

ULTRASONIC FLOWMETER FOR STEAM

(Clamp-on Type)

DATA SHEET

FSJ, FSX, FLY

This flowmeter is a clamp-on (external) type ultrasonic flowmeter which does not require piping work and can measure the flow amount of steam. It can be installed without stopping the production line because piping work is not necessary; there is no risk of steam leakage.

Conventional clamp-on type flowmeters presented difficulties in measuring the flow amount of steam used in plants and business establishments of various industries. This flowmeter can measure the flow amount of steam in the pressure range 0.1 to 0.9 MPa (G)^{Note} because of the new technology, i.e. "high-sensitivity ultrasonic sensor" and "noise reduction technology".

Note) The (G) in MPa (G) indicates gauge pressure (with atmospheric pressure of 0 as baseline).

Note) 0.2 to 0.9 MPa (G) when the pipe size is 65A or larger

FEATURES

1. No need of piping work

Can be installed without cutting pipes.

2. Zero pressure loss

There is no pressure loss because it is externally attached to the pipe.

3. Maintenance cost reduction

Low cost of periodical maintenance including cleaning because of no movable part. No damage due to water hammer.

4. Low flow measurement

Lowest measurable flow is zero flow, which other types of steam flowmeter cannot do.

5. High-speed calculation

The flowmeter is equipped with a high-performance CPU, offering high-speed response of 0.2 seconds.

6. Mass flow rate conversion

Mass flow output is possible by conversion with volume flow and. Density can be adjusted by pressure and temperature input (Pt100).

7. RS-485 communication function

The flowmeter is equipped with communication functions such as RS-485 (Modbus specification), which is capable of carrying out self-diagnosis as an IoT terminal device, and features a remote diagnosis function.

8. Multi-lingual

The following languages are supported for display:
Japanese (Katakana), English, German, French, and Spanish.

SPECIFICATIONS

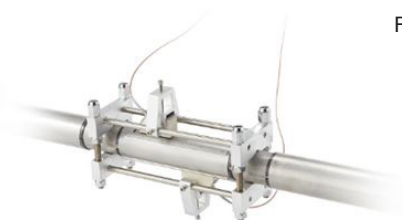
1. General specifications

Measurement principle:

Ultrasonic transit-time difference method



Flow transmitter
(FSJ)



Detector (FSX)

System configuration:

Measurement with flow transmitter (type: FSJ) and detector (type: FSX)

Conversion to mass flow rate with flow transmitter, detector, pressure gauge/thermometer (analog input)

Power supply:

100 to 240 V AC (+10%/-15%), 50/60 Hz

Power consumption:

20 VA or less

Grounding:

Class D grounding with ground resistance of 100 Ω or less

Varistor:

Provided as standard for power supply

Arrester:

Provided as standard for analog output

Signal cable:

2 m (between detector and pre-amplifier)

5 to 30 m (between pre-amplifier and flow transmitter)

Enclosure:

IP67 (with connectors fitting)

Ambient temperature:

-20 to +60°C (when in use)

-20 to +65°C (when stored)

Note) Refer to the 10 pages for "Usage precautions".

Ambient humidity:

95% RH or less

Vibration resistance:

0.5 G, 5 to 200 Hz

Installation environment:

Non-explosion-proof area with no direct sunlight, corrosive gas, or radiant heat

Material:

Flow transmitter: Aluminum alloy
 Detector (sensor): Plastic, stainless steel
 Detector (sensor mounting bracket): Aluminum alloy, stainless steel
 Noise elimination frame: Heat-resistant rubber, stainless steel
 Pre-amplifier: Aluminum alloy

Coating:

Flow transmitter: Urethane resin coating
 Pre-amplifier: Polyester powder paint

Finish color:

Flow transmitter (front cover): Silver
 Flow transmitter (case): Dark silver
 Pre-amplifier: Light gray

Weight:

Flow transmitter: 5.5 kg
 Detector (excluding preamp): 6.5 kg (50A), 7.5 kg (65A), 8.0 kg (80A), 8.5 kg (100A)
 Dedicated cable (10 m): 2.1 kg
 Pre-amplifier: 1.5 kg

2. Measurement fluid specifications

Applicable fluid:

Saturated steam

Flow profile:

Fully-developed turbulent or laminar flow in round pipe

Splashing, wetness fraction:

Wetness fraction: 0%, there should be no splashing

Flow rate/flow amount:

Lower limit of measurable range: 0 m/s
 Upper limit of measurable range: Refer to Table 1

Pressure:

0.1 MPa (G) to 0.9 MPa (G) (50A)
 0.2 MPa (G) to 0.9 MPa (G) (65A, 80A, 100A)
 Note) When the pressure changes by 0.1 MPaG or bigger within 10 seconds, it may not be measured.

Temperature:

+120°C to + 180°C (50A)
 +134°C to + 180°C (65A, 80A, 100A)

3. Performance

Accuracy:

<Table 2>

Flow rate	50A	65, 80, 100A
10 to 30 m/s	±3.0% of rate	±4.0% of rate
30 to 50 m/s	±5.0% of rate	±5.0% of rate
0 to 10 m/s	±0.3 m/s	±0.4 m/s

Note) They are guaranteed values obtained with our inspection equipment.
 Accuracy may be lower, depending on the condition of steam and piping, and the length of straight pipes.
 Please refer to "Check Items before Purchase" on Page 10.
 Note) Flow rate of 30 to 50 m/s at 100A is out of the measurement range.
 Note) The above accuracies are for displayed values and pulse output.
 For analog output, ± 0.04mA is to be added to those values (at ambient temperature of 25°C).

Response time:

0.2 s (standard)

Warm-up time:

Starting at the normal temperature, it takes about 10 minutes until the temperature of the detector stabilize after steam begins to flow (this depends on the facilities).
 During warm-up, the measurement accuracy might not be satisfied or there may happen output holding.

