Fuji Electric

Innovating Energy Technology

For liquid

Spool piece ultrasonic flowmeter (FST)

High accuracy for a wide range of applications

- ☑ Accuracy: ±0.2% of rate
- ☑ Easy-to-operate
- ☑ Low maintenance

21A1-E-0089

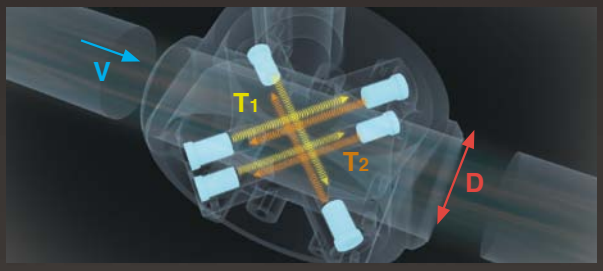
The highest level accuracy offers great advantages

Precise grasp of flow help you reduce energy consumption and costs.

Three pairs of sensors offer an accuracy of ±0.2% of rate

Wetted sensors are used to deliver highly sensitive measurement. Three parallel paths are arranged at selected positions to reduce the adverse effect of flow profile. Furthermore, we developed the unique algorithm to calculate the average value, thus achieving the high-precision. With no obstruction inside pipe, no pressure loss is generated.

Measuring principle: parallel three-path, transit time difference method



The sensors placed on upstream and downstream emit ultrasonic pulse in turn, and detect the transit time difference of the pulse to calculate the flow rate.

Flow velocity : $V = K \cdot (T_2 - T_1)$

Pipe cross-sectional areas : $A = \frac{\pi D^2}{4}$

Flow rate: $Q = A \cdot V$

Pipe inner diameter	: D
Transit time from upstream to downstream	: T_1
Transit time from downstream to upstream	: T_2
Flow coefficient	: K

