

GENERAL SPECIFICATIONS



GS-F1011E-00

POSITIVE DISPLACEMENT OIL FLOWMETER (Mechanical Totalizing Unit)



Overview

POSITIVE DISPLACEMENT OIL FLOWMETER for general use is a positive displacement type flowmeter composed of two rotors and measures flow directly.

There is little deterioration in the accuracy because a couple of roots rotates with non-contact. This flowmeter measures with high accuracy and wide flow range.

Features

•Measurement with High Accuracy

As the fluid is directly measured, the integration accuracy of this flowmeter is within $\pm 0.5\%$. (The accuracy within $\pm 0.2\%$ is also available depending on the demands for a dealing and a tax certificate, etc.)

Especially, as a pair of rotors is non-contact, a light material can be adopted for the flowmeter and low viscosity fluids can be measured with high accuracy and wide flow range.

•Small Size and Light Weight

As the roots type rotors are adopted for the rotor, discharging fluid volume in one rotation of rotor is larger and the roots type meter is designed small and light.

•Excellent Stability of Accuracy

Mechanical parts of the roots type meter will not be worn because of non-contact rotation and there is little change of accuracy in a long time operation.

•Excellent Durability

As the rotors rotate without contact, the rotors are excellent in durability.

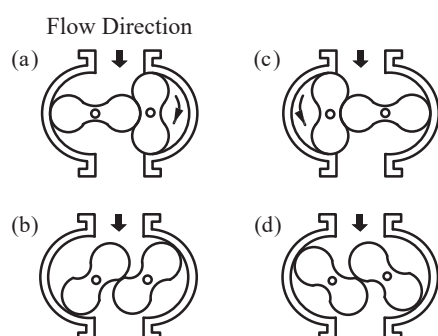
•Small Pressure Loss

The pressure loss is smaller than another positive displacement type flow meter because the rotors do not contact each other.

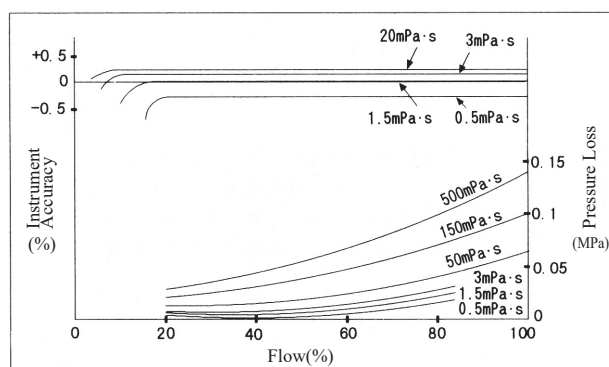
Standard Specification

Applicable Fluid	Petroleum, Petrochemical
Accuracy	$\pm 0.5\%$ or $\pm 0.2\%$ (Option)
Flow Rate Range	0.07 ~ 160 m ³ /h
Fluid Temperature	-5 ~ 150°C (Max. 50°C in case of roots material AC7A) Max. 150°C in case of FC200)
Max. Working Pressure	Max. 2.5 MPa
Fluid Viscosity	Max. 150,000 mPa · s
Connection Size	25mm(1B)~100mm(4B)
Flange Rating	FC250 : JIS 10K FF FCD400 : JIS 10K FF SCPH2 : (JIS 10K, 20K RF) (ASME · JPI 150, 300 RF)
Material	Main Body
	FC250 : (Capacity 35-52 type) FCD400 : (Capacity 35-41 type) SCPH2 : (Capacity 35-52 type) (80mm of 45 type is excluded.)
	Rotor
	FC200, AC7A or ADC
	Rotor Shaft
Material	SUS416 hard chrome plating
	Bearing
	C5191, FC, Ball Bearing
Material	Driving Gear
	SUS316
Piping Installation	Horizontal or Vertical Piping
Paint Color	Munsell 1.4 PB 3.1/1.2

Principle of Operation



Performance Characteristic



Note) Flow rate in 100% are the maximum values of intermittent flow in each type of capacity.

