TECHNICAL GUIDANCE

All in one, Ultrasonic flowmeter, Controller and Control valve

CLFC-100 Series

Closed Loop Flow Controller

OUTLINE

All functions are integrated into one **CLFC-100** controller: proven Ultrasonic Flowmeter: Flow computation function: PID calculation: Setting of control value: Throttling of control valve. PID control enables liquid flow control for various services for semiconductor manufacturing such as feed control of chemicals, DIW and slurry. PID controller compares the set point to the measured variable and gives a correcting output value to follow quickly the set point as required.

FEATURES

Compact size !

A flow sensor, flow computation unit, PID controller including external set point unit, and even control valve are built in a small housing, thus saving the space.

Easy installation !

Just connect pipes to the fluid inlet and outlet, and connect multicore cable to the cable entry of the controller.
No complicated piping and wiring required.

Applicable to highly corrosive chemicals !

High anti-corrosive materials, new PFA for ultrasonic flowmeter and PFA, PTFE for other wet parts, are best suited for the semiconductor manufacturing services and other corrosive chemical services.

Reliable flow measurement !

High speed digital arithmetic algorithm (DSP) developed by Tokyo Keiso Co., Ltd. enables stable measurement of the bubble contained liquids.

Fast response, excellent controllability !

The quick step response time realized by state-of-art signal processing technology achieved less than 2 seconds of control tracking against the set point change.

Two types of valves for wide applications !

The needle valve for chemical liquids and DIW, the pinch tube valve for slurry liquids are standardized.

APPLICATIONS

① Constant chemical feed of the chemicals and DIW:
The CLFC FEEDBACK FLOW CONTROLLER, taking over feeding methods of metering pumps and static head tanks, secures the accurate and stable feed control of the chemicals and DIW.

② Control of solution concentration:
The CLFC installed on the chemical and pure water lines enables accurate and stable concentration control, directly diluting chemicals by pure water to keep a constant concentration of the solution.

③ Constant feed of slurry:
The CLFC FEEDBACK FLOW CONTROLLER, installed on various slurry lines of CMP devices ensures stable and constant feed of slurry and saves valuable liquids.

SPECIFICATIONS

1. Outline

CLFC controllers are classified into the following types according to the applications.

Measuring liquid	Installation posture	Valve type	Model code
Chemical liquids, Pure water	Horizontal installation	Needle	CLFC-100-Txxx-xx-NHx
Slurry	Horizontal installation	Pinch tube	CLFC-100-Txxx-xx-PHx