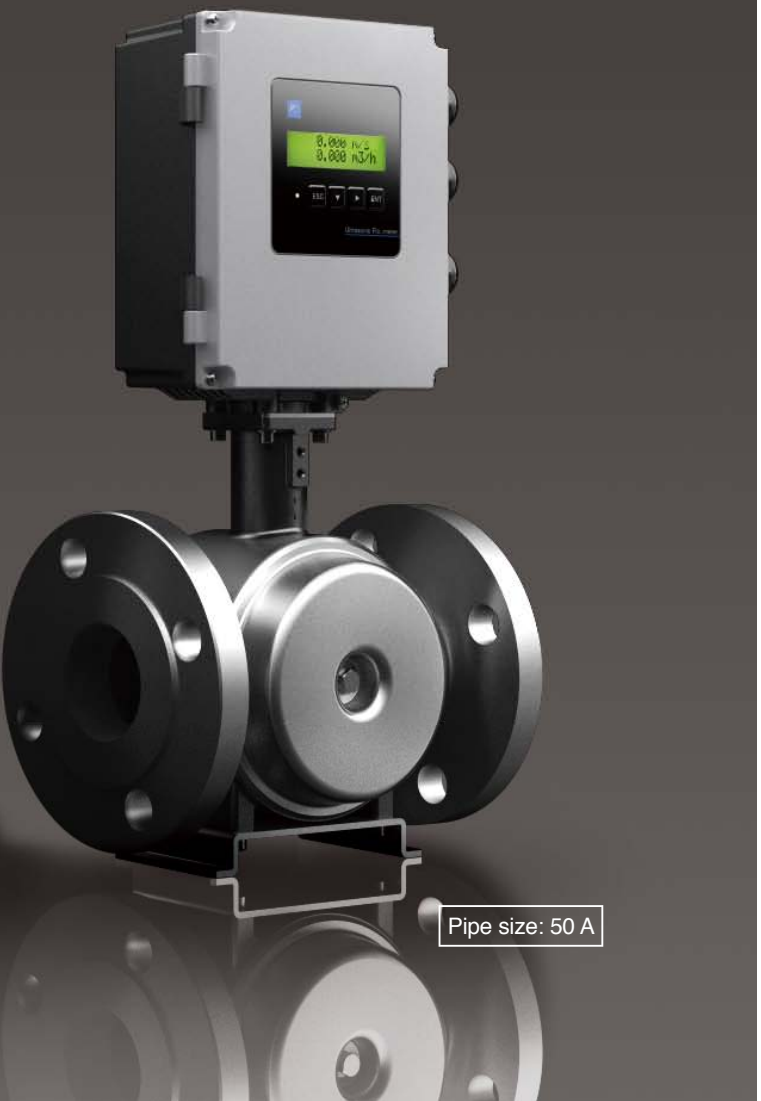
Offers various types of output

Operation from front panel

Accepts liquid from -40°C to 150°C

Pipe size: 100 A

Pipe size: 80 A

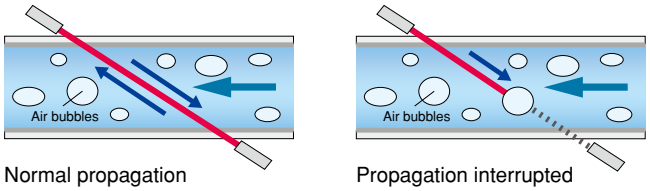


Accurate measurement for various liquid

Excellent bubble resistance

With the Fuji Electric advanced anti-bubble measurement technology, the interference of air bubbles is reduced.

Signal averaging



Normal propagation

Propagation interrupted by bubbles

Measurement failure may occur.

By averaging a set of several measurements, precise signals can be obtained.

Improved zero-point stability

Achieved by the advanced circuit design with the latest electronics and the digital signal processing technology.

Improved sensitivity (signal-to-noise ratio)

Offered by the newly developed high-sensitivity sensor and noise reduction technology

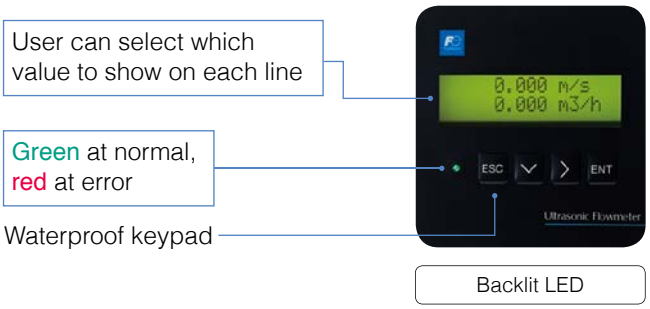
Accepts various types of fluid with temperature ranging from -40°C to 150°C

Non-conductive fluid such as oil, purified water, or a mixture can be measured.

Designed for ease of use

Operation from easy-to-see front panel

Front keys allow you to configure parameters, enter piping conditions, or calculate sensor spacing, without opening the cover. Measurement results are shown on the 16-digit 2-line LCD in Japanese, English, German, French, or Spanish. Self-diagnosis function tells you if an error occurs.



Selectable panel position

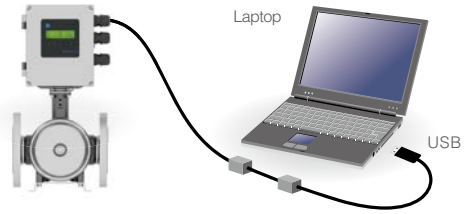
You can select the most suitable panel position for your application.

∗ See “Mounting/wiring port position” on Page 7.

Vertical mounting

Easy configuration and data management by PC

Parameter loader software, provided as standard, allows parameter setting and measurement data acquisition on PC. RS-485 communication is optionally available.



∗ A RS232C to RS485 converter is required.
If your PC does not support the RS232C serial interface, an USB to RS232C converter is additionally required.

Low maintenance

With no projections inside, the pipe is relatively free from contamination; which reduces the maintenance work.

Flexible output terminal

Equipped with terminals for insulated 4–20 mA DC analog output, pulse output, and alarm output.

Functions which make it reliable

[For reliability]

Zero point adjustment

During the flow is stopped, the zero point can be adjusted with a single push of a button.

Damping

Used to reduce fluctuation of measured values.
Setting range: 0 to 100 s (in 0.1 second steps)

Low flow cut-off

Output can be cut off when the flow rate is low.
Setting range: 0 to 5 m/s (in 0.01 m/s steps)

[For safety]

Alarm contact output

Emits output at hardware error and process error

Burnout

When there is no fluid in the pipe or there are air bubbles in the fluid, the flowmeter holds the analog output and emits a contact output.

Flow switch

Contact output is emitted when the instantaneous flow rate has reached the high or low limit.

