

GENERAL SPECIFICATIONS



GS-1302E-02

VERTICAL-TYPE NON-FLUCTUATION FLOWMETER

Overview

VERTICAL-TYPE NON-FLUCTUATION FLOWMETER has been developed for the use of flow measurement in large volume.

This is a volumetric flowmeter which measures the flow directly with a pair of 45° combination roots used as the rotors.

As this 45° combination roots rotates at constant velocity, the occurrence of pulsation pressure is extremely low and thus realized the low noise and vibration during the measurement of large volume

Features

● Low Vibration and Noise

A pair of 45° combination roots rotates at constant velocity, the piping vibration is very small and it is able to make silent measurement even when measuring the flow in large volume.

● Superior Durability

As with vertical type structure, the load of rotor is dispersed in the directions of its own-weight direction (pivot bearing) and rotating load direction (radial bearing).

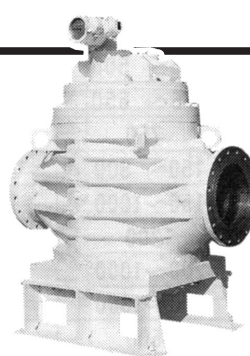
This will provide us that each bearing load becomes smaller and the bearing withstands the longer period of use.

● Wide Flow Range

By the adoption of pivot bearing, the rotor rotates very lightly. And, it provides low pressure-losses and is able to take the flow in the wider scope.

● Smaller Piping Area

As with vertical type structure, we can save the spaces for piping and maintenance in upper and lower stream of the flowmeter.



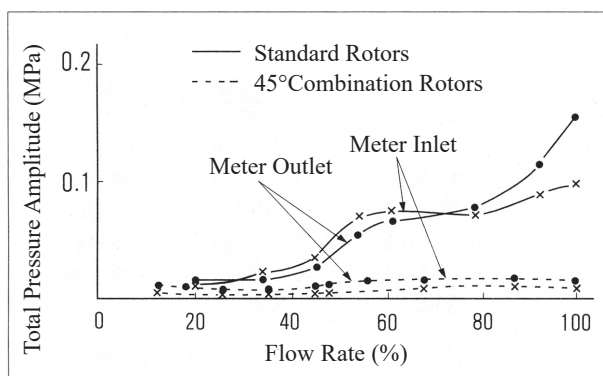
45° Combination Rotors

Standard Specification (Measuring Unit)

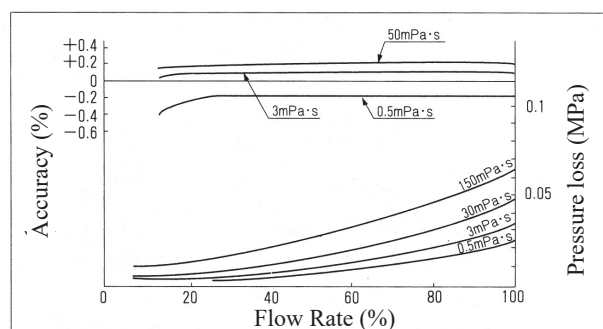
Applicable Fluid		White oil (Gasoline,Kerosene,Light oil) Black oil (A,B,C Heavy oil,Crude oil)
Accuracy		±0.5% or ±0.2% *
Flow Rate Range		8～1,500m³/h
Fluid Temperature		<div>－5～150℃ <div><div>50℃ is Max. in case of roots material AC7A. 150℃ is Max. in case of FC200.</div></div></div>
Max. Working Pressure		Max. 2.45MPa
Fluid Viscosity		Max. 150mPa·s
Connection Size		150mm (6B)～350mm (14B)
Flange Rating		JIS 10K, 20K FF or RF ASME·JPI 150,300RF
Material	Main Body	SCPH2
	Rotor	AC7A (White Oil), FC200 (Black Oil)
	Bearing	Carbon
Piping Installation		Horizontal Piping
Paint Color		Silver

Note) *±0.2% is guaranteed only with easy-change gear type adjuster for mechanical totalizing unit.

Pulsating Pressure of Standard Rotors and 45° Combination Rotors



Performance Characteristic



Note) Flow rate in 100% are the maximum values of intermittent flow in each type of capacity
1mPa·s=1cP, 0.98MPa=10kgf/cm²

Flow Range : Accuracy $\pm 0.5\%$ ReadingUnit : m³/h

Connection Size (mm)	Capacity Model	Use Condition	Oil (mPa·s)			
			Gasoline (0.3~0.9)	Kerosene (0.9~2)	Light Oil (2~5)	Heavy Oil (5~150)
150	54	Continuous	25~ 190	20~ 200	15~ 250	8~ 250
		Intermittent	25~ 240	20~ 250	15~ 280	8~ 280
		Maximum	280	280	280	280
200	57	Continuous	50~ 300	35~ 320	22~ 400	15~ 400
		Intermittent	50~ 380	35~ 400	22~ 450	15~ 450
		Maximum	450	450	450	450
250	59	Continuous	75~ 500	45~ 550	30~ 670	20~ 670
		Intermittent	75~ 650	45~ 670	30~ 750	20~ 750
		Maximum	750	750	750	750
300	60	Continuous	150~ 800	100~ 850	75~1100	40~1100
		Intermittent	150~1000	100~1100	75~1200	40~1200
		Maximum	1200	1200	1200	1200
350	61	Continuous	200~1000	150~1050	100~1350	50~1350
		Intermittent	200~1300	150~1350	100~1500	50~1500
		Maximum	1500	1500	1500	1500

