

# PORTABLE TYPE ULTRASONIC FLOWMETER

## Easy Measurement Anytime Anywhere

- ✓ Compact and Lightweight—Only 1 kg
- ✓ Easy-to-Install Detector
- ✓ Consumed Energy Calculation



# Clamp-on Detector & Portable Transmitter

You can start measurement anytime you wish without interrupting the plant operation



Flow transmitter (FSC)

## Display

- 1 Date & time
- 2 SD memory card
- 3 Measurement mode
- 4 AI/AO status
- 5 Ultrasonic signal level indicator
- 6 Battery indicator
- 7 Site name

- 8 Quick logger start/stop button
- 9 Kind of data
- 10 Switch to graph view
- 11 Unit
- 12 Totalizer reset
- 13 Totalizer ON/OFF
- 14 Measurement status

## Operation keys

- 15 Power ON/OFF
- 16 Backlight ON/OFF
- 17 Print out or data-saving on SD card
- 18 Charging status
- 19 Power supply
- 20 ▲ Up key
- 21 ▼ Down key
- 22 ◀ Left key
- 23 ▶ Right key

- 24 Escape key
- 25 Enter key
- 26 Menu key

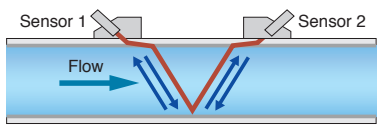
## Side

- 27 Downstream sensor
- 28 Upstream sensor
- 29 AI/AO
- 30 12 V DC power

# Select the best configuration for your application


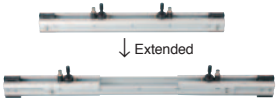


## Transit time difference: V method

**Principle**



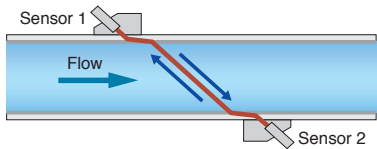
A pair of sensors aligned on the outside wall of a pipe. The sensors emit ultrasonic pulse in turn, and detect the transit time difference of the pulse, by which the flow rate is calculated.

Detectors

|                          | Appearance   | Model | Pipe diameter (mm) | Fluid temperature (°C) |
|--------------------------|--|-------|--------------------|------------------------|
| For small diameter pipes |   | FSSD  | 13 to 100          | -40 to +100            |
| Extendable rail type     |  | FSSC  | 50 to 600          | -40 to +120            |
| For large pipes          |   | FSSE  | 200 to 3000        | -40 to +80             |
| For high temperature     |   | FSSH  | 50 to 250          | -40 to +200            |


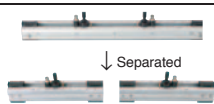


## Transit time difference: Z method

**Principle**



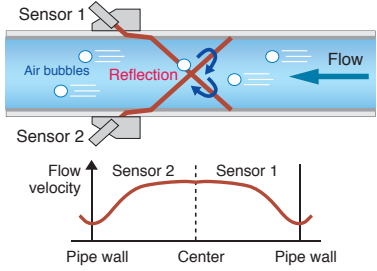
A pair of sensors installed on the outside wall of a pipe, facing each other slantingly. The sensors emit ultrasonic pulse in turn, and detect the transit time difference of the pulse. This method is used mainly when the V method is not available due to the space limitation, or when the fluid has high turbidity.

Detectors

|                          | Appearance  | Model | Pipe diameter (mm) | Fluid temperature (°C) |
|--------------------------|---|-------|--------------------|------------------------|
| For small diameter pipes |  | FSSD  | 150 to 300         | -40 to +100            |
| Extendable rail type     |  | FSSC  | 200 to 1200        | -40 to +120            |
| For large pipes          |  | FSSE  | 200 to 6000        | -40 to +80             |
| For high temperature     |  | FSSH  | 150 to 400         | -40 to +200            |




## Pulse doppler method: for real-time flow profile analysis

**Principle**



The frequency of ultrasonic pulses reflected by air bubbles or solid particles changes according to the flow velocity. The pulse doppler flowmeter uses this frequency shift to determine the flow velocity profile.

