TS Absolute®

Intelligent Coaxial Dual Plunger Micro Pump for Continuous Flow

- **Automatic removal of bubbles and dissolved gas**
- **Liquid volume loss due to compressibility can be compensated to realize precision liquid delivery without pulsation**
- **Stable fluidic flow at constant pressure with pressure-adjusting valve**
- **Stable flow of fluid even with lower boiling point**
- **Communication with RS232C**
- **For semi-micro HPLC through Preparative Works**

You'll no longer need a degasser for TS Absolute Pump !!

TS Absolute® -series are new innovative micro pumps embodying the coaxial dual plunger technology, entirely different from conventional pumps. (See the next page for details.) They automatically eliminate any small air bubbles as well as dissolved gas in the fluid.

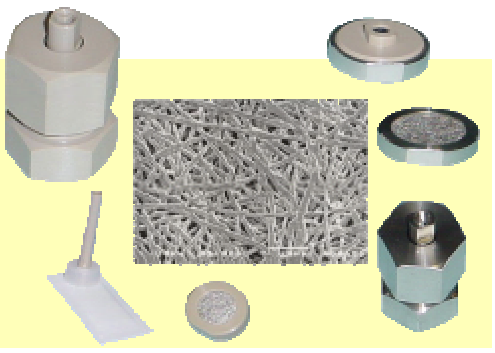
In addition, thanks to the new function to compensate fluid loss due to its inherent compressibility, the pump provides stable pulse-free flow for a long time and is suitable for highly sensitive analyses. Furthermore, the integrated pressure regulating system with newly designed pressure-adjusting valve lends itself to stable flow of fluid even with lower boiling point, which technique has never been available before.

One or more pumps can be externally controlled via RS232C interface.

Feather weight filters for precision filtration of fluids

Sintered Stainless Steel "Fiber" Filters were developed for less disturbance to pump performance.

- For small particles down to 0.1µm diameter.
- Reduced clogging. - Longer service life.

