



Battery-powered Clamp-on Type Ultrasonic Flowmeter for Liquid UC-1

GENERAL SPECIFICATION
GS.No.GBM009E-1

■ GENERAL

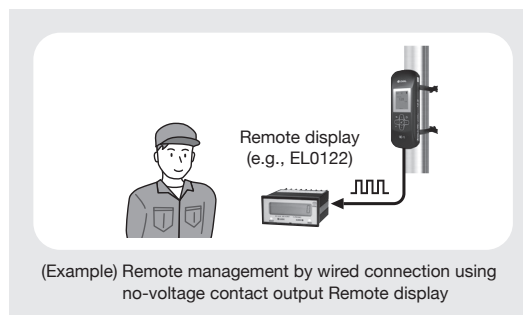
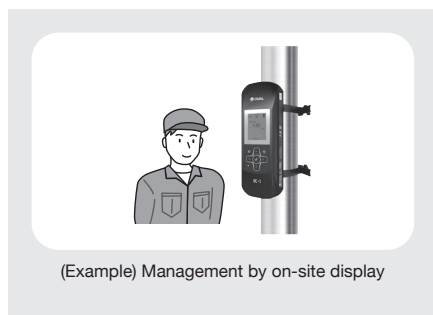
This flowmeter is a clamp-on type ultrasonic flowmeter for liquid developed based on the concept of “completely construction-free.” This flowmeter is ideal for expanding the measurement range of utility and energy fluids (water, hot water, etc.) in factories and commercial facilities because it can measure flow rates easily and conveniently. It is expected to contribute to the promotion of energy saving and decarbonization by visualizing flow rates in every nook and corner of branch pipes where it has been difficult to install flowmeters in the past due to cost, construction period and other factors.



■ FEATURES

- (1) The clamp-on type flowmeter attached from the outside of a pipe required no piping work. In addition, no bypass piping for maintenance is required.
- (2) From small to large diameters, one model can measure eight different pipe diameters (nominal sizes: 25A to 100A). It is also economical to prepare spare parts because it is not necessary to have different models to measure each diameter.
- (3) No tools such as screwdrivers are required when installing the flowmeter (the flowmeter can be fixed to a pipe using two accompanying bands with hand-tightened screws).
- (4) No external power supply equipment or power supply installation work is required because the built-in battery enables continuous operation for about ten years.

