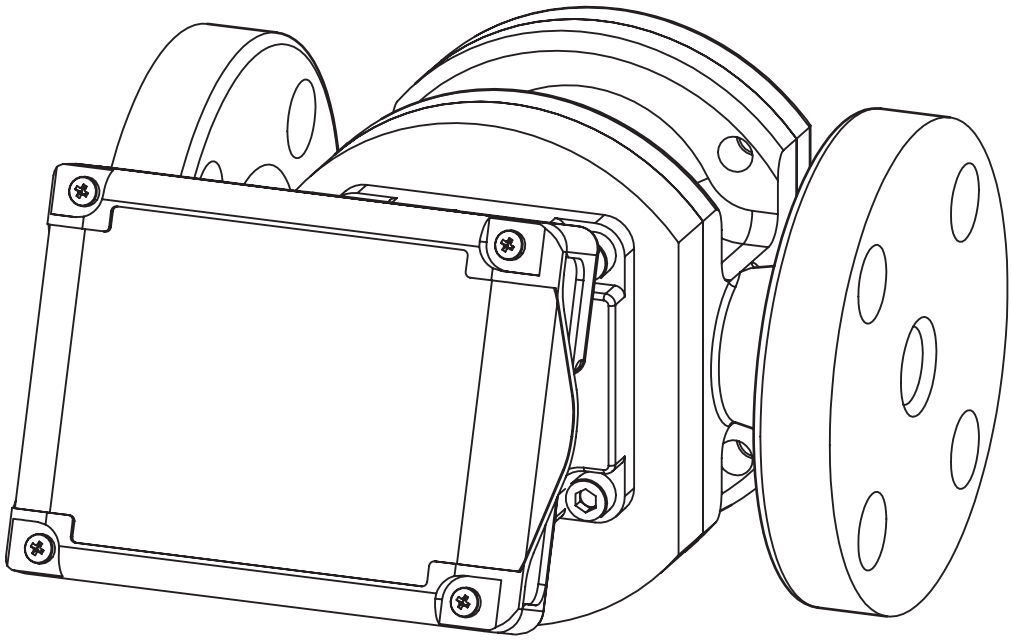
OVAL INSTRUCTIONS

Ins. No. S-212-2-E

CE

Gas meter
GAS OVAL-5G
(Indoor use, non-explosionproof)

MODEL：GAL 50 / 52 / 53 / 55 / 56 L3-5G0-□□A



Gas OVAL-5G (GAL55)

Thank you for choosing GAS OVAL-5G. This product is fabricated and shipped from our factory under stringent quality control. In order to maintain its design performance throughout its life, this manual offers the operator the necessary installation, operation and maintenance information. Be well familiar with these instructions before you place the product in service and keep this manual at the field location for ready reference.

CONTENTS

1. BEFORE YOU BEGIN 4
1.1 Confirming the Specification Plate 4
1.2 Transportation Considerations 4
1.3 Storage Considerations 4
1.4 General Consideration for Installation Location 5
1.5 Register Life 5
1.6 Battery Life 5
2. OPERATING CONDITIONS 6
3. GENERAL 6
3.1 Features 6
3.2 Part Names 6
4. INSTALLATION 7
4.1 Piping Guidelines 7
4.2 Flushing the Piping Assembly 7
4.3 Examples of Installation 8
4.4 Adjusting the Flow Direction and Display Orientation 9
5. WIRING 10
5.1 Field Wiring 10
5.2 Furnished Leads from the Meter 10
5.3 About External Power Source 10
5.4 Hook-up Diagrams 11
6. DISPLAY AND CONTROLS 12
6.1 Display and Operation Buttons 12
6.2 Display Capabilities and Operation 12
7. OPERATION 14
8. PERIODIC INSPECTION 15
9. TROUBLESHOOTING 16
10. INTERNAL SWITCHES AND TEST ELECTRODES 17
11. PARAMETER SETTING PROCEDURE 18
12. BATTERY REPLACEMENT 23
13. GENERAL SPECIFICATIONS 25
13.1 Basic Meter Specifications 25
13.2 Electronic Register Specifications 25
13.3 Accuracy and Flow Ranges 26
13.4 Register Measurement Units and Pulse Generation Units 26

(Continued on next page)

14. PRODUCT CODE EXPLANATION 27
15. OUTLINE DIMENSIONS 27
16. STRAINER 28
16.1 General Specifications 28
16.2 Pressure Losses 28
16.3 Product Code Explanation 28
16.4 Outline Dimensions 29

The indications **NOTE**, **CAUTION**, and **WARNING** shown throughout this manual are to draw your attention to specific items:

➡ NOTE

Notes are separated from the general text to bring user's attention to important information.

⚠ **CAUTION**

Caution statements call attention to user about hazards or unsafe practices that could result in minor personal injury or property damage.

⚠ **WARNING**

Warning statements call attention to user about hazards or unsafe practices that could result in serious personal injury or death.

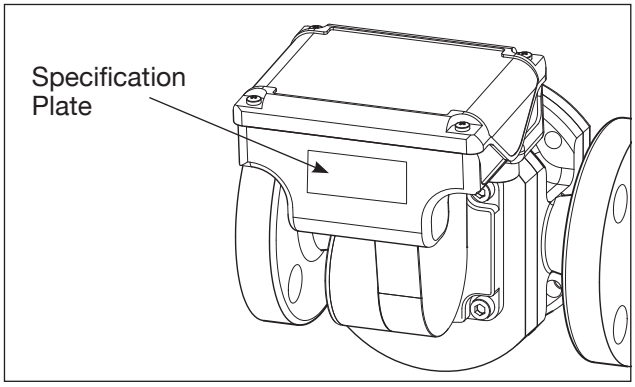
1. BEFORE YOU BEGIN

Every unit is thoroughly tested and inspected before shipment from our factory. When received, its appearance should be inspected for possible damage by rough handling during transit.
First, thoroughly read the handling precautions described in this section. For topics other than those stated in this section, refer to respective sections.
If you have any questions, contact the nearest sales office in your area.

⚠ CAUTION:
When you inquire, please specify the product name, model number, serial number, ratings/ specifications and other information.

1.1 Confirming the Specification Plate

Every OVAL product is carefully assembled and adjusted to the requested specifications. Product code number and ratings appear on the specification plate outside of the register housing. By comparing them against the GENERAL SPECIFICATIONS on page 25 and MODEL CODE EXPLANATION on page 27, make sure that the product you received is fully in compliance with your order.



1.2 Transportation Considerations

(1) In order to safeguard against damage during transportation, transport the instrument to the installation location in the style packaged from our factory if possible.
(2) This instrument is adjusted and inspected as an assembly consisting of the flowmeter, pulse generator (sensor) and register. It should therefore be handled as an assembly at all times; you should not attempt to separate the register.
(3) During transit, exercise care not to give impact shocks to the register.

1.3 Storage Considerations

If the product is stored for long periods of time upon receipt before installation, unforeseen circumstances can arise. Therefore, if a long-term storage is necessary, take the following precautions:
(1) The meter can best be stored in the original packing used for transportation from the factory.
(2) The place of storage should meet the following requirements:
★ Free from rain and water
★ Vibration and impact shocks are least encountered
★ At room temperature and humidity (around 25℃ and 65%, respectively)
(3) A meter that has once been placed in service for any length of time should be purged with clean air, nitrogen gas, etc. to remove residual metered gas completely before storage.
(4) Keep the register assembly free from organic solvents, such as thinner and alcohol.
(5) If a long term storage is expected, keep in store in the same conditions as you received from the factory.

⚠ CAUTION:
Do not disassemble or modify the register.
(The performance of modified product is not guaranteed.)

1.4 General Consideration for Installation Location

(1) The sensor assembly inside the register uses a magnetic sensor to detect magnetic fields generated by a magnet embedded in the rotor. Installation location should be sufficiently away from other sources of magnetic fields. If you plan to use a solenoid valve of approx.10 watts, locate it at least 10 centimeters from the meter (depending on given operating conditions).

(2) This meter is intended for indoor-use; place it in service in an environment free from rainwater or oil. Provide a roof overhang if the register is exposed to these weather conditions.

⚠ **CAUTION: Installation in a hazardous area is not acceptable.**

⚠ **CAUTION: To prevent damage to the register, avoid installation locations where:**

(3) Ambient temperature is out of a range of –10 to +60°C.

(4) Exposed to direct sun light.

(5) Temperature rapidly changes.

(6) Exposed to substances (oils, solvents, etc.) that deteriorate transmitter housing (material: polycarbonate)

(7) Free from rainwater and running water.

➡ **NOTE:** If operating the meter in an environment that does not meet these requirements is unavoidable, it is necessary to provide protective means, such as a protective housing or an enclosed environment.

1.5 Register Life

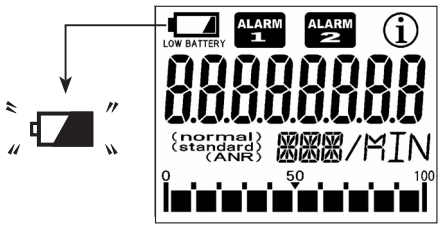
The electronic module of the register requires replacement every 10 years or so due to the life expectancy of LCD and other electronic components. The electronic module life depends on operating conditions.
Especially under the following operating condition, replacement of the entire register assembly in 5 to 6 years is recommended.

◆ Frequent start/stop of fluid metering operation

1.6 Battery Life

(1) The lithium battery incorporated in the register is good for approximately eight years (it may be reduced more or less depending on the operating and environmental conditions). Operation on external power source is recommended for the pulse output models. (Supplying external power source will save the battery.)

(2) When the battery has run down, the low alarm icon "▭" begins to flicker on the display. This blinking icon tells you to replace the battery unit within a week.
(See section 12 (4) for battery replacement procedure.)



(3) Storage life of the battery is approximately 10 years after shipment.
Normally, even in an application where the register is powered by an external source and the battery is practically free from current drain, the storage life requires replacement in approximately ten years. (Taking the above mentioned register life, replacing the entire register assembly will thus be required.)
The battery storage life may be even shorter under any of the following environments, requiring early replacement:

◎ High temperature environment
◎ High temperature fluid measurement
◎ Cold region

2. OPERATING CONDITIONS

To maintain the stated high accuracy and long service life of the meter, make sure that the flow rate, pressure, temperature, and viscosity are held within the specified ratings. These ratings appear on the nameplate placed on the meter register.
Read them carefully before you place the meter in service.

