

COMPACT ELECTROMAGNETIC FLOWMETER (COMPACT FLOW)

DATA SHEET

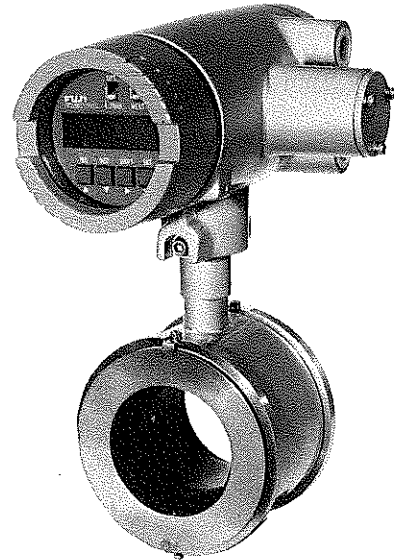
FMK

The electromagnetic flowmeter is an instrument to measure the volumetric flow rate of liquid simply by applying a magnetic field from the outside utilizing the fact that an electric conductor which crosses a magnetic field at a certain velocity causes voltage to be induced in proportion to the velocity, which is known as Faraday's law.

Using the latest electronics technologies, this flowmeter is a compact and light-weight device in which the detector and transmitter are combined. It is completely different in image from conventional electromagnetic flowmeters. The flowmeter has its own built-in micro-computer to provide a self-diagnosis function as well as easy handling and a high cost-performance.

FEATURES

- 1. Compact wafer-type flowmeter in which detector and transmitter are combined**
The compact and light-weight design allows the piping work to be accomplished with the ease of installing an orifice and permits easy centering of pipe.
- 2. Easy external wiring**
No special cables are required for wiring. The flowmeter can be wired almost in the same way as pressure or differential pressure transmitters.
- 3. Simple adjustment**
Measuring ranges can easily be changed by manipulating key switches.
- 4. Self-diagnosis function**
Various kinds of self-diagnoses can be achieved by the built-in micro-computer.
- 5. High reliability**
The detector casing is fully welded and the electrode unit is double sealed. The transmitter and external terminals are sealed separately.
- 6. Field indicator with digital display (option)**
The indicator can be installed horizontally or vertically (non-explosion-proof type only).
- 7. Explosion-proof**
Safety barrier is self-contained.
- 8. The transmitter orientation is changeable.**



SPECIFICATIONS

- Measured fluid:** Industrial water, service water, dainage, sludge, chemical liquid slurry and other liquids with more than $5\mu\text{S}/\text{cm}$ of conductivity
- Measuring range and accuracy:**
Fluid velocity 0 to 1 . . . 10m/s: $\pm 0.5\%$ FS
Fluid velocity 0 to 0.3 . . . 1m/s less: $\pm 1\%$ FS
- Output signal:** 4 to 20mA DC
- Allowable load resistance:**
0 to 600Ω
- Meter size:** 2.5A, 6A, 15A, 25A, 50A, 80A, 100A, 150A, 200A
- Measuring range:** 0 to 0.3 . . . 10m/s

Materials of main parts:

Detector material	Measuring tube	Teflon lining
	Electrode	Platinum, iridium, SUS316L
	Grounding	Tantalum, SUS316, Hastelloy C
Electronics housing material		Aluminum alloy

Process fluid pressure range:

-0.1 to 2MPa (-1 to 20kgf/cm²)

Process fluid temperature range:

-10 to 120°C Note: Refer to Figs. 1 and 2.

Enclosure:

Conforms with JIS C 0920 immersion-proof and JIS C 0903 flameproof ids2G4 (excluding meter size 2.5A and 200A)

Functions

(Flowmeter with field indicator and setting unit)

Field-indicator:

LCD 6-digit display
Display of instantaneous flow rate (0 to 100% or actual scale), symbols of setting items and setting value, and symbols of self-diagnostic items

Setting items:

Setting is effected by manipulating toggle switch and key switches.
Output calibration (0%, 100%)
Fluid velocity full scale setting range: 0.3 to 10m/s
Damping constant: 1 to 51 sec
Output low cutoff: 0 to 10%FS
Fluid noise cutoff: 0 to 10%FS
Interchangeability constants of detector and converter

Self-diagnosis:

