FC6000 Series
Flow Control System

DESCRIPTION

A controller with an ultrasonic flow converter for compact system design. The FC6000 series is a separate-type flow controller system which enables a compact system design. It consists of control valve, flow detector, and flow controller. The FCA6000 series flow rate controller integrates highly accurate ultrasonic flowmeter.

- Control valve: FCV series
- Flow detector: UCUF series
- Flow rate controller: FCA6000 series

The FC6000 series can control a wide range of flow rates with an extensive lineup of flow rate detectors and control valves. Also, higher safety and greater freedom in layout can be realized by separating the measurement and control part from the process fluid part, such as the flow detector and the control valve. The reliable FC6000 series is best suited for handling chemical liquids such as in semiconductor processes which require highly accurate flow rate control.





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.

KEY FEATURES

- **Improved bubble resistance and flow measurement**
  The conventional ultrasonic flowmeters used to have difficulties in measuring fluids containing bubbles because the bubbles disturb the propagation of ultrasound waves. The FCA6000 series uses our unique, proven signal processing technology, which makes it possible to measure the flow even when the bubbles contain. Furthermore, by detecting and removing abnormal outputs based on our extensive field experience, bubble resistance has been greatly improved, as well as measurement stability of the flowmeter.

- **Enhanced safety and freedom in layout**
  The flow detector and the control valve in the process fluid part are separated from the measurement and control part, ensuring enhanced protection against liquid leakage as well as greater freedom in layout.

- **Support for a wide flow range**
  The FCA6000 series covers a wide range of flow rate, from a minimum of 2.5 to 25 mL/min up to 1 to 10 L/min.

- **Low power consumption**
  The FCA6000 series consumes less current than existing converters.

- **CE marking**
  Complies with EU EMC, RoHS2, and low voltage requirements
  (EMC standards: EN61326-1:2013, EN61326-2-3:2013)

- **High corrosion resistance**
  The UCUF series uses highly corrosion resistant PFA and PTFE for the wetted parts and can be used to handle chemical liquids in the semiconductor and other industries.

SPECIFICATIONS

Control Valve

Model	FCV-1000S	FCV-3000	FCV-3000T
Actuator	High resolution stepping motor		
Coupling cable	Multi-core cable, PVC cover, 5 m (standard)		
Wetted part material	PTFE, PFA		
End connection (tube OD size)	ϕ3/8", ϕ1/2"	ϕ1/4"	ϕ4mm
Controllable differential pressure	0.05 to 0.2 MPa		
Maximum operating pressure	0.3 MPa		
Fluid temperature	5 to 50°C		10 to 50°C
Ambient temperature	5 to 50°C		10 to 50°C

Ultrasonic Flowmeter (Detector)

Model	UCUF-						
	04K	06K	10K	04E	06E	04M	06M
Nominal size	4 mm	6 mm	10 mm	4 mm	6 mm	4 mm	6 mm
Wetted part material	New PFA					PFA	
End connection (tube OD size)	ϕ3/8"		ϕ1/2"	ϕ3/8"		ϕ1/4"	ϕ3/8"
Coupling cable	Coaxial cable×2, PVC cover, 5 m (standard)						
Construction	Jet-proof (IP65)						
Ambient temperature	Fluid temperature: 10 to 60°C					Fluid temperature : 10 to 90°C	
Accuracy	Velocity 1m/s or larger: ±1% of the reading Velocity less than 1m/s: less than ±0.01 m/s Note: The accuracy of UCUF-04K/C with full scale less than 50 mL/min is ±2 mL/min						

