PORTABLE TYPE
ULTRASONIC FLOWMETER (PORTAFLOW-C)

DATA SHEET

PORTAFLOW-C is a portable type ultrasonic flowmeter utilizing the transit time measuring method, using a clamp-on type detector.
It is a compact and lightweight instrument incorporating the latest electronics and digital signal processing technologies, realizing high performance and easy operation.

FEATURES

1. **Compact and lightweight**
   The adoption of the latest electronics and digital signal processing technologies has reduced the size and weight of the flow transmitter by 30% and 30%, respectively, in comparison with the Fuji conventional portable flowmeter (Model FSC). (in comparison to our existing model)

2. **Battery operation**
   The flowmeter is designed for 12 hours of continuous operation via built-in battery which is rechargeable in 3 hours with the exclusive power adapter.

3. **Full variety of detectors**
   The flowmeter is suitable for various types of detectors applicable for small to large diameter pipe (pipe inner diameter $\phi13$ to $\phi6000$mm) and low to high temperature (-40 to $+200°C$).

4. **High accuracy and high-speed response**
   The flowmeter is designed for high accuracy ($\pm1.0\%$).
   Response time is within 1 second.

5. **Improved anti-bubble characteristic**
   Anti-bubble characteristic is greatly improved by digital signal processing.

6. **Excellent performance and easy operation**
   Large graphic LCD that is outside but easy to read. Minimum number of function keys are used for page selection, allowing easy setting.
   While battery is working, the flowmeter is water resistant and tolerates exposure to rain.

7. **Large capacity storage by SD memory card**
   Measured data is periodically stored in SD memory card. For example, in the case of 256MB (option), it can be saved about 1 year measurement date(In case of saving period 30 seconds, 14 kinds of saved data). Available up to 8MB.

8. **Serial communication**
   Use of a USB port allows easy connection to a personal computer. Measured date collection panel and Loader software for PC (standard) which is available for display and change of parameter (site setting) are prepared.

9. **Heat quantity (calorie) measurement**
   Heat quantity (calorie) may be measured by temperature input, making energy management easy for cooling and heating.

Flow transmitter (FSC)
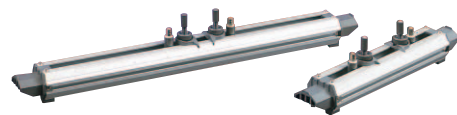
Detector for transit time(FSD)
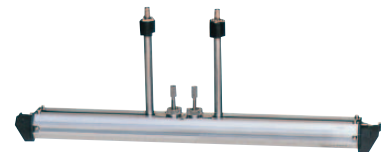
Detector for high-temperature(FSD)

10. **Graphic printer connection (option)**
    Easy recording with the Integral type printer.
11. **Flow velocity profile measurement (option)**
    Flow profile may be observed in real time.

SPECIFICATIONS

Measuring objects

Measurement fluid:
　　　　　Uniform liquid in which ultrasonic waves can propagate.
Turbidity of fluid: 10000 mg/L or less
State of fluid: Well-developed turbulent or laminar flow in a filled pipe.
Fluid temperature: -40 to $+200°C$
Measuring range: $0\cdots\pm0.3$ to ±32m/s

Piping conditions

Applicable piping material:
　　　　　Select from carbon steel, stainless steel, cast iron, PVC, FRP, copper, aluminum, acrylic or material of known sound velocity.
Pipe size:　　Flow rate measurement
　　　　　　　$\phi13$ to $\phi6000$mm
　　　　　　Flow velocity profile measurement
　　　　　　　$\phi40$ to $\phi1000$mm

Fuji Electric Co.,Ltd.

Lining material: Select from no lining, tar epoxy, mortar, rubber, Teflon, pyrex glass or material of known sound velocity.
Note) No gap allowed between the lining and the pipe.

Straight pipe length: 10D or more upstream and 5D or more downstream (D: internal pipe diameter)
Refer to Japan Electric Measuring Instruments Manufactures' Association's standard JEMIS-032 for details.

Performance specifications

Accuracy rating:

Pipe inner diameter	Flow velocity range	Accuracy
φ13 to φ50mm	2 to 32m/s	±1.5% of rate
	0 to 2m/s	±0.03m/s
φ50 to φ300mm	2 to 32m/s	±1.0% of rate
	0 to 2m/s	±0.02m/s
φ300 to φ6000mm	1 to 32m/s	±1.0% of rate
	0 to 1m/s	±0.01m/s

Note) Reference conditions are based on JEMIS-032.

Flow transmitter (Type: FSC)

Power supply: Built-in battery or AC power adapter
Built-in battery: Exclusive lithium button battery (5000m Ah)
Continuous operation time, approx. 12 hours (without printer, back light OFF, output current not used and at normal ambient temperature (20°C))
Recharging time, approx. 3 hours (power adapter used)
Recharging temperature range: 0 to +40°C
Power consumption: Min. 3W and Max. 16W
The consumption varies depending on the use conditions.
Power adapter: Exclusive power adapter 90V to 264V AC (50/60Hz), 70VA or less.
LCD: Semi-transmissive color graphic display
240 × 320 (with back light)
Measurement value (instantaneous flow rate, integrated flow rate) and various settings are displayed.
Excellent visibility even outdoors in direct sunlight.
LED display: Status display when using AC power adapter.
DC IN (green): Power supply status
CHARGE (red): Battery charging underway
Operation keypad: 11 buttons
(ON, OFF, ENT, ESC, MENU, △, ▽, ◁, ▷, LIGHT, PRINT)
Power failure backup: Measurement value is backed up by nonvolatile memory.
Clock backup with lithium battery (effective term, 10 years or more)
Response time: 1 second

Analog output signals: 4 to 20mA DC, one point (load resistance, 600Ω or less)
Instantaneous velocity, instantaneous flow rate or heat quantity (calorie) after scaling.

Analog input signal: 4 to 20mA DC, one point (input resistance, 200Ω or less)
4 to 20mA DC, one point (input resistance, 200Ω or less) or 1 to 5V DC, one point | Total 2 points
Used to input temperature for heat quantity measurement, etc.

SD memory card: Used for data logger function and recording screen data.
Available up to 8GB (Option256MB)
Compliant media
• SD memory card: speed class 2, 4, 6
• SDHC memory card: speed class 4, 6
Format
• FAT16: 64MB to 2GB
• FAT32: 4GB, 8GB
Otherwise, reading and saving are impossible.
File format
• Date logger: CSV file
• Screen date: Bit map file

Serial communication: USB port (device* compatible): Mini B receptacle
Connectable number of Mini B receptacles: 1 unit
Transmission distance: 3m max.
Transmission speed: 500kbps
Data: Instantaneous velocity, instantaneous flow rate, total value, heat quantity (calorie) value, error information, logger data, etc.
* Device: Connected plug from PC

Printer (option): To be mounted on top of transmitter unit
Thermal line dot printing
Note) When the Chinese display is selected, printing is made in kanji characters.