Flow Range

Rotor Material: FC200 Accuracy:±0.2%

Unit : m³/h

Connection Size(mm)	Capacity Model	Use Condition	Fluid Temperature (mPa · s)				
			Gasoline 0.3 ~ 0.9	Kerosene 0.9 ~ 2	Light oil 2 ~ 5	A · B Heavy oil 5 ~ 150	C Heavy oil 150 ~ 500
25	35	Intermittent	2.5 ~ 3.5	1.5 ~ 3.5	1 ~ 4	0.4 ~ 4	0.4 ~ 3.5
		Continuous	2.5 ~ 2.5	1.5 ~ 2.5	1 ~ 3.5	0.4 ~ 3.5	0.4 ~ 2.5
25	38	Intermittent	3 ~ 6	2 ~ 6	1.5 ~ 7	0.5 ~ 7	0.5 ~ 6
40		Continuous	3 ~ 4.5	2 ~ 4.5	1.5 ~ 6	0.5 ~ 6	0.5 ~ 4.5
50	41	Intermittent	5 ~ 13	3 ~ 13	2.6 ~ 15	0.6 ~ 15	0.6 ~ 13
		Continuous	5 ~ 9	3 ~ 9	2.6 ~ 13	0.6 ~ 13	0.6 ~ 9
50	45	Intermittent	13 ~ 35	8 ~ 35	5 ~ 40	2 ~ 40	2 ~ 35
80		Continuous	13 ~ 25	8 ~ 25	5 ~ 35	2 ~ 35	2 ~ 25
80	47	Intermittent	20 ~ 50	12 ~ 50	8 ~ 55	4 ~ 55	4 ~ 50
		Continuous	20 ~ 35	12 ~ 35	8 ~ 50	4 ~ 50	4 ~ 35
100	51	Intermittent	30 ~ 120	25 ~ 120	17 ~ 130	8 ~ 130	8 ~ 120
		Continuous	30 ~ 85	25 ~ 85	17 ~ 120	8 ~ 120	8 ~ 85
100	52	Intermittent	40 ~ 150	25 ~ 150	20 ~ 160	10 ~ 160	—
		Continuous	40 ~ 110	25 ~ 110	20 ~ 140	10 ~ 140	—

Rotor Material: FC200 Accuracy:±0.5%

Unit : m³/h

Connection Size(mm)	Capacity Model	Use Condition	Fluid Temperature (mPa · s)				
			Gasoline 0.3 ~ 0.9	Kerosene 0.9 ~ 2	Light oil 2 ~ 5	A · B Heavy oil 5 ~ 150	C Heavy oil 150 ~ 500
25	35	Intermittent	1.5 ~ 3.5	1 ~ 3.5	0.6 ~ 4	0.07 ~ 4	0.07 ~ 3.5
		Continuous	1.5 ~ 2.5	1 ~ 2.5	0.6 ~ 3.5	0.07 ~ 3.5	0.07 ~ 2.5
25	38	Intermittent	2 ~ 6	1 ~ 6	0.8 ~ 7	0.1 ~ 7	0.1 ~ 6
40		Continuous	2 ~ 4.5	1 ~ 4.5	0.8 ~ 6	0.1 ~ 6	0.1 ~ 4.5
50	41	Intermittent	3 ~ 13	2 ~ 13	1.5 ~ 15	0.25 ~ 15	0.25 ~ 13
		Continuous	3 ~ 9	2 ~ 9	1.5 ~ 13	0.25 ~ 13	0.25 ~ 9
50	45	Intermittent	8 ~ 35	5 ~ 35	3.5 ~ 40	0.6 ~ 40	0.6 ~ 35
80		Continuous	8 ~ 25	5 ~ 25	3.5 ~ 35	0.6 ~ 35	0.6 ~ 25
80	47	Intermittent	12 ~ 50	8 ~ 50	5 ~ 55	1 ~ 55	1 ~ 50
		Continuous	12 ~ 35	8 ~ 35	5 ~ 50	1 ~ 50	1 ~ 35
100	51	Intermittent	25 ~ 120	16 ~ 120	12 ~ 130	4 ~ 130	4 ~ 120
		Continuous	25 ~ 85	16 ~ 85	12 ~ 120	4 ~ 120	4 ~ 85
100	52	Intermittent	30 ~ 150	20 ~ 150	15 ~ 160	8 ~ 160	—
		Continuous	30 ~ 110	20 ~ 110	15 ~ 140	8 ~ 140	—

