FUJI ELECTRIC

Fuji Instrumentation & Control

Ultrasonic Flowmeters

TIME DELTA Series
PORTAFLOW X Series

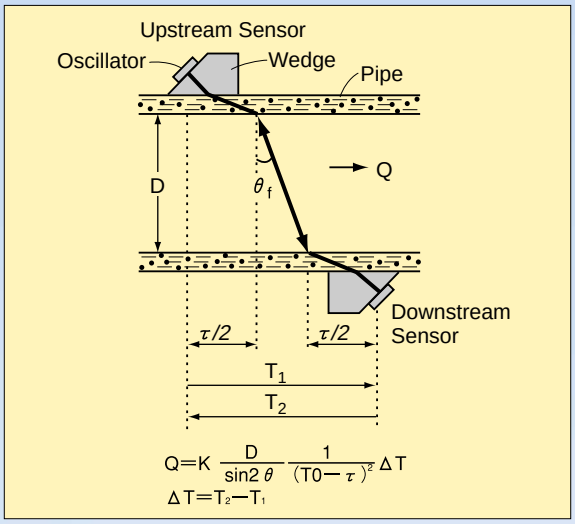
ECXNO:618b

Affluent experience in Ultrasonic flow measurement

Fuji Electric have over 25years experience in development and manufacturing of Ultrasonic Flowmeters.
More than 20,000 units have been installed all over the world.

Basic Measuring Principle "TRANSIT-TIME Difference"

All Fuji's Ultrasonic flowmeters measure flow rate by utilizing the Transit-Time Difference Principle.
Simply, two ultrasonic sensors are mounted on the pipe exterior. Each transmits an ultrasonic pulse to the opposite sensor. The difference in the transit times of the two waves is used to calculate the flow velocity.
Compared to the other popular principle, "Doppler", "Transit-time" has better performance in accuracy and measurable flow range.



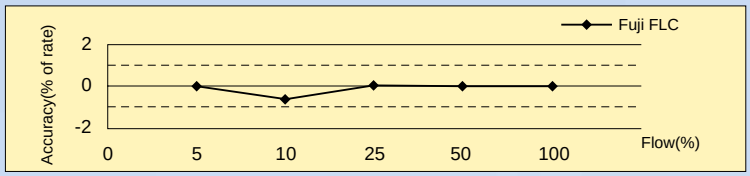
A Wide-Range of Applications

- **Water Service and Sewage Treatment**
  Locate water leaks or determine flow direction in service pipes.
- **Chemical Plants**
  Measure chemical liquid which is corrosive and high viscous
- **Power Plants and Generating Facilities**
  Monitor flow of boiler feed water supply, condensate, turbine oil, etc.
- **Processing Plants**
  Measure cooling water or corrosive liquids.
- **Food and Beverage Processors**
  Use with products for sanitary condition or washing and process water.
- **Semiconductor Manufacturing**
  Install on pure water feed lines.
- **Office and Large Residential Environments**
  Applicable to either fresh water supplies or heating and cooling water.
- **Hot and Cold Ground Water Draw Rates**
  In the field or at pumping stations.
- **Pulp and Paper Plants**
  Monitor clean water or wash water usage.
- **Plating and Finishing Operations**
  Applications include process water and petroleum based fluids.
- **Pumping Efficiency**
- **Leakage Detection**

Superior Measurement Performance by High-Speed Digital Signal Processing

Our technical breakthrough based on years of experience and the adoption of the latest digital processor (32bit MPU), enabled Fuji's Ultrasonic flowmeters to provide remarkable features;

