The latest advance in high performance
transit time flow measurement

Superior signal processing and
best-in-class anti-bubble performance
in a compact and lightweight package

- **High accuracy measurement**: 1.0% of rate
- **Superior anti-bubble performance**: Our Advanced ABM method * is adopted.
- **Maintenance free operation**: Non-invasive setup with no moving parts
- **Compact and lightweight**: Size and mass reduced by 2/3 (compared with model FLV).
- **Flexible communication functions**: RS-232C or RS-485 (MODBUS) (option)
- **Wide application range**: φ13 to φ6000mm applicable pipe diameters
- **Quick and easy setup**: Simple menu guided setup from the front panel or PC interface

* Advanced ABM method: anti-bubble measuring method.

Fuji Electric Co., Ltd.
Applicable pipe diameter is \( \phi 13\text{mm} \) to \( \phi 6000\text{mm} \)

- High accuracy measurement of fluid flow rate: 1.0% of rate
- Quick response: 0.2 sec. or less (quick response mode)
- Minimal Influence by the pressure of measured fluid and temperature
- Superior anti-bubble performance (Advanced AMB method * is adopted.)

* Advanced AMB method: anti-bubble measurement method

Advanced received signal digital processing results in higher performance flow measurement

- Normal propagation
- Propagation interrupted by bubble

Digital data of the received signals:

- Synchronized summation of received signals

Summed 128 or 256 times for a single output

Flow velocity

<table>
<thead>
<tr>
<th>Flow velocity [m/s]</th>
<th>Acceptable value of bubble quantity [vol.%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

(Note) Flowmeter indicates the volumetric flow rate, including bubbles.

Conventional method

Advanced ABM method

A wide range of detectors is available, and no piping work is required

(A detector is simply attached to the exterior of the piping.)

<table>
<thead>
<tr>
<th>Classification</th>
<th>Appearance</th>
<th>Detector type</th>
<th>Applicable pipe inner diameter (mm)</th>
<th>Measured fluid temperature</th>
<th>Mounting/structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact type</td>
<td></td>
<td>FLSE1</td>
<td>( \phi 25 ) to ( \phi 100 )</td>
<td>-20 to 100°C or 0 to 120°C</td>
<td>V method mounting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FLSE2</td>
<td>( \phi 50 ) to ( \phi 225 )</td>
<td></td>
<td>Jet structure (equivalent to IP65)</td>
</tr>
<tr>
<td>Small diameter type</td>
<td></td>
<td>FSD22</td>
<td>( \phi 13 ) to ( \phi 100 )</td>
<td>-40 to 100°C</td>
<td>V mounting method</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FSD32</td>
<td>( \phi 50 ) to ( \phi 400 )</td>
<td>-40 to 200°C</td>
<td>V or Z method mounting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FSGS3</td>
<td>( \phi 50 ) to ( \phi 300 )</td>
<td>-40 to 80°C</td>
<td>V method mounting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FSGS4</td>
<td>( \phi 200 ) to ( \phi 1200 )</td>
<td>-40 to 80°C</td>
<td>V or Z method mounting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FSGS5</td>
<td>( \phi 200 ) to ( \phi 6000 )</td>
<td>-40 to 80°C</td>
<td>Submersible type available</td>
</tr>
</tbody>
</table>

Common type

- V method mounting
- Watertight structure (equivalent to IP67)
- Submersible type available

High temperature type

- V or Z method mounting
- Splash-proof structure (equivalent to IP52)

Large diameter type

- V or Z method mounting
- Watertight structure (equivalent to IP67)
- Submersible type available

Measuring principle

With ultrasonic pulses propagated diagonally between the upstream and downstream sensors mounted on the exterior of the pipe, the flow rate is measured by detecting the time difference caused by the flow.
Both the mass and volume of the flow transmitter are reduced by 2/3!