Detectors

|        | Appearance  | Model | Pipe diameter (mm) | Fluid temperature (°C) |
|--------|---|-------|--------------------|------------------------|
| Small  |  | FSDP2 | 40 to 200          | -40 to +100            |
| Middle |  | FSDP1 | 100 to 400         | -40 to +80             |
| Large  |  | FSDP0 | 200 to 1000        | -40 to +80             |

# Designed for Ease-of-Use

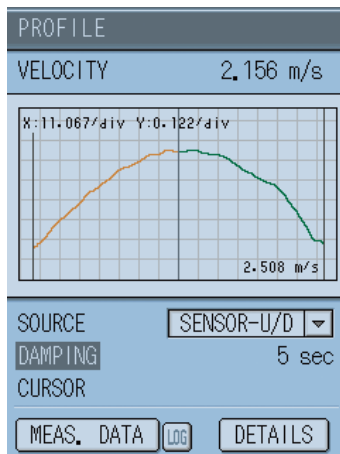
## Easy Measurement Anytime Anywhere

Handy and battery-powered design allows you to take measurement when and where needed.



## Real-Time Monitoring of Flow Profile

Using the flow transmitter FSC in combination with the optional pulse doppler detector (FSD) enables real-time monitoring of flow profile (option).



Flow profile indication

## Carrying Case

The dedicated case accommodates all the necessary equipment including:

- Flow transmitter
- Detector (FSSC or FSSD)
- Acoustic coupler (silicone grease)
- Signal cable
- Analog I/O cable
- Strap
- AC power adapter
- Power cable
- Mounting belt
- USB cable
- CD-ROM (instruction manual, parameter loader software)

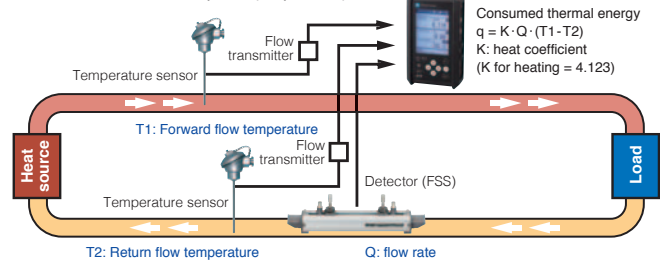


Carrying case

## Consumed Energy Calculation

A function to obtain thermal energies exchanged via fluid used in air-conditioning systems. The transmitter calculates the consumed thermal energy based on the forward flow temperature, the return flow temperature, and the flow rate.

4–20 mA DC output (1 point)



## Data Management on PC

Data in SD card can be transmitted to your PC through a USB cable.

Loader software provided

Parameter setting screen



Flow trend screen



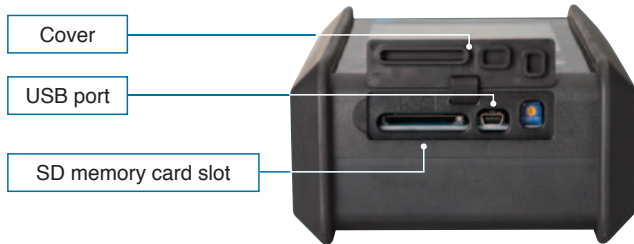
Flow profile screen



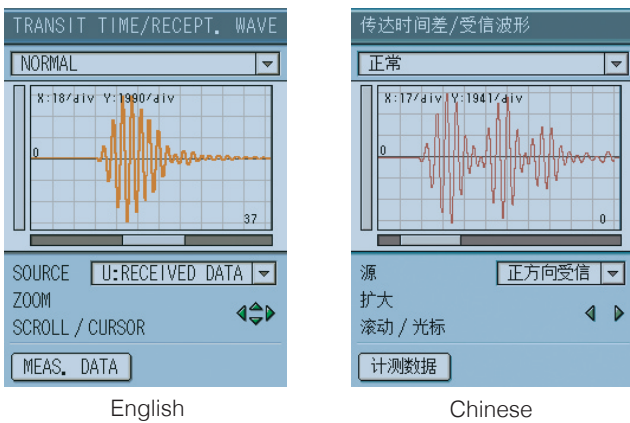
## Data Storage on SD Card

The transmitter automatically saves the measured data on SD memory card at user-specified cycle. You can also send the data through USB port to your PC.