2. Specifications

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Power supply</td><td>24VDC (±10%)</td></tr>
<tr><td>Power consumption</td><td>Max 300mA (Rush current 2A)</td></tr>
<tr><td>Operating ambient temperature / humidity</td><td>0 – 40°C (30 – 80%RH, Without dew)</td></tr>
<tr><td>Measuring / Controlling fluids</td><td>Liquids (Do not include bubbles in the liquids for the stable measurement.)</td></tr>
<tr><td>Sonic velocity range</td><td>1000 to 2200 m/s</td></tr>
<tr><td>Fluid kinematic viscosity</td><td>0.3 to 40 mm^2/s</td></tr>
<tr><td>Operating temperature range of fluid</td><td>10 to 60°C</td></tr>
<tr><td>Flowmeter accuracy</td><td>±8mL/min. at flow velocity ＜1m/s
±1% of the reading at flow velocity ≧1m/s
Note): The accuracy is determined by the actual water calibration.</td></tr>
<tr><td>Control accuracy</td><td>±1% of the reading at set point flow rate</td></tr>
<tr><td>Response speed</td><td>Within 2 seconds after flow rate set</td></tr>
<tr><td>Differential pressure range for control</td><td>For slurry 0.05 to 0.2MPa
For pure water and chemical liquids 0.05 to 0.3MPa</td></tr>
<tr><td>Maximum operating pressure</td><td>0.4MPa</td></tr>
<tr><td>Scale range</td><td>For slurry (Pinch tube valve)
<table>
<tr><th>Range</th><th>Code</th></tr>
<tr><td>5 to 50 mL/min</td><td>1</td></tr>
<tr><td>50 to 500 mL/min</td><td>3</td></tr>
</table>
For pure water and chemical liquids (Needle valve)
<table>
<tr><th>Range</th><th>Code</th></tr>
<tr><td>5 to 50 mL/min</td><td>1</td></tr>
<tr><td>10 to 100 mL/min</td><td>2</td></tr>
<tr><td>50 to 500 mL/min</td><td>3</td></tr>
<tr><td>100 to 1000 mL/min</td><td>4</td></tr>
<tr><td>200 to 2000 mL/min</td><td>5</td></tr>
</table></td></tr>
<tr><td>Analog input / output signal</td><td>1 set point signal and 1 flow output signal
The combination of input and
output form is as follows.
<table>
<tr><th>Set Point</th><th>Flow out</th><th>Code</th></tr>
<tr><td>0 to 10VDC</td><td>0 to 10VDC</td><td>1</td></tr>
<tr><td>4 to 20 mA</td><td>4 to 20 mA</td><td>2</td></tr>
<tr><td>0 to 10VDC</td><td>4 to 20 mA</td><td>3</td></tr>
<tr><td>4 to 20 mA</td><td>0 to 10 V</td><td>4</td></tr>
</table></td></tr>
<tr><td>Indication
(installed at the OUT connection side.)</td><td>· 4-digit instantaneous flow rate
· Power supply Green LED
· Valve alarm Red LED
· Flow alarm Red LED</td></tr>
<tr><td>Contact output</td><td>Open collector 2 points
· The alarm status of valve
· The alarm status of flow rate</td></tr>
<tr><td>Zero adjustment</td><td>Contact input (Pull up at the + side of power supply)
Push button switch of main body</td></tr>
<tr><td>Wetted parts</td><td>PFA, PTFE</td></tr>
<tr><td>Process connection</td><td>
<table>
<tr><th>Connection size</th><th>Code</th></tr>
<tr><td>∅1/4 inch</td><td>1</td></tr>
<tr><td>∅3/8 inch</td><td>2</td></tr>
</table>
<table>
<tr><th>Connection type</th><th>Code</th></tr>
<tr><td>Flare</td><td>1</td></tr>
<tr><td>Pillar　S300</td><td>2</td></tr>
</table></td></tr>
<tr><td>Case material</td><td>ABS (UL-94 V-0) (Option: PVDF)</td></tr>
<tr><td>Enclosure</td><td>Equivalent to IP64</td></tr>
<tr><td>CE marking</td><td>Under preperation</td></tr>
<tr><td>Weight</td><td>Approx. 1.2kg</td></tr>
</table>

MODEL CODE

Code										Remarks		
CLFC-100	①	②	③	—	④	—	⑤	⑥	⑦			
①Connection size	–T1									1/4"		
	–T2									3/8"		
②Connection form		1								Flare		
		2								Pillar S300		
③Flow range			1							5–50mL/min	Pressure loss coefficient ∗1	P: 0.2 N: 2
			2							10–100mL/min		N: 1.25
			3							50–500mL/min		P: 0.023 N: 0.1
			4							100–1000mL/min		0.023
			5							200–2000mL/min		0.015
			—									
④Analog input/output (Set Point/Flow Out)					D1					0–10 VDC / 0–10 VDC		
					D2					4–20 mA / 4–20 mA		
					D3					0–10 VDC / 4–20 mA		
					D4					4–20 mA / 0–10 VDC		
⑤Valve type							N			Needle type (For chemical liquids and pure water)		
							P			Pinch tube type (For slurry)		
⑥Mounting∗2								H		Horizontal		
								—		Vertical (Under preparation)		
⑦Electrical connection									0	HIROSE HR30 connector (With exclusive cable 5m)		
									1	Cable from main body (Standard 5m)		

∗1

Pressure loss (Water case)

