



TECHNICAL GUIDANCE

ULTRASONIC FLOWMETER

CE Marking

UCUF series

for Small Line Applications

OUTLINE

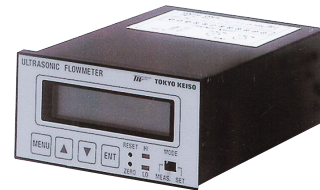
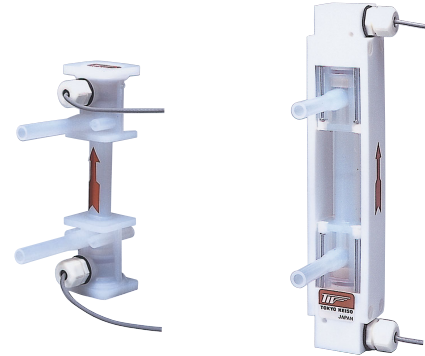
The UCUF (Ultra-Clean Ultrasonic Flowmeter) Series Ultrasonic Flowmeter is designed for low flowrate, small line applications. The Flowmeter consists of the UCUF Flow Detectors and its associated SFC-450 Signal Converters. The non-wetted transducer design, constructed of PFA material, makes the UCUF Series an ideal choice for semiconductor industry, where the extreme cleanness of pipe is required.

FEATURES

- ❑ All wetted parts made of New PFA (420HP-J)
No contamination with ions or particles
- ❑ Accuracy $\pm 1\%$ of Reading
- ❑ Wide rangeability of 100:1 (Typical)
- ❑ Low flow measurement down to 10 mL/min
- ❑ Measures viscous fluids up to $4.5 \times 10^{-5} \text{ m}^2 / \text{s}$
- ❑ Corrosion resistant
- ❑ Easy installation with compact meter body
- ❑ Easy configuration in front panel with LCD display

APPLICATIONS

- ❑ Pure water and ultra-pure water in semiconductor manufacturing plants
- ❑ Chemical Mechanical Polishing (CMP) slurries
- ❑ Chemical feeds
- ❑ Highly corrosive chemicals
- ❑ Very low flow measurement 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, generate and receive an ultrasonic wave alternately. The wave travelling with the fluid is accelerated and the wave travelling against the fluid is slowed. The difference in transit time of wave is proportional to the velocity of the fluid.

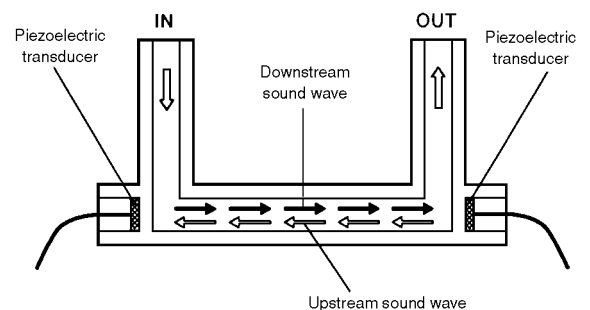


Figure 1. Operating Principle

SPECIFICATIONS

Flow detector

Measurable Fluid	: Liquids with no air bubbles
Fluid Sound Speed	: 100 to 2500 m/s
Fluid Temperature	: 10 to 60 °C
Fluid Pressure	: 0 to 0.5 MPa
Fluid Kinematic Viscosity	: 0.8 x10 ⁻⁶ m ² /s to 4.5x10 ⁻⁵ m ² /s
Process Connection	: PFA Tube End (Refer to Table 1)
Enclosure Classification	: IP65
Flow Range	: Refer to Table 1

Table 1. Flow Range and Connecting Tube Size

Model	Flow Range (L/min)		Connecting Tube Size
	Min. Range	Max. Range	
UCUF-04	0~0.1	0~3.0	3/8"
UCUF-06	0~0.4	0~8.0	3/8"
UCUF-10	0~1.0	0~20.0	1/2"
UCUF-15	0~3.0	0~50.0	3/4"
UCUF-20	0~4.0	0~80.0	1"

