

# GENERAL SPECIFICATIONS

# ELECTRONIC OIL FLOWMETER



GS-F1061E-04



## Overview

ELECTRONIC OIL FLOWMETER is a positivedisplacement type flowmeter widely used exclusively in the measurement of fuel oil for boiler and diesel engine oil etc.

## Features

### •Wide Flow Range and High Accuracy

In case of heavy oil, the accuracy is within 0.5% in the wide measurement range of 1:150.

As standard material at pressurized part is FCD400 which has a 12% or more of elongation being regulated in the steel ship rules, it can be used for vessels.

### •Visible Totalizing Unit

The totalizing counter, reset counter, and momentary flow rate can be switched and displayed. In addition, the display of momentary flow rate can be switched in the hourly and one minute display.

### •Multi-functional Totalizing Unit

Forward and reverse flow detection, self-diagnosis, and worn battery alarm etc are available. Also, display angle can be adjusted over 90° by each upward or downward directions at the step of 15 degrees.

### •Excellent Durability

As the rotors without contact, there is no mechanical wear, and have almost no secular change in a long time operation.

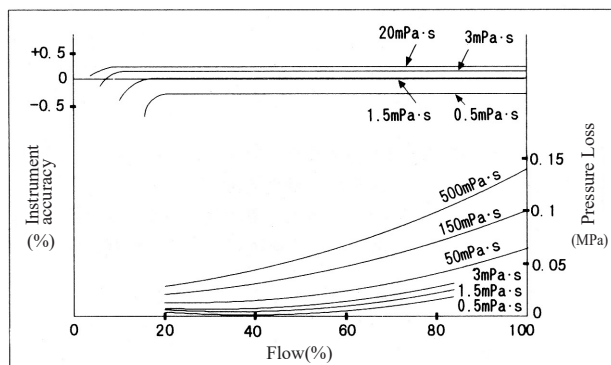
### •Remote Measurement

It sends output pulsation that propotionate to the rotation number of rotor.

## Standard Specification

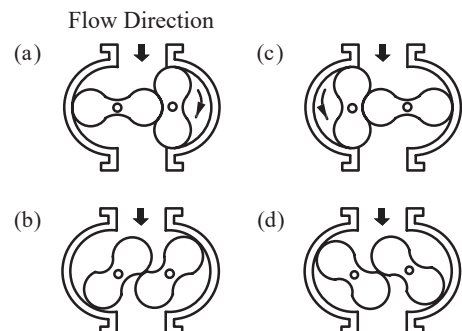
Applicable Fluid	Kerosene, Light oil, Heavy oil, and Lubricant etc.	
Accuracy	±0.5%	
Flow Rate Range	0.07 ~ 160 m <sup>3</sup> /h	
Fluid Temperature	-5 ~ 120°C (Max.50°C in case of roots material AC7A) Max.150°C in case of FC200)	
Max. Working Pressure	Max. 2.5 Mpa	
Fluid Viscosity	Max. 150,000 mPa · s	
Connection Size	25mm(1B)~100mm(4B)	
Flange Rating	FC 250 : JIS 10K FF FCD400 : JIS 10K FF SCPH2 : (JIS 10K, 20K RF ASME · JPI 150, 300 RF)	
Material	Main Body	FC 250 : (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	SUS416 hard chrome plating
	Bearing	C5191, FC, Ball Bearing
	Driving Gear	SUS316
Piping Installation	Horizontal or Vertical Piping	
Paint Color	Munsell 2.5 PB 3.5/10	

## Performance Characteristic



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

## Principle of Operation



## Standard Specification (Totalizing Unit)

Display	Totalizing Counter	8 digits LCD(TOTAL mode)	Indication Part Type 75
	Reset Counter	8 digits LCD(R. COUNT mode)	
	Momentary Flow Rate (L/h)	6 digits LCD(FLOW.Fh mode)	
	Momentary Flow Rate (L/min)	6 digits LCD(FLOW.Fn mode)	
Function	Forward or Reverse Flow Detection	Integration display of forward and reverse flow by addition and subtraction Note)1	
	Alarm	Capacity upper and lower limits	
	Battery Wear Alarm	"BATT" is turned on when the battery is worn out	
	Self-submission	Pulsation is submitted when Loop Check is carried out (Open collector output pulsation 1 or 8 Hz, and Output pulsation width is same as the Output pulsation width)	
Output Signal	<ul style="list-style-type: none"> <li>■ Open Drain (Allowable current: 50 mA, Max. Voltage: 30V DC)                             <ul style="list-style-type: none"> <li>· Factored Pulse (0.5 ms, 10 ms, 100 ms, 500 ms) or Alarm Output</li> <li>· Unfactored Pulse</li> </ul> </li> <li>■ Analogue output: 4~20mA DC</li> </ul>		Note)2
	Wiring Connection Port	Ground Connector for the vessels: JIS F8801 15c is attached	
	Transmission Distance	1 km	

