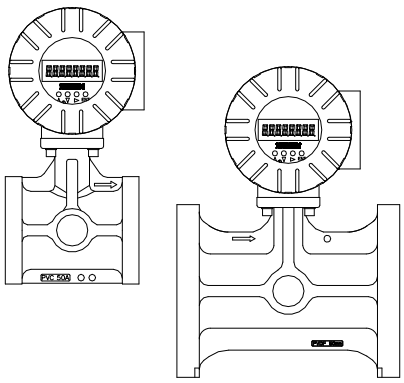
Serial No.:	H-AS-001-3

Ultrasonic Vortex Flowmeter

User's Manual



Contents

ASAHI YUKIZAI CORPORATION

⚠ Please read through the terms of our product warranty.

◇ We would like you to ask you to abide by relevant product specifications, cautions and so forth in using our product.

◇ While we pursue continuing efforts to enhance the quality and reliability of our product, we are not in a position to guarantee the integrity of our product. In using our product in any installation that is likely to cause physical injury or property damage, please fully implement safety designs as full protection against normally conceivable faults. We are not held responsible for any consequences of use of our product in such installations, unless specifications or any other relevant documentation has been approved by us in writing beforehand.

◇ Tips on selecting, constructing, installing, operating and servicing our products are found in our engineering sheets, user's guides and so forth. Please contact our dealer or sales office nearest to your location.

◇ Repair and replacement services on a fee basis after the expiry of the warranty period are available. Our warranty does not extend to the following:

(1) Usage conditions outside the coverage of our warranty.
(2) Failure to abide by our precautions in constructing, installing, handling and servicing our products.
(3) Defects traceable to any other than our products.
(4) Modification or secondary elaboration carried out by other than us.
(5) Use of parts for purposes other than their intended uses.
(6) Defects caused by conditions out of our control, such as acts of God and natural disasters.

* Damages that may be induced by defects in our product are out of warranty.

◇ This warranty applies to your product insofar as you use it within the country of Japan. If you intend to use the product overseas, please check with us beforehand.

1. Introduction

This flowmeter is a vortex flowmeter that measures the vortexes created in proportion to flow velocity.
Principles of Operation
Regular vortexes, called “Karman vortexes”, are created alternately on a vortex shedding bluff body placed in a fluid flow. Assuming that the frequency generated by the Karman vortexes is f, the width of the vortex shedding bluff body is d and the velocity is V, then the following relation is established:

$$f = St.V/d$$

where St is a Dimensionless number called a “Strouhal number.” Because St is a constant that is dependent on the shape of a vortex shedding bluff body in a constant range of Reynolds numbers, velocity V can be determined by measuring generated frequency f and the volumetric flowrate can in turn be determined from velocity V.

This flowmeter has one set of a send and a receive ultrasonic sensor installed on the Downstream side of the vortex shedding bluff body as shown in Figure 1. Ultrasonic waves are constantly propagated from the transmitter. When ultrasonic waves are propagated, they pass through a fluid and reach the receiver over some period of time. If Karman vortexes flowing in the Direction opposite to the Direction of ultrasonic wave propagation are created as shown in Figure 1-1, ultrasonic waves would take longer to reach the receiver. Conversely, Karman vortexes flowing in the same Direction as the Direction of ultrasonic wave propagation are created, ultrasonic waves would travel to the receiver faster. Since the time of ultrasonic wave propagation varies in proportion to the frequency generated by the vortexes, it follows that the flowrate can be measured by detecting changes in the time of ultrasonic wave propagation. The ultrasonic sensors, being installed outside the conduit of the flowmeter body, allow users to perform measurement tasks without having to touch the fluid under test. The sensing flowmeter offers greater vibration immunity, offering a host of features, including high sensitivity.

