OVAL

Battery-powered Clamp-on Type Ultrasonic Flowmeter for Liquid

UC-1

GENERAL SPECIFICATION

GS.No.GBM009E–2

■ GENERAL

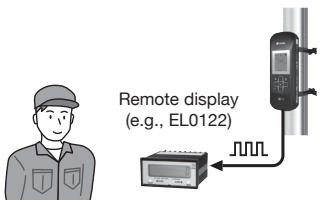
This flowmeter is a clamp-on type ultrasonic flowmeter for liquid developed based on the concept of "completely construction-free." This flowmeter is ideal for expanding the measurement range of utility and energy fluids (water, hot water, etc.) in factories and commercial facilities because it can measure 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 hand-tightened bands).
(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

(Example) Management by on-site display



(Example) Remote management by wired connection using no-voltage contact output Remote display

OVAL Corporation

https://www.oval.co.jp/english

Head Office (Tokyo): Tel. +81 3-3360-5121 Fax. +81 3-3365-8605
Overseas Branch Offices: Beijing, Seoul, Singapore, Taipei

■ GENERAL SPECIFICATIONS

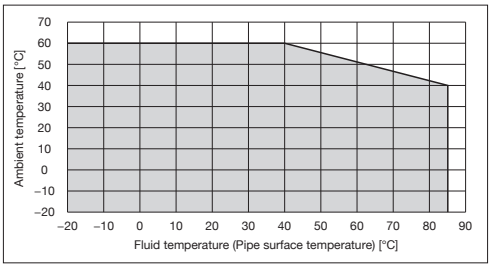
Item		Description		
Structure		Converter and sensor integrated, sensor slide lock structure		
Dry couplant		No need to apply grease (ultrasonic propagation medium) to the sensor		
Piping *1	Nominal size	25A to 100A (8 diameters can be measured with one model)		
	Type	Metal pipes (SUS, SGP, etc. under 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 *4)		
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(m^3/PLS, L/PLS) … Default value: 100m^3/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.		
	Languages	English, Japanese		
	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	m^3	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 2s, 10s, 1min, 5min, 10min (initial value: 2s)	
		No-voltage contact output		
	LED	Red × 1 point (flashes when alarm occurs, and lights up when error occurs)		
Other functions	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		
Standards	CE Marking	• EMC (2014/30/EU) EN IEC 61326-1:2021 • RoHS (2011/65/EU+(EU)2015/863) EN IEC 63000:2018		
	KC Marking	• KS C 9811:2019 • KS C 9610-6-2:2019 URL: http://www.rra.go.kr/selform/OVJ-UC-1		
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: ±6.0% of RD (10 to 100% of max. flow rate), ±0.6% of FS (0.3 to 10% of max. flow rate)
※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

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

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]