■ USAGE EXAMPLES



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■ GENERAL SPECIFICATIONS

Item		Description	
Structure		Converter and sensor integrated, sensor slide lock structure	
Dry couplant		No need to apply grease (ultrasonic propagation medium) to the sensor	
Piping ^{*1}	Nominal size	25A to 100A (8 diameters can be measured with one model)	
	Type	Metal pipes (SUS, SGP, etc. under Sch40) and resin pipes (PVC, etc.) in accordance with JIS/ASME standards	
	Lining	None, or polyethylene, vinyl chloride, etc.	
	Straight pipe length	Refer to JEMIS032-2019	
Metering objects	Type ^{*1}	Liquids in general (cold water, hot water, oils, etc.)	
	Temperature range (Pipe surface temperature)	-20 to +85°C (with derating for operating ambient temperature ^{*5})	
Metering system		Ultrasonic wave propagation time difference system	
Number of measurement paths		1 measurement path	
Metering cycle		1s	
Metering accuracy ^{*2,3}		±3.0% of RD (10 to 100% of max. flow rate), ±0.3% of FS (0.3 to 10% of max. flow rate)	
Repeatability ^{*2}		±1.0% of RD	
Output Select from 2 types	None (UC1-MBN)	No external output	
	No-voltage contact output (UC1-MBC)	NPN open collector	
		Applied voltage and current	Max. voltage: 26.4VDC, Max. current: 0.25A, ON resistance: 1.7Ω or less
		Number of channels	3 channels
		Functions (Set optionally from the functions listed on the right)	(1) Normally open, (2) Normally closed, (3) Alarm (output when any of 4 to 10 occurs), (4) Upper limit alarm, (5) Lower limit alarm, (6) Battery voltage reduction, (7) No echo received, (8) Reverse flow, (9) Max. flow rate exceeded, (10) Accumulated pulse output disabled, (11) Error, (12) Accumulated pulse output
		Accumulated pulse output setting ^{*5}	Pulse width: 10 to 100ms... Default value: 10 ms Total Pulse Rate: 0.01 to 100(m³/PLS, L/PLS) ... Default value: 100m³/PLS
Display	Display	Graphic liquid crystal (reflective liquid crystal), Resolution: 240×320	
	Menu operation	Flowmeter parameters and operation can be set with the up, down, right, left, enter and back keys.	
	Measured values	Measured value display can be set manually in four directions.	
		Instantaneous flow rate	Max. 4 digits (decimal point position is automatically determined by pipe diameter and unit)
		Accumulated flow rate	Pipe inner diameter: 56.05 mm or less...6 digits in integer part and 2 digits in decimal part
			Pipe inner diameter: over 56.05 mm...7 digits in integer part and 1 digit in decimal part
		L, and others	8 digits in integer part
		Conversion to money amount	Flow rate is converted to an arbitrary money amount and displayed (default setting: function OFF) Unit: 3-digit alphabetic characters 6 digits in integer part (value obtained by multiplying an arbitrary coefficient by the accumulated flow rate)
	Measurement screen update cycle (during energy saving mode) ^{*6}	None	Set from the following
		No-voltage contact output	2s, 10s, 1min, 5min, 10min (initial value: 2s)
Other functions	LED	Red × 1 point (flashes when alarm occurs, and lights up when error occurs)	
	Flow direction setting	The direction of forward flow can be set as desired	
	Reverse flow detection	When a reverse flow occurs, a negative flow rate and an alarm are displayed and output	
	Disturbance detection	When a large amount of air bubbles or other measurement obstacles are detected in the fluid, an alarm is displayed and output	
	Battery low notification	When the battery level is low, an alarm is displayed and output	
	Password	Parameters can be protected by setting an arbitrary password (four digits)	
	Energy saving mode	If the switch is not operated for a certain period of time, it will switch to energy saving mode Wait time can be selected from 30 seconds, 60 seconds, or 120 seconds (default: 30 seconds)	
	USB communication	For maintenance	
	Self-diagnosis	An error is displayed when a fault is detected	
	Simulation Mode	Simulated flow rate output is possible by specifying an arbitrary percentage flow rate value	
Operating ambient temperature		-20°C to +60°C (key operation below 0°C is not covered by operation guarantee)	
Operating ambient humidity		90% or less (however, no condensation inside the housing)	
Protection class		IP65 (available for outdoor use, but direct sunlight must be avoided)	
Explosionproof		Non-explosionproof	
Power supply		Dedicated battery (manganese dioxide lithium primary battery)	
		Battery life: Approx. 10 years ^{*7} (when measuring in stationary position, in energy saving mode, and at an average ambient temperature of 25°C)	
Materials	Housing	Polycarbonate and glass filler (20%)	
	Resin band, Hand-tightened screw	Polyamide (PA66)	
Approx. Weight		No output: Approx. 450g, No-voltage contact output: Approx. 460g	
Accessories	Resin band ^{*8}	25A to 50A: 2 pieces 50A to 100A: 2 pieces	
	Hand-tightened screw	4 pieces	
	M8 Output Cable (2m ^{*9})	1 piece (No-voltage contact output type only)	

*1: Homogenous liquid through which ultrasonic waves propagate and which does not contain a large amount of air bubbles (Measurement may not be possible depending on the piping material or diameter, or sound velocity of the liquid)

*2: Guaranteed values based on our inspection environment

Errors may occur depending on the type and condition of the customer's piping, type of fluid, fluid temperature, etc.

*3: For no-voltage contact output type, accuracy when electrical noise is applied to the cable (under EN IEC 61000-4-6 environment of EN IEC 61326-1) is as follows.
Measurement accuracy under the above conditions

*4: Refer to the right for temperature derating specifications.

*5: When using accumulated pulse output with non-voltage contact output type, please refer to the following notes and set it.

① The integrated pulse output cannot be used for frequency/analog signal conversion (the signal is for integration only and will be output at an uneven speed).

