TECHNICAL GUIDANCE

Ultraclean Ultrasonic Flowmeter

UCUF-M

Suitable for flow measurements and control of cleaning and CMP processes

OUTLINE

The **UCUF-M Ultrasonic Flowmeter** is designed for very low flow rate applications. UCUF-P series has been further miniaturized for space-saving and yet maintaining the accuracy of the series. The diameter of measuring tube is 3mm and 4mm, and very low flow rate can be measured, which could not be measured by the conventional clamp-on type Ultrasonic flowmeter. The liquid contact part is made of specific grade PFA, and there is no moving part, nor is there sealing part where the liquid easily becomes stagnant. Having the ultimately clean structure, it is ideal for the process such as semi-conductor manufacturing machines and equipment for which the cleanliness is required.

The inlet and outlet of flowmeter have the tube in the industrial standard dimensions, and the connection with various PFA fittings can be made. In the applications where only flow monitor has been simply used so far, remote flow measurements can be carried out now.

FEATURES

[UCUF-03M]

❏ Suitable for low flow rate measurement
Flow range : Min. 0 to 25mL/min
Max. 0 to 100mL/min

❏ Accuracy ±2mL/min High accuracy is realized.

[UCUF-04M]

❏ Wide rangeability
Flow range : Min. 0 to 100mL/min
Max. 0 to 2000mL/min

❏ Accuracy ±1% of reading (Flow velocity ≥ 1m/s)

[Common]

❏ Designed for cleanliness
Sensor body is made of PFA and has no stagnation of liquid and moving part inside.

❏ Corrosion resistant
All wetted parts are made of resin.

❏ Miniaturized and space-saving structure

❏ Easy installation
The detector and the converter are of separate type. Lightweight and compact, selectable the direction of flow and cable, and installation more flexible than before.

APPLICATIONS

❏ Pure water and ultra-pure water in semiconductor manufacturing plants

❏ Chemical feedings

❏ Highly corrosive chemicals

❏ Chemical Mechanical Polishing (CMP) slurries

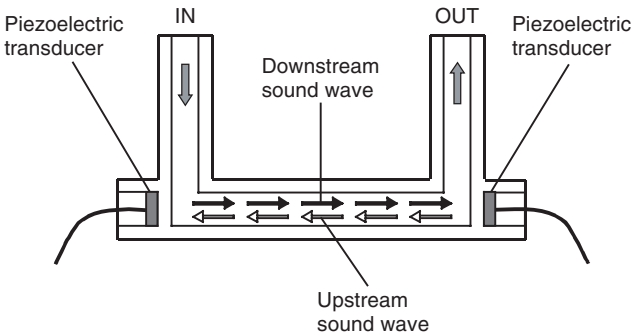
❏ Very low flow measurement and flow control of liquid

OPERATING PRINCIPLE

The fluid to be measured flows through the U-shaped tube. Two piezoelectric transducers, mounted at both ends of the measuring section, emit and receive an ultrasonic wave alternately.

The wave propagating in the same direction as the fluid flow is accelerated and the wave travelling against the fluid flow is slowed. The difference in transit time of wave is proportional to the velocity of the fluid.

The converter converts received ultrasonic wave signal into digital data, computes flowrate and transmits output signal. Stable transit time measurements is conducted with new signal processing, regardless of fluctuation of wave signal level.



STANDARD SPECIFICATIONS

Flow detector

- Measurable fluid : Liquids
- Fluid temperature : 10 to 60°C
- Fluid pressure : 0 to 0.5MPa
- Fluid sound speed : 1000 to 2200m/s
- Fluid kinematic viscosity : UCUF-03M : 0.8 to 2.0mm²/s (Water)
  UCUF-04M : 0.8 to 40.0mm²/s
- Process connection : PFA tube end (Refer to table 2.)
- Material (Wetted part) : PFA
- Enclosure classification : IP65
- Flow range : Refer to table 1.
- Accuracy : Refer to table 1.
- Pressure loss : Pressure loss in case of water (kPa) = $C \times Q^2$
  But C: Pressure loss coefficient (Refer to Table 2.)
  Q: Flow rate (L/min)
- Mass : Refer to Table 2.
- Material : Refer to Table 3.
- Exclusive cable : Two coaxial cables attached. Cable: 5m (Extensible up to 30m with extension cable.)
  Shape of connector is different, depending on converters to be used.