Flow Range : Accuracy $\pm 0.2\%$ ReadingUnit : m³/h

Connection Size (mm)	Capacity Model	Use Condition	Oil (mPa·s)			
			Gasoline (0.3~0.9)	Kerosene (0.9~2)	Light Oil (2~5)	Heavy Oil (5~150)
150	54	Continuous	40~ 190	30~ 200	25~ 250	10~ 250
		Intermittent	40~ 240	30~ 250	25~ 280	10~ 280
		Maximum	280	280	280	280
200	57	Continuous	70~ 300	50~ 320	40~ 400	20~ 400
		Intermittent	70~ 380	50~ 400	40~ 450	20~ 450
		Maximum	450	450	450	450
250	59	Continuous	100~ 500	70~ 550	50~ 670	30~ 670
		Intermittent	100~ 650	70~ 670	50~ 750	30~ 750
		Maximum	750	750	750	750
300	60	Continuous	200~ 800	150~ 850	100~1100	50~1100
		Intermittent	200~1000	150~1100	100~1200	50~1200
		Maximum	1200	1200	1200	1200
350	61	Continuous	300~1000	250~1050	150~1350	80~1350
		Intermittent	300~1300	250~1350	150~1500	80~1500
		Maximum	1500	1500	1500	1500

Note) 1. Continuous flow shows the operation for 8–24 hours day. Intermittent shows for 8 hours or less. Maximum shows a instantaneous Maximum flow.
 2. Select the range of the usual flow to be less than 70–80% of the Maximum flow.

Flange Rating and Max. Working Pressure

Pressure Code	Material Code	Flange Rating			
		JIS		ASME·JPI	
		10K	20K	150	300
E	NA, NE	1.18	2.45	*1.96	2.45

Note) *Shows that the Maximum working pressure can be applied when the temperature of the fluid is 38°C.

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	30mA		45mA
Output Voltage (Floating Voltage)	6V±1V ^{P-P} (0.5V or Less)	4V±1V ^{P-P} (1.8V or Less)	6V±1V ^{P-P} (1.5V or Less)
Load Resistance	10 kΩ or More	200Ω	
Output Frequency	Max.2000 Hz		
Structure	Flameproof Type (d2G4)		
Wiring Connection	G1/2 (PF1/2 Female Screw)		
Signal Cable	3-Core Shielded Cable	2-Core Shielded Cable	
Cross-section Area of Cores	0.75 ~ 2 mm ²		
Transmission Distance	2km ... at 500Hz (when the sectional area 1km ... at 2000Hz of the wire is 2mm ²)		
Ambient Temperature	- 20 ~ 80℃		

Contact Pulse Transmitter

Model	R
Transmission System	Reed Switch
System Structure	Flameproof Type (d2G4)
Contactor Capacity	Max.Contact Capacity 50W Max.Voltage DC200V Max.Current DC1A
Max Voltage Between Contact	DC250V
Output Frequency	Max.10Hz
Life	10,000,000Times at DC24V,100mA
Wiring Connection	G1/2 (PF1/2 Female Screw)
Signal Cable	2 Core Wire Shield Line
Cross-Section Area of Cores	0.75 ~ 2 mm ²
Transmission Distance	1km (When the Sectional Area of the Core Wire is 2mm ²)
Ambient Temperature	- 20 ~ 60°C

Change-gear Type Accuracy Adjuster

This is a device to compensate the accuracy of the flow meter easily from the outside 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%

Standard Specification (Intelligent Totalizing Unit)

Model : 89PC or D (For Vertical-type Non-Fluctuation Flowmeter)

