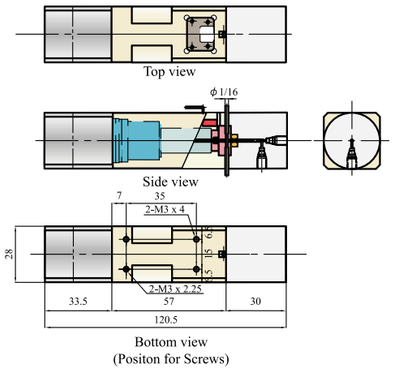
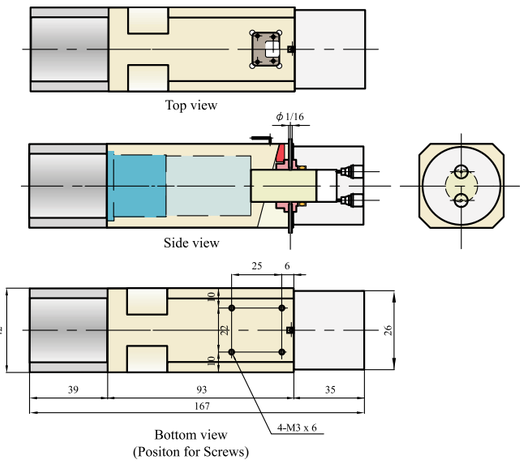
Dimensions

<< Metering flow model >>

TS-MP18, MP22, MP32, MP45, MP55, MP64 & MP78

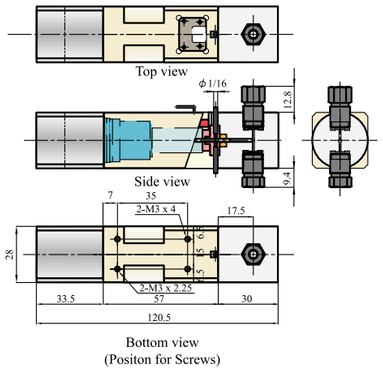


TS-MP100, MP135 & MP160

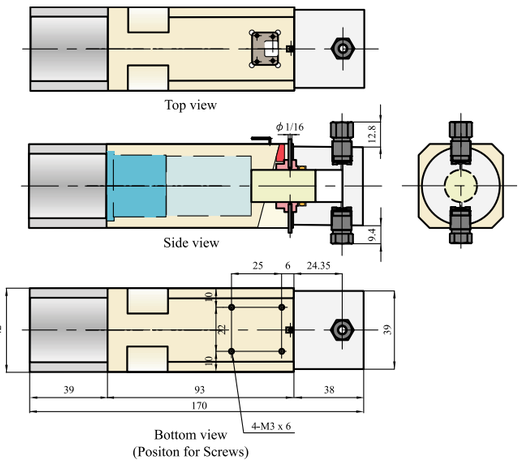


<< Continuous flow model >>

TS-MP18, MP22, MP32, MP45, MP55, MP64 & MP78



TS-MP100, MP135 & MP160



Driver (Option)

TS-2A-SDB-220B 2 phase, bipolar micro step driver

- ✔ Cool running by minimizing pump motor heat
- ✔ High speed liquid handling

Specifications

1	1/2 through 1/256 micro step	7	Motor temperature of 28 degrees C* after one hour
2	+11 through 30 V input voltage		1/2 step running of 1,700 pps with 1 MPa load
3	0.4 through 2.0 A/phase		at 0.6 A at ambient temperature of 25 degrees C, and
4	2 phase, bipolar & unipolar stepping motors applicable		32 degrees C* after one hour 1/2 step running of
5	Dispensing speed, 1/2 step with 1 Mpa load		8,000 pps with 1 MPa load at 0.87 A at ambient temperature
	1,700 pps* (TS-MP78SPAC2020)		of 25 degrees C (TS-MP78SPAC2020) □
	3,300 pps* (TS-MP100SPAC3020)	8	70 (W) x 45 (D) x 14 (T) mm
6	Sucking speed, 1/2 step without load		
	7,000 pps* (TS-MP78SPAC2020)		
	4,300 pps* (TS-MP100SPAC3020)	NB:	The figures with an asterisk represent test data for reference.

The specifications are subject to change without a prior notice.