Power Source	External Power Source	DC 12 to 24V Note)3
	Electric Current Consumption	40 mA
	Lithium Cell Battery	After the manufacturing 10 years (Depends on usage conditions) Note)4
Structure	Drip-proof Structure	
Display Installation Direction	Faced upward at 45 degrees angle(standard) (However, it can be changed to upward or downward at the step of 15 degrees)	
Ambient Temperature	-20 ~ 60°C	
Paint Color	Black (Resin Material Color)	

Note) 1. Indication of totalizing and reset counter is added or subtracted by forward or reverse detection. However, the pulse is not output when the fluids are in the reverse flow. In this case, the pulse for reverse flow is memorized in the microcomputer and when the flow changed to the forward, the reverse flow portion is offset and pulse signal will be sent.

2. With output is signal cable of CWS3 Core Sealed Wire (Core wire: 1.25 mm<sup>2</sup>, Outer diameter: φ11)

3. When with analog output, supply the external power of DC 12 to 24 V

4. In the case of FRL1051 and 1052 type, 10 years of battery life is applicable when it is used at flow rate of 120m<sup>3</sup>/h or less.

## Flow Range (Accuracy: ±0.5%)

### Rotor Material: FC200

Unit : m<sup>3</sup>/h

Connection Size(mm)	Capacity Model	Use Condition	Viscosity (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
		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
		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

Unit : m<sup>3</sup>/h

Connection Size(mm)	Capacity Model	Use Condition	Viscosity (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
		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
		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 a day. Intermittent shows for 8 hours or less. Maximum shows a instantaneous maximum flow.

2. Select the range of the usual flow to become less than 80% of the maximum flow.

## Standard Unit of Totalizing Unit

Capacity Model	Conn.Size (mm)	Max.Flow Rate (m <sup>3</sup> /h)	Totalizing Counter (8 digits L)	Reset Counter (8 digits L)	Momentary Flow Rate (6 digits L/h)	Output Pulse Unit (L/P)
35	25	4	1	1	4000	0.01 , <input type="checkbox"/> 0.1 , 1
38	40	7	1	1	7000	0.1 , <input type="checkbox"/> 1 , 10
41	50	15	1	1	15000	0.1 , <input type="checkbox"/> 1 , 10
45	50/80	40	1	1	40000	0.1 , <input type="checkbox"/> 1 , 10
47	80	55	1	1	55000	0.1 , <input type="checkbox"/> 1 , 10
51	100	130	1	1	130000	0.1 , <input type="checkbox"/> 1 , 10
52	100	160	1	1	160000	0.1 , <input type="checkbox"/> 1 , 10

- Note) 1. To be selected from L, m<sup>3</sup> or kL for the unit of the totalizing/reset counter and /min or /h for the unit of instantaneous flow rate.  
 2. Pulse output: open drain  
 3. 0.1, 1 or 10 L/P can be selected as the output pulse unit (0.01, 0.1 or 1 L/P for the capacity model 35).  
 4. In the frame  shows standard specification

## Flange Rating and Max. Working Pressure

Unit:MPa

Nominal Pressure (MPa)	Material Code	Frang Rating			
		JIS		ASME • JPI	
		10K	20K	150	300
B	AA, AE, DA, DE	1.00	—	—	—
E	NA, NE	1.40	2.50	1.96 *	2.50