<Table 1>

Nominal diameter	Inner diameter of SGP [mm]	Flow rate [m/s]	Upper limit of measurable range									
			Volumetric flow rate [m³/h]	Mass flow rate [kg/h]								
				0.1 at [MPa]	0.2 at [MPa]	0.3 at [MPa]	0.4 at [MPa]	0.5 at [MPa]	0.6 at [MPa]	0.7 at [MPa]	0.8 at [MPa]	0.9 at [MPa]
50A	52.9	±50	±396	±450	±656	±858	±1058	±1256	±1453	±1648	±1843	±2037
65A	67.9	±50	±652	—	±1081	±1414	±1743	±2069	±2393	±2715	±3036	±3357
80A	80.7	±50	±921	—	±1526	±1997	±2462	±2923	±3381	±3836	±4289	±4741
100A	105.3	±30	±941	—	±1559	±2040	±2515	±2986	±3453	±3918	±4382	±4844

Note) Values in Table 1 are for SGP. The measurable range of the flow rate varies depending on the inner diameter of pipes.

4. Detector specifications (FSX)

Detector mounting method:

Clamp-on type (mounted externally on pipe)

Pipe size:

- 50A (outer diameter: \varnothing 60.5 mm)
- 65A (outer diameter: \varnothing 76.3 mm)
- 80A (outer diameter: \varnothing 89.1 mm)
- 100A (outer diameter: \varnothing 114.3 mm)

Pipe thickness:

2.8 to 4.5 mm

Pipe material:

- Steel, stainless steel
- Note) Not applicable to lining pipes

Sensor heat-resistant temperature:

Max. 180°C

5. Flow transmitter specifications (FSJ)

Analog output signals:

- 4 to 20 mA DC (insulated), 1 point
- Allowable load resistance: 600 Ω or less

Analog input signals:

- 4 to 20 mA DC (insulated), 1 point
- Input signals: Saturated steam pressure or saturated steam temperature

Temperature input function:

- Pt100: 1 point (for saturated steam temperature or pipe surface temperature)
- Measurement range: 100 to 180°C
- *Temperature sensor should be prepared separately.

Contact output signals:

- Forward total, reverse total, alarms, working range, flow switch, or total switch can be allocated as required.
- Type: Transistor output, open collector output (insulated)
- Load rating: 30 V DC, 50 mA
- Number of output points: 2 points
- Max. output frequency: 100 pulses per second

Communication function:

- RS-485 (Modbus specification, insulated)
- No. of connectable modules: Up to 31
- Baud rate: 9600, 19200, 38400 bps
- Parity: None/odd/even, selectable
- Stop bit: 1 or 2 bits, selectable
- Cable length: Up to 1 km
- Data: Instantaneous flow velocity, instantaneous flow rate, total value, etc.

Display device:

- LCD with 2 lines of 16 characters and back light
- 2-color LED (Normal: green, Extraordinary: red)

Indication language:

- Japanese (Katakana)/English/French/German/Spanish (changeable)

Flow velocity/flow rate indication:

- Numerals: 8 digits (incl. decimal point)
- Instantaneous flow velocity, flow rate (volumetric flow rate)
- Instantaneous flow velocity indication (minus indication for reverse flow)
- Unit:

<Table 3>

Flow velocity	m/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

Instantaneous flow rate (mass flow rate):

<Table 4>

Flow rate	g/s, g/min, g/h, g/d, kg/s, kg/min, kg/h, kg/d, t/s, t/min, t/h, t/d
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Mass flow rate conversion:

Conversion from density and volumetric flow rate measurement value to mass flow rate

Density is calculated with either one of the below input

- Density fixed value input
- Saturated steam pressure AI input value
- Saturated steam temperature AI input value
- Temperature input

Total value indication:

Numerals: 9 digits

<Table 5>

Volumetric flow rate	mL, L, m ³ , km ³ , Mm ³ , mBBL, BBL, kBBL
Mass flow rate	g, kg, t

Pipe connection:

Refer to ordering code in the page 5.

6. Functionality

Self-diagnostic function:

Receiving wave diagnosis, S/N diagnosis, device diagnosis, etc.

Damping:

0 to 100s (every 0.1s) 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

Bi-directional flow measurement:

Bi-directional flow measurement and flow rate summation

Range switching and range setting range:

Single range, automatic 2 ranges, bi-directional range, bi-directional automatic 2 ranges

Troubleshooting function:

Dialog style troubleshooting display

Maintenance function:

Analog output/analog input adjustment and verification
Digital output verification

Burnout:

Analog output: Hold/Overscale/Underscale/Zero selectable

Flow rate total: Hold/Count selectable

Burnout timer: 10 to 900s (every 1s)

Bi-directional range:

Forward and reverse ranges configurable independently.

Hysteresis: 0 to 20% of working range

Working range applicable to digital output

Auto-2 range:

2 forward ranges configurable independently

Hysteresis: 0 to 20% 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:

Forward total switching point configurable

Digital output available when actuated

Total preset:

Total flow returns to the user-defined preset value every time a user resets the total.

Backup of power failure:

backup by non-volatile memory

EU Directive Compliance CE

- LVD (2014/35/EU)
 - EN 61010-1
- EMC (2014/30/EU)
 - EN 61326-1 (Table 2)
 - EN 55011 (Group 1 Class A)
 - EN 61000-3-2 (Class A)
 - EN 61000-3-3
 - EN 61326-2-3
- RoHS (2011/65/EU)
 - EN 50581

Physical specifications

Acoustic coupler:

Acoustic coupler is a filling between detector and pipe.
Type of acoustic coupler:

<Table 6>

Type	High-temperature grease (for short-term installation) Name: KS-62M	High-temperature grease (for long-term installation) Name: Moly High Temp Grease
Fluid temperature	-30 to 250°C	-15 to +250°C
Expected lifetime	6 months	2 years

Note) Please contact us when using high-temperature grease (long-term type) outside of Japan.