Display	Display	LCD Display
	Totalizing Counter	8 digits, Select "Correction"/"Non-correction" (Note: Correction means in case of temperature correcting function is equipped) Unit: L, m ³ , KL
	Reset Conuter	
	Momentary Flow Rate	Maximum 7 digits, Unit: /min, or /h
	Temperature Display	Maximum 5 digits(If Temperature Input is Required)
	Mode	Indicates "Display Mode" or "Test Mode"
	Status	Indicates the Rotating Direction of the Flowmeter
	Alarm	Indicates "Number of Times that Alarm Occurred" and "Lapse of Time"
	Display Change	Changeable by Magnet
Function	*Linearize	Approximation Correction of Line Graph in the 4 Sections(5 Points) (Available up to 10 Sections by Additional Option)
	*Temperature Correction	Correction Range: - 50 to 150℃ Temperature Range Span of Temperature Resistor can be set. Petroleum in JIS: K 2249 Or Correction by Using General Secondary Formula
	Coefficient Correction	Flowmeter Constant is Set between 0.0001 and 1.9999
	*Thermal Expansion Correction of Flowmeter Measurement Compartment	Thermal Expansion Correction of Flowmeter Measurement Compartment
	Forward and Reverse Distinction	Distinguishes the Rotating Direction of the Flowmeter When a 2-Phase Pulse is Input
	*Accuracy Correction of Temperature Resistor	Approximation Correction of Line Graph in the 2 Sections(3 Points) (Available up to 10 Sections by Additional Option)
	Lapse of Time after Abnormality Occurred	Laps of Time is Measured from the Occurrence of Abnormality
	Self-pulse Generation	For the use in loop check or correction calculation check
	Abnormality Detection	Upper or Lower Limit in the Flow Rate. Or Upper or Lower Limit in Temperature etc.
	Accuracy in Linearize Calculation	± 0.005 % or Less (at Measuring Point)
	Temperature Correction Calculation Accuracy	± 0.075 % or Less
Accuracy	Analog Accuracy	± 0.5 % FS or Less
	Pulse Input	Vertical Type Non-Fluctuation Positive Displacement Flowmeter (MR sensor) Maximum Input Frequency: 500 Hz
Input	*Temperature Input	Temperature Resistor (Regulated Current: Part with 2 mA)

Table1. Output List

Power Source Voltage : DC12V、DC20V~24V

Output ① (Terminal at Left Side)					Output ② (Terminal at Right Side)				
Output Signal	Single Cable	Old Transmitter Model(*5)	Output	Communication	Open Drain	Voltage Pulse	Current Pulse (With Temp. Correction)	Current Pulse (Without Temp. Correction)	Analog
					2 Wire Type	3 Wire Type	2 Wire Type	2 Wire Type	2 Wire Type
					—	Fp-1(DC12V) or (DC20V~ 2 4V)	Fp-5(DC12V) Fp-6(DC20V) Fp-12(DC24V)	Fp-5(DC12V) Fp-6(DC20V) Fp-12(DC24V)	—
Open Drain	3 Wire Type	—	○	○ (*1)	○	○ (*3)	○ (*3)	○ (*3)	×
Open Drain	4 Wire Type	—	○	○	○	○ (*3)	○ (*3)	○ (*3)	×
Voltage Pulse	3 Wire Type	Fp-1(DC12V) or (DC20V~ 2 4V)	○	○ (*1)	○	○ (*3)	○ (*3)	○ (*3)	×
Current Pulse (With Temp. Correction)	2 Wire Type	Fp-5(DC12V)	×	×	○	○ (*3)	○ (*3)	○ (*3)	×
		Fp-6(DC20V)	○ (*4)	○					
		Fp-12(DC24V)	○ (*4)	○					
Current Pulse (Without Temp. Correction)	2 Wire Type	Fp-5(DC12V)	○ (*4)	○	○	○ (*3)	○ (*3)	○ (*3)	×
		Fp-6(DC20V)	○ (*4)	○					
		Fp-12(DC24V)	○ (*4)	○					
Analog	2 Wire Type	—	○ (*2)	○ (*2)	○	○ (*3)	○ (*3)	○ (*3)	×
None (For power supply only)	2 Wire Type	—	×	○	○	○ (*3)	○ (*3)	○ (*3)	×

(*1) It is necessary to add load resistor in Positive (+) side.
(*2) Use in DC 12V is not available.
(*3) Additional power is required.
(*4) Pulse width of the current pulse is 0.5ms only. (In case of output ②, 10ms, or 100ms is available)
(*5) Figure within parentheses () of the old transmitter model indicates the supply voltage.

Pulse Output	Output Signal	To be selected from open drain, (FET), voltage pulse, or current pulse. Please Refer to the Table - 1
	Output Contents	Select Corrected/Non-Corrected Pulse, Forward and Reverse Judgment Status, Alarm Output (Note: Compensation is Carried Out With a Temperature Correction Function)
	Output Capacity	30V, 0.1A
	Pulse Width	To be Selected from 0.5 ms, 10 ms, or 100 ms
	Transmission Distance	1 km or Less (When Core Wire Cable is 1.25mm ²) 2 km or Less (When Core Wire Cable is 2 mm ²)
	Output Signal	4~20mA (±0.5%FS) Please Refer to the Table - 1
Analogue Output	Output Contents	Select Correction/No-Correction Current Pulse and Correction Required /No-Correction Required for Momentary Flow Rate. (Note: Correction Means the Case that Temperature Correcting Function is Equipped)
	Response Time	0.5~60s (Set With Interval of 0.5s)
	Transmission Distance	1 km or less (When core wire cable is 1.25mm ²) 2 km or less (When core wire cable is 2 mm ²)
	Communication	Smart Communication
Power	Vertical Type Non-Fluctuation Positive Displacement Flowmeter	12~24V DC (It Depends the Output Specification. Please Refer Table - 1 for details)
	Consumption Current	28mA or Less (Rush Current: 0.8A)
	Backup Function	Corrected/Non-Corrected Totalized Value
	Parameter Setting	To be Set by the Push Button Operation on the Display Board or by the Communication
	Waterproof Structure	IP66
	Explosion Proof Structure	Pressure Resistant and Explosion Proof Structure (Exd II BT4)
	Ambient Temperature	-10~60℃ (Storage Temperature Range : -20~80℃)
	Ambient Humidity	5~90%RH

