Fuji Electric

Innovating Energy Technology

Spool Piece Ultrasonic Flowmeter (FST)

for liquid applications

Advanced Features for a Wide Range of Applications

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

21A1-E-0089a

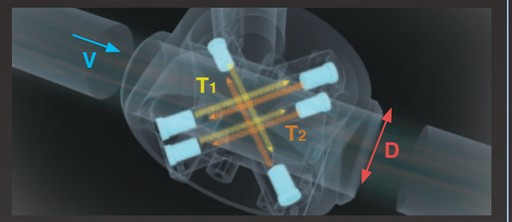
Unparalleled Accuracy for Optimal Performance

Precision measurement of flow helps reduce costs and energy consumption

Three Pairs of Sensors for 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



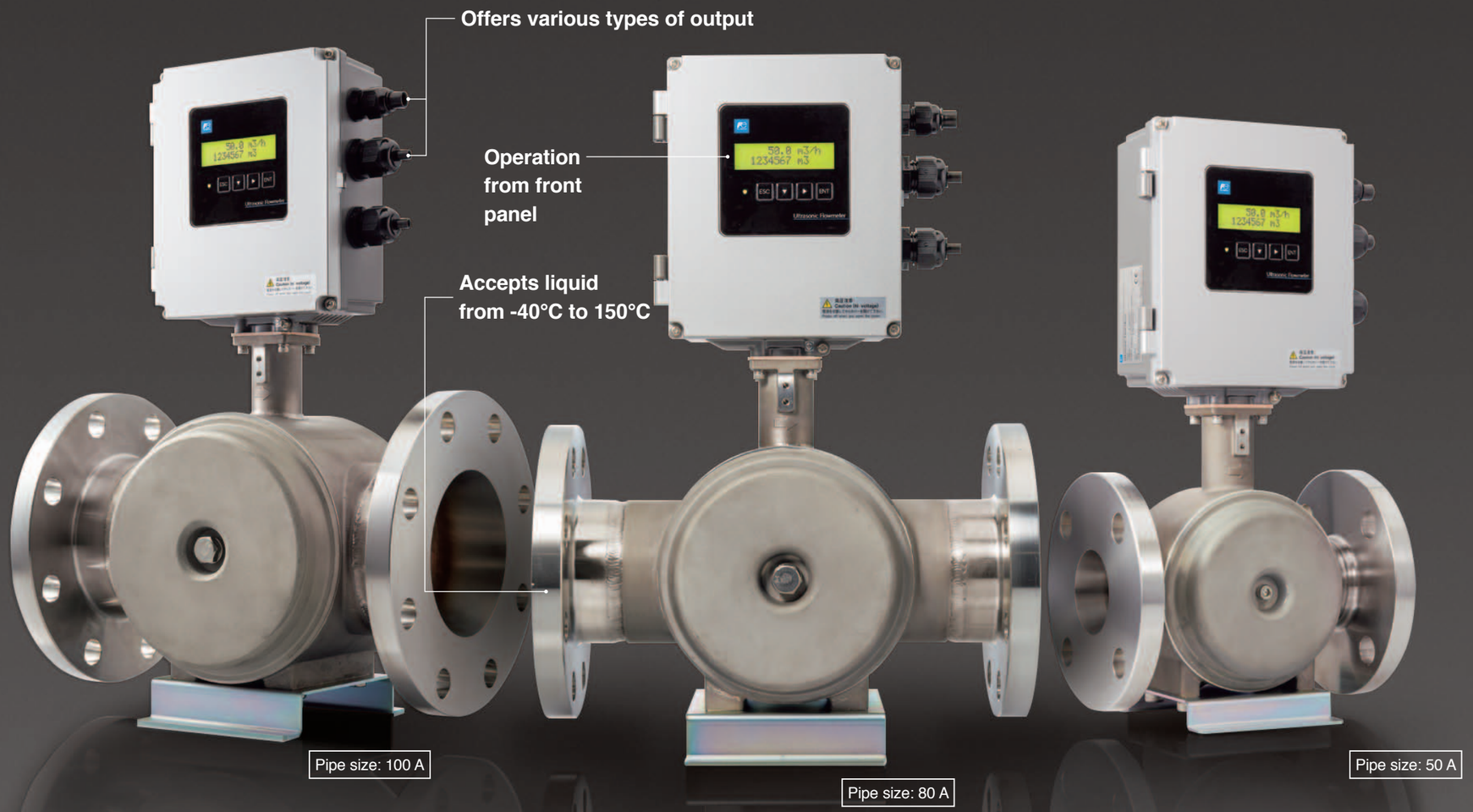
The sensors placed on upstream and downstream emit ultrasonic pulse in turn, and detect the transit time difference of the pulse to calculate the flow rate.