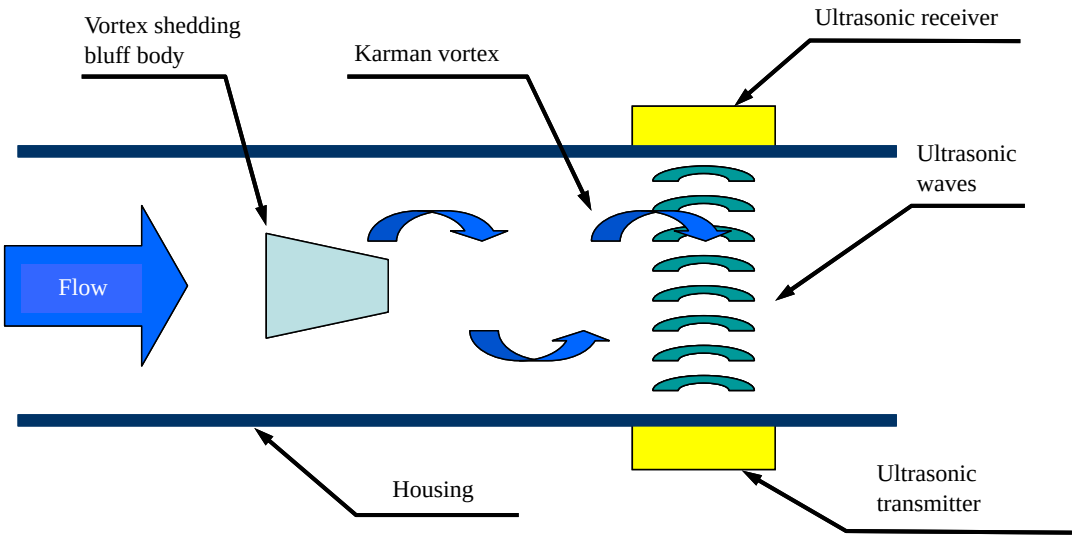


Figure 1-1 Principals of measurement

2. Precautions for Use

- Before using your flowmeter, read through the User's Guide carefully to ensure correct product handling.
- Be sure to use your flowmeter within specified limits. (Use of the flowmeter outside the allowable limits could cause harm to it.)
- The flowmeter may not work with certain kinds of fluids. (With high-viscosity fluids, pulsating fluids, non-full fluids or the like, accuracy would not be established.)
- This product is non-explosionproof and may not be used in explosive environments. (The flowmeter could be damaged or explode.)
- Keep the flowmeter housed in the corrugated fiberboard box until shortly before the installation of tubing.
- Keep the flowmeter apart from fires and heated objects. (The flowmeter could be deformed, be damaged or fire.)
- Do impact the flowmeter as by Dumping or Dropping or load it with heavy objects. (The flowmeter could be damaged.)
- In Disposing of remainder and scrapped materials, be sure to submit them to Disposal specialists. (The incineration of remainder and scrapped materials would generate toxic gases.)
- To solve any other questions you may have about your flowmeter, please contact our dealer or sales office nearest to your location.

3. Specifications

[Basic Specifications]

Item	Specification					
Diameter	20, 25, 40, 50, 80, 100A (six sizes in total)					
Tubing connection	Wafer JIS 10K					
Measuring range	About 0.5 to 5m/sec (For more details, see [Range of Flowrate Measurement] on page 4.)					
Measurement accuracy	±1% R.D					
Wetted material	U-PVC, PVDF					
Fluid temperature	0 to 55°C (U-PVC), -10 to 100°C (PVDF)					
Ambient temperature	0 to 55°C (U-PVC), -10 to 60°C (PVDF)					
Maximum working fluid pressure	1.0MPa					
Display	Total integrating/Instantaneous flowrate/% flowrate/reset integrating flowrate (The display mode is externally selectable using the accessory magnet.) Unit, Equipment alarm					
Analog output	4-20 mA two-wire load resistance up to 300 Ω					
Pulse output	Open collector output: One-shot width					
	20A	25A	40A	50A	80A	100A
	1.30ms	1.82ms	2.86ms	3.90ms	5.98ms	9.62ms
Alarm output	Open collector output: Upper and lower limit output/alarm output Open collector output concurrently with pulse output is not available, though.					
Case material	Aluminum alloy (melamine baking finish), Munsell value 5Y7/1					
Supply voltage	24VDC±10%					
Protective structure	IP66 equivalent (avoid exposure to direct sunlight)					

[Range of Flowrate Measurement]

Nominal Size(mm)	Min. Flowrate（m^3/h）					Max. Flowrate（m^3/h）
	Kinematic Viscosity ×１０$^{-6}m^2/s$（cst）					
	1	2	3	4	5	
２０mm	０．６	１．１	１．７	２．３	２．８	５．４
２５mm	０．９	１．８	２．７	３．５	４．４	８．５
４０mm	２．３	４．５	６．８	９．０	１１．３	２２．０
５０mm	３．７	７．４	１１．０	１４．７	１８．４	３４．０
８０mm	８．４	１６．８	２５．１	３３．５	４１．９	８８．０
１００mm	１４．１	２８．３	４２．４	５６．５	７０．７	１３７．０

[Guaranteed ±1% RD accuracy range]

Nominal Size(mm)	Min. Flowrate（m^3/h）					Max. Flowrate（m^3/h）
	Kinematic Viscosity ×１０$^{-6}m^2/s$（cst）					
	1	2	3	4	5	
２０mm	０．９	１．８	２．７	３．６	４．５	５．４
２５mm	１．４	２．８	４．２	５．６	７．０	８．５
４０mm	３．６	７．２	１０．８	１４．４	１８．０	２２．０
５０mm	５．９	１１．８	１７．７	２３．６	２９．５	３４．０
８０mm	１３．４	２６．８	４０．２	５３．６	６７．０	８８．０
１００mm	２２．６	４５．２	６７．８	９０．４	１１３．０	１３７．０

◇ The higher the kinematic viscosity of a fluid under test is, the faster becomes the velocity at which the Strouhal number gets stabilized, with a proportionate rise in the minimum flow rate that can be measured.

◇ Kinematic viscosity equals the viscosity (Pa.s) divided by density (kg/m^3).
1 Pa.s (pascal second) = 10P (poise) = 100 cp (centipoise)
Example: The kinematic viscosity of a fluid under test having a viscosity of 6 cp and a density of 1200 kg/m^3 is
$6cP=6\times10^{-3}Pa.s \quad 6\times10^{-3}Pa.s\div1200kg/m^3=5\times10^{-6}m^2/s$

4. Installation

4.1 Location Tips

- Locate the flowmeter with the following points taken into consideration to ease the work of making daily checks on it and operating it and to use it with unfailing accuracy over an extended period of time:

(1) The flowmeter can be mounted in any position: horizontal, vertical or oblique. In any position, however, the tube must be kept full of water.

(2) In vertical tubing, mount the flowmeter to allow fluids to flow from bottom so that they can fill the conduit.