Note 1) * marked items are option.
2) Output is capable up to 2 points.
For output-capable combination, please refer to the Table - 1

Accuracy as a Flowmeter Equipped with an Intelligent Totalizing Unit (Common with Vertical-type Non-Fluctuation Flowmeter)

Standard Specifications (Coefficient Correction function)	Within ±0.2%
With Linearization Function	Within ±0.15% and Within ±0.04% of the Linearization Point
With Temperature Correction Function	Within ±0.2%
With Linearization Function +Temperature Correction Function	Within ±0.15% and Within ±0.12% of the Linearization Point

Note) Provided the flow rate range is within ±0.2% of each type of flow rate accuracy.

Basic Models

1	2	3	4	5	6	7	8	9	10	11	Contents			
F	F	L									VERTICAL-TYPE NON-FLUCTUATION FLOWMETER			
Conn.Size	1	5									6B (150mm)			
	2	0									8B (200mm)			
	2	5									10B (250mm)			
	3	0									12B (300mm)			
	3	5									14B (350mm)			
Capacity Model								Intermittent Max. Flow Rate (Applicable Connection Size)						
			5	4					280m ³ /h (150mm)					
			5	7					450m ³ /h (200mm)					
			5	9					750m ³ /h (250mm)					
			6	0					1200m ³ /h (250mm)					
			6	1					1500m ³ /h (350mm)					
Max.Working Pressure									Max.Working Pressure MPa	Hydraulic Test Pressure MPa	Applicable Flange Rating			
						E			2.5	3.75	JIS 10K,20K	ASME · JPI 150,300		
Material									Main Body	Roots	Rotor Shaft		Bearing	
						N	A	SCPH2		FC200		S45C+Cr Plating	Carbon	
						N	E			AC7A				
								—						

	12	13	14	15	16	17	Contents				
Indicator	0	2					Pointer Type Indicator	Direct-Reading Totalizer	With Reset Counter (5 digits)		
	0	4									
Pulse Transmitter			F				Non Contact Pulse Transmitter (Flameproof)				
			R				Reed Switch Transmitter (Flameproof)				
			X				Without Pulse Transmitter				
Compensator				2			Accuracy Adjuster			Fixed Gear Type	
				3						Easy-Change Gear Type*	
					—						
Attachment							Type		Fluid temperature		Applicable indicator
						F	Radiation Fin + 90° Attachment		121 ~ 150℃		Pointer Type
						P	90°Attachment		~ 120℃		