- (Following items are displayed)
- Micro-computer abnormal(*)
- RAM backup battery abnormal
- Current output D/A converter abnormal
- Input overflow (120%FS or more)
- Input underflow (-20%FS or less)

Note: * Abnormal micro-computer is normalized by auto reset.
(No display of abnormality)

Built-in arrester (option):

For power source and current output

Excitation system:

Low frequency excitation

Mounting method:

Insert a meter body between adjacent pipe flanges, or mounted on the flange with flange short pipe

Conduit connection:

JIS G 1/2 (Terminals: M4 screw)

Power consumption:

Approx. 10VA

Power source : 100, 115, 220V (±10%) AC, 50/60Hz (±2Hz)

Ambient temperature:

-20 to +60°C

Ambient humidity:

95%RH or less

Finish color:

Silver (housing cover: blue)

Mass and external dimensions:

See "Outline diagram"

OTHER OPTIONAL SPECIFICATIONS

(non-standard; contact Fuji for details)

- Non-fluid detecting function
- 24V DC power supply (when using exclusive inverter)

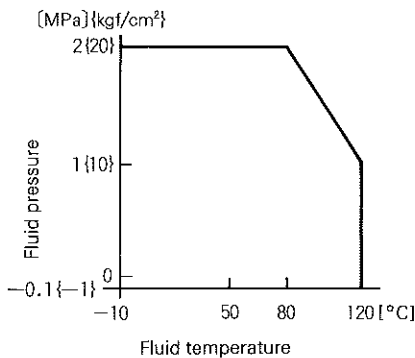


Fig. 1 Fluid temperature vs allowable fluid pressure

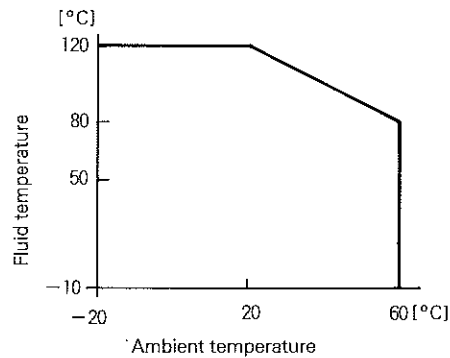


Fig. 2 Ambient temperature vs allowable fluid temperature

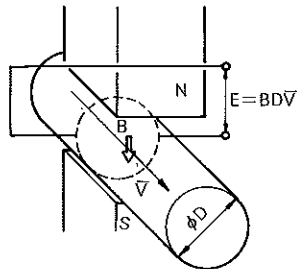
OPERATING PRINCIPLE

The flowmeter is designed utilizing Faraday's law that "when a electric conductor moves in a magnetic field, an electromotive force proportional to the velocity is generated in the electric conductor"

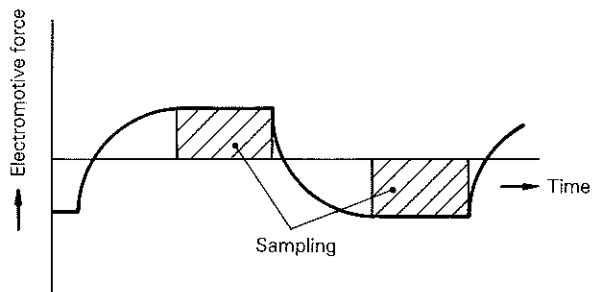
Suppose that there is a magnetic field with magnetic flux density "B" in a pipe of inside diameter "D" and a pair of electrodes are placed at right angles to the pipe, and that the mean fluid velocity is " \bar{V} ", then an electromotive force "E" is induced between the electrodes.

$$E = B \cdot D \cdot \bar{V}$$

This flowmeter uses a low-frequency rectangular wave exciting system to provide excellent zero point stability and minimum power consumption, thereby allowing an electromotive force to be detected under stabilized condition.