(3) Avoid installing the flowmeter in places subjected to marked temperature gradients or temperature changes.

(4) In installing the flowmeter, support it in secure position to protect the tubing and the joints.

(5) This flowmeter is built to the specifications of JIS C0920 “Waterproof Structure” (IEC IP66 equivalent) and cannot be used in water.

(6) Install the flowmeter to allow enough clearances for servicing.

(7) Install the flowmeter in place that afford ready access for wiring and tubing.

(8) Ensure that the fluids in the conduit are not frozen. (Frozen fluids could damage the flowmeter body.)

⚠	CAUTION	Gas-liquid two-phase fluids or fluids with bubbles mixed with them might not be measured correctly. Minimize the inflow of bubble-contained fluids. Bubbles deposited in the flowmeter could impair correct measurement. Ensure that bubbles do not deposit in the flowrate. (Have safeguards, such as air vents, implemented in position.)

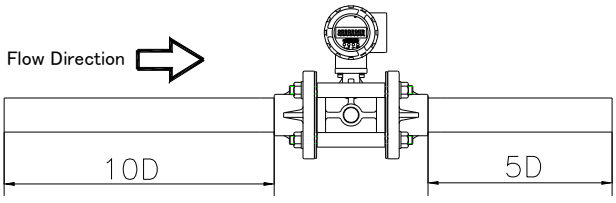
⚠	CAUTION	Do not splash the flowmeter directly with water. Flowmeter or power supply failures could result.

4.2 Tubing and Mounting Tips

- Tube and mount the flowmeter with the following points taken into consideration to use it with unfailing accuracy over an extended period of time:

(1) Ensure that the direction of fluid flow and the flow direction marked on the flowmeter match.

(2) Install a straight pipe at least 10 times the diameter upstream from the upstream end face of the flowmeter and one at least five times the diameter downstream from the downstream end face of the flowmeter, because certain flows, such as drift and spiral flows, could affect its accuracy.
If there is any equipment installed upstream that could significantly disturb fluid flows, please consult us.



(3) To ensure flowmeter measurement accuracy, use tubes that have an inside diameter greater than or equal to the tube inside diameter of the flowmeter before and after the flowmeter.

(4) To ensure flowmeter measurement accuracy, ensure that the gasket does not run off into the conduit.

(5) If a pressure tap is required, locate it five to seven times the diameter downstream from the downstream end face of the flowmeter to ensure flowmeter measurement accuracy. If a temperature tap is required, locate it one to two times the diameter downstream from the pressure tap position.

(6) Construct tubing with care to maintain coaxiality between the flowmeter and the connection tubing. Off-center coaxiality (decentering) can be source of erratic measurement accuracy. Use the collar (centering jig) supplied with the flowmeter to construct tubing.

(7) If the flowmeter is mounted on a line involving the use of a sharply pulsating pump, such as a bellows pump, it would be liable to error. Try to minimize pulsation by using a damper or the like.

(8) On a line in which flows are disturbed (drifted) as by a glove valve, install the flowmeter upstream.

(9) When it is necessary to install a heat exchanger or any other device involving sharp fluid temperature variations, install it downstream of the flowmeter, or upstream but with an adequate separation from the flowmeter.

(10) Cavitation, when it occurs, would degrade flowmeter measurement accuracy. To prevent cavitation, maintain at least a minimum line pressure downstream of the flowmeter (five to seven times the diameter) that is calculated by solving the following equation:

$$\triangle P = c \times \gamma$$

$\triangle P$: Pressure Loss (MPa)
c : Pressure Loss Coefficient
γ : Density (kg/m^3)

5. Installation Procedure

(1) Set the flowmeter and an AV packing between the tubing flanges.

(2) Pass a stud bolt from the connection flange on either side and then set the collar (centering jig) to locate the central position of the flowmeter as shown in Figure 5-1. Insert plain washers and nuts from both tubing flanges and clamp them finger-tight.

(3) Tighten the tubing gradually in diagonal direction to reach the specified torque (see Table 5-1) using a torque wrench.