For example, a 512 MB memory card can store the data of two years' worth (at a data save cycles of 30 s, 14 kinds of data). SD card up to 8 GB can be used.



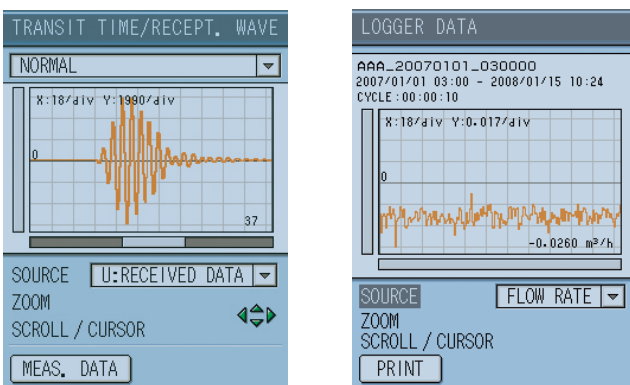
## Multilingual Display



English

Chinese

## Easy-to-See LCD



Received waveform

Logger data

## 12 Hours of Continuous Operation with Built-in Battery

FSC can serve long hours of outdoor measurement.

## Easy-to-Mount Detector

Mounting detector requires no tools. You can start measurement anytime.



## On-Site Printing (option)

You can print out the measured data or screenshot by the dedicated printer.

