CLFC®300 Series Ultrasonic Flow Sensor

DESCRIPTION

An All-in-one ultrasonic flowmeter for closed loop control. The CLFC®300 series is flow controller which integrates all functions of an ultrasonic flowmeter, a control valve, and a circuit for flow computation and valve control. Its control function can quickly follow the target flow rate. Thus, the CLFC300 is ideal for liquid control which is essential in semiconductor manufacturing for the constant supply of chemicals and flow control of DIW and slurry.



KEY FEATURES

- **Improved flow measurement**
  Flow measurement is stabilized by faster calculation and improved bubble resistance.
- **Excellent controllability**
  A quick step response is achieved by state-of-the-art signal processing technology. The CLFC300 tracks variations in the flow and returns it to the set point within 1.5 seconds.
- **Two valves for wider applications**
  A needle valve is available for chemical liquids and DIW, and a pinch tube valve for slurry liquids.
  The STA-PURE style pcs tube is adopt to the lineup of pinch tubes. This tube has excellent durability and does not need to be replaced regularly.
- **Lightweight and compact**
  An ultrasonic flowmeter, a control valve, and a circuit are all contained in a single case. In addition, the layout was revised to make the controller more compact: it is now 20% smaller and 35% lighter.
- **Easy installation**
  No complicated piping or wiring is required: simply connect the fittings and multi-core cables to complete the installation.
- **Eco-friendly**
  Power consumption is reduced by 35%. All parts are comply with the RoHS requirements.
- **Corrosion-resistant**
  The CLFC uses highly-corrosion-resistant PFA and PTFE for wetted parts and ultra-durable PVDF for the case. It is ideal for the semiconductor industry and other industries that use corrosive chemicals.
- **EMC-compliant**
  The controller conforms to EN 61326-1:2006.

APPLICATIONS

- **Constant feed of chemical liquids and DIW:**
  The CLFC300 ensures accurate and stable feed control of chemical liquids and DIW, which was conventionally conducted by metering pumps and static head tanks.

- **Control of concentration:**
  When CLFC300 are installed both in chemical liquids and pure water lines, they help directly dilute chemicals with pure water while controlling the concentration accurately and stably.

- **Constant feed of slurry:**
  The CLFC300 on various slurry lines of CMP devices ensures stable and constant feed of slurry and saves valuable liquids.

SPECIFICATIONS

Measuring liquid	Valve type	Mounting
Chemical liquid, pure water	Needle	Horizontal or vertical
Slurry	Pinch tube	

Item	Specifications
Power supply	24 V DC (±10%)
Power consumption	Max. 200 mA
Inrush current	1.5 A or less
Applicable standard and EMC compatibility	RoHS EMC standard: EN61326-1: 2006
Ambient temperature and humidity	5 to 50 °C, 30 to 80 %RH (no condensation)
Measuring/controlling fluid	Any liquids (not including bubbles for stable measurement)
Sonic velocity	1000 to 2200 m/s
Fluid kinematic viscosity	0.3 to 40 mm^2/s
Fluid temperature	10 to 50 °C For fluids at more than 50 °C, consult us.
Flowmeter accuracy	±1 % R.D. for flow rates of 800 mL/min or larger ±8 mL/min for flow rates of up to 800 mL/min (±2 mL/min for F.S. of 50 mL/min or smaller) Note: The accuracy is determined by water calibration.
Control accuracy	±1.5 % R.D. for a set point
Output accuracy	Additional error for analog output: ±0.2 % F.S.
Input conversion error	Input conversion error for analog setting: ±0.2 % F.S.
Response speed	Needle type : Within 1.5 seconds to ±3.0 % of the set point (Central value) Pinch tube type : Within 1.5 seconds to ±1.5 % of the set point (Central value)
Differential pressure range for control	Needle type : 0.05 to 0.3 MPa Pinch tube type : 0.05 to 0.2 MPa
Maximum operating pressure	0.4 MPa
Scale range	For slurry (pinch tube valve): 50 to 500 mL/min
	For pure water and chemical liquids (needle valve): 5 to 50 mL/min through 200 to 2000 mL/min
Analog I/O signal	Total two points, one for set point input signal and one for flow output signal 0 to 10 V : Input impedance 980 kΩ, Output load resistance 500 kΩ or more 0 to 20 mA : Input impedance 250 Ω, Output load resistance up to 600 Ω
Indication	Power supply: Green LED Flowmeter status: Green LED Valve status: Green LED
Contact output	Open collector: 2 points (NO as standard) For abnormal valve status For abnormal flow rate Rating: 30 V DC, 50 mA (max.)
Zero adjustment	Contact input (short/open at the plus side of the power supply)
Wetted parts material	PFA, PTFE, (Pinch tube)
Fitting	ϕ 1/4", Super300 pillar fitting ϕ 1/4", Flare type fitting
Case material	PVDF
Protection code	Equivalent to IP20 (IP54 for the substrate housing)
Mass	Approx. 1 kg (1.3 kg including cables)