Controller

Model		FCA6100	FCA6200	FCA6300
Power supply		24 V DC ±10%		
Consumption current		200 mA		
		At starting time: 1A		
Output signal	Flow rate signal	4-20 mA DC (load resistance : 0 to 500Ω)	0–10 V DC (output Impedance : 500Ω)	4-20 mA DC (load resistance : 0 to 500Ω)
	Flow rate alarm	Open collector output (rated value: 30 V DC, 50 mA)		
	Action mode	Logic: A (NO)/B (NC) set at the factory		
	Pulse output	Open collector output (rated value: 30 V DC, 50 mA) Pulse width: 0.5 ms, 50 ms, 100 ms		
Input signal	Flow set point	1–5 V DC	0–10 V DC	4–20 mA DC
	Control start/ stop	Relay contact (on: start, off: stop)		
	Totalizer reset	Relay contact (one shot)		
	Sensor	Exclusive cable (SMB connecter)		
Display		2 lines, 16 alphanumeric letters LCD with a backlight Alarm: red (LED), status: green (LED)		
Construction/ Installation		Indoor use (IP 20 equivalent), panel mount		
Wiring		Power supply line, grounding line, signal lines, sensor cable (×2), valve cable		
Connector		Divided-type tension spring connection, 5P, 10P, 3P, 6P		
Housing material and color		ABS, black		
Ambient temperature		0 to 50°C (except LCD)		
Control accuracy		Flow rate > 30%FS: ±3% of the target value, flow rate ≤ 30%FS : 5% of the target value, response time within 3 seconds		

Conversion Cable

Model	Specification
CONC-76-301	SMB connector with a lock between the SMB connector (plug)
CONC-56-151	BNC connector (jack) between the SMB connector (plug)

MODEL CODE

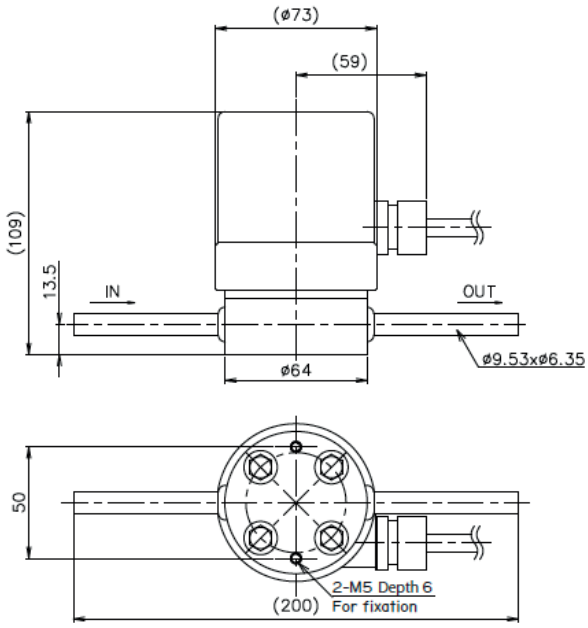
FC6	□	□	□	–	□□	□	–	□□	□	□	/	□	Specification	Remarks
Electrical specifications (output/input)	1												4-20 mA/1-5 V	FCA6100
	2												0-10 V/0-10 V	FCA6200
	3												4-20 mA/ 4-20 mA	FCA6300
	*												Others	
Valve model		0											FCV-3000	7 types, 2.5 mL/min up to 2 L/min
		1											FCV-1000S	6 types, 200 mL/min up to 10 L/min
		2											FCV-3000T	Pinch tube, 50 to 500 mL/min only
		3											FCV-3000D	Double seal (chemical resistant)
		*											Others	
Special specification (1)			0										Standard	
			*										Others	
Flow range				–	00								2.5 to 25 mL/min	FCV-3000
					01								5 to 50 mL/min	FCV-3100
					02								10 to 100 mL/min	FCV-3200
					03								20 to 200 mL/min	FCV-3300
					04								50 to 500 mL/min	FCV-3400/ 3000T
					05								100 to 1000 mL/min	FCV-3500
					06								200 to 2000 mL/min	FCV-3600/ 1100S
					07								300 to 3000 mL/min	FCV-1200S
					08								400 to 4000 mL/min	FCV-1300S
					09								600 to 6000 mL/min	FCV-1400S
					10								800 to 8000 mL/min	FCV-1500S
					11								1 to 10 L/min	FCV-1600S
					*								Others	
Valve connection size (OD)						1							ϕ4 tube connection	FCV-3000T
						2							1/4 tube connection	FCV-3000 Series
						3							3/8 tube connection	FCV-1000S (Less than 4 L/min)
						4							1/2 tube connection	FCV-1000S only (6 L/min or larger)
						*							Others	
Flowmeter model							–	4M					UCUF-04M	MAX. 2 L/min
								4K					UCUF-04K	MAX. 3 L/min
								4E					UCUF-04E	
								6M					UCUF-06M	MAX. 8 L/min
								6K					UCUF-06K	
								6E					UCUF-06E	
								10K					UCUF-10K	MAX. 10 L/min
								*					Others	
Flowmeter shape (1) (tube direction)									U				U shape	Standard
									Z				Z shape	
									*				Others	
Flowmeter shape (2) (cable direction)										N			Standard	The same direction with the tube
										W			Opposite side	UCUF-04M only
Special specification (2)											/	Blank	Standard	
												*	Others	