Operating principle



CODE SYMBOLS

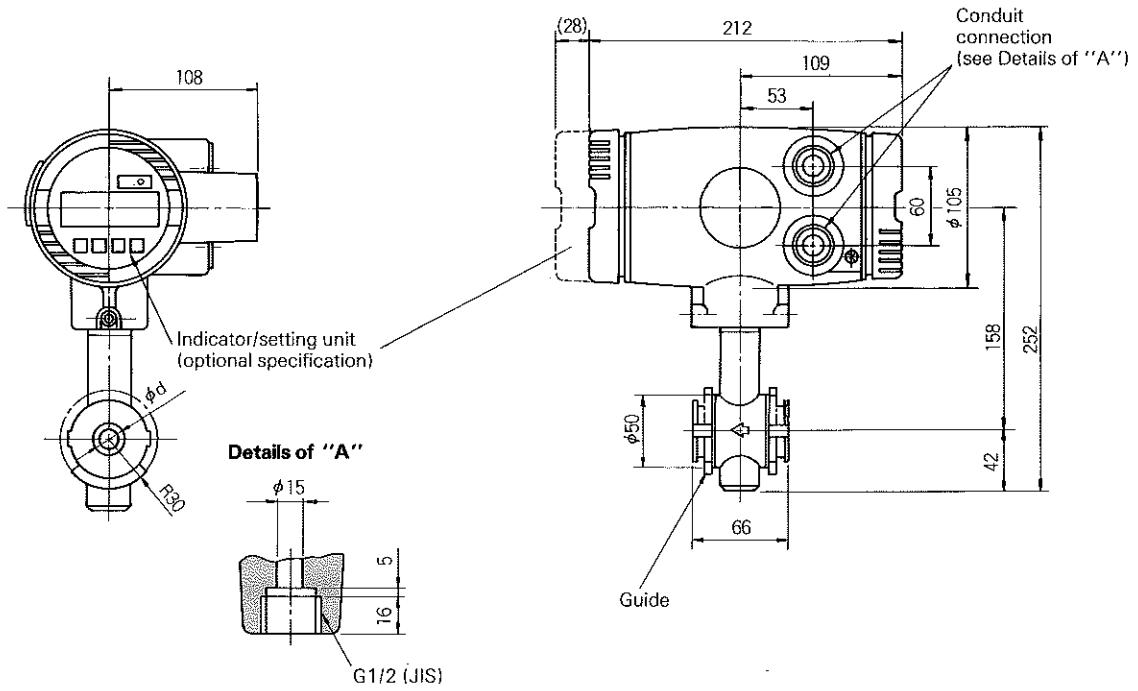
< Lining type >

1	2	3	4	5	6	7	8	9	10	11	12	13	Description
FMK				P	1								Flange
				0									Non (flange insertion type)
				2									With flange short pipe. Corresponds to JIS 10KRF.
				3									With flange short pipe. Corresponds to JIS 75M water service standard normal pressure. (unusable with "S", "A", "C", "D" and "E" in 5th digit of code)
				S									Meter size [mm]
				A									2.5A
				C									6A
				D									15A
				E									25A
				F									50A
				G									80A
				H									100A
				J									150A
													200A
				P									Meter liner
													Teflon (PFA mold)
				T									Ground ring
				H									Tantalum
				W									Hastelloy C
													316 stainless steel
													Guide (**)
													1 For JIS 10K flanges
													2 For JIS 20K flanges
													7 For JIS 75M flanges (unusable with "S", "A", "C", "D", and "E" in 5th digit)
													Material of electrode
													P Platinum-Iridium
													W 316L stainless steel
													Output signal and field indicator/setting unit
													A 4 to 20mA DC/without field indicator/setting unit
													B 4 to 20mA DC/with field indicator/setting unit
													Power source and arrester
													A 100V AC 50Hz Without arrester
													B / 60Hz /
													C / 50Hz With arrester
													D / 60Hz /
													E 115V AC 50Hz Without arrester
													F / 60Hz /
													G / 50Hz With arrester
													H / 60Hz /
													J 220V AC 50Hz Without arrester
													K / 60Hz /
													L / 50Hz With arrester
													M / 60Hz /
													Structure
													1 Non-explosionproof, waterproof case
													3 Flameproof (conduit screw coupling) } Unusable with "S" and "J" in 5th digit
													4 Flameproof (packing)

Note: * Tantalum is not standard.
 ** Guide rings to fit with ANSI(150LB or 300LB), DIN(PN16 or PN40), or BS(PN16, PN40) flanges are also available. Contact Fuji.