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MODEL CODE

Code												Remarks
	–	①	②	–	③	–	④	–	⑤	⑥	⑦	
CLFC300												CLFC300: analog type
①Connection size		T1										1/4"
		**										Others (optional)
②Fitting			1									Flare
			2									Pillar S300 (Standard)
③Flow range					250							2.5 to 25 mL/min
					500							5 to 50 mL/min
					101							10 to 100 mL/min
					151							15 to 150 mL/min
					201							20 to 200 mL/min
					501							50 to 500 mL/min
					102							100 to 1000 mL/min
					152							150 to 1500 mL/min
					202							200 to 2000 mL/min
					***							Others (optional)
④Analog input/output (Set point/Flow out)							D1					0 to 10 V / 0 to 10 V
							D2					4 to 20 mA / 4 to 20 mA
							**					Others (optional)
⑤Valve type									N			Needle type for chemicals and pure water
									SP			Pinch type for slurry (STA-PURE®)
⑥Mounting										H		Horizontal
										V		Vertical
⑦Electrical connection											0	Hirose HR30 connector

Example:
A controller with a connection size of 1/4", flow rate of 500 mL/min, analog input and output of 4 to 20 mA, attached with a needle type valve and connectors, to be installed horizontally, will be specified as follows:

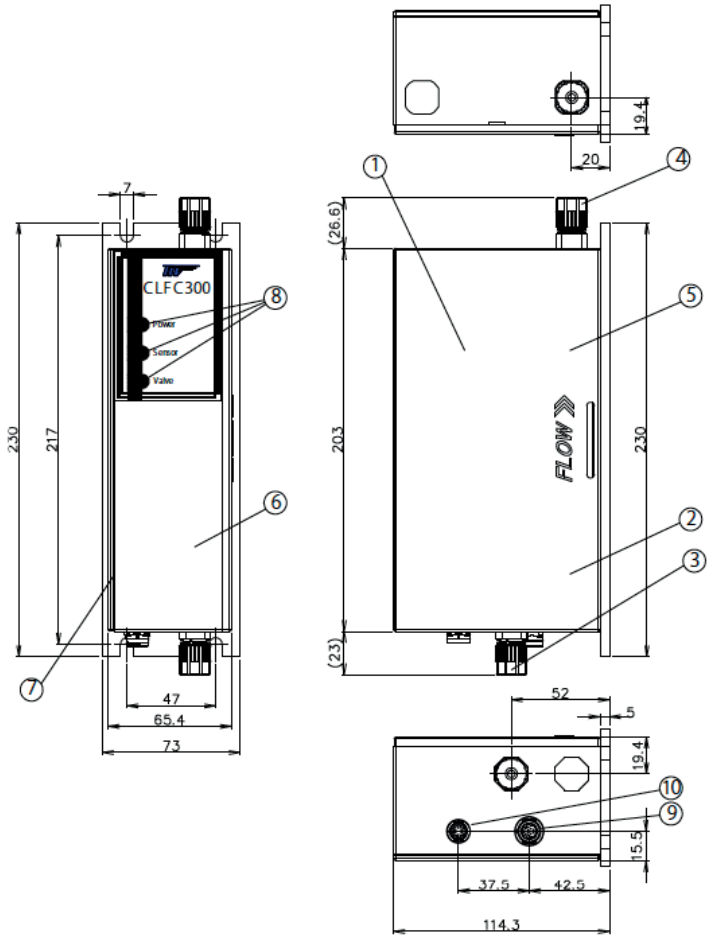
$$\overset{①②}{\text{CLFC300}-\text{T12}}-\overset{③}{\text{501}}-\overset{④}{\text{D2}}-\overset{⑤⑥⑦}{\text{NH0}}$$

