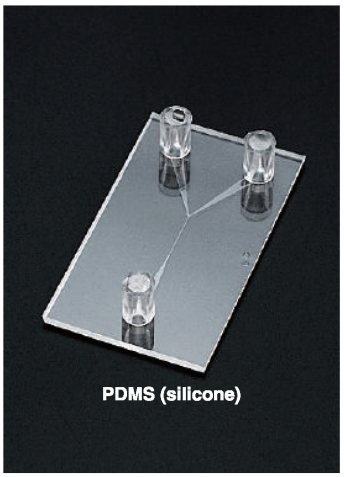


- Suitable for lab-on-a-chip devices, cell culture media circulation, etc.
- Flow from a piezoelectric micro pump is adjusted by a micro needle valve.
- Can adjust flow from sub-microliter level to around 1.5 ml/min.
- Flow pulsation at low flow rates is drastically reduced by the micro needle valve.
- Stand-alone functionality powered by AAA or R03 batteries.
- Compact size: Dimensions of 70 x 25 x 94 mm

Microfluid

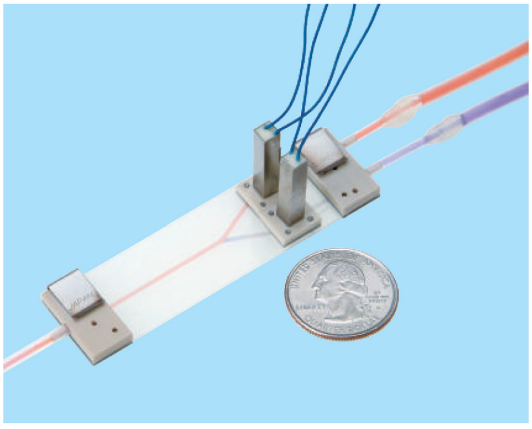
Microfluidic Chips





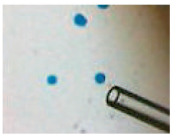
These are chips made by bonding plastic or elastomer layers. The layers can be made by machining for prototypes or injection molding for production. Available in the following materials : PMMA (acrylic) , COC (cyclic olefin copolymer) , PDMS (silicone) , PI (polyimide) , PEN (polyethylene naphthalate)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

Example of Module with Film Chip

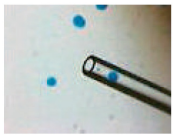


This is a demo module exhibiting the introduction and mixing of two liquids in the internal channels of a film chip of just 225 µm thickness. The flow of each liquid can be controlled by opening and closing the mounted ultra-small solenoid valves. A "clip-on" connection is adopted for easy interface between the film chip and tube connection barbs.

PicoPipet



1. Target



2. Suck & hold

3. Discharge at intended position

- Simplify single cell isolation & transfer
- Requires an extremely small volume of cell culture media during a cell/bacteria transfer, which contributes to mitigating contamination.
- Flow range is 1 nl/min – 12 µl/min.
- Simple operation. Just turn the dial, or push the buttons for preset volumes of suction or discharge.
- Optional accessories further simplify precise handling of a single cell

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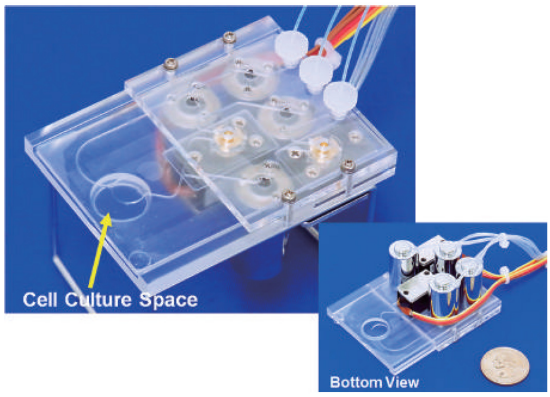
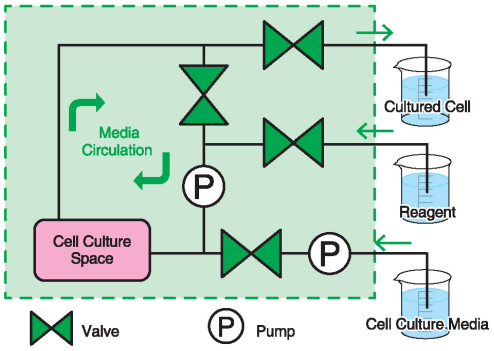
ic Devices