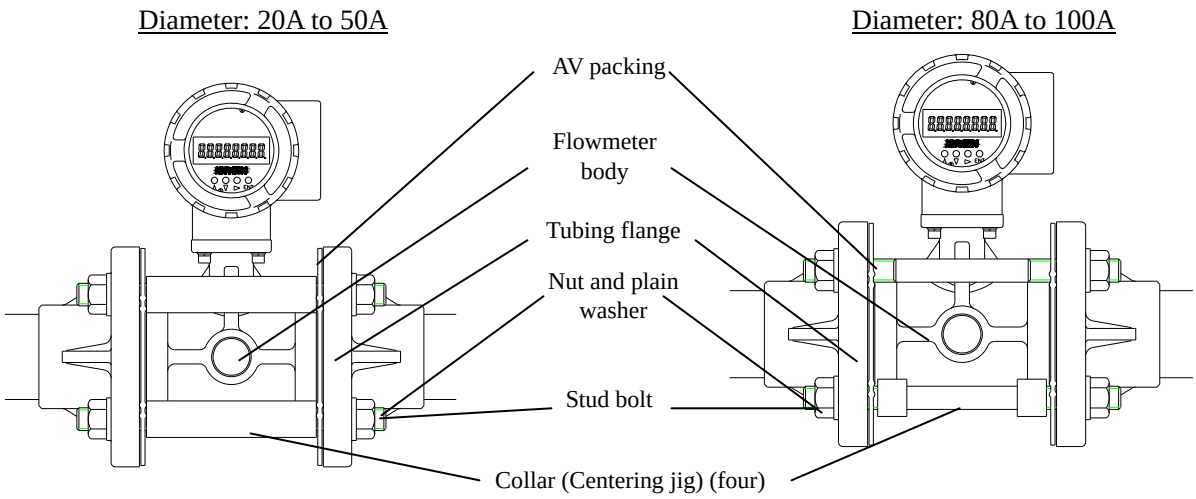


Figure 5-1 Recommended Torque Value

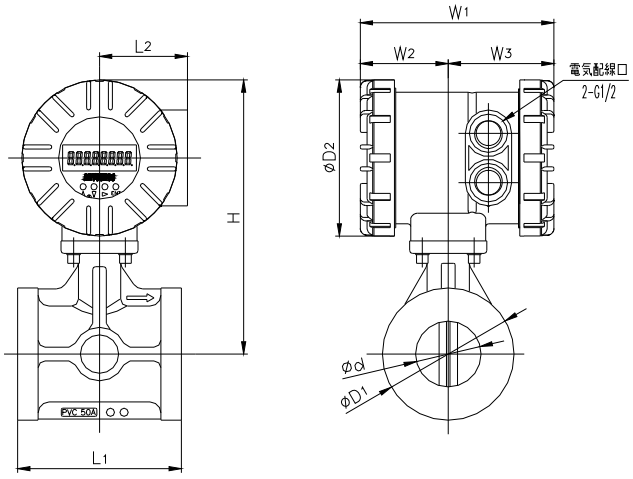
	２０Ａ	２５Ａ	４０Ａ	５０Ａ	８０Ａ	１００Ａ
ＰＶＣ	１５	１５	２０	２５	３０	３０
ＰＶＤＦ	１５	１５	２０	２５	３０	３０

⚠ CAUTION

- Do not tighten the tubing beyond the specified torque.
- Packings might run off into the conduit, impeding flowmeter measurement accuracy.
- Damage to the flowmeter could result.

6. Dimensional Outline Drawings

6-1. Waher (Body material: U-PVC, PVDF)

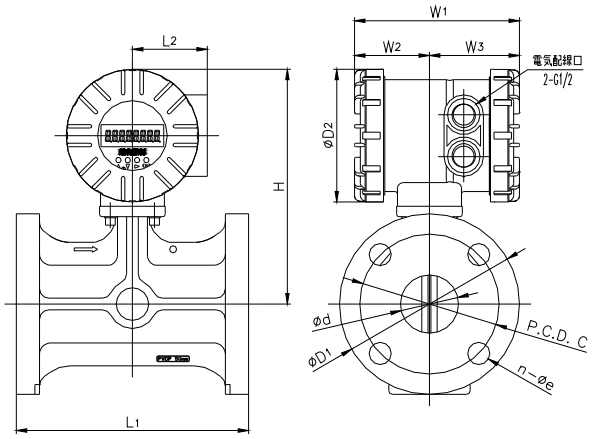


Unit: ㎜

Nominal Size	L_1	L_2	H	W_1	W_2	W_3	ϕD_2	ϕD_1	ϕd	Weight (kg)	
										PVC	PVDF
20 ㎜	85	64.5	187.5	138	62.5	75.5	114	53	19	1.3	1.3
25 ㎜	93		190					62	24	1.4	1.4
40 ㎜	106		197.5					77	38.5	1.6	1.6
50 ㎜	120		202.5					96.5	48.5	1.8	1.9
80 ㎜	160		225					127	72.5	2.2	2.3
100 ㎜	180		239.5					155.5	94	2.5	2.6

* The values noted above are reference values and are subject to change because of improvement or modification.

6-2. Flanged end (Body material: PVDF)



Unit: mm

口径	L_1	L_2	H	W_1	W_2	W_3	ϕD_2	JIS10K フランジ					Weight
								ϕD_1	ϕd	C	n	e	(kg)
20 mm	200	64.5	180	138	62.5	75.5	114	100	19	75	4	15	1.5
25 mm			190					125	24	90		19	1.8
40 mm			197					140	38.5	105			2.2
50 mm			204					155	48.5	120			2.8

* The values noted above are reference values and are subject to change because of improvement or modification.

7. Electrical Wiring Diagrams

7.1 Wiring Procedures

(1) Connect the external cable of the flowmeter, power supply and external equipment as shown in Figures 7-1 and 7-2.

