e-Front runners

Fuji Instrumentation & Control

ULTRASONIC FLOWMETER TIME DELTA-C

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

Detector (FLS)

Flow transmitter (FSV...S)

- **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.

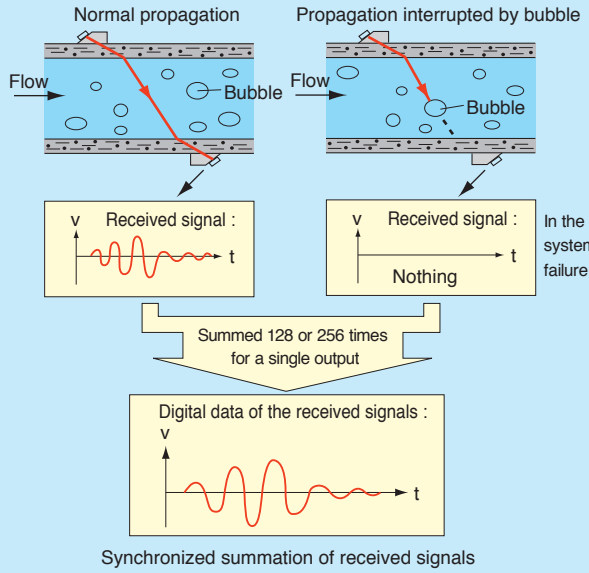
ECNO:636e

Applicable pipe diameter is ϕ13mm to ϕ6000mm

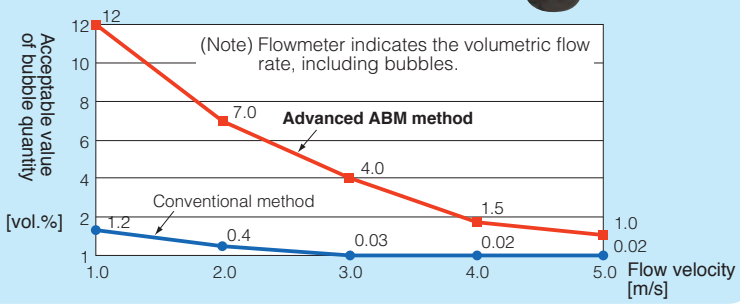
- High accuracy measurement of fluid flow rate: 1.0% of rate
- Quick response: 0.2 sec. or less (quick response mode)
- Minimal Influence by the pressure of measured fluid and temperature
- Superior anti-bubble performance
  (Advanced AMB method ∗ is adopted.)

∗ Advanced ABM method: anti-bubble measurement method

● Advanced received signal digital processing results in higher performance flow measurement

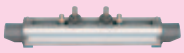
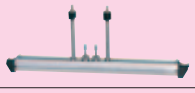


In the case of an analog system, measurement failure will occur.



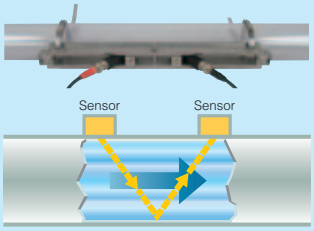
A wide range of detectors is available, and no piping work is required

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

Classification	Appearance	Detector type	Applicable pipe inner diameter (mm)	Measured fluid temperature	Mounting/structure
Compact type		FLSE1	ϕ25 to ϕ100	-20 to 100°C or 0 to 120°C	· V method mounting · Jet structure (equivalent to IP65)
		FLSE2	ϕ50 to ϕ225		
Small diameter type		FSD22	ϕ13 to ϕ100	-40 to 100°C	· V mounting method · Watertight structure (equivalent to IP67)
High temperature type		FSD32	ϕ50 to ϕ400	-40 to 200°C	· V or Z method mounting · Splash-proof structure (equivalent to IP52)
Common type		FSGS3	ϕ50 to ϕ300	-40 to 80°C	· V method mounting · Watertight structure (equivalent to IP67) · Submersible type available
Large diameter type		FSGS4	ϕ200 to ϕ1200	-40 to 80°C	· V or Z method mounting · Watertight structure (equivalent to IP67) · Submersible type available
		FSGS5	ϕ200 to ϕ6000		

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

<Our FLV type>

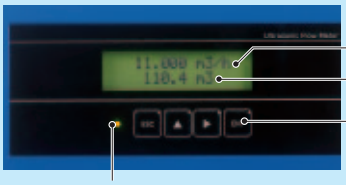
<Our FSV type>

Mounting method: wall or pipe mounting

■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)