Ambient temperature: −10 to +55°C (Without printer)
−10 to +45°C (With printer)
Ambient humidity: 90%RH or less
Type of enclosure: IP64 (Without printer)
Enclosure case: Plastic case
Outer dimensions: H210 × W120 × D65mm (Without printer)
H320 × W120 × D65mm (With printer)
Weight: 1.0kg (Without printer)
1.2kg (With printer)

Various functions

Display language: Selectable from Japanese, English, German, French, Spanish or Chinese (switchable by key operation).
Clock display function: Time (year, month, day, hour, minute) display (configurable)
Monthly error: about 1 minutes at normal temperature (20°C).

Instantaneous value display function:

Instantaneous velocity, instantaneous flow rate display (The flow in reverse direction is displayed with minus "−.")

Numeric value: 10 digits (decimal point equals 1 digit)

Unit: Metric/English system selectable

Metric system

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

English system

Velocity: ft/s

Flow rate: 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
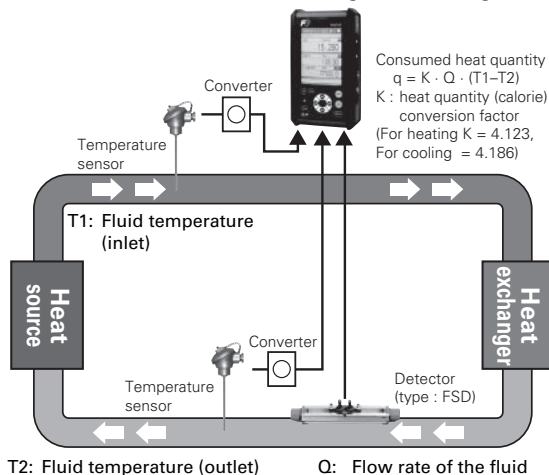
Total value display function:

Display of forward or reverse total (reverse is displayed as minus)

Numeric value: 10 digits (decimal point is corresponding to 1 digit)

Unit: Metric/English system selectable

Metric system

Flow rate total: mL, L, m^3, km^3, Mm^3, mBBL, BBL, kBBL

English system

Flow rate total: gal, kgal, ft^3, kft^3, Mft^3, mBBL, BBL, kBBL, ACRE-ft

Consumed heat quantity (calorie) display function:

Display of consumed heating medium

Metric system

Heat flow: MJ/h, GJ/h

Total heat quantity: MJ, GJ

English system

Heat flow: MJ/h, GJ/h, BTU/h, kBTU/h, MBTU/h, kWh, MWh

Total heat quantity:

MJ, GJ, BTU, kBTU, MBTU, kW, MWh

J : Joule

BTU : British thermal unit

W : Watt

Computation function of consumed heat quantity (calorie):

This function calculates the heat quantity received and sent with liquid (water) in cooling and heating.

Consumed heat quantity
$q = K \cdot Q \cdot (T1–T2)$
K : heat quantity (calorie) conversion factor
(For heating K = 4.123, For cooling = 4.186)

Converter

Temperature sensor

T1: Fluid temperature (inlet)

Heat source

Heat exchanger

Converter

Temperature sensor

Detector (type : FSD)

T2: Fluid temperature (outlet)   Q: Flow rate of the fluid

Temperature display function:

Fluid temperature be displayed by current input from temperature transmitter.

Metric system

Temperature unit: °C or K

English system

Temperature unit: F or K

Site data storage function:

Max. 32 locations (sites) data (pipe size, material, fluid type and etc) can be stored into built-in non-volatile memory.

Damping: 0 to 100sec (every 0.1sec) configurable for analog output and velocity/flow rate display

Low flow cut: Equivalent to 0 to 5m/s

Output setting function:

Current output scaling, output type, burnout setting and calibration

Serial communication function:

Instantaneous velocity, instantaneous flow rate, total value, heat flow, error information, received waveform, analog input, velocity profile data, logger data, etc. may be downloaded to personal computer.

Logger function: Instantaneous velocity, instantaneous flow rate, total value, heat flow, error information, received waveform, analog input, velocity profile date can be saved in a SD memory card.

Waveform display function:

Bi-directional received waveforms may be displayed.

Graph display function:

Flow rate trend graph may be displayed.

Printing function (option):

Hard copy output of a screen

Periodic printing (type: text, graph)

Logger date (type: text, graph)

Flow velocity profile measurement (option):

Flow velocity profile may be observed in real time using the exclusive detector (option).

(Refer to page 5 for details.)

Detector (Type: FSD)

Type of detector:

Kind	Type	Internal pipe diameter (mm)	Fluid temperature
Small diameter	FSD22	φ13 to φ100	−40 to 100°C
Small type	FSD12	φ50 to φ400	−40 to 100°C
Middle type	FSD41	φ200 to φ1200	−40 to 80°C
Large type	FSD51	φ200 to φ6000	−40 to 80°C
High temperature	FSD32	φ50 to φ400	−40 to 200°C

Mounting method:

Mounting on outside of pipe

Sensor mounting method: V or Z method

Signal cable: Exclusive coaxial cable

Standard 5m (included with FSD41, 51 and FSD32)

Method for connection:
        Flow transmitter side
          Exclusive connector
        Detector side
          Large/middle type: Screw terminal
          Others: BNC connector

Ambient temperature: -20 to $+60°C$

Ambient humidity: Large/middle type sensor:
                100%RH or less
        Others: 90%RH or less

Type of enclosure:
        Large/middle type sensor: IP67
   Others: IP52

Material and mounting belt/wire:

| Kind	Type	Sensor case	Mounting bracket	Mounting belt /wire
Small diameter	FSD22	Plastic	Aluminum alloy + Plastic	Plastic cloth belt
Small type	FSD12	Plastic	Aluminum alloy + Plastic	Plastic cloth belt
Middle type	FSD41	Plastic	SUS304	Stainless wire
Large type	FSD51	Plastic	——	Stainless wire
High temperature	FSD32	SUS304	Aluminum alloy + SUS304	Stainless belt

Extension cable (option):
        Extended when the length of the detector signal cable is not sufficient.
        Length: 10m, 50m

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.
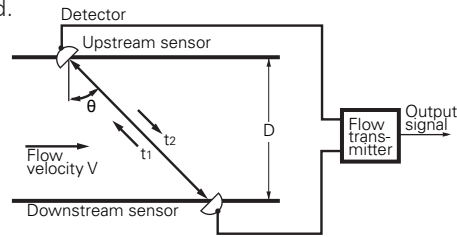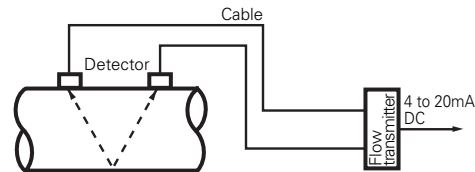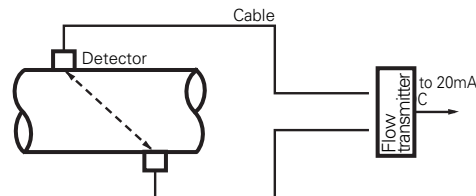