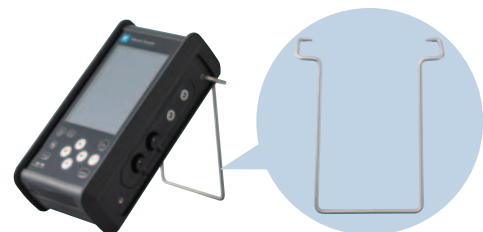


## Accessories for Comfortable Operation (option)

- Hand strap  
Helps you hold the transmitter



- Stand  
Holds the transmitter at an easy-to-see angle

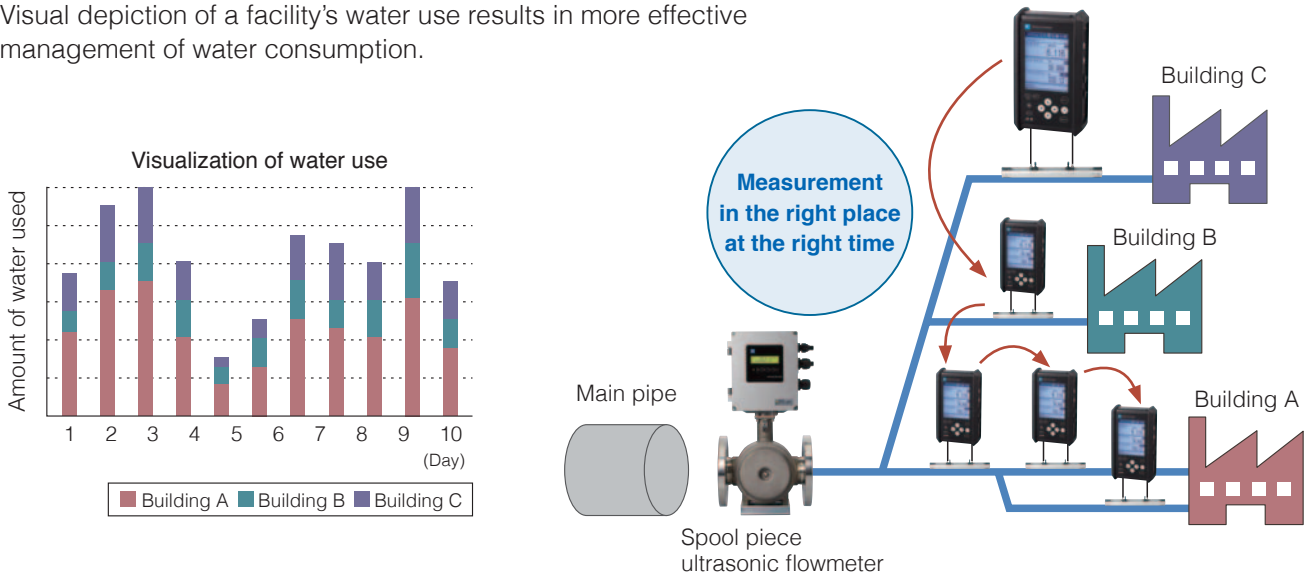


\* The hand strap and the stand cannot be used simultaneously.

# Applications

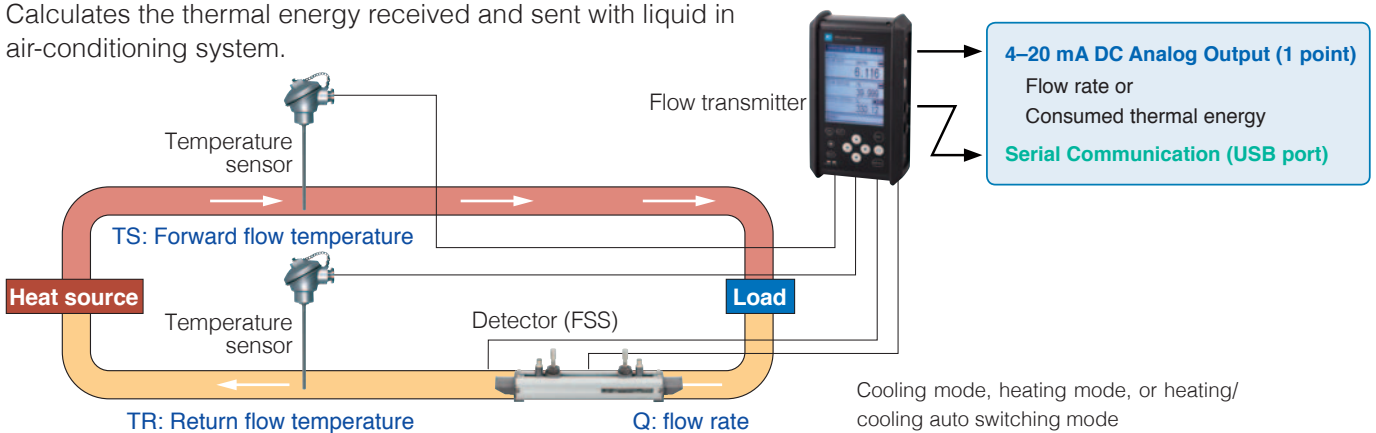
## Reduction of Water Used in Plant Utilities

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



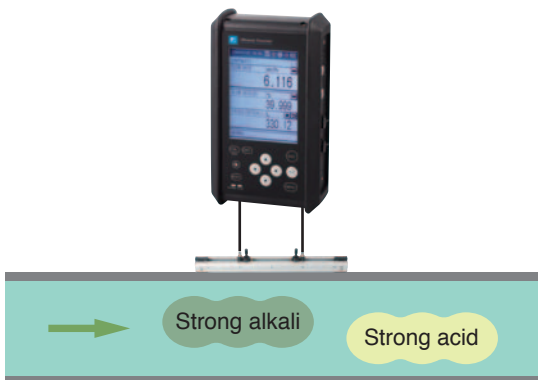
## Energy Consumption in Air-Conditioning Systems

Calculates the thermal energy received and sent with liquid in air-conditioning system.