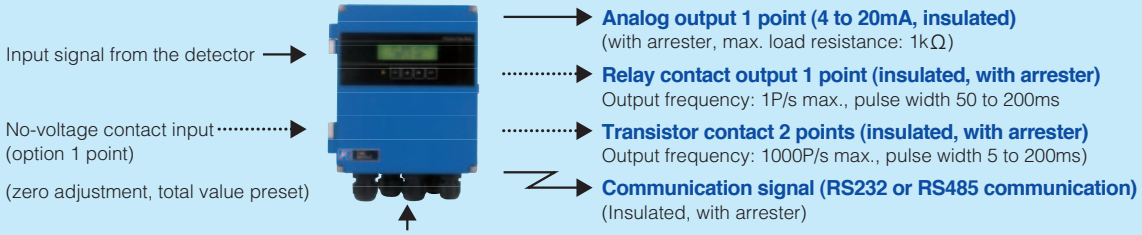
LCD display with backlight is clearly legible, even in dark places.

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

PC loader software for the setting of various parameters and the collection of measured data is a standard accessory

(Note) The communication cable for PC loader is an optional accessory. (Type: ZZP*TK4J1236)

■Signal and process interfaces are designed with functionality as priority.



■Fully equipped with extensive functions

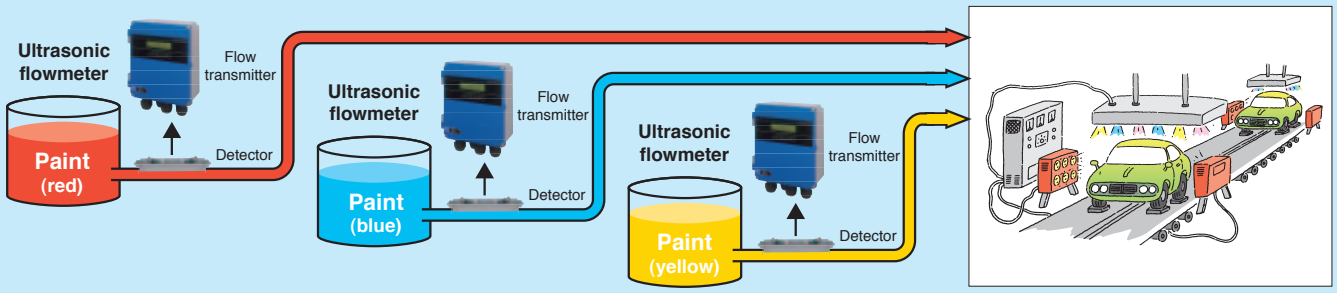
Zero adjustment	one-touch adjustment while the flow is stopped
Damping	Used to reduce the fluctuation of the measured value. Setting range: 0 to 100 sec. (setting per 0.1 sec.)
Low flow rate cut	Output may be cut when the flow rate is low. Setting range: 0 to 5m/s (setting in 0.01m/s unit)
Alarm contact output	Contact output at condition of hardware and process faults
Output burnout	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.
Forward and backward ranges	Ranges may be set arbitrarily. The digital output of the operation range is available.
Auto 2-range	2 forward ranges are independently configurable. Digital output of operation is available.
Flow switch	Contact output is made when the upper or lower limit values of the instantaneous flow rate are reached
Total value switch	Contact output is made when the upper limit value of the total flow rate (forward) exceeds the setting value.
Display of various units	Unit may be set in 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, Mm^3/d
Multilingual display	The display language may be selected from 5 choices, including Japanese (Katakana), English, French, Spanish and German.

Application example

The ultrasonic flowmeter is a liquid flowmeter used in various applications.

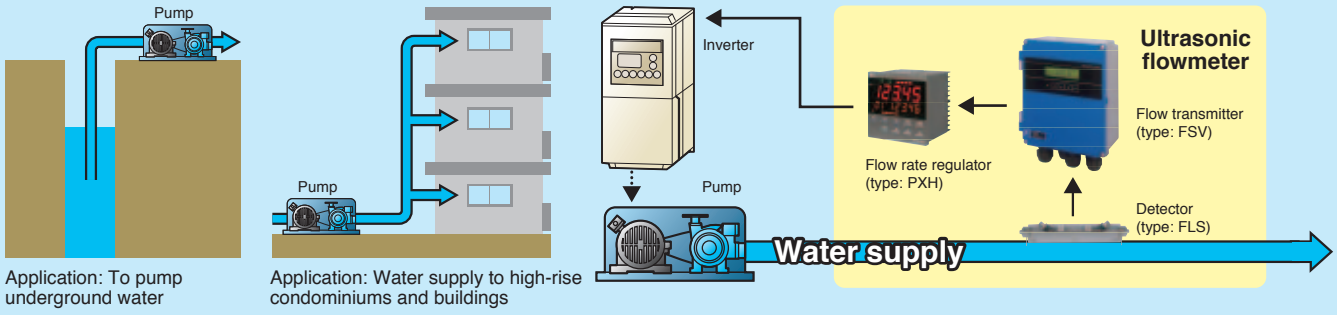
1. Measuring system for the paint flow rate