MOUNTING OF DETECTOR
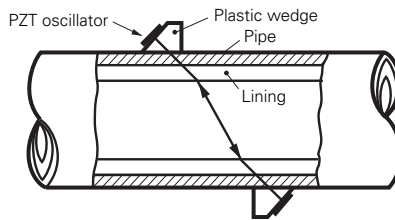
CONFIGURATION DIAGRAM

(1) When V method is used for mounting

(2) When Z method is used for mounting

DETECTOR SELECTION GUIDE

Type (Name)	Fluid temperature [°C]	Mounting method	Inner diameter of piping ø (mm)
FSD22 (Small diameter)	−40 to 100	V	13 — 100 *2)
FSD12 (Small type)	−40 to 100	V	50 — 300
		Z *1)	150 — 400
FSD41 (Middle type)	−40 to 80	V	200 — 600
		Z	400 — 1200
FSD51 (Large type)	−40 to 80	V	200 — 3000
		Z	200 — 6000
FSD32 (High-temperature)	−40 to 200	V	50 — 250
		Z *1)	150 — 400

Scale markings: 13 25 50 100 200 250 300 400 1000 3000 6000

*1) When FSD12 or FSD32 is mounted using the Z-size method, guide rail (option) is required additionally.

*2) For the pipe inner diameter of ϕ13mm, the sensor mounting dimension may be 0.0mm or less depending on pipe material and thickness. When the sensor mounting dimension is 0.0mm or less, measurement error is about 2 to 5%.

<Description of the table>
It shows pipe thickness of each material that the sensor mounting size is to be 0.0mm, when fixing a pipe. If the fluid is the one other than water, and if the sound velocity of fluid is faster than the one of water, the sensor mounting size is to be 0.0mm or more.

Required min. pipe thickness (fluid: water) (Unit: mm)			
Steel pipe	2.15 or more	FRP	3.21 or more
Stainless pipe	1.87 or more	Ductile cast iron	2.15 or more
PVC pipe	3.69 or more	PEEK	3.69 or more
Copper pipe	3.82 or more	PVDF	3.69 or more
Cast-iron pipe	2.98 or more	Acrylic pipe	2.90 or more
Aluminum pipe	1.99 or more	Polypropylene	3.69 or more

FLOW VELOCITY PROFILE DISPLAY FUNCTION (OPTION)

Flow velocity profile can be observed in real time using the dedicated detector from the outside. It is specifiable by the code symbol of flow transmitter.

APPLICATION

Pulse Doppler method is applicable to observe flow velocity profile in real time, display the flow status in the pipe, and decide the appropriate measurement location. Also, it can be used for diagnosis of flow and laboratory test.

SPECIFICATIONS

Measuring fluid: Uniform liquid in which ultrasonic waves can propagate.
Turbidity of fluid: Axisymmetric flow in a filled pipe.
Fluid temperature:
　　　　　−40 to +100°C (FSDP2)
　　　　　−40 to +80°C (FSDP1,FSDP0)
Air bubble quantity:
　　　　　0.02 to 15Vol% (Velocity is 1m/s)
Pipe size: 　Small type sensor : φ40 to φ200mm
　　　　　Middle type sensor :φ100 to φ400mm
　　　　　Large type sensor :φ200 to φ1000mm
Measurement range:
　　　　　0 to ±0.3: ±Maximum Velocity (depending on the pipe diameter)
　　　　　Refer to chart, table.1.
　　　　　Note) This function is to observe flow velocity profile, and it may be different from actual flow rate.

DETECTOR FOR FLOW VELOCITY PROFILE MEASUREMENT (TYPE: FSDP)

Mounting method:
　　　　　Mounting on outside of existing pipe
Ambient temperature: −20 to +80°C
Ambient humidity: 100% RH or less
Type of enclosure:
　　　　　IP67 (with waterproof BNC connector provided.)
Material: 　Sensor housing: PBT
　　　　　Guide frame: 　Aluminum alloy
　　　　　Mounting belt: 　Plastic cloth belt/stainless belt

Measurement principle

<Pulse Doppler method>

• Ultrasonic pulses are transmitted through the fluid flow. Entrained bubbles and microscopic particles within the fluid create frequency phase shifts (Doppler effect.) The resulting doppler shifts are integrated across the inside pipe diameter cross section. The resulting profile curve is a real-time dynamic display of the flow profile within the pipe.
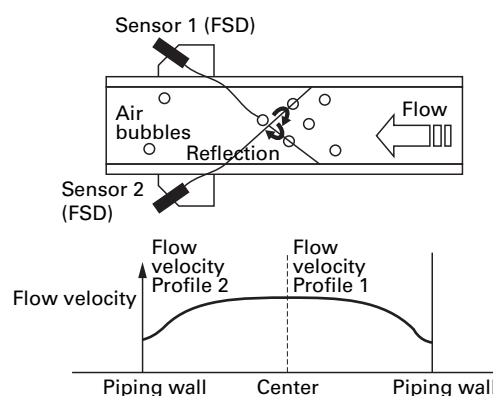
The above shows an example when using two sensors. One detector displays the flow velocity profile for a radius.

Block diagram

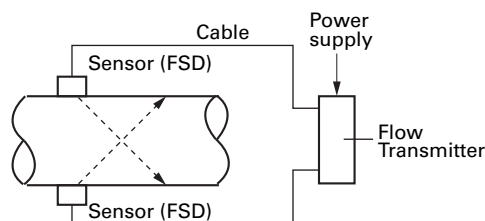(1) Using one sensor
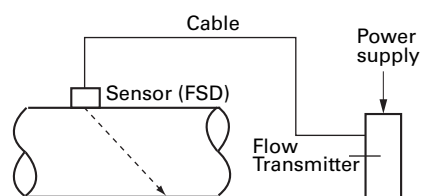
(2) Using two sensors

Table.1

Maximum measurement range of Pulsed Doppler method.
When nominal thickness of a stainless pipe of pipe material is Sch20s and the fluid is water, the maximum measurement range varies depending on the outer diameter of pipe, nominal thickness, material, or fluid type.