② If the expected battery life is 10 years, the power consumption must be set to satisfy the following formula:

[Formula] Number of pulses output per second (Average) × Pulse Width [ms] × 2 ≤ 10 [ms]

(Example calculation) Average flow rate: 15m³/h, Pulse Rate: 0.1m³/P, Pulse Width: 100ms

$$\frac{15[\text{m}^3/\text{h}]}{0.1[\text{m}^3/\text{P}] \times 3600} \times 100[\text{ms}] \times 2 \div 8.3[\text{ms}] \leq 10[\text{ms}]$$

③ Even if you do not use the low power consumption setting, the pulse weight and pulse width must be set to satisfy the following formula.

[Formula] Number of pulses output per second (Average) × Pulse Width [ms] × 2 ≤ 500 [ms]

*6: When key operation is performed, update is performed every 1 second regardless of output specifications

If no key operation is performed for a certain period of time, the flowmeter automatically shifts to the energy saving mode

*7: Battery life varies depending on the operating conditions. (the above is not a guaranteed value)

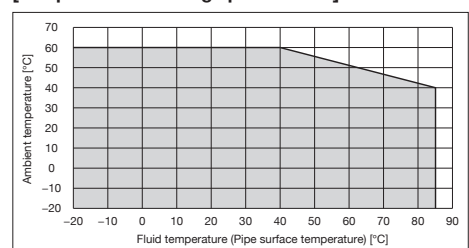
*8: If you want to avoid using resin bands, we recommend using commercially available metal hose bands.

*9: If you wish to extend the output cable, please limit the length to a maximum of 30m.

*10: When installing the unit at high altitudes, we recommend using a strap to prevent it from falling.

(Note) This product cannot be used in explosionproof areas. In addition, it cannot be used for "transaction and certification" purposes.

[Temperature derating specification]