> ⚠ **CAUTION:**
> **This flowmeter cannot be used for certifying and authenticating legal transactions.**

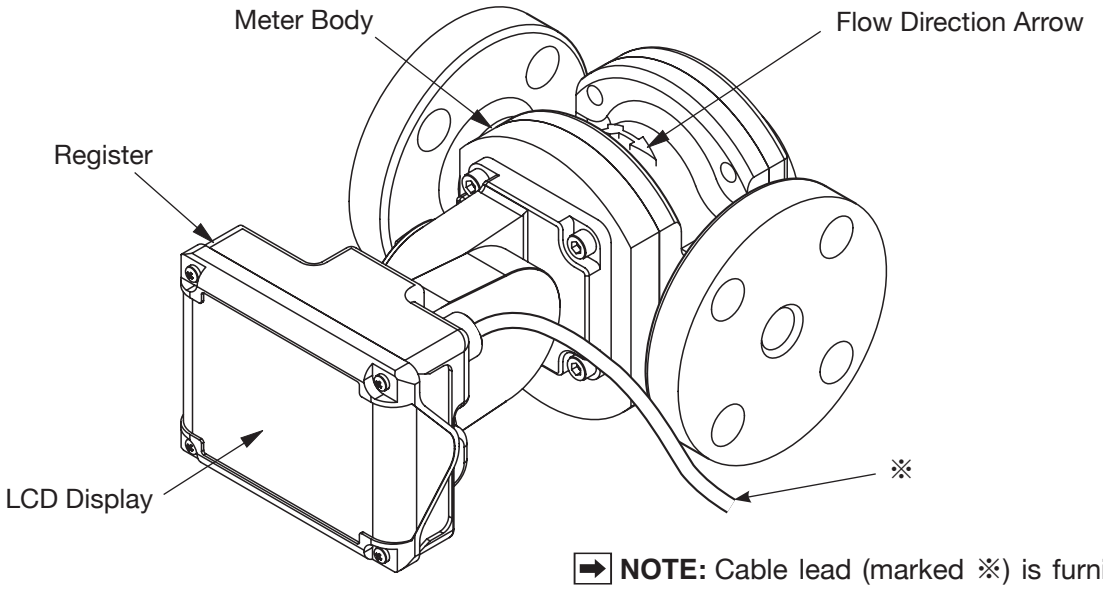
3. GENERAL

This gas service flowmeter has the same construction as the general purpose liquid service OVAL PD flowmeters proven in the field over the years for consistent accuracy. Designed and built specifically for gas flow metering, GAS OVAL-5G has a precision machined measuring chamber, making this instrument ideal for making measurement of gases in general, including air, carbon dioxide and nitrogen gases.

3.1 Features

(1) High accuracy attributable to the positive displacement technologies using two oval shaped rotors.
(2) Rotors are supported on ball bearings to reduce the pressure loss to a minimum.
(3) With the multifunction register (LCD display provided) equipped, battery powered (dedicated to local display) or externally powered (pulse generator provided) can be chosen.
(4) By selecting the electronic register with pulse generator, various remote metering systems can be developed.
(5) When used in combination with our flow computer, continuous density meter, etc., you can measure gas flow in terms of mass or gas flow corrected to standard conditions.

3.2 Part Names



➡ **NOTE:** Cable lead (marked ※) is furnished only on pulse generator equipped models.

Fig. 3.1

4. INSTALLATION

4.1 Piping Guidelines

(1) Make sure to provide a strainer (mesh count 100 or higher than 200) upstream of the meter.

> ⚠ **CAUTION: In most cases, trouble arises from clogging by foreign matter or rotors spinning out of control as a result of incorrect valve operations sequence.**

(2) Be sure to provide a bypass line. It permits uninterrupted process operation by allowing the metered gas to run through the bypass during meter and strainer servicing.

(3) Secure sufficient working space to permit access for maintenance and servicing.

① Provide sufficient workspace so that hand tools, such as a wrench, can be used when removing the meter from the pipeline.

② Periodic strainer net cleaning is required. Do not forget to secure a space to permit access to the strainer net.

(4) Provide a pressure gauge and thermometer at the inlet and outlet of the meter.

NOTE: The volume this instrument measures is the volume at the average pressure and temperature by the gauge and thermometer used.

(5) Make connections to the pipeline exercising care to avoid using excessive force (pipe strains) on the meter. Pipe strains can lead to large meter errors and even stalled rotors.

NOTE: In order to prevent pipe strains, avoid long straight pipe runs and provide bends before and after the equipment to absorb pipe strains in the bend portions.

(6) Prior to installing the equipment, thoroughly flush the piping assembly.

On a newly built piping assembly in particular, weld spatters and metal chips are often left in the piping. If gas flows into the meter in this condition, foreign solids such as metal chips may rupture the strainer net and enter the measuring chamber, cause the oval rotors to stall, resulting in costly downtime.

(See Section 4.2 Flushing the Piping Assembly.)

(7) Adjust the flow direction arrow indicated on the equipment to conform to the actual flow direction.

(8) Tighten bolts and nuts on the connecting flanges evenly and securely.

⚠ **CAUTION: Flanges are made from aluminum alloy; do not overtighten.**

(9) We recommend to test gastightness (leak check) of the piping.

⚠ **CAUTION: During a gas leak check of piping, adhere to the operations sequence in Section 7 to prevent damage to the rotors caused by violent rotor motion.**

4.2 Flushing the Piping Assembly (See figure below.)

(1) Before meter installation, install a short pipe, identical in face-to-face dimension of the meter, in place of the meter.

(2) Leave all valves open.

(3) Remove the strainer net.

(4) Using dry compressed air, flush out foreign matter left in the piping assembly.

⚠ **CAUTION: Before blowing compressed air, verify that the meter is out of the line.**

Allowing compressed air into the line with the meter will cause the meter to spin at unusually high rpm, leading to costly downtime.

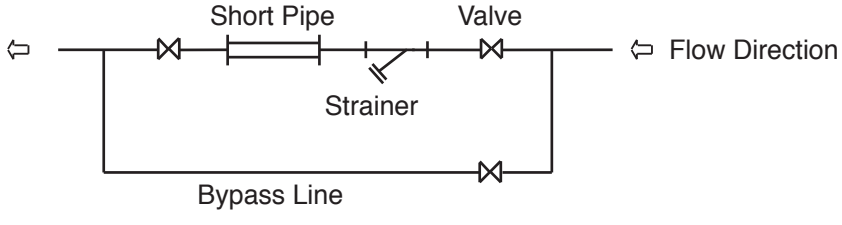


Fig. 4.1

4.3 Examples of Installation

➡ **NOTE:** ⇦Make meter-to-piping connections observing the instructions outlined in "**Piping Guidelines**" on the previous page.

⇨Outline dimensions appear on pages 27 and 29.

Horizontal Installation ….. Standard piping

※ Mark: Secure a work space at least 600 millimeters for disassembly and inspection.

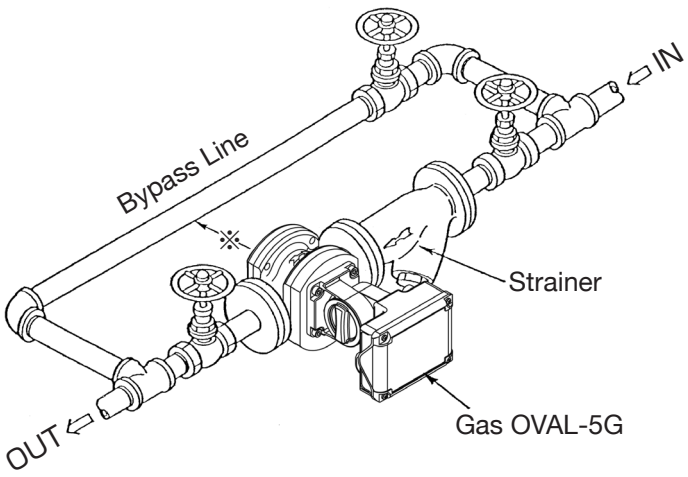


Fig. 4.2

Vertical Installation

To prevent scales falling down the piping from getting into the meter, install the meter in the bypass line.

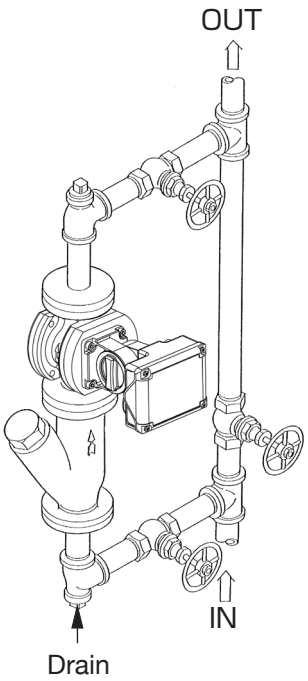


Fig. 4.3

An Example of Wrong Installation

◎ Do not install the meter as shown in the below figure.
(In the correct installation, the measuring chamber is placed in the horizontal plane.)

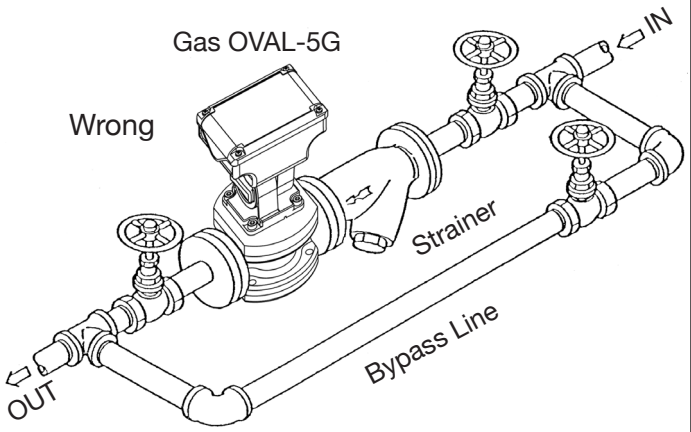


Fig. 4.4

Prevention of Induction Interference

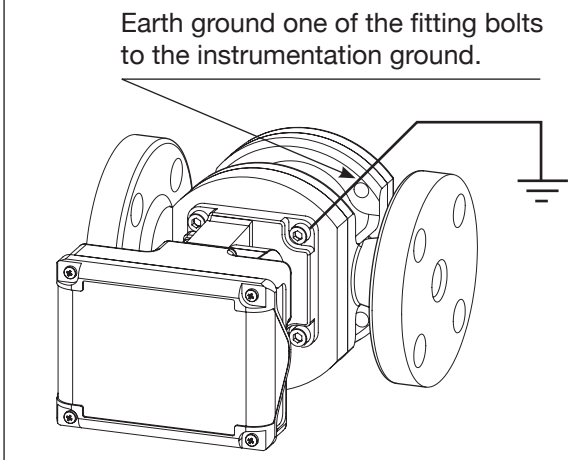


Fig. 4.5

⇨ Procedure to adjust the display orientation appears on page 9.

⇨ With pulse generator equipped model, make wiring connections according to the Wiring instructions on page 10.

4.4 Adjusting the Flow Direction and Display Orientation

(1) Procedure to adjust the flow direction.
Register's flow direction is readily and simply changed by the following steps:

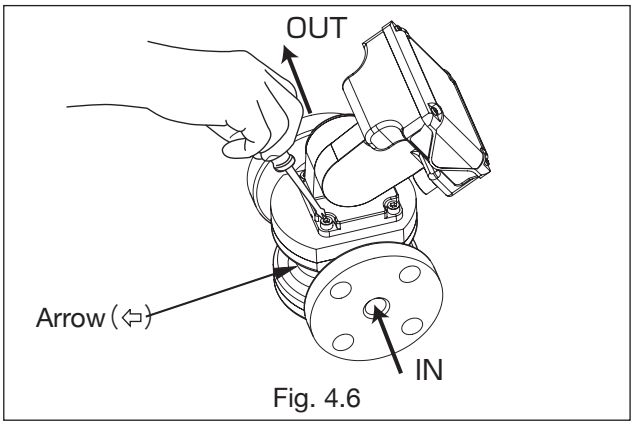


Fig. 4.6

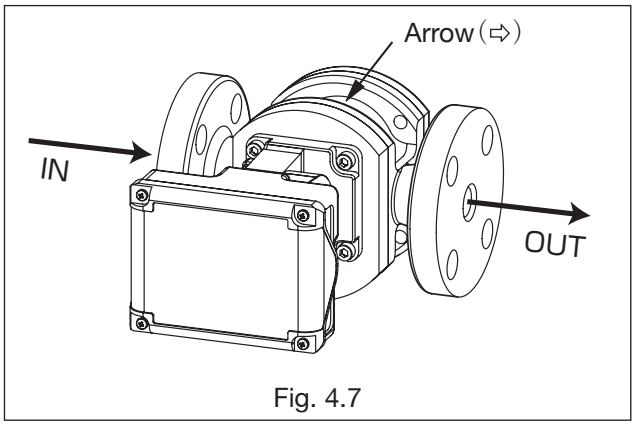


Fig. 4.7

① Remove the meter from the pipeline and separate the register from the meter body. Adjust the flow direction arrow to match the actual flow direction.
To change flow direction from right-to-left to left-to-right, turn the meter body the other way as shown above and install it back in the pipeline.