<Maximum measurable flow velocity>
Unit: m/s

<Maximum measurable flow rate>
Unit: m³/h

Diameter	FSDP2	FSDP1	FSDP0	FSDP2	FSDP1	FSDP0
40A	6.56			33.6		
50A	6.52			52.7		
65A	5.31			72.1		
80A	4.65			86.5		
90A	4.12			102		
100A	3.69	7.25		118	231	
125A	3.08	6.08		147	289	
150A	2.63	5.20		179	354	
200A	2.04	4.05	7.77	239	474	908
250A		3.30	6.38		604	1168
300A		2.78	5.41		735	1428
350A		2.51	4.90		820	1598
400A		2.20	4.31		951	1858
450A			3.80			2118
500A			3.48			2358
550A			3.17			2618
600A			2.91			2879
650A			2.71			3096
700A			2.52			3357
750A			2.35			3618
800A			2.21			3879
850A			2.08			4140
900A			1.97			4400
1000A			1.77			4902

PC Loader software

Equipped as standard
- PC/AT compatible machines. (Operation on custom built PCs or shop-brand PCs cannot be guaranteed.)
- Major functions: Performs parameter (site setting) display /change of the main unit and collects measured date.
  Instantaneous velocity, instantaneous flow rate, total value, error information, received waveform, analog input, logger data, etc. may be downloaded in a personal computer.
- O/S: Windows2000/XP/Vista*
- Memory requirement: 128MB or more
- Disk unit: Windows2000/XP/Vista-compatible CD-ROM drive
- Hard disk drive capacity: Free space of 64MB or more

* Windows Vista: Use it in basic mode.
              It is not available for Windows Aero.

CODE SYMBOL

<Flow transmitter>

												Description
F	S	C				1	-		0			

Position	Code	Description
	S	<Specification> Standard
	1	<Converter> Basic system
	2	Basic system + Printer
	0	<Flow velocity profile measurement> None
	1	Provided (detector to measure flow velocity profile is separately required.)
	A	<Power adapter> AC power + power cord (125V AC) for Japanese and North American use
	B	AC power + power cord (250V AC) for European and Korean use
	C	AC power + power cord (250V AC) for Chinese use
	1	Modification No.
	0	<SD memory card> None
	1	Provided (256MB)
	Y	<Bound instruction manual/Language> None (Factory-set language: English)
	J	Provided/Japanese (Factory-set language: Japanese)
	E	Provided/English (Factory-set language: English)
	C	Provided/Chinese (Factory-set language: Chinese)

(Note1) Instruction manual contained in CD is the standard attached article.
(Note2) You can change the language by key operation.

\<Detector\>
(for transit time)

```
1 2 3 4 5 6 7 8
F S D _ _ _ _ _
```

	Description
	\<Kind\>
1 2	Small type (for φ50 to φ400mm) *1) *2)
2 2	Small diameter (for φ13 to φ100mm)
4 1	Middle type (for φ200 to φ1200mm)
5 1	Large type (for φ200 to φ6000mm)
3 2	High-temperature (for φ50 to φ400mm) *1) *2)
	\<Terminal mold\>
0	None
1	Provided (Middle/Large type only)
	\<Structure\>
Y	General use
1	Modification No.

Note)
*1) Applicable diameter range:
        V method: φ50 to φ250 (FSD32), φ50 to φ300 (FSD12)
        Z method: φ150 to φ400 (FSD32, FSD12)
    Use the optional guide rail, if a pipe that does not allow ultrasonic waves to pass through easily, such as when an old pipe, cast iron pipe or a pipe with mortar lining is used, or the flow or liquid high in turbidity is measured. Employ the Z method for mounting.

(for flow velocity profile measurement)

```
1 2 3 4 5 6 7 8
F S D _ _ 0 Y 1
```

	Description
	\<Kind\>
P 2	Small type (φ40 to φ200mm)
P 1	Middle type (φ100 to φ400mm)
P 0	Large type (φ200 to φ1000mm)
	\<Terminal mold\>
0	None
	\<Structure\>
Y	General use
1	Modification No.

SCOPE OF DELIVERY

\<Flow transmitter : FSC\>

	Name of unit	Scope of delivery
1	Basic system	1) Conversion unit 2) Power adapter and Power connector conversion cord 3) Power cord 4) Analog input/output cord (1.5m) 5) USB cable (1m) 6) Carrying case 7) Strap 8) Special type signal cable (5m × 2) 9) BNC adapter 10) CD-ROM (Instruction manual and Loader software for PC)
2	Option	1) Printer unit + rolled paper (1 roll) 2) SD memory card (256MB) 3) Bound instruction manual (including a detector)

\<Detector : FSD\>

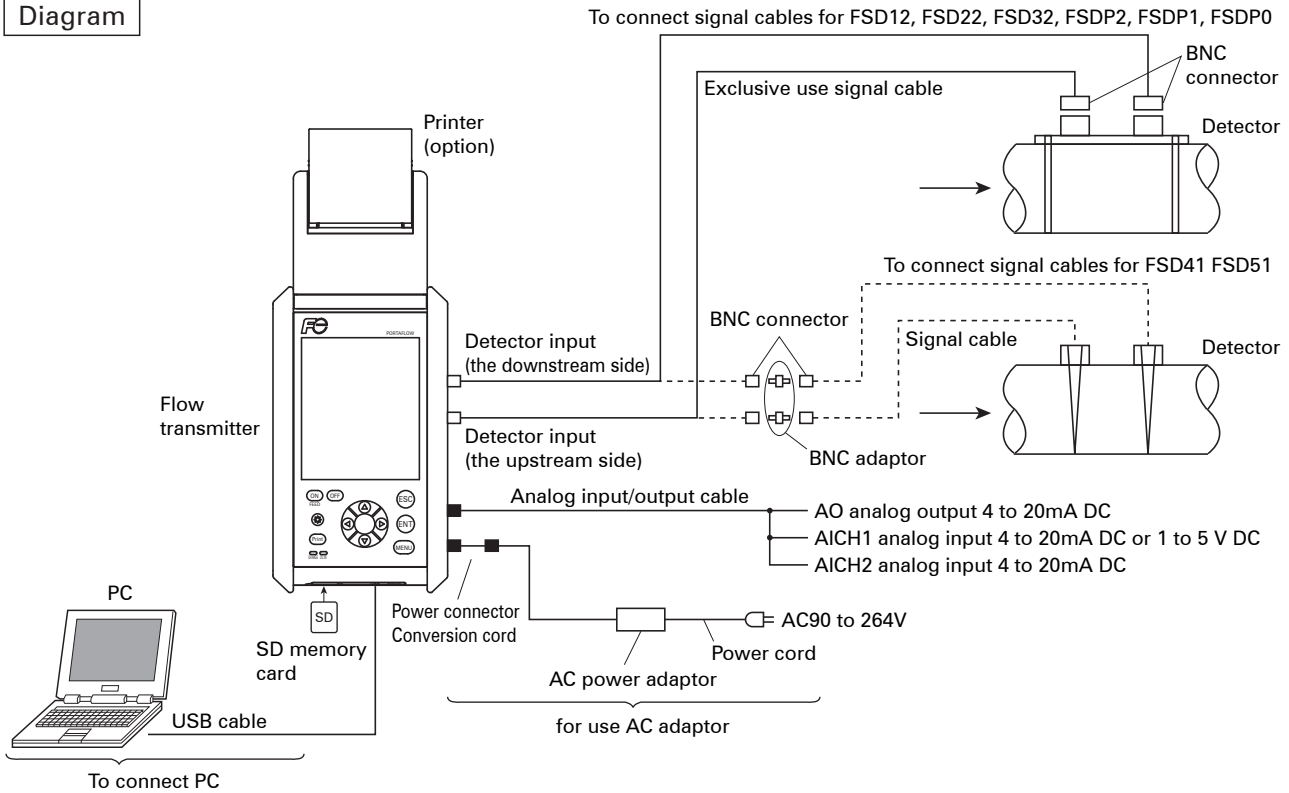|	Name of unit	Scope of delivery
1	Detector for propagation time differ-ence (FSD)	1) Sensor unit 2) Signal cable (5m) (included with FSD41, 51) 3) Mounting belt/wire 4) Silicone grease (100g)
2	Detector for flow velocity profile (FSDP)	1) Detector unit 2) Mounting belt/wire 3) Silicone grease (100g)