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

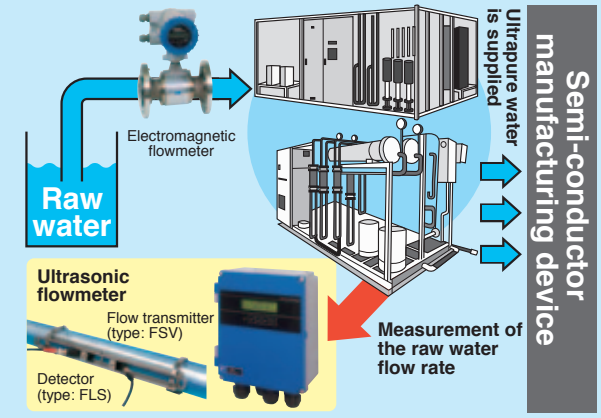
A detector is attached to the already constructed pipe to measure the flow rate at the pump outlet, and a regulator is used to implement inverter control of the pump.



3. Flow rate measurement in a water purifying system for semi-conductors

Advantages of using an ultrasonic flowmeter for the system

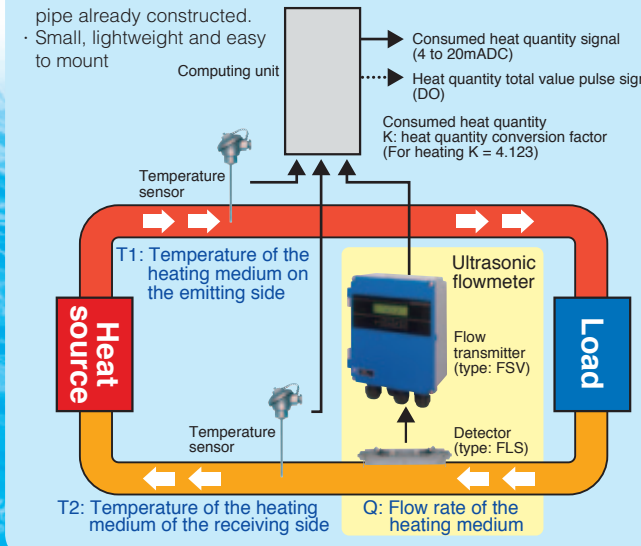
1) It can be easily mounted on the exterior of a pipe, helping reduce mounting cost.
2) As a sensor, it can operate without coming into contact with fluid, so the fluid is not affected by metallic ions.
3) This meter, compact and lightweight, can be easily carried and mounted.



4. A system for measuring heat transfer and efficiency

Heat is transferred by water flow in the process of HVAC loop

- It can be mounted on the pipe already constructed.
- Small, lightweight and easy to mount



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 plan ..... 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

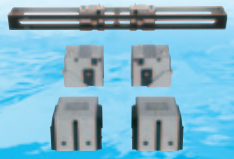
IP66 IP67

Flow transmitter

1	2	3	4	5	6	7	8		9	10	11	12	13		14	Description
F	S	V	E		Y		1	–		Y	Y			–		
			E													(Language) (4th digit) Standard
				Y A B												(Communication) (5th digit) None RS232C+DI RS485+DI
					Y											(6th digit) Single measuring path
						1 4										(Power supply)(7th digit) 100 to 240VAC 50/65Hz 20 to 30VDC
									S H							(Case structure) (9th digit) IP66 IP67
										Y A						(Wire connection port) (10th digit) Weatherproof gland provided Union (for plica) with gland [G1/2 female screw] (when "H" is specified 9th digit)
											Y					(Combination with an explosion-proof detector) (11th digit) None
												Y A B C				(Parameter setting) (12th digit) None Setting provided Setting provided + tag Tag
													A B C			(Mounting method) (13th digit) Pipe mount (if the 9th digit is S) Wall mount Pipe mount (if the 9th digit is H)
															N E A	(Area) (14th digit) America Europe, Middle East, Africa Asia