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





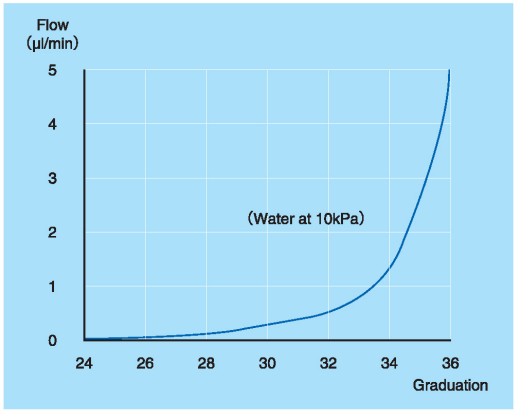
This all-in-one system on a disposable PDMS chip is a microfluidic module designed for cell culture. It has peristaltic pumps, miniature valves, and a built-in cell culture space which can be observed under a microscope. The replaceable chip is sterilizable before use. A remote controller using an Android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

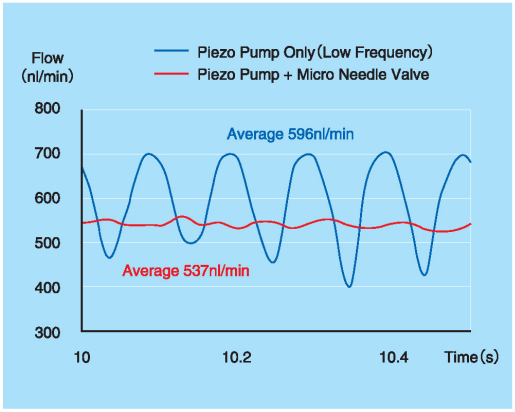


*Flow-graduation relationship varies according to valve.

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

< Example of Reduced Pulsation >

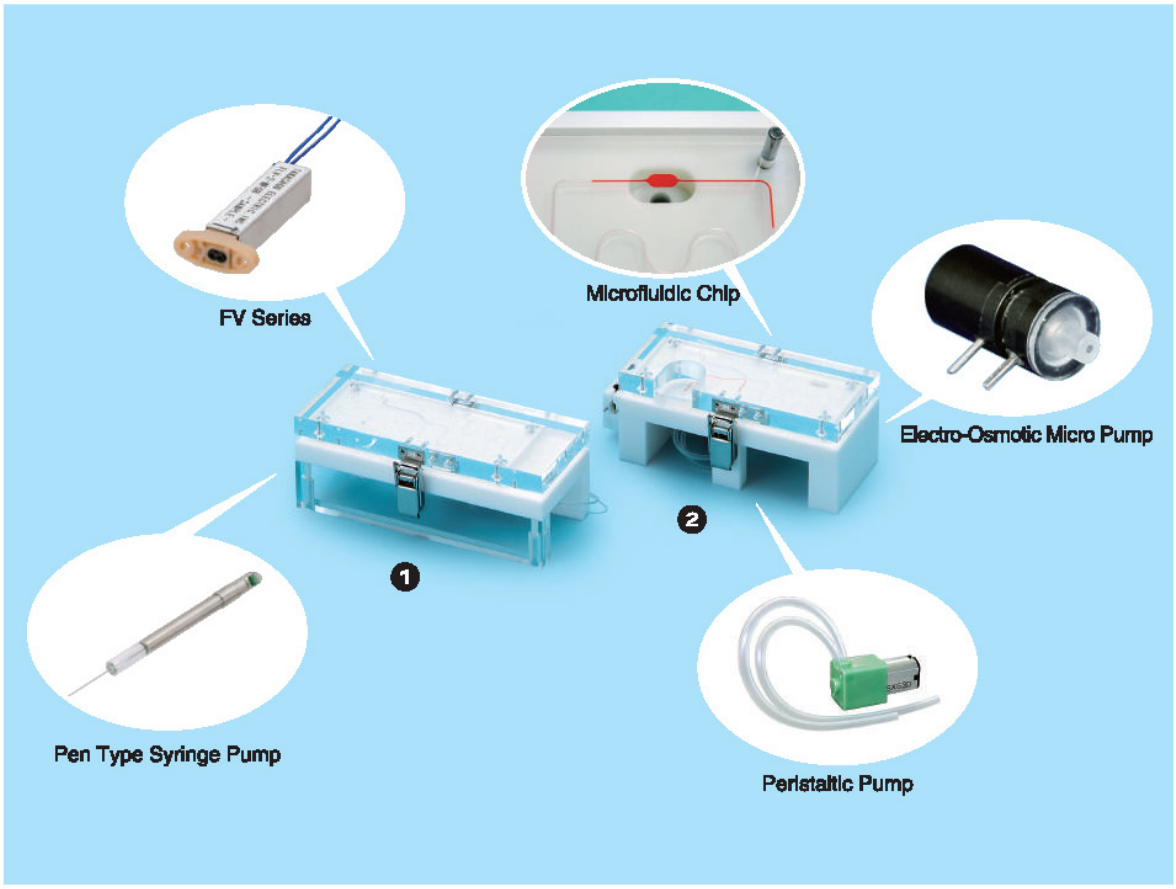
By incorporating a micro needle valve on the discharging side of a piezoelectric micro pump, the significant pulsations created by the low flow operation of a piezoelectric pump are eliminated and a low flow rate with almost no pulsation can be achieved. The graph below is an example of this remarkable 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



