UCUF-02M/SFC-010L Ultrasonic Flowmeter

DESCRIPTION

The UCUF-02M/SFC-010L ultrasonic flowmeter is designed for measuring small flow rates of pure water, ultrapure water, and chemical liquids. The size of the measuring section is ϕ2.5 mm, which allows the flowmeter to cover small flow rates which are difficult for other UCUF flowmeters to measure.
All wet parts are made of special-grade PFA molds for the semiconductor industry and have no moving parts or sealing mechanism which would accumulate liquid components. The simple and smooth construction leaves no residues and is ideal for processes such as semiconductor manufacturing which requires ultimate cleanliness.
The inlet and outlet of the flowmeter are formed by standardized tubes, so the flowmeter can connect to various PFA fittings.



KEY FEATURES

- Small size: The UCUF-02M/SFC-010L can measure ultrasonic propagation through liquids in the ϕ2.5 tubing, which is difficult for other flowmeters to measure.
- Low flow measurement: 0 to 10 mL/min
- EMC compliance: EN61326-1
- RoHS compatible
- Liquids with kinematic viscosity of as high as 40 mm^2/s can be measured.
- Detector with highly clean construction
- Corrosion resistant and easy to install
- Accuracy: Within ±1% of the reading at a flow rate of 25 mL/min or more

APPLICATIONS

- Pure water and ultrapure water in the semiconductor manufacturing process
- Chemical feeding
- Highly corrosive chemicals
- Chemical mechanical polishing (CMP) slurries
- Process liquids of small fl ow rate
- Ideal for flow measurement and control of cleaning and CMP processes

OPERATING PRINCIPLE

The measuring fluid flows into the U-shaped tube, changes direction by 90 degrees twice, and goes out as shown in Figure 1.
Two piezoelectric transducers A and B are mounted at both ends of the measuring section. They emit and receive ultrasonic waves alternately and measure the traveling times tA (A to B) and tB (B to A) through the liquid. Without flow, tA is equal to tB. With flow, tA becomes shorter and tB longer in proportion to the flow rate. Thus, calculating tB - tA gives the flow rate of the liquid. tA and tB depend on the size and shape of the tube and liquid viscosity. The actual flow test data are stored in the linearizer in the converter, which enables the flowmeter to measure flow rates with high accuracy.

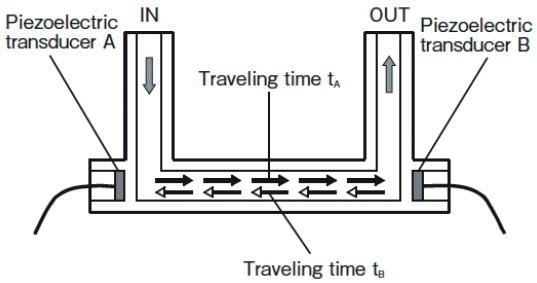


Figure 1 Operating principle

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SPECIFICATIONS

Flow detector

Measuring fluid : Liquids (those that do not contain air bubbles and permeate or corrode PFA)
Fluid temperature : 10 to 90°C
Ambient temperature : 0 to 60°C
Fluid pressure : 0 to 0.5 MPa
Fluid sound speed : 1000 to 2200 m/s
Fluid kinematic viscosity : 0.8 to 40 mm2/s
Process connection : 1/4" PFA tube end
Wetted part material : PFA
Enclosure classification : IP65 (indoor use)
Flow range : 0 to 100 mL/min (max.)
0 to 10 mL/min (min.)
Full scale setting in 10 mL/min steps.
Accuracy : ±1% RD (at a flow rate of 25 mL/ min or more)
±0.25 mL/min (at a flow rate of up to 25 mL/min)
For water of 20°C
Pressure loss : Pressure loss for water (kPa) = C×Q2
C: Pressure loss coefficient = 16.8
Q: Flow rate (L/min)
Mass : Approx. 250 g
Cable : 2 coaxial cables attached
Cable length : 5 m (standard)
Connector : SMB

Materials of the flow detector

Parts		Material
Wetted part	Body	PFA
	Tube	PFA
Sensor cap		PP
Cable fitting		PP
Cable sheath		PVC

Model codes

UCUF—	□□	M	□	□	□	□	Description
Size	02						2.5 mm
Connector type			D				SMB connector
Shape				-U			U-shape (standard)
				-Z			Z-shape
Cable length					5		5 m (standard)
Special						Blank	Not provided
						/ Z	Provided

Converter

Output : 1) Current 4 to 20 mA DC
(Load resistance: within 500Ω)
2) Frequency Open collector pulse
Load rating: 30 V DC, 10 mA
0 to 1000 Hz
3) Alarm Open collector, 2 points
Load rating : 30 V DC, 10 mA
Time constant : 0.5 to 25 s
Low cut-off : 0 to 25%FS
Display : 4-digit LED
Display content : Instantaneous flow rate (mL/min)
Parameter setting : Via RS485 communication (Modbus protocol)
Linearizer : Automatic compensation with kinematic viscosity setting
Manual / 15 line-segment approximation (Option)
Address switch : 1 to 32 (selectable)
Power supply : 24 V DC±10%
Consumption current : Approx. 155 mA
(Approx. 350 mA at start up)
Inrush current : Approx. 2A/2ms
Ambient temperature : 0 to 50°C when installed alone
0 to 30°C when installed at 10 mm intervals
Contact installation is not allowed.
* Leave a space of at least 10 mm between instruments. Avoid enclosed environments and provide exhaust or forced air-cooling systems.
Ambient humidity : 30 to 80% RH (without condensation)
Installation : DIN rail installation
Enclosure classification : IP20 (indoor use)
Materials : ABS
Mass : Approx. 150 g