Rotor Material:AC7A or ADC Accuracy:±0.2%

Unit : m³/h

Connection Size(mm)	Capacity Model	Use Condition	Fluid Temperature (mPa · s)				
			Gasoline 0.3 ~ 0.9	Kerosene 0.9 ~ 2	Light oil 2 ~ 5	A · B Heavy oil 5 ~ 150	C Heavy oil 150 ~ 500
25	35	Intermittent	1.5 ~ 3.5	1 ~ 3.5	0.5 ~ 4	0.4 ~ 4	0.4 ~ 3.5
		Continuous	1.5 ~ 2.5	1 ~ 2.5	0.5 ~ 3.5	0.4 ~ 3.5	0.4 ~ 2.5
25	38	Intermittent	2 ~ 6	1.5 ~ 6	0.7 ~ 7	0.5 ~ 7	0.5 ~ 6
40		Continuous	2 ~ 4.5	1.5 ~ 4.5	0.7 ~ 6	0.5 ~ 6	0.5 ~ 4.5
50	41	Intermittent	3 ~ 13	2.6 ~ 13	1.5 ~ 15	0.6 ~ 15	0.6 ~ 13
		Continuous	3 ~ 9	2.6 ~ 9	1.5 ~ 13	0.6 ~ 13	0.6 ~ 9
50	45	Intermittent	8 ~ 35	5 ~ 35	3 ~ 40	2 ~ 40	2 ~ 35
80		Continuous	8 ~ 25	5 ~ 25	3 ~ 35	2 ~ 35	2 ~ 25
80	47	Intermittent	12 ~ 50	8 ~ 50	6 ~ 55	4 ~ 55	4 ~ 50
		Continuous	12 ~ 35	8 ~ 35	6 ~ 50	4 ~ 50	4 ~ 35
100	51	Intermittent	20 ~ 120	17 ~ 120	12 ~ 130	8 ~ 130	8 ~ 120
		Continuous	20 ~ 85	17 ~ 85	12 ~ 120	8 ~ 120	8 ~ 85
100	52	Intermittent	25 ~ 150	20 ~ 150	15 ~ 160	10 ~ 160	—
		Continuous	25 ~ 110	20 ~ 110	15 ~ 140	10 ~ 140	—

Rotor Material:AC7A or ADC Accuracy:±0.5%

Unit : m³/h

Connection Size(mm)	Capacity Model	Use Condition	Fluid Temperature (mPa · s)				
			Gasoline 0.3 ~ 0.9	Kerosene 0.9 ~ 2	Light oil 2 ~ 5	A · B Heavy oil 5 ~ 150	C Heavy oil 150 ~ 500
25	35	Intermittent	0.9 ~ 3.5	0.6 ~ 3.5	0.25 ~ 4	0.07 ~ 4	0.07 ~ 3.5
		Continuous	0.9 ~ 2.5	0.6 ~ 2.5	0.25 ~ 3.5	0.07 ~ 3.5	0.07 ~ 2.5
25	38	Intermittent	1 ~ 6	0.8 ~ 6	0.4 ~ 7	0.1 ~ 7	0.1 ~ 6
40		Continuous	1 ~ 4.5	0.8 ~ 4.5	0.4 ~ 6	0.1 ~ 6	0.1 ~ 4.5
50	41	Intermittent	2 ~ 13	1.5 ~ 13	0.8 ~ 15	0.25 ~ 15	0.25 ~ 13
		Continuous	2 ~ 9	1.5 ~ 9	0.8 ~ 13	0.25 ~ 13	0.25 ~ 9
50	45	Intermittent	5 ~ 35	3.5 ~ 35	1.8 ~ 40	0.6 ~ 40	0.6 ~ 35
80		Continuous	5 ~ 25	3.5 ~ 25	1.8 ~ 35	0.6 ~ 35	0.6 ~ 25
80	47	Intermittent	8 ~ 50	5 ~ 50	2.5 ~ 55	1 ~ 55	1 ~ 50
		Continuous	8 ~ 35	5 ~ 35	2.5 ~ 50	1 ~ 50	1 ~ 35
100	51	Intermittent	16 ~ 120	12 ~ 120	8 ~ 130	4 ~ 130	4 ~ 120
		Continuous	16 ~ 85	12 ~ 85	8 ~ 120	4 ~ 120	4 ~ 85
100	52	Intermittent	20 ~ 150	15 ~ 150	10 ~ 160	8 ~ 160	—
		Continuous	20 ~ 110	15 ~ 110	10 ~ 140	8 ~ 140	—

Note) 1. Continuous flow shows the operation for 8-24 hours per day. Intermittent flow shows the operation of 8 hours or less per day.
 2. Select the range of the usual flow to become less than 70-80% of the maximum flow.
 3. Minimum flow might be changed by combination of the counter parts.