② Adjust the register to the correct orientation and tighten bolts. The same procedure applies to changing directions from left-to-right to top-to-bottom or bottom-to-top.

(2) Procedure to adjust display viewing angle
The register display can be easily adjusted by click stop in 15 deg. increment to a desired direction for maximum viewability. The adjustable range is 165 deg. upward or downward. See the sketches below.

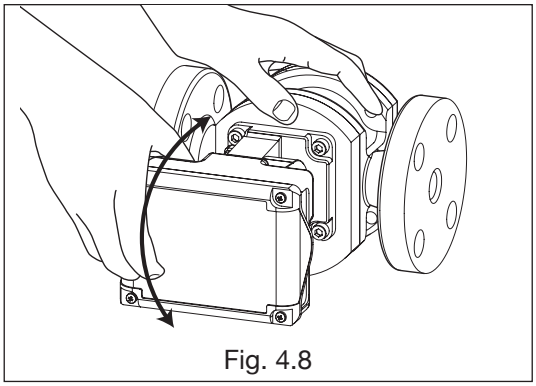


Fig. 4.8

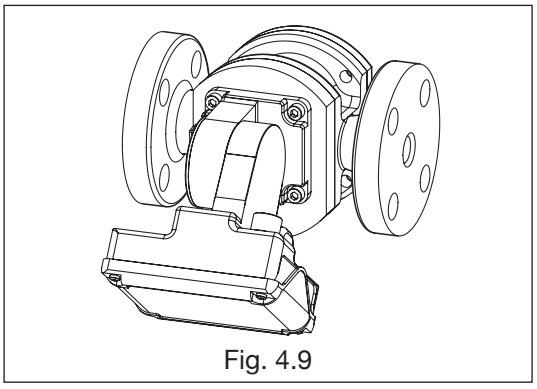


Fig. 4.9

Tilted Downward (or Upward)

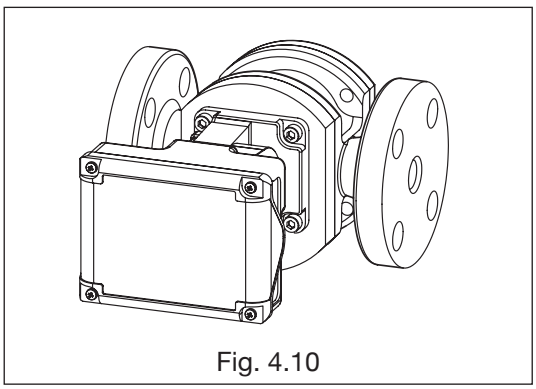


Fig. 4.10

Facing Forward (Horizontal)

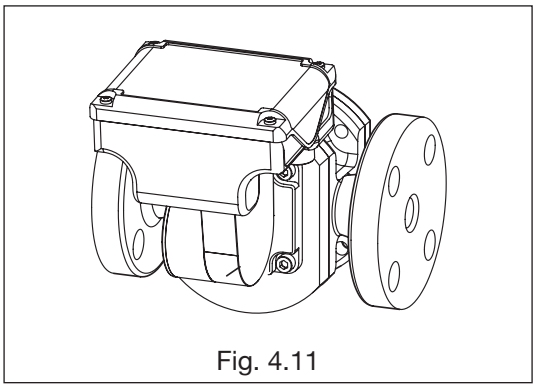


Fig. 4.11

Facing Upward (or Downward)

5. WIRING

With pulse generator equipped model, make wiring connections as follows.
Also refer to the instruction manual (wiring instructions) of the receiving instrument.

⚠ CAUTION:
Make certain that the flowmeter (pulse generator) is compatible with the receiving instrument used in combination by checking their product numbers, instrument numbers, etc.

5.1 Field Wiring

(1) Wiring Cables
This flowmeter is furnished with 1 meter-long cable (vinyl-sheathed, 4-conductor, individual elements AWG24). To extend the cable, make sure to use shielded cable (CVVS: 1.25 to 2.0mm^2) and extend the shield as well. Leave the shield end of the extended cable open..

(2) Transmission length
With transmission cable (CVVS: 1.25 to 2.00mm^2), the maximum transmission length is 1km. If using both analog output and pulse output, the transmission distance is 100m max.

➡ **NOTE:** If transmission length exceeds one kilometer, consult OVAL.

(3) Prevention of inductive interference
Route the field wiring sufficiently away from existing power cables or power circuits, if any, to minimize possible stray current pickup.

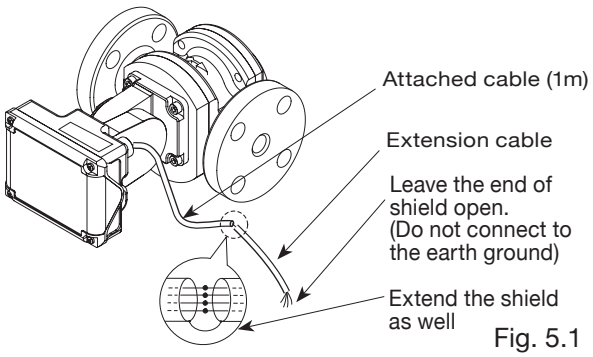


Fig. 5.1

5.2 Furnished Leads from the Meter

In case of an output capability equipped meter, a shielded cable 1 meter long is furnished. Make electrical connections by referring to the wiring nameplate attached to the register.

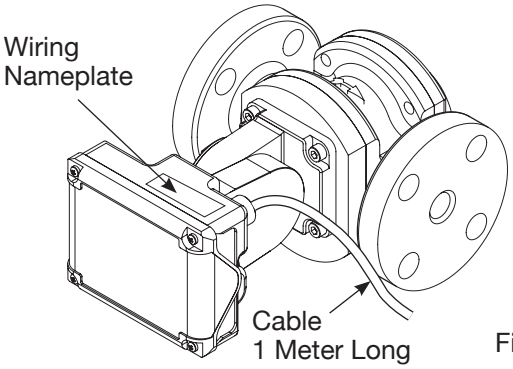


Fig. 5.2

〈Wiring Nameplate〉

●Pulse output type

BROWN	SUP.	+12 to 50 VDC
GREEN	COM.	0V
GREY	SIG.1	Factored pulse
WHITE	SIG.2	Unfactored pulse

●Pulse output + Analog output type

BROWN	SUP.	Analog output
GREEN	COM.	4 to 20mA ⟵ + 12 to 50VDC
GREY	SIG.1	Factored pulse
WHITE	SIG.2	Unfactored pulse

➡ **NOTE:**

1. BROWN is for an external power source to the register.
2. Stripping the outer insulation from the shielded cable installed exposes a yellow wire, which must not be used.

5.3 About External Power Source

⚠ IMPORTANT:

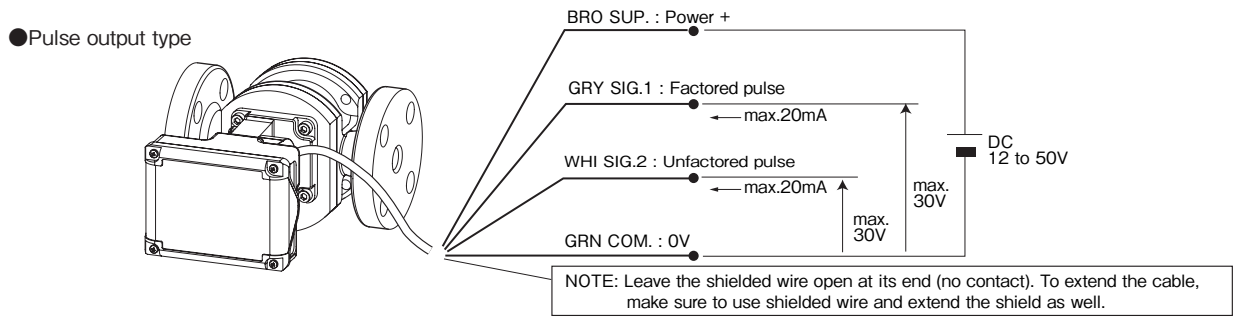
(1) The meter with external output capability can operate solely on the built-in battery. However, by supplying external power to leads BROWN and GREEN, it can work without consuming the battery. Also, even when the meter is operating on external power, do not remove the battery. (In case external power is interrupted for some reason, the operation is automatically switched to the battery drive.)

(2) The shielded cable (1 meter long) attached to the instrument with external output capability is connected to the flowmeter body within the register. Accordingly, leave the shield of the cable open on the part of the receiving instrument. (Do not connect the shield to the earth ground terminal, 0V line of the power source, etc.)

(3) An external power source is necessary for using analog output.

5.4 Hook-up Diagrams

(1) Output Circuitry



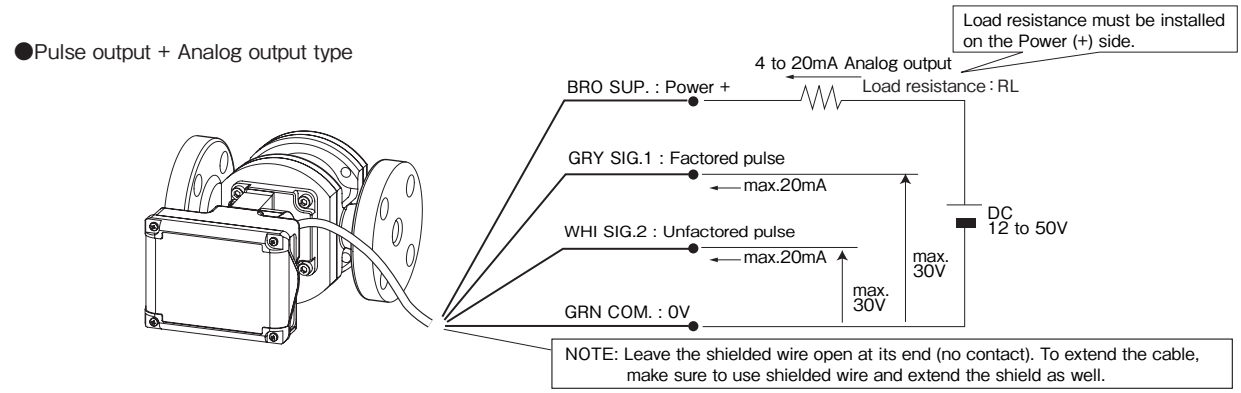


Fig. 5.3

(2) Load resistance of analog output specification

In the analog 2-wire transmission system, power source cable is also used for signal wiring. Load resistance of analog output must be installed on the + side of the power. In addition, make sure that load resistance of the meter and leads are with in the operating range shown in the right figure.