Notes
1. Choose the pinch type for slurry to avoid deposition. The flow range of pinch-type flow controllers is limited to 50 to 500 mL/min only.
2. The posture of the inner flowmeter differs in horizontal and vertical mounting. Select an appropriate mounting for measurement.
3. The heat from the integrated electronic circuit may raise the temperature of the fluid retained in the controller piping.
4. Consult us for other optional requirements.

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DIMENSIONS

Vertical mounting type

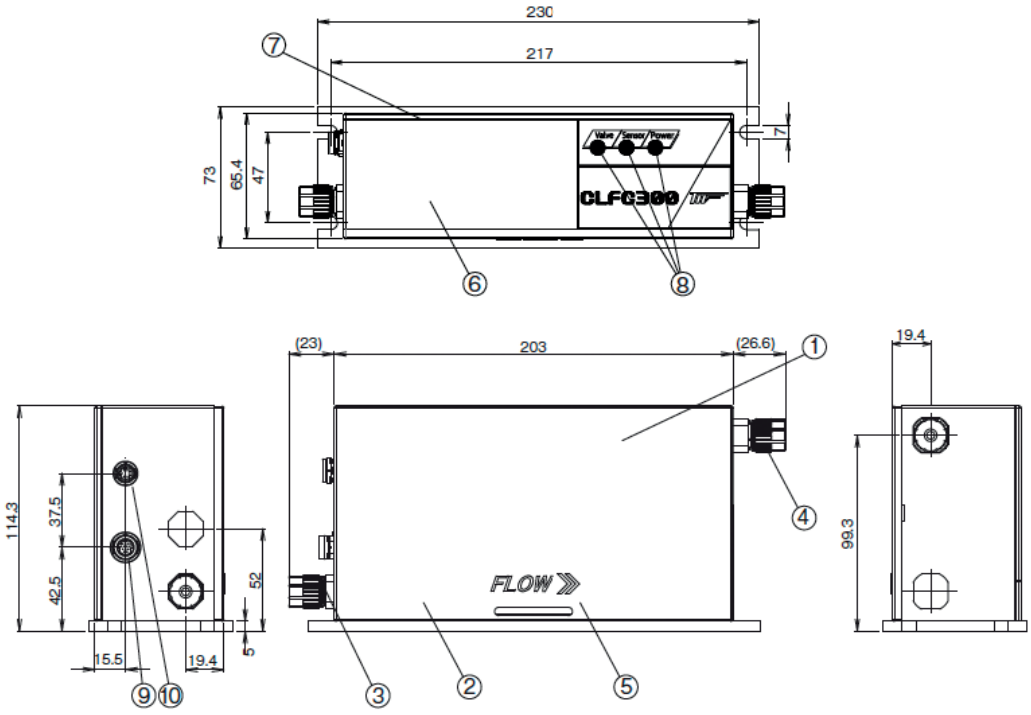


Components

No.	Parts	Material	Q'ty	Remarks
1	Control valve	—	1	FCV-3000S
2	Flow sensor	PFA	1	UCUF-04E6/Z
3	IN-side fitting	PFA	1	Super300(φ1/4)
4	OUT-side fitting	PFA	1	Super300(φ1/4)
5	Side cover	PVDF	1	White
6	Casing	PVDF	1	White
7	Case sealing	EPDM	1	—
8	LED indicator	—	3	Green × 3
9	I/O connector	—	1	HR30-7R-12PC
10	Connector for maintenance	—	1	HR30-6R-6PC