Standard Specification(Mechanical Totalizing Unit)

Non-contact Pulse Transmitter(Photo Coupler)

Model	Fp1	Fp5	Fp12
Transmission System	3 Wire Type	2 Wire Type	
Power Supply	12V DC±1.2V		24V DC±2.4V
Current Consumption	30 mA		45 mA
Output Voltage (Floating Voltage)	6V±1V ^{P-P} (0.2V or less)	4V±1V ^{P-P} (1.5V or less)	6V±1V ^{P-P} (1.5V or less)
Load Resistance	10KΩ or more	200Ω	
Output Frequency	Max.2000 Hz		
Structure	Flame Proof Type (d2G4)		
Wiring Connection	G1/2(PF1/2 Female Crew)		
Signal Cable	3-core Shielded Cable	2-core Shielded Cable	
Cross - Section Area of Cores	0.75-2mm ²		
Transmission Distance	2km...at 500 Hz (When the sectional area) 1km...at 2000 Hz of the wick wire is 2 mm ²)		
Ambient Temperature	－20 ～ 80 ℃		

Contact Pulse Transmitter

Model	R	S	M
Transmission System	Reed Switch		Micro Switch
Structure	Flame Proof Type (d2G4)	Drip-proof Type	
Contactor Capacity	Resistance Load (Cos φ = 1) (100V AC 2A 50VA 100V DC 2A 50W)	Resistance Load (Cos φ =1) (250V AC 15A 2KVA) (115V DC 0.5A 50W) Induction Load (Cos φ = 0.4) (250V AC3A 300VA) (115V DC 0.05A 5W)	
Max Voltage between Contract	DC250V(One minute)		1000V(One minute)
Output Frequency	Max. 10Hz		Max. 5Hz
Life	10,000,000 times at 20VA		5,000,000 times at 20kVA
Wiring Connection	G1/2(PF1/2 Female Screw)		The same as the left Note)
Single Cable	2 Wick Wire Shield Line		
Cross Section Area of Cores	0.75-2mm ²		
Transmission Distance	1km When the sectional area of the wick wire is 2mm ²		
Ambient Temperature	- 20 ~ 60 °C		- 20 ~ 70 °C

Note) Metal fittings for a ship,JIS F880115c(standard),a,b,JIS F880120a,b,and c are also available to be choosen.

Changer-gear Type Accuracy Adjuster

This is a device to compesate the accuracy of the flow meter easily by interval of 0.045% with two compensation set levers.

Fine adjustment	0.045% /step 11steps
Rough adjustment	0.5 % /step 11steps
Range of correction	5.45 %

Flange Rating and Max. Working Pressure

Unit:MPa

Pressure Code (MPa)	Material Code	Frang Rating				
		JIS			ASME·JPI	
		10K	16K	20K	150	300
B	AA, AE, DA, DE	1.00	—	—	—	—
C	DA, DE	—	1.60	—	—	—
E	NA, NE	1.40	—	2.50	1.96 ^{*1}	2.50

Note)*1 shows that the maximum working pressure can be applied when the temperature of the fluid is under 38℃.

Basic Models

1	2	3	4	5	6	7	8	9	10	11	Contents			
F	R	P									POSITIVE DISPLACEMENT OIL FLOWMETER (Mechanical Totalizing Unit)			
Conn.Size	B	8									25 mm (1 B)			
	0	4									40 mm (1 1/2 B)			
	0	5									50 mm (2 B)			
	0	8									80 mm (3 B)			
	1	0									100 mm (4 B)			
Capacity Model											Intermittent Max. Flow Rate (Applicable Connection Size)			
			3	5									4 m ³ /h (25mm)	
			3	8									7 m ³ /h (25, 40mm) Main body of 25mm : SCPH2 only	
			4	1									15 m ³ /h (50mm)	
			4	5									40 m ³ /h (50, 80mm) Main body of 80mm : FC250 only	
			4	7									55 m ³ /h (80mm)	
			5	1									130 m ³ /h (100mm)	
			5	2									160 m ³ /h (100mm) Non-fluctuation Type Note)1	
Max.Working Pressure Note)2											Max.Working Pressure MPa	Hydraulic Test Pressure MPa	Applicable Flange Rating	
													JIS	ASME・JPI
			B								1.00	2.00	10K	—
			C								1.60	3.20	16K	—
											2.50	3.75	10K, 20K	150, 300
Material											Main Body	Rotors	Applied Pressure	Fluid Temperature
			A A								FC250	FC	Pressure Code	0 ~ 150℃
			A E									AC or ADC	B (1.0MPa)	0 ~ 50℃
			D A								FCD400	FC	Pressure Code	0 ~ 150℃
			D E									AC or ADC	B (1.0MPa) C (1.6MPa)	0 ~ 50℃
			N A								SCPH2	FC	Pressure Code	— 5 ~ 150℃
			N E									AC or ADC	E (2.5MPa)	— 5 ~ 50℃
										—				