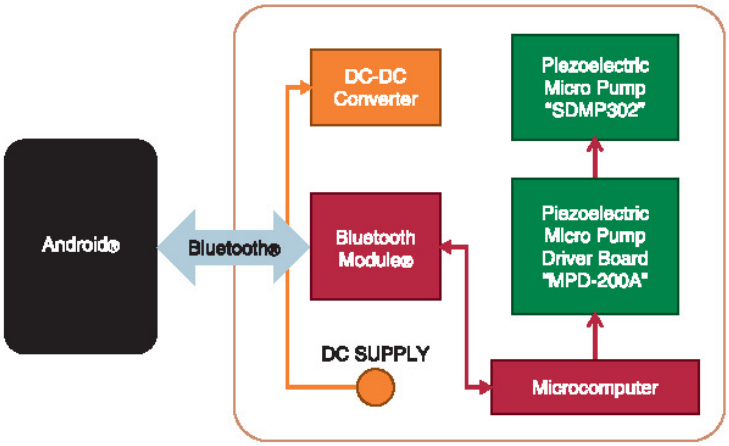
1. This is a demo module in which a plastic chip is prefilled with a reagent. It is constructed from a pen type syringe pump and an ultra-small inert 3-way valve.

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.

TAKASAGO ELECTRIC, INC.

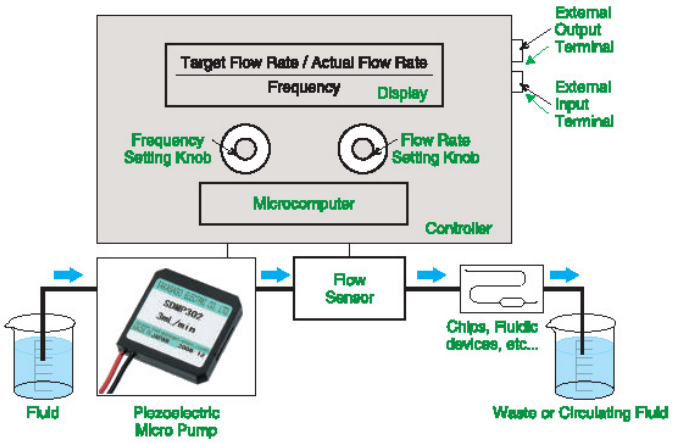
lution Provider

Remote Control System <Android® Application>



This Android® application is for the remote control of Takasago piezoelectric micro pumps. Your Android® device wirelessly connects to a microcomputer, and allows you to easily switch on/off and adjust the drive voltage and drive frequency. A ready-to-use sample package that includes a Bluetooth® module, a microcomputer and a driver board is available upon request. Consult with us for developing other systems to control pumps, valves, etc.

Flow Control System for Piezoelectric Micro Pump【Under development】



- Automatically adjusts the flow to the target rate set manually by the flow setting knob. Flow remains stable even when the liquid levels of the vessel change.
- Programmed flow control using an external input is also possible.
- The flow data can be exported through the external output terminal.
- Applicable to Takasago piezoelectric micro pump models SDMP302, SDMP308 and APP-20KG.
- The flow sensor can be selected from Sensirion LG16-0150 or LG16-1000. These support a range of flow rates from a few hundred nl/min to 7 µl/min and from a few µl/min to 1 ml/min, respectively.
- The wetted materials of the flow sensors are PEEK and glass, and those of the pumps are plastics and elastomers. The highly inert model allows the handling of a wide range of fluids.