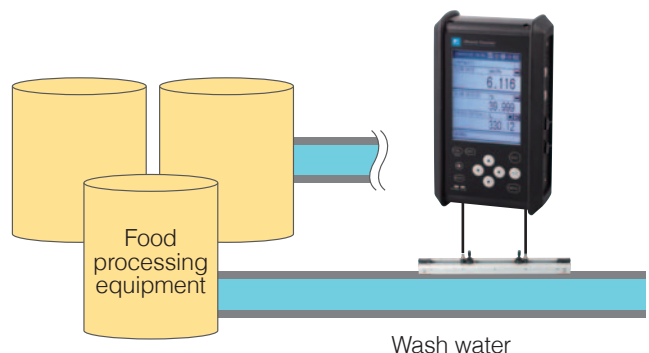
## Corrosive Fluid

Ultrasonic flowmeters can take measurement on glass, metallic, and plastic pipes.



## Wash Water in Food Manufacturing Plants

Easier installation and lower maintenance compared to mechanical flowmeters or Coriolis flowmeters



# Ordering Code Select a code for each digit to configure the model for your application.

F S C S 

|   |   |   |   |
|---|---|---|---|
| 5 | 6 | 7 | 8 |
|   |   |   | 3 |

 - 

|   |    |    |
|---|----|----|
| 9 | 10 | 11 |
|   | 0  |    |

F S S 

|   |   |   |   |   |
|---|---|---|---|---|
| 4 | 5 | 6 | 7 | 8 |
|   |   |   |   | 1 |

 - 

|   |    |
|---|----|
| 9 | 10 |
|   |    |

## Flow transmitter

| Digit | Specifications  | Code |
|-------|---|------|
| 5     | Transmitter unit  |      |
|       | Standard unit   | 1    |
|       | Standard unit + printer   | 2    |
| 6     | Flow velocity profile   |      |
|       | None  | 0    |
|       | With (A detector for flow velocity profile measurement is required) | 1    |
| 7     | AC power adapter + cable  |      |
|       | 125 V AC (Japan, North America)                                     | A    |
|       | 250 V AC (EU, Korea)  | B    |
|       | 250 V AC (China)  | C    |
| 8     | Revision code   | 3    |
| 9     | SD memory card  |      |
|       | None  | 0    |
|       | With (512 MB)   | 1    |
| 11    | Instruction manual / default language setting                       |      |
|       | None / English  | Y    |
|       | With / Japanese   | J    |
|       | With / English  | E    |
|       | With / Chinese  | C    |

## Detector (transit time difference method)

| Digit | Specifications   | Code         |   |
|-------|--|--------------|---|
| 4     | Type   |              |   |
|       | Extendable rail type   | ∅50–1200 mm  | C |
|       | For small diameter pipes   | ∅13–100 mm   | D |
|       | For large pipes  | ∅200–6000 mm | E |
|       | For high temperature   | ∅50–400 mm   | H |
| 5     | Guide rail   |              |   |
|       | Standard   | 1            |   |
|       | Long (Selectable when the 4th code is D)                         | 3            |   |
| 6     | Mounting belt <sup>*1</sup>                                      |              |   |
|       | None   | Y            |   |
|       | Stainless belt (for pipe diameters ≤ 300 mm)                     | A            |   |
|       | Plastic cloth belt (for pipe diameters ≤ 300 mm)                 | B            |   |
|       | SS belt with screws (for pipe diameters ≤ 600 mm)                | C            |   |
|       | Wire (for pipe diameters ≤ 1500 mm)                              | D            |   |
|       | Wire (for pipe diameters ≤ 6000 mm)                              | E            |   |
| 7     | Acoustic coupler   |              |   |
|       | None   | Y            |   |
|       | Silicone-free grease   | B            |   |
|       | Silicone grease <sup>*2</sup>                                    | C            |   |
|       | Grease for high temperature (Selectable when the 4th code is H)  | D            |   |
| 8     | Revision code  | 1            |   |
| 9     | Waterproof treatment   |              |   |
|       | None   | Y            |   |
|       | With <sup>*3</sup> (Selectable when the 4th code is C or E)      | B            |   |
| 10    | Tag plate  |              |   |
|       | None   | Y            |   |
|       | Stainless steel tag plate (The tag number need to be specified.) | A            |   |

\*1: Select an appropriate mounting belt in 6th code in reference to the following table.