Table 1. Detector characteristics (1)

Model	Flow velocity < 1m/s		Flow velocity > 1m/s	
	Flow rate (mL/min)	Accuracy (mL/min)	Flow rate (mL/min)	Accuracy (R.D.)
UCUF-03M	0 ~ 25 to 0 ~ 100	±2		
UCUF-04M	0 ~ 100 to 0 ~ 800	±8	0 ~ 800 to 0 ~ 2000	±1%

*Note: Accuracy is based on water calibration

Table 2. Detector characteristics (2)

Model	Pressure loss coefficient	Connecting tube size	Mass
UCUF-03M	9.75	1/4"	Approx. 60g (Without cable)
UCUF-04M	4.50		

Table 3. Materials of flow detector

Wetted part		Materials	
Wetted part	Body	PFA	①
	Tube	PFA	②
Sensor cover		PP	③
Cable fitting		PP	④
Cable sheath		PVC	⑤
Sensor cap		PFA	⑥
Installation band		PFA	⑦

MODEL CODE

Flow detector

Model code								Description
UCUF	– □ □	M	□	–	□	□	□	
Meter size	– 0 3							3mm
	– 0 4							4mm
Connector *1			B					BNC connector
			C					SMB connector with lock
Shape					U			U shaped (Standard)
					Z			Z shaped
Cable direction						N		Tube side (Standard)
						W		Opposition side of IN and OUT tubes
Special (Blank)							(Blank)	None
							/Z	*2

*1 Connector type is different, depending on converters to be used. Refer to Signal converter of the following table.
*2 In case of special specifications required, put "z" at the end of Code number, and describe contents separately. (Contact Tokyo Keiso in advance about manufacturing possibility.)

Signal converter

Model code	Description	Connector
SFC-710	Antibubble capability type / DSP type / CE marked	C
SFC-750	Antibubble capability type / Without display / DSP type	C
FCA-7000	Unit with flow controller / DSP type / CE marked	C

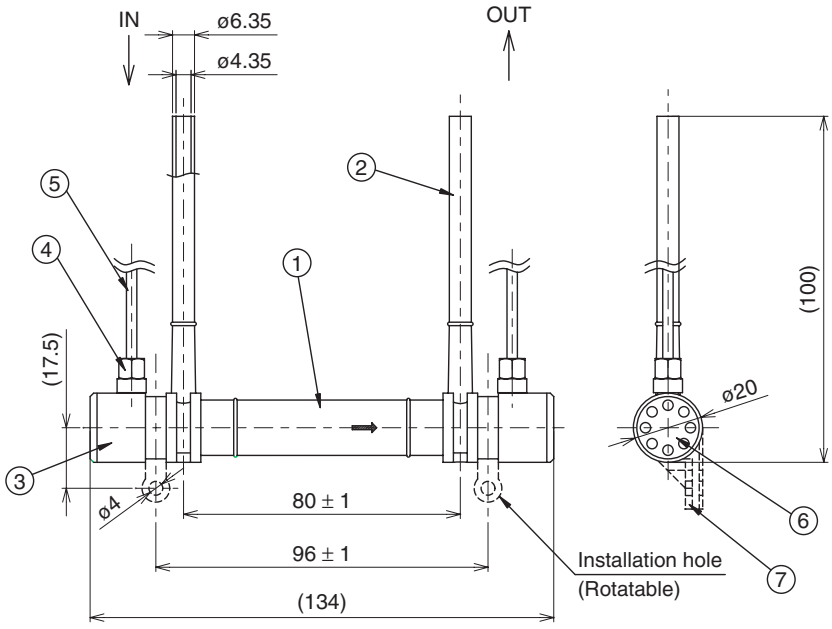
* Consult in advance if other converter is required.

CAUTIONS ON INSTALLATION

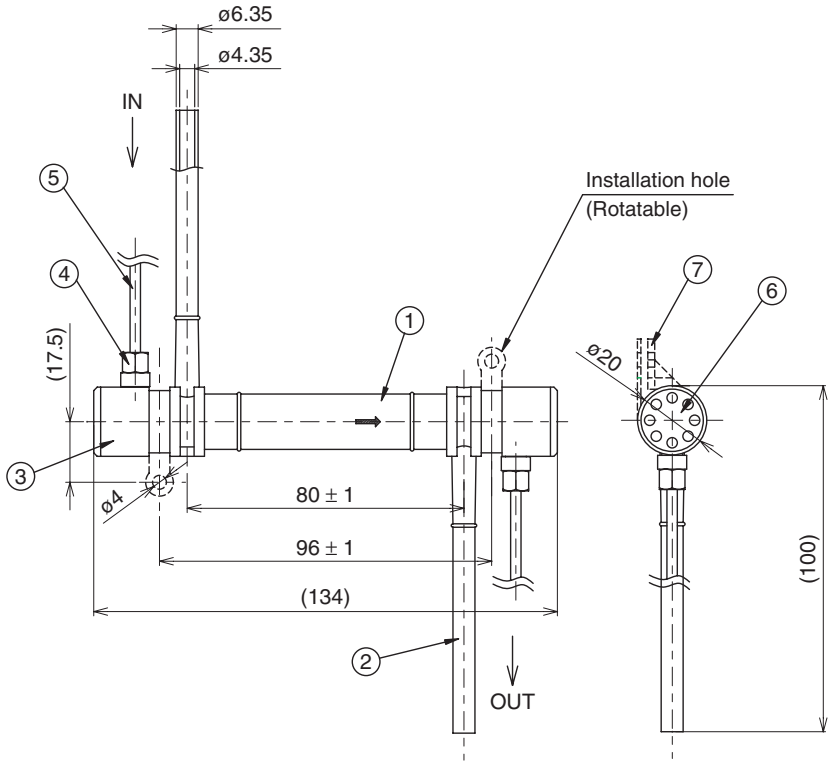
- ❏ Installation area for flow detector: Select the area of pipe where no air or gas bubbles exist in the flow.
- ❏ Regarding the mounting of flow detector, be sure to make the inside of measuring tube always full with liquid. Installation can be made in horizontal, vertical or slanting piping, but the recommended posture of installation is to make the bottom of U-shaped tube perpendicular, so that the liquid removal can be easily performed.
- ❏ Location of control valve: If a flow control valve is installed in the piping, it should be located on the downstream side of the flow detector.
- ❏ Noise suppression: All electrical noise sources near the flowmeter, such as power relays or solenoid valves, should be fitted with a surge suppressor.
- ❏ Signal Cable Wiring: Keep signal cables away from high voltage or high current power cables to avoid induced electrical noise.