Total switch

Contact output is emitted when the total flow rate (normal direction) has reached the high limit.

[For user convenience]

Unit selection

m/s, L/s, L/min, L/h, L/d, KL/d, ML/d, m^3/s, m^3/ min, m^3/h, m^3/d, Km^3/d, or Mm^3/d

Bi-directional range

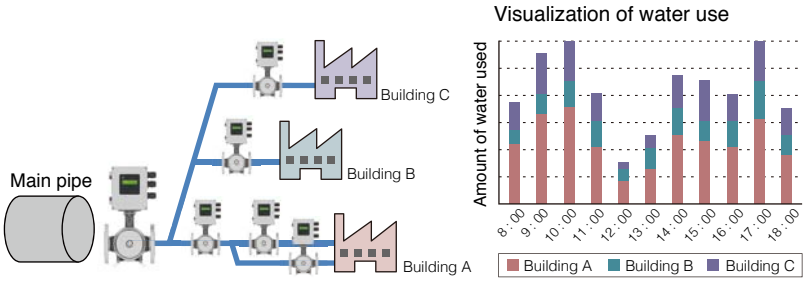
User can select between normal and reverse range. Operating range can be emitted as contact output.

Auto-switchable two ranges

Typical applications

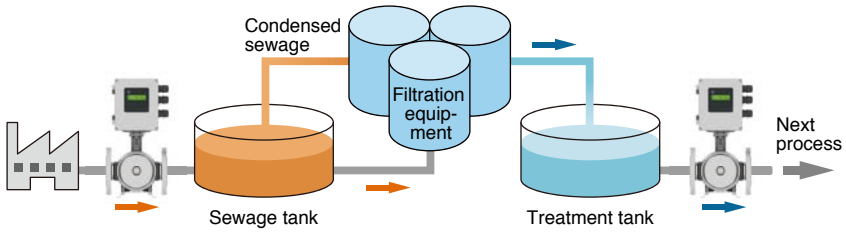
Reduction of water used in plant utilities

By visualizing the water use by facility or by time-domain, excessive water consumption can be eliminated.



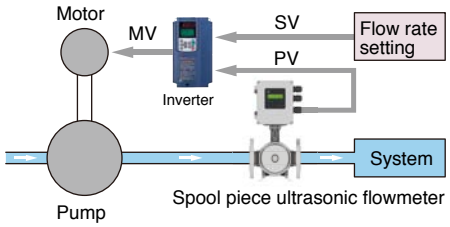
Flow monitoring in filtration equipment

Real-time visualization of the filtration capacity allows you to optimize the flow rate. Less pressure loss also help you save energy.



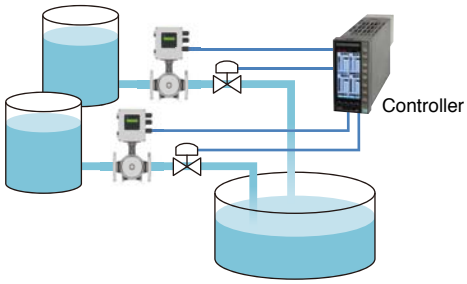
Motor load reduction

Controlling the flow rate by using an inverter instead of a valve allows you to suppress the load on the motor, thus reducing the power consumption. You can also save the cost for a valve.



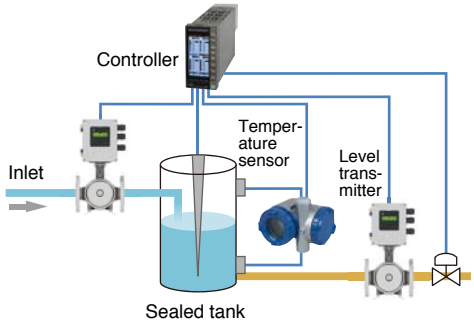
Flow measurement on two pipes

Allows the flow control for each pipe with an optimal ratio.



Liquid level control in tanks

Monitoring the flow rate at inlet and at outlet enables you to manage the liquid level in a tank.