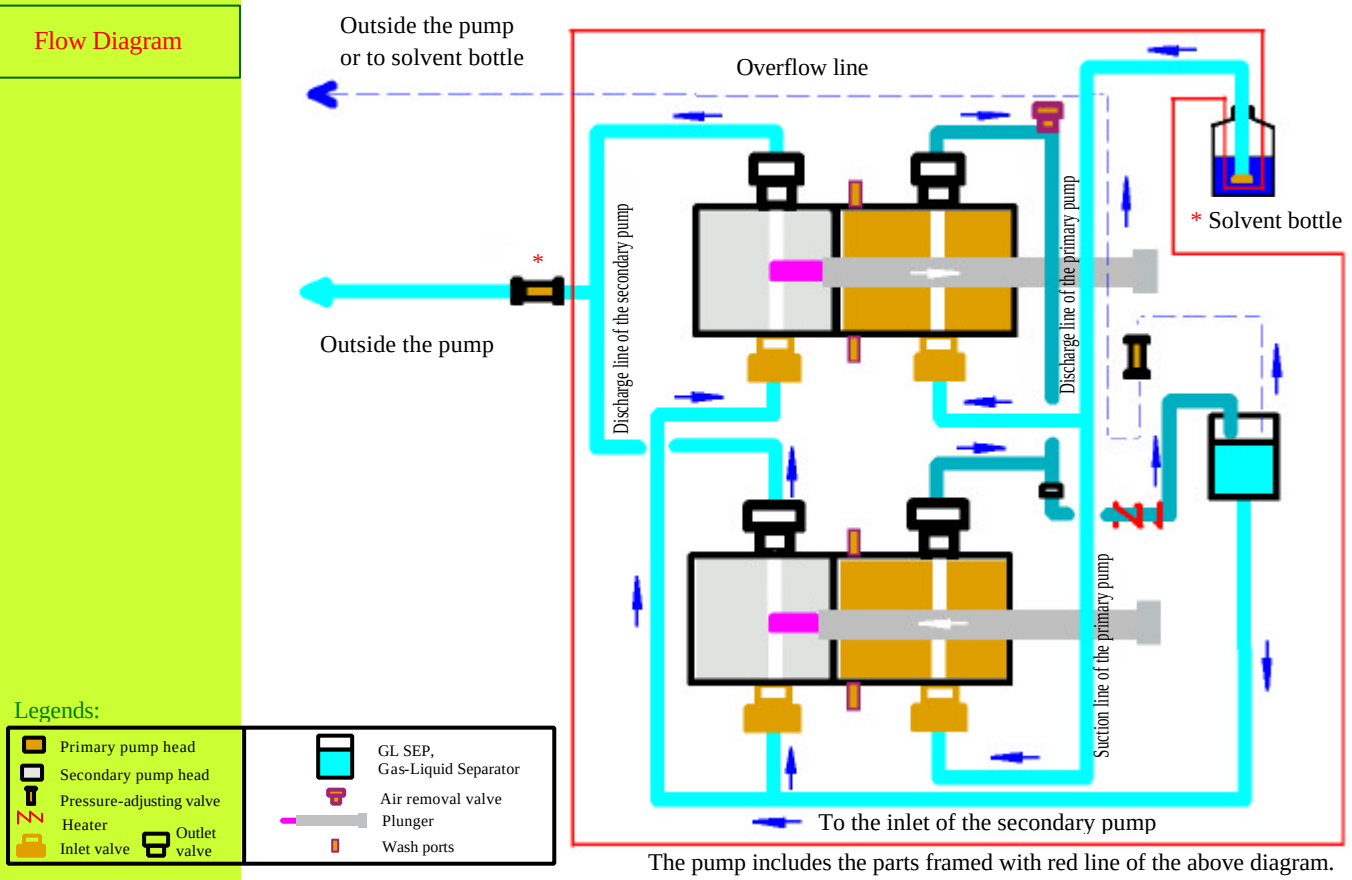


WWW.SANWATSUSHO.COM

TS Absolute®

Intelligent Coaxial Dual Plunger Micro Pump for Continuous Flow

Flow Diagram



The pump includes the parts framed with red line of the above diagram.

The parts shown with * are to be prepared separately.

What is "Coaxial Dual Plunger Pump" technology?

TS Absolute has two pump heads. Each pump head consists of the primary and secondary pumps combined together with different internal volumes and the coaxial plunger with different diametrical rods.

Automatic removal of bubbles and dissolved gas:

The miracle is worked by the integrated "GL SEP" (Gas-Liquid Separator) and heater coils. The fluid discharged from the primary pump outlet flows through the precision in-line filter and is heated up by heater coils to get the dissolved gas saturated. The gas, delivered to GL SEP together with liquid, will be separated and removed there. GL SEP eliminates both air bubbles sucked from the outside and those generated within the pump.

Fluid with lower boiling point:

TS Absolute enables stable delivery of the fluid with lower boiling point like n-pentane, which has been difficult with conventional pumps. The flow rate of the primary pump is higher than that of the secondary. The differential pressure between two pumps is maintained with the integrated pressure-adjusting valve. This constant pressure is applied to GL SEP and also to the secondary pump inlet. This pressure prevents the fluid from reaching the lower boiling point and provides stable running. Moreover, the pump can be restarted promptly, as the bubbles generated at the secondary pump will be dissolved in the fluid with the pressure loaded.

Compensation of fluid loss due to compressibility:

TS Absolute is equipped with a new function to compensate the fluid loss due to its compressibility according to individual fluids and suppress pulsation before running the pump. It eliminates pulsation troubles and contributes to stable baselines, which makes the pump suitable for high sensitive analyses. The conventional pumps compensate pulsations by feedback after the detection of pressure but it cannot cover the micro flow range, resulting in troubles.

Air Purge Valve:

The air purge valve is intended to remove manually air bubbles sucked or remained in the fittings and tubing before and during the run with ease.