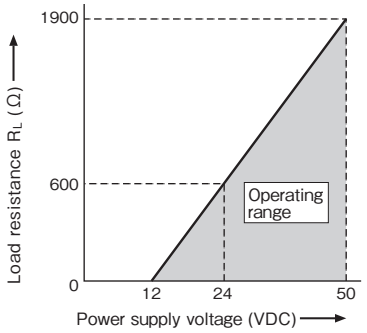
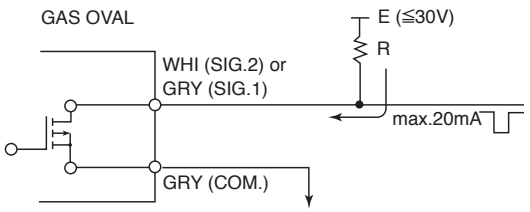


Fig. 5.4 Acceptable load resistance range

<Reference> When converting open drain pulse (equivalent of open collector) into voltage pulse:



➡ (NOTE) Select the value of load resistance R depending on E so that current flowing through MOSFET becomes 20mA or less.

Fig. 5.5

⚠ **CAUTION: 1. Both factored pulse output and unfactored pulse output are of open drain output (equivalent of open collector).**
Install the load to keep 30VDC max, and 20mA.
2. Operating out of the rating or wiring with wrong polarity may cause damage.

6. DISPLAY AND CONTROLS

6.1 Display and Operation Buttons

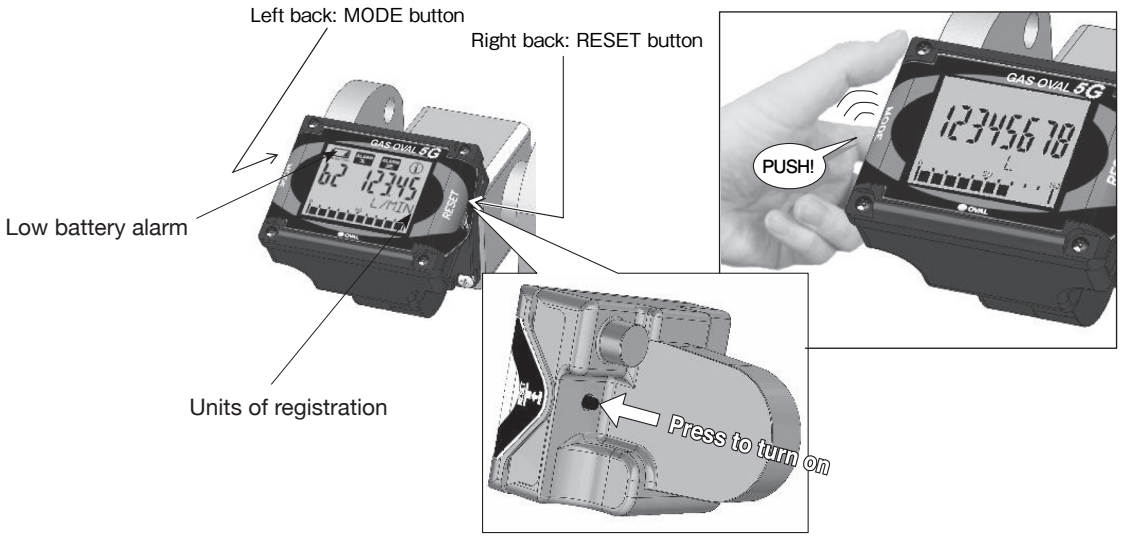


Fig. 6.1

➡ **NOTE:** About the Display Units

The units of registration can be changed.

L(std.), kL, m^3, g, kg, t, gal, ft^3, lb, /h, /min, none

Any change made to the display unit alone does not affect the process of flowrate calculation.

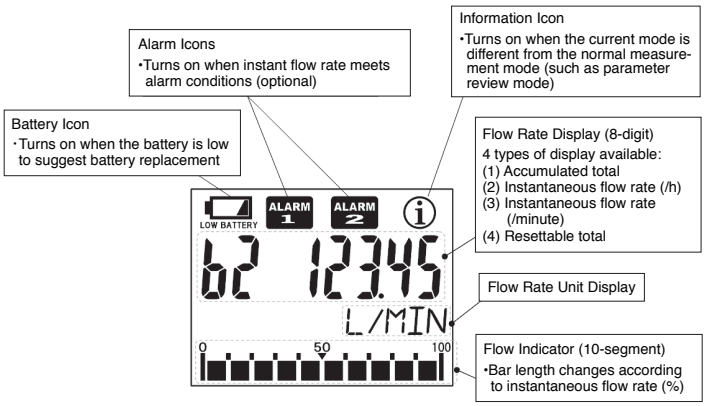
6.2 Display Capabilities and Operation

(1) Register

Because the register face can be adjusted to a desired direction in increments of 15 deg., there is virtually no limitation in choosing meter installation location. (Section 4.4 for display angle changing procedure.) Built around a microprocessor, the register is capable of various display and pulse and analog signal output for remote flow measurement. These functions operate on an internal lithium battery which eliminates the need for any external power source. (External output is also available on an external power.)

(2) LCD display

The 8-digit LCD digitally displays accumulated total, instantaneous flow rate (hourly and per-minute), and resettable total count, flow rate unit, instantaneous flow rate indicator, and low battery alarm.



(3) External output signal

〈**MODEL GAL ○○ L3-5G0-** $\frac{36}{57}$ $\frac{0}{1}$ **A**〉

Generates pulse and analog signals for remote flow measurement.

(See Section 5 for field wiring.)

Factored pulse (SIG1) → for flow totalization

Unfactored pulse (SIG2) → for flowrate indication and recording

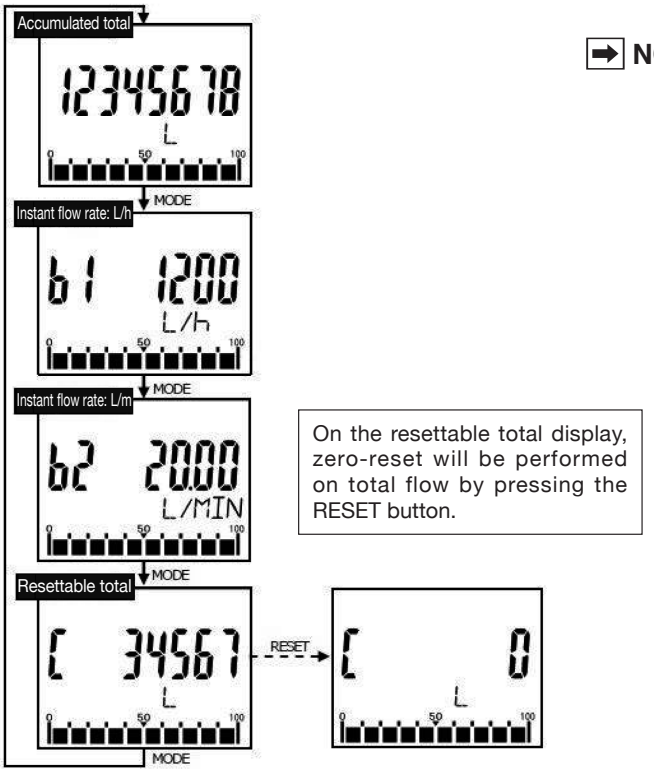
Analog output → for instantaneous flow rate monitoring

(4) Reset pushbutton

Only in the reset total "C mode," total count is resettable.

(5) Mode selector pushbutton

Each time the “MODE” pushbutton is depressed, accumulated total, instantaneous flowrate (hourly and per-minute) and resettable total are displayed sequentially.



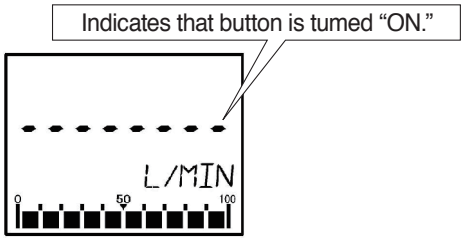
➡ **NOTE:**

1. Depressing the MODE button to obtain an instantaneous flow rate while the meter is in operation, the internal counter keeps counting the flow for accumulated total.
2. At very small flow rate below meter's minimum flow rate, the instantaneous flow rate display remains “0”.
   However, totalizing continues to count.
3. Instantaneous flow rate reading may vary depending on operating conditions and other contributing factors.
4. The display screen scrolls when the MODE button is released. Holding the MODE button down for more than 5 seconds will make a transition to parameter review mode.
5. In this instruction manual, “turned ON” refers to the state where a finger holds the button depressed.

(6) About the Displayed Messages during Operation

① Ordinary operation

When MODE button is pressed, 8 bars appear.



⇒ Immediately turning “OFF” scrolls the window to the next one.

➡ **NOTE:**

In the mode validating “RESET” button operation (resettable total mode, etc.), the same messages as above also appear in response to “RESET” button depression. (In this mode, however, there is no distinction between normal depression and prolonged depression.)

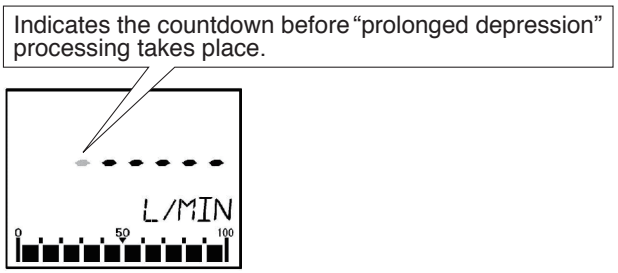
(7) Flow Indicator Display

Using full scale flow rate setting (parameter: AF) as 100%, instantaneous flow rate is indicated in 10 segments.

(The maximum flow rate of standard specification is set at the time of shipment,)

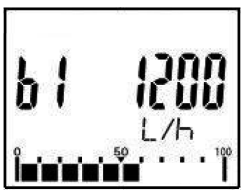
② Prolonged operation

Held depressed ON without turning “OFF” immediately. ⇒ Bars begin to disappear from the leftmost one. Indicates a countdown before “prolonged depression”processing takes place.



⇒ By holding MODE button down until the last dash disappears ,“prolonged operation” process (※) takes place. (Releasing MODE button before the last dash disappears results in the same behavior as in ① to take place.)

※ prolonged operation: Operation required for Normal mode ⇔ Parameter review mode selection, finalizing the parameter setting, etc.



7. OPERATION

To initiate operation, carefully follow the steps given below. Keep in mind to hold the flowrate within the range specified. Abruptly allowing large quantities of gas into the meter can cause a violent and uncontrollable motion of the rotors, leading to a costly downtime.

⚠ CAUTION:

This meter is specifically designed for metering extremely low flows. Use extra care in operating in-line valves. Operating the valve with one hand in the manner as shown in the right figure may result in sudden, uncontrollable inrushes of gas flow. Instead, open and close the valve gradually, using both hands.