Signal cable: (between detector and Pre-amplifier):

Structure: Heat-resisting high-frequency coaxial cable
Sheath: Flame-resisting PVC
Outer diameter: ø11.5 mm
Terminal treatment:

<Table 7>

Cable type	FLYE
Terminal to transmitted	dedicated
Terminal to detector side	dedicated

External terminal of flow transmitter:

plug terminal (Screw type euro terminal)

PC loader software

Provided as standard

- PC/AT compatible computer
 - Main functions: Software for displaying and making changes to parameters, for gathering measurement data Instantaneous flow rate, instantaneous flow velocity, total values, and error information, etc. can be imported.
 - OS: Windows 8.1 (Professional)/Windows 10 (Enterprise) Editions in parentheses () indicate versions for which operation has been verified.
 - Required memory: 125 MB or more
 - Disk drive: Windows 8.1/10 compatible CD-ROM drive
 - Hard disk drive capacity: Min. available capacity of 52 MB
- Note: Communication converter

For the PC that supports RS-232C serial interface, RS-232C - RS-485 converter is needed for connecting the PC and main unit.

For the PC that does not support RS-232C serial interface, additionally, USB - RS232C converter is also needed.

<Recommendation>

[RS-232C - RS-485 converter]

RC-770X (manufactured by SYSMEX RA)

[USB - RS-232C converter]

USB-CVRS9 (manufactured by SANWA SUPPLY)

Conditions on straight pipe

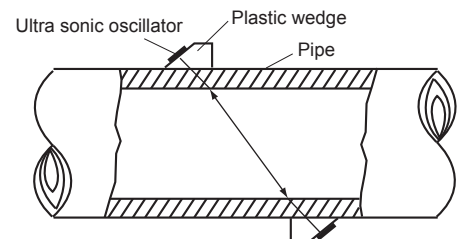
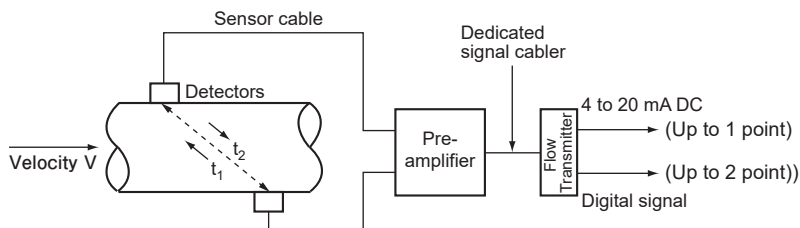
(D : Inside diameter of pipe)

Classification	Upstream side	Downstream side
90° bend		
Tee		
Diffuser		
Reducer		
Various Valve		
Pump		

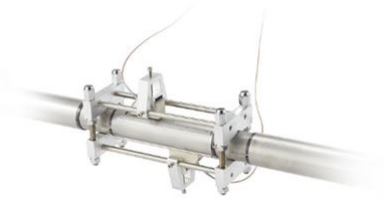
When the straight pipe is shorter than the above length, please contact us.

CONFIGURATION DIAGRAM, MEASURING PRINCIPLE

With ultrasonic pulses propagated diagonally between the upstream and downstream sensors, flow rate is measured by detecting the time difference obtained by the flow of fluid.



ORDERING CODE



<Flow transmitter>

Digit	Specification	Note:	4	5	6	7	8	9	
			FSJ						F
			1	Y	1				
4	<Wiring port, mounting method> With water-proof gland, wall mount With union (for plica tube) gland, wall mount With water-proof gland, pipe mount With union (for plica tube) gland, pipe mount	Note: L M N P							
5	<Power Supply> 100 to 240 V AC, 50/60 Hz		1						
6	<Explosion-proof specification> None			Y					
7	<Parameter setting/tag plate (flow transmitter)> None With setting With setting + tag plate (flow transmitter) Tag plate (flow transmitter)				Y A B C				
8	Revision code					1			
9	<Option functions> Communication (RS-485)							F	

Note) Specifications for the wiring port are as follows.
 With water-proof gland: G1/2 and G3/8 (female screw)
 With union (for plica tube) gland: G1/2 (female screw)

<Detector>

Digit	Specification	Note:	4	5	6	7	8	9	
			FSX						S
			S	Y	1				
4	<Pipe diameter> 50A 65A 80A 100A		5 6 8 A						
5	<Sensor fixing bracket, noise elimination frame> Standard		S						
6	<Explosion-proof specification> None			Y					
7	<Acoustic coupler, tag plate (detector)> None High-temperature grease (for short-term installation) High-temperature grease (for long-term installation) * Tag plate (detector) High-temperature grease (for short-term installation) + tag plate (detector) High-temperature grease (for long-term installation) + tag plate (detector) * Note) Please contact us if you use E and H overseas.				Y D E F G H				
8	Revision code					1			
9	<Pre-amplifier> Standard							S	