- **Compact and lightweight flow transmitter (1/3 size of model FLV)**
  Easy to carry and install on a system

  ![Image of FLV and FSV types](image)

- **Operation can be performed from the outside panel**
  (In case of IP66 type)
  Various settings can be made from the front side without opening the cover of the flow transmitter. (Parameter setting, input of mounted pipe data, automatic calculation of mounting dimensions and similar)

- **Parameter setting and data collection can be performed via optional PC communications interface.**

- **Signal and process interfaces are designed with functionality as priority.**

  ![Signal & Process Interfaces](image)

- **Fully equipped with extensive functions**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero adjustment</td>
<td>One-touch adjustment while the flow is stopped</td>
</tr>
<tr>
<td>Damping</td>
<td>Used to reduce the fluctuation of the measured value. Setting range: 0 to 100 sec. (setting per 0.1 sec.)</td>
</tr>
<tr>
<td>Low flow rate cut</td>
<td>Output may be cut when the flow rate is low. Setting range: 0 to 5 m/s (setting in 0.01 m/s unit)</td>
</tr>
<tr>
<td>Alarm contact output</td>
<td>Contact output at condition of hardware and process faults</td>
</tr>
<tr>
<td>Output burnout</td>
<td>When measurement cannot be made because the pipe is empty or bubbles are entrained in the fluid, contact output is activated while analog output is held.</td>
</tr>
<tr>
<td>Forward and backward ranges</td>
<td>Ranges may be set arbitrarily. The digital output of the operation range is available.</td>
</tr>
<tr>
<td>Auto 2-range</td>
<td>2 forward ranges are independently configurable. Digital output of operation is available.</td>
</tr>
<tr>
<td>Flow switch</td>
<td>Contact output is made when the upper or lower limit values of the instantaneous flow rate are reached</td>
</tr>
<tr>
<td>Total value switch</td>
<td>Contact output is made when the upper limit value of the total flow rate (forward) exceeds the setting value.</td>
</tr>
<tr>
<td>Display of various units</td>
<td>Unit may be set in m/s, L/s, L/min, L/h, L/d, KL/d, ML/d, m³/s, m³/min, m³/h, m³/d, Km³/d, Mm³/d</td>
</tr>
<tr>
<td>Multilingual display</td>
<td>The display language may be selected from 5 choices, including Japanese (Katakana), English, French, Spanish and German.</td>
</tr>
</tbody>
</table>
The ultrasonic flowmeter is a liquid flowmeter used in various applications.

1. Measuring system for the paint flow rate
The flow rate of thick paint is measured by a detector mounted on the pipe already constructed.

2. An energy-saving system for measuring and controlling the flow rate of a pump
A detector is attached to the already constructed pipe to measure the flow rate at the pump outlet, and a regulator is used to implement inverter control of the pump.

3. Flow rate measurement in a water purifying system for semi-conductors
Advantages of using an ultrasonic flowmeter for the system

4. A system for measuring heat transfer and efficiency
Heat is transferred by water flow in the process of HVAC loop

Major applications
- Backup for the already constructed flowmeter
- Water supply and sewage systems: leakage investigation of water pipe and investigation of the flow direction in the water distribution pipe
- Power plant: flow rate measurement of the boiler water supply, condenser circulating pump and turbine oil
- Various plants: flow rate measurement of cooling water, plating solution and corrosive liquid
- Food manufacturing plant: flow rate measurement of raw material and washing water
- Semiconductor manufacturing plant: flow rate measurement of pure water
- Air-conditioning equipment: flow rate measurement of hot water and chilled water in heating and cooling
- Hot spring: Measurement of suction quantity
# CODE SYMBOL