■High Accuracy : typically ±0.5 to 1% of reading



■Repeatability : ±0.2 to 0.5% full scale

■Quick Response : 0.5 to 1sec

■Broad Measuring Range

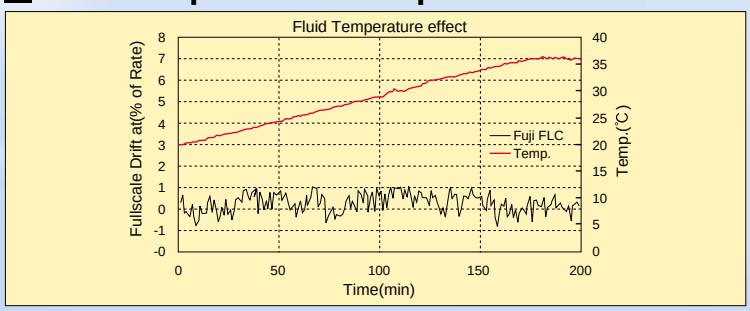
Temperature : —40 to + 200℃
Rangeability : 0.02 to 32m/s (1600 : 1)
Pipe diameter : 13mm to 6000mm

■New Sound Velocity Measurement System[PAT.]

-Auto Calculation of unknown sound velocity
-Auto-Temp./Press. Compensation

Sound velocity of measured fluid is influenced while pressure and temperature change. "New Sound Velocity Measurement System[PAT.]" realizes temp./press. compensation which is essential for precise flow velocity measurement, by measuring sound velocity of measured fluid at every measuring cycle.

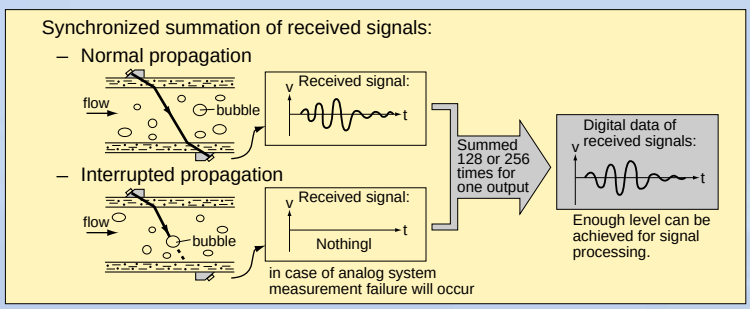
■Auto-Temp./Press. Compensation function



■Advanced Anti Bubble Measurement : ABM

(No problem up to 12% vol. bubble in flow fluid at 1m/s)

※See Note 1

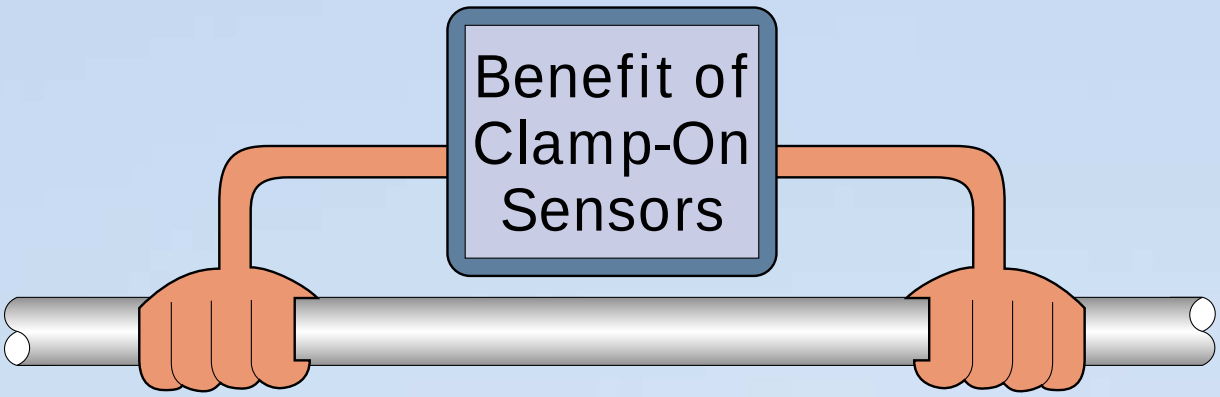


32Bit High Speed MPU

Note1 :Flow Velocity < 1m/s.

Clamp-on type Non-intrusive sensor benefits “Cost saving” and “Easiness in maintenance” in ownership.