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

# Basic Model

1	2	3	4	5	6	7	8	9	10	11	Contents					
F	R	L									ELECTRONIC OIL FLOWMETER					
Conn.Size			B	8							25mm( 1B)					
			0	4								40mm( 1 1/2B)				
			0	5									50mm(2B)			
			0	8									80mm(3B)			
			1	0									100mm(4B)			
									Intermittent Max. Flow Rate(Applicable Connection Size)							
Capacity Model			3	5							4m <sup>3</sup> /h (25mm)					
			3	8								7m <sup>3</sup> /h (25,40mm)Main body of 25mm : SCPH2 only				
			4	1									15m <sup>3</sup> /h (50mm )			
			4	5									40m <sup>3</sup> /h (50,80mm)Main body of 80mm : FC250 only			
			4	7									55m <sup>3</sup> /h (80mm)			
			5	1									130m <sup>3</sup> /h (100mm)			
			5	2							160m <sup>3</sup> /h (100mm)Non-fluctuation Type					
Max.Working Pressure									Max.Working Pressure Hydraulic Test Pressure MPa		Hydraulic Test Pressure MPa		Applicable Flange Rating			
									1.0		2.0		10K			
									2.5		5.0		10K, 20K			
Material									Main Body		Rotors		Applied Pressure		Fluid Temperature	
									FC250		FC		Pressure Code B (1.0 MPa)		0 ~ 120 °C	
									FC250		AC or ADC				0 ~ 50 °C	
									FCD400		FC		Pressure Code E (2.5 MPa)		0 ~ 120 °C	
									FCD400		AC or ADC				0 ~ 50 °C	
									SCPH2		FC		Pressure Code E (2.5 MPa)		-5 ~ 120 °C	
						SCPH2		AC or ADC		-5 ~ 50 °C						
											—					

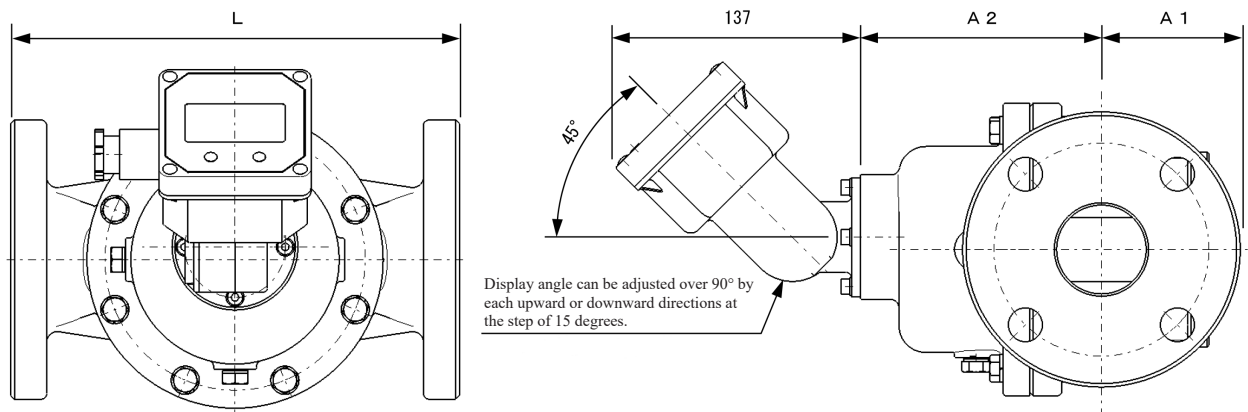
	12	13	14	15	16	17	Contents	
Totalizing Unit (Drip-proof Type)	7	5					Totalizing Counter, Reset Counter, Momentary Flow Rate	
Output Signal			P	A			Non-contact Pulse Output + Analogue Output	
			P	X			Non-contact Pulse Output	
			X	A			Analogue Output	
			X	X			Without Output Signal	
						—		
Attachment						X	Without Attachment (Fluid Temperature 120°C or Less)	

1	2	3	4	5	6	7	8	9	10	11	Contents			
F	R	Y									ELECTRONIC OIL FLOWMETER (For High Temperature)			
Conn.Size			0	4							40mm( 1 1/2B)			
			0	5								50mm(2B)		
									Intermittent Max. Flow Rate (Applicable Connection Size)					
Capacity Model			3	8							7m <sup>3</sup> /h (40mm)			
			4	1								15m <sup>3</sup> /h (50mm )		
Max.Working Pressure									Max.Working Pressure Hydraulic Test Pressure		Hydraulic Test Pressure		Applicable Flange Rating	
											1.0 MPa		2.0 MPa	
Material									Main Body		Rotors			
									FCD400		FC			
											—			