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 with flow	: T_1
Transit time against flow	: T_2
Flow coefficient	: K

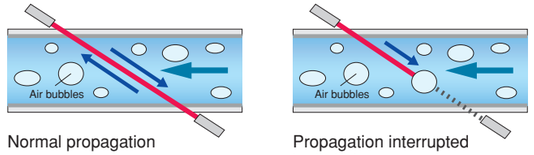


Precision Measurements for Various Liquids

Superior bubble resistance

Fuji Electric's advanced anti-bubble measurement technology reduces the interference of air bubbles to ensure accurate measurements.

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 a combination of the advanced circuit design, the latest electronics, and innovative digital signal processing technology.

Improved Sensitivity

Newly-developed high-sensitivity sensors and noise reduction technology result in improved signal-to-noise ratio.

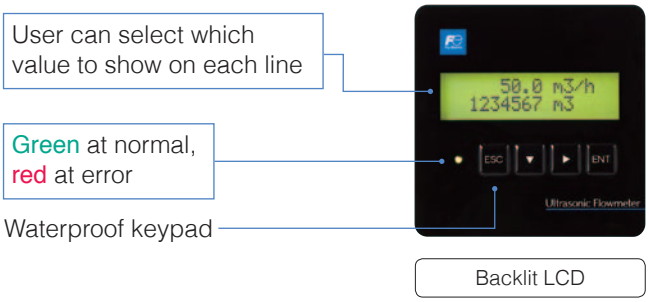
Accepts Various Types of Fluid with Temperature Ranging from -40°C to 150°C

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

Designed for Ease-of-Use

Backlit LCD and Front Panel Operation

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

Convenient Configuration and Data Management from 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, a USB to RS232C converter is required.

Low Maintenance

The lack of projections inside keeps the pipe almost entirely free from contamination, thereby reducing maintenance work.

Flexible Output Terminal

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

Reliability. Safety. Convenience.

Reliability

Zero point adjustment
When 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)

Safety

Event-triggered alarms
Alarm output is activated upon instances of hardware error and/or process error.

Output 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 (forward direction) has reached the high limit.

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

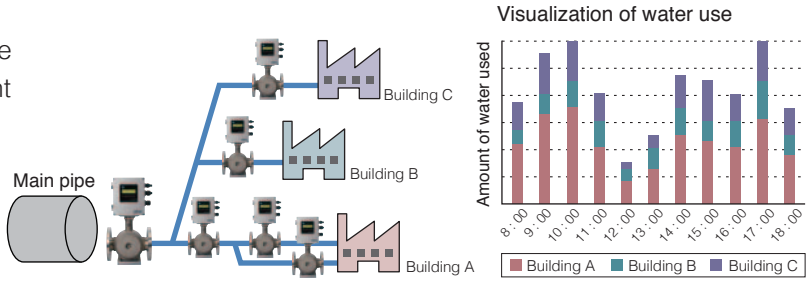
Bi-directional range
User can configure a range for each of forward flow and reverse flow. Operating range can be emitted as contact output.

Auto-switchable ranges
User-defined two ranges can be switched automatically.

Applications

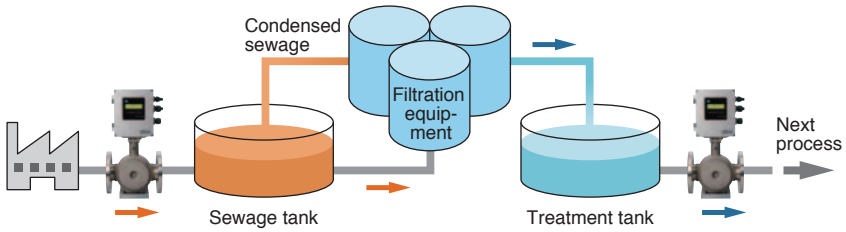
Reduction of water used in plant utilities

Visual depiction of a facility's water use results in more effective management of water consumption.



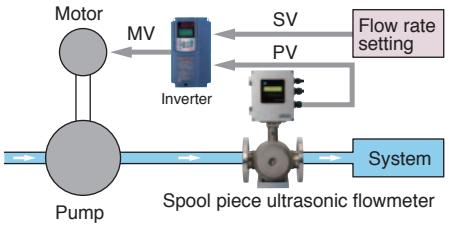
Flow monitoring in filtration equipment

Real-time visualization of the filtration capacity allows for the optimization of flow rates, while reductions in pressure loss result in energy savings.



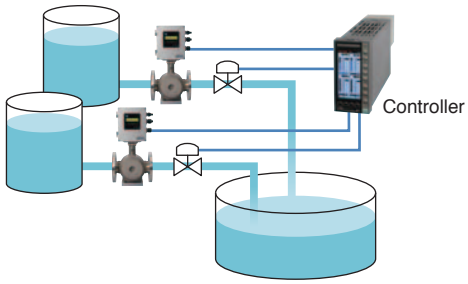
Motor load reduction

Reductions in power consumption are achieved by using an inverter only, instead of a combination of motorized valve and controller to control flow rate.



