Flowmeter Series

Fuji Electric Systems Co., Ltd.
Wide Selection of Flowmeter

PRODUCT’S CONCEPT
- Suitable for versatile application among process automation and factory automation.
- Liquid, gas, and vapor can be measured.
- The most appropriate model for the fluid property can be selected.

Liquid flow rate measurement
- Electromagnetic flowmeter
- Ultrasonic flowmeter
- Vortex flowmeter
- Differential pressure flowmeter

Gas flow rate measurement
- Vortex flowmeter
- Differential pressure flowmeter

Vapor flow rate measurement
- Vortex flowmeter
- Differential pressure flowmeter

Connected measuring instrument
- Recorder (PHR or PHL)
- Integrator (FDC-281)
- Integrator (FDC-981)
- Alarming indicator (PCP)
- Distributor (PTL)
- Controller (PDA)
- Personal computer
Flowmeters with various measuring principle to meet your needs

Simply select to suit the application

<table>
<thead>
<tr>
<th>Object of measurement</th>
<th>Ultrasonic</th>
<th>Electromagnetic</th>
<th>Differential pressure</th>
<th>Vortex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td></td>
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</tr>
<tr>
<td>Gas</td>
<td>X</td>
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<tr>
<td>Vapor</td>
<td>X</td>
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<tr>
<td>Slurry</td>
<td>△</td>
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<tr>
<td>Application</td>
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<tr>
<td>Control</td>
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</tr>
<tr>
<td>Monitor</td>
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<tr>
<td>Supply</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Operating condition</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>–40 to 200°C</td>
<td>–20 to 120°C</td>
<td>–40 to 600°C</td>
<td>–10 to 200°C</td>
</tr>
<tr>
<td>Pressure</td>
<td>----</td>
<td>–1 to 2MPa</td>
<td>–0.1 to 42MPa</td>
<td>max 5MPa</td>
</tr>
<tr>
<td>Pressure loss</td>
<td>None</td>
<td>None</td>
<td>Large</td>
<td>Large</td>
</tr>
<tr>
<td>Rangeability</td>
<td>Large</td>
<td>Large</td>
<td>Small</td>
<td>Medium</td>
</tr>
<tr>
<td>Installing condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bore</td>
<td>≠13 to ≠6000</td>
<td>≠2.5 to ≠3000</td>
<td>≠25 to ≠3000</td>
<td>≠4 to ≠100</td>
</tr>
<tr>
<td>Straight pipe length</td>
<td>Upstream side</td>
<td>10D</td>
<td>5D</td>
<td>10D</td>
</tr>
<tr>
<td>Downstream side</td>
<td></td>
<td>5D</td>
<td>2D</td>
<td>5D</td>
</tr>
<tr>
<td>Piping work</td>
<td>Not required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Explosion-proofing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>±1% of rate</td>
<td>±0.5% of rate</td>
<td>±2.0% of rate</td>
<td>1 to 3% of rate</td>
</tr>
<tr>
<td>Velocity range</td>
<td>–32 to +32m/s</td>
<td>0 to 15m/s</td>
<td>–32 to +32m/s</td>
<td>0.3 to 4m/s</td>
</tr>
</tbody>
</table>

Applicable flowmeter

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Ultrasonic</th>
<th>Electromagnetic</th>
<th>Differential pressure</th>
<th>Vortex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultra-demineralized water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warm cooling water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drainage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sludge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condensed sludge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High purity alcohol</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Liquor</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Milk, fruit juice</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Soy sauce, dip</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Air</td>
<td></td>
<td></td>
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<tr>
<td>Vapor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas</td>
<td></td>
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</tr>
</tbody>
</table>

Note: Straight pipe length (D): Represents pipe bore.