TS Absolute®

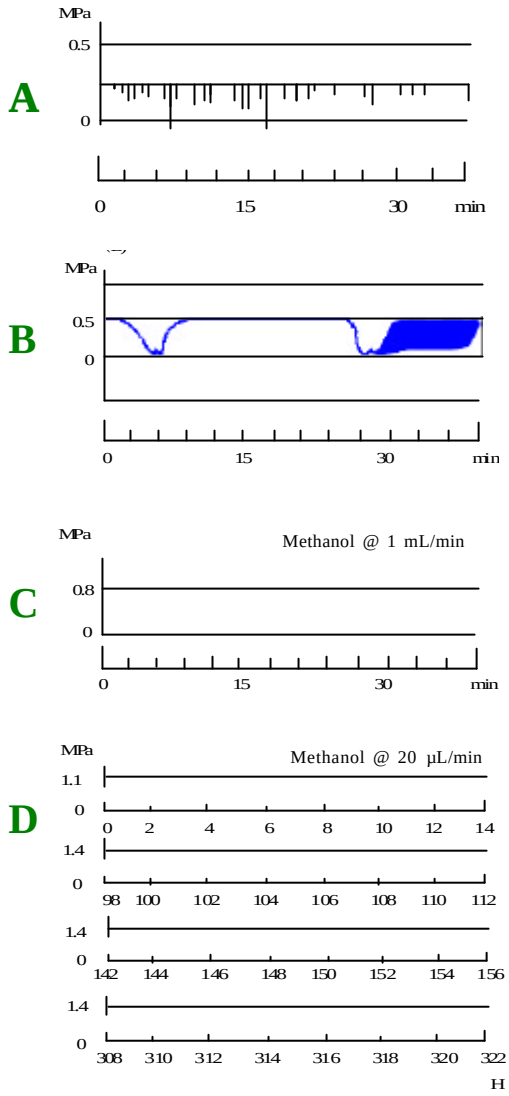
Intelligent Coaxial Dual Plunger Micro Pump for Continuous Flow

TS Absolute pump vs. Conventional Micro Pump

Conventional Micro Pump (Figure A & B)

Figure A is the flow chart of the conventional pump without degasser at room temperature (28 degrees C).
Unstable running : The cavitations are generated inside the pump and the spikes are shown as pressure ripples in the data.

Figure B is the flow chart after 100 µL of air is sucked into the pump.
Unstable flow : At first, the pump shows temporal instability. Then, the performance gets recovered for a while. However, whenever air is sucked, the pumping volume fluctuates.



TS Absolute Micro Pump (Figure C & D)

Figure C is the flow chart of TS Absolute pump when air is sucked into the pump as the figure B.
Stable flow : No pulsation even without degasser, thanks to the function to automatically eliminate air bubbles.

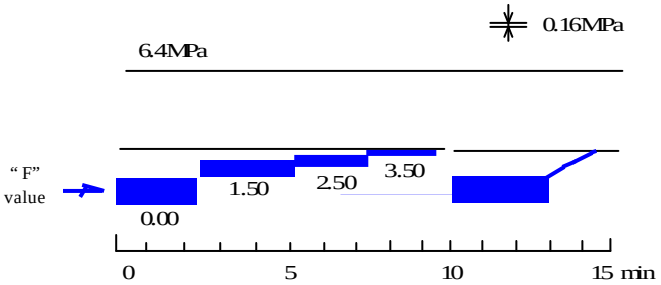
Figure D is the flow chart for 324 hours. Excellent prolonged stability of micro flow.