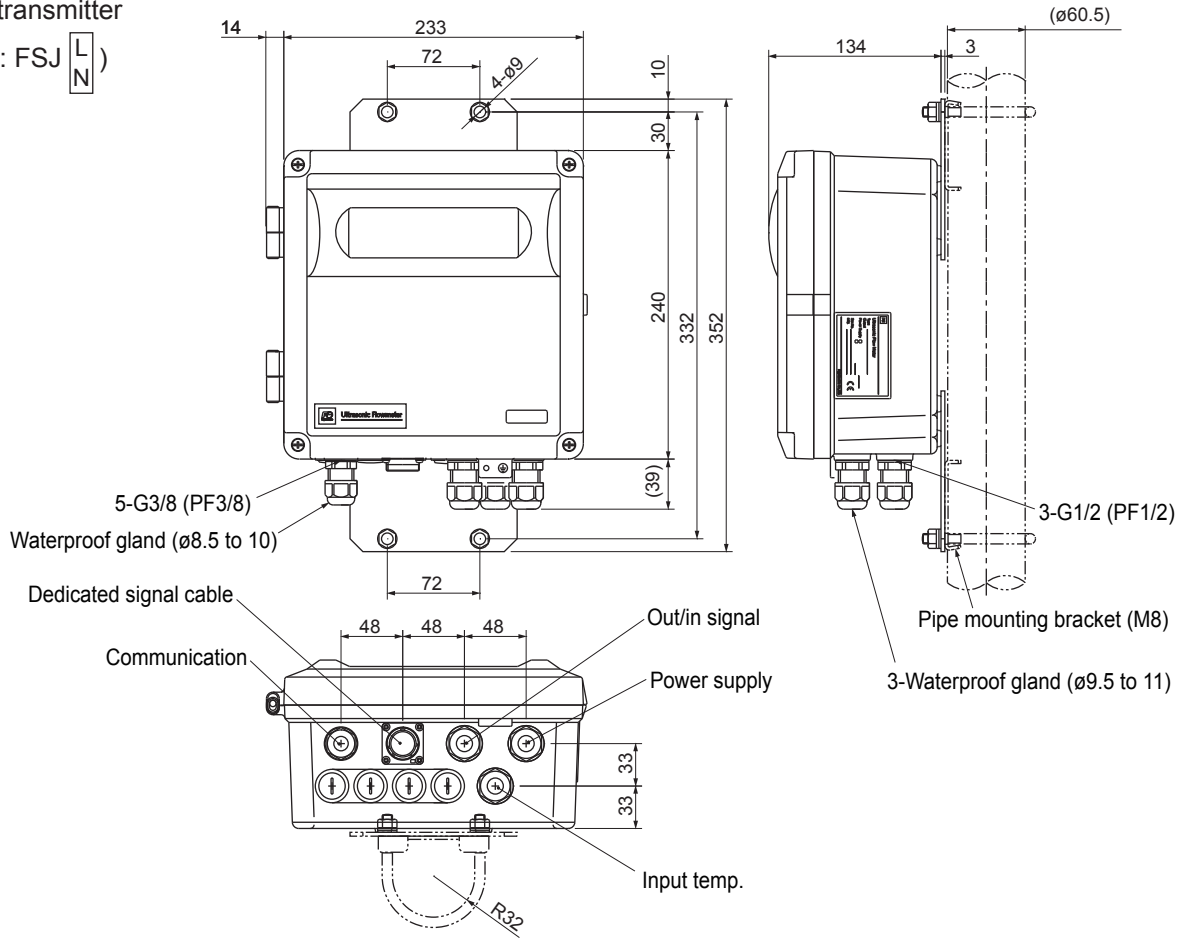
* Note Please contact Fuji when using high-temperature grease (long-term type) outside of Japan.

<Dedicated signal cable>

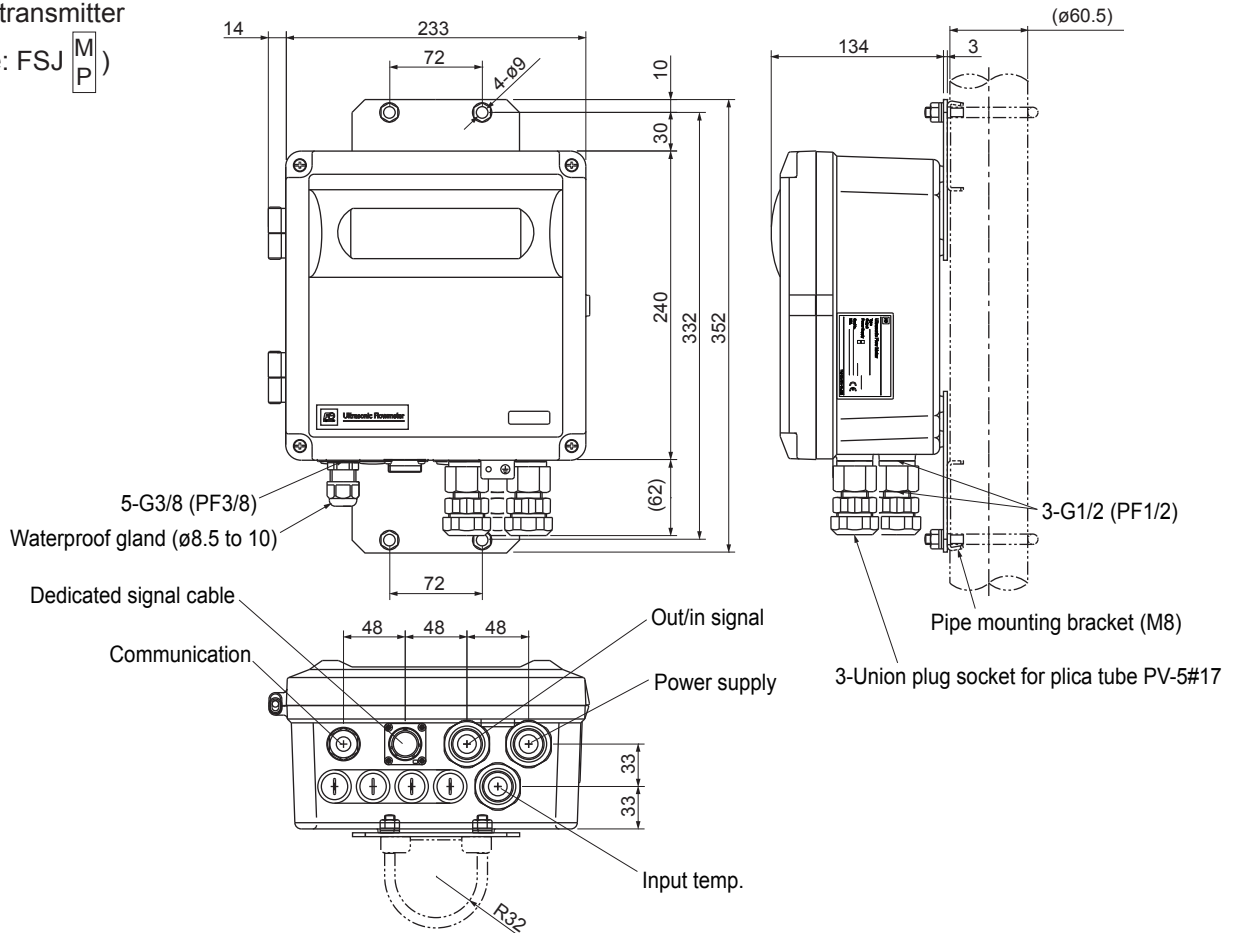
Digit	Specification	Note:	4	5	6	7	8	
			FLY					1
			E					
4	<Applications> Flow transmitter for steam (FSJ), detector for steam (FSX)		E					
5	<Dedicated cable length>							
6	5m			0	0	5		
7	10m			0	1	0		
	15m			0	1	5		
	20m			0	2	0		
	25m			0	2	5		
	30m			0	3	0		
	Other standard length (Max. 30 m)		Z	Z	Z			
8	Revision code						1	