• The code will be named according to the specification.

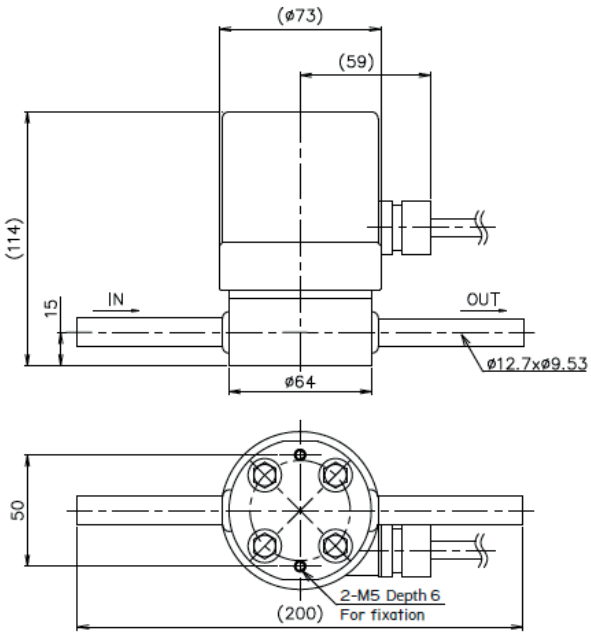
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EXTERNAL DIMENSION (MM)

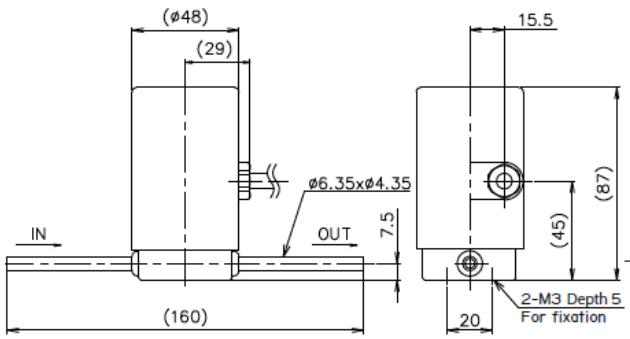
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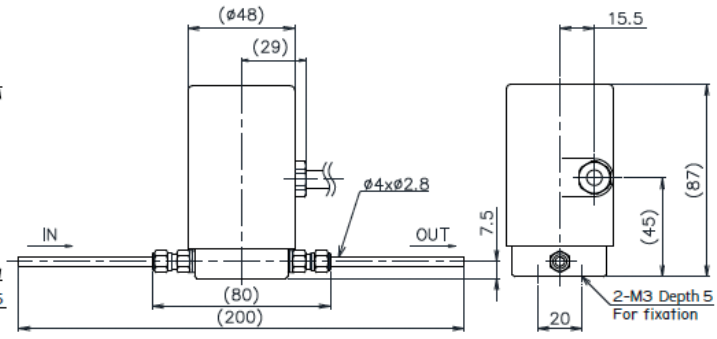
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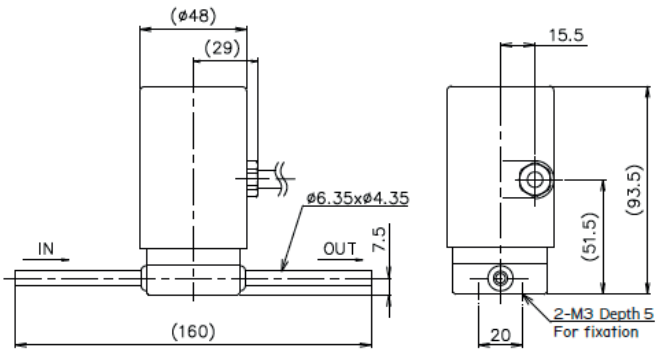
FCV-3000