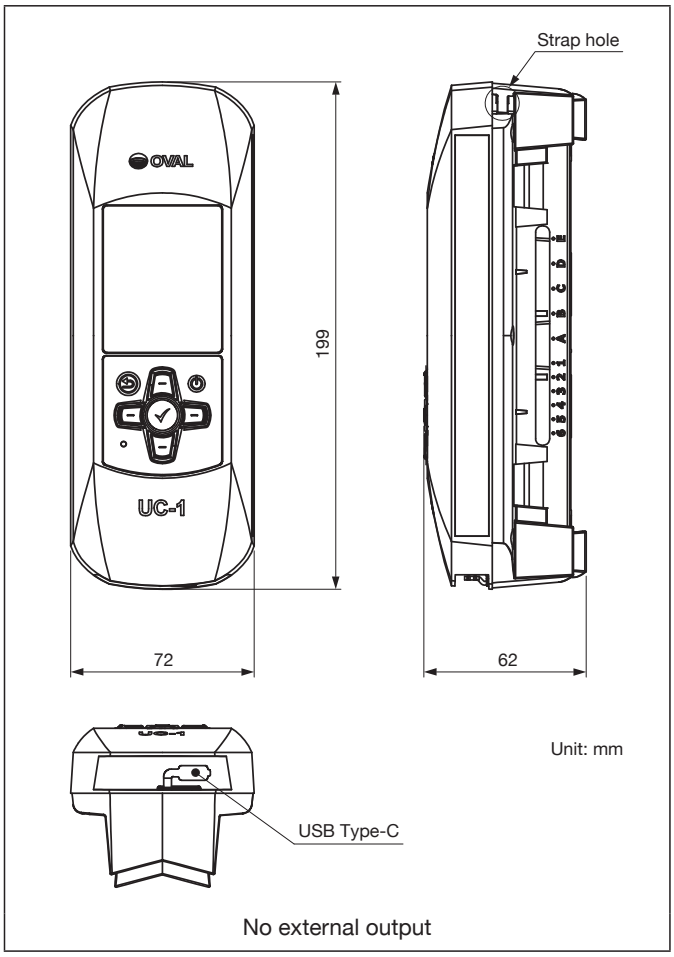
■ FLOW RANGE

Reference flow speed: 0.03 to 10 m/s

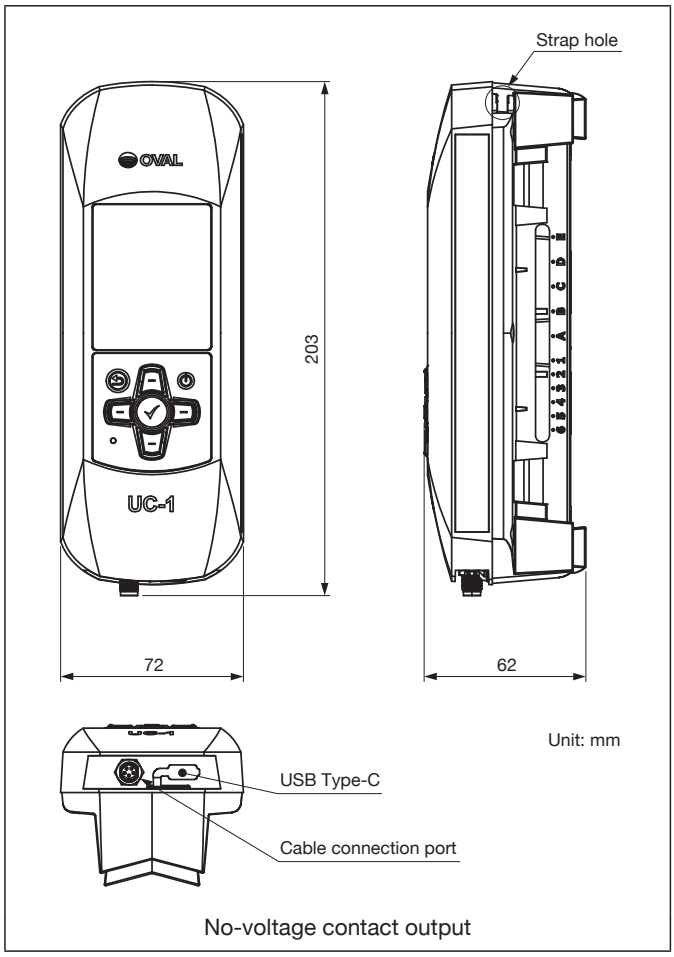
Supported diameter		Flow range	
Nominal size A	Nominal size B	Min. flow rate ※ [m³/h]	Max. flow rate ※ [m³/h]
25A	1B	0.07	22.80
32A	1 1/4B	0.12	38.92
40A	1 1/2B	0.16	52.28
50A	2B	0.26	85.22
65A	2 1/2B	0.42	139.73
80A	3B	0.59	195.25
90A	3 1/2B	0.78	258.41
100A	4B	0.99	331.63

※ 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.
Set applicable pipe information (Outer Diameter, Thickness) to UC-1, automatically calculated flow range is displayed in "Parameter list" display.