Typical applications for flowmeter

<table>
<thead>
<tr>
<th>Application</th>
<th>Measuring fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical &amp; petroleum chemical</td>
<td>Crude oil, refined oil, fertilizer, chemical</td>
</tr>
<tr>
<td>Steel</td>
<td>Cooling water</td>
</tr>
<tr>
<td>Water treatment</td>
<td>Pure water, drainage, sludge, condensed sludge, chemical, air</td>
</tr>
<tr>
<td>Semiconductor</td>
<td>Demineralized water, chemical, drainage</td>
</tr>
<tr>
<td>Food &amp; beverage</td>
<td>Water, liquor, milk, fruit juice, sauce, etc.</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>Chemical, water</td>
</tr>
<tr>
<td>Building and regional heating / cooling</td>
<td>Chilled water, hot water</td>
</tr>
<tr>
<td>Energy conservation</td>
<td>Air, vapor, water</td>
</tr>
<tr>
<td>Assembly plant</td>
<td>Air, vapor, water, oil, chemical</td>
</tr>
<tr>
<td>Molding plant</td>
<td>Cooling water</td>
</tr>
</tbody>
</table>

Applicable flowmeter
Ultrasonic Flowmeter series

Ultrasonic flowmeter for measuring flow rate from outside the pipe

PORTAFLOW-X, offering true mobility
Detector type: FLD, Converter type: FLC

Compact M-Flow PW
Detector type: FLS, Converter type: FLR

Features
- Portable, 1.5kg & 5hrs operation
- Superior operability with large graphic display
- Dedicated carrying case for easy carriage
- 40,000 data logging function

Specifications
- Detector types:
  - FLD22: For r13 to r100mm / -40 to 100°C
  - FLD12: For r50 to r400mm / -40 to 100°C
  - FLD41: For r20 to r1200mm / -40 to 80°C
  - FLD51: For r20 to r6000mm / -40 to 80°C
  - FLD32: For r50 to r400mm / -40 to 200°C
- Measurement range: -32 to 0 to 32 m/s (0.3m/s min.)
- Response time: 1s or less
- Output signal: 4 to 20mA DC, pulse output, alarm output
- Communication interface: RS232C
- Accuracy: 1.5% or 2% of rate
- Structure: Both of converter and detector are of IP65 waterproof structure
- Power supply voltage: 100 to 240V AC, 200 to 30V DC

Features
- Small converter, front face of 140X130 mm
- High speed response in 0.2 second
- Almost unaffected by fluid temperature or pressure variations

Specifications
- Detector types:
  - FLS12: For r25 to r100mm / -20 to 100°C
  - FLS22: For r50 to r225mm / -20 to 100°C
  - FLS31: For r50 to r300mm / -20 to 80°C
  - FLS31: For r30 to r600mm / -20 to 80°C
- Measurement range: -10 to 10 m/s (0.3m/s min.)
- Response time: 0.2s
- Output signal: 4 to 20mA DC, pulse output, alarm output
- Communication interface: RS485 or RS232C
- Accuracy: 1.5% or 2% of rate
- Structure: Converter is of IP65 waterproof structure
- Power supply voltage: 100 to 240V AC
- Cable length between detector and converter: 150 m max

Conversions
- FLD32: For 50 to 400mm / -40 to 200°C
- FLW51: For 200 to 6000mm / -40 to 80°C
- FLD41: For 200 to 1200mm / -40 to 80°C
- FLD51: For 50 to 6000mm / -40 to 80°C
- FLSS41: For 300 to 600mm / -20 to 80°C
- FLD22: For 13 to 100mm / -40 to 100°C
- FLSS31: For 50 to 225mm / -20 to 100°C
- FLD12: For 50 to 400mm / -40 to 100°C
- FLSS22: For 50 to 225mm / -20 to 100°C
- FLW12: For 50 to 400mm / -40 to 80°C
- FLSS12: For 50 to 100mm / -20 to 100°C

Detector types:
- FLW, FLD

Compact M-Flow PW
Detector type: FLS, Converter type: FLR

Features
- Resistant to bubbles in the liquid
- Accurate measurement: 1.0% of rate
- Various sensors available according to usage
- Almost unaffected by fluid temperature or pressure variations