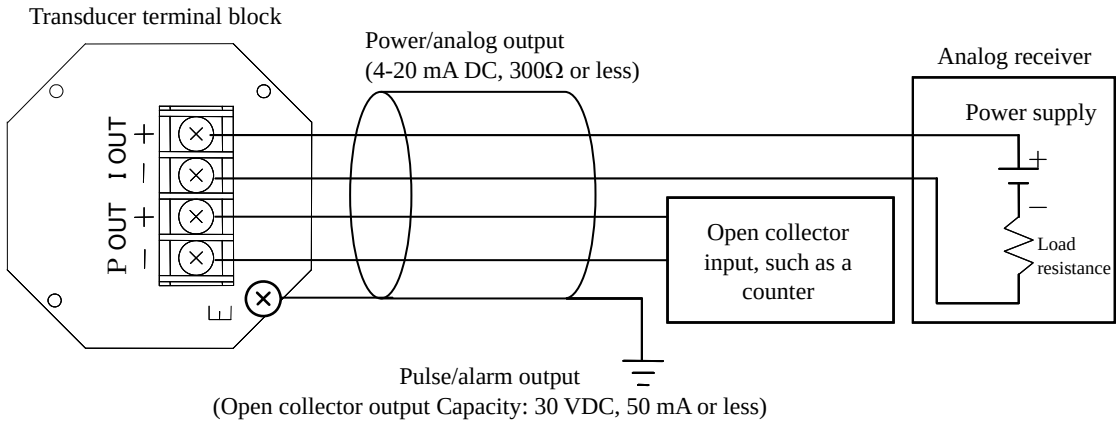


Figure 7-1 Wiring diagram

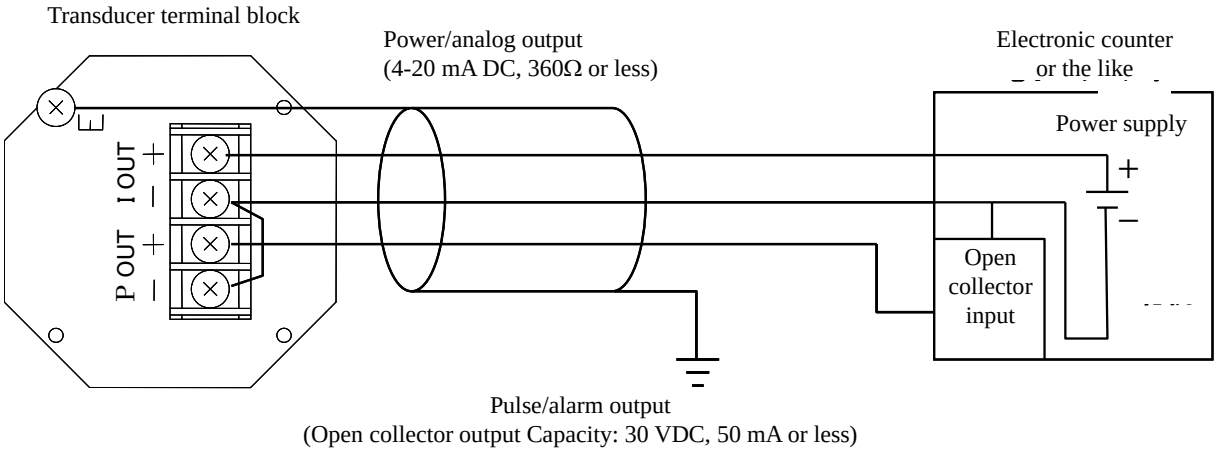


Figure 7-2 Wiring diagram (Three-wire connection)

(2) Analog output
Form a flowmeter analog transmission loop by connecting the equipment between the analog output lines + and – (which serve as a power supply to the flowmeter).

(3) Pulse/alarm output
The pulse/alarm output of this flowmeter is an open-collector output. Connect a power supply between the pulse/alarm output line and COM line with an intervening current-limiting resistor.

(4) Make connections to the wiring connection port with a dust plug in position after uncovering the terminal section of the amplifier case.

(5) Use of a conduit tube and a duct for external connections is recommended to make them waterproof.

(6) Before making a grounding connection, clamp the grounded screw with a clamping torque of 0.49 to 0.69N.m.

7.2 Wiring Notes

(1) Cable specifications are as follows:
Recommended cable type: CVV-S or CEV-S (cable cross section: 1.25 sq)

Flowmeter output	Number of cores
No or analog output only	2C shield
No or analog output + Pulse output or alarm output	4C shield (3C shield wiring also available)

(2) Run cables to avoid noise sources, such as large-capacity equipment and industrial power supplies, and high-voltage and high-current sources to protect from noise interferences.

8. Operation

8.1 Setting Parameters

The four pushbutton switches in the LCD indicator let you set the parameters described below.