Valve type	Fitting		A	B
Needle	Flare	1/4"	33.5	33.5
	Super300	1/4"	23	23
Pinch	Flare	1/4"	33.5	33.5
	Super300	1/4"	23	26.6

Horizontal mounting type



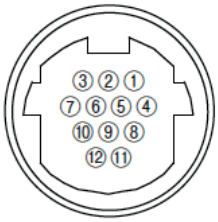
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WIRING SPECIFICATIONS

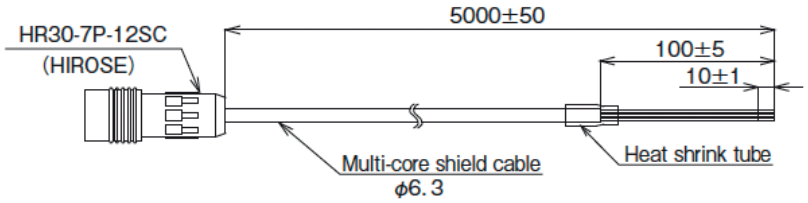
❑ Terminals

I/O connector (HR30-7R-12PC)

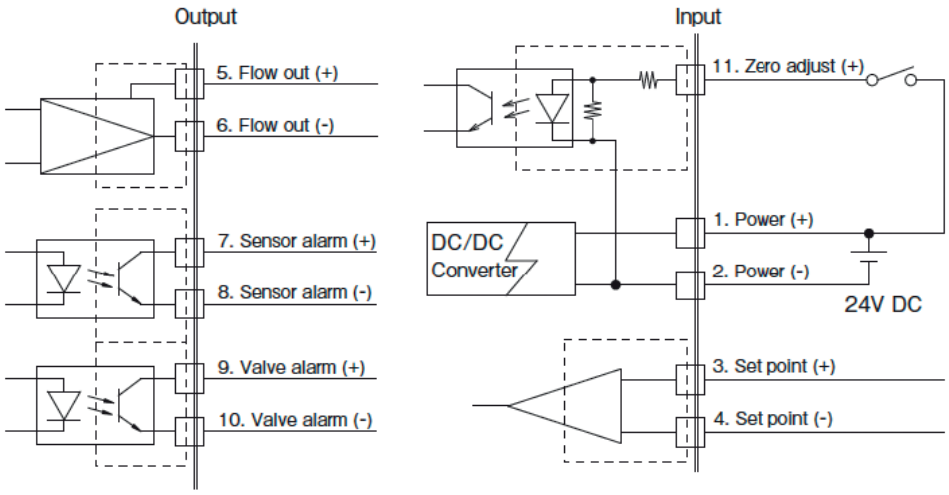
Pin No.	Services		Wire color/Dot	Size
1	Power (24 V DC)	+	Orange/red 1	AWG26
2		−	Orange/black 1	
3	Set point (4 to 20 mA)	+	Yellow/red 1	AWG28
4		−	Yellow/black 1	
5	Flow out (4 to 20 mA)	+	Gray/red 1	
6		−	Gray/black 1	
7	Sensor alarm	+	White/red 1	
8		−	White/black 1	
9	Valve alarm	+	Pink/red 1	
10		−	Pink/black 1	
11	Zero adjust		Orange/red 2	
12	N.C.		Orange/black 2	



❑ Dedicated cables



❑ I/O circuits



CONSUMABLE PARTS

The THV tube used in pinch type is one of consumable parts. The timing of its replacement depends on the operating conditions. It is recommended to replace the THV tube with a new one after about 300,000 times of control motions or after about one year's operation from the start-up. The highly durable STA-PURE tube needs no periodical replacement.

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