	12	13	14	15	16	17	Contents	
Totalizing Unit (Drip-proof Type)	7	5					Totalizing Counter, Reset Counter, Momentary Flow Rate	
Output Signal			P	A			Non-contact Pulse Output + Analogue Output	
			P	X			Non-contact Pulse Output	
			X	A			Analogue Output	
			X	X			Without Output Signal	
						—		
Attachment						S	With Heat Radiation Fin (Fluid Temperature ~150°C)	

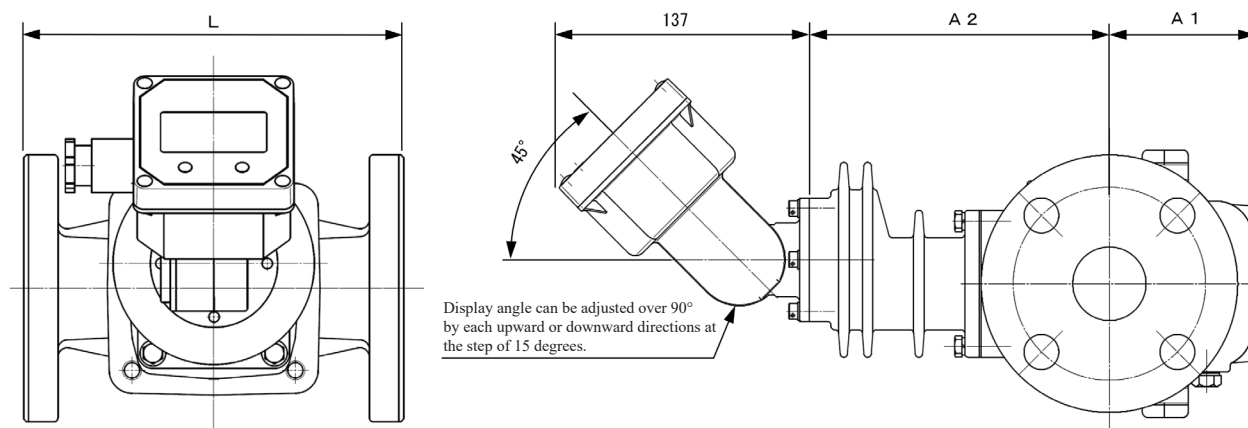
# Dimension Drawing

## FRL Type



Conn.Size (mm)	Capacity Model	Main Body Material	Dimensions (mm)			Approx. Weight (kg)
			L	A1	A2	
25	35	FC250, FCD400 SCPH2	200	35	106	11
40	38	FC250, FCD400 SCPH2	200	45	116	13
50	41	FC250, FCD400 SCPH2	250	60	135	15.5
50	45	FC250	320	89	163	42
		SCPH2	360			
80	45	FC250	300	89	163	42
80	47	FC250	320	119	193	45
		SCPH2	360			
100	51	FC250, SCPH2	450	180	273	100
100	52	FC250, SCPH2	450	206	273	100

## FRY Type (with the attachment)

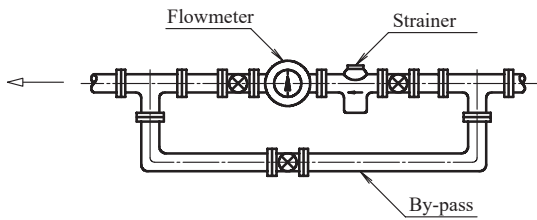


Conn.Size (mm)	Capacity Model	Dimensions (mm)			Approx. Weight (kg)
		L	A1	A2	
40	38	200	81	164	16.5
50	41	250	109	184	18.5

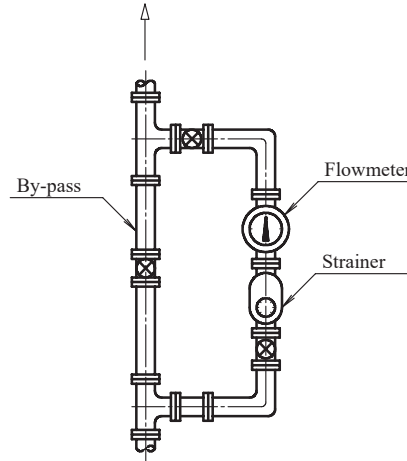
## ⚠ Caution for Flowmeter Piping Installation

- 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.
- After the worn battery warning, spare battery can be used for approx. 0.5 year. However, replace the battery as early as possible. If the batteries are worn out completely the totalized value will be cleared to Zero.

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)
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	Applied Regulations	Name of Regulation 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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