## Flow transmitter

<table>
<thead>
<tr>
<th>IP66</th>
<th>IP67</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14</td>
<td></td>
</tr>
<tr>
<td>(Language) (4th digit)</td>
<td>Standard</td>
</tr>
<tr>
<td>(Communication) (5th digit)</td>
<td>None</td>
</tr>
<tr>
<td>Small diameter sensor</td>
<td>RS323C+DI</td>
</tr>
<tr>
<td>Small diameter sensor</td>
<td>RS485+DI</td>
</tr>
<tr>
<td>Small diameter sensor</td>
<td>6th digit</td>
</tr>
<tr>
<td>Single measuring path</td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>100 to 240V/AC 50/63Hz</td>
</tr>
<tr>
<td>Weatherproof gland</td>
<td>IP66</td>
</tr>
<tr>
<td>Weatherproof gland</td>
<td>IP67</td>
</tr>
<tr>
<td>(Case structure) (9th digit)</td>
<td></td>
</tr>
<tr>
<td>Wire connection port (10th digit)</td>
<td>Weatherproof gland provided</td>
</tr>
<tr>
<td>- Union for pipe with gland (G1/2 female screw) (when “Y” is specified 9th digit)</td>
<td></td>
</tr>
<tr>
<td>- Cardboard or paper product (11th digit)</td>
<td>None</td>
</tr>
<tr>
<td>- Parameter setting (12th digit)</td>
<td>None</td>
</tr>
<tr>
<td>- Setting provided</td>
<td>Setting provided + tag</td>
</tr>
<tr>
<td>- Tag plate</td>
<td></td>
</tr>
<tr>
<td>- Mounting method (13th digit)</td>
<td>Pipe mount (if the 9th digit is S)</td>
</tr>
<tr>
<td>- Wall mount</td>
<td>Pipe mount (if the 9th digit is H)</td>
</tr>
<tr>
<td>- (Area) (14th digit)</td>
<td></td>
</tr>
<tr>
<td>- America</td>
<td>Europe, Middle East, Africa</td>
</tr>
<tr>
<td>- Asia</td>
<td></td>
</tr>
</tbody>
</table>

### Optional accessories

- **Type (5th and 6th digits)**: Small diameter detector (ø25 to ø100mm) (Note 1)
- **Small diameter detector (ø50 to ø225mm)(Note 1)**
- **Silicone rubber**
- **Silicone-free grease (Note 3)**

### Required accessories

- **Type (5th and 6th digits)**: Small diameter detector (ø25 to ø100mm)
- **Silicone rubber**
- **Silicone-free grease (Note 3)**

### Notes

1. When the 9th digit in the code symbol is “A”, the applicable piping diameter is up to 150mm.
2. Normally silicone rubber is selected as an acoustic couplant. Silicone rubber is provided in a tube (100g). If you place an order for several units, 1 tube may suffice for every 5 units.

## Detector, common / large diameter type

### Scope of delivery

- **Flow transmitter** (when you choose pipe mount option provided with a U-bolt for pipe mounting)
- **Detector** (provided with a mounting fixture and acoustic couplant) *in case of compact type detector acoustic couplant is option.
- **CD-ROM** (contains an instruction manual and loader software for PC communication)

### Optional accessories

- **(1) Signal cable (type: FLV)**
- **(2) Loader cable (type: ZZPTK4J1236)**

### Detector, small diameter/high temperature type

<table>
<thead>
<tr>
<th>FSGS</th>
<th>Y</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 2 1 1 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type (5th and 6th digits)</td>
<td>Small sensor 2MHz (ø50 to ø300)</td>
<td></td>
</tr>
<tr>
<td>- Small diameter sensor (ø50 to ø300)</td>
<td>V method</td>
<td></td>
</tr>
<tr>
<td>- Small sensor 1MHz (ø300 to ø1200)</td>
<td>V or Z method</td>
<td></td>
</tr>
<tr>
<td>- Large sensor 1MHz (ø1200 to ø6000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Large sensor 0.5MHz (ø6000 to ø6000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acoustic coupler (10th digit)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>- Silicone rubber (KE348)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Silicone-free grease (HIGH-Z) (Note 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Silicone grease (G40M) (Note 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional specification (11th digit)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Tag plate</td>
<td>Wire rope for mounting (12th digit)</td>
<td></td>
</tr>
</tbody>
</table>