Specifications
- Detector types:
  - FLD12: For r50 to r400mm / -40 to 100°C
  - FLD41: For r20 to r1200mm / -40 to 80°C
  - FLD51: For r20 to r6000mm / -40 to 80°C
  - FLD32: For r50 to r400mm / -40 to 200°C
- Measurement range: -32 to 0 to 32 m/s (0.3m/s min.)
- Response time: 0.5s or less
- Output signal: 4 to 20mA DC, pulse output, alarm output
- Communication interface: RS485 or RS232C
- Accuracy: 1.0% of rate
- Structure: Converter is of IP65 waterproof structure
- Power supply voltage: 100 to 240V AC
- Cable length between detector and converter: 150 m max

Detector types:
- FLW, D, FLV

Compact M-Flow PW
Detector type: FLS, Converter type: FLR

Features
- Resistant to bubbles in the liquid
- Simultaneous measurement of two lines or pipes
- Portable, 1.5kg & 5hrs operation
- Almost unaffected by fluid temperature or pressure variations

Specifications
- Detector types:
  - FLW12: For r50 to r400mm / -40 to 80°C
  - FLW51: For r200 to r6000mm / -40 to 80°C
  - FLW51: For r200 to r6000mm / -40 to 80°C
  - FLD32: For r50 to r400mm / -40 to 200°C
- Measurement range: -32 to 0 to 32 m/s (0.3m/s min.)
- Response time: 1.5s or less
- Output signal: 4 to 20mA DC, pulse output, alarm output
- Communication interface: RS485 or RS232C
- Accuracy: 1.0% of rate
- Power supply voltage: 100 to 240V AC
- Cable length between detector and converter: 150 m max

Detector types:
- FLW, FLH
High-Accuracy Hybrid Ultrasonic Flowmeter <DUOSONICS>

Ultrasonic flowmeter based on a new concept of using pulse Doppler profiling and propagation time difference methods in combination

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**Features**
- The automatic switchover function between the two methods, utilizing reflection and penetration respectively, enables flow rate measurement of various liquids with or without air bubbles and solid particles.

- High accuracy to within 0.5% to 1%
- Real time monitoring of velocity profile (pulse Doppler method).
- Eliminates need for correction coefficient, enables straight pipe restrictions, applicable to undeveloped flow.
- High speed response: 0.1s (Pulse Doppler method) / 0.5s (transit time method)

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**Specifications**
- Detector types:
  - FSWS12: For 50 to 1000mm / -40 to 100°C
  - FSWS21: For 100 to 2000mm / -40 to 80°C
  - FSWS40: For 200 to 500mm / -40 to 80°C
  - FSWS50: For 500 to 1000mm / -40 to 80°C

- Measurement range: Transit time method: -32 to 0 to +32m/s (0.3m/s min.)
- Flow velocity: V:
- Pulse Doppler method: -4 to 0 to +4m/s (0.3m/s min.)
- Transit time method: 0.5s or less
- Response time: Transit time method: 0.5s or less

- Pulse Doppler method: 0.1s or less
- Pulse Doppler method: 0.5s or less
- Output signal: 4 to 20mA DC, pulse, alarm
- Communication interface: RS485, RS232C (selectable)
- Accuracy: 0.5% to 1% of rate
- Measurement range: Transit time method: -32 to 0 to +32m/s (0.3m/s min.)

**Applications**
- Crude oil emulsions, HVAC, petroleum products, waste & water management, potable water, effluent monitoring, slurries, dyestuff, juice with pulp, dressing, yogurt, etc.
- Flow rate measurements for fluids that were previously difficult to measure are now possible.

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**Material grade**
- Typical recommended material grades of components that come in contact with typical fluids measured with electromagnetic flowmeters are shown, based on various references and results of use.

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**Features of electrode (earth ring)**
- Stainless steel: Suitable for high temperature and high pressure fluid.
- TFe: Suitable for medium to high temperature and high pressure fluid.
- TFe: Suitable for medium and high temperature and high pressure fluid.
- TFe: Suitable for medium temperature and high pressure fluid.
- TFe: Suitable for low temperature and high pressure fluid.