Note 1) Silicon grease is for filling a gap between a detector and a pipe joint area. It is provided with a detector.
      Since silicon grease does not become hardened, if you use it in the long term, periodic maintenance is required. (Under the condition of room temperature, semiannual cleaning and refill is recommended.)
Note 2) When you order a detector alone, an instruction manual is not provided. Please request, if necessary.

OPTIONAL ITEMS

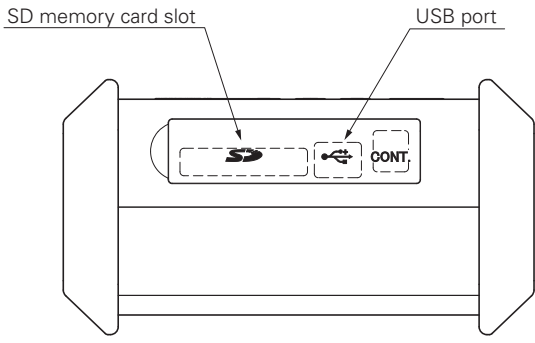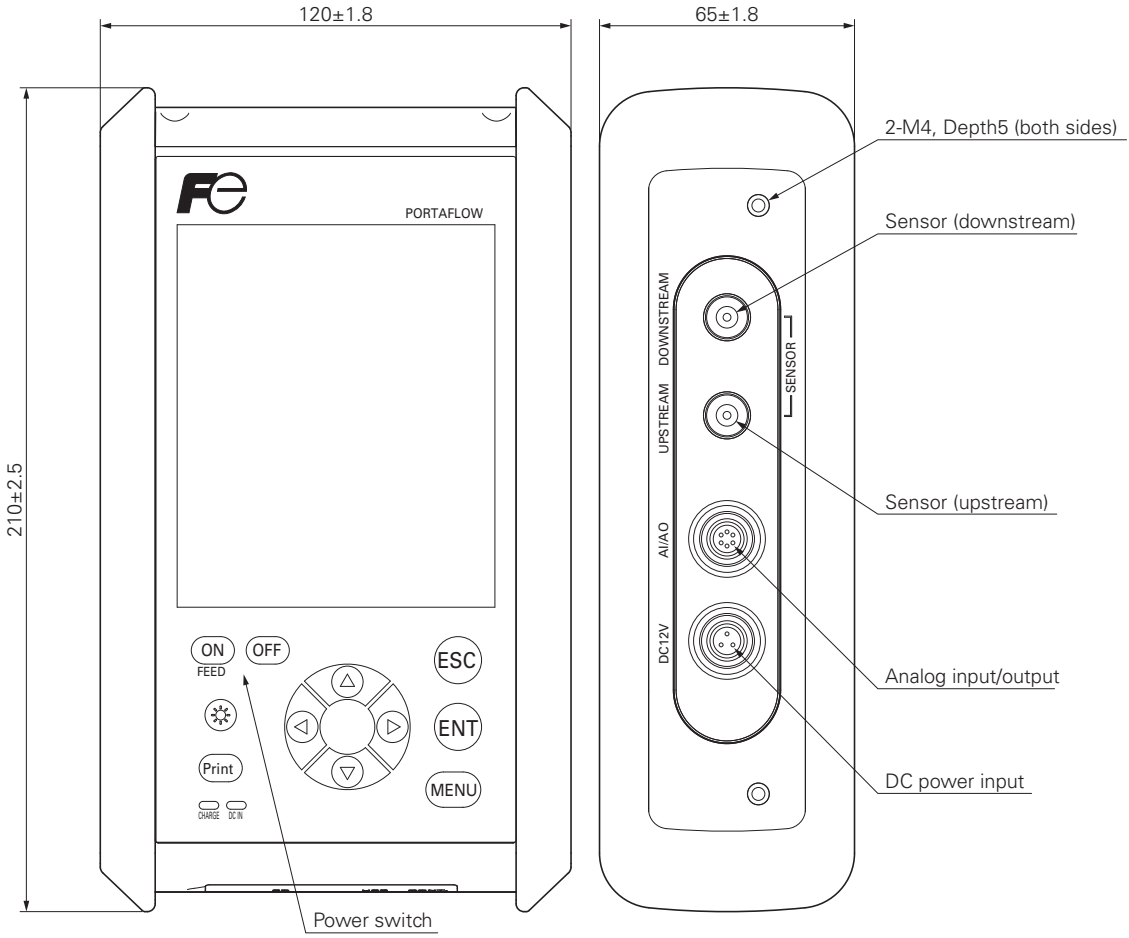|	Name	Specifications	Arrange-ment No.
1	Battery	Special type Li-ion battery (7.4V, 2500mAh)	ZZP∗TK7N6384P1
2	AC power adapter	Special type power adapter and 90 to 264V AC, 50/60Hz · Power connector conversion code	ZZP∗TK7N6380C4
3	Power code	Japan, North America:125V AC 2m Europe, Korea: 250V AC 2m China: 250V AC 2m	ZZP∗TK7N6621P1 ZZP∗TK7N6608P1 ZZP∗TK7N6609P1
4	Printer	To be mounted on top of converter Thermal serial dot system (8 x 384 dot)	ZZP∗TK4J2634C1
5	Printer roll paper	Maker: SEIKO I SUPPLY Co. Ltd. Type: TP-211C-1 Specifications: Thermal roll paper Width: 58mm×ø48mm	ZZP∗TK7N6381P1
6	Silicone grease	Maker: Shin-Etsu Chemical Co., Ltd. Type: · For standard use G40M, 100g · For high temperature KS62M, 100g	ZZP∗45231N5 ZZP∗TK7P1921C1
7	Signal cable	Special type signal cable, 5m × 2 · FSD12, 22, 32 (Connector on one side) · FSD41 (Connector on one side) · FSD51 (Connector on one side)	ZZP∗TK7N7795C1 ZZP∗TK7N7795C2 ZZP∗TK7N7795C3
8	BNC adapter	· BNC adapter (×2)	ZZP∗TK7N6323P11
9	Extension signal cable	Special type coaxial cable with BNC connector · 10m × 2 · 50m × 2	 ZZP∗TK468664C3 ZZP∗TK468664C4
10	Analog input/output cable	6-core cable, 1.5m, with connector	ZZP∗TK4J2639C1