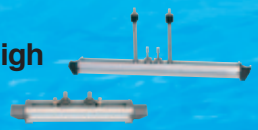
Detector, common / large diameter type

1	2	3	4	5	6	7	8		9	10	11	12	13	Description
F	S	G	S			Y	1	–	Y				1	
				3 2 3 1 4 1 5 1 5 0										Type (5th and 6th digits) Small sensor 2MHz (ø50 to ø300) Small sensor 1MHz (ø50 to ø300)*2 } V method Middle sensor 1MHz (ø200 to ø1200) Large sensor 1MHz (ø200 to ø6000) Large sensor 0.5KHz (ø200 to ø6000)*2 } V or Z method
										Y A B C				Acoustic coupler (10th digit) None*5 Silicon rubber (KE348) Silicone-free grease (HIGH-Z) (Note 2) Silicone grease (G40M) (Note 2)
											Y A			Additional specification (11th digit) None Tag plate
												Y A B C D E		Wire rope for mounting (12th digit) Specify it in the case of FSGS41 or FSGS5. None Nominal diameter: up to ø500mm Nominal diameter: up to ø1000mm Nominal diameter: up to ø1500mm Nominal diameter: up to ø3000mm } Can be specified Nominal diameter: up to ø6000mm } only for FSGS5



*2: For aging pipes, cast iron pipes or mortar-lined pipes that interrupts the propagation of ultrasonic signals, select FSGS31 or FSGS50.
*3: Procure type FLY for the signal cable.
*5: Silicone rubber (KE-348W) is provided as a standard accessory to fill the wiring mold. (It can also be used as an acoustic coupler.)
If an additional acoustic coupler is required, select one among A, B and C.

Detector, small diameter/high temperature type



1	2	3	4	5	6	7	8	Description
F	S	D	2	2	0	S	1	Smoall diameter senser(ϕ 13 to ϕ 100)V method
F	S	D	3	2	0	Y	1	High-temperature senser*1(ϕ 50 to ϕ 400)V or Z method

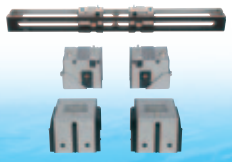
*1: For turbid fluid or old pipe, cast iron pipe, mortar lining pipe or others through which the ultrasonic signal could not be transmitted easily, use an optional guide rail (TK4C6164C1), and carry out mounting by Z method.
Applicable diameter range
V method: ø50 to ø250 Z method: ø150 to ø400
Note: As standard acoustic coupler, silicone rubber (KE-348W) is provided for small diameter sensor, or grease for high temperature (KS62M) for high-temperature sensor.

Detector, Compact type

1	2	3	4	5	6	7	8		9	10	Description
F	L	S	E				3	–			
			E								Version (4th digit) Standard
				1 2 2 2							Type (5th and 6th digits) Small diameter detector (ϕ 25 to ϕ 100mm) Small detector (ϕ 50 to ϕ 225mm)(Note 1) } V method
					Y A B						Acoustic coupler (7th digit) (Note 2) None Silicone rubber Silicone-free grease (Note 3)
						Y A					Fluid temperature range (9th digit) -20 to 100˚C -0 to 120˚C
							Y B				Optional specification (10th digit) None Tag

Note 1: When the 9th digit in the code symbol is "A", the applicable piping diameter is up to 150mm.
Note 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.Select silicone-free grease for semiconductor equipment or similar that is vulnerable to silicone. The 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.
Note 3: Select silicone grease for Teflon-coated piping.

Detector, submersible type



1	2	3	4	5	6	7	8		9	10	11	12	13	Description
F	S	G	S			A	1	–					1	
				3 2 3 1 4 1 5 1 5 0										Type (5th and 6th digits) Small sensor 2MHz (ø50 to ø300) Small sensor 1MHz (ø50 to ø300)*2 } V method Middle sensor 1MHz (ø200 to ø1200) Large sensor 1MHz (ø200 to ø6000) Large sensor 0.5KHz (ø200 to ø6000)*2 } V or Z method
									B C D E F G H J K L M N P Q R Z					Dedicated signal cable (9th digit) 10m 20m 30m 40m 50m 60m 70m 80m 90m 100m 110m 120m 130m 140m 150m Specified length (Contact us if length is more than 150m. Max. length is 300m.)
										A C				Acoustic coupler (10th digit) Silicon rubber (KE348) Silicone grease (G40M) (Note 2)
											Y A			Additional specification (11th digit) None Tag plate
												Y A B C D E		Wire rope for mounting (12th digit) Specify it in the case of FSGS41 or FSGS5. None Nominal diameter: up to ø500mm Nominal diameter: up to ø1000mm Nominal diameter: up to ø1500mm Nominal diameter: up to ø3000mm } Can be specified Nominal diameter: up to ø6000mm } only for FSGS5

*2: For aging pipes, cast iron pipes or mortar-lined pipes that interrupts the propagation of ultrasonic signals, select FSGS31 or FSGS50.