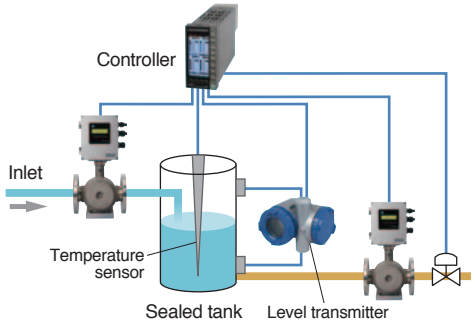
Flow measurement on two pipes

Optimal ratio of flow control for both pipes



Liquid level control in tanks

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

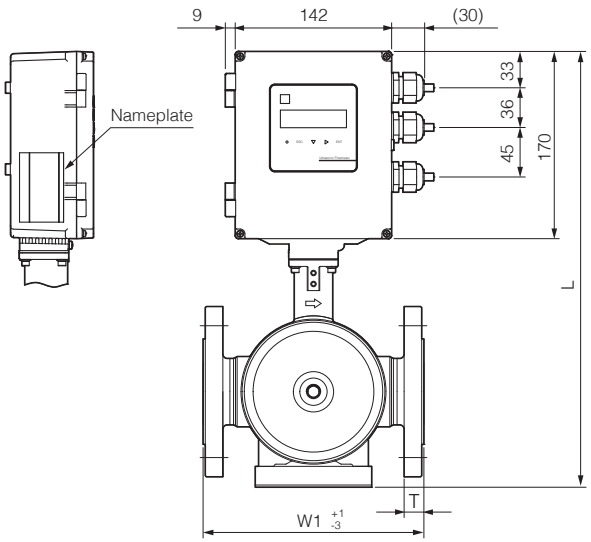


…and more

- 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 liquids in paper & pulp plants
- Cooling water in cement plants
- Cooling water, hot water and drainage in waste treatment plants

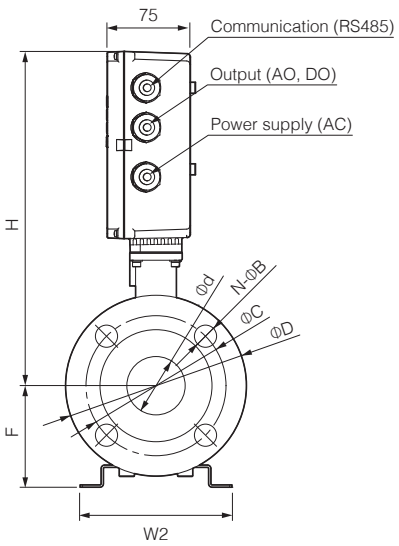
Dimensions (in mm)

Front view



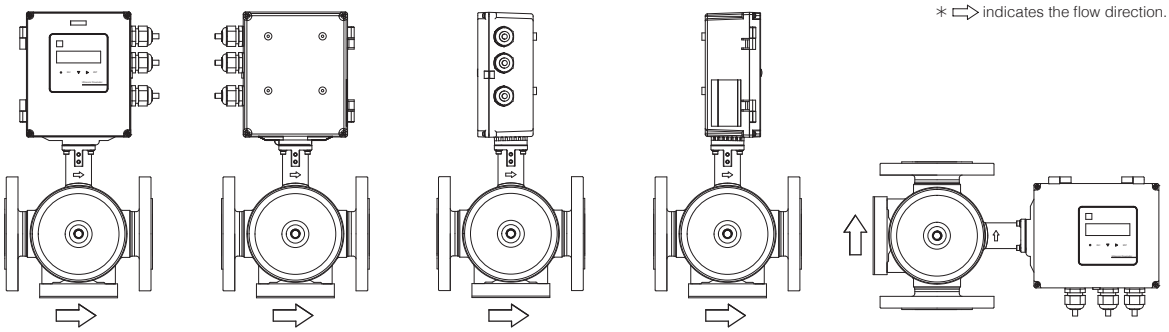
Pipe size	50 A	80 A	100 A
W1	200	300	300
W2	130	160	160
Φd	50	74	97
H	303	315	326
F	87	120	129
L	390	435	455

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	13	18	23
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	13	21	26
ANSI 150LB Flange (6th code: 3)	ΦD	150	190	229
	ΦC	120.7	152.4	190.5
	N-ΦB	4-19	4-19	8-19
	T	19.1	23.9	23.9
	Weight in kg	13	21	27
ANSI 300LB Flange (6th code: 4)	ΦD	165	210	254
	ΦC	157	168.1	200
	N-ΦB	8-19	8-22	8-22
	T	22.3	28.6	31.8
	Weight in kg	15	25	35
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	14	21	24
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	15	22	28

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

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.

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