OUTLINE DIAGRAM (Unit:mm)

Flow transmitter
(Type: FSJ $\begin{matrix} L \\ N \end{matrix}$)



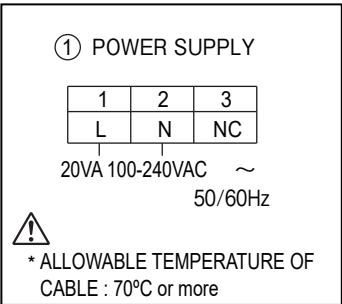
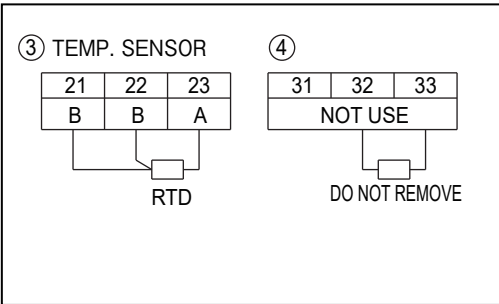
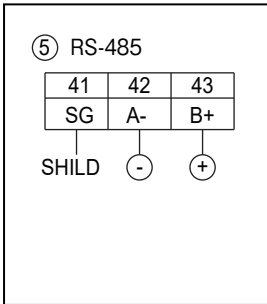
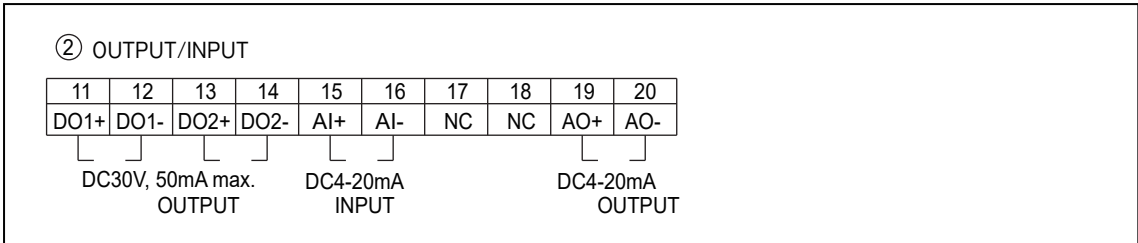
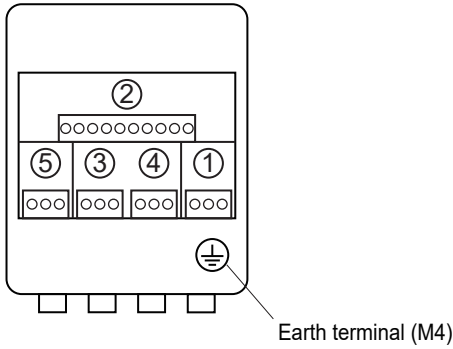
Flow transmitter
(Type: FSJ $\begin{matrix} M \\ P \end{matrix}$)