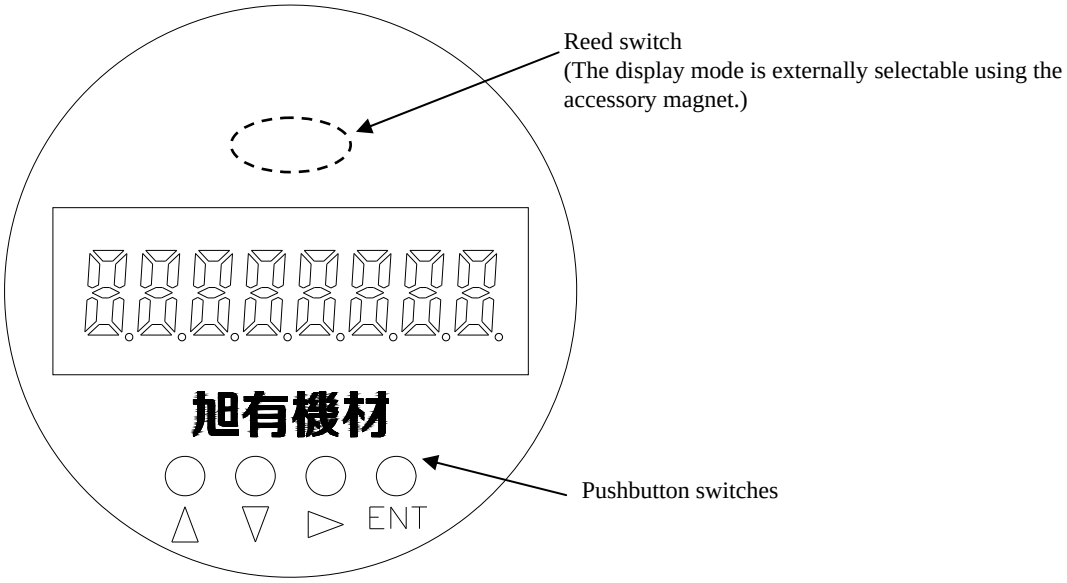


Figure 8-1 LCD indicator

(1) Invoking the user setting mode

The flowmeter comes up in the flowrate calculation by default. To invoke the user setting mode for setting a variety of parameters from this mode, simultaneously press pushbutton switches [▶] and [ENT] for longer than 3 seconds. "FUNC1" will blink in the LCD indicator as shown in Figure 7-2.

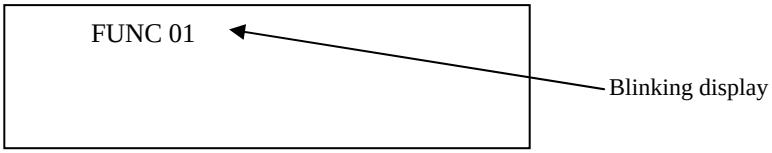


Figure 8-2 Display following a transition to the user setting mode

To select the parameters to edit in the user setting mode, select the FUNC number associated with the desired parameter using pushbutton switches [▲] and [▼].

(2) Selecting parameters

FUNC Numbers and Parameter definitions

FUNC No.	Parameter name		User setting	Variable value	
FUNC1	Span		See the Parameter Setting Table	From 10% of the maximum flowrate in each size to the maximum flowrate	
	Decimal point position			Within the blinking display segment range	
	Instantaneous flowrate unit	Volume unit		L, kL, m^3	
		Time unit		sec, min, h, d	
FUNC2	Integrating flowrate unit			L, kL, m^3	
FUNC3	Integrating display decimal point position			Zero to two decimal places	
FUNC4	Damping			1 to 199 sec.	
FUNC5	Output pulse setting			0.01L, 0.1L, 1L, 10L, 100L 1m^3, 10m^3 (Selection range dependent on the flowmeter diameter)	
FUNC6	Flowrate setting	Upper flowrate alarm limit		1 to 110% of full scale	FUNC6 > FUNC7
FUNC7		Lower flowrate alarm limit		0 to 109% of full scale	
FUNC8	EEPROM update count		————		
FUNC9	Contact output selection (Only the item selected by FUNC9 is output for FUNC5, 6 and 7.		See the Parameter Setting Table	Pulse (PLS) Equipment alarm (AL) Flowrate alarm (FAL)	
FUNC10	Low-flowrate cutoff value		0%	0 to 20% of the maximum flowrate	
FUNC11	Process selection on error (*1)	Analog output	BOL	BOL, BOH, HOLD (*2)	
FUNC12		Pulse output	STOP	STOP	
FUNC13		Alarm output	ON	ON	
FUNC14	Status			Error history	
FUNC15	Analog test output		Simulated analog output of 0 to 100%		
FUNC16	Pulse test output		Simulated pulse output of 1 to 1000 Hz (10,000 pulses or continuous)		
FUNC60	BPF lower limit		0.25	Not customer-variable.	
FUNC61	BPF upper limit		1.0		
FUNC62	Hysteresis		0		

*1 Analog output BOL is not functionally generated for FUNC11 “Process selection on error” when equipment alarm (AL) has been selected with FUNC9.

*2 Analog output BOL for FUNC11 “Process selection on error” is generated as 3.98 mA DC, analog output BOH as 20.02 mA DC.

(3) Editing user mode settings

To edit the setting of the FUNC number associated with a parameter of your choosing, do the following:

① While the selected FUNC number is blinking, press pushbutton switch [ENT]. The stored setting will be displayed.

② A blinking position in a setting displayed denotes that the value at that position is variable.
In all items, [▶] changes the blinking position.
With FUNC1, 3, 4, 5, 6, 7 and 10, press pushbutton switches [▲] and [▼] to change the value at the blinking position, decimal point position and the unit system.
[▲] increments a value, and [▼] decrements a value or moves the display unit in sequence.

③ For FUNC2, press pushbutton switches [▲] and [▼] to move the display unit in sequence.