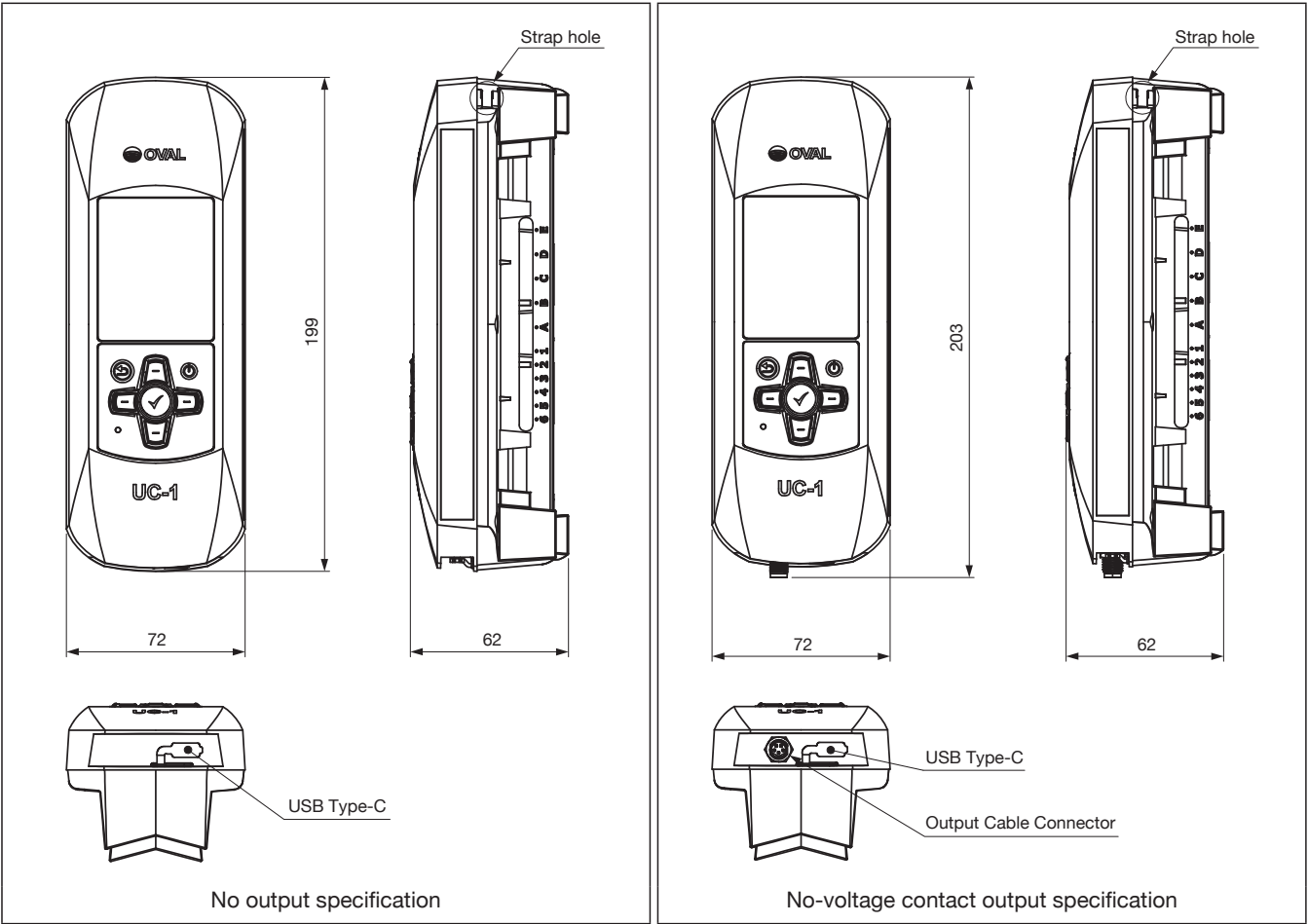
■ FLOW RANGE

Reference flow speed: 0.03 to 10 m/s

Supported diameter		Flow range	
Nominal size A	Nominal size B	Min. flow rate * [m³/h]	Max. flow rate * [m³/h]
25A	1B	0.07	22.80
32A	1 1/4B	0.12	38.92
40A	1 1/2B	0.16	52.28
50A	2B	0.26	85.22
65A	2 1/2B	0.42	139.73
80A	3B	0.59	195.25
90A	3 1/2B	0.78	258.41
100A	4B	0.99	331.63

※ The above flow ranges are reference values for Sch10S size according to JIS G 3459: Stainless Steel Pipes.
The actual flow range varies depending on the inner diameter of the pipe used.

■ OUTLINE DIMENSIONS (Unit: mm)



[Accompanying band and hand-tightened screw]

The illustrations show a black resin band with a buckle, a metal hand-tightened screw, and a circular diagram of the band's cross-section. The diagram labels 'A' as the diameter, 'B' as the width, and 'C' as the thickness.

Type	A: Minimum diameter	A: Maximum diameter	B: Width	C: Thickness
For 25A to 50A	25	75	12.7	3.25
For 50A to 100A	50	125	12.7	3.25

Unit: mm

※ If you want to avoid using resin bands, we recommend that you use commercially available metal hose bands.

■ DISPLAY AND CONTROLS

Sensor position

Flow direction setting

Battery status

Measurement obstruction detection

Alarm/error

A-1

Flow

ECO

Flowrate

1.234

L/s

Measurement screen

Back

Power

Up, down, right, left

LED lamp

Enter

Controls

[Icon description]

Battery status	With remaining battery		Alarm	Upper limit alarm		Hi-Limit	
	Energy saving			Lower limit alarm		Lo-Limit	
	Low remaining battery			No echo received		No Echo	
	No remaining battery			Reverse flow detected		Reverse Flow	
	USB power supply (maintenance)			Max. flow rate exceeded		F.S. Over	
				Max. pulse frequency exceeded		PLS Over	
			Error	Equipment failure		Error	

■ WIRING SPECIFICATIONS

For no-voltage contact output specifications, the attached output cable is wired as follows:

4

2

3

1

5

M8×1.0

2000±50

34.0 (ref)

φ10.5

φ5.2±0.2

Output Cable

2

4

1

3

5

Flowmeter

No.	CH Name	Color	Output setting (Initial Value)
1	CH1	Brown	Total PLS (+)
2	GND	White	COM GND (–)
3	CH3	Blue	N/O (+)
4	GND	Black	COM GND (–)
5	CH2	Gray	Alarmv

※ Cable specifications: 5-pin, 24AWG/0.25mm², shielded, finished outer diameter5.2±0.2mm

※ Signal logic: NPN open collector (Max.26.4VDC, 0.25A, ON resistance: 1.7Ω or less)