CONNECTION DIAGRAM

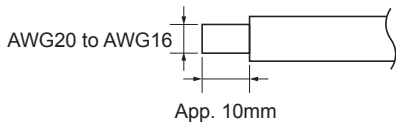
Flow transmitter

Terminal outline

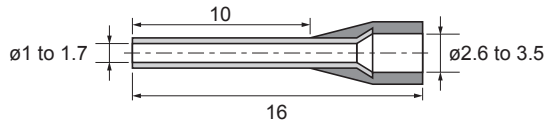


Usable wiring material

- Wire
 Gauge: AWG20 (0.5mm²) to AWG16 (1.5mm²)
 Strip-off length: 10mm



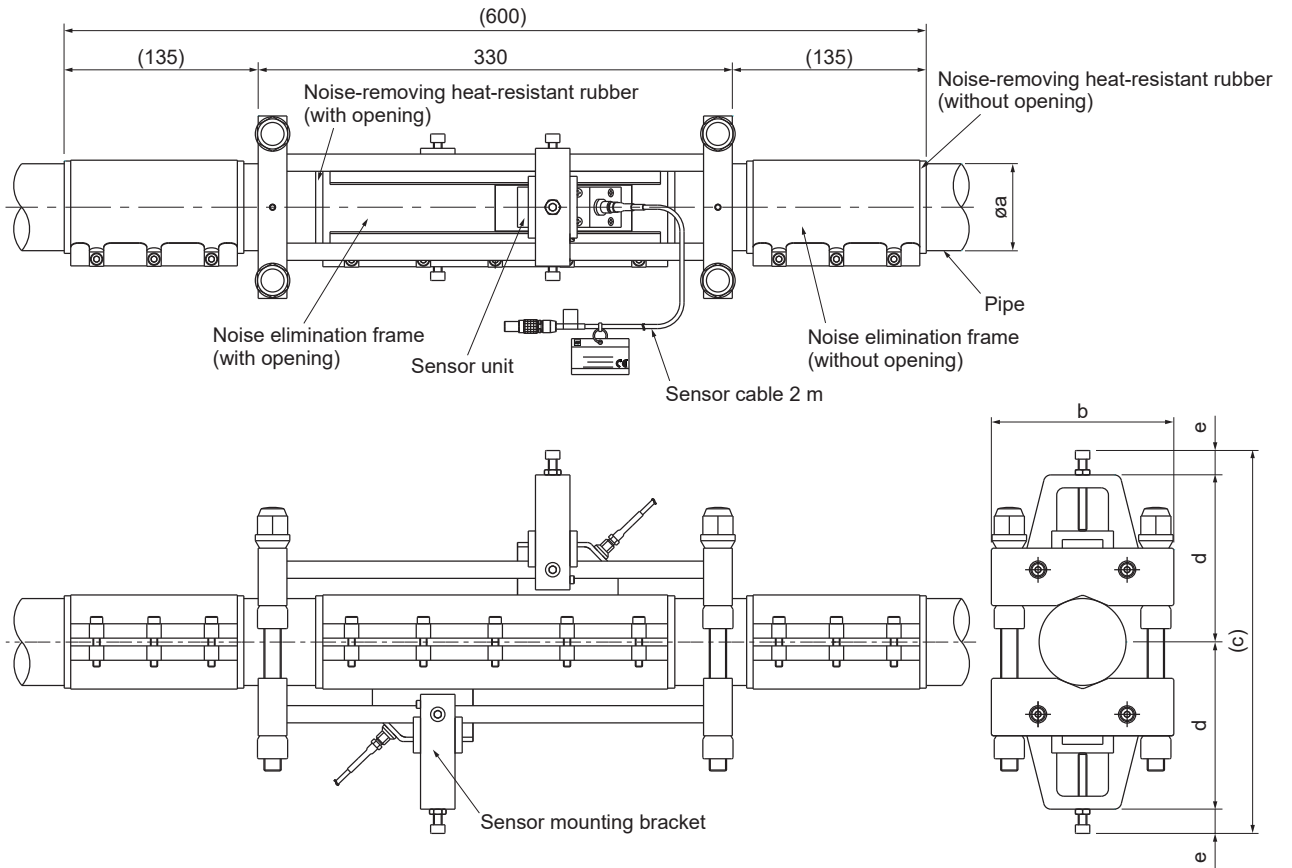
- Bar terminal
 Weidmüller
www.weidmuller.com



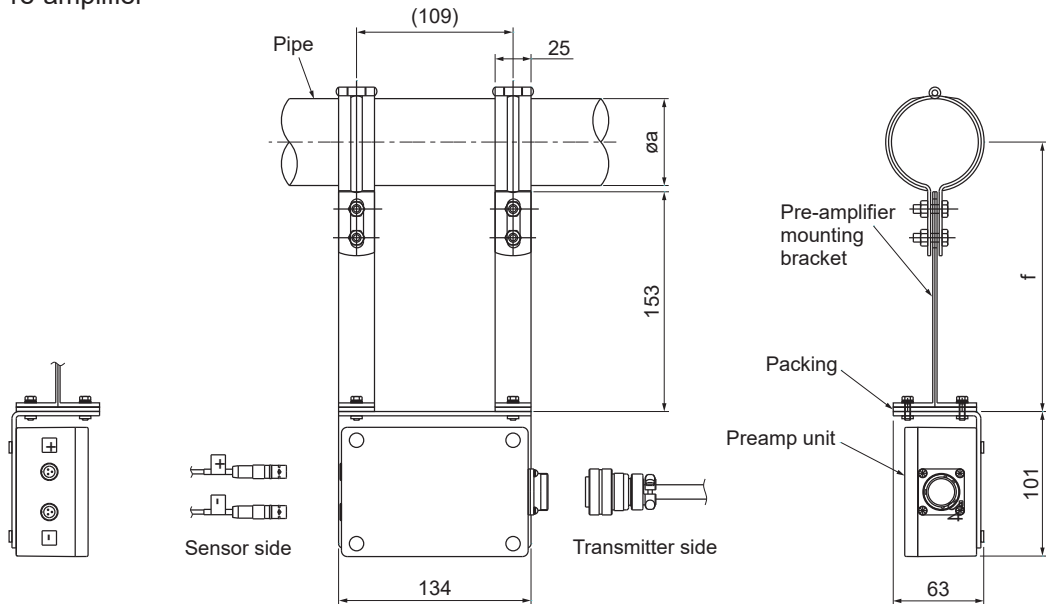
OUTLINE DIAGRAM (Unit:mm)

Detector (Type:FSX)

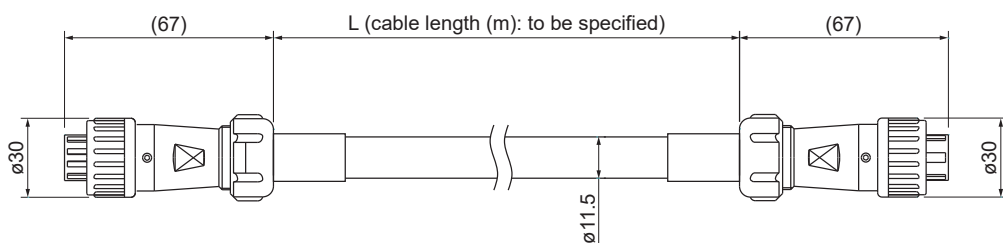
Pipe size	øa	b	c	d	e	f
50A	60.5	127	267	116	17	188
65A	76.3	175	282	124	17	196
80A	89.1	175	295	131	16	202
100A	114.3	175	320	145	16	215



Pre-amplifier



Dedicated signal cable (Type:FLYE)



SCOPE OF DELIVERY

■ Flow transmitter: FSJ

- Flow transmitter unit
- CD-ROM (loader software for PC, instruction manual)
- Safety precautions
- Pipe mounting bracket (option) U-bolts, bracket, etc. (2 sets)

■ Detector: FSX

- Sensor unit (with sensor cable) (2 units)
- Pre-amplifier
- Pre-amplifier mounting bracket (2 sets)
- Sensor mounting bracket
- Noise elimination frame (3 frames)
- High-temperature grease (option)

■ Dedicated cable: FLYE

- Dedicated cable (length specified by user)

ITEMS DESIGNATED ORDERING

1. Detector code symbols
2. Flow transmitter code symbols
3. Signal cable code symbols
4. Tag No. as necessary (up to 8 alphanumeric characters)
5. If parameter setting is specified, send back the attached parameter specification table duly filled.