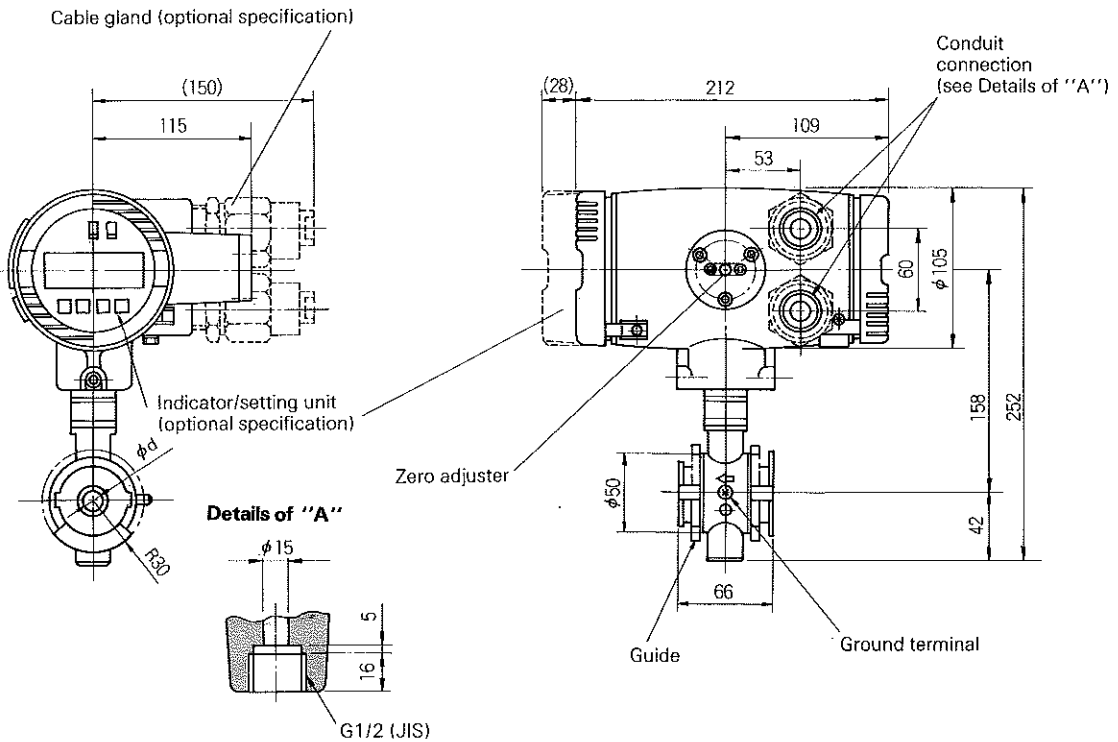
OUTLINE DIAGRAM (Unit:mm)

< Lining type >



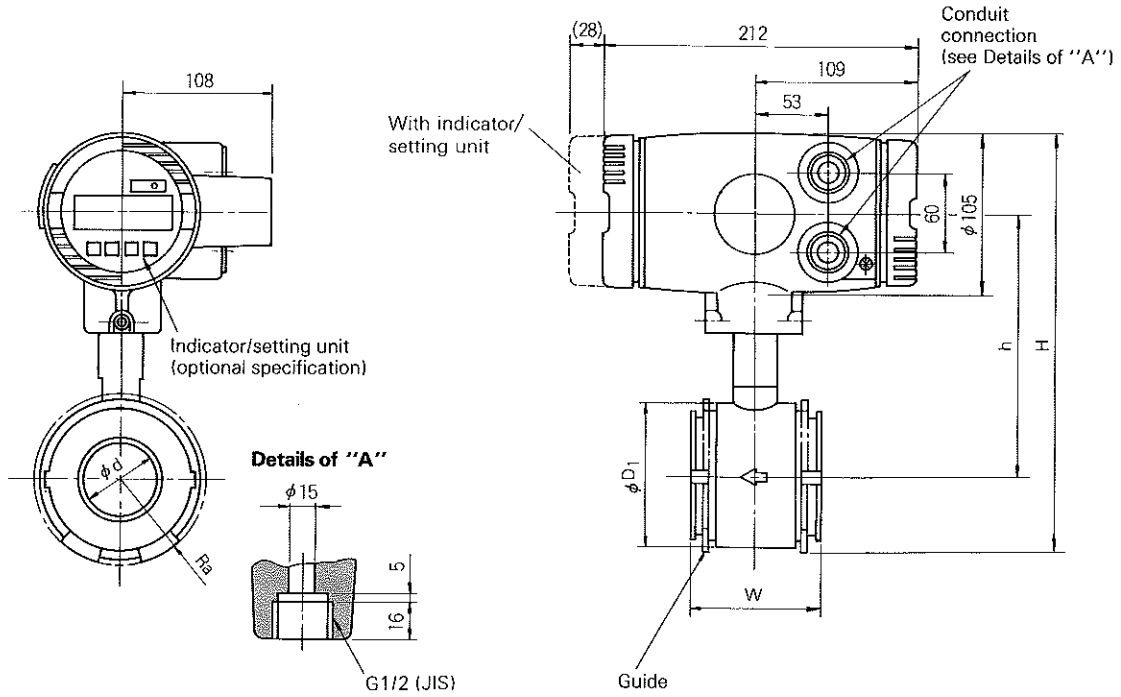
Meter size	ød	Mass [kg]
2.5A	2.5	4.0
6A	6	4.5
15A	12	4.5