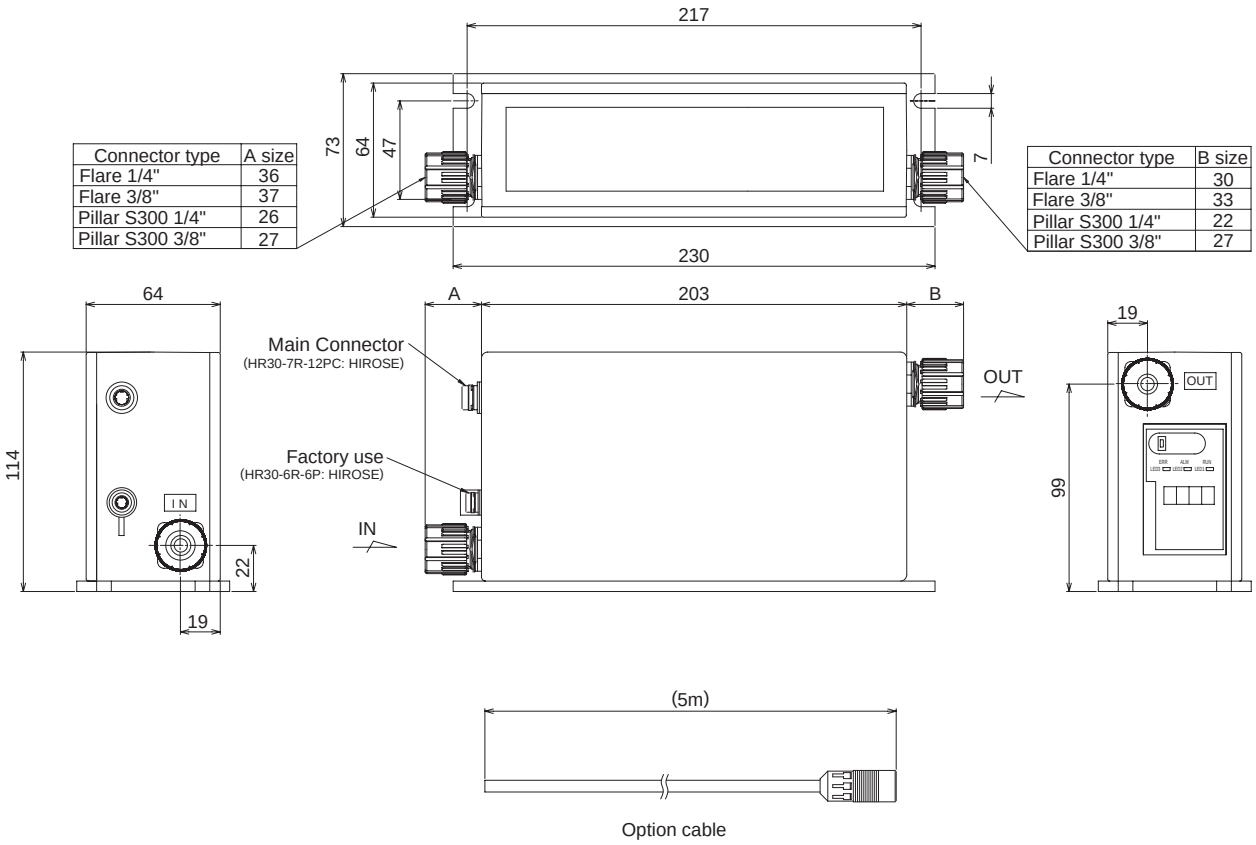
(kPa)=C×Q^2

C: Pressure loss coefficient

Q: Flow rate (mL/min)

∗2: Vertical mounting is available as option.
Please contact with our Sales office.