Accuracy :

Table 2. Accuracy

Model UCUF	Flow Velocity < 1m/s		Flow Velocity >= 1m/s	
	Flowrate (L/min)	Accuracy (L/min)	Flowrate (L/min)	Accuracy (of Resding)
UCUF-04	0 ~ 0.8	± 0.008	0.8 ~ 3	± 1%
UCUF-06	0 ~ 1.7	± 0.017	1.7 ~ 8	± 1%
UCUF-10	0 ~ 4.7	± 0.047	4.7 ~ 20	± 1%
UCUF-15	0 ~ 10.6	± 0.106	10.6 ~ 50	± 1%
UCUF-20	0 ~ 18.8	± 0.0188	18.8 ~ 80	± 1%

Note: Accuracy statement is based on a water calibration

Pressure Loss :

$$\text{Pressure Loss for Water (kPa)} = C \times Q^2$$

where C : Factor (Refer to Table 3)
Q : Flowrate (L/min)

Table 3. Pressure Loss Factor

Model	C
UCUF-04	3.04
UCUF-06	0.537
UCUF-10	0.0625
UCUF-15	0.0120
UCUF-20	0.00377

Signal Cable	: Two 5m Coaxial Cables Note : Extension Cables available up to 30m
Model Code	: Refer to Table 5
Mass	: Refer to Table 7
Materials	: Refer to Table 4

Table 4. Materials of Flow Detector

Part Name		Material
Wetted Part	Body	New PFA
	Tube	New PFA
Sensor Housing (Not for UCUF-04)		PTFE
Sensor Cover (Only for UCUF-04)		PTFE
Side Plate (Not for UCUF-04)		PTFE
Cable Fitting		PP
Signal Cable Sheath		PVC

Signal converter

SFC-450 for UCUF-04B, -06B, -10B, -15B, -20B

Output :

- 4 to 20 mA (Load resistance 0 to 500 ohms)
Damping Time Constant : 0.04 to 99 seconds
- Scaled Pulse (Open collector / DC 30V, 20mA Max.)
Pulse Width :
0.5 ms (Max. 1000 Hz), 50 ms (Max. 10 Hz), 100ms (Max. 5 Hz)
(Selectable depending on the pulse rate at full scale)
- Flow rate alarm / Preset function
2 points (Open collector / DC 30V, 20mA Max.)
Alarm : Relative method
Relay Action : NO or NC (Alternative choice)
Setting : Free programmable (By parameter key switch)

Pulse Rate	: 10 to 1000 pps
Low Cut-off	: 0 to 30% of full scale
Display	: LCD / 2 line 16 digit alphanumeric (with illuminator)
Alarm indicator	: 2 LED
Data Entry	: By 4 key switches in front panel
Linearizer	: 15 line-segment approximation
Power Supply	: DC24V ±10%
Power Consumption	: 2.4W / 100mA (running) (1.3A / starting)
Ambient Condition	: 0 to 60 °C / 30~80% RH
Installation	: Panel Mounting
Enclosure Classification	: IP20 (Indoor Use)
Materials	: Panel /Acryl, Housing / Aluminum
Color	: Panel /Gray, Housing/Black
Data back-up	: Total count by EEPROM
Mass	: Approx. 410g
EMC	: EMI : EN55011, CLASS A1 EMS: EN50082-2

MODEL CODE

Table 5. Flow Detector

Model code				Description
UCUF	-□□	□		
Meter size	-04			4mm
	-06			6mm
	-10			10mm
	-15			15mm
	-20			20mm
Converter		B		SFC-450
Additional function				Not provided
			/z	Provided *

*□ 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)

Table 6. Signal Converter

Model code		Description
SFC-450	-0	0

CAUTIONS ON INSTALLATION

- Installation Area for Flow Detector: Select the area of pipe where no air or gas bubbles exist in the flow.
- Mounting of Flow Detector: Recommend to install detector vertically with upward flow, in order to prevent deposit of slurry or bubbles in low flowrate conditions.
- 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 to keep the fluid pressure high. The high fluid pressure will prevent the formation of bubbles in the flow.
- 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 (Converter)