	12	13	14	15	16	17	Contents				
Indicator	0	2					Pointer Type Indicator	Direct-reading Totalizer			
	0	4							With Reset Counter (5 Digits)		
	9	6					Counter Type Indicator		With Reset Counter (4 Digits) Note)3		
Pulse Transmitter			F				Non Contact Pulse Transmitter		(Flame Proof)		
			R				Reed Switch Transmitter		(Flame Proof)		
			S				Reed Switch Transmitter		(Drip-Proof)		
			M				Microswitch Transmitter		(Drip-Proof)		
			X				Without Pulse Transmitter				
Compensator			2				Accuracy Adjuster		(Fixed Gear Type)		
			3				Accuracy Adjuster		(Easy change Gear Type) Note)4		
					—						
Attachment							Type	Fluid Temperature			
			A				Heat Radiation Fin	101 ~ 150℃			
			P				90°Attachment	~ 120℃			
			X				without Attachment	~ 100℃			

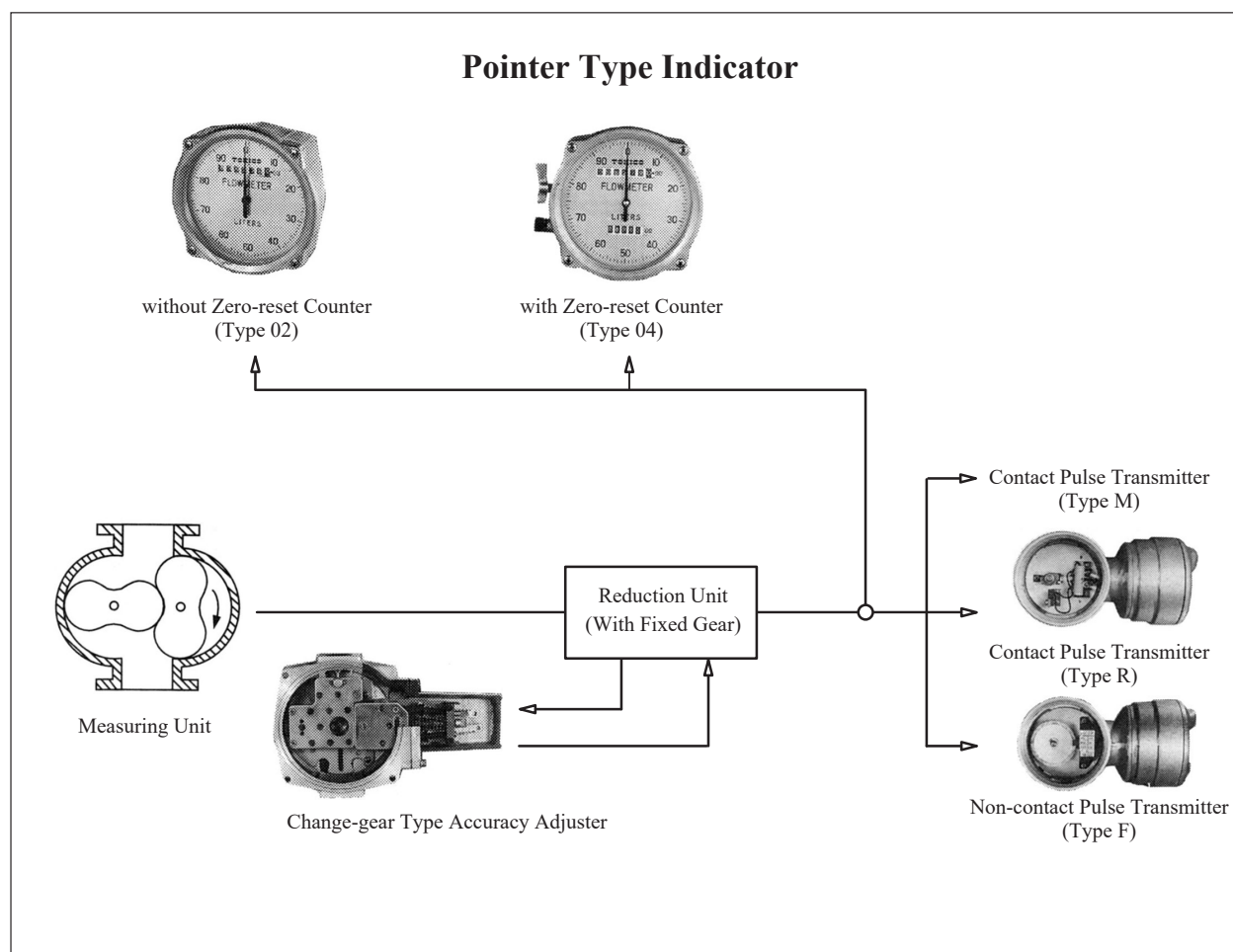
Note) 1. JIS20K and ASME·JPI300 of flange connection are not applicable for capacity model 52.