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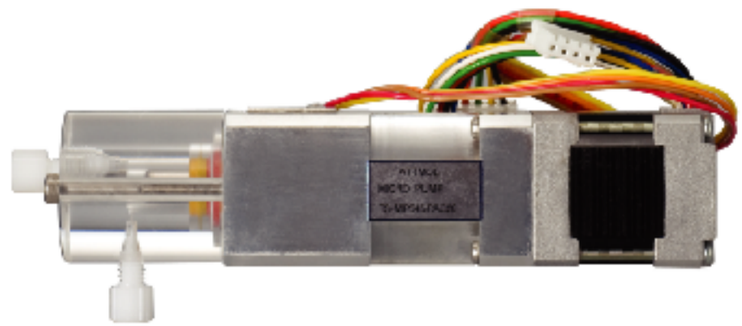
High Precision Control of Micro-Scale Fluidic Flow Volumes



Why is the importance of being high in reproducibility and precision so much demanded?

The inner parts of the pump, unless they are precision-engineered and - machined,□
will more likely get overloaded in contact with the mating parts.□
The initial running of the pump may not pose a problem,
but with a lapse of time serious problems such as tear and wear might be actualized,□
resultant in a downtime of the equipment where the pump is incorporated.

Easy to use:

- ☀ **Plunger Seals and Benchmark Sensor can be locally replaced**
- ☀ **Long Service Life Expectancy of Plunger Seals exceeding 2,000,000 Cycles**

Precision Engineered and Built in Japan

Micro Pump Modules TS Series

By and large, the small precision plunger pump is one of the most versatile and demanded for high reproducibility and accuracy. Downsizing is the needs of the times, and the pump modules for systems cannot be an exception. Increasingly demanded are lesser and lesser volume of reagents and samples as well as high throughput and multi-function in the system. As the fluidic flow volumes get smaller, all of the mechanisms of the pump will need to be smaller, including micro-scale dead volumes, and high-precision machining is executed to provide unparalleled accuracy and high reproducibility.

The plunger material is available from zirconia, sapphire, or stainless steel. The use of stainless steel plunger may sound strange in consideration of its chemical compositions. However, the stainless steel is a material much more ideally suitable for high precision machining, and its drawback of containing some negative chemical compositions is offset with chromium nitride (CrN) treatment on the plunger surface. The CrN treated stainless steel plunger provides higher abrasion resistance, and chemical inertness equivalent to ceramic in addition to dimensional accuracy and surface smoothness, while its cost is much lower than sapphire.

Features

☀ High reproducibility. For example, CV 0.1235 % is the value from Model TS-MP22SPAC2020, when an air bubble is fed into the mixture of water and methanol (7:3) filled in a 0.3 mm ID tubing, and the traverse distance is measured with an input of 40 pulses before the test starts and an additional input of 400 pulses (a plunger traverse of 2 mm) for dispensing 8 ul at a speed of 200 pps each for intake and dispensing.

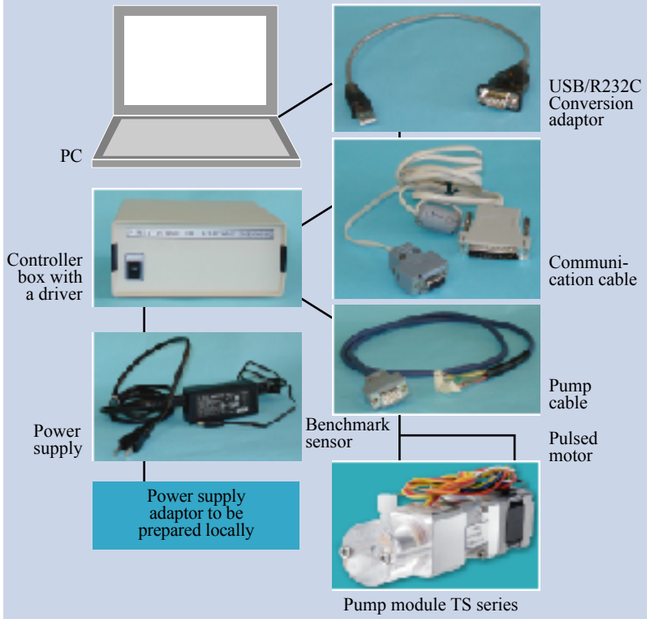
Other features include. . .

- ☀ Minimized jolting and high rectilinear stroke of plunger contributing to high reproducibility
- ☀ Precision machined pitch threads of feed screws leading to high accuracy in dispensing volumes
- ☀ Precision guide system alleviates load to motor, thus enhancing the service life of motor
- ☀ Minimized dead volumes, e.g. as small as 5.7 ul (TS-MP18)
- ☀ The UHMPE plunger seal for very long service life expectancy

To facilitate your evaluation

Evaluation kit:

The design of the evaluation kit is subject to specific requirements for the evaluation. The following is an example to check the delivery stability with the pump module at micro flow rates:



Specifications

The other specifications can be accomodated.