### Detector, submersible type

<table>
<thead>
<tr>
<th>FSGS</th>
<th>A</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 2 1 1 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type (5th and 6th digits)</td>
<td>Small sensor 2MHz</td>
<td></td>
</tr>
<tr>
<td>- Small sensor 2MHz (ø50 to ø300)</td>
<td>V method</td>
<td></td>
</tr>
<tr>
<td>- Small sensor 1MHz (ø300 to ø1200)</td>
<td>V or Z method</td>
<td></td>
</tr>
<tr>
<td>- Large sensor 1MHz (ø1200 to ø6000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Large sensor 0.5MHz (ø6000 to ø6000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acoustic coupler (10th digit)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>- Silicone rubber (KE348)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Silicone-free grease (G40M) (Note 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional specification (11th digit)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Tag plate</td>
<td>Wire rope for mounting (12th digit)</td>
<td></td>
</tr>
</tbody>
</table>

### Detector, compact type

<table>
<thead>
<tr>
<th>FLS</th>
<th>E</th>
<th>S</th>
<th>3</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version (4th digit)</td>
<td>Standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type (5th and 6th digits)</td>
<td>Small diameter detector (ø25 to ø100mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Small diameter detector (ø50 to ø225mm)(Note 1)</td>
<td>V method</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acoustic coupler (7th digit)</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Silicone rubber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Silicone-free grease (Note 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid temperature range (9th digit)</td>
<td>-20 to 100˚C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-30 to 120˚C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optional specification (10th digit)</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Tag</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes

1. Normally silicone rubber is selected as an acoustic couplant. Silicone rubber is provided in a tube (100g). If you place an order for several units, 1 tube may suffice for every 5 units.
2. Normally silicone-free grease is selected as an acoustic couplant. Silicone-free grease is water-soluble and cannot therefore be used in an environment exposed to water or on piping subject to condensation. Since the grease does not set, periodic maintenance (cleaning, refilling every about 6 months at normal temperatures) is necessary.
3. Normally silicone rubber is selected as an acoustic couplant. Silicone rubber is provided in a tube (100g). If you place an order for several units, 1 tube may suffice for every 5 units.

### Specifications

- **Nominal diameter**: up to ø6000mm
- **Nominal diameter**: up to ø6000mm
- **Nominal diameter**: up to ø6000mm
- **Nominal diameter**: up to ø6000mm
- **Nominal diameter**: up to ø6000mm
- **Nominal diameter**: up to ø6000mm
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- **Nominal diameter**: up to ø6000mm
- **Nominal diameter**: up to ø6000mm
- **Nominal diameter**: up to ø6000mm
- **Nominal diameter**: up to ø6000mm

### Acoustic coupler

- **Type (10th digit)**: Silicon rubber (KE348)
- **Silicone-free grease (G40M) (Note 2)**
- **Additional specification (11th digit)**: None
- **Tag plate**
Specifications

**Applicable subjects and operation environment**

<table>
<thead>
<tr>
<th>Applicable fluid</th>
<th>Homogeneous liquids capable of ultrasonic wave propagation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bubble quantity: 0 to 12Vol% (reference diameter 50A, water and flow velocity of 1m/s)</td>
</tr>
<tr>
<td></td>
<td>Turbidity of fluid: 10000 degrees (mg/L) or less</td>
</tr>
<tr>
<td></td>
<td>Straight pipe length: upstream side 10D or more, downstream 5D or more (D: pipe inner diameter)</td>
</tr>
<tr>
<td></td>
<td>State of flow: fully developed turbulent or laminar flow in round pipe filled with fluid</td>
</tr>
</tbody>
</table>