11	Mounting belt /wire	· Small type/small diameter sensor:
		    Plastic cloth belt
		· Large type sensor:
		    Stainless wire
		    Nominal diameter
		    f200 to f500mm
		    f200 to f1000mm
		    f200 to f2000mm
		    f200 to f3000mm
		    f200 to f6000mm
		· High-temperature sensor:
		    Stainless steel belt
			ZZP∗TK7G7979C1
			
			ZZP∗TK7G7980C1
			ZZP∗TK7G7980C2
			ZZP∗TK7G7980C3
			ZZP∗TK7G7980C4
			ZZP∗TK7G7980C5
			
			ZZP∗TK7P1943C1

12	Guide rail for high-temperature sensor (In mounting by the Z method)	· Mounting bracket material: Aluminum alloy+SUS304 · FSD32	ZZP∗TK4J5917C3
13	Guide rail for small type detector (In mounting by the Z method)	· Mounting bracket material: Aluminum alloy+plastic · FSD12	ZZP∗TK4J5917C1
14	SD memory card	Maker: Apacer Technology, Inc. Type: AP-ESD256TPSR Capacity: 256MB	ZZP∗TK7N6386P1
15	USB cable	Maker: Sunwa Supply Inc. Type: KU-AMB510 Specifications: Mini USB cable (1.0m)	ZZP∗TK7N6622P1

Diagram

To connect signal cables for FSD12, FSD22, FSD32, FSDP2, FSDP1, FSDP0

BNC connector

Exclusive use signal cable

Detector

Printer
(option)

To connect signal cables for FSD41 FSD51

Signal cable

Detector

BNC connector

Flow transmitter

Detector input
(the downstream side)

Detector input
(the upstream side)

BNC adaptor

Analog input/output cable

AO analog output 4 to 20mA DC

AICH1 analog input 4 to 20mA DC or 1 to 5 V DC

AICH2 analog input 4 to 20mA DC

PC

SD

SD memory card

Power connector
Conversion cord

AC90 to 264V

Power cord

AC power adaptor

USB cable

for use AC adaptor

To connect PC

Conditions on straight pipe

(D: Nominal diameter of pipe)

Type	Length of upstream straight pipe	Length of downstream straight pipe
90° bend	10D or more, $L \geq 10D$, Detector	$L \geq 5D$
Tee	10D or more, $L \geq 50D$, 10D or more	$L \geq 10D$
Diffuser	0.5D or more, $L \geq 30D$, D, 1.5D or more	$L \geq 5D$
Contraction pipe	$L \geq 10D$	$L \geq 50D$
Valve	$L \geq 30D$, Flow controlled upstream	$L \geq 10D$, Flow controlled downstream
Pump	Isolation valve, Check valve, P	$L \geq 50D$

Note) Source: Japan Electric Measuring Instruments Manufacturers' Association (JEMIS-032)
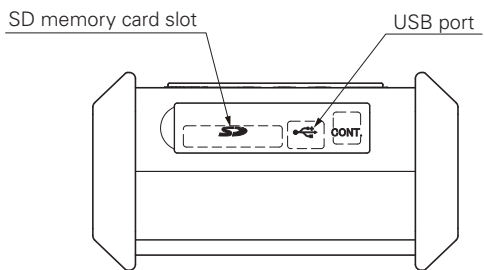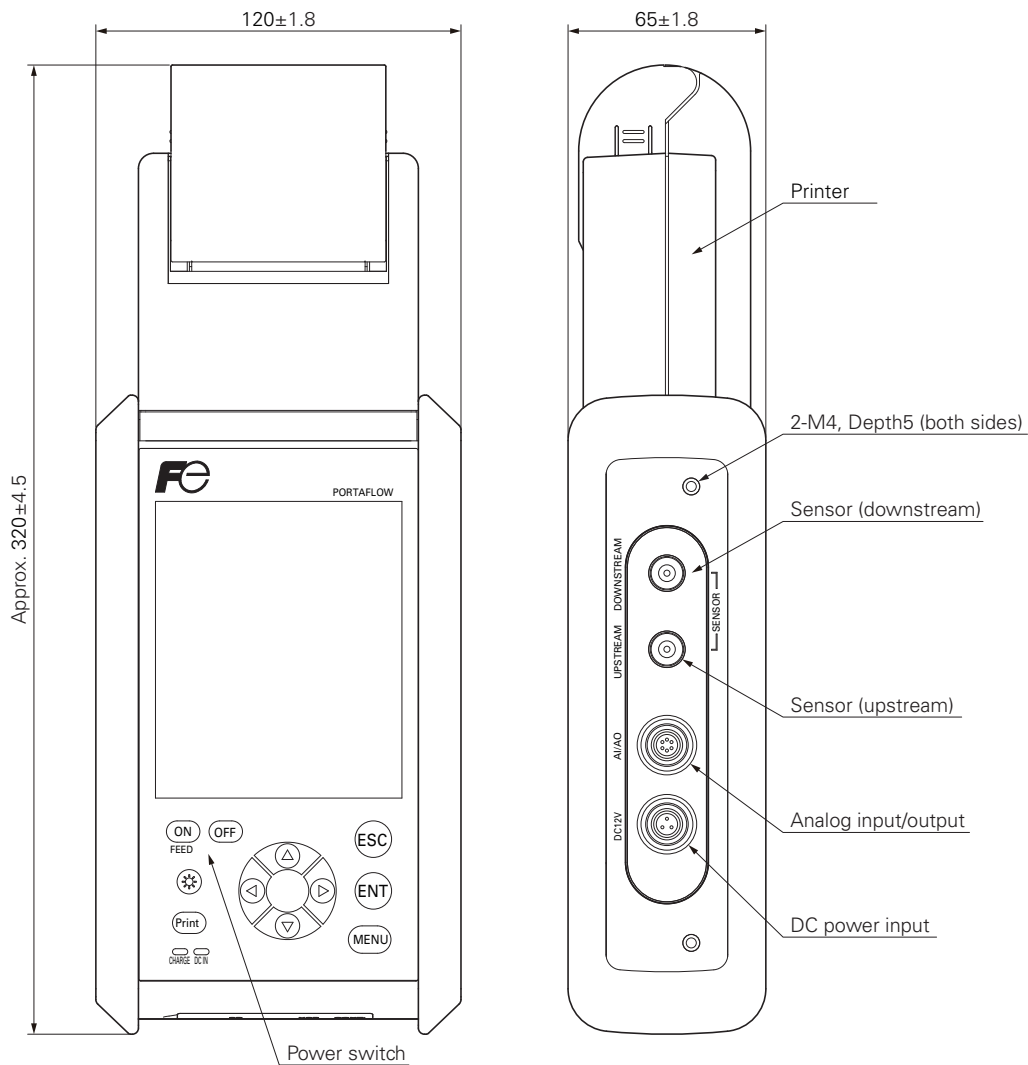
OUTLINE DIAGRAM (Unit:mm)

Flow transmitter

120±1.8

65±1.8

210±2.5

Fe

PORTAFLOW

ON
FEED

OFF

ESC

Print

ENT

MENU

CHARGE   DC IN

Power switch

2-M4, Depth5 (both sides)

Sensor (downstream)

DOWNSTREAM

UPSTREAM

SENSOR

Sensor (upstream)

AI/AO

Analog input/output

DC12V

DC power input

SD memory card slot

USB port

SD

CONT.