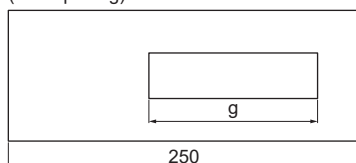
OPTIONAL ACCESSORIES

	Name	Specifications	Drawing No.
1	High-temperature grease	for short-term installation for long-term installation	ZZP*TQ506697C1 ZZP*TQ507247C1
2	Noise-removing heat-resistant rubber	50A, with opening, Figure below g=95mm	ZZP*TQ405811P1
		50A, with opening, Figure below g=120mm	ZZP*TQ405811P2
		50A, without opening	ZZP*TQ405811P3
		65A, with opening, Figure below g=136mm	ZZP*TQ405811P4
		65A, without opening	ZZP*TQ405811P5
		80A, with opening, Figure below g=130mm	ZZP*TQ405811P6
		80A, without opening	ZZP*TQ405811P7
		100A, with opening, Figure below g=118mm	ZZP*TQ405811P8
		100A, without opening	ZZP*TQ405811P9

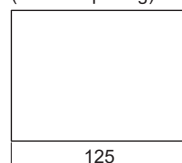
Note) The noise removing frame can be repeatedly used. However, if it is peeled off forcefully, the heat-resistant rubber may be damaged or the double stick tape between the heat-resistant rubber and stainless frame may be peeled off. If the double stick tape is peeled off, please use a commercial product "No. 760H#25 (0.145 mm thick, 20mm wide)(Manufactured by Teraoka Seisakusho Co., Ltd.).

Note) The following two types are used for noise-removing heat-resistant rubber (50A, with opening): g=95mm and g=120mm.

Noise-removing heat-resistant rubber (with opening)



Noise-removing heat-resistant rubber (without opening)



Items to be checked before purchase

Following conditions may cause failure of the measurement or to reduce the accuracy by this flow meter.

Please consult and ask Fuji Electric for checking with actual equipment before purchase if it is hard to judge the application is appropriate.

1) Steam

- Steam with a lot of splashing
- Overheated steam
- Steam that doesn't have wetness of 0%

2) Pipe

- Carbon steel pipe that is rough with rust on inside
- Pipe with accretions and/or sediments on inside
- Carbon steel pipe with rough outer surface
- Carbon steel pipe with uneven surface coated with rust preventive
- Carbon steel pipe with uneven surface to which antirust agent is applied
- SGPW pipe [zinc-plated steel pipe for water supply (commonly known as white pipe)]

3) Length of the straight pipe

For accurate measurement, straight pipes are needed between up and down stream side of the measuring part. Please meet the straight pipe conditions according Page 5.

4) A Rapid Change in Pressure

A pressure change of 0.1 MPaG or bigger within 10 seconds.

Usage precautions

- 1) Take care not to damage the detector or signal cable installed on pipes.
- 2) It is recommended that the detector be mounted horizontally when using horizontal pipes.
- 3) When installing the detector outdoors, it is recommended that a cover be installed to prevent high-temperature grease being directly exposed to water.
- 4) After mounting the detector, always apply heat lagging materials to keep the detector and piping warm.
- 5) Do not cover the pre-amplifier with pipe thermal insulating material. Failure to observe this could result in a fault due to high-temperature.
- 6) When using high-temperature grease (long-term type), reapply the grease if the pipe temperature drops below -15°C when the equipment is shut off for a long time.

<Parameter specification table Measurement mode> 1/2

	Setting item	Initial value	Setting value	Setting range
1	ID No	0000		
2	LANGUAGE	English		English, Japanese, German, French, Spanish
3	SYSTEM UNIT	Metric		Metric or Inch
4	VOLUME FLOW UNIT	m ³ /h		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
5	VOL.TOTAL UNIT	m ³		mL, L, m ³ , km ³ , Mm ³ , mBBL, BBL, kBBL
6	MASS FLOW UNIT	kg/h		g/s, g/min, g/h, g/d, kg/s, kg/min, kg/h, kg/d, t/s, t/min, t/h, t/d
7	MASS TOTAL UNIT	kg		g, kg, t
8	PRESSURE UNIT	MPa		MPa, bar
9	TEMPERATURE UNIT	°C		°C, K, °F
10	OUTER DIAMETER	60.50 mm		[mm]
11	PIPE MATERIAL	Carbon steel		Carbon steel, Stainless
12	WALL THICKNESS	3.80 mm		[mm]
13	DENSITY	Fixed value 2.667378 kg/m ³		AI Current, Pt TEMPERATURE, Fixed value (DENSITY: [kg/m ³])
14	DAMPING	5.0 sec		[sec]
15	LOW FLOW CUT	2.40 m ³ /h		[4.UNIT]
16	1ST.ROW	VELOCITY (m/s)		VELOCITY, VOLUME FLOW RATE, VOLUME FLOW (%), MASS FLOW RATE, MASS FLOW (%), +TOTAL (VOLUME), +TOTAL PULSE (V), -TOTAL (VOLUME), -TOTAL PULSE (V), +TOTAL (MASS), +TOTAL PULSE (M), -TOTAL (MASS), -TOTAL PULSE (M), PRESSURE, TEMPERATURE, Pt TEMPERATURE, SNR, AGC
17	DECIMAL POINT POSITION	****.***		□□□□□□□□ (Specified digit check)
18	2ND.ROW	FLOW RATE (m ³ /h)		VELOCITY, VOLUME FLOW RATE, VOLUME FLOW (%), MASS FLOW RATE, MASS FLOW (%), +TOTAL (VOLUME), +TOTAL PULSE (V), -TOTAL (VOLUME), -TOTAL PULSE (V), +TOTAL (MASS), +TOTAL PULSE (M), -TOTAL (MASS), -TOTAL PULSE (M), PRESSURE, TEMPERATURE, Pt TEMPERATURE, SNR, AGC
19	DECIMAL POINT POSITION	****.***		□□□□□□□□ (Specified digit check)
20	AO OUT.SOURCE	VOLUME FLOW RATE		VOLUME FLOW RATE, MASS FLOW RATE
21	RANGE TYPE	Single		Single, Auto 2, Bi-dir, Bi-dir Auto 2
22	KIND	Flow rate		Velocity, Flow rate
23	VOLUME FLOW FS1	80.000 m ³ /h		[4.UNIT]
24	VOLUME FLOW FS2	0.000 m ³ /h		[4.UNIT]
25	MASS FLOW FS1	0.000 kg/h		[6.UNIT]
26	MASS FLOW FS2	0.000 kg/h		[6.UNIT]
27	HYSTERESIS	10.00%		%
28	BURNOUT (CURRENT)	Hold		Not used, Hold, Lower, Upper and Zero
29	BURNOUT TIMER	10 sec		[sec]
30	OUTPUT LIMIT LOW	-20%		[%]
31	OUTPUT LIMIT HIGH	120%		[%]
32	RATE LIMIT	40.000 m ³ /h		[4.UNIT]
33	RATE LIMIT TIMER	10 sec		[sec]
34	TOTAL MODE	STOP		START, STOP, TOTAL RESET
35	VolumeTOTAL RATE *Note1	0 m ³		[5.UNIT]
36	V:TOTAL PRESET	0 m ³		[5.UNIT]
37	MASS TOTAL RATE *Note1	0 m ³		[7.UNIT]
38	M:TOTAL PRESET	0 kg		[7.UNIT]
39	PULSE WIDTH *NOTE1	50.0 msec		5.0 msec, 10.0 msec, 50.0 msec, 100.0 msec, 200.0 msec, 500.0 msec, 1000.0 msec