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 conpact type detector acoustic couplant is option.
CD-ROM (contains an instruction manual and loader software for PC communication)

Optional accessories
(1) Signal cable (type: FLY)
Cable between detector and flow transmitter
Note: Cable is attached for a submersible detector.
(2) Loader cable (type: ZZP*TK4J1236)

Specifications

Applicable subjects and operation environment

<table>
<tr><td>Applicable fluid</td><td colspan="6">Homogeneous liquids capable of ultrasonic wave propagation
Bubble quantity: 0 to 12Vol% (reference diameter 50A, water and flow velocity of 1m/s)
Turbidity of fluid: 10000 degrees (mg/L) or less
Straight pipe length: upstream side 10D or more, downstream 5D or more (D: pipe inner diameter)
State of flow: fully developed turbulent or laminar flow in round pipe filled with fluid</td></tr>
<tr><td rowspan="9">Applicable piping and fluid temperature</td><td>Classification</td><td>Detector type</td><td>Pipe inner diameter (mm)</td><td>Applicable pipe material</td><td>Mounting method</td><td>Fluid temperature range (Note 3)</td></tr>
<tr><td rowspan="3">Compact type</td><td rowspan="2">FLSE12</td><td>ϕ25 to ϕ100</td><td>Plastic (PVC, etc.) (Note 1)</td><td rowspan="3">V method</td><td rowspan="3">The 9th digit of the code symbols
Y : -20 to 100°C
A : 0 to 120°C (Note 4)
Heat shock resistance 150°C for 30 min.</td></tr>
<tr><td>ϕ50 to ϕ100</td><td>Metal pipe (SS, steel pipe, copper pipe, aluminum pipe, etc.) (Note 2)</td></tr>
<tr><td>FLSE22</td><td>ϕ50 to ϕ225</td><td>Plastic (PVC, etc.) (Note 1)
Metal pipe (SS, steel pipe, copper pipe, aluminum pipe, etc.) (Note 2)</td></tr>
<tr><td>Small diameter type</td><td>FSD22</td><td>ϕ13 to ϕ100</td><td rowspan="5">Plastic (PVC, etc.) (Note 1)
Metal pipe (SS, steel pipe, copper pipe, aluminum pipe, etc.) (Note 2)</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>V method</td><td rowspan="3">-40 to 80°C</td></tr>
<tr><td rowspan="2">Large diameter type</td><td>FSGS41</td><td>ϕ200 to ϕ1200</td><td rowspan="2">V or Z method</td></tr>
<tr><td>FSGS5</td><td>ϕ200 to ϕ6000</td></tr>
<tr><td>High temperature type</td><td>FSD32</td><td>ϕ50 to ϕ400</td><td>-40 to 200°C</td></tr>
<tr><td colspan="6">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.
* In case the lining suffers from peeling-off, measurement may be impossible.
Note 3: 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.</td></tr>
<tr><td>Flow velocity range</td><td colspan="6">0 to ±0.3 ····· ±32m/s</td></tr>
<tr><td>Power supply voltage</td><td colspan="6">100 to 240VAC 50/60Hz or 20 to 30VDC</td></tr>
<tr><td>Power consumption</td><td colspan="6">15VA or less (AC power supply), 6W or less (DC power supply)</td></tr>
<tr><td>Signal cable (between the detector and converter)</td><td colspan="6">Coaxial cable (60m max. for compact type detector (FLS), 300m max. for other others)
Heat resistance: 80°C</td></tr>
<tr><td>Installation environment</td><td colspan="6">Non-explosive area not exposed to direct sunlight, corrosive gas or heat radiation</td></tr>
<tr><td>Ambient temperature</td><td colspan="6">Flow transmitter: -20 to 55°C
Detector: -20 to 60°C or -20 to 80°C (FLSE2□2□-A)</td></tr>
<tr><td>Ambient moisture</td><td colspan="6">95% RH max.</td></tr>
<tr><td>Grounding</td><td colspan="6">Class D (100Ω)</td></tr>
<tr><td>Arrester</td><td colspan="6">Provided as standard at the output and power supply</td></tr>
</table>