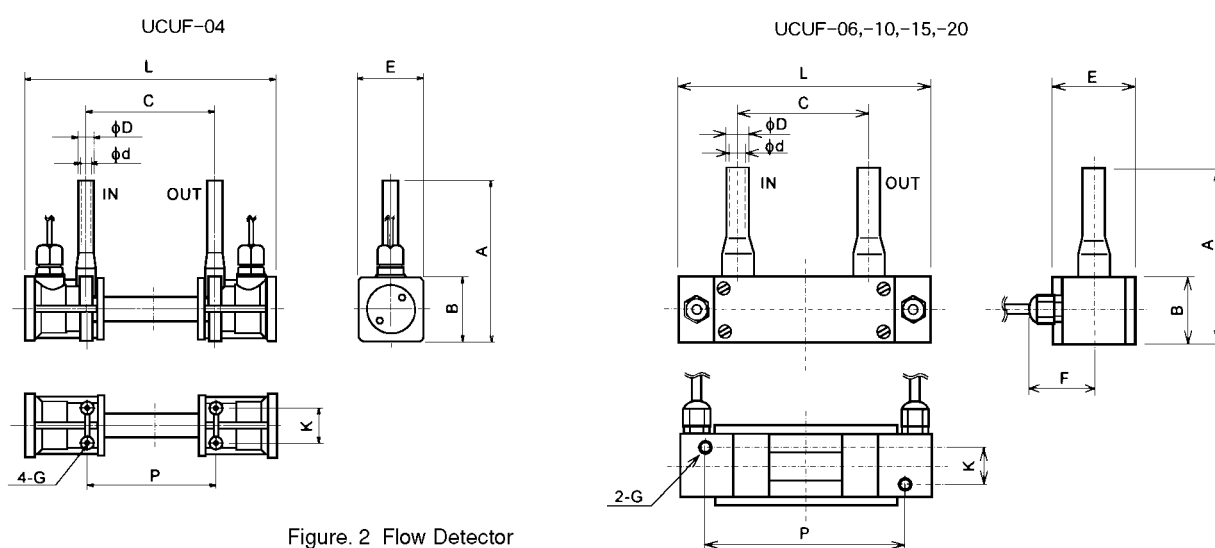


Figure 2 Flow Detector

Table 7. Flow Detector Dimensions and Mass

Model	Connecting Tube size	Dimensions (mm)											Mass (g)		
		D	d	C	L	A	B	E	F	G	K	P	Detector	Cable (5m)	Total
UCUF-04	3/8"	9.53	6.38	80	155	100	40	40	-	M4	22	80	200	140	340
UCUF-06	3/8"	9.53	6.38	100	213	90	30	40	35	M4	18	179	370	140	510
UCUF-10	1/2"	12.70	9.55	110	227	90	30	40	35	M4	18	193	420	140	560
UCUF-15	3/4"	19.05	15.90	165	287	100	40	50	40	M5	26	253	760	140	900
UCUF-20	1"	25.40	22.25	220	344	120	40	50	40	M5	26	310	880	140	1020

OUTLINE DIMENSION (Converter)