Model code

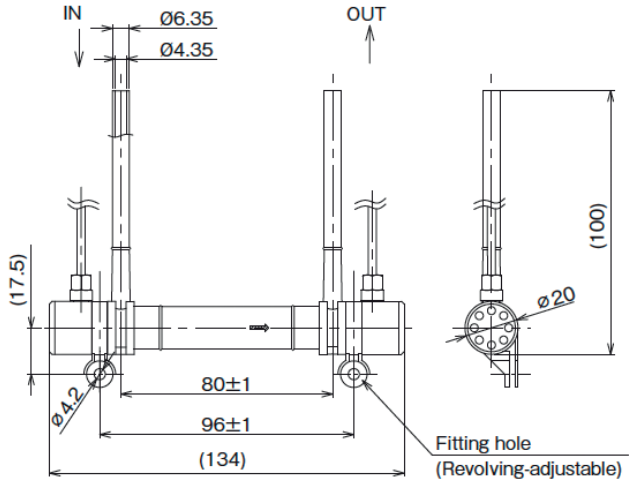
SFC-010L-	□	□	Description
Analog output	0		4 to 20 mA
	1		0 to 20 mA
Special		Blank	Not provided
		/ Z	Provided

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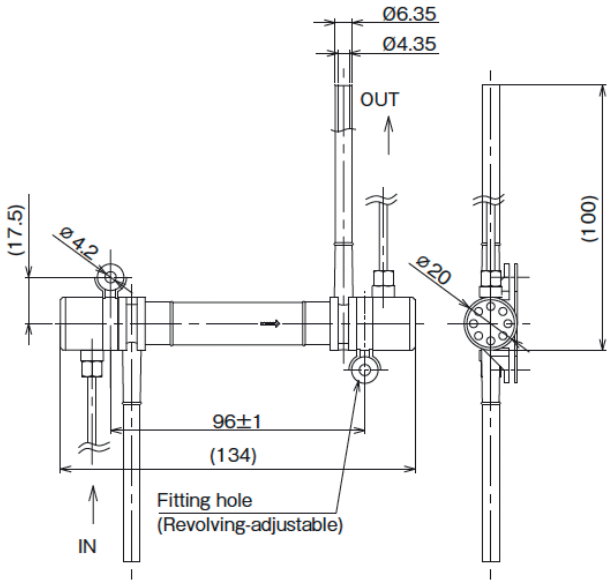
DIMENSIONS

Flow detector

UCUF-02MD-U□



UCUF-02MD-Z□

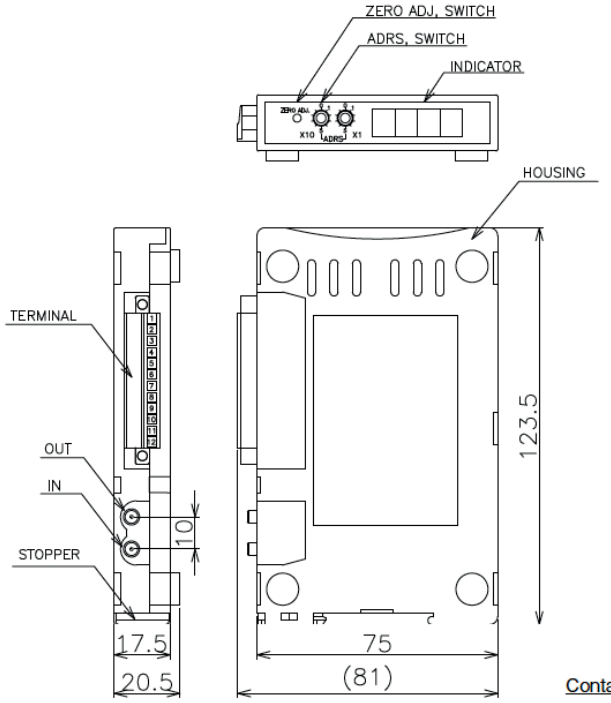


CAUTIONS ON INSTALLATION

- To ensure precise, stable measurement, do not bend the connecting tube during installation.
- To ensure precise, stable measurement, stabilize the liquid temperature (within ±5°C).
- Install the detector at a piping location where air bubbles do not form.
- Keep the measuring tube fi lled with liquids. Although the instrument can be installed with horizontal, vertical, or slant tubing, it isnrecommended to select a position for easy self-draining.
- Install a control valve downstream of the instrument, if necessary.
- Install the fl ow detector and converter away from noise sources such as power relays and solenoid valves.
- Lay the signal cable away from power cables of high voltage or current.
- Leave a space of at least 10 mm between instruments. Avoid enclosed environments and provide exhaust or forced air-cooling systems.

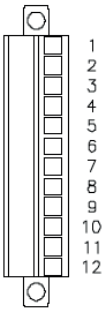
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Converter



Contact installation is not allowed.

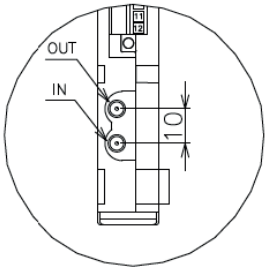
Terminal box



Terminal arrangement

Number	Name	Description
1	+	Power supply input: 24 V DC
2	–	
3	FG	FG
4	+	Analog current output: 4 to 20 mA
5	–	
6	+	Alarm output 1
7	+	Alarm output 2
8	COM	Common (for Alarms 1 and 2)
9	+	Pulse output: 0 to 1000 Hz
10	–	
11	+	RS485 communication output
12	–	

SMB connector



SMB connector

Terminal	Polarity	Description
OUT	Outlet	Sensor signal input
IN	Inlet	

*Specification is subject to change without notice.

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