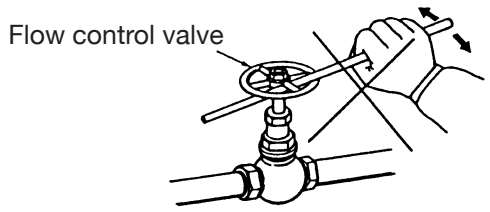
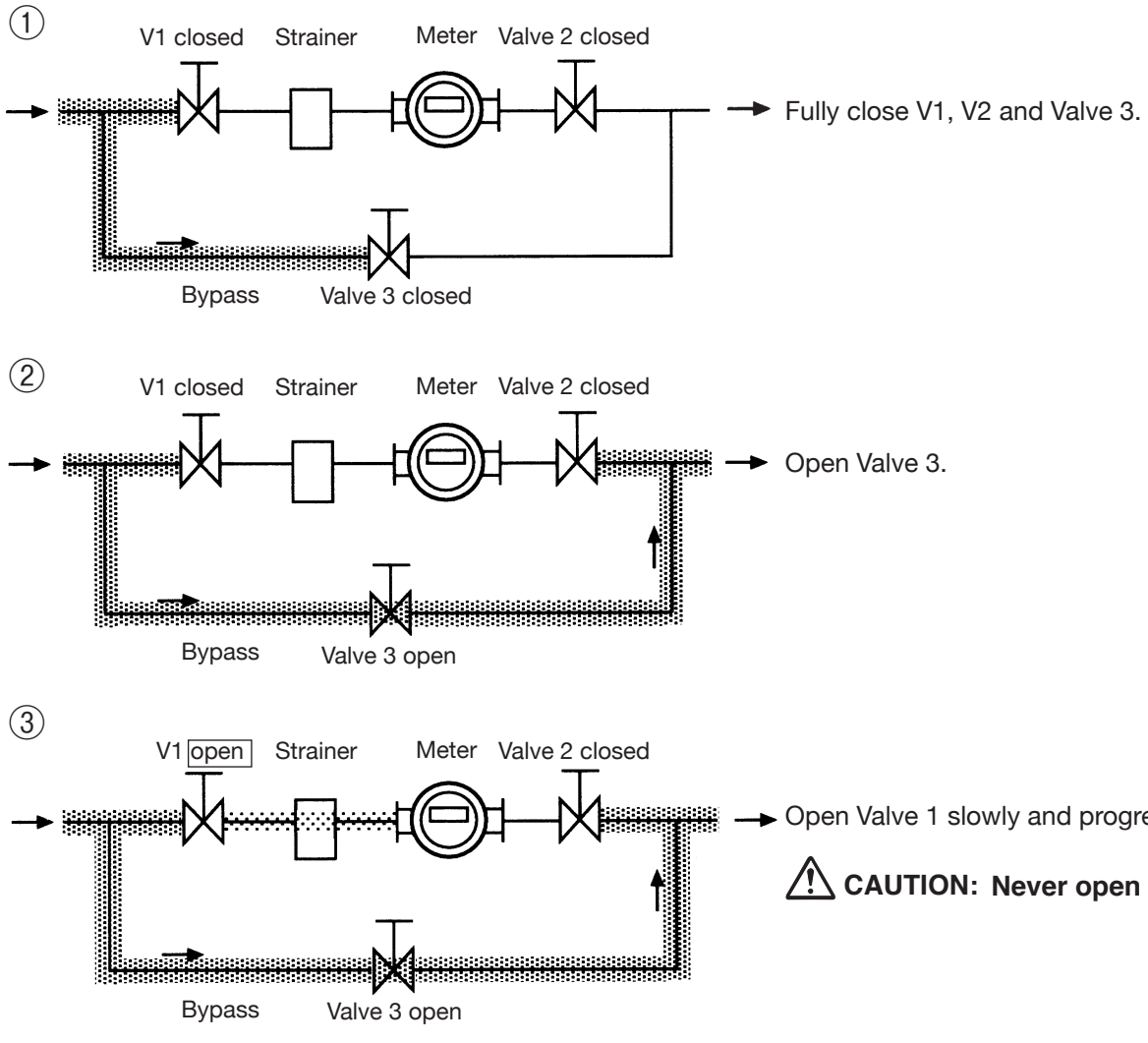


Fig. 7.1 Wrong Valve Operation

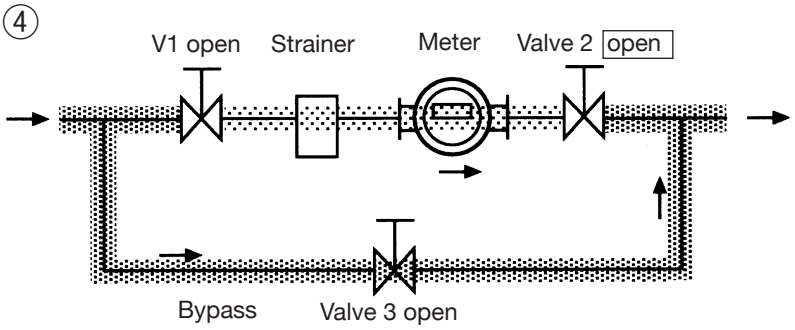
● **Safe Operation Sequence**

(1) Gases are compressible. Quick valve opening (abrupt gas flow) may cause a violent and uncontrollable motion of the meter.

(2) Good practice in valve operation sequence is shown below (steps ① through ⑤) .



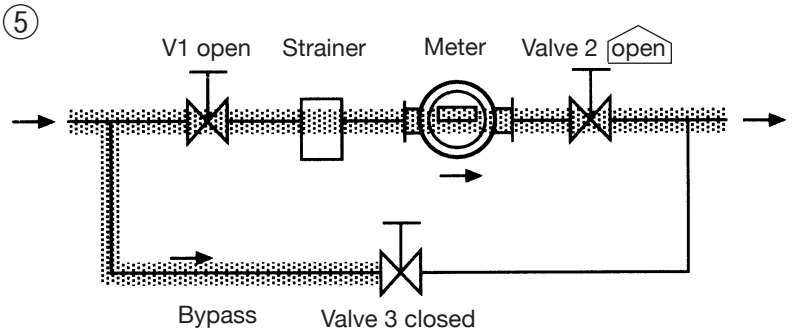
④



Open Valve 2 slowly and progressively.

⚠ **CAUTION: Never open quickly.**

⑤



Close V3 slowly and progressively until fully closed.
V1 is fully open
V3 is fully closed.
Regulate flowrate with V2.

➡ **NOTE:** Meter's flowrate adjustment

Regulate the flowrate with downstream valve V2 while verifying the instant flowrate indicated in the register which reads in L/h (mode: b1) or L/min (mode: b2). Place the meter in service within the rated flow.

8. PERIODIC INSPECTION

We suggest that the meter be inspected on a regular basis, preferably once a year.
Inspecting major components periodically will reduce the possibility of costly downtime to a minimum.
For information about periodic inspection, contact the nearest OVAL sales office or representative in your area.

⚠ **WARNING**

This gas meter is a precision instrument. Do not attempt to disassemble the basic meter body.

9. TROUBLESHOOTING

Symptom	Possible Cause	Remedy
1. Fluid will not flow.	1.Pipes are connected without removing protective covers over the inlet and outlet of flanges of the meter.	1. Remove the meter and remove the covers.
	2. Oval rotors are jammed with scales and fail to rotate, blocking the fluid flow.	2. Separate the register, disassemble and clean the meter body.
	3. Pump pressure or head pressure is low.	3.Taking pressure loss of the entire piping system into consideration, choose a pump that best suits your application. (See Section 4. INSTALLATION)
2. LCD counter (b1, b2 modes) fails to count.	1. Flowrate is too low.	1. Carefully open the valve and operate with in the rated flow range.
	2. Fluid not flowing.	2. Refer to Symptom 1.
3. Blinking "▰"on the LCD.	1. Battery voltage has dropped.	1. Replace the flowmeter, the counter unit or battery unit within a week.
4. Fluid leaks.	1. Sealed improperly.	1. Retighten pipe connections. 2. Replace the O-ring on meter body cover.
5. Fluid flows but the register fails to count	1. Rotors are installed backwards.	1. Disassemble the meter body and reinstall the rotors so that the magnets on the rotor will face the meter body cover.
6. Counts while valves remain closed (without fluid flow).	1. Fluid leak or ripple pressure of the pump is causing the rotors to oscillate.	1. Provide a check valve and accumulator.
7. Accumulated total too high.	1. Rotors in rocking motion in response to a pulsating flow.	1. Provide a check valve and accumulator.
	2. Influenced by external magnetic fields (Meter sensor senses external magnetic fields created by a motor, generator, etc.).	2. Remove external magnetic fields.
8. Accumulated total too low.	1. Influenced by external magnetic fields.	1. Remove external magnetic fields.

● NOTE:

When troubles is found other than any of those shown above, seek our service. In this case, please supply the product name, model number, symptoms or other information that will help distinguish the trouble.

■ About Error messages

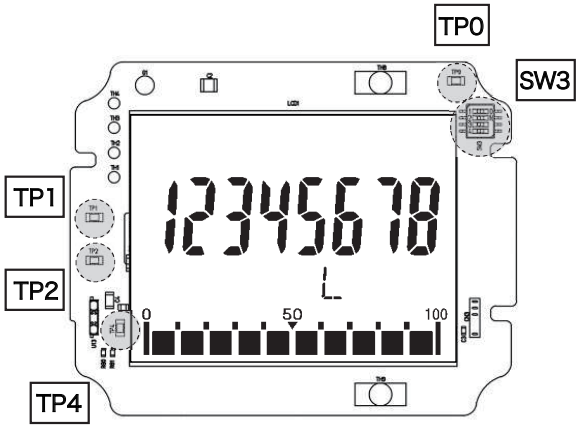
In cases of improper situations, the 5G register displays error messages on the LCD as follows:

Display	Name	Description	Remedy
PA. Err.	Parameter setup error	Rewriting a parameter is attempted although the parameter is write-protected. (In standard model, parameter write-protect function is turned OFF; it will not be shown.)	Setting No.4 of SW3 of the display board OFF cancels this condition (rewriting parameters is enabled).
PA. Err. 1	Parameter error 1	Parameter backup data has been lost.	Parameters must be reset after initializing the CPU. (Please contact the nearest sales office)
PA. Err. 2	Parameter error 2	Display modes, accumulated total flow, or resettable total flow variable has been lost.	Pressing the MODE button restores the normal measurement mode, but variables of accumulated total flow and resettable total will be reset.
PA. Err. 3	Parameter error 3	Parameter data for factory reset has been lost.	Pressing the MODE button restores the normal measurement mode, but factory reset function will remain disabled.
PA. Err. Pu	Pulse weight error	Relative to meter factor F and conversion factor H, pulse weight "Pu" setting is too small.	Adjust settings so that F, H, and Pu satisfy the following relations: F×H/2 ≦ Pu ≦ F×H×10000
Out. Err	Pulse output error	For one of the following two reasons, pulse OFF width of factored pulse output falls short of 1msec. ① Flow rate is too high ② Factored pulse width setting is too large	In case ① : Reduce the flow rate. In case ② : Adjust factored pulse width Pon to an appropriate value according to the flowmeter specification.
FS. Err	Full scale error	For one of the following two reasons, measured flow rate is more than 1.2 times the full scale setting. ① Flow rate is too high ② Full scale setting is too small	In case ① : Reduce the flow rate. In case ② : Adjust full scale setting to an appropriate value according to the flowmeter specification.
(Battery icon blinking) ▰	Low battery life	Circuit voltage is decreasing.	Replace the battery. (If replacing the battery does not clear this condition, internal failure is suspected.)