※ Assignable signal types:

(1) Normally open

(2) Normally closed

(3) Alarm

(4) Upper limit alarm

(5) Lower limit alarm

(6) Battery voltage reduction

(7) No echo received

(8) Reverse flow

(9) Maximum flow rate exceeded

(10) Accumulated pulse output disabled

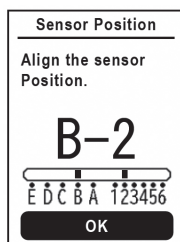
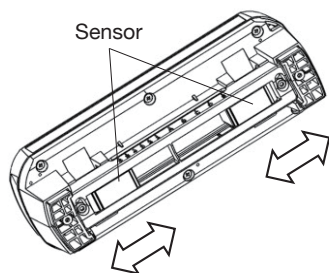
(11) Error

(12) Accumulated pulse output

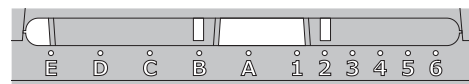
■ HOW TO ATTACH TO PIPE

- ① Set piping information, fluid to be measured, flow direction, etc. on the screen.

Adjust the sensor position according to the instructions on the sensor position confirmation screen.



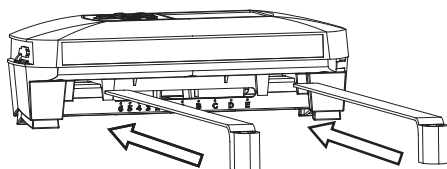
[Sensor position confirmation screen]



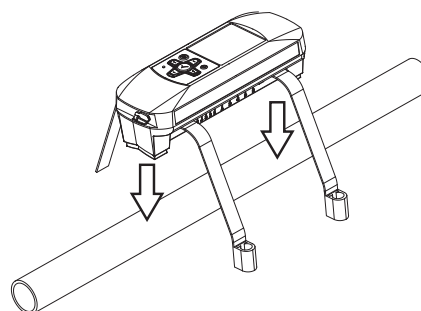
(Example) B-2

[Sensor slide lock position]

- ② Pass the bands through the through holes of the main body.



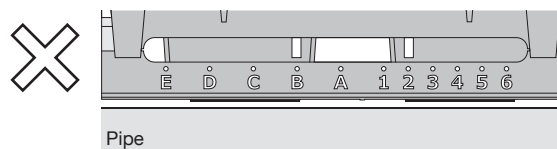
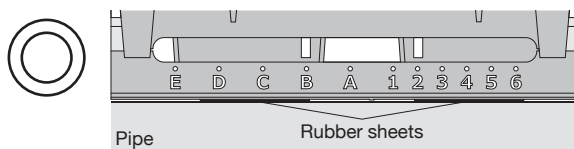
- ③ Wrap the bands around the pipe and tighten the hand-tightened screws.



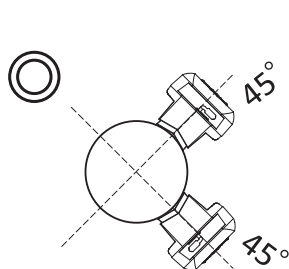
(※1) Be careful not to overtighten as this may damage the bands. As long as the rubber sheet and pipe are in close contact, measurements are possible so there is no need to overtighten.

(※2) When using commercially available hose clamps, please refer to the recommended torque.

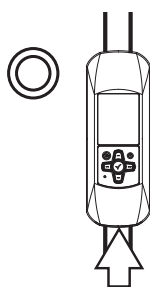
(※3) Check from the side of the flowmeter body that the rubber sheet and the piping are in close contact.



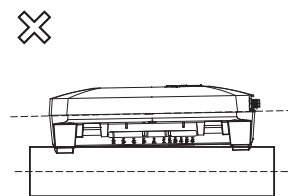
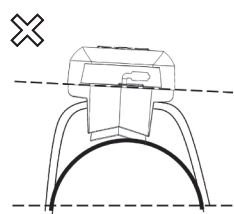
● Precautions when attaching to pipe