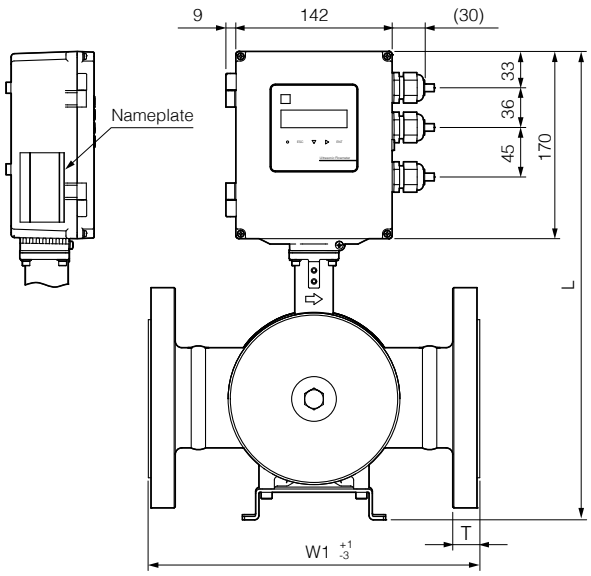


Suitable for a wide range of applications

- Cooling/heating water and drainage in steel plants, chemical plants, or air conditioning systems
- Purified water and drainage in water treatment
- Cooling water and hot water in boilers
- Various liquid in paper & pulp plants
- Cooling water in cement plants
- Cooling water, hot water and drainage in waste treatment plants

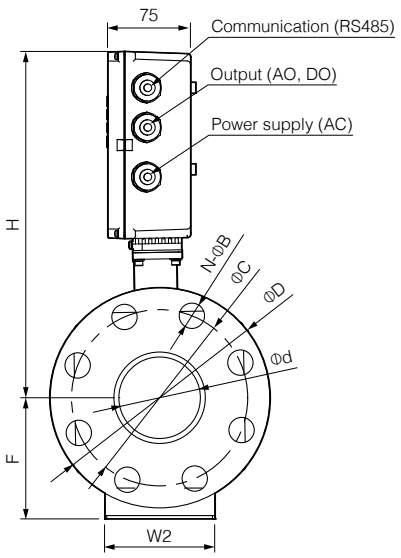
Dimensions (in mm)

Front view



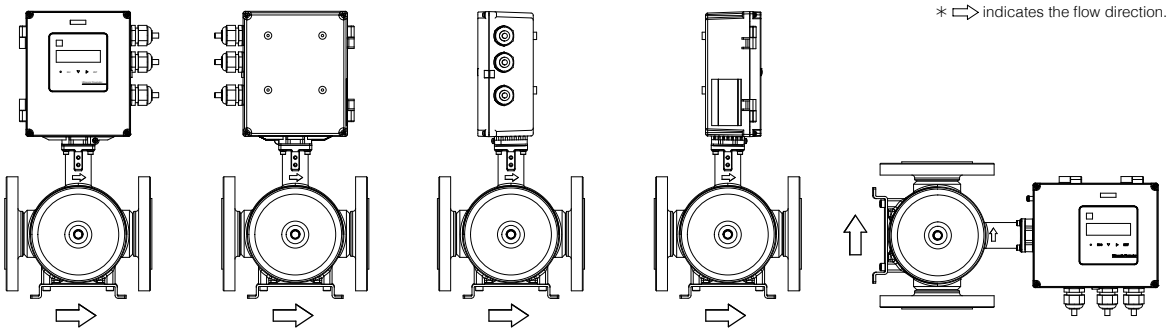
Pipe size	50 A	80 A	100 A
W1	200	300	300
W2	70	100	124
Φd	50	74	97
H	303	316	330
F	87	110	132
L	390	426	462

Flange (6th code)



Pipe size		50 A	80 A	100 A
JIS 10K Flange (6th code: 1)	ΦD	155	185	210
	ΦC	120	150	175
	N-ΦB	4-19	8-19	8-19
	T	16	18	18
	Weight in kg	10.5	18.5	22.5
JIS 20 K Flange (6th code: 2)	ΦD	155	200	225
	ΦC	120	160	185
	N-ΦB	8-19	8-23	8-23
	T	18	22	24
	Weight in kg	11.5	19.5	23.5
ANSI 150LB Flange (6th code: 3)	ΦD	150	190	229
	ΦC	120.7	152.4	190.5
	N-ΦB	4-19.1	4-19	8-19
	T	19.1	23.9	23.9
	Weight in kg	10.5	18.5	22.5
ANSI 300LB Flange (6th code: 4)	ΦD	165	210	254
	ΦC	127	168.1	200
	N-ΦB	8-19.1	8-22	8-22
	T	22.3	28.6	31.8
	Weight in kg	11.5	19.5	23.5
DIN PN16 Flange (6th code: 5)	ΦD	165	200	220
	ΦC	125	160	180
	N-ΦB	4-18	8-18	8-18
	T	18	20	20
	Weight in kg	10.5	18.5	22.5
DIN PN40 Flange (6th code: 6)	ΦD	165	200	235
	ΦC	125	160	190
	N-ΦB	4-18	8-18	8-22
	T	20	24	24
	Weight in kg	11.5	19.5	23.5