**Applicable piping and fluid temperature**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Detector type</th>
<th>Pipe inner diameter (mm)</th>
<th>Applicable pipe material</th>
<th>Mounting method</th>
<th>Fluid temperature range (Note 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact type</td>
<td>FLSE12</td>
<td>φ25 to φ100</td>
<td>Plastic (PVC, etc.)</td>
<td>V method</td>
<td>Y: -20 to 100°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>φ50 to φ100</td>
<td>Metal pipe (SS, steel pipe, copper pipe, aluminum pipe, etc.)</td>
<td></td>
<td>A: 0 to 120°C (Heat shock resistance 150°C for 30 min.)</td>
</tr>
<tr>
<td></td>
<td>FLSE22</td>
<td>φ50 to φ225</td>
<td>Plastic (PVC, etc.)</td>
<td>V method</td>
<td>-40 to 100°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Metal pipe (SS, steel pipe, copper pipe, aluminum pipe, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small diameter type</td>
<td>FSD22</td>
<td>φ13 to φ100</td>
<td>Plastic (PVC, etc.)</td>
<td>V method</td>
<td>-40 to 100°C</td>
</tr>
<tr>
<td>Common type</td>
<td>FSGS3</td>
<td>φ50 to φ300</td>
<td>Plastic (PVC, etc.)</td>
<td>V method</td>
<td>-40 to 100°C</td>
</tr>
<tr>
<td>Large diameter type</td>
<td>FSGS41</td>
<td>φ200 to φ1200</td>
<td>Metal pipe (SS, steel pipe, copper pipe, aluminum pipe, etc.)</td>
<td>V or Z method</td>
<td>-40 to 200°C</td>
</tr>
<tr>
<td>High temperature type</td>
<td>FSD32</td>
<td>φ50 to φ400</td>
<td>Metal pipe (SS, steel pipe, copper pipe, aluminum pipe, etc.)</td>
<td>V or Z method</td>
<td>-40 to 200°C</td>
</tr>
</tbody>
</table>

Note 1: If the pipe material is PP or PVDF, select FSGS31, FSGS41 or FSGS50. Note that the wall thickness is 15mm or less for PP, 9mm or less for PVDF.

Note 2: For cast iron pipes, lining pipes, old steel pipes or similar, through which the ultrasonic signal cannot easily be transmitted, select FSGS31, FSGS41 or FSGS50. Lining material: Tar epoxy, mortar, rubber, etc.

Note 3: If the lining suffers from peeling-off, measurement may be impossible.

Note 4: If silicone-free grease is used as an acoustic couplant, the fluid temperature range is 0 to 60°C, regardless of the detector.

Note 4: When the 9th digit in the code symbol is “A”, the applicable piping diameter is up to 150mm.

Flow velocity range 0 to ±0.3 → ±32m/s
Power supply voltage 100 to 240VAC 50/60Hz or 20 to 30VDC
Power consumption 15VA or less (AC power supply), 6W or less (DC power supply)
Signal cable (between the detector and converter) Coaxial cable (60m max. for compact type detector (FLS), 300m max. for other others)
Heat resistance: 80°C
Installation environment Non-explosive area not exposed to direct sunlight, corrosive gas or heat radiation
Ambient temperature Flow transmitter: -20 to 55°C
Detector: -20 to 60°C or -20 to 80°C (FLSE2□□□-A)
Ambient moisture 95% RH max.
Grounding Class D (100Ω)
Arrester Provided as standard at the output and power supply

**Performance specifications**

<table>
<thead>
<tr>
<th>Accuracy rating</th>
<th>Classification</th>
<th>Detector type</th>
<th>Pipe size (inner diameter)</th>
<th>Accuracy</th>
<th>Flow velocity</th>
<th>Applicable pipe material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact type</td>
<td>FLSE12</td>
<td>φ25 to φ50</td>
<td>2.0% of rate</td>
<td>0.04m/s</td>
<td>0 to 2m/s</td>
<td>Plastic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>φ50 to φ100</td>
<td>1.0% of rate</td>
<td>0.02m/s</td>
<td>0 to 2m/s</td>
<td>Metal pipe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>φ50 to φ100</td>
<td>2.0% of rate</td>
<td>0.04m/s</td>
<td>0 to 2m/s</td>
<td>Metal pipe</td>
</tr>
<tr>
<td></td>
<td>FLSE22</td>
<td>φ50 to φ225</td>
<td>1.0% of rate</td>
<td>0.02m/s</td>
<td>0 to 2m/s</td>
<td>Plastic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>φ50 to φ225</td>
<td>2.0% of rate</td>
<td>0.04m/s</td>
<td>0 to 2m/s</td>
<td>Metal pipe</td>
</tr>
<tr>
<td>Small diameter type</td>
<td>FSD22</td>
<td>φ13 to φ50</td>
<td>2.5% of rate</td>
<td>0.05m/s</td>
<td>0 to 2m/s</td>
<td>Metal pipe</td>
</tr>
<tr>
<td>Common type</td>
<td>FSGS3</td>
<td>φ50 to φ100</td>
<td>1.5% of rate</td>
<td>0.03m/s</td>
<td>0 to 2m/s</td>
<td>Plastic, metal pipe</td>
</tr>
<tr>
<td>High temperature type</td>
<td>FSD32</td>
<td>φ50 to below φ300</td>
<td>1.0% of rate</td>
<td>0.02m/s</td>
<td>0 to 2m/s</td>
<td>Plastic, metal pipe</td>
</tr>
<tr>
<td>Large diameter type</td>
<td>FSGS41</td>
<td>φ300 to φ6000</td>
<td>1.0% of rate</td>
<td>0.0075m/s</td>
<td>0 to 0.75m/s</td>
<td>Plastic, metal pipe</td>
</tr>
<tr>
<td>Common type</td>
<td>FSGS31</td>
<td>φ300 to φ6000</td>
<td>1.5% of rate</td>
<td>0.03m/s</td>
<td>0 to 2m/s</td>
<td>Plastic, metal pipe</td>
</tr>
<tr>
<td>Large diameter type</td>
<td>FSGS50</td>
<td>φ300 to φ6000</td>
<td>1.5% of rate</td>
<td>0.0113m/s</td>
<td>0 to 0.75m/s</td>
<td>Plastic, metal pipe</td>
</tr>
</tbody>
</table>