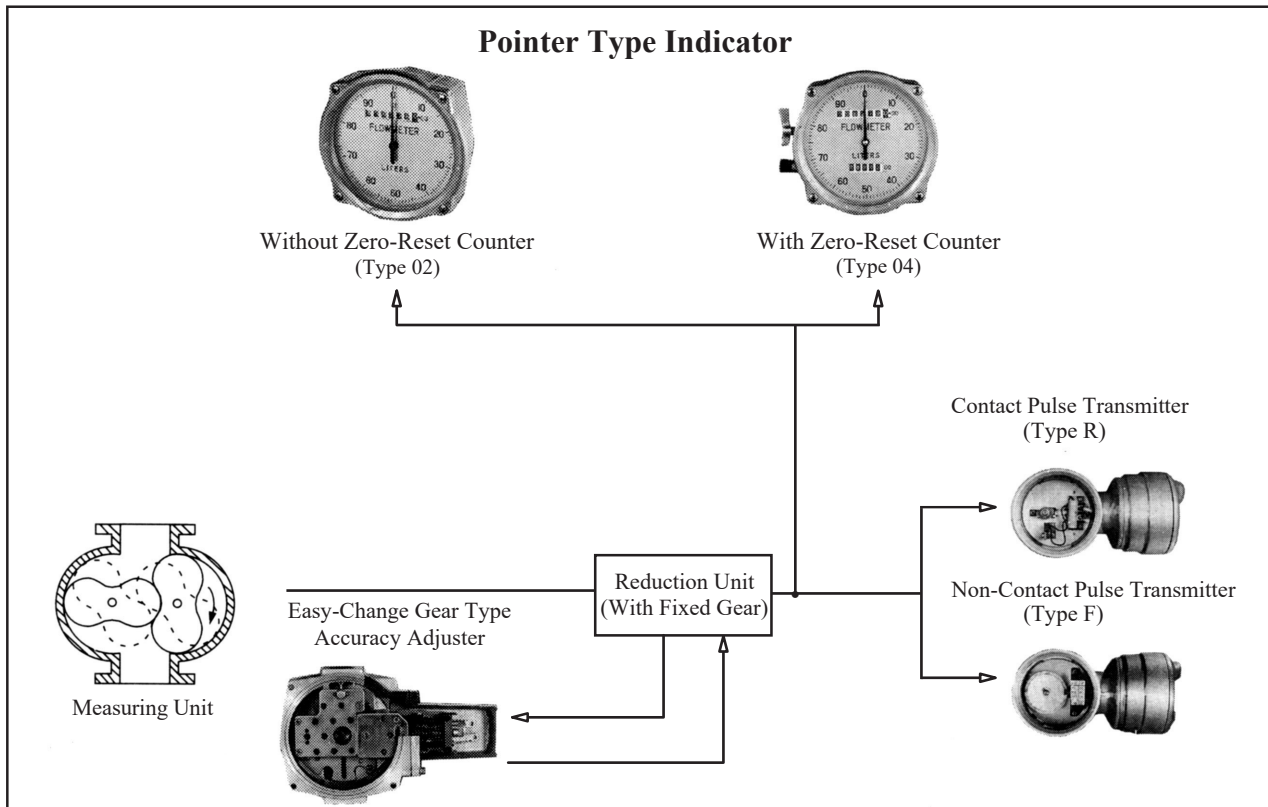
Note: * Accuracy ±0.2% is guaranteed only with easy-change gear type adjuster for mechanical totalizing unit.

	12	13	14	15	16	17	Contents			
Indicator	8	9	P	C			54 ~ 59 Type			
	8	9	P	D			60 ~ 61 Type			
						—				
Attachment			L				Attachment for 89P+90° Attachment (Fluid Temperature 120°C or Less)			
			Q				Attachment for 89P+90° Attachment + Radiation Fin (Fluid Temperature 150°C or Less)			

Note 1) Temperature compensator can be attached to 89P with the combination.

2) The attachment for capacity model 60 – 61 is always “Q”.

Totalizing Unit Composition



Standard Unit of Totalizing Unit (Mechanical Totalizing Unit)

Capacity Model	Conn. Size (mm)	Max.Flow Rate (m ³ /h)	Indication Part				Pulse Transmitter	
			Pointer		Totalizing Counter (7 digits kL)	Reset counter (5 digits kL)	Non Contact Pulse (L/P)	Contact Pulse (L/P)
			One Revolution (kL/Rev)	Minimum Scale (kL)				
54	150	280	1	0.01	1	1	1	1000
57	200	450	1	0.01	1	1	1	1000
59	250	750	1	0.01	1	1	1	1000
60	300	1200	1	0.01	1	1	1	1000
61	350	1500	1	0.01	1	1	1	1000

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

2) The combination of the indication part, transmission part and the compensation part might be unavailable under a certain specification.

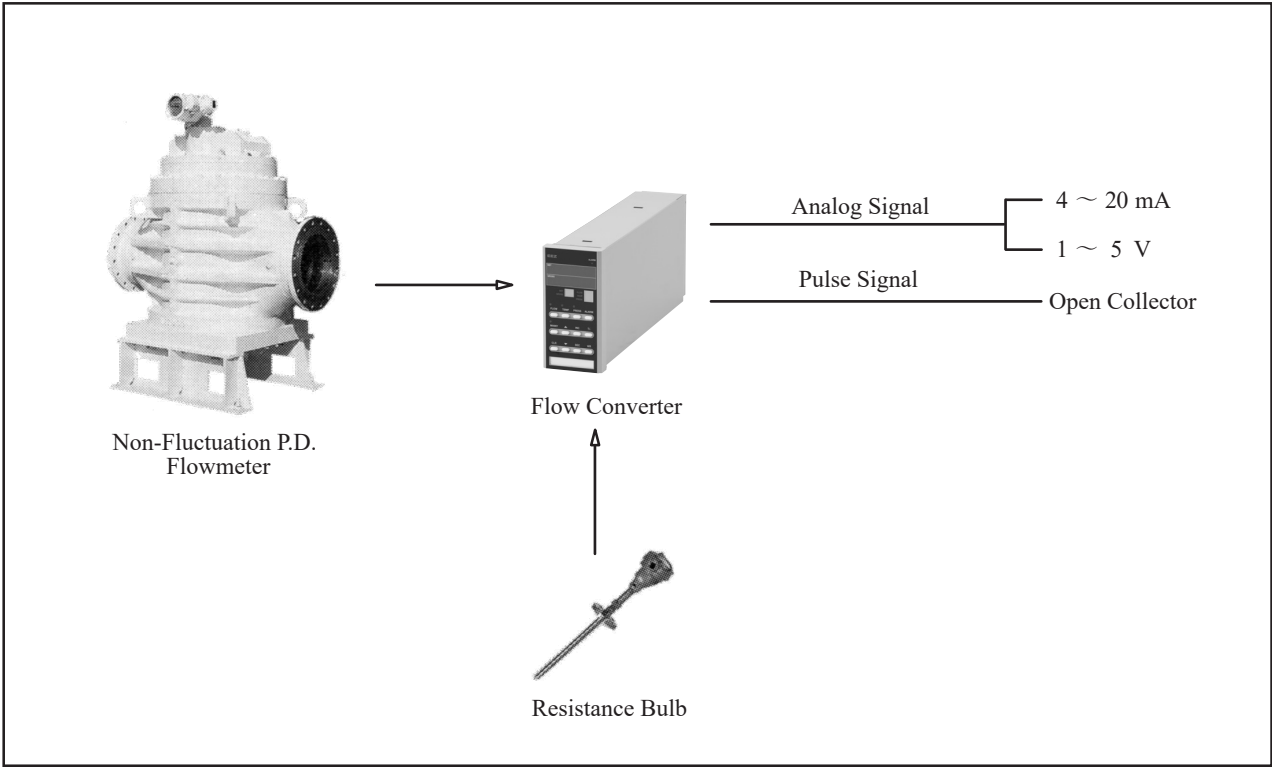
Standard Unit of Totalizing Unit (Intelligent Totalizing Unit)