■ OUTLINE DIMENSIONS

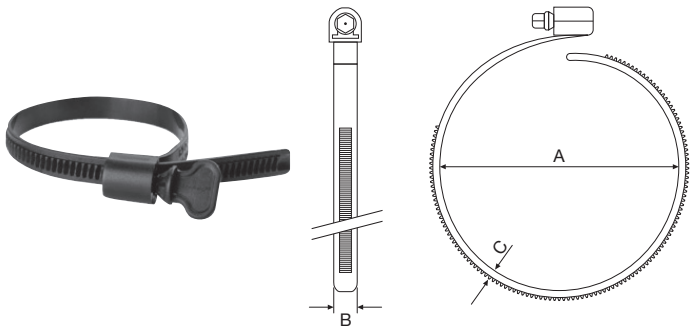


No external output



No-voltage contact output

[Accompanying band and hand-tightened screw]

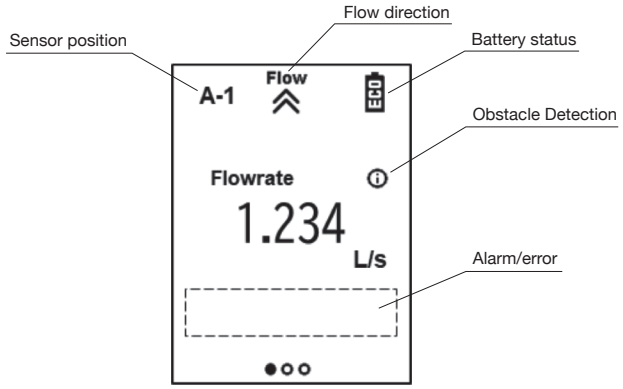


Unit: mm

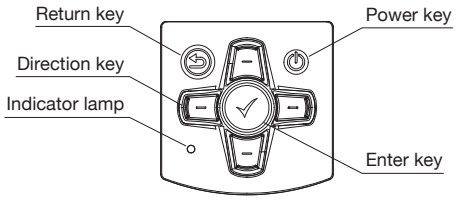
Type	A: Min. Diameter	A: Max. Diameter	B: Width	C: Thickness
25A to 50A	25	75	12.7	3.25
50A to 100A	50	125	12.7	3.25

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

■ DISPLAY AND CONTROLS



Flowrate display screen



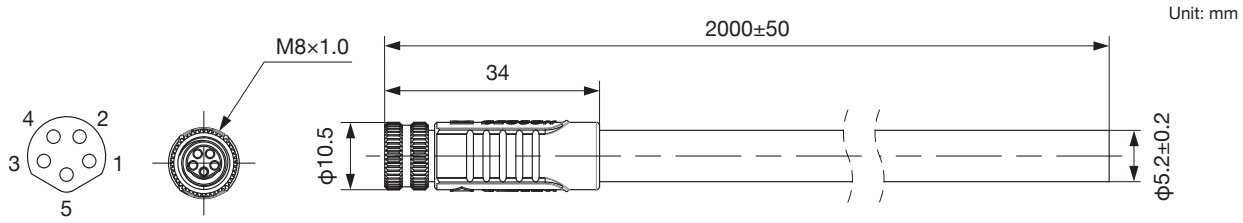
Key sheet

[Icon description]

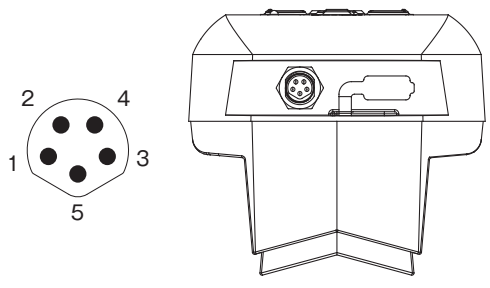
Battery status	Good		Alarm	Hi-Limit	⚠ Hi-Limit
	Energy saver	ECO		Lo-Limit	⚠ Lo-Limit
	Low			No Echo	⚠ No Echo
	Shortage			Reverse Flow	⚠ Reverse Flow
	USB connected			F.S. Over	⚠ F.S. Over
				PLS Over	⚠ PLS Over
			Error	Error	⊗ Error