Response time 0.5 sec. (standard mode), 0.2 sec. depending on setting (quick response mode)
### Functional specifications

**Analogue signals**
- 4 to 20mA DC (1 point), Load resistance: 1kΩ max.

**Digital output**
- Forward total, reverse total, alarm, acting range, flow switch, total switch assignable arbitrarily
- (1) Mechanical relay contact (isolated, socket provided, arrester incorporated)
  - Output: 1 point
  - Normal: Open/Close selectable
  - Contact capacity: 240VAC/30VDC, 1A
  - Output frequency: 1% max. (pulse width: 50, 100, 200ms)
- (2) Transistor contact (isolated, open collector, arrester incorporated)
  - Output: 2 points
  - Normal: ON/OFF selectable
  - Contact capacity: 30VDC, 0.1A
  - Output frequency: 1000PPS max. (pulse width: 5, 10, 50, 100, 200ms)

**Serial communication (option)**
- RS-232C equivalent or RS-485, isolated, arrester incorporated
- Connectable quantity: 1 unit (RS-232C) up to 31 units (RS-485: MODBUS)
- Baud rate: 9600, 19200, 38400bps
- Cable length: 15m max. (RS-232C)/1km max. (RS-485)
- Parity: None/Odd/Even selectable
- Data: Flow velocity, flow rate, forward total, reverse total, status, etc.

**Display device**
- 2-color LED (Normal: green, Abnormal: red), LCD display (2 lines of 16 digits, back light provided)

**Indication language**
- Japanese (Katakana), English, French, German, Spanish (switchable)

**Flow velocity/flow rate indication**
- Instantaneous flow velocity/ instantaneous flow rate indication (minus indication for reverse flow)
- Numerals: 8 digits (decimal point is counted as 1 digit) English and metric units selectable.

**Total indication**
- Forward or reverse total value indication (negative indication for reverse direction)
- Numerals: 8 digits (decimal point is counted as 1 digit) English and metric units selectable.

**Setting function**
- Setting available with 4 keys (ESC, ↓, ↑, ENT) on the flowmeter front
- Zero adjustment: Set zero/Clear available
- External zero adjustment: Set available by digital input (option) setting
- Damping: 0 to 100s (setting per 0.1 sec.) for analog output and flow velocity/flow rate indication
- Low flow rate cutoff: 0 to 5m/s in terms of flow velocity
- Alarm: Digital output available for Hardware fault or Process fault
- Burnout: Analog output: Hold/Over-scale/Under-scale/zero (selectable)
  - Flow rate total: Hold/Count (selectable)
  - Burnout timer: 0 to 100s (every 1s)
- Bi-directional range: Forward and reverse ranges configurable independently / Hysteresis: 0 to 10% of working range / Working range applicable to digital output
- Auto 2-range: 2 forward ranges configurable independently / Hysteresis: 0 to 10% of working range / Working range applicable to digital output
- Flow switch: Lower limit, upper limit configurable independently (Digital output available for status at actuated point)
- Total switch: Upper limit of the forward total settable (Digital output available when actuated)