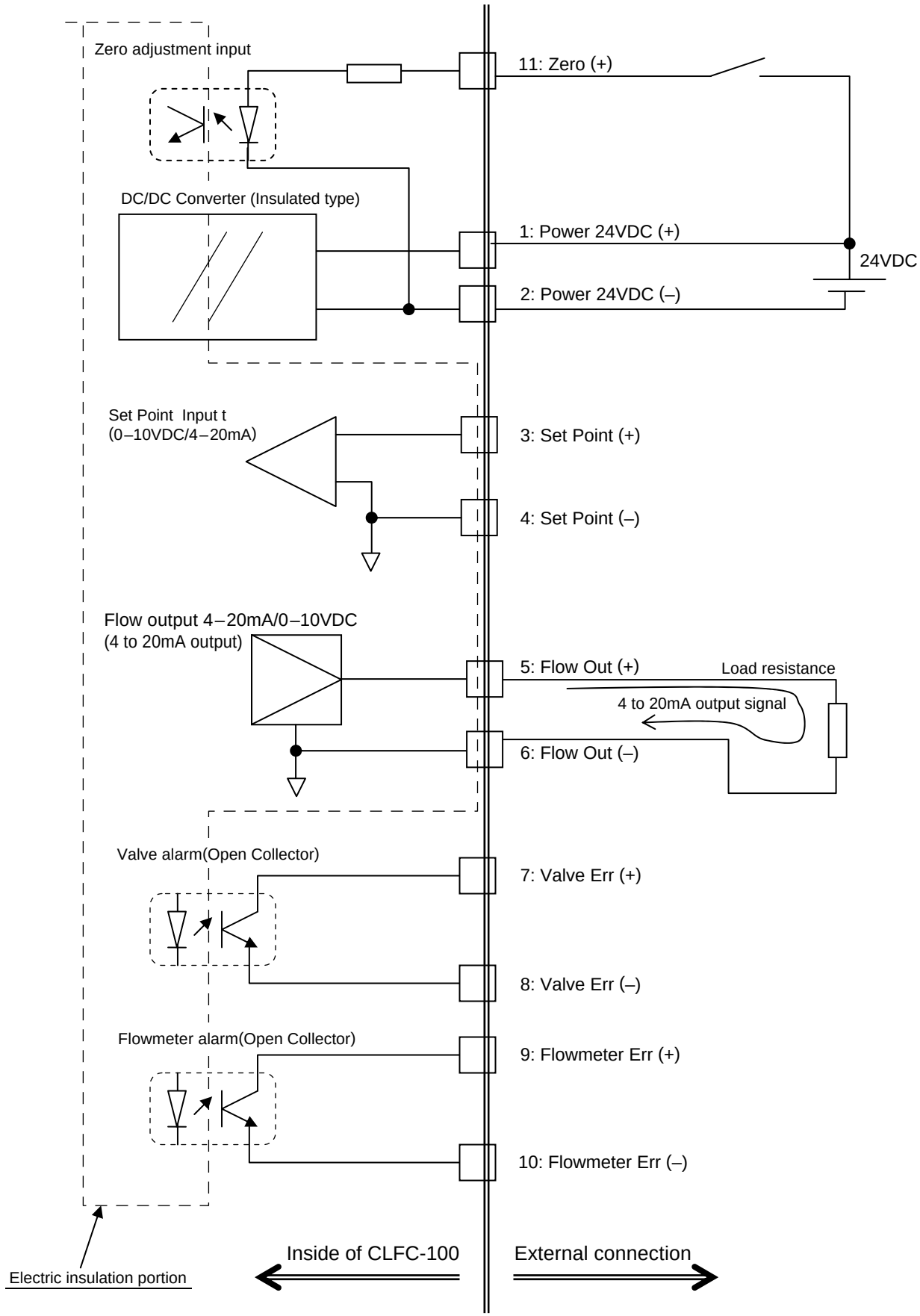
DIMENSIONS



WIRING SPECIFICATIONS

No.	Color	Item	Specifications	Remarks
1	Orange / Red dot	Power supply +	24VDC±10%	
2	Orange / Black dot	Power supply –		
3	Yellow / Red dot	Set Point +		
4	Yellow / Black dot	Set Point –		
5	Grey / Red dot	Flow Out +		
6	Grey / Black dot	Flow Out –		
7	White / Red dot	Valve alarm +	Open collector output	Select normal open or close.
8	White / Black dot	Valve alarm –	MAX 30VDC, 50mA	
9	Pink / Red dot	Flowmeter alarm +	Open collector output	Select normal open or close.
10	Pink / Black dot	Flowmeter alarm –	MAX 30VDC, 50mA	
11	Orange / Red Two dots	Zero adjustment		Zero adjustment is started by short-circuit with +24VDC (Red).
12	Orange / Red Two dots	—		

DETAILS OF INPUT/OUTPUT CIRCUIT



INSTRUCTION FOR INSTALLATION

Observe following instructions for the installation of CLFC FEEDBACK FLOW CONTROLLER to secure precise measurement.

(1) The measuring tube must be full of liquids.
(2) Install the controller, horizontally or vertically, in the same posture as specified.
(3) Install the controller at the lower part of piping which has an open end.
(4) Install the controller along the liquid flow direction as indicated on the name plate.
(5) Install the controller at the place where pressure in the pipe is positive, i.e. higher than atmospheric pressure.
(6) The differential pressure across the controller must be within the range as specified.
(7) A bypass pipe including bypass valve and block valves are recommended for easy 0 point check and maintenance.
(8) Avoid any stress on the tubes from the piping.
(9) Follow the instruction manuals of tube connector manufacturer for tube connection work.
(10) Avoid any stress on the controller generated from the input and output piping.

* Specification is subject to change without notice.

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