Capacity Model	Conn. Size (mm)	Max.Flow Rate (m ³ /h)	Totalizing Counter (8 digits kL)	Reset Counter (8 digits kL)	Momentary Flow Rate (kL/h)	Pulse Output (L/P)
54	150	280	0.01	0.01	0.1	1
57	200	450	0.01	0.01	0.1	1
59	250	750	0.01	0.01	0.1	1
60	300	1200	0.01	0.01	1	1
61	350	1500	0.01	0.01	1	1

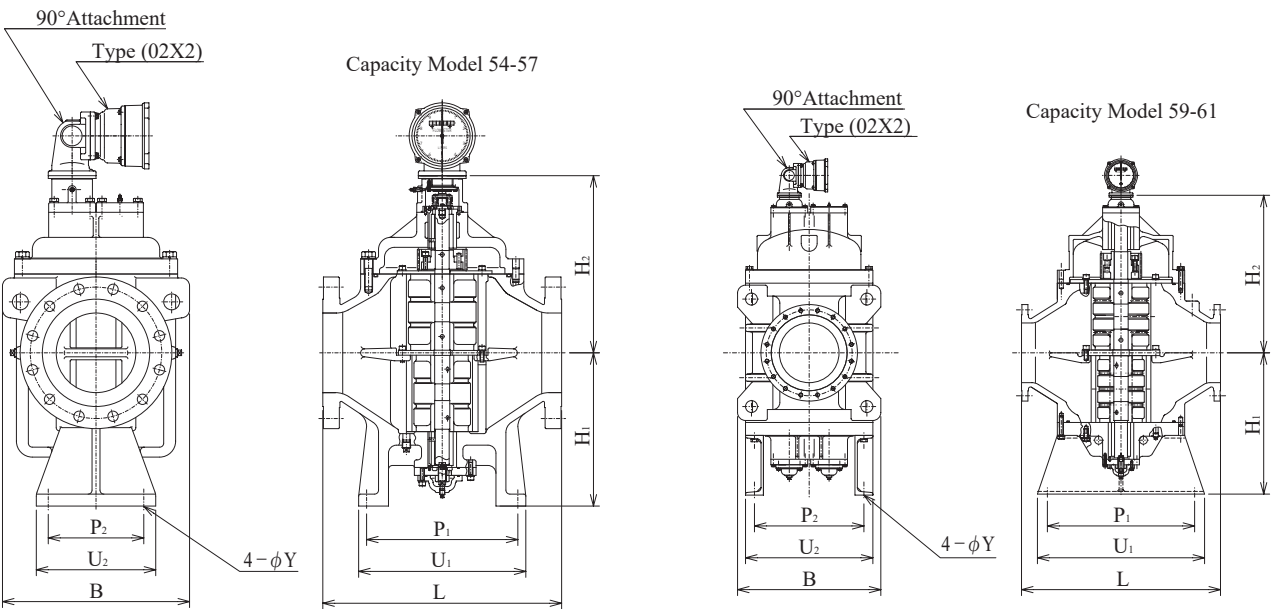
Note 1) The maximum flow depends on the applied fluid and condition.

2) "m³" indication is selectable for the totalizing counter, reset counter and momentary flow rate.