Model	TS-MP18	TS-MP22	TS-MP32	TS-MP45	TS-MP55	TS-MP64	TS-MP78	TS-MP100	TS-MP135	TS-MP160
Pump type	Plunger type									
Plunger diameter (mm)	1.8	2.26	3.2	4.5	5.5	6.4	7.8	10.0	13.5	16.0
Max stroke (mm)	11							15		
Max volume (uL)	27.99	44.12	88.46	174.94	261.34	353.86	525.61	1,178.0	2,147.0	3,015.9
Resolution (uL/pulse)	0.0127	0.02	0.0402	0.0795	0.1187	0.1608	0.2389	0.3926	0.7157	1.0052
Dead volume (uL)	5.7	5.7	11.1	21.1	27.0	32.7	42.3	121.6	174.6	216.0
Pressure resistance (MPa)	1 (Gas pressure)									
Reproducibility (%)	CV 0.1235 (Test data with TS-MP22SPAC2020 on the conditions shown on the left page.)									
Tubing port In: □ODxID, UNF Threads Out: ODxID, UNF Threads	2.0 x 1.0 mm, 10-32 2.0 x 1.0 mm, 10-32							3.0 x 2.0 mm, 1/4-28 2.0 x 1.0 mm, 10-32	3.0 x 2.0 mm, 1/4-28 3.0 x 2.0 mm, 1/4-28	
Plunger material	Stainless steel SUS316 with CrN surface treatment (SP), Sapphire (SA) or Zirconia (SE)						Stainless steel SUS316 with CrN surface treatment (SP) or Zirconia (SE)			
Plunger seal material	UHMPE									
Pump head material	Acrylic resin (AC), PEEK (PE), PES (PES), PSU (PSU) or PPS (PPS)							Acrylic resin (AC), PEEK (PE) or PPS (PPS)		
Motor	Unipolar stepping motor, DC 2.6 V/phase, DC 0.95 A/phase, 2.7 Ohm +/- 10 %/phase, 1.2 mH +/- 20 %/phase (1 V, 1 kHz), 1,500 pps max. (Self-start), 200 pulses/rotation, 2 phases							Unipolar stepping motor, DC 6.4 V/phase, DC 0.8 A/phase, 8 Ohm +/- 10 %/phase, 7.6 mH +/- 20 %/phase (1 V, 1 kHz), 1,500 pps max. (Self-start), 200 pulses/rotation, 2 phases		
Benchmark sensor	Photo coupler, Omron EE-SX1103									
Mounting ports	M3 x 4 pieces									
Power supply	DC 24 V 0.95 A min.							DC 24 V 1.0 A		
Dimensions & weight	28 (W) x 28 (H) x 120.5 (D) mm, Approx. 260 g w/ & w/o C.V.							42 (W) x 42 (H) x 170 (D) mm, Approx. 730 g w/ C.V. 42 (W) x 42 (H) x 167 (D) mm, Approx. 730 g w/o C.V.		
Option	Driver / Controller									

NB: CrN: Chromium nitride PEEK: Polyetheretherketone PES: Polyethersulfone POM: Polyacetal PPS: Polyphenylensulfide PSU: Polysulfone UHMPE: Ultra High Density Molecular Polyethylene

How to select your pump model

TS — MP ① ② ③ ④ ⑤

① Plunger diameter ② Plunger material ③ Pump head material ④ Tubing OD, In ⑤ Tubing OD, Out

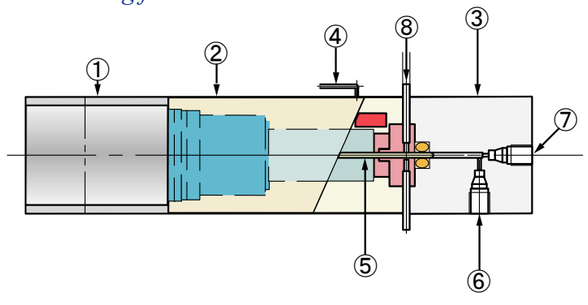
Example

TS-MP18SPAC2020:

TS series with 1.8 mm dia. CrN treated SUS316 plunger, acrylic pump head and in & out ports for 2.0 mm OD tubing

Internal mechanism

<< Metering flow model >>



<< Continuous flow model >>