2. Pressure Code C is only available for model 0438 and 0541.

3. For indicator model 96, the accuracy is only “± 0.5%”, pulse transmitter is only “F”, and attachment is only “X”.

4. When the accuracy is ±0.2%, select the Type 3 instrument accuracy adjuster for the compensator part.

Totalizing Unit Composition



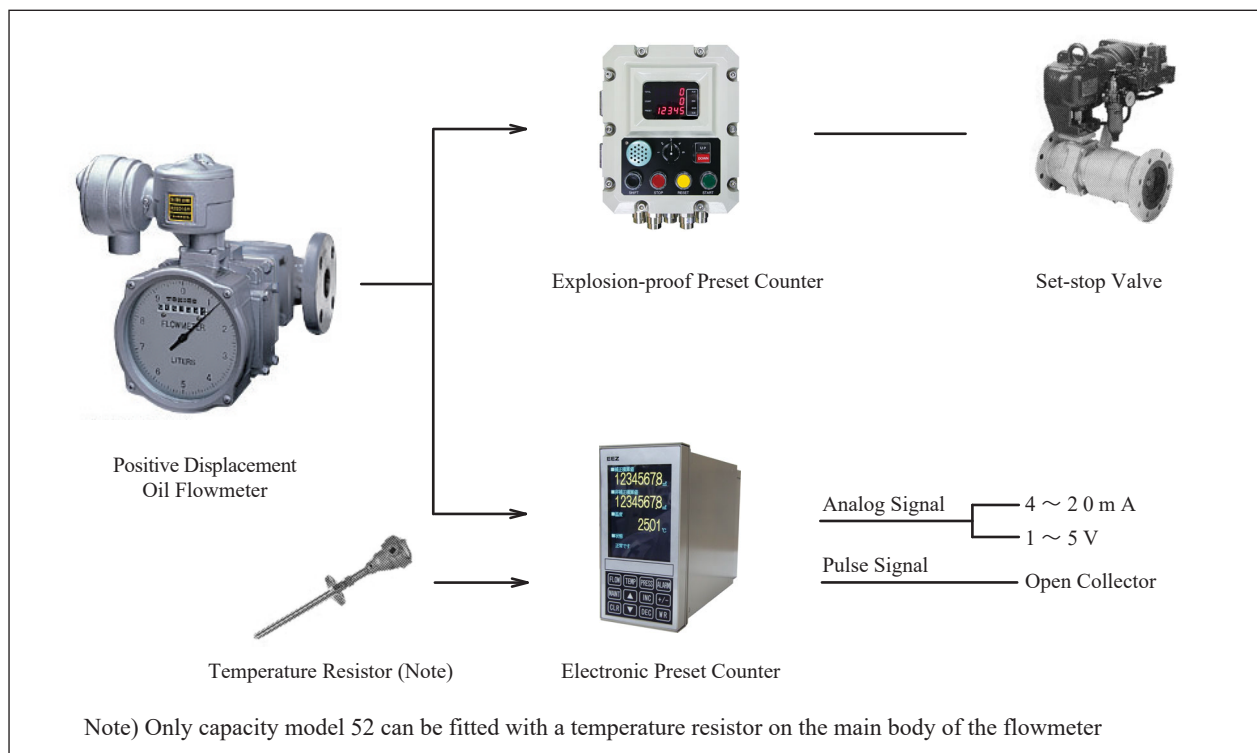
Standard Unit of Totalizing Unit and Range of Application