| Mounting method | ≤ 300 mm   | ≤ 600 mm | ≤ 1200 mm |
|-----------------|------------|----------|-----------|
| V method        | A, B, or C | C        | D         |
| Z method        | C          | D        | D         |

Possible combination of 4th code and 6th code

|          |   | 4th code |   |   |   |
|----------|---|----------|---|---|---|
|          |   | C        | D | E | H |
| 6th code | Y | ✓        | ✓ | ✓ | ✓ |
|          | A | ✓        | ✓ |   | ✓ |
|          | B | ✓        | ✓ |   |   |
|          | C | ✓        | ✓ |   | ✓ |
|          | D | ✓        |   | ✓ |   |
| E        |   |          | ✓ | ✓ |   |

\*2: Normally, select the silicone grease as an acoustic coupler. A silicone grease comes in a 100 gram tube.

\*3: Two 10-meter signal cables are included. Waterproof treatment makes the detector submersible for five days.

## Scope of Delivery

|   |  |
|---|--|
| <b>Flow transmitter (FSC)</b>                   | <ol style="list-style-type: none"> <li>Transmitter unit</li> <li>AC power adapter with AC/DC conversion cable</li> <li>Power cable</li> <li>Analog I/O cable (1.5 m)</li> <li>USB cable (1 m)</li> <li>Carrying case</li> <li>Strap</li> <li>Signal cable (5 m × 2)</li> <li>CD-ROM (instruction manual, parameter loader software)</li> </ol> <p>Option (as specified by order)</p> <ol style="list-style-type: none"> <li>SD memory card (512 MB)</li> <li>Printer (with 1 roll of paper)</li> <li>Instruction manual</li> </ol> |
| <b>Transmit time method flow detector (FSS)</b> | <ol style="list-style-type: none"> <li>Detector unit</li> <li>Signal cable conversion cable (provided when the detector is FSSE)</li> <li>Mounting belt or wire (as specified by order)</li> <li>Silicone grease or silicone-free grease (as specified by order)</li> </ol>  |
| <b>Pulse doppler flow detector (FSDP)</b>       | <ol style="list-style-type: none"> <li>Detector unit</li> <li>Mounting belt or wire</li> <li>Silicone grease (100 g)</li> </ol>  |

\* Parameter loader software is available from our website at: <http://www.fujielectric.com/products/instruments/>

## Detector (pulse doppler method, for flow velocity profile measurement)

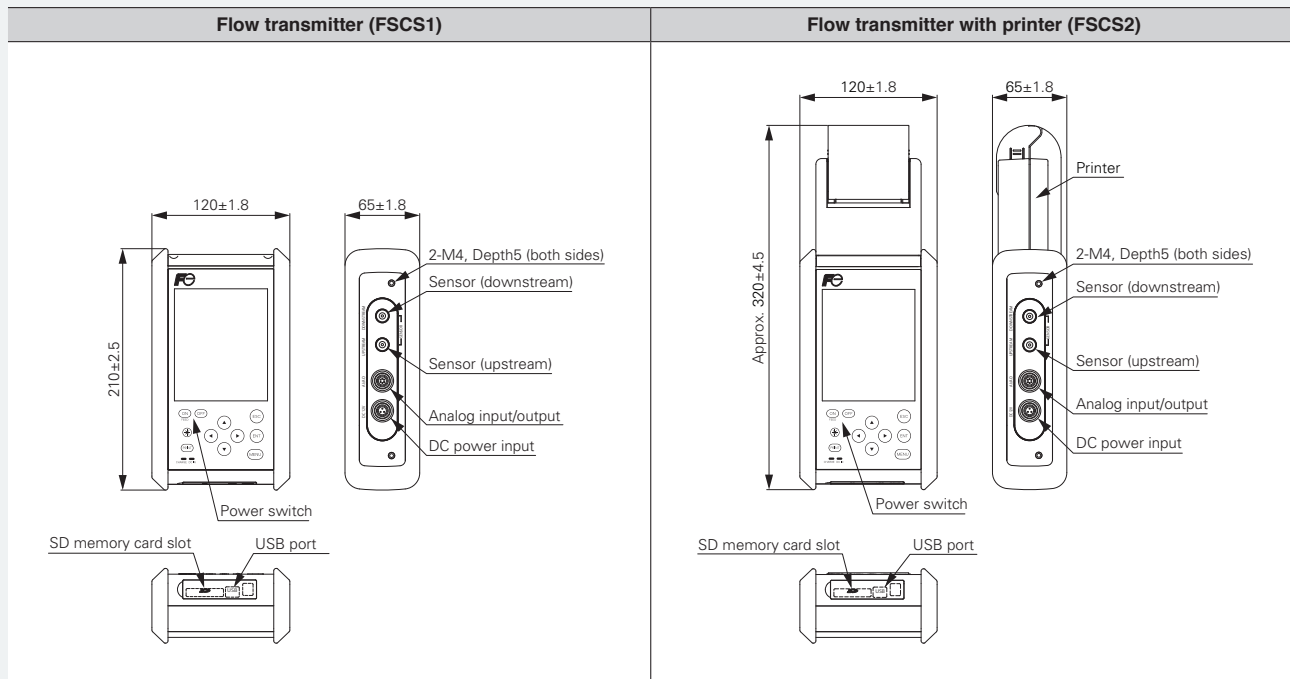
| Model    | Specifications            |
|----------|---------------------------|
| FSDP20Y1 | Small (40 mm to 200 mm)   |
| FSDP10Y1 | Middle (100 mm to 400 mm) |
| FSDP00Y1 | Large (200 mm to 1000 mm) |