■ WIRING SPECIFICATIONS

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



Output Cable



Flowmeter

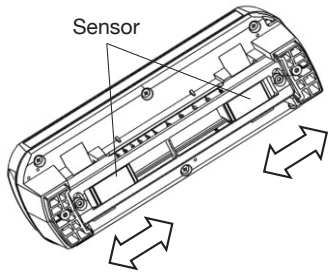
No.	CH Name	Color	Output setting (Initial Value)
1	CH1	Brown	Total PLS (+)
2	GND	White	COM GND (–)
3	CH3	Blue	N/O (+)
4	GND	Black	COM GND (–)
5	CH2	Gray	Alarm (+)

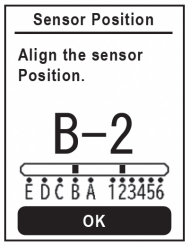
※ Cable specifications: 5-pin, 24AWG/0.25mm^2, shielded
※ Signal logic: NPN open collector (Max.26.4VDC, 0.25A, ON resistance: 1.7Ω or less)
※ Assignable signal types:

(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

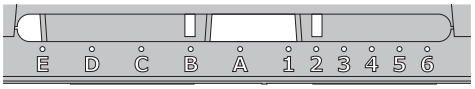
■ INSTALLATION

① Align the sensors according to the position on display.





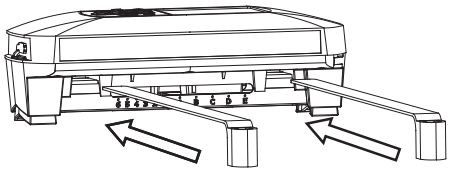
[Sensor position confirmation screen]



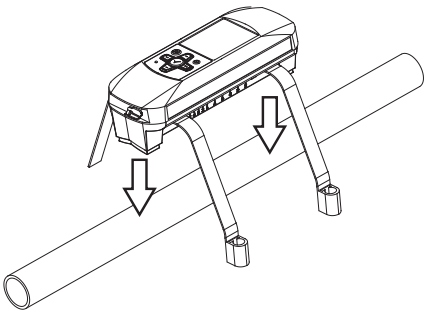
(Example) B-2

[Sensor slide lock position]

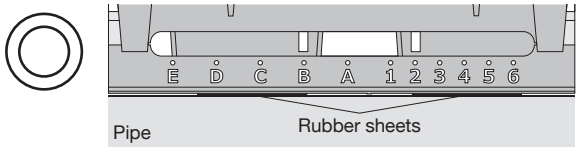
② Pass bands through holes in the main body.

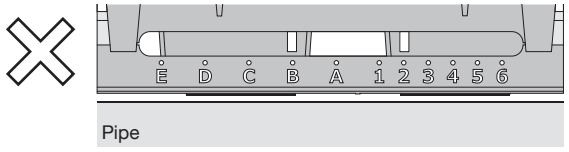


③ Wrap bands around the pipe and tighten by hand.

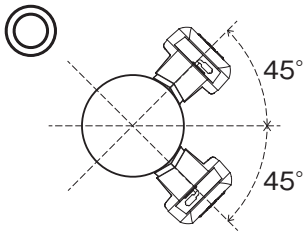


(※1) Be careful not to overtighten as this may damage the bands. As long as the rubber sheet and pipe are in close contact, measurements are possible so there is no need to overtighten.
(※2) When using commercially available hose clamps, please refer to the recommended torque.
(※3) Check from the side of the flowmeter body that the rubber sheet and the piping are in close contact.

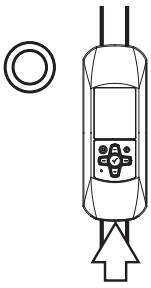




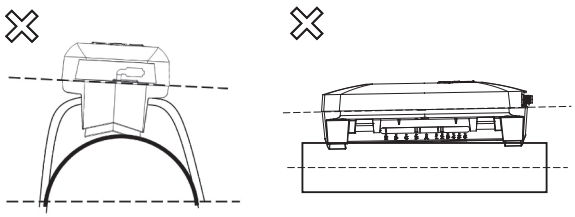
● Installation precautions



Recommended position for horizontal pipe



Flow direction in vertical pipe



Example of misalignment during installation

(1) For horizontal pipes, install an angle within 45°, avoiding directly above or below, to avoid air bubbles and sediment.
(2) For vertical pipes, install where the flow direction is from bottom to top.
(3) The performance of the ultrasonic flowmeter depends on the installation position, so please avoid misalignment.