10. INTERNAL SWITCHES AND TEST ELECTRODES

With the test electrodes (TP0 through TP4) inside the register, signal waveshape and internal voltage can be monitored.

● **Internal PCB (FB board)**



Label	Name	Description
TP0 (0V)	Test electrode for monitoring reference potential (0V)	Reference potential (0V) for monitoring waveshape and circuit voltage
TP1 (FWD)	Test electrode to monitor amplified signal waveshape	For monitoring amplified magnetic sensor signal waveshape
TP2 (TRG)	Test electrode to monitor triggered signal waveshape	For monitoring triggered waveshape (rectangular wave) of signal at TP1
TP4 (4V)	Test electrode for internal voltage 4V	For testing internal circuit voltage (4V) * Output 4V while external power is supplied, output 0V when running by battery power.

➡ **NOTE:** 1. Description and handling of the waveshape monitoring test electrodes TP1 and TP2 are the same as the previous EG register. (TP3 [waveshape past the doubler] is not equipped on 5G register, however.)

2. SW3 is for factory setting and does not require further adjustment. All settings are placed in OFF at the time of shipment.

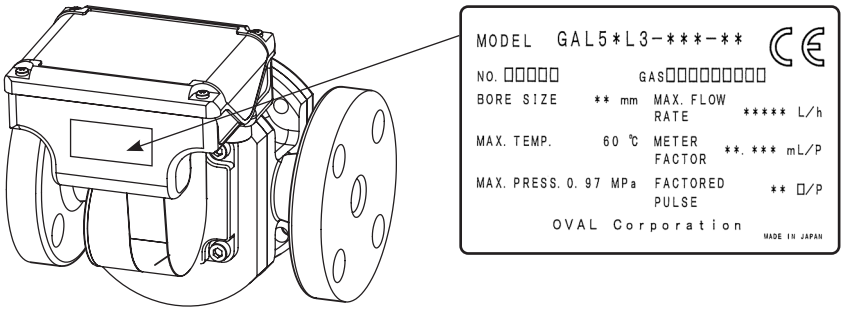
11. PARAMETER SETTING PROCEDURE

If you want to rewrite some parameters of the register, such as the unit of accumulated total, it is necessary that the parameters stored in the CPU be rewritten. If such is the case, rewrite parameters by the following procedure.

(1) Parameter Setting

In cases where replacing the entire register assembly or restoring the factory established parameter settings is desired, refer to the parameter list.

Unfactored pulse unit and factored pulse unit are stated in the specification plate (see below).



(2) Parameter List (1/2)

(NOTE: Flow unit “L” written under “Description” in the following table refers to the standard setting.)

• Total flow related data (Title Display: totAL)

Symbol	Parameter	Description	Remarks
F	Meter factor	Meter factor of the flowmeter (Unit: L/Pulse)	Example: Given meter factor 9.918mL/P (= 9.918×10^{-3} [L/P]) → Set to "F9.9180 – 3" (L/P).
H	Conversion factor	Unit conversion factor (Unit:[Converted Unit/L])	To convert total flow and instant. flow rate units to units other than L. (Normally H1.0000E0 unless unit conversion takes place.) Example: at 1.5kg per 1L, to convert the flow rate to read in kg → Conversion factor is 1.5 [kg/L] (=1.5000×10^{0}[kg/L]); Set to "H1.5000E0" [kg/L]. (Note 1)
Pu	Pulse weight	Pulse weight of factored pulse output (Unit:[L/P])	Example: To change factored pulse weight to 10L/P (=$1.00 \times 10^{+1}$ [L/P]) → Set to "Pu 1.00E1" (L/P). (Note 2)
Pon	Pulse width	ON width of factored pulse (Unit:[msec])	Example: To obtain factored pulse width of 100ms → Set to "Pon 100" (ms). (Note 3)
Un	Indicated unit	Description of unit display on the bottom of the LCD	By changing Un, units that appear on LCD can be changed. (This is a change in indicated units; it does not affect flow calculation.) Setting items: L, kL, m^3 , gal, ft^3 , g, kg, t, lb, none
SP	Total flow decimal point	Decimal point of accumulated total and resettable flow	Example: To show total flow to 0.01L (= two places below decimal point) → Set to "SP .2".
d.o1	Digital output assign. 1	Output spec. of SIG1 (Color: GRY)	Setting items: U.PLS: Unfactored pulse, PLS: Factored pulse, AL.1: Alarm 1, AL.2: Alarm 2, -: No assignment (Alarm capability is optional.)
d.o2	Digital output assign. 2	Output spec. of SIG2 (Color: WHI)	

• Instantaneous flow related data (Title Display : rAtE)

Symbol	Parameter	Description	Remarks
AF	Full scale flow rate	Full scale flow rate for flow indicator and analog output (Unit: L/h)	Example: To set full scale flow rate of analog output to 1800L/h (= flow rate that is represented by 20mA) → Set to "AF 1800" (L/h) Note that the place of decimal point depends on bP.
AdAn	Damping	Time constant for instantaneous flow rate value (Unit: [sec])	In case ripple of instant. flow rate display and analog output is too great, setting larger value for AdAn will stable the indication. Example: To set time constant of instantaneous flow rate display and analog output at [5sec] → Set to "AdAn 5.0".
bP	Instant flow decimal point	Decimal point place of per-hour instantaneous flow rate: b1 measurement	Example: To show instantaneous flow rate to 0.1 L/h (= one place below decimal point) → Set to "bP .1". Per-minute instant. flow rate: b2 is bP+2 digits
At	Sampling time	Timeout duration in instantaneous flow rate measurement (Unit: [sec])	If no flow rate pulse arrives during At [sec], instantaneous flow rate is 0.
A	Sampling cycle number	Number of sampling cycles in instantaneous flow rate measurement	Instantaneous flow rate is determined by timing the incoming flow rate pulses for A times. If dispersion in instant. flow rate indicated is too great, choosing a greater A eases the problem.

➡ **NOTE:** 1: In case of changing conversion factor (H), related parameters such as pulse weight (Pu) and indicated unit (Un) must also be changed according to the converted unit.

2: Make sure that the setting satisfies $\frac{F \times H}{2} \leqq Pu \leqq F \times H \times 10000$.

3: Be sure to set up a value such that factored pulse "OFF" duration > 1 ms.

■ Parameter List (2/2) (NOTE: Flow unit "L" written under "Description" in the following table refers to the standard setting.)

• **Alarm data (Title Display: AL)** NOTE: Not displayed on standard specification. (Displayed only on alarm option specified models) See (8) of this section for operation detail.

Symbol	Parameter	Description	Remarks
A1d	Alarm 1 Setting	Instantaneous flow rate value that triggers Alarm 1 (Unit:L/h)	(Decimal point depends on bP)
A1H	Alarm 1 Hysteresis	Alarm 1 Hysteresis setting (Unit:L/h)	(Decimal point depends on bP)
A1S	Alarm 1 Status	Status setting of Alarm 1	【Left digit of the setting】L: Low Alarm, H: High Alarm 【Right digit of the setting】S: Transistor ON during Alarm, O: Transistor OFF during Alarm
A2d	Alarm 2 Setting	Instantaneous flow rate value that triggers Alarm 2 (Unit:L/h)	(Decimal point depends on bP)
A2H	Alarm 2 Hysteresis	Alarm 2 Hysteresis setting (Unit:L/h)	(Decimal point depends on bP)
A2S	Alarm 2 Status	Status setting of Alarm 2	【Left digit of the setting】L: Low Alarm, H: High Alarm 【Right digit of the setting】S: Transistor ON during Alarm, O: Transistor OFF during Alarm

• **Analog trim (Title Display: AnA.tri.)** NOTE: Displayed only on meters with analog output capability. See (6) of this section for operation detail.

Symbol	Parameter	Description	Remarks
A04	Analog Output 4mA trim	Analog 4mA output calibration mode (Unit:mA)	Calibrated at the time of shipment. Normally unused.
A20	Analog Output 20mA trim	Analog 20mA output calibration mode (Unit:mA)	

• **Simulated output (Title Display: LooPtESt)** ※ See (7) of this section for operation detail.

Symbol	Parameter	Description	Remarks
S.b	Simulated instantaneous flow rate	Set the value of instantaneous flow rate for simulated output	Set these parameters when performing loop test and etc.
S.c	Simulated total flow	Set the value of total flow rate for simulated output	
Start	Simulated output	Execute simulated output based on the conditions set for parameters S.b and S.c	

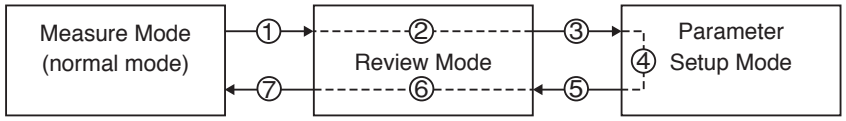
• **Service mode (Title Display : 88888888)** NOTE: These parameters are for use by OVAL service personnel.

Symbol	Parameter	Description	Remarks
I.Fr	Input frequency display	Displays frequency of flow signal detected (Unit: Hz)	These parameters are for confirming the state of device and not for setting.
O.t	Operating time	Accumulated operating time since the time of shipment (Unit: time)	
F.t	Flow operating time	Accumulated flow operating time since the time of shipment (Unit: time)	
SWM	No. of times MODE button is pressed	Shows how many times MODE button has been pressed (Unit: number of times)	
SWR	No. of times RESET button is pressed	Shows how many times RESET button has been pressed (Unit: number of times)	
th	LPF determining threshold	Threshold for determining low-pass filter (Normally disabled=set at "00")	Should not be used under normal circumstances
P.Fr.	LPF frequency	Low-pass filter setting (displayed only when tH is other than 00)	
FC.r	Factory reset	Reset all parameters to the factory setting value	
SoFt.	Software revision	For factory use	This parameter is for confirming the state of device and not for setting.

(3) Parameter Setup Procedure

With MODE and RESET buttons in the display, you can set up parameters.

A diagram to show parameter setup flow



➡ NOTES:

1. For details of button operation in steps ①, ②, ⑥, and ⑦, see (4) Menu Trees and Button Operation.
2. Throughout the text in this instruction manual, holding the MODE and RESET buttons depressed is expressed as "turned ON".

● Given below is the parameter setup procedure:

①In "Measure Mode (normal mode)," hold MODE button depressed for more than 5 seconds to go into "Review Mode."

↓

②Using MODE and RESET buttons, show the parameter you want to modify.

↓

③Hold MODE button depressed for more than 2 seconds to go into "Parameter Setup Mode."

↓

④Using MODE and RESET buttons, set up the new parameter. (For details of this operation, see (5))

↓

⑤Following the parameter entry, hold MODE button depressed for more than 2 seconds to go back to "Review Mode."