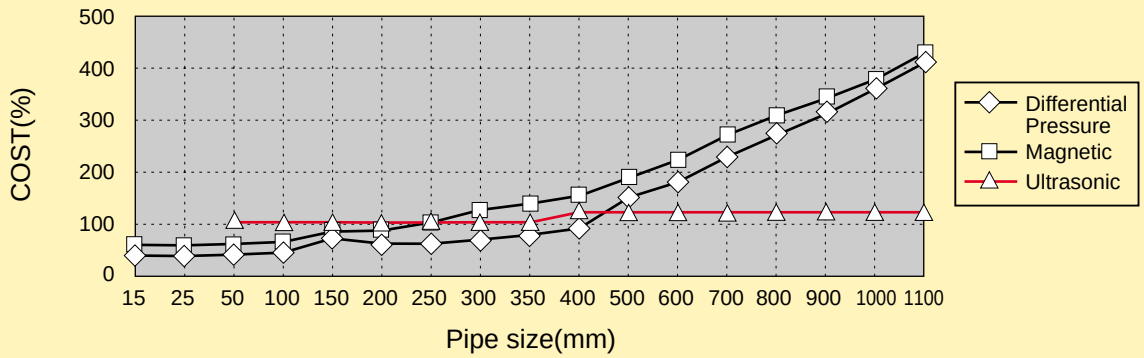
Thanks to the Non-intrusiveness of clamp-on sensors, we can offer the ideal solution to the users of ordinary intrusive or spool-piece type flowmeters
(ex. Differential Pressure, Electromagnetic, Turbine, etc.)
The advantages of Clamp-on mounting are ;



- **Easy installation (No Pipe Work required)**
- **Simple maintenance thanks to no moving parts**
- **Free from Pressure Loss, Choking and Corrosion and Leakage.**

These features of Clamp-on sensors result the reduction of the total ownership cost.

Comparison of TOTAL OWNERSHP COST with major rivals



Why not choose Ultrasonic?

Please check whether your flowmeter working in line is really the best choice.

Wide Coverage in Product Line-up

From permanent on-line measurcment in process monitoring to temporary need for checking at one place to another, Fuji Electric can offer most suitable flowmeter from various models.

Fixed type for monitoring & control.

TIME DELTA S

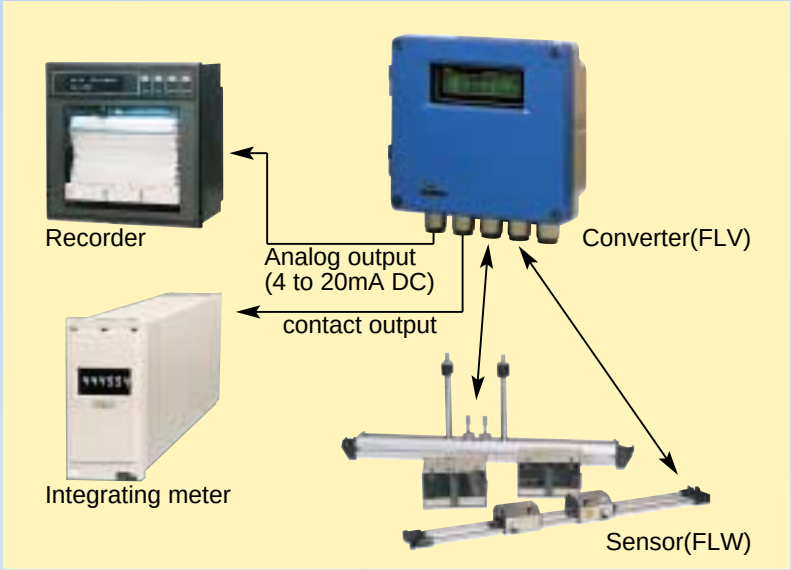
(Model : FLV2/FLW2)

◇Compact and light weight. (H220 x W230 x D95mm, about 4.5kg)

◇Excellent performance and easy operation. Large LCD with back light and function keys allow easy configuration and trouble shooting.