Performance specifications

<table>
<tr><td rowspan="20">Accuracy rating</td><td>Classification</td><td>Detector type</td><td>Pipe size (inner diameter)</td><td>Accuracy</td><td>Flow velocity</td><td>Applicable pipe material</td></tr>
<tr><td rowspan="8">Compact type</td><td rowspan="4">FLSE12</td><td rowspan="2">ϕ25 toϕ50</td><td>2.0% of rate</td><td>2 to 32m/s</td><td rowspan="2">Plastic</td></tr>
<tr><td>0.04m/s</td><td>0 to 2m/s</td></tr>
<tr><td rowspan="2">ϕ50 to ϕ100</td><td>1.0% of rate</td><td>2 to 32m/s</td></tr>
<tr><td>0.02m/s</td><td>0 to 2m/s</td></tr>
<tr><td rowspan="2">ϕ50 to ϕ100</td><td>2.0% of rate</td><td>2 to 32m/s</td><td rowspan="2">Metal pipe</td></tr>
<tr><td>0.04m/s</td><td>0 to 2m/s</td></tr>
<tr><td rowspan="4">FLSE22</td><td rowspan="2">ϕ50 to ϕ225</td><td>1.0% of rate</td><td>2 to 32m/s</td><td rowspan="2">Plastic</td></tr>
<tr><td>0.02m/s</td><td>0 to 2m/s</td></tr>
<tr><td rowspan="2">ϕ50 to ϕ225</td><td>2.0% of rate</td><td>2 to 32m/s</td><td rowspan="2">Metal pipe</td></tr>
<tr><td>0.04m/s</td><td>0 to 2m/s</td></tr>
<tr><td rowspan="4">Small diameter type</td><td rowspan="4">FSD22</td><td rowspan="2">ϕ13 to ϕ50</td><td>2.5% of rate</td><td>2 to 32m/s</td><td rowspan="12">Plastic, metal pipe</td></tr>
<tr><td>0.05m/s</td><td>0 to 2m/s</td></tr>
<tr><td rowspan="2">ϕ50 to ϕ100</td><td>1.5% of rate</td><td>2 to 32m/s</td></tr>
<tr><td>0.03m/s</td><td>0 to 2m/s</td></tr>
<tr><td>Common type</td><td>FSGS32</td><td rowspan="2">ϕ50 to below ϕ300</td><td>1.0% of rate</td><td>2 to 32m/s</td></tr>
<tr><td>High temperature type</td><td>FSD32</td><td>0.02m/s</td><td>0 to 2m/s</td></tr>
<tr><td>Large diameter type</td><td>FSGS51</td><td>ϕ300 to ϕ6000</td><td>1.0% of rate</td><td>0.75 to 32m/s</td></tr>
<tr><td colspan="3"></td><td>0.0075m/s</td><td>0 to 0.75m/s</td></tr>
<tr><td>Common type</td><td>FSGS31</td><td rowspan="2">ϕ50 to below ϕ300</td><td>1.5% of rate</td><td>2 to 32m/s</td></tr>
<tr><td rowspan="2">Large diameter type</td><td>FSGS41</td><td>0.03m/s</td><td>0 to 2m/s</td></tr>
<tr><td>FSGS50</td><td>ϕ300 to ϕ6000</td><td>1.5% of rate</td><td>0.75 to 32m/s</td></tr>
<tr><td colspan="3"></td><td>0.0113m/s</td><td>0 to 0.75m/s</td></tr>
<tr><td>Response time</td><td colspan="6">0.5 sec. (standard mode), 0.2 sec. depending on setting (quick response mode)</td></tr>
</table>

Functional specifications

Analog signal	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: 1P/s 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: 1000P/s max. (pulse width: 5, 10, 50, 100, 200ms)
Digital input (option)	1 point (no-voltage contact)/Set zero, preset total assignable
Serial communication (option)	RS-232C equivalent or RS-485, isolated, arrester incorporated Connectable quantity: 1 unit (RS-232) /up to 31 units (RS-485: MODBUS) Baud rate: 9600, 19200, 38400bps Parity: None/Odd/Even selectable Stop bits: 1 or 2 bits selectable Cable length: 15m max. (RS-232C)/1km max. (RS-485) 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.

Unit:	Metric system	Inch system
Velocity	m/s	ft/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, BBL/s, BBL/min, BBL/h, BBL/d, kBBL/d, MBBL/d	gal/s, gal/min, gal/h, gal/d, kgal/d, Mgal/d, ft^3/s, ft^3/min, ft^3/h, ft^3/d, Kft^3/d, Mft^3/d, BBL/s, BBL/min, BBL/h, BBL/d, kBBL/d, MBBL/d

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.