Recommended attachment position on horizontal pipe



Flow direction for vertical pipe



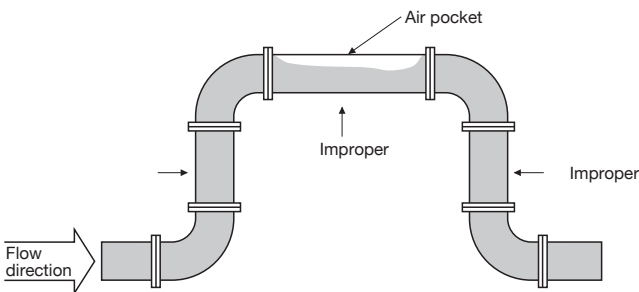
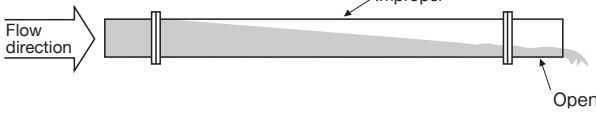
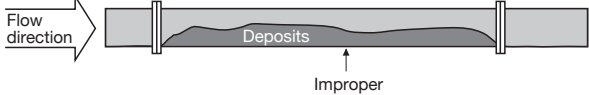
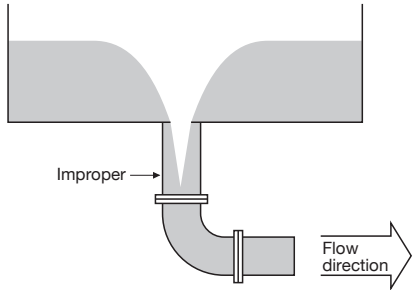
Misalignment when attaching

- (1) When attaching this product to a horizontal pipe, attach it at a 45-degree position, avoiding a position directly above or below the pipe, to avoid the influence of air bubbles or precipitates.
- (2) When attaching this product to a vertical pipe, attach it so that a fluid flows from bottom to top.
- (3) Since the performance of ultrasonic flowmeter depends on the accuracy of the attachment, be careful of misalignment when attaching it.

● Precautions for installation location

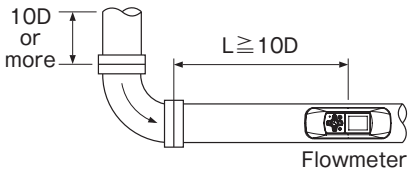
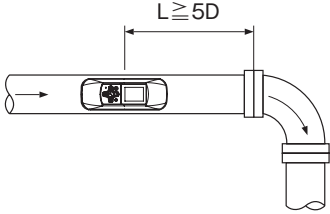
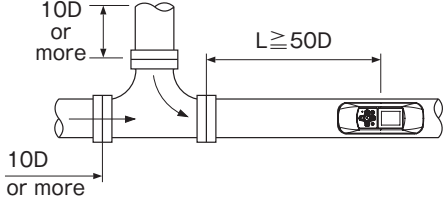
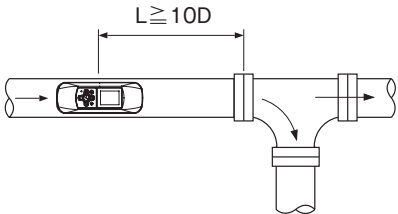
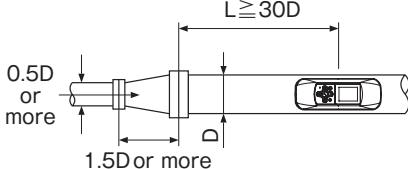
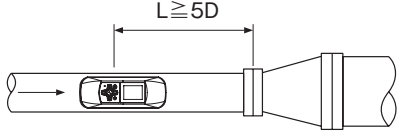
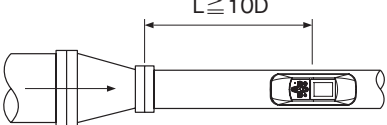
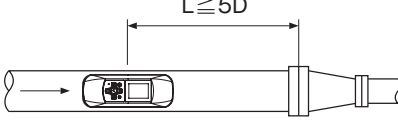
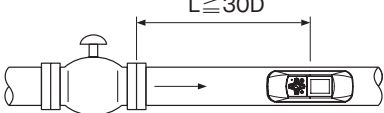
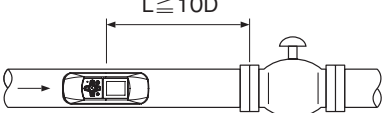
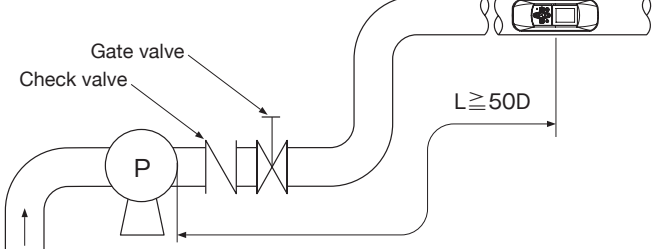
Select the installation location taking into consideration the following conditions.