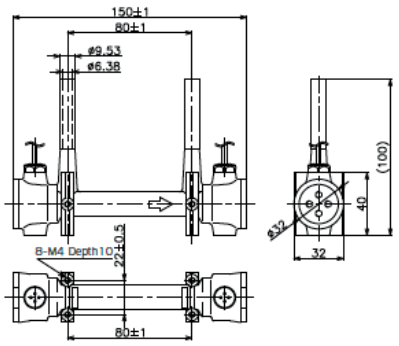
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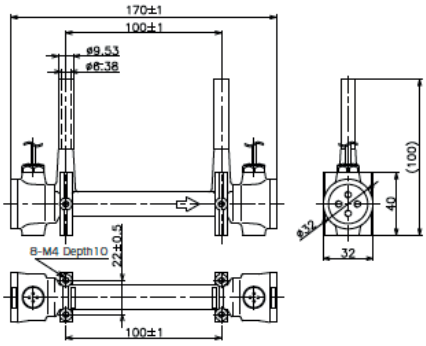
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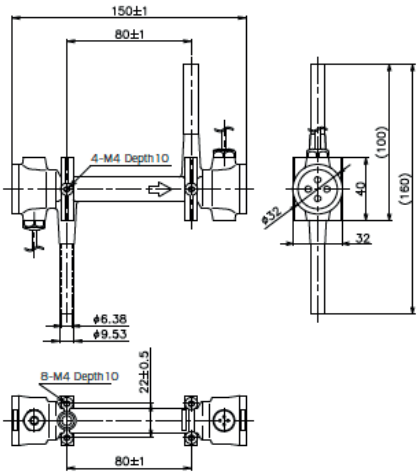
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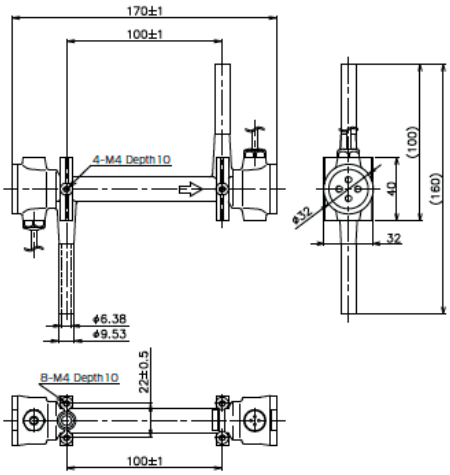
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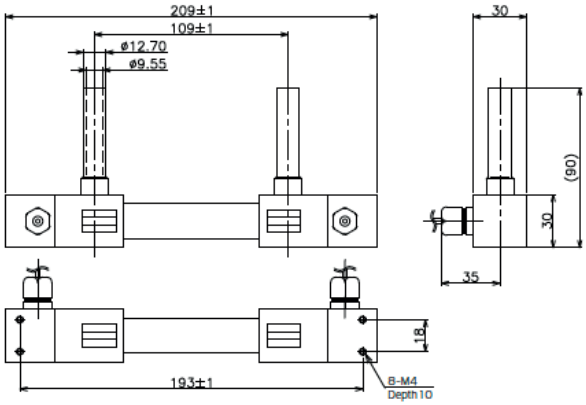
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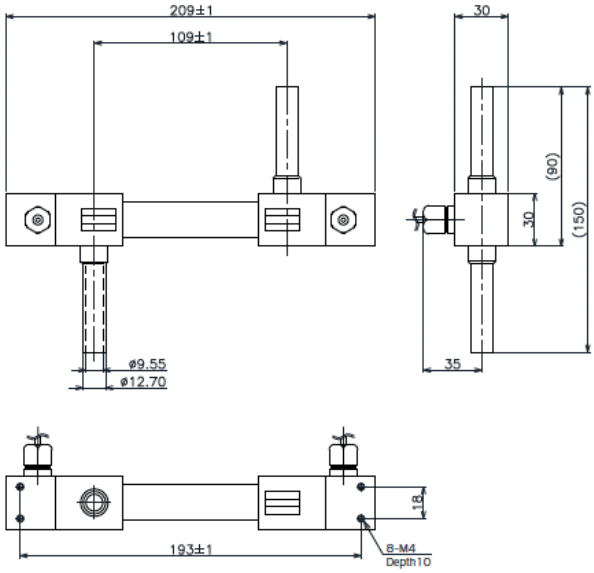
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UCUF-10K