Unit:	Metric system	Inch system
Total	mL, L, m^3, km^3, Mm^3, mBBL, BBL, KBBL	gal, kgal, ft^3, kft^3, Mft^3, mBBL, BBL, kBBL, ACRE-ft

Setting function	Setting available with 4 keys (ESC, △, ▷, ENT) on the flowmeter front
Zero adjustment	Set zero/Clear available
External zero adjustment	Set zero 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)

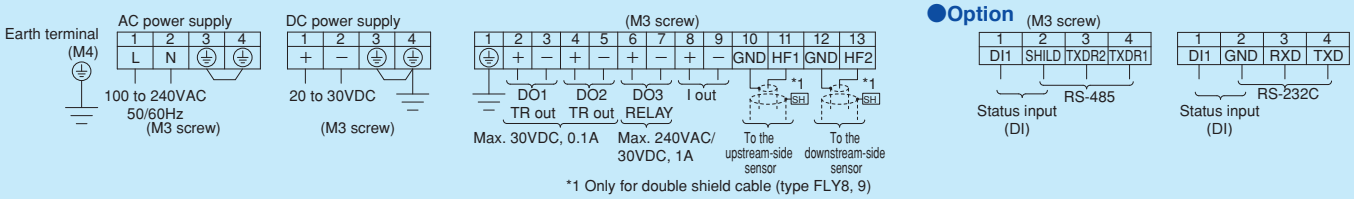
Physical specifications

Type of enclosure	Flow transmitter: IP66 or IP67 / Detector: IP52/IP65/IP67 (Depend on ditector type)				
Mounting method	Mounted on wall or by 2B pipe / Detector: Clamped on existing piping.				
Acoustic couplant Note: The acoustic couplant is a medium that eliminates the gap between detector and pipe.	Silicone rubber, silicone grease or silicone-free grease				
	Type	Silicone rubber (type:KE-348W)	Silicone grease (type:G40M)	Silicone-free grease (type:HIGH Z)	Grease for high temperature (type:KS62M)
	Fluid temperature	−40 to +150˚C	−30 to +150˚C	0 to +60˚C	−30 to +250˚C
	Teflon piping	Not usable	Good	Good	Good
Outer dimensions, mass	See outline diagrams.				

Loader software (standard accessory)

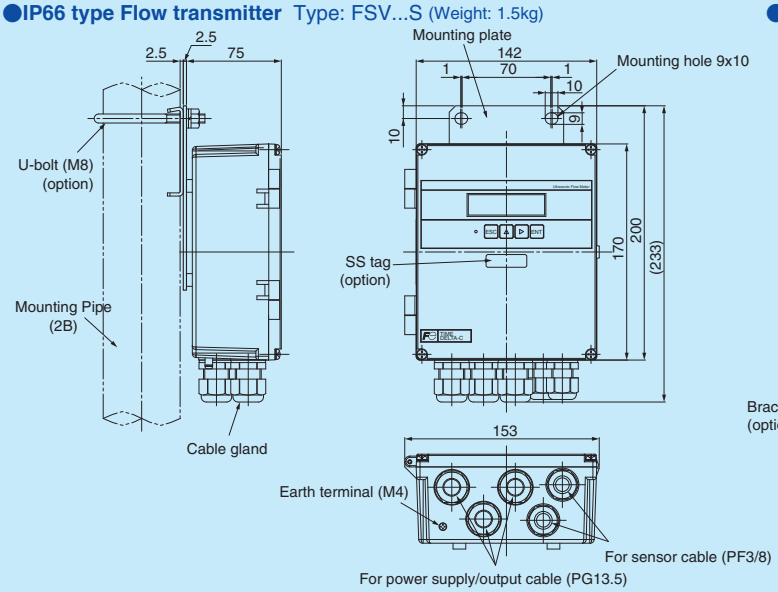
Compatible PC model	PC/AT compatible instrument Operation is undefined for PC98 series (NEC)
Main function	Software for setting/change of the main unit parameters and for collection of the measured data on PC
OS	Windows 2000/XP
Memory requirement	125MB min.
Hard disk capacity	Minimum free space of 52MB or more Note: Loader cable (code symbol ZZP＊TK4J1236) is additionally required.

Connection diagram

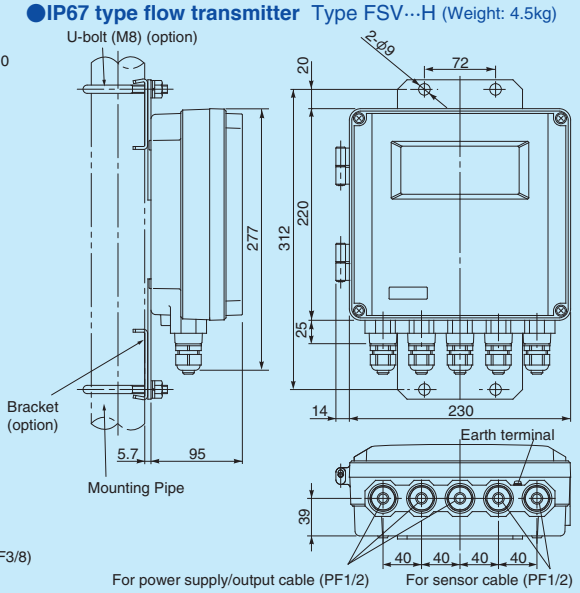


Outline diagram of the flow transmitter (unit: mm)