◇Full variety of sensors, (small sensor, large sensor, high-temperature sensor. Explosion-proof type per CENELEC Std. can be also available.)

◇RS-232C computer/control systems interface.



Two path measuring ultrasonic flowmeter

TIME DELTA F

(Model : FLH3/FLW2)

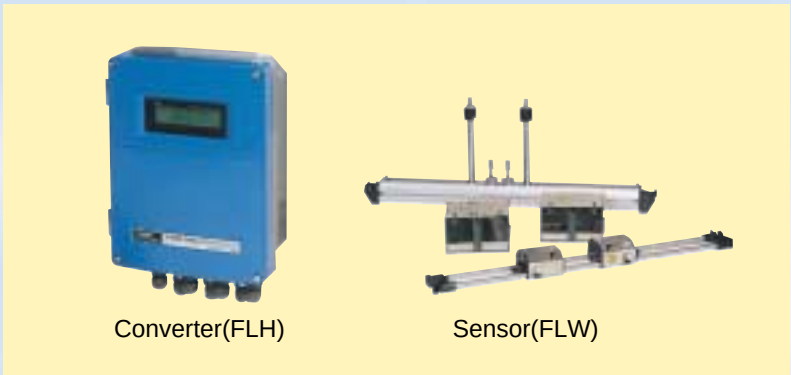
◇Simultaneous 2-path or 2-pipe system.

◇Compact and light weigh.

◇Full variety of sensors.

◇High accuracy.

◇Excellent performance and easy operation.



Portable type for checking.

PORTAFLOW X

(Model : FLC/FLD)

◇Improved operator display by graphic LCD.

◇Simple operation through page selection.

◇Choice of AC, DC or Internal Rechargable Battery Power.

◇Integrated type graphic printer. (option)

◇Powerful Data Logging function. (20 points, 40,000 readings)

◇RS-232C computer/control systems interface.

◆Page menu screen

Flow monitoring screen

Flow rate, flow velocity and integrated value are indicated simultaneously.

Trend display screen

A flow rate trend graph is displayed.

Site setup screen

Pipe parameter setting up to 20 measuring points.