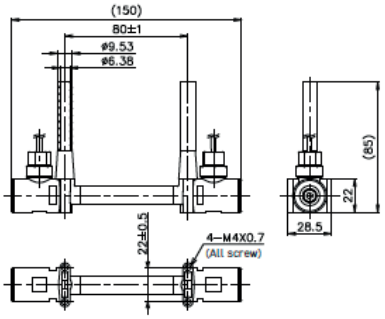


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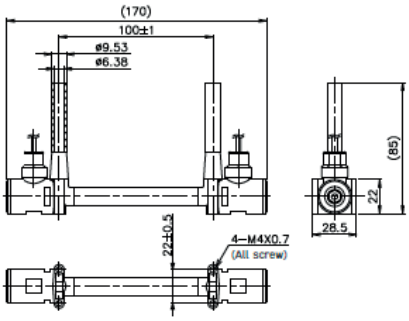


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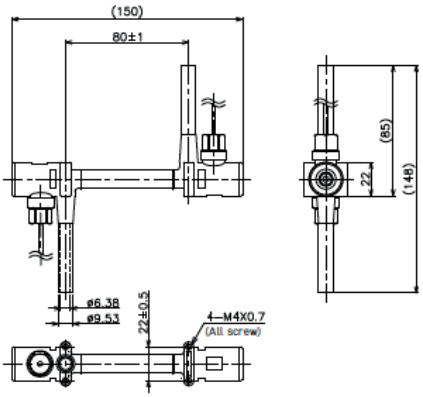
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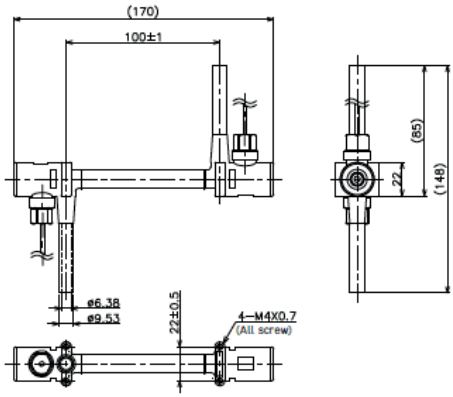
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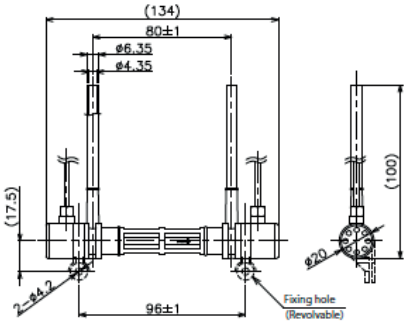