### Physical specifications

**Type of enclosure**
- Flow transmitter: IP66 or IP67 / Detector: IP52/IP65/IP67 (Depend on detector type)

**Mounting method**
- Mounted on wall or by 2B pipe / Detector: Clamped on existing piping.

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- Flow transmitter: IP66 or IP67 / Detector: IP52/IP65/IP67 (Depend on detector type)

**Physical specifications**

**Display device**
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### Loader software (standard accessory)

**Compatible PC model**
- PC/AT compatible instrument Operation is undefined for PC98 series (NEC)

**Main function**
- Software for setting/change of the main unit parameters and for collection of the measured data on PC

**OS**
- Windows 2000/XP

**Memory requirement**
- 125MB min.

**Hard disk capacity**
- Minimum free space of 52MB or more

**Note:** Loader cable (code symbol ZZP●TK4J1236) is additionally required.

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**Connection diagram**

**Option**

- RS-485
- Status input (DI1)
- Status input (DI2)
- Remote connection (M3 screw)

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<table>
<thead>
<tr>
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<table>
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<tr>
<th>Acoustic couplant</th>
<th>Silicone rubber, silicone grease or silicone-free grease</th>
</tr>
</thead>
</table>

**Note:** The acoustic couplant is a medium that eliminates the gap between detector and pipe.

**Type:**
- Silicone rubber (type:KE-348W)
- Silicone grease (type:G40M)
- Silicone-free grease (type:HIGH Z)
- Grease for high temperature (type:KS62M)

**Flow rate indication:**
- Numerals: 8 digits (decimal point is counted as 1 digit) English and metric units selectable.

**Total indication:**
- Forward or reverse total value indication (negative indication for reverse direction)
- Numerals: 8 digits (decimal point is counted as 1 digit) English and metric units selectable.

**Setting function:**
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Outline diagram of the flow transmitter (unit: mm)

- **IP66 type Flow transmitter**
  - Type: FSV...S (Weight: 1.5kg)
  - Mounting plate
  - Mounting hole 9x10
  - U-bolt (M8) (option)
  - Cable gland
  - Earth terminal (M4)
  - Mounting Pipe (2B)

- **IP67 type Flow transmitter**
  - Type: FSV...H (Weight: 4.5kg)
  - U-bolt (M8) (option)
  - For sensor cable (PF1/2)
  - For sensor cable (PF1/2)

Outline diagram of detector (unit: mm)

- **Compact type detector**
  - Type: FLSE1 (diameter φ 25 to φ 100)
  - Type: FLSE2 (diameter φ 50 to φ 225)

- **Common type detector**
  - Type: FSGS3 (diameter φ 50 to φ 300, Weight: 0.6kg)

- **High-temperature sensor**
  - Type: FSD32
  - (diameter φ 50 to φ 400, Weight: 1.6kg)

- **Small diameter sensor**
  - Type: FSD22
  - (diameter φ 13 to φ 100, Weight: 0.6kg)

- **Large diameter sensor**
  - Type: FSGS4
  - (diameter φ 200 to φ 1200, Weight: 0.3kg)

- **Large diameter sensor**
  - Type: FSGS5
  - (diameter φ 200 to φ 6000, Weight: 1.2kg)

- **IP66 type Flow transmitter**
  - Type: FSV...S (Weight: 1.5kg)
  - Mounting plate
  - Mounting hole 9x10
  - U-bolt (M8) (option)
  - Cable gland
  - Earth terminal (M4)
  - Mounting Pipe (2B)

- **IP67 type Flow transmitter**
  - Type: FSV...H (Weight: 4.5kg)
  - U-bolt (M8) (option)
  - For sensor cable (PF1/2)
  - For sensor cable (PF1/2)

**Caution on Safety**

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