Example of Instrumentation



Dimension Drawing (Mechanical Totalizing Unit)



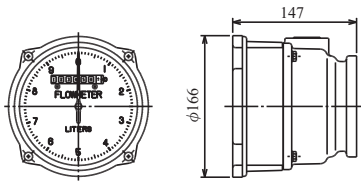
FFL 1554~2057

FFL 2559~3561

Capacity Model	Conn. Size (mm)	Dimensions (mm)									Internal Volume (L)	Approx Weight (kg)
		L	H ₁	H ₂	P ₁	P ₂	φY	B	U ₁	U ₂		
54	150	560	320	348	300	200	24	400	350	270	20	260
57	200	600	385	437	380	240	24	470	420	300	42	430
59	250	850	530	570	540	470	35	600	680	540	82	750
60	300	1000	710	784	740	550	35	720	840	640	160	1500
61	350	1200	790	864	740	550	35	720	840	640	230	1800

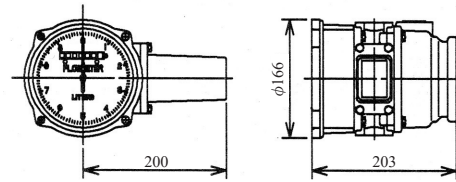
Dimension Drawing of Totalizing Unit

Type 02X2



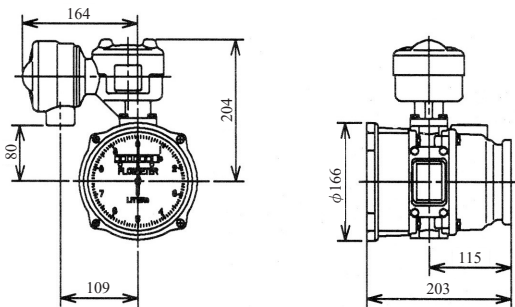
Approx Weight 2.5kg

Type 02X3



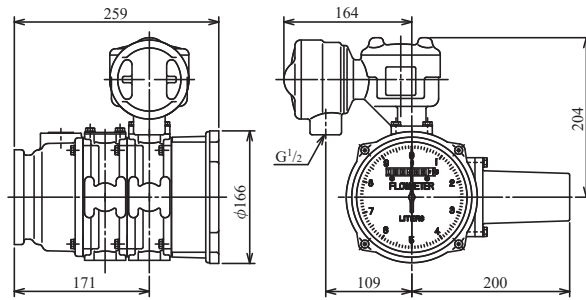
Approx Weight 4.6kg

Type 02F2



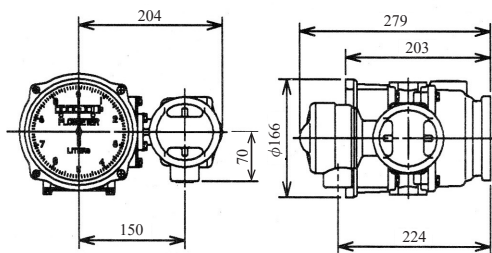
Approx Weight 4.4kg

Type 02F3



Approx Weight 6.5kg

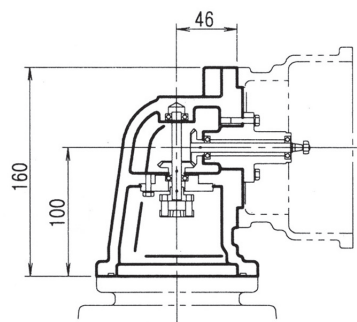
Type 02R2



Approx Weight 4.4kg

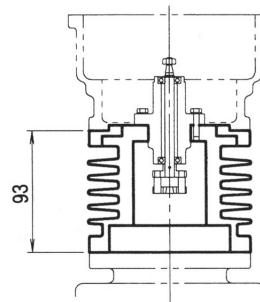
Dimension Drawing of Attachment

90° Attachment (Type P)



Approx Weight 5kg

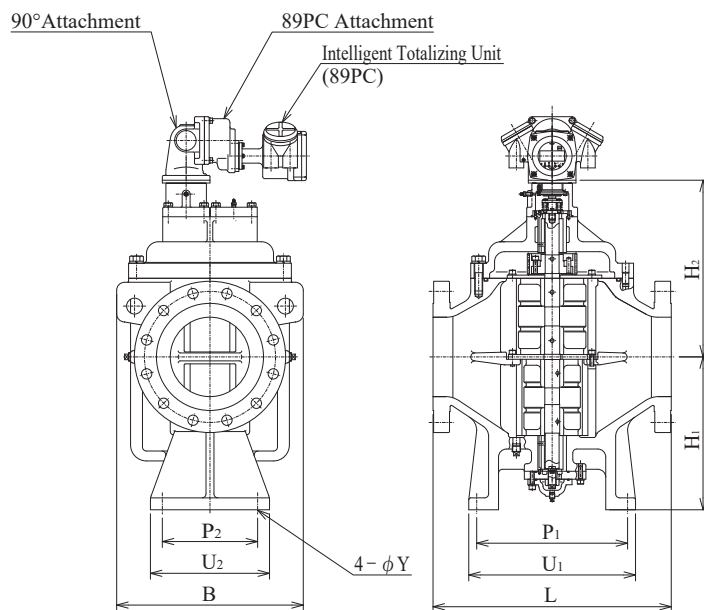
Heat Radiation Fin (Type A)