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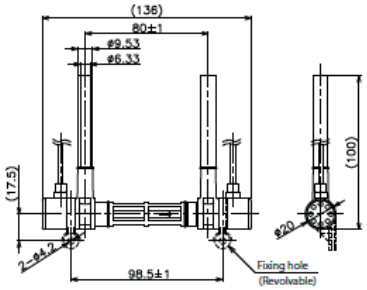
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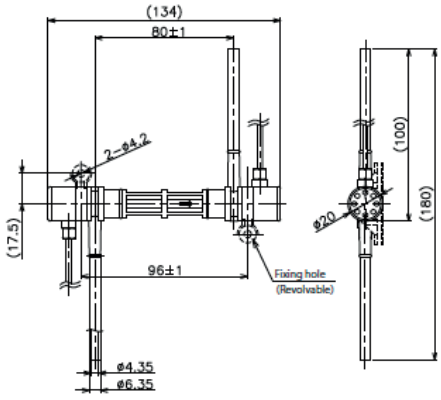
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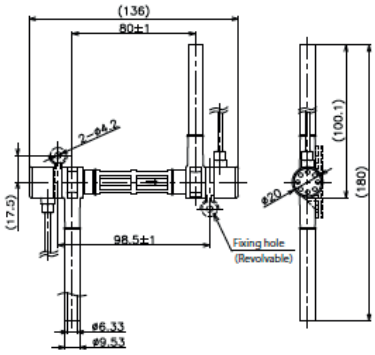
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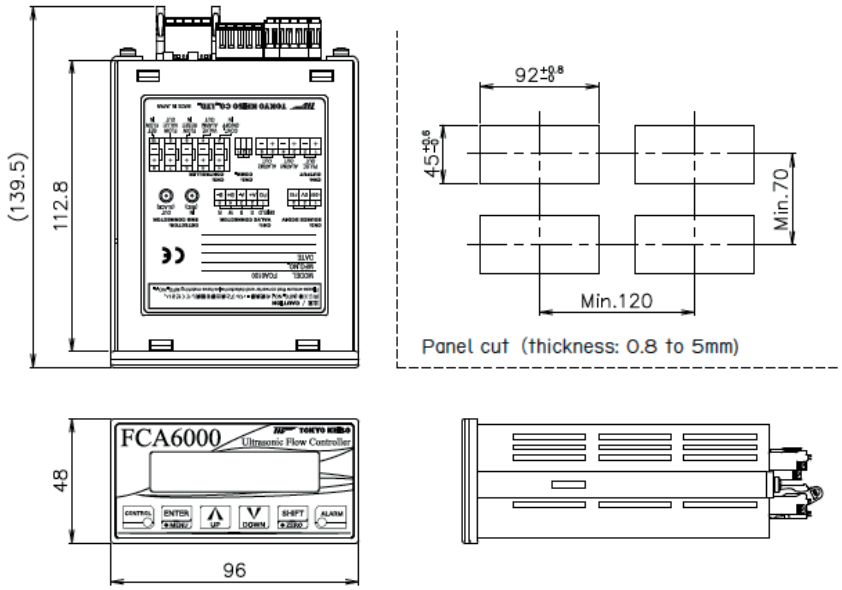
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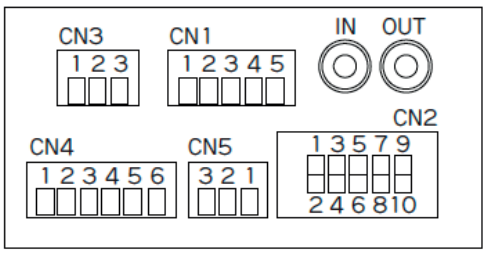
UCUF-06M-Z