Mounting/wiring port position



(11th code: A) (11th code: B) (11th code: C) (11th code: D) (11th code: E)

11th code	A	B	C	D	E
Mounting	Horizontal	Horizontal	Horizontal	Horizontal	Vertical (upward flow)
Wiring port	on downstream side	on upstream side	on the right side seen from upstream	on the left side seen from upstream	on upstream side (i.e. bottom side)

Specifications

Principle	Transit time difference method (parallel 3-path)
Pipe size	Φ50 mm, Φ80 mm, Φ100 mm
Flange rating	JIS10K/JIS20K, ANSI 150/300, DIN PN16/40
Accuracy	±0.2% of rate (flow velocity: 1 m/s to 10 m/s)
Fluid pressure	Up to flange rating
Fluid temperature	-40°C to +150°C
Measuring range	Flow velocity: 0 to ±0.3…..±10 m/s
Wetted parts material	stainless steel 316L
Output signal	4–20 mA DC, total pulse, alarm output
Display	16-digit 2-line backlit LCD 2-color LED (green: normal, red: at error)
Functions	Zero point adjustment, damping, low-flow cutoff, alarm, output burnout, output limit, bi-directional range, automatic two ranges, flow switch, total switch, preset total, data backup at power outage
Communication (option)	RS-485
Data backup at power outage	on nonvolatile memory
Power supply voltage	100–240 V AC, 50/60 Hz
Grounding	D-class grounding with ground resistance of 100Ω or less
Arrestor	provided as standard, on power supply port and analog output port
Power consumption	Approx. 20 VA
Ambient temperature	-40°C to 60°C
Ambient humidity	90% RH or less
Waterproof	IP66
Unit	Flow velocity: m/s Flow rate: L/s, L/min, L/h, L/d, kL/d, ML/d, m^3/s, m^3/min, m^3/h, m^3/d, km^3/d, Mm^3/d

Ordering code

Digit	Specifications	1	2	3	4	5	6	7	8		9	10	11	12
		F	**S**	**T**	**1**			**1**	**1**	**-**				**Y**
4	Enclosure													
	Non-explosion-proof				1									
5	Pipe size													
	50 A					D								
	80 A (∗)					F								
	100 A (∗)					G								
6	Flange rating and material													
	JIS10K/SS316L						1							
	JIS20K/SS316L						2							
	ANSI 150LB/SS316L						3							
	ANSI 300LB/SS316L						4							
	DIN PN16/SS316L						5							
	DIN PN40/SS316L						6							
7	Power Supply													
	100–240 V AC, 50/60 Hz							1						
8	Revision code								1					
9	Parameter setting/tag plate													
	None										Y			
	With setting										A			
	With setting + tag										B			
	With tag										C			
10	Communication													
	None											Y		
	RS-485											D		
11	Mounting/wiring port position													
	Horizontal/on downstream side												A	
	Horizontal/on upstream side												B	
	Horizontal/on the right side seen from upstream												C	
	Horizontal/on the left side seen from upstream												D	
	Vertical/on bottom side												E	
12	Wiring port													
	1/2 G internal thread/ Plastic water-proof gland + rubber plug													Y

∗ Φ80 and Φ100 versions will be released soon.

Scope of delivery
Flowmeter
CD-ROM (Japanese/English/Chinese instruction manual, parameter loader software)
Note) Bolts, nuts, and gaskets used for connecting with flange are not provided.

Spool piece ultrasonic flowmeter: introduction movie

Read the QR code with your smartphone or tablet, or access the following URL:

http://www.fujielectric.com/products/instruments/movie/spool_video.html

⚠ Caution on Safety

∗ Before using products in this catalog, be sure to read their instruction manuals in advance.

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Printed in Japan 2016-4/5FOLS