●IP66 type Flow transmitter Type: FSV...S (Weight: 1.5kg)

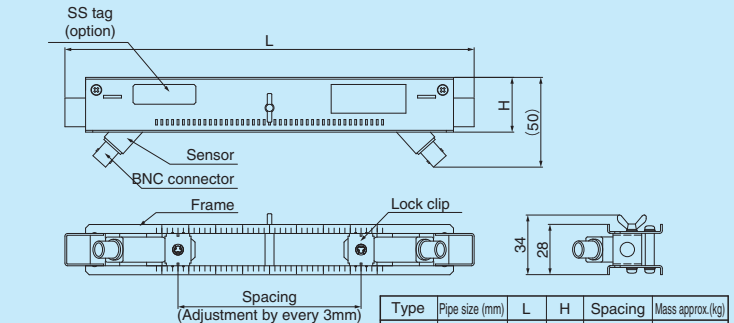


●IP67 type flow transmitter Type FSV···H (Weight: 4.5kg)



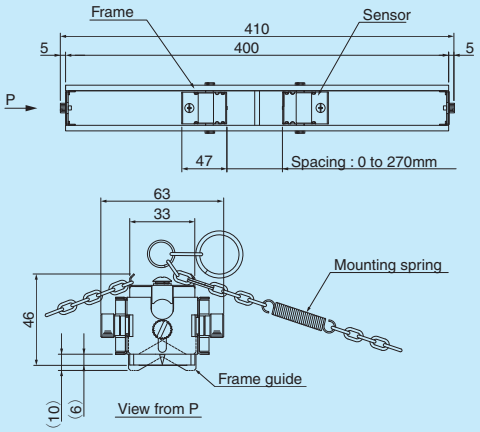
Outline diagram of detector (unit: mm)

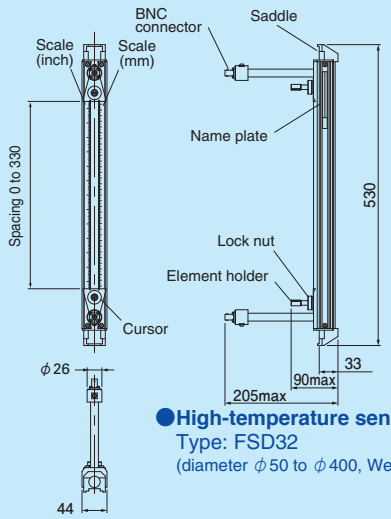
●Compact type detector Type: FLSE1 (diameter ϕ25 to ϕ100)
Type: FLSE2 (diameter ϕ50 to ϕ225)



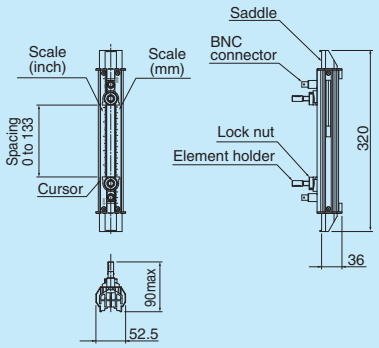
Type	Pipe size (mm)	L	H	Spacing	Mass approx.(kg)
FLSE12	25 to 100	228	31	21 to 120	0.3
FLSE22	50 to 225	348	30	21 to 240	0.4

●Common type detector Type: FSGS3 (diameter ϕ50 to ϕ300, Weight: 0.6kg)

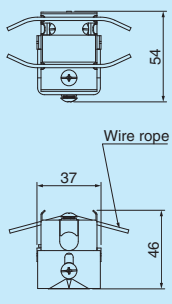




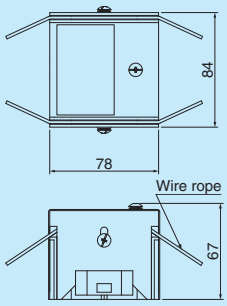
●High-temperature sensor
Type: FSD32
(diameter ϕ50 to ϕ400, Weight: 1.6kg)



●Small diameter sensor
Type: FSD22
(diameter ϕ13 to ϕ100, Weight: 0.6kg)



●Large diameter sensor
Type FSGS4
(diameter ϕ200 to ϕ1200,
Weight: 0.3kg)



●Large diameter sensor
Type: FSGS5
(diameter ϕ200 to ϕ6000,
Weight: 1.2kg)

⚠ Caution on Safety

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

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