Specification

<table>
<tr><td>Type</td><td>FLV-2/FLW-2</td><td>FLH-3/FLW-2</td><td>FLC/FLD</td></tr>
<tr><td>Applicable inside-diameter</td><td colspan="2">ϕ50 to ϕ6000mm</td><td>ϕ13 to ϕ6000mm</td></tr>
<tr><td>Type of sensor applicable fluid temperature</td><td colspan="2">Small type sensor : ϕ50 to ϕ400mm
(— 40℃ to + 80℃)
Large type sensor : ϕ200 to ϕ6000mm
(— 40℃ to + 80℃)
High-temperature sensor : ϕ50 to ϕ400mm
(— 40℃ to + 200℃)</td><td>Small diameter pipe : ϕ13 to ϕ100mm
(— 40℃ to + 100℃)
Small type sensor : ϕ50 to ϕ400mm
(— 40℃ to + 100℃)
Large type sensor : ϕ200 to ϕ6000mm
(— 40℃ to + 80℃)
High-temperature sensor : ϕ50 to ϕ400mm
(— 40℃ to + 200℃)</td></tr>
<tr><td>Measurement range</td><td colspan="3">Flow rate 0 to ±0.3m/s ··· ±32m/s</td></tr>
<tr><td>Measured fluid</td><td colspan="3">Any liquid through which ultrasonic signal can pass.</td></tr>
<tr><td>Accrracy
Straight length of pipe shall be 10D up stream, 5D down stream.</td><td colspan="2"><table><tr><th>Pipe size</th><th>Flow velocity</th><th>Accurcy</th></tr><tr><td rowspan="2">ϕ50 to ϕ300 or less</td><td>2m/s to 32m/s</td><td>±0.5 to 1.0% of rate</td></tr><tr><td>0m/s to 2m/s</td><td>0.02m/s</td></tr><tr><td rowspan="2">ϕ300 to ϕ6000</td><td>1m/s to 32m/s</td><td>±0.5 to 1.0% of rate</td></tr><tr><td>0m/s to 1m/s</td><td>0.01m/s</td></tr></table></td><td><table><tr><th>Pipe size</th><th>Flow velocity</th><th>Accuracy</th></tr><tr><td rowspan="2">ϕ13~ϕ50 or less</td><td>2m/s to 32m/s</td><td>±0.5 to 1.5% of rate</td></tr><tr><td>0m/s to 2m/s</td><td>0.03m/s</td></tr><tr><td rowspan="2">ϕ50~ϕ300 or less</td><td>2m/s to 32m/s</td><td>±0.5 to 1.0% of rate</td></tr><tr><td>0m/s to 2m/s</td><td>0.02m/s</td></tr><tr><td rowspan="2">ϕ300~ 6000</td><td>1m/s to 32m/s</td><td>±0.5 to 1.0% of rate</td></tr><tr><td>0m/s to 1m/s</td><td>0.01m/s</td></tr></table></td></tr>
<tr><td>Response characterristic</td><td>0.5sec or less</td><td>1.5sec or less</td><td>1.0sec</td></tr>
<tr><td>Display</td><td colspan="2">16digits, 21lines (LCD with backlight)</td><td>LCD (320 x 240 dut) with Backlight</td></tr>
<tr><td>Analog output</td><td>4 to 20mA DC, 1point</td><td>4 to 20mA DC, 3points</td><td>4 to 20mA DC, 1point</td></tr>
<tr><td>Integration status output</td><td>2points (open-collector)</td><td>6points (open-collector)</td><td>—</td></tr>
<tr><td>Communication interface</td><td>RS-232C</td><td>RS-232C or
RS-485</td><td>RS-232C</td></tr>
<tr><td>Cable length</td><td colspan="3">150m max. (as specified)</td></tr>
<tr><td>Ambient temperature</td><td colspan="2">Converter : —20℃ to + 50℃
Sensor : —20℃ to + 60℃
Sensor cable : —20℃ to + 60℃</td><td>Converter : —10℃ to + 55℃ (without printer)
—10℃ to + 45℃ (with printer)
Sensor : —20℃ to + 60℃
Sensor cable : —20℃ to + 60℃</td></tr>
<tr><td>Converter size/mass</td><td>220 x 230 x 95mm</td><td>390 x 240 x 134mm</td><td>127 x 240 x 70mm (without printer)
127 x 359 x 70mm (with printer)</td></tr>
<tr><td>Display function</td><td colspan="2">· Actual scale display of instantaneous flow rate and flow velocity
· Actual scale display of normal/reverse integrated volume
· Self-diagnosis display of cause and processing method</td><td>· Instantaneous flow velocity and flow rate.
· Integrated value
· Direction of flow
· Trend graph
· Logging data, etc.</td></tr>
<tr><td>Air bubble resistance measurement</td><td colspan="3">Advanced ABM function
ABM : Anti Bubble Measurement</td></tr>
<tr><td>Temp./press. compensation</td><td colspan="3">New Sound Velocity Measurement System</td></tr>
<tr><td>Power source</td><td>100 to 240V AC, 50/60Hz
or 20 to 30V DC</td><td>100 to 120V AC or
200 to 240V AC 50/60Hz</td><td>Rechargable Ni-Cd Battery, 100 to 240V AC
or 10 to 30V DC</td></tr>
<tr><td>Number of measuring lines</td><td>1</td><td>2</td><td>1</td></tr>
<tr><td>Automatic range selection</td><td colspan="2">Automatic 2-range selection</td><td>—</td></tr>
<tr><td>Hazardous Condition</td><td colspan="3">EEx mⅡ T6 (Tamb ≤ 60℃) per CENELEC Std, EN50014 & EN50028 for explosion-proof sensors FLW1, 4 & 5 Combined with the converter FLV specific to them</td></tr>
</table>

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