Capacity Model	Conn. Size (mm)	Max. Flow Rate (m ³ /h)	Indication Part				Counter Type Indicator			Pulse Transmitter	
			Pointer		Totalizing Counter (7 digits L)	Reset Counter (5 digits L)	Totalizing Counter (7 digits)	Reset Counter (4 digits)		Non Contact Pulse (L/P)	Contact Pulse (L/P)
			One Revolution (L/rev)	Minimum Scale (L)				Minimum Digits (L)	Minimum Scale (L)		
35	25	4	10	0.1	10	10	10	1	0.2	0.01	1
38	25/40	7	10	0.1	10	10	10	1	0.2	0.01	1
41	50	15	10	0.1	10	10	10	1	0.2	0.1	1
45	50/80	40	100	1	100	100	100	10	2	0.1	10
47	80	55	100	1	100	100	100	10	2	0.1	10
51	100	130	100	1	100	100	100	10	2	1	10
52	100	160	100	1	100	100	100	10	2	1	10

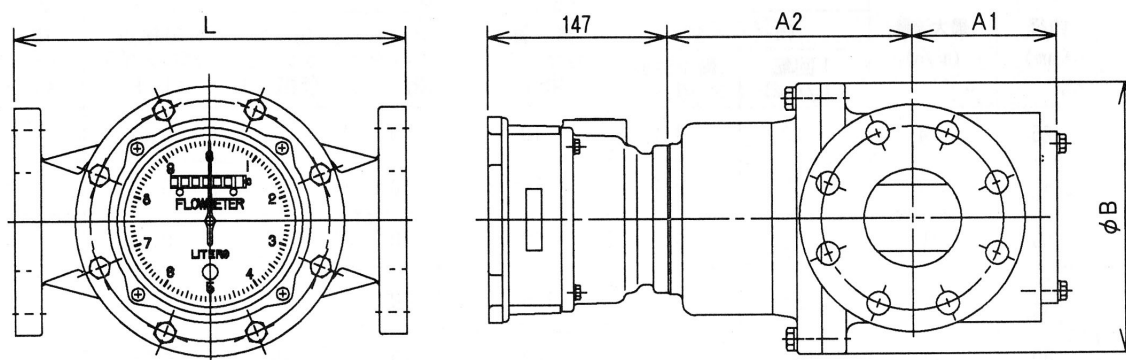
Note) 1. The maximum flow depends on the applied fluid and usage condition.

2. The combination of the indicator, transmitter and the compensator might be unavailable under a certain condition.

Example of Instrumentation



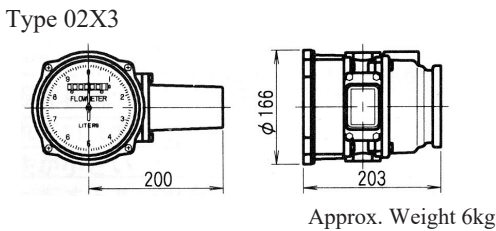
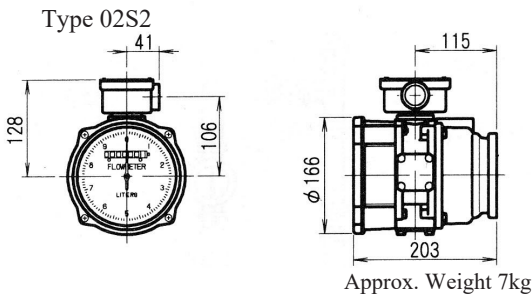
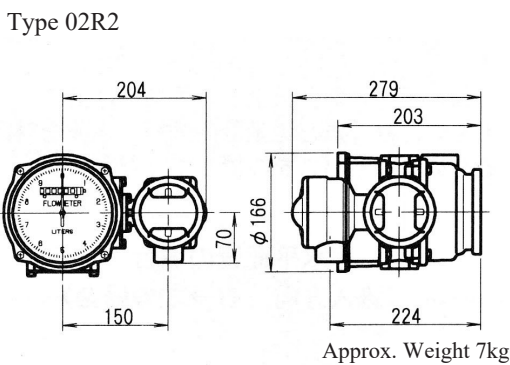
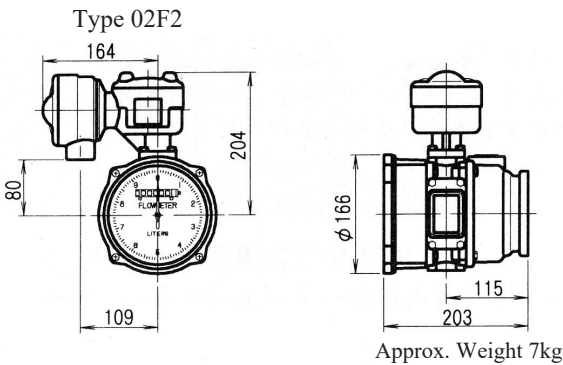
Dimension Drawing