Non-explosionproof type



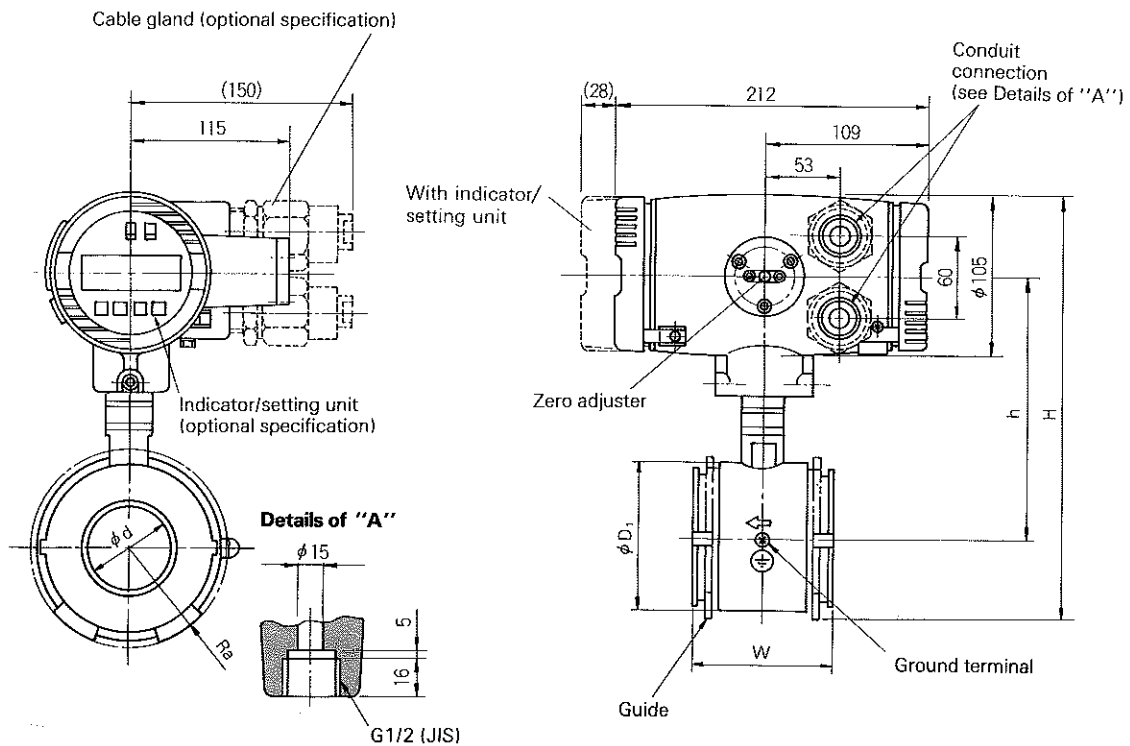
Meter size	ød	Mass [kg]
6A	6	4.5
15A	12	4.5