- (1) Ambient temperature: -20 to +60°C. No heating elements nearby. No direct sunlight.
- (2) No dust or corrosive atmosphere.
- (3) A location where maintenance and inspection can be easily performed.
- (4) A location where there is no risk of inductive interference from power equipment or copper wiring.
- (5) A location where it is filled with fluid even when the flow is stopped.
- (6) Select a piping location with few obstructions to the flow. Ensure the required straight pipe length shown on page 7.
- (7) Select a location where there is no air pocket or deposits. Also, avoid joints such as welded parts, and select a location where the outer surface of the pipe is as smooth as possible and the inner surface of the pipe is less likely to be corroded.

Problem	Piping condition	Remarks
Air pocket Poorly filled pipe		When rising piping is used, installing the sensor at the places ② and ③ may cause air pocket or poorly filled pipe, resulting in measurement error. Install the sensor in the place of ①.
Poorly filled pipe		If the downstream side of the sensor location is open to the air, poorly filled pipe may be caused.
Deposit		If there is deposit or accumulation in the sensor location, measurement error may occur.
Air trapping		If air trapping occurs in the tank located upstream the sensor position, poorly filled pipe may be caused.

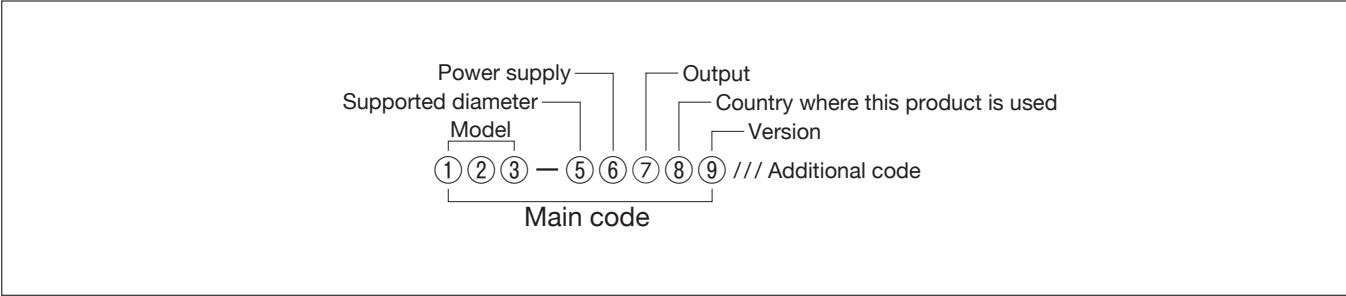
STRAIGHT PIPE LENGTH REQUIRED

[According to JEMIS 032:2019 standards]

Section	Upstream straight pipe length	Downstream straight pipe length
90°bend		
T		
Expanding pipe		
Contracting pipe		
Various valves	 <p>When flow volume is adjusted at the upstream valve.</p>	 <p>When flow volume is adjusted at the downstream valve.</p>
pump		

[D: pipe diameter]

■ PRODUCT CODE EXPLANATION



● Main code

1	2	3	Model
U	C	1	Clamp-on Type Ultrasonic Flowmeter UC-1
4	—		
5	Supported diameter		
M	25A to 100A		
6	Power supply		
B	Battery powered		
7	Output		
N	None (on-site display only)		
C	No-voltage contact output		
8	Country where this product is used		
J	Japan		
W	Outside Japan		
9	Version		
A	Version A		

The specification as of October, 2024 is stated in this GS Sheet. Specifications and design are subject to change without notice.

Sales Representative:

GS.No.GBM009E		
初版	改訂	印刷
24.10		