# Specifications

|                               |  |
|-------------------------------|--|
| <b>Fluid</b>                  | Uniform liquid through which ultrasonic wave can propagate (water, distilled water, alcohol, etc.) |
| <b>Pipe inner diameter</b>    | 13 mm to 6000 mm (depending on detector)   |
| <b>Fluid temperature</b>      | -40°C to +200°C (depending on detector)  |
| <b>Velocity</b>               | 0 to ±32 m/s (minimum ±0.3 m/s)  |
| <b>Accuracy</b>               | ±1.0% of rate (depending on flow velocity)   |
| <b>Output cycle</b>           | 1 s  |
| <b>Path</b>                   | 1 path, transit time method  |
| <b>Display</b>                | Color LCD with back light  |
| <b>Analog output</b>          | 4–20 mA DC (1 point)   |
| <b>Analog input</b>           | 4–20 mA DC / 1–5 V DC (2 points)   |
| <b>Power supply voltage</b>   | Built-in battery (12 hours of continuous operation)  |
| <b>Transmitter enclosure</b>  | IP64 (no printer version)  |
| <b>Transmitter dimensions</b> | 210 × 120 × 65 mm (no printer version)   |
| <b>Transmitter weight</b>     | Approx. 1 kg   |
| <b>SD card</b>                | 512 MB (stores 2 years' worth data)  |

|                             |   |
|-----------------------------|---|
| <b>Serial communication</b> | Transmission data:<br>Data stored in SD card (instantaneous value, total value, etc.)<br>Through USB port<br>Cable length: up to 3 m  |
| <b>Functions</b>            | Damping time constant (0 to 100 s)<br>Instantaneous value (10-digit) *The flow rate unit is selectable<br>Total value (10-digit) *The flow rate unit is selectable<br>Consumed energy calculation<br>Self-diagnosis (battery power, received wave)<br>Flash memory (measurement parameters for pipe, fluid, sensor, etc)<br>Number of registration sites: 32<br>Zero point adjustment (by setting zero or clearing zero)<br>Graph view, waveform view<br>Language (Japanese, English, German, French, Spanish, Chinese)<br>Bidirectional flow measurement<br>Low flow cut-off (0–5 m/s) |
| <b>Options</b>              | Printer: screen hard copy, periodic printing and logged data printing<br>Detector for flow velocity profile measurement: displays flow velocity profile of instantaneous value and average value  |

# Dimensions



Information in this catalog is subject to change without notice.  
Read the instruction manuals thoroughly before using the products.

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