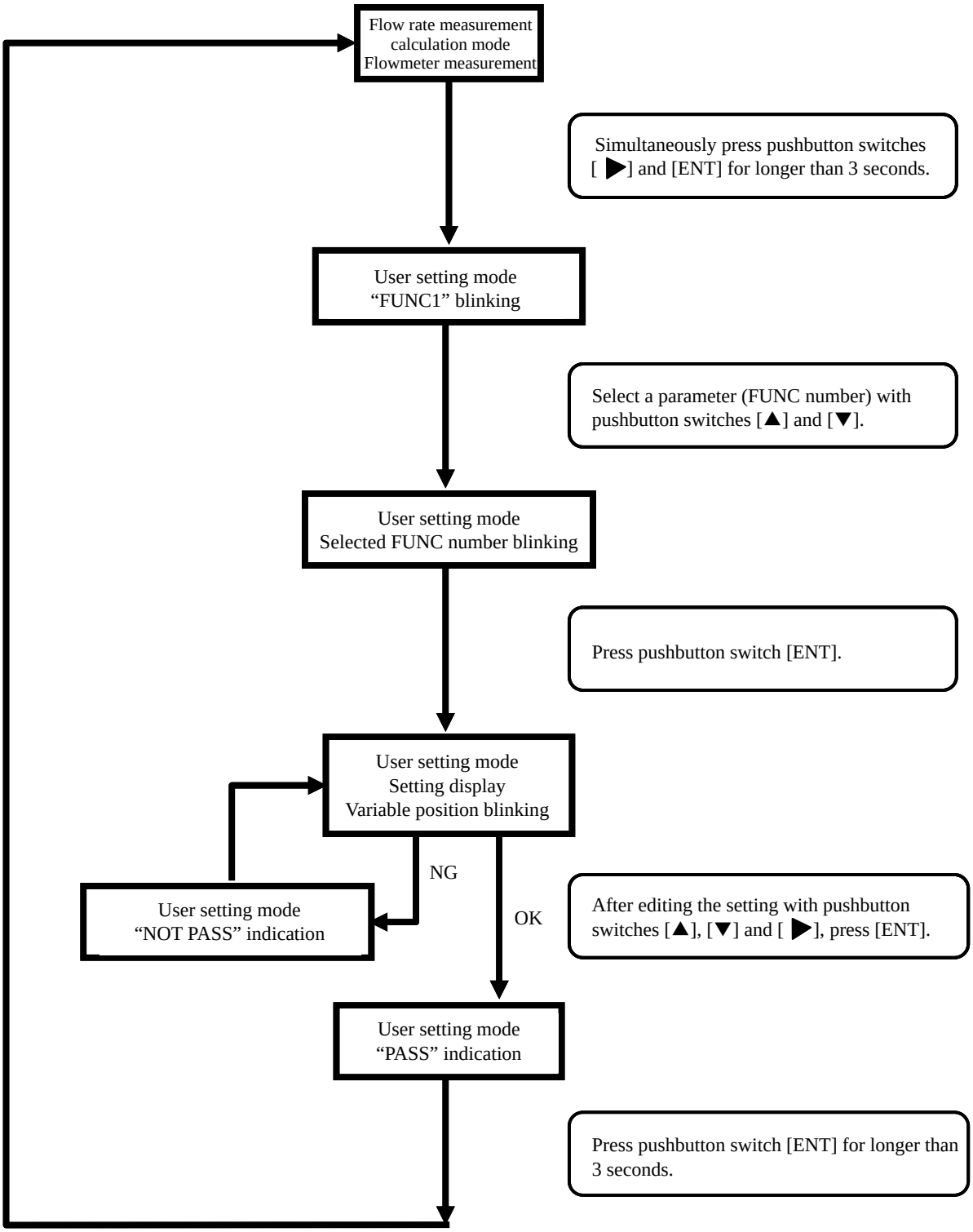
④ FUNC8 denotes the number of cycles of writing data to EEPROM completed. (The count is simply displayed and cannot be varied.)

⑤ For FUNC9, press pushbutton switches [▲] and [▼] to display the contact output setting in sequence.
(The display of the contact output appears as “AL” for [Equipment alarm], as “FAL” for [Flowrate alarm] and as “PLS” for [Pulse output].

⑥ Press pushbutton switch [ENT] at the completion of entry of a setting change. If the new value is within specified limits, “PASS” is displayed and the setting value is written to internal memory before the FUNC number blinks again. If the new value is outside specified limits, the flowmeter displays “NOT PASS” in the LCD before it returns to state ② (displaying the stored value, with a variable position in it blinking) to prompt the entry of another value.

⑦ Exiting the user setting mode (end of setting changes)
While a FUNC number is blinking, press pushbutton switch [ENT] for longer than 3 seconds.

8.2 Flow of Programming Parameters



8.3 Displays

The flowmeter can display total integrating flowrate values, instantaneous flowrate values, reset integrating flowrate values and on-error alarm numbers in the LCD indicator.

(1) Flowrate displays
During flowrate measurement, the display varies from one MODE number to another as listed in Table 8-1.

Table 8-1 Flowrate Measurement Displays

MODE No.	Display
MODE1	Total integrating flowrate value
MODE2	Instantaneous flowrate value
MODE3	Reset integrating flowrate value
MODE4	% flowrate reading (Instantaneous flowrate)

When the flowmeter is switched on, it starts displaying flowrate measurements. The display mode (MODE change) is externally selectable using the accessory magnet. (Display mode changes can be carried out from above the display glass, without having to uncover the transducer.)
To change display modes, follow these steps:

① Bring the accessory magnet closer to the reed switch in the upper part of the indicator (dotted in Figure 8-1) and the “MODE” number shown in the indicator will vary.

② Display mode changes cyclically change from “MODE1”(total integrating flowrate value) to “MODE2”(instantaneous flowrate value), to “MODE3”(reset integrating flowrate value), to “MODE4”(% flowrate reading) and back to “MODE1.”

(2) Resetting the reset integrating flowrate value (MODE3)
With the display screen set in the reset integrating flowrate value state (MODE3), bring the accessory magnet close to the dotted area shown in Figure 8-1 to turn on the reed switch for longer than 3 seconds.

(3) Alarm displays

When errors occur in the flowmeter, ALARM turns on and an alarm number is displayed to alert the user to the error state. Table 8-2 summarizes definitions of the alarm numbers.