↓

⑥Using MODE and RESET buttons,
(= totAL, rAtE, AL ※1), AnA. tri. (※2), LooPtESt, 88888888)

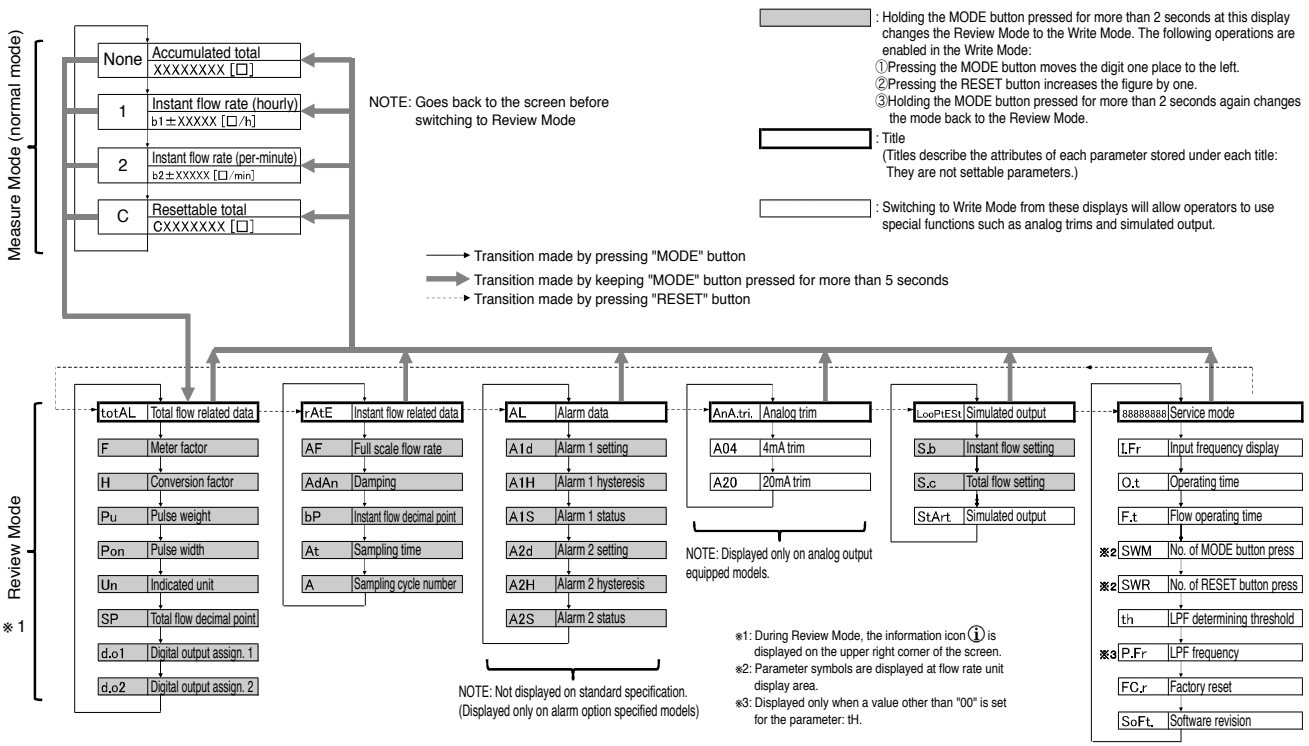
↓

⑦Hold MODE button depressed for more than 5 seconds to go back to "Measure Mode."

(※1) AL: Only with alarm option

(※2) AnA.tri.: Only for analog output equipped model

(4) Menu Trees and Button Operation



(5) The procedure to manually enter a parameter

Switch operations sequence in "Parameter Setup Mode" comes in three ways (numerical setup, decimal point setup, and item selection) that follow:

① **Numerical setup parameters (F, H, Pu, Pon, AF, AdAn, At, A, A1d, A1H, A2d, A2H)**

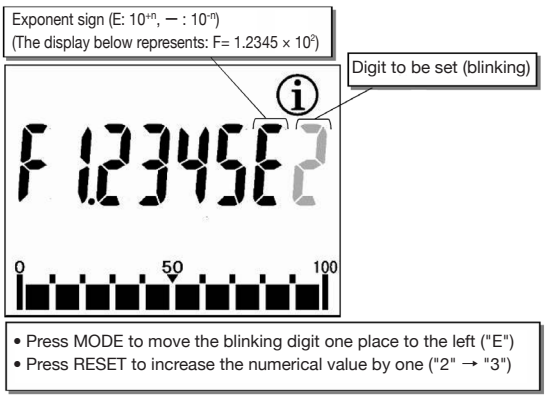
The blinking digit in the parameter setup mode is the place of interest.

MODE ···Each time the button is turned ON, the blinking place moves one place to the left.

RESET ···Each time the button is turned ON, the figure in the blinking place increases by one.
Or exponential sign toggles ("E" ⟷ "-").

→ Following the parameter setup, hold the "MODE" button depressed for 2 seconds (the new setting is established and the screen returns to the review mode).

Example: Parameter: F (meter factor)



② **Decimal point setup parameter (bP and SP)**

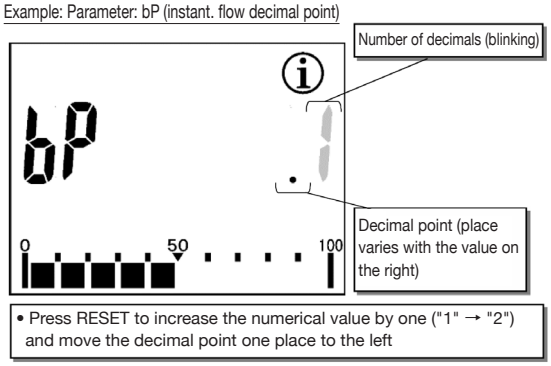
In the parameter setup mode, a figure representing the decimal places of interest flickers.

MODE ...Not used in the setup process

RESET ...Each time the RESET is pressed, the decimal point moves one place to the left and the figure increases by one.

→ When the decimal point appears at the desired location, hold the MODE button depressed for 2 seconds (the new setting is established and the screen returns to the review mode).

Example: Parameter: bP (instant. flow decimal point)



③ **Item selection parameters (Un, d.o1, d.o2, A1S, A2S)**

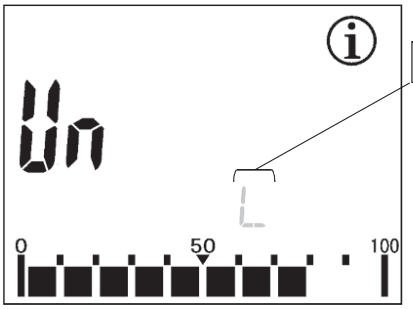
In the parameter setup mode, the flickering part of a display indicates an item subject to change.

MODE …Each time MODE is pressed, the decimal point moves one place to the left (applicable only to A1S and A2S).

RESET …Each time the RESET is pressed, the displayed item changes to the next available item.

→ When the desired item for the parameter is displayed, hold the MODE button depressed for 2 seconds (the new setting is established and the screen returns to the review mode).

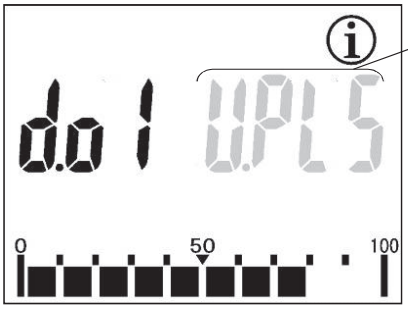
Example: Parameter: Un (indicated unit)



Display unit (blinking)

• Each time RESET is pressed, the displayed item changes to the next available item such as:
[L→kL→m³→gal→ft³→g→kg→t→lb→none]

Example: Parameter: d.o1 (digital output 1)



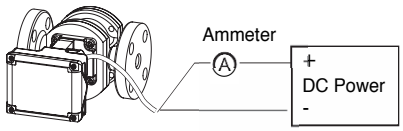
Available option for digital output 1 (blinking)

• Each time RESET is pressed, the displayed item changes to the next available item such as:
[U.PLS→PLS→AL.1→AL.2→ no output (display: ----)]

(6) Analog output trim procedure

⚠ **CAUTION: Analog output trimming (calibration of analog output characteristics) is performed at the time of shipment; there is no need to perform this procedure under normal circumstances.**

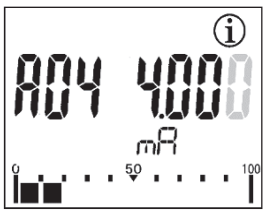
Example: 4mA trim procedure



【STEP1】 Preparation

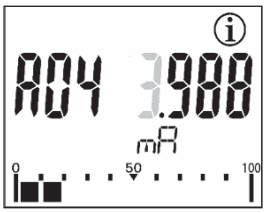
①Set up an ammeter (or voltmeter) to monitor analog output.

【STEP 2】 Begin 4mA simulated output



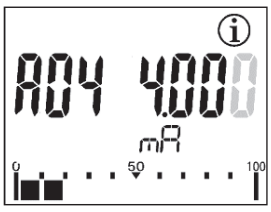
①Press MODE button for 2 seconds while [A04 4.000] is displayed
→The setting (far-right "0") starts blinking and 4mA simulated output begins.
②Once output becomes stable, read the ammeter value.

【STEP 3】 Enter simulated output current value



①Enter the ammeter reading by following the same procedure as parameter setting.
→For example, if the ammeter reads 3.988mA, enter "3.988" as shown above.
②Establish the setting by pressing MODE button for 2 seconds.
→Analog output is trimmed towards 4.000mA according to the setting.

【STEP 4】 Confirm trimmed 4mA output



①Check the ammeter reading once again.
(At this point, the display is back to [A04 4.000] with the far-right digit blinking)
②If the reading is acceptable for 4.000mA, press MODE button for 2 seconds to exit setting mode
→Trimming complete (⇒If the reading remains unacceptable, perform trimming again from procedure ④.)

→ 20mA output trim can be performed by the same procedure described above in 20mA trimming mode (A20).

(7) Simulated output function (LooPtESt)

In the parameter review mode, simulated output can be performed by specifying "Instantaneous flow rate (S.b)" and "Total flow (S.c)" then executing "Start".
Simulated output is calculated from parameters such as Meter factor, Pulse weight, Analog full scale, etc., based on "Instantaneous flow" setting.

Signals subject to simulated output

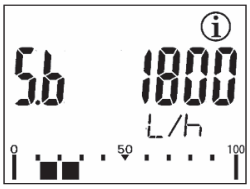
- SIG.1 and SIG.2: Unfactored pulse, Factored pulse, Alarm 1, or Alarm 2 (depends on d.o1 and d.o2 settings)
- Analog output

(NOTE)

- Simulated output does not affect actual measured values (accumulated total mode and resettable total mode)
- Due to the capability of simulated output (frequency resolution), instantaneous flow rate (S.b) value may be automatically changed to a value available for simulated output that is closest to manually set value.(The actual simulated output value of instantaneous flow rate is displayed when the setting is confirmed.)
- Although simulated output function is available while there is actual flow, the actual flow will not be measured by the register.

Example: Simulated output performed of 100L at 1800L/h

【STEP1】 Simulated instant flow rate setting

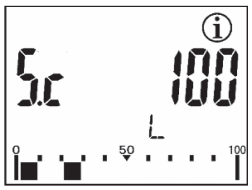


①In the parameter review mode, display the item "S.b" and press MODE button for 2 seconds.

②As the display starts blinking, enter 1800[L/h] following the same procedure as parameter setting.