Explosionproof type



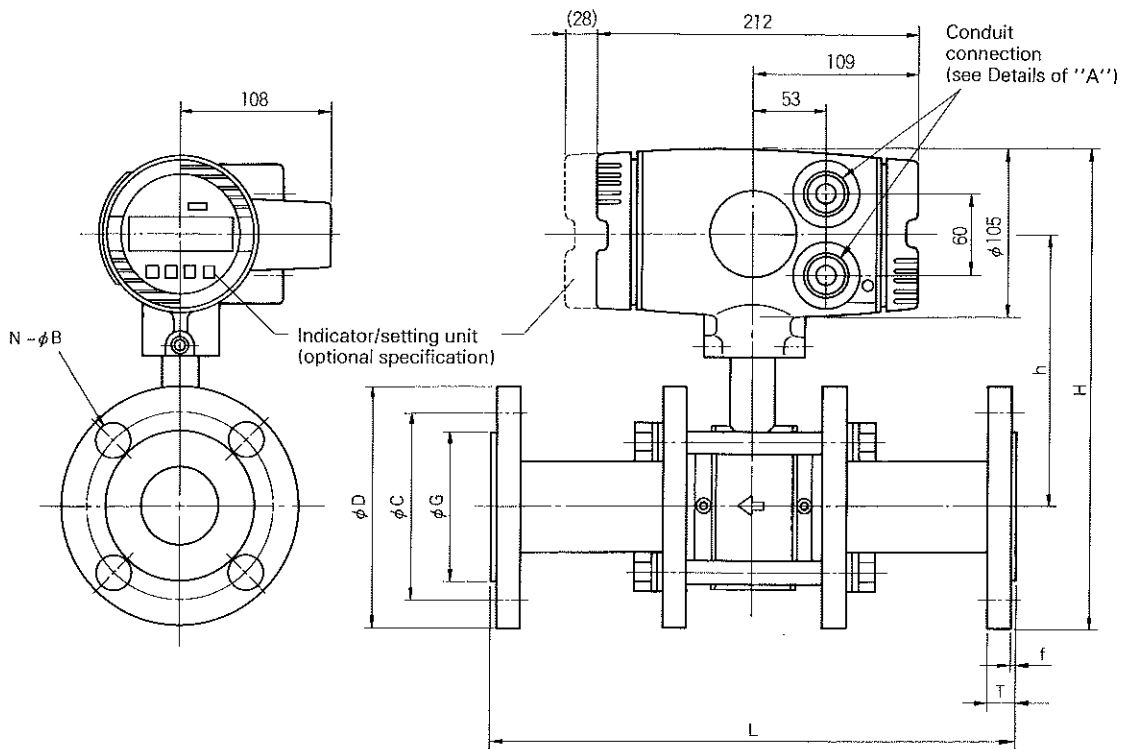
Meter size	W	ød	øD ₁	h	H	Guide Ra			Mass (kg)
						JIS10K	JIS20K	JIS75M	
25A	65	21	70	169	257	38	38	-	4.5
50A	80	48	96	182	283	53	53	-	5.5
80A	100	76	128	198	315	68	71	77	6
100A	120	100	156	212	343	81	84	91	8.5
150A	165	150	206	237	393	111	120	117	12
200A	200	200	265	267	451	136	142	142	20

Non-explosionproof type



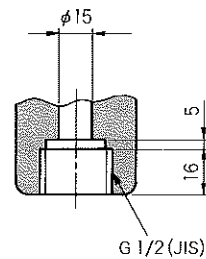
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80A	100	76	128	198	315	68	71	77	6
100A	120	100	156	212	343	81	84	91	8.5
150A	165	150	206	237	393	111	120	117	12