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**Features of lasing material grade**
- For use in liquids with high acidity and high concentration.
- Not for use in high temperature and high pressure fluid.
- Not for use in high temperature and high pressure fluid.
- Not for use in high temperature and high pressure fluid.
- Not for use in high temperature and high pressure fluid.
- Not for use in high temperature and high pressure fluid.

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**Electromagnetic flowmeter series**
Electromagnetic flowmeters capable of measuring the flow rate of conductive fluids with high accuracy

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**Features**
- High accuracy to within 0.5%
- The terminal and circuit area inside the converter consist of a tightly sealed 2-chamber structure resistant to condensation and water.
- Wide measurement range of 0 to 0.1 .. 15m/s

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**Communication**
- **Conversion interface:** RS485/RS232C (selectable)
- **Output signal:** 4 to 20mA DC, pulse, alarm

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**Calibration method**
- **Transit time method:** Eliminates need for correction coefficient, easing pipe restrictions, applicable to undeveloped flow.
- **Pulse Doppler profiling method:** Propagation time difference method

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**Material grade**
- Stainless steel: Suitable for high temperature and high pressure fluid.
- TFe: Suitable for medium to high temperature and high pressure fluid.
- TFe: Suitable for medium and high temperature and high pressure fluid.
- TFe: Suitable for medium temperature and high pressure fluid.
- TFe: Suitable for low temperature and high pressure fluid.

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**Measuring principle**
- Faraday’s law of electromagnetic induction: When a conductor moves in a magnetic field, an electromotive force is generated in the conductor in a direction that is perpendicular to both the magnetic field and moving direction, and its magnitude is proportional to the density and speed of the magnetic flux density."
**Eggs DELTA Pulse**

**DELTA FLOWPET**

**Eggs DELTA**

**DELTA FLOWPET - A compact and robust body made of stainless steel**

**Type: FMR**

**Features**
- Measurement of flow rate of gases, liquids and vapors
- Range of bores, from 10 mm to 100 mm
- Ideal for high-temperature measurement up to 200°C
- 8-digit actual scale display optimum for integrated display

**Specifications**
- **Nominal diameter**: 10, 15, 25, 40, 50, 80, 100 mm
- **Piping connection**: Flange clamping type
- **Applicable fluid**: Liquid up to 80°C, Gas up to 80°C, High temperature gas and saturated vapor up to 200°C, High temperature liquid up to 200°C
- **Flow rate range**:
  - **For water (20°C)**
    - Nominal diameter (mm)
    - Min: 0.2 to 10.0
    - Max: 2.2 to 25.0
  - **For compressed air (20°C)**
    - Nominal diameter (mm)
    - Min: 0.7 to 1.2
    - Max: 10.0 to 4.0
- **Material**: SCS14A

**Display function**
- Selective display out of cumulative integration, instantaneous flow rate (every hour), instantaneous flow rate (every minute) and reset integration, Alarm display (H, L).
- **Accuracy**: ±1% of full scale ±1% of full scale (12% of full scale in case of nominal diameter 10 mm)
- **Power supply voltage**: Local display only: Built-in lithium battery unit With output signal: 12 to 25V DC (analog output: 2-wire system, pulse output: 3-wire system, Pulse/alarm output: 5-wire system), provided with 1 m cable

**Eggs DELTA - Lightweight and compact**

**Type: FMP**

**Features**
- Weighs just 285 g (for nominal diameter of 4 mm).
- Ideal for measurement of liquids and gases
- 8-digit actual scale display, perfect for display of integrated value
- Battery driven, ideal for display only