Approx Weight 5kg

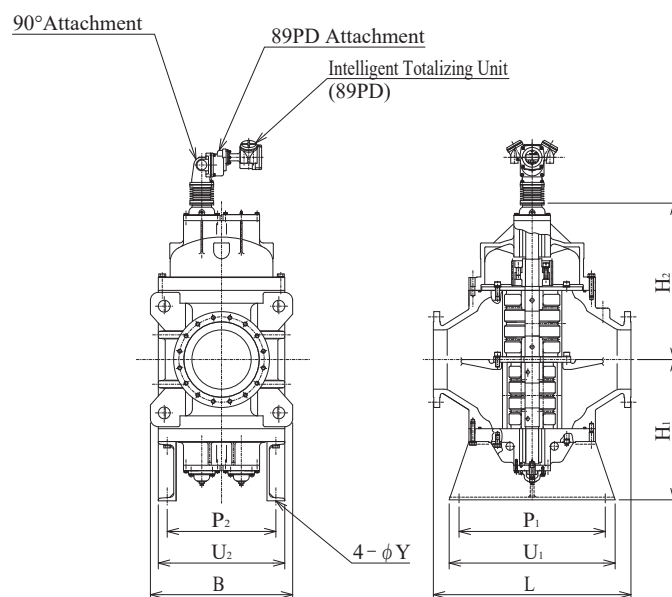
Dimension Drawing (Intelligent Totalizing Unit)

Capacity Model 54~57



Note) With attachment(L)

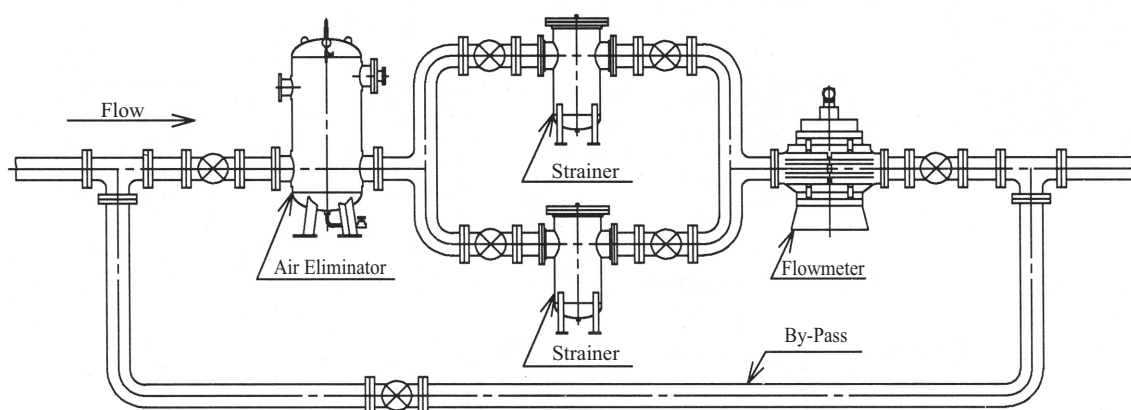
Capacity Model 59~61



Capacity Model	Conn. Size (mm)	Dimensions (mm)									Internal Volume (L)	Approx Weight (kg)
		L	H ₁	H ₂	P ₁	P ₂	φY	B	U ₁	U ₂		
54	150	560	320	348	300	200	24	400	350	270	20	260
57	200	600	385	437	380	240	24	470	420	300	42	430
59	250	850	530	570	540	470	35	600	680	540	82	750
60	300	1000	710	784	740	550	35	720	840	640	160	1500
61	350	1200	790	864	740	550	35	720	840	640	230	1800

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.
- In case fluid contains dust,install strainers in parallel as shown below and use one by turns, or install double strainers.
- Use the air eliminator where air of other gasses are likely to enter the fluid.Avoid using it where the pressure is lower than atmospheric pressure (i.g,suction side of pump.)
- To avoid the accuracy error,do not use the pipes with 2 size bigger/smaller than the flowmeter's connection.



Ordering Instructions

	Item	Contents
1	Applications	Production Control,dealings,receipt and shipment etc.
2	Applicable Fluid Name	Name,Composition,Existence of Admixture and Corrosion
3	Accuracy	± %
4	Flow Rate	Maximum,Nomal,Minimum (time of use for each day) (m³/h)
5	Operating Temperature	Maximum,Nomal,Minimum (°C)
6	Operating Pressure	Maximum,Nomal,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 Piping
10	Applied Regulations	Name of Regulations and Standards
11	Attached Equipment	Necessity of Strainer and Valve,etc.
12	Power Supply	for Pulse Transmitter

*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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