Explosionproof type



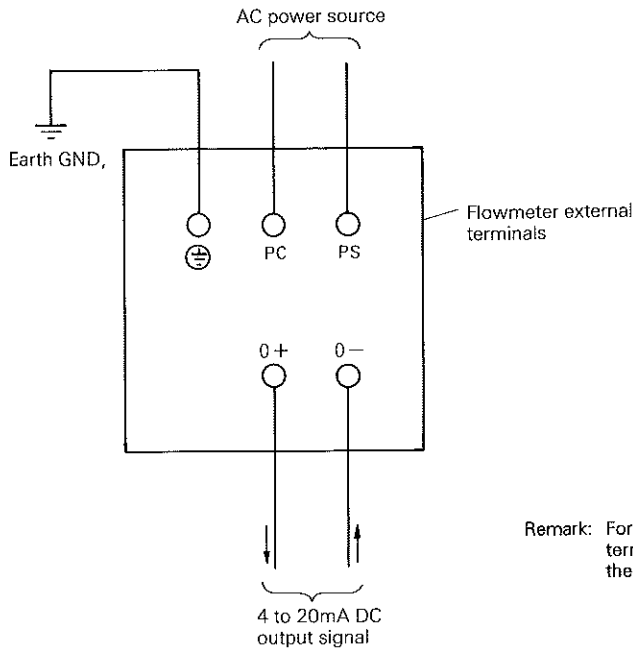
Meter size	2.5A	6A	15A	25A	50A	80A	100A	150A	200A	
L	300	300	300	300	330	380	380	507	507	
h	158	158	168	168	181	197	211	236	266	
For JIS 10K flange	ϕD	95	95	95	125	155	185	210	280	330
	ϕC	70	70	70	90	120	150	175	240	290
	N- ϕB	4-15	4-15	4-15	4-19	4-19	8-19	8-19	8-23	12-23
	T	12	12	12	14	16	18	18	22	22
	f	1	1	1	1	2	2	2	2	2
	ϕG	51	51	51	67	96	126	151	212	262
	H	258	258	258	283	311	342	368	428	483
Mass[kg]	7.5	7.5	8.0	11.0	16.0	22.5	28.0	52.0	73.0	
For JIS 75M flange	ϕD						211	238	290	342
	C						168	195	247	299
	N- ϕB						4-19	4-19	6-19	8-19
	T						18	18	22	24
	f						2	2	2	2
	ϕG						125	152	204	256
	H						355	382	433	489
Mass[kg]						25.0	30.5	53.5	77.0	

Details of "A"



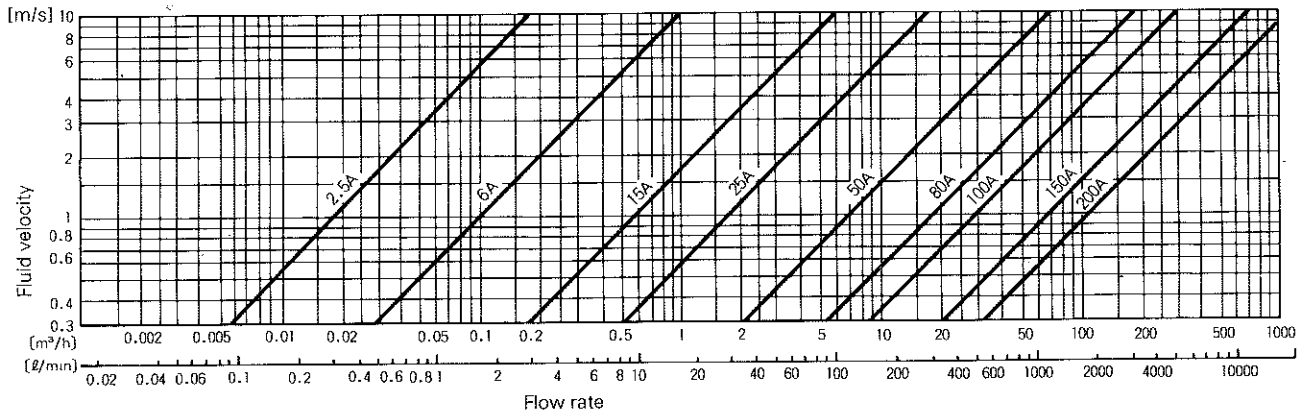
With flange short pipe, non-explosionproof type

CONNECTION DIAGRAMS



Remark: For explosionproof type flowmeter, individual ground terminals should be connected to the detector and the transmitter.

FLOW RATE vs. FLUID VELOCITY CONVERSION DIAGRAM



SCOPE OF DELIVERY

Flowmeter (without mounting bolts and gaskets).

Fuji Electric Co.,Ltd.

Head office
 12-1 Yurakucho 1-chome, Chiyoda-ku, Tokyo, 100 Japan
 Phone: Tokyo 3211-7111
 Telex: J22331 FUJIELEA or FUJIELEB

Instrumentation System Div.
 No.1, Fuji-machi, Hino-city, Tokyo 191 Japan
 Phone: 0425-85-2800
 Fax: 0425-85-2810