**Specifications**
- **Nominal diameter, material**: 4, 8, 15, 25 mm, PPS resin
- **Piping connection**: Screw-in type (female thread or male thread)
- **Applicable fluid**: Liquid up to 80°C, Gas up to 80°C, High temperature gas and saturated vapor up to 200°C, High temperature liquid up to 200°C
- **Flow rate range**
  - **For liquid**
    - Nominal diameter (mm)
    - Min: 4 to 20 m³/h
    - Max: 60 m³/h
  - **For sea water (20°C)**
    - Nominal diameter (mm)
    - Min: 4 to 20 m³/h
    - Max: 60 m³/h
- **Material**: SCS14A
- **Display function**
  - Selective display out of cumulative integration, instantaneous flow rate (every hour), instantaneous flow rate (every minute) and reset integration, Alarm display (H, L).
- **Accuracy**: ±1% of full scale ±1% of full scale (±2% of full scale in case of nominal diameter 10 mm)
- **Power supply voltage**: Local display only: Built-in lithium battery unit With output signal: 12 to 25V DC (analog output: 2-wire system, pulse output: 3-wire system, Pulse/alarm output: 5-wire system), provided with 1 m cable

**Vortex flowmeter series**

**Vortex flowmeters for measurement of liquids, gases and vapors**

**Measuring principle**
A regular stream of vortices is generated alternately on the right-hand side and left-hand side under certain conditions downstream of an object located in a flow. These vortices are called Karman vortices. Letting the number of vortices (vortex frequency) generated per unit time be f, the flow velocity in the aperture portion be v, and the width of the object (vortex generator) be d, then the following relation holds:

\[ f = \frac{1}{2} \cdot \frac{v}{d} \cdot \frac{1}{\rho} \cdot \frac{d}{d_v} \]

where \( d_v \) is a proportional constant called Strouhal number. The Strouhal number is a function of the shape of the vortex generator, and it is a fixed value of about 0.16 over a broad range of Reynolds number.

Since the vortex frequency is proportional to the flow velocity in the range in which the Strouhal number is a fixed value, the flow velocity can be deduced by counting this vortex frequency, and the flow rate can be calculated as the area through which the fluid passes is known.

**Typical connection**

**Eggs DELTA Pulse**

**Eggs DELTA Pulse Light weighted and compact**

**Type: FMP**

**Features**
- Weighs just 285 g (for nominal diameter of 4 mm).
- Compact size of 65×102×83 mm (for nominal diameter of 4 mm)
- 8-digit actual scale display, perfect for display of integrated value
- Battery driven, ideal for display only

**Specifications**
- **Nominal diameter, material**: 4, 8, 15, 25 mm, PPS resin
- **Piping connection**: Screw-in type (female thread or male thread)
- **Applicable fluid**: Liquid up to 80°C, Gas up to 80°C, High temperature gas and saturated vapor up to 200°C, High temperature liquid up to 200°C
- **Flow rate range**
  - **For water (20°C)**
    - Nominal diameter (mm)
    - Min: 4 to 20 m³/h
    - Max: 60 m³/h
  - **For sea water (20°C)**
    - Nominal diameter (mm)
    - Min: 4 to 20 m³/h
    - Max: 60 m³/h
- **Material**: SCS14A
- **Display function**
  - Selective display out of cumulative integration, instantaneous flow rate (every hour), instantaneous flow rate (every minute) and reset integration, Alarm display (H, L).
- **Accuracy**: ±1% of full scale ±1% of full scale (±2% of full scale in case of nominal diameter 10 mm)
- **Power supply voltage**: Local display only: Built-in lithium battery unit With output signal: 12 to 25V DC (analog output: 2-wire system, pulse output: 3-wire system, Pulse/alarm output: 5-wire system), provided with 1 m cable
Differential pressure flowmeter series

Differential pressure flowmeters for a broad range of applications

- Differential pressure (flow rate) transmitter <Model: FKC>
- Remote seal type differential pressure (flow rate) transmitter <Model: FKD, FKX>

### Measuring principle

An aperture is located along the pipeline, the differential pressure produced before and after it is detected, and hence the flow rate is calculated.

#### Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Differential pressure (flow rate) gauge &lt;Model: FKC&gt;</th>
<th>Measuring span</th>
<th>1 kPa min. , 3,000 kPa max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid pressure</td>
<td>3.2 - 42MPa</td>
<td>3.2 - 42MPa</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.1%</td>
<td>0.1%</td>
<td></td>
</tr>
</tbody>
</table>

- Diaphragm material grade
  - SUS316L, Hastelloy C, Monel, tantalum, gold plated SUS316L, gold, ceramic coating
  - SUS316L, Hastelloy C, Monel, tantalum, titanium, zirconium, gold plated SUS316L

- Process connecting port: Rt1/4 or 1/4-18NPT
- Flange (SUS316L,搪撈料, Monel, tantalum, titanium, zirconium, gold plated SUS316L)
- Measuring period: 120ms (high-speed response is also possible: optional 4ms/sec.)
- Working transmission range: 0 to 100% (transmitting part), 0 to 10V (transmitting part)
- Output signal: 4 to 20mA (2-wire system) / Load resistance 600 max.
- Power supply voltage: 10 to 5V DC
- Communication function: HART protocol / Fuji protocol
- Structure: IP67 waterproof structure
- Explosion proof: ATEX, FM, CSA, RIIS, JIS

### System configuration

#### Aperture mechanism

- Stop valve
- Connecting pipe
- Equalizer valve (3-way valve)
- Differential pressure transmitter
- Hand-held communicator (HHC)
- Power supply (1 to 5V DC)
- Recorder (Type: PFR or PHL)
- Remote seal type differential pressure transmitter <Model: FKD, FKX>

#### Panel instrument

- Orifice plate with ring (Type: FVA)
- Orifice plate (Type: FVB)
- Integrant Orifice (Type: PTN)

#### Material grade of the pressure diaphragm can be selected to suit the application.

- SUS316L (standard), Hastelloy C, Monel, tantalum, titanium, zirconium and Hydro-seal (gold and ceramics coating or gold-plated SUS316L) are available.

Note: Hydro-seal: If hydrogen is contained in the fluid to be measured, hydrogen gas enters the sensing part of the transmitter and may cause deformation of the seal diaphragm and malfunctions such as zero drift. Therefore, the sensing part that is in contact with the fluid is coated with gold and ceramics, thus preventing the transmission of hydrogen more than 100 times better than conventional materials (comparison with our conventional product). (It is superior to gold plating.)

#### Hydrogen transmission treatment

- Gold ceramics coated seal diaphragm

#### Typical application

<table>
<thead>
<tr>
<th>Pressure diaphragm material grade</th>
<th>Use</th>
<th>Immeasurable fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUS316L</td>
<td>Tap water, sewage, weak alkali</td>
<td>Hydrofluoric acid, organic acid, chlorides, etc.</td>
</tr>
<tr>
<td>Monel</td>
<td>Alkal, hydrofluoric acid</td>
<td>Sulfuric acid, ferric chloride, aqua regia, etc.</td>
</tr>
<tr>
<td>Tantalum</td>
<td>Sulfuric acid, nitric acid, nitric acid, aqua regia</td>
<td>Hydrochloric acid, fluoride, etc.</td>
</tr>
<tr>
<td>Hastelloy C</td>
<td>Various organic acids, inorganic acid, alkali</td>
<td>Chlorides, sulfuric acid, valve waste liquid, etc.</td>
</tr>
<tr>
<td>Monel</td>
<td>Hydrochloric acid, sulfuric acid, chloride, bleaching agent</td>
<td>Hydrofluoric acid, ferric chloride, etc.</td>
</tr>
<tr>
<td>Titanium</td>
<td>Chlorides, sulfites, sulfuric acid compounds</td>
<td>Hydrochloric acid, sulfuric acid, nitric acid, etc.</td>
</tr>
<tr>
<td>Gold/ceramics coating or gold plates SUS316L</td>
<td>Hydrogen or hydrogen chloride generation plant or measuring environment that permits easy generation of hydrogen in the measuring fluid</td>
<td></td>
</tr>
</tbody>
</table>
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