Table 8-2 Alarm Numbers and Error States

ALARM No.	Error state	Flowmeter operation	Probable cause and remedial action
ALARM4	Sensor error	Measurement operation halted	- Conduit empty → Once the conduit is filled up, the flowmeter resumes its operation automatically. - Bubbles present and not full → Remove bubbles and full up the conduit. - Sensor failure → Replace the sensor.
ALARM5	Reset counter reference value error	Measurement operation carried on (integrating value likely to be invalid)	- Error on reset → Turn the power to the flowmeter off, then back on.
ALARM6	EEPROM failure (Stored data numeric error)	Measurement operation carried on (Measurement operation halted if the problem occurred at power on)	- Stored parameter data error → Correct the data in error. - Turn the power to the flowmeter off, then back on. (The validity of the power supply requires validation.) - EEPROM failure → Replace the board unit. (An EEPROM failure is most likely if the problem occurred entering parameters.)
ALARM7	RAM failure	Flowmeter operation halted	- RAM failure → Replace the board unit.
ALARM8	ROM failure	Flowmeter operation halted	- ROM failure → Replace the board unit.
ALARM9	Integrating value protection error	Measurement operation carried on (integrating value likely to be invalid)	- Stored data error on power failure → Turn the power to the flowmeter off, then back on. (The stability and validity of the power supply require validation.)
ALARM10	Data base range error	Measurement operation carried on	- A parameter loaded from EEPROM has been set to its default because it was out of bounds. → Turn the power to the flowmeter off, then back on.

* In responding to alarms as they occur, record the parameters set in the flowmeter before switching it off.

* When any of these alarms occurs, contact the customer support of the sales office closest to your location. Continued use of the flowmeter without clearing the alarms would make successful measurement unpredictable.

9. Servicing

9.1 Error Handling

While meticulous care has been taken in adjusting the product prior to shipment, if it should prove faulty when it starts up or it is running, please check it according to the table below.
If what action to take is unknown, please call our sales office nearest to your location.

Phenomenon	Point to check	Remedial action
No output is generated (even though there fluids flowing).	- Is the flowmeter wired correctly?	- Wire the flowmeter correctly.
	- Is the load resistance within specified limits?	- Hold the load resistance to within specified limits.
	- Is the conduit filled with a fluid?	- Fill up the conduit with a fluid.
	- Is the flowrate without the measurable range?	- Perform measurement within the measurable range.
Output is generated without fluids flowing	- Is the conduit filled with a fluid?	- Fill up the conduit with a fluid.
	- Isn't the fluid in the conduit fluctuating due to marked pulsations (pump pressure)?	- Prevent the fluid in the conduit from fluctuating (by having a valve installed upstream of the flowmeter).
	- Isn't the flowmeter mounted on a branch tube (T-shaped tubing)? (Effect of pulsations from T-shaped tubing)	- Install a valve at a point closer to the branch point than the flowmeter.
	- Aren't any noise sources (such as power lines and electromagnetic sources) present externally?	- Keep the flowmeter away from the noise sources. - Ground the flowmeter completely. - Use a shielded wire,
Marked instrument errors (significant measurement errors)	- Is the supply voltage within specified limits?	- Hold the supply voltage to within specified limits.
	- Is the load resistance within specified limits?	- Hold the load resistance to within specified limits.
	- Aren't any noise sources (such as power lines and electromagnetic sources) present externally?	- Keep the flowmeter away from the noise sources. - Ground the flowmeter completely. - Use a shielded wire,
	- Doesn't any flow disturbing element, such as a valve, exist just upstream of the flowmeter?	- Relocate the flowmeter (to maintain a specified straight tube length).
	- Aren't cavitations present?	- Maintain a specified line pressure to preclude cavitations.
	- Aren't bubbles present in the fluid?	- Prevent the entry of bubbles.
	- Isn't any object (foreign matter) stuck in the vortex shedding buff body?	- Remove the stuck object (foreign matter).

9.2 Precautions in Servicing

In servicing your flowmeter, take notice of these precautions:

(1) Before demounting a flowmeter mounted on a pipeline, stop the fluid flow first and fully open the valves before and after the flowmeter to discharge residual pressure from the flowmeter line.

(2) In servicing your flowmeter, turn off the power to it with the fluid flow stopped.

(3) Customers servicing their flowmeter should not make unauthorized modifications to the flowmeter, particularly those affecting the amplifier board and sensors (including their overhauls and adjustment).

⚠ CAUTION	- Before demounting the flowmeter from a pipeline, stop the fluid flow first and allow residual pressure to be discharged from the flowmeter line. (Residual pressure in the conduit could cause the internal fluid to jet out, threatening significant physical injury.)

⚠ CAUTION	- Turn off the power to the flowmeter before servicing it.

⚠ CAUTION	- Do not make unauthorized modifications to the flowmeter. - Do not overhaul or adjust the flowmeter either. - If the flowmeter should require overhauls and adjustment, please call our sales office nearest to your location.

10. Disposing of Remainder and Scrapped Materials

⚠ CAUTION	In Disposing of remainder and scrapped materials, be sure to submit them to Disposal specialists. (The incineration of remainder and scrapped materials would generate toxic gases.)

Ultrasonic Vortex Flowmeter

[Asahi AV Sensor]

ASAHI YUKIZAI CORPORATION

Distributor

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Information in this manual is subject to change without notice. 2016.4