Weight : Approx. 1.0kg

OUTLINE DIAGRAM (Unit:mm)

Flow transmitter (with printer)

120±1.8

65±1.8

Approx. 320±4.5

Fe

PORTAFLOW

Printer

2-M4, Depth5 (both sides)

Sensor (downstream)

DOWNSTREAM

UPSTREAM

SENSOR

Sensor (upstream)

AI/AO

Analog input/output

DC12V

DC power input

ON
FEED

OFF

ESC

ENT

Print

MENU

CHARGE   DC IN

Power switch

SD memory card slot

USB port

CONT.

Weight : Approx. 1.2kg

OUTLINE DIAGRAM (Unit:mm)

Scale(inch)
Scale(mm)
Spacing: 0 to 348
Cursor
Saddle
Connector
Name prate
540±2
Lock nut
Element holder
36±0.5
90max.
52.5±0.5

Weight : Approx. 0.8kg
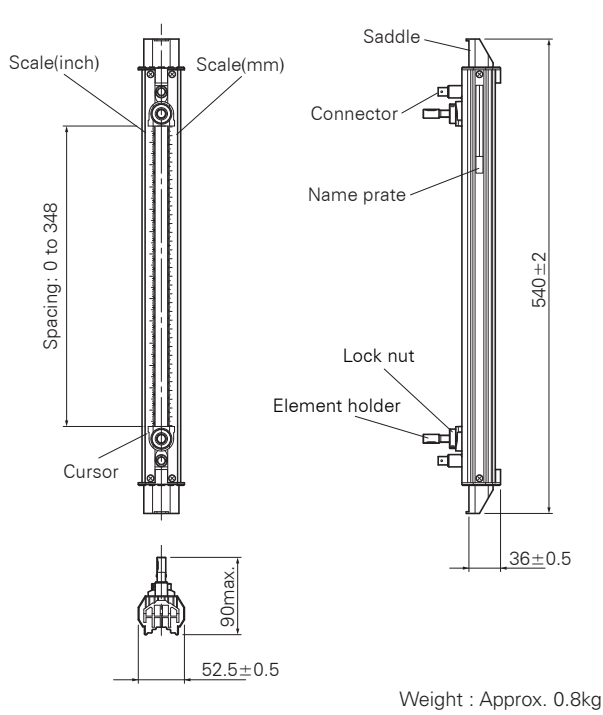
Detector FSD12 (Small type)

Scale (inch)
Scale (mm)
Spacing: 0 to 133
Cursor
Saddle
Connector
Name plate
320±2
Lock nut
Element holder
36±0.5
90max.
52.5±0.5

Weight : Approx. 0.6kg
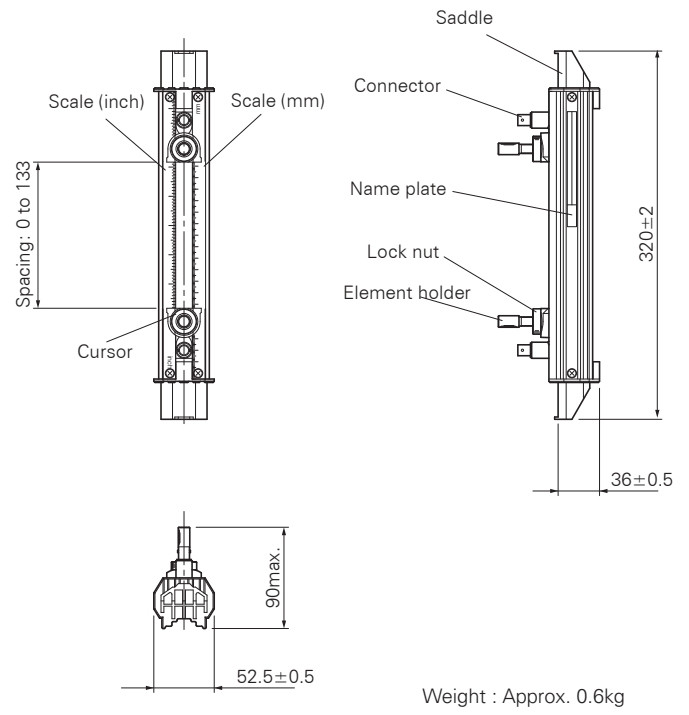
Detector FSD22 (Small diameter)

Scale(inch)
Scale(mm)
Connector
Saddle
Distance between two sensors 0 to 330
Name plate
530±2
Lock nut
Element holder
Cursor
φ26
33±0.5
90max.
205max.
44±1

Weight : Approx. 1.7kg
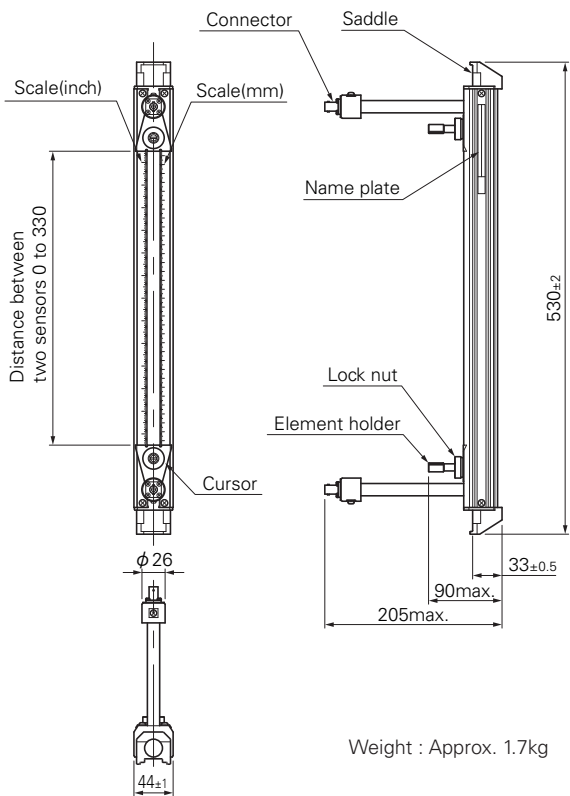
Detector FSD32 (High-temperature)