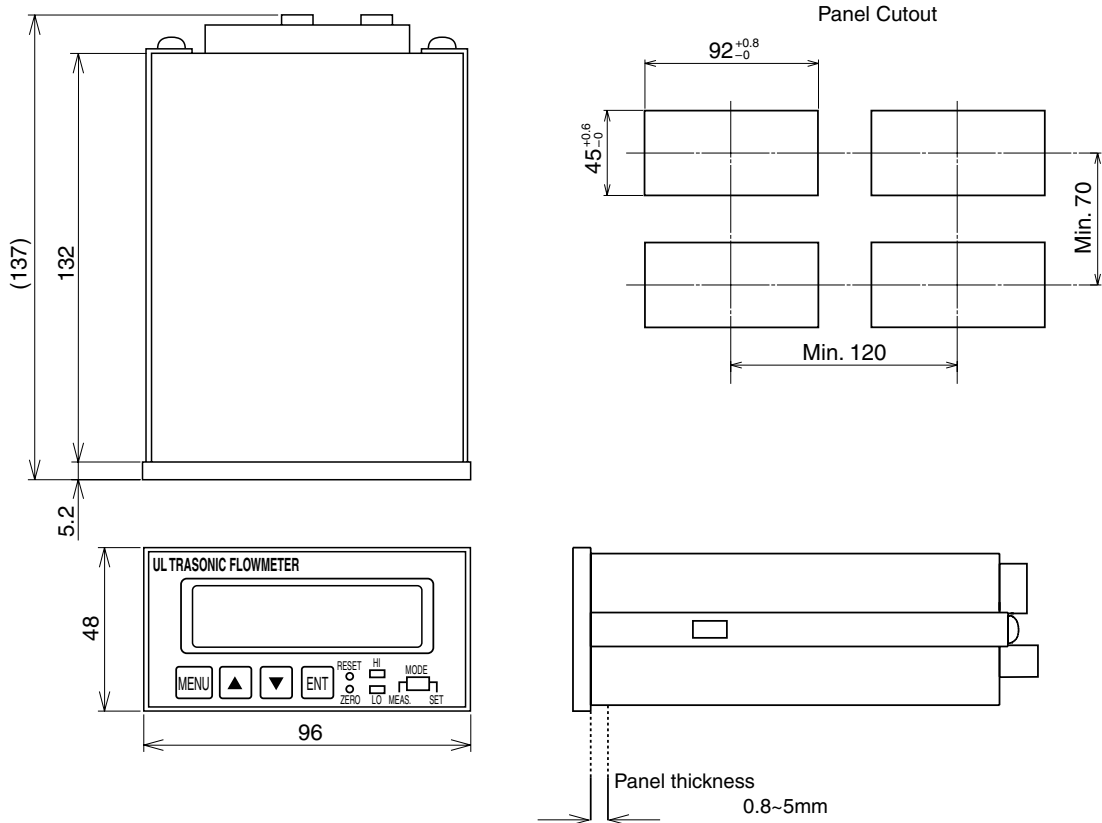
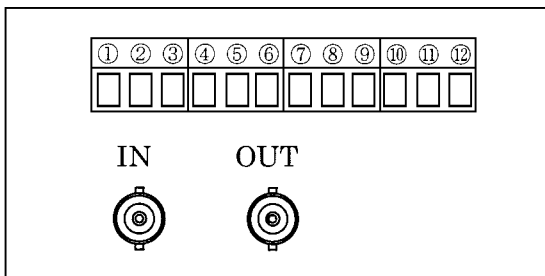


Figure 3. SFC-450 Signal Converter

TERMINAL (Converter)



Terminal	Polarity	Description
IN	Inlet side	Sensor signal (BNC Connector)
OUT	Outlet side	
①	+	Current output (DC 4~20mA)
②	-	
③	+	Scaled pulse output (Open collector)
④	-	
⑤	+	H alarm (H) or Total H Alarm (HH) (Open collector)
⑥	-	
⑦	+	L Alarm (L) or Total H Alarm (H) (Open collector)
⑧	+	
⑨	-	Reset input (Totalizer)
⑩	⏏	FG (Grounding)
⑪	0V	Power supply (DC24V)
⑫	24V	

* Specification subject to change without notice

TIV TOKYO KEISO CO., LTD.

Head Office : Shiba Toho Building, 1-7-24 Shibakoen, Minato-ku, Tokyo 105-8558
 Tel : 03-3431-1625 (KEY) ; Fax : 03-3433-4922
 e-mail : overseas.sales@tokyokeiso.co.jp ; URL : http://www.tokyokeiso.co.jp