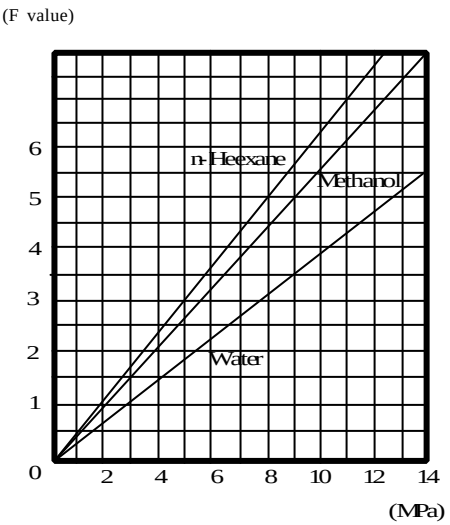
Pulse-Free Flow

TS Absolute micro pumps incorporate the new method for compensation of fluid loss due to its compressibility.

Before running the pump, refer to the Factor value chart shown on the right and select the "F" value according to the discharge pressure. Input the "F" value you selected after setting the pump to "Factor" mode and the pump is ready for pulse-free flow.

The figure below shows an example effect of Factor input function. "F" value changed from 0 to 3.5 will approach to pulse-free flow with the discharge pressure of 6 MPa.





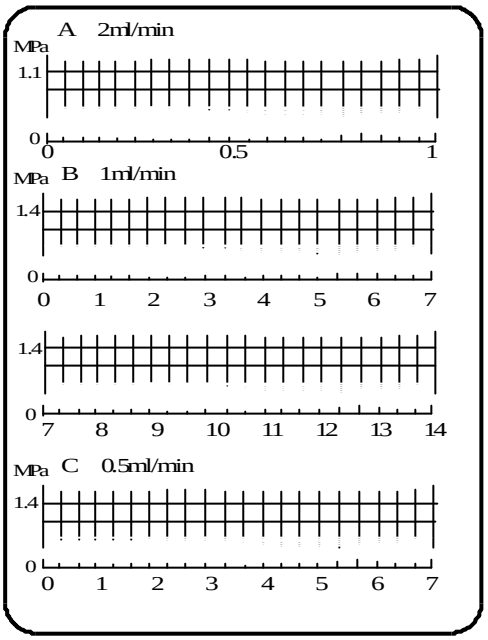
Factor value chart

TS Absolute®

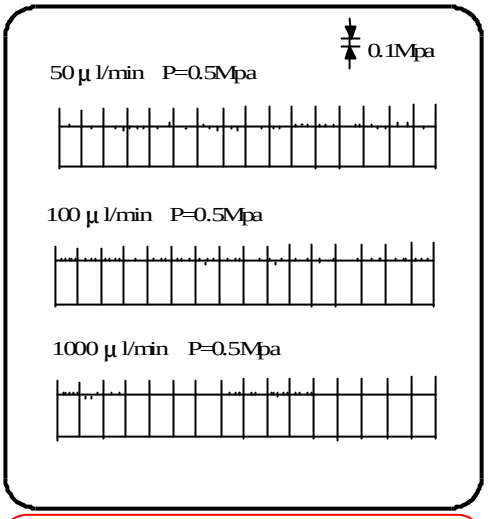
Intelligent Coaxial Dual Plunger Micro Pump for Continuous Flow

Application Data of Continuous Micro Flow (Reference only)