● Installation Location Precaution

Select an installation location observing the following conditions.

(1) With ambient temperature of –20 to +60°C. Avoid near heat sources and in direct sunlight.

(2) Without excessive dust or a corrosive atmosphere.

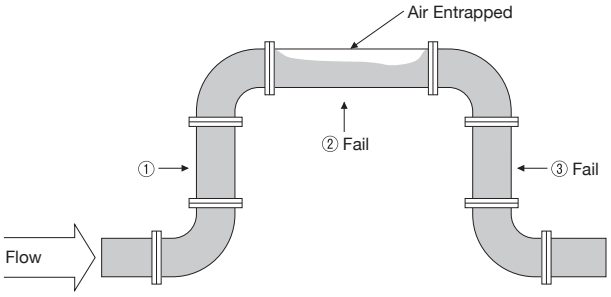
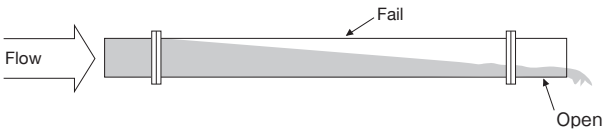
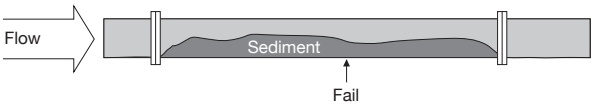
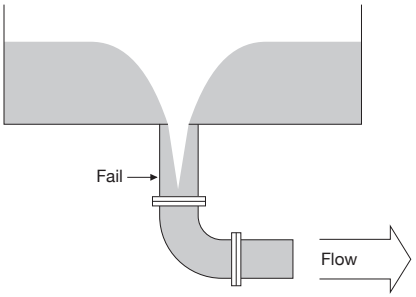
(3) For easy inspection and maintenance.

(4) Have no inductive interference from electrical power equipment or wiring (including power lines).

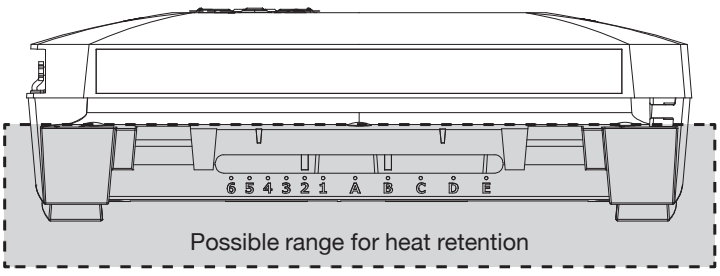
(5) Filled with fluid even when the flow is stopped.

(6) Have no disturbance in the flow. Satisfies the **GENERAL CONDITION FOR STRAIGHT PIPE LENGTH** described on the next page.

(7) Without air pockets or deposits, and the pipe surface is smooth and has little corrosion on the inside, avoiding welds.

Phenomenon	Pipe Condition	Remarks
Air Entrapped & Not full		For rising pipe, if the flowmeter is installed in positions ② or ③ , air may accumulate and the pipe is not completely filled with liquid, which may result in measurement errors. Please install it in position ① .
Not full		If the downstream side of the flow meter installation location is open to the atmosphere, there is a risk of the pipe being half-full.
Sediment		Sediment accumulation at the flowmeter position may cause measurement errors.
Entrained air		Measurement may not be possible if there is entrained air at the flowmeter position.