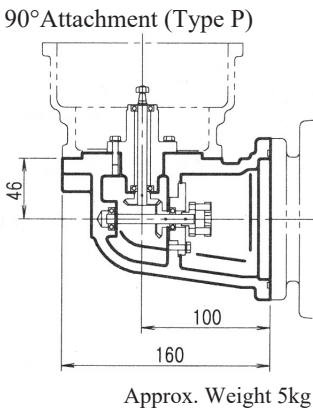
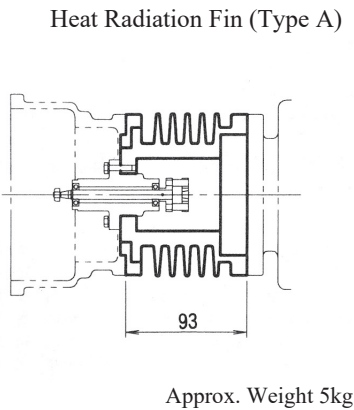
Capacity Model	Conn.Size (mm)	Main Body Material	Dimensions (mm)				Internal Volume (L)	Approx. Weight (kg)
			L	A 1	A 2	ϕB		
35	25	FC250, FCD400	200	35	113	$\square 112$	0.5	17
		SCPH2						
38	25	SCPH2	200	50	118	$\square 112$	1	16
	40	FC250, FCD400	200	45	123	$\square 112$	1	19
		SCPH2						
41	50	FC250, FCD400	250	60	145	165	2	29
		SCPH2						
45	50	FC250	320	89	170	220	4	45
		SCPH2	360					
	80	FC250	300					
47	80	FC250	320	119	200	220	5	49
		SCPH2	360					
51	100	FC250	450	180	275	300	11	100
		SCPH2						
52	100	FC250	450	206	275	300	13	100
		SCPH2						

Note) This drawing shows a flowmeter with 02X2 type counter.

Dimension Drawing of Totalizing Unit



Dimension Drawing of Attachment

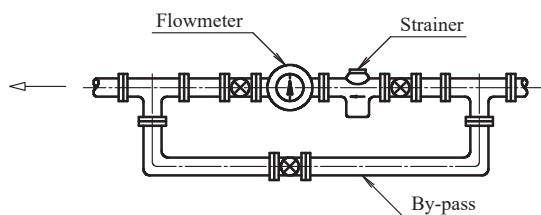




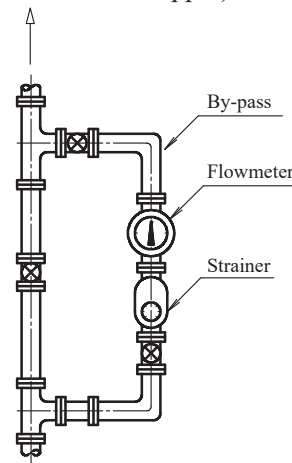
Caution for Flowmeter Piping Installation

- Be sure to operate the flowmeter within the specification stamped on the name plate.
- As shown below, install a strainer at the up-stream of the flowmeter and provide a by-pass for the convenience of flowmeter disassembly and maintenance.
- Install the flowmeter so as to level its rotor shaft pose regardless of the mode(horizontal or vertical) of its associated pipes.
- The flowmeter should be installed on the by-pass side since the dirt in the outlet piping flows back when the flow direction is from bottom to top.

Horizontal Arrangement
(Flow Direction Right → Left)



Vertical Arrangement
(Flow Direction Lower → Upper)



Ordering Instructions

	Item	Contents
1	Applications	Production Control, Dealings, Receipt and Shipment etc.
2	Applicable Fluid Name	Name, Compositions, Existence of Admixture and Corrosion
3	Accuracy	± %
4	Flow Rate	Maximum, Normal, Minimum (Time of Use For Each Day) (L/h or m ³ /h)
5	Operating Temperature	Maximum, Normal, Minimum (°C)
6	Operating Pressure	Maximum, Normal, Minimum (MPa)
7	Viscosity and Specific Gravity	Viscosity (at °C), Specific Gravity (at °C)
8	Connection Standard	Connection Size and Flange Standard, etc.
9	Flow Direction	Horizontal or Vertical piping
10	Transmission Unit	For Pulse Transmitter
11	Applied Regulations	Name of Regulation and Standards
12	Attached Equipment	Necessity of Strainer and Valve, etc.
13	Power Supply	For Pulse Transmitter, Electric Type Set-Stop Measuring System

*Be sure to read the instruction manual carefully before you use this meter to ensure you use it correctly.

*Note that the contents may be subject to change without notice.

● Contact

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