FCA6000



Controller terminal diagram



Wiring

CN	No.	Polarity	Description
1	Motor drive connecter		
	1	FG	Motor ground
	2	Green	Motor A phase +
	3	Black	Motor A phase –
	4	White	Motor B phase +
	5	Red	Motor B phase –
2	Controller connector		
	1	+	Control start/stop input *
	2	–	
	3	+	Valve abnormal alarm output
	4	–	
	5	+	Reset signal input for the totalizer **
	6	–	
	7	+	Flow output
	8	–	
	9	+	Target flow input
	10	–	

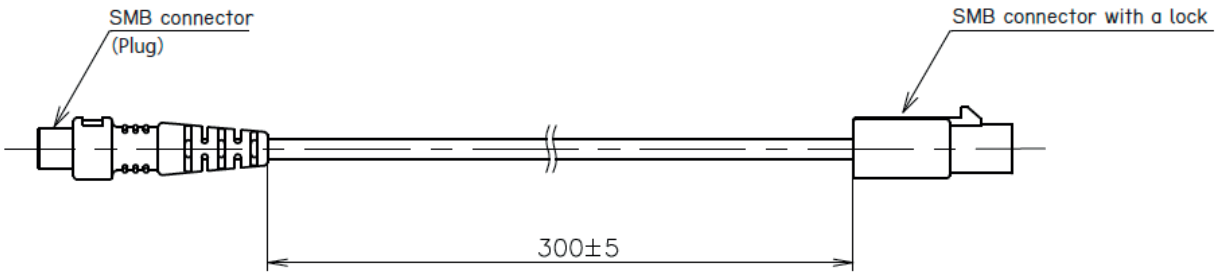
CN	No.	Polarity	Description
3	Power connecter		
	1	+24 V	Power
	2	0 V	
	3	FG	Frame ground
4	Alarm output connector		
	1	+	Scaled pulse output
	2	–	
	3	+	Flow rate alarm 1
	4	–	
	5	+	Flow rate alarm 2
	6	–	
5	Serial communication connector		
	1		For maintenance use
	2		
	3		
SMB connector			
IN			Sensor I/O signal on the upstream
OUT			Sensor I/O signal on the downstream

*Control start/stop input CN2 1, 2 Close: Controlling
Open: Stop

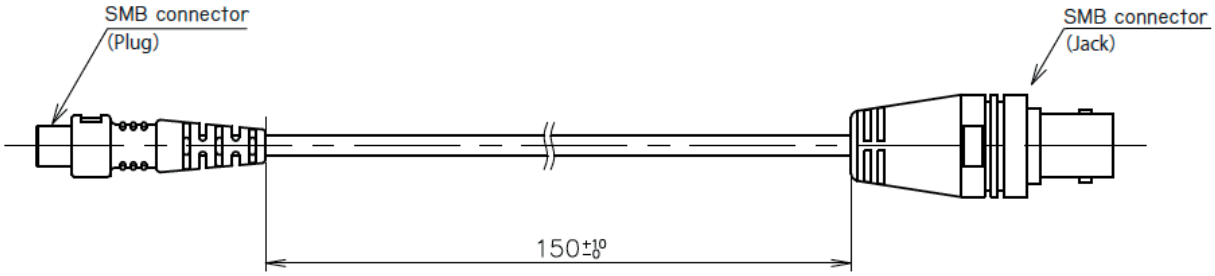
** Reset signal input for the totalizer CN2 5, 6 Close: Reset (one shot)
Open: Totalizing

SPS
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Conversion cable



Conversion cable between the SMB connector with a lock and the SMB connector
(For replacing from FCA-7000)



Conversion cable between the BNC connector and the SMB connector
(For replacing from FCA-5000 or using the existing UCUF)

A conversion cable between the SMB connector with a lock and the SMB connector is available, enabling the detector used for the FCA-7000 to be used for the FCA6000.
A conversion cable between the BNC connector and the SMB connector is available for adding controller to the line that is used for measuring the flow rate only by UCUF, or for replacing from the FCA-5000.