OUTLINE DIMENSIONS (DETECTOR)

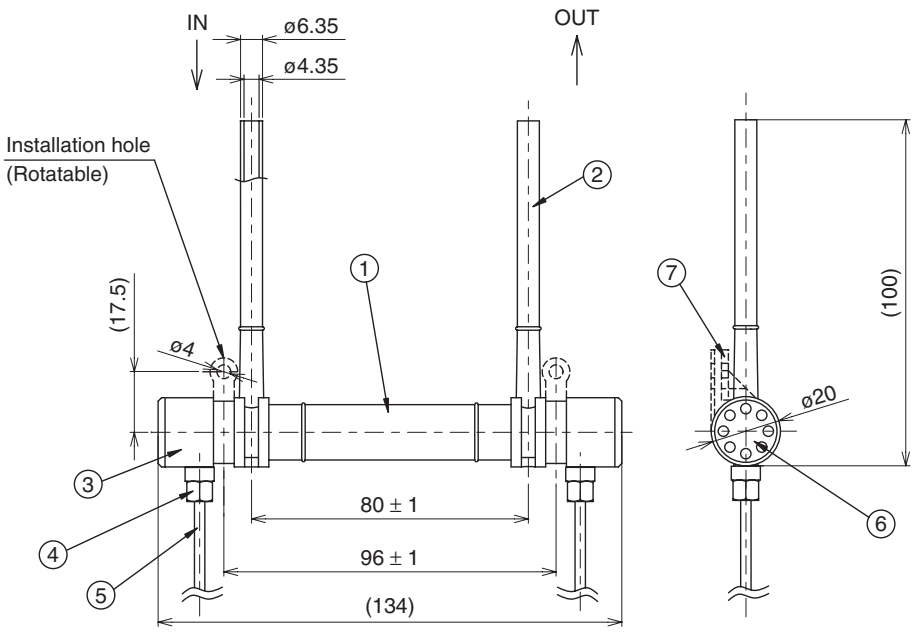
UCUF-⁎M□-UN (Standard)



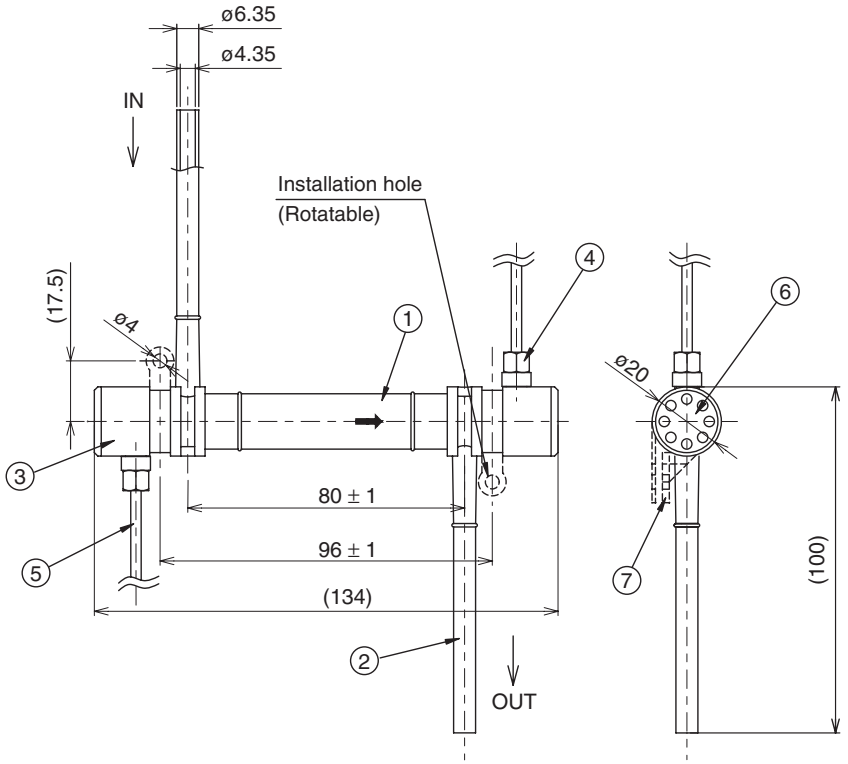
UCUF-⁎M□-ZN



UCUF-⁎M□-UW



UCUF-⁎M□-ZW



* Specification is subject to change without notice.

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