Hexane

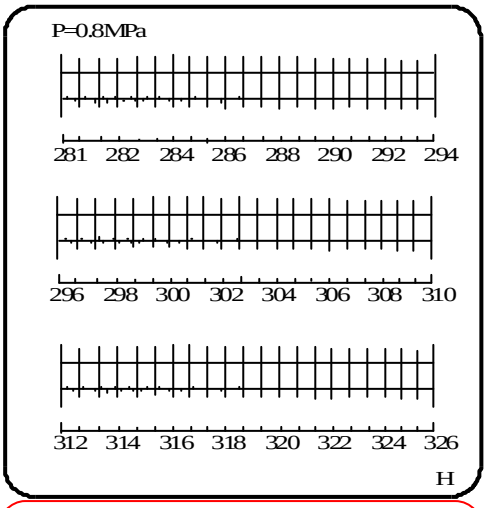


Gasoline



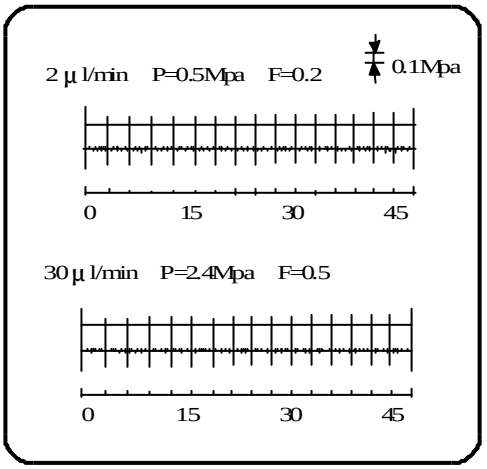
Sample: Gasoline on the market, filtered (0.2µ)
Pump: TSI-500
Flow rate: 50, 100, 1,000 µL/min.

Methanol



Excellent stability for a long time
Solvent: Methanol
Flow rate: 20 µL/min.

Toluene-system solvent



Sample: 3,4 dichlorotoluene, , filtered (0.4µ)
Pump: TSO-250
Flow rate: 20, 30 µL/min.
Restrictor: 0.06 x 2000 PEEK tubing

TS Absolute®

Intelligent Coaxial Dual Plunger Micro Pump for Continuous Flow

Specifications

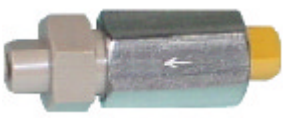
	Organic	Inorganic	Organic	Inorganic	Organic
Model	TSO-250	TSI-250	TSO-500	TSI-500	TSO-1000
Application	Semi-micro HPLC		Analytical		Preparative works
Pumping Method	Coaxial Dual Plunger Method				
Fluid Delivery Mode	Constant flow rate mode				
Flow Rate	1 - 2,500 µL/min.		1 - 5,000 µL/min.		0.01 - 10 mL/min.
Precision	+/- 2 % (200 µL/min.)		+/- 1 % (1,000 µL/min.)		
Accuracy	+/- 5 % (200 µL/min.)		+/- 0.3 % (1,000 µL/min.)		
Discharge/Stroke	16 µL		32 µL		64 µL
Max. Discharge Pressure	Resin fitting: 15 MPa, SUS fitting: 25 MPa				15 MPa
Max. Pressure Limiter	0.5 - 35 MPa				
Pulse Compensation	Compensated by parameter input				
Wetted Parts	1	2	1	2	1
In-line Filter	3	4	3	4	3
Seal Wash	High pressure seal to be washed backside through washing ports				
Air Purge Valve	Air purge before and during run				
Pressure applied to solvents	Pressurized by integrated pressure-adjusting valve				
External Input	ON/OFF of Pump running by contact closure				
Communication	RS232C				
Power Supply	90 - 240 VAC (Please specify in ordering), 50/60Hz, 200 VA (Fuse 2A)				
Operating Temperature	4 – 35 degrees C				
Dim. & Weight	154 (H) x 112 (W) x 378 (D) mm, 6 kg				

1. SUS316, Sapphire, Ruby, PEEK, PPS
2. PEEK, Polyimide, Sapphire, Ruby, PPS, PTFE, Fluoroelastmer
3. SUS filter
4. PTFE filter

Accessory

Part No.	Descriptions
TS-PCV-01	Pressure-adjusting valve for organic/inorganic, Pressure range: 4- 6 kg/cm^2

The specifications are subject to change without prior notice.



SANWA TSUSHO CO., LTD.
13-2, Nishi-Gotanda 3 chome, Shinagawa-ku, Tokyo 141-0031 Japan
Tel : +81 3 3492 6300 Fax : +81 3 3492 6311
URL : http://www.sanwatsusho-global.com
E-mail : mailto@sanwatsusho.com

(06.08)