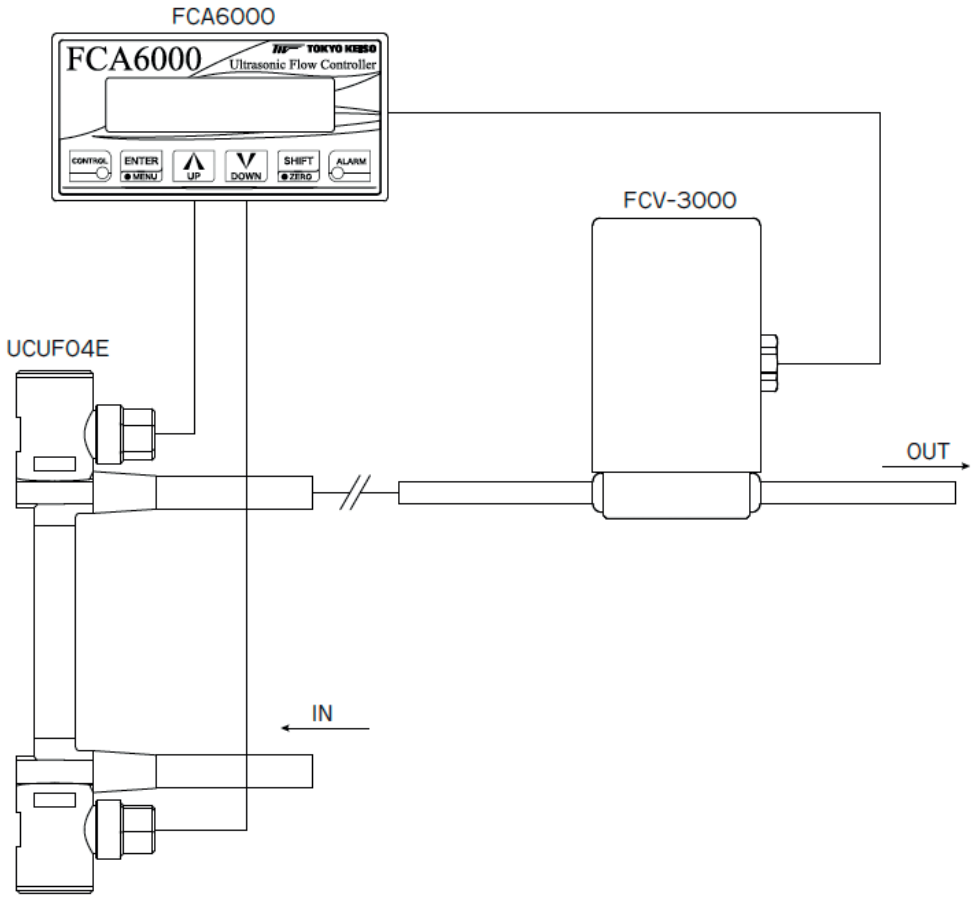
CONTROL PERFORMANCE AND ACCURACY

The FC6000 series is a feedback type control unit, which measures current flow and outputs a signal to actuate the control valve unit until the current flow goes to the set point.
It is possible to control with ±3% of the set point within about 3 seconds.

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EXAMPLE

When combining FCA6000, FCV-3000, and UCUF04E



CAUTIONS

1. The control valve should be installed on the downstream side of the flowmeter.
2. The control valve and flowmeter (detector) should be piped within 500 mm.
3. Do not use this control valve for piping with large pulsation (e.g., fluid supply by a diaphragm pump etc.).

*Specification is subject to change without notice.