Name plate
Sensor
A
54±2
(114)
37±1
Wire rope
Mounting spring
46±1
(φ19)
φ4.3
Cable
BNC Connector
8
8.5
5000$^{+200}_{-0}$

Weight : Approx. 1.3kg
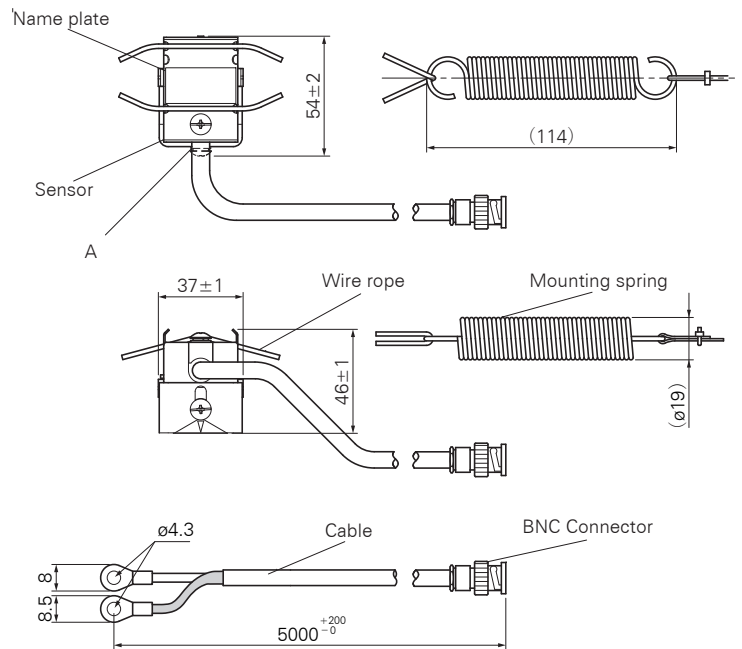
Detector FSD41 (Middle type)

11

OUTLINE DIAGRAM (Unit:mm)

Name plate

Wire rope

Mounting spring

92±2

(114)

78±1

Detector

A

67±2

ø19

ø4.3

Cable

BNC Connector

8.5 8

5000 +200 −0

Weight : Approx.2.2kg
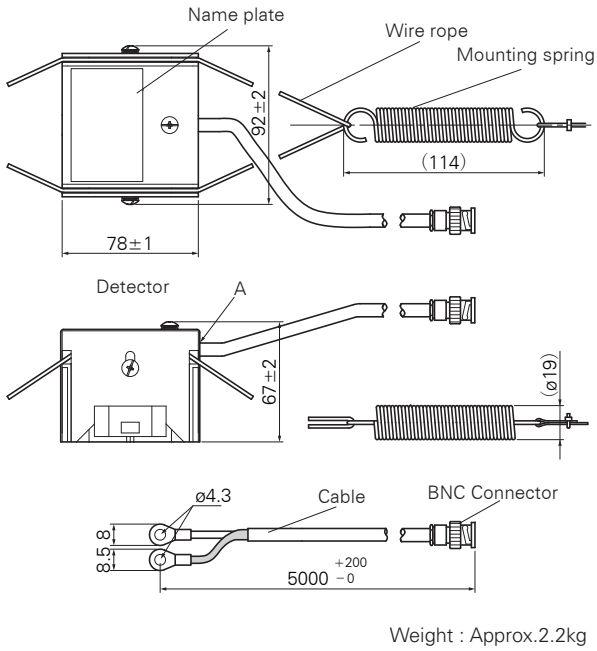
Detector FSD51 (Large type)

Clip

Straight plug

(ø12.3)

(ø5)

AO
AI ch1
AI ch2

1500 +100 −0

100±5

Weight : approx. 0.1kg
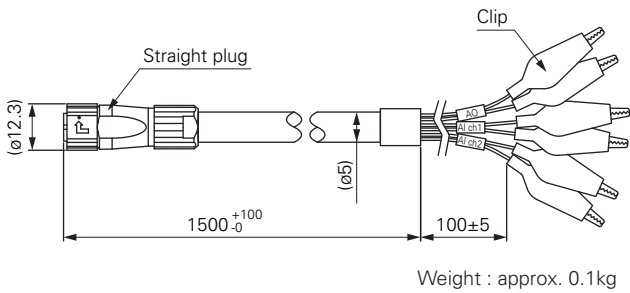
Code color	Clip color		Mark
Black (BK)	Red (R)	(+)	AO
White (W)	Black (BK)	(−)	
Red (R)	Red (R)	(+)	AI ch1
Green (G)	Black (BK)	(−)	
Yellow (Y)	Red (R)	(+)	AI ch2
Brown (BN)	Black (BK)	(−)	

Analog input/output cable

BNC connector

Sensor unit

L

Absorber unit

Frame

(H)

W±1

Type	Diameter (mm)	L	H	W	Weight Approx. (kg)
FSDP2	φ40 to φ200	260±1.2	70	57	0.8
FSDP1	φ100 to φ400	260±1.2	72	57	0.9
FSDP0	φ200 to φ1000	350±2.0	90	85	2.0
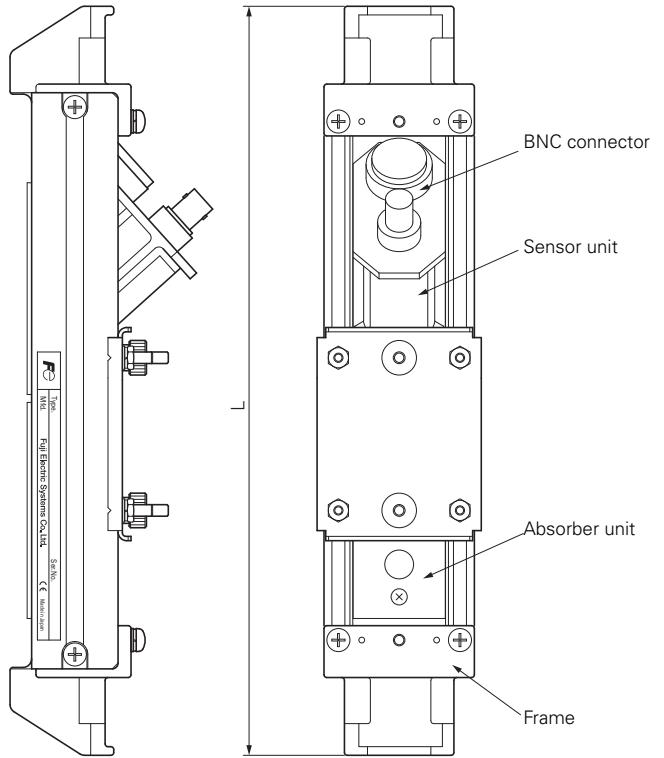
Detector FSDP (Detector for flow velocity profile measurement)

⚠ Caution on Safety

*Before using this product, be sure to read its instruction manual in advance.

Fuji Electric Co., Ltd.

Information in this catalog is subject to change without notice.