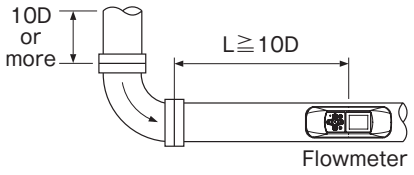
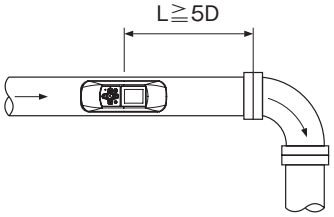
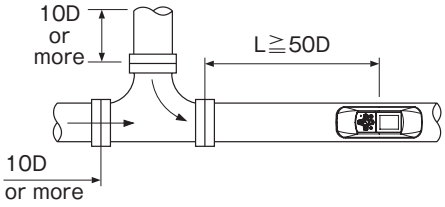
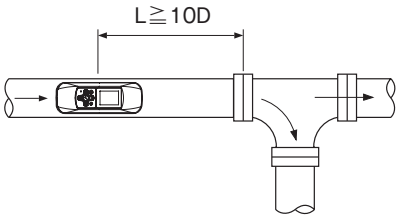
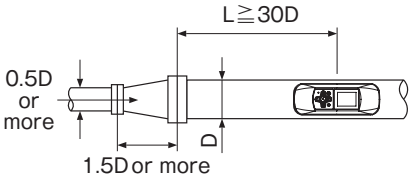
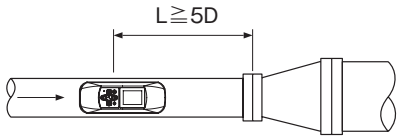
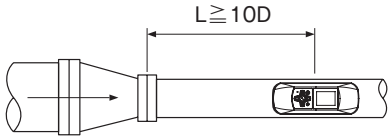
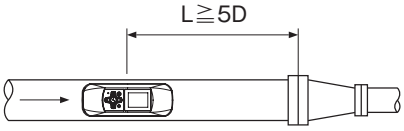
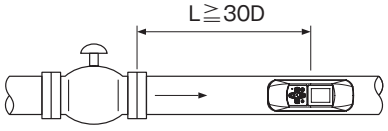
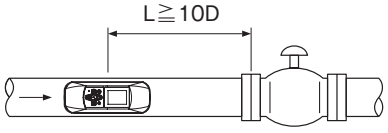
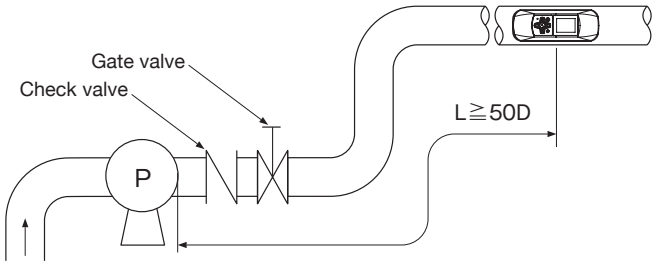
(8) When keeping the entire UC-1 warm, please observe the temperature derating specifications. If you cannot observe the temperature derating, please keep the heat retention range as shown in the figure below.



Heat retention range outside temperature derating

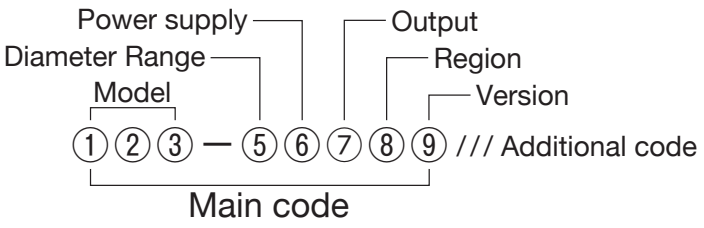
■ GENERAL CONDITION FOR STRAIGHT PIPE LENGTH

[According to JEMIS 032:2019 standards]

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

[D: pipe diameter]

■ PRODUCT CODE



● Main code

①	②	③	**Model**
U	C	1	Clamp-on Type Ultrasonic Flowmeter UC-1
④	—		
⑤	**Diameter Range**		
M	25A to 100A		
⑥	**Power supply**		
B	Battery		
⑦	**Output**		
N	None (No external output)		
C	No-voltage contact output		
⑧	**Region**		
J	Japan		
W	Abroad		
⑨	**Version**		
A	Version A		

Sales Representative:

GS.No.GBM009E

初版	改訂	印刷
24.10	25.05	