Parameter specification table Measurement mode> 2/2

	Setting item	Initial value	Setting value	Setting range
40	BURNOUT (TOTAL)	Hold		Not used, Hold
41	BURNOUT TIMER	10 sec		[sec]
42	DO1 OUTPUT TYPE	Not used		<input type="checkbox"/> NOT USE <input type="checkbox"/> +Vol.TOTAL PULSE <input type="checkbox"/> -Vol.TOTAL PULSE <input type="checkbox"/> +MassTOTAL PULSE <input type="checkbox"/> -MassTOTAL PULSE <input type="checkbox"/> FULL SCALE 2 <input type="checkbox"/> ALARM [ALL, HARDWARE FAULT, PROCESS ERROR] <input type="checkbox"/> Vol.FLOW SWITCH <input type="checkbox"/> Vol.FLOW SW HIGH [[4.UNIT]] <input type="checkbox"/> Vol.FLOW SW LOW [[4.UNIT]] <input type="checkbox"/> MassFLOW SWITCH <input type="checkbox"/> MassFLOW SW HIGH [[6.UNIT]] <input type="checkbox"/> MassFLOW SW LOW [[6.UNIT]] <input type="checkbox"/> Vol.TOTAL SWITCH [[5.UNIT]] <input type="checkbox"/> MassTOTAL SWITCH [[7.UNIT]] <input type="checkbox"/> AO RANGE OVER <input type="checkbox"/> PULSE RANGE OVER <input type="checkbox"/> -FLOW DIRECTION <input type="checkbox"/> INPUT ALARM <input type="checkbox"/> MAINTENANCE
43	DO1 OUTPUT OPERATION	Active ON		Active ON, Active OFF
44	DO2 OUTPUT TYPE	Not used		<input type="checkbox"/> NOT USE <input type="checkbox"/> +Vol.TOTAL PULSE <input type="checkbox"/> -Vol.TOTAL PULSE <input type="checkbox"/> +MassTOTAL PULSE <input type="checkbox"/> -MassTOTAL PULSE <input type="checkbox"/> FULL SCALE 2 <input type="checkbox"/> ALARM [ALL, HARDWARE FAULT, PROCESS ERROR] <input type="checkbox"/> Vol.FLOW SWITCH <input type="checkbox"/> Vol.FLOW SW HIGH [[4.UNIT]] <input type="checkbox"/> Vol.FLOW SW LOW [[4.UNIT]] <input type="checkbox"/> MassFLOW SWITCH <input type="checkbox"/> MassFLOW SW HIGH [[6.UNIT]] <input type="checkbox"/> MassFLOW SW LOW [[6.UNIT]] <input type="checkbox"/> Vol.TOTAL SWITCH [[5.UNIT]] <input type="checkbox"/> MassTOTAL SWITCH [[7.UNIT]] <input type="checkbox"/> AO RANGE OVER <input type="checkbox"/> PULSE RANGE OVER <input type="checkbox"/> -FLOW DIRECTION <input type="checkbox"/> INPUT ALARM <input type="checkbox"/> MAINTENANCE
45	DO2 OUTPUT OPERATION	Active ON		Active ON, Active OFF
46	AI RANGE KIND	NOT USED		NOT USED, PRESSURE, TEMPERATURE
47	AI BASE SCALE	0		[8. or 9.UNIT]
48	AI FULL SCALE	0		[8. or 9.UNIT]
49	COMMUNICATION BAUD RATE	38400 bps		9600 bps, 19200 bps, 38400 bps
50	COMMUNICATION PARITY	Odd		None, Odd, Even
51	COMMUNICATION STOP BIT	1 bit		1 bit, 2 bits
52	COMMUNICATION STATION NO.	1		
53	LIGHTS-OUT TIME	0		[min]

Note1: When total pulse output has been selected for DO1, DO2 specify total pulse value and total pulse width so that conditions 1 and 2 shown below are satisfied.

$$\text{conditions 1: } \frac{\text{Flow span-1* [m}^3\text{/s]}}{\text{total pulse value* [m}^3\text{]}} \leq 100 \text{ [Hz]}$$

$$\text{conditions 2: } \frac{\text{Flow span-1* [m}^3\text{/s]}}{\text{total pulse value* [m}^3\text{]}} \leq \frac{1000}{2 \times \text{total pulse width [ms]}}$$

* In the case of 2 ranges, perform calculations using either flow span-1 or flow span-2, whichever is greater.

[Remarks]

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

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