③Establish the setting by pressing MODE button for 2 seconds (blinking stops).
→Press MODE button once and move to "S.c"

【STEP2】 Simulated total flow setting

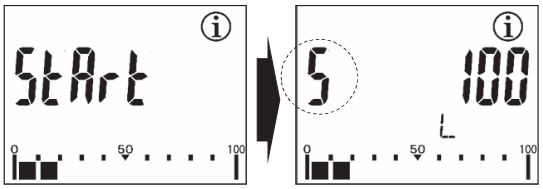


①In the parameter review mode, display the item "S.c" and press MODE button for 2 seconds.

②As the display starts blinking, enter 100[L] using the same procedure as parameter setting.

③Establish the setting by pressing MODE button for 2 seconds (blinking stops).
→Press MODE button once and move to "StArt"

【STEP3】 Begin simulated output



↑ Hold down MODE button

①In the parameter review mode, display the item "StArt" and press MODE button for 2 seconds.

②Simulated total flow setting (100) established in 【STEP2】 will be displayed indicating that it is ready for simulated output.

③Simulated output starts by pressing RESET button once, and the total counts down to zero (during simulated output, "S" on the left hand blinks).
→Pressing MODE button once during simulated output pauses the process (Press RESET button to resume).

④Simulated output is complete when the count reaches zero.
・To run simulated output again with the same setting→continue from ③
・To finish simulated output procedure, press MODE button for 2 seconds to go back to ① (StArt)

(8) About alarm output function (optional)

【Alarm related parameters and their meaning】

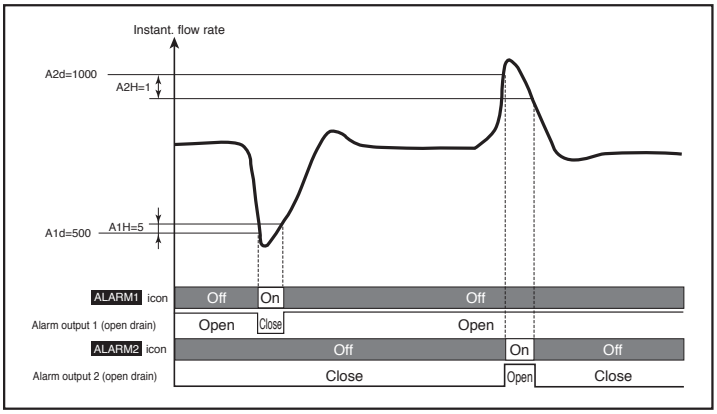
Parameter Symbol	Parameter	Description
A 1 d □□□□□	Alarm 1 Setting	Alarm flow rate setting for Alarm output 1 (Set as per-hour flow rate)
A 1 H □□□□□	Alarm 1 Hysteresis	Hysteresis for Alarm output 1 (Set as per-hour flow rate) Threshold between alarm setting value and the value at which the alarm is canceled
A 1 S △○	Alarm 1 Status	Output status of Alarm output 1 △ : High alarm or Low alarm setting Set at "H" → High alarm, Set at "L" → Low alarm ○ : State of external output during alarm (MOSFET/open drain output) Set at "S" → Short (・・・contact "Close") Set at "O" → Open (・・・contact "Open")
A 2 d □□□□□	Alarm 2 Setting	Alarm flow rate setting for Alarm output 2 (description is same as A1d)
A 2 H □□□□□	Alarm 2 Hysteresis	Hysteresis for Alarm output 2 (description is same as A1h)
A 2 S △○	Alarm 2 Status	Output status of Alarm output 2 (description is same as A1S)

- When the instantaneous flow rate exceeds (or falls below) the alarm setting, an ALARM icon will be turned on and external alarm output signal will be generated.
- Hysteresis can be set for alarm.
- There are 2 points for alarm: Alarm 1 and Alarm 2. These can be set individually.

⚠ CAUTION:

If not intending to use alarm function, "0" must be set for A1d and A2d.
→ By setting "0" for A1d or A2d, each alarm function will be disabled.

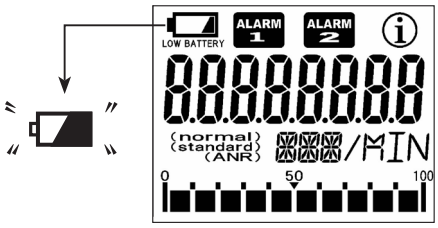
For example: If A1d=500, A1H=5, A1S=LS, A2d=1000, A2H=10, A2S=HO



12. BATTERY REPLACEMENT

(1) The lithium battery incorporated in the register is good for approximately eight years. (The battery life may be reduced more or less depending on the environmental conditions and other factors.)

(2) When the battery has run down, the low alarm icon " " begins to flicker on the display.
This blinking icon tells you to replace the battery unit within a week.



(3) This battery is a dedicated battery pack with a connector. Other commercially available batteries cannot be used. Be sure to use the battery pack dedicated to this register.

(4) Battery pack replacement

① If using external power source, disconnect the power first. Take off the four cross recess screws holding the register housing. Remove the cover to access the internal PC board. Next, hold both sides of the LCD and lift the internal PC board. The battery pack is now accessible.

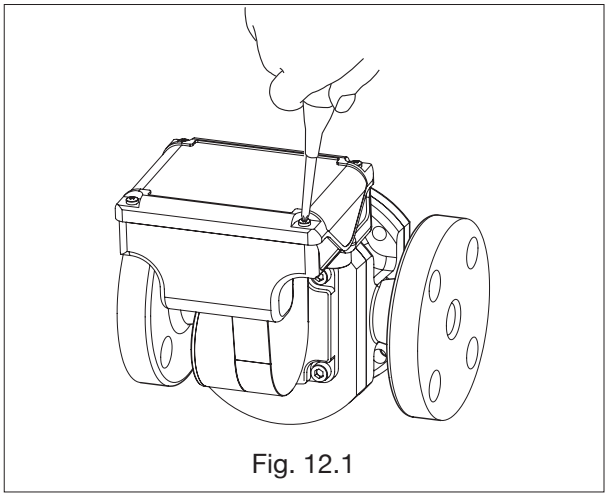


Fig. 12.1

② Pull out the battery pack and uncouple the connector from the internal PC board by holding the lead wires close to the connector and pulling it vertically up.

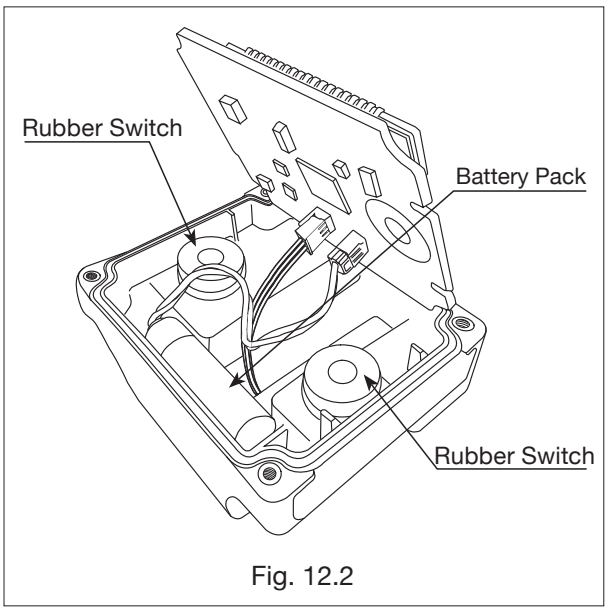


Fig. 12.2

⇨ See next page

⚠ **CAUTION:** **Over a long period of time, the rubber switches may adhere to the PC board. Use caution when lifting the PC board. If the rubber switches come off the housing, place the rubber switches back (at the dents on the sides of housing interior) then resume the procedure for battery replacement.**

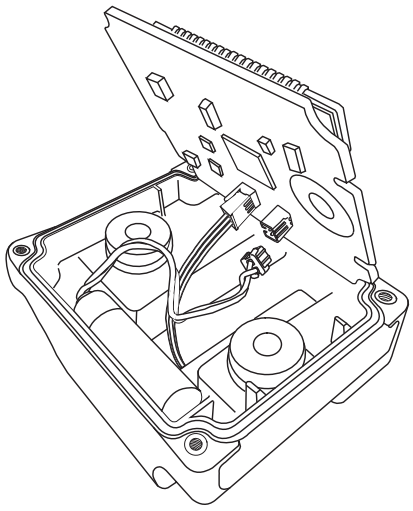


Fig. 12.3

③ Install a new battery pack in place: install it with its red wire lead on the“ +”polarity side.
Then carefully place the PC board back into its original position without jamming the lead wires between the housing and the PC board, and install the cover.

④ When installing register housing tighten four cross-recess screws to the specification below: (Allowable tightening torque: 0.4 [N • m])

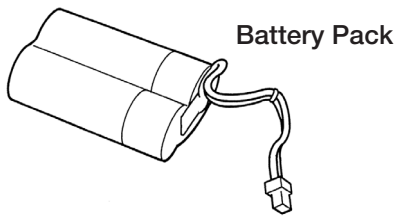


Fig. 12.4

● **Replacement battery packs are available at your nearest sales office.**

⚠ **CAUTION:**

When you separate the register housing, be extremely careful to keep moisture and dust out. Also, keep your fingers off the electronics.

13. GENERAL SPECIFICATIONS

13.1 Basic Meter Specifications

Item		Description
Nominal dia.		15, 20, 25, 40mm
Acceptable fluids		Air, nitrogen, carbon dioxide gas, town gas, LPG, etc. ※ (See Note.)
Accuracy		±1% of RD or ±1% of FS
Max. operating pressure		0.97 MPa
Hydraulic test pressure		1.47 MPa
Operating temperature range		–10 to +60°C
Process connection		Flanged (flange rating JIS 10K FF)
Materials	Meter body	Aluminum (anodized)
	Rotors	Special resin
Finish		Meter body: Munsell 7.5G7/2.5

➡ **NOTE** ※: Gases subject to the high pressure gas safety regulations, corrosive gases and oxygen are unacceptable.

13.2 Electronic Register Specifications

Item	Description		
Display	① Accumulated total flow (8-digit) ② Instantaneous flow rate, L/h (mode: b1) ③ Instantaneous flow rate, L/min (mode: b2) ④ Resettable total flow (zero start/zero resettable, mode: C) (7-digit) } Selectable with MODE button		
Function	① Low battery alarm (Low battery indicator " ▭ " flickers below 3.0V) ② LCD with 7-segment, 14mm-high characters (background color: orange) ③ Flow indicator (10-segment) ④ Simulated output: set any accumulated total or instantaneous flow rate for simulated outputs (unfactored, factored, and analog) ⑤ Protection against erroneous wire connection		
Register accuracy	Total flow: ±1 count, Instantaneous flow rate: within ±1% of full scale		
Display orientation	165° range in 15° steps (From horizontal position: upward 90°, downward 75°)		
Flow detection	Magnetic sensor detects alternating magnetic fields. Response frequency 200Hz max.		
Pulse output	Output type	Open drain (equivalent of open collector)	
	Capacity	Allowable current: 20mADC, Max. voltage applied: 30V	
	Pulse type	Factored	Unfactored
	Pulse width	1ms, 50ms, 100ms, 250ms (※1)	2ms (fixed)
Alarm output (optional)	Output type	Open drain (equivalent of open collector)	
	Capacity	Allowable current: 20mADC, Max. voltage applied: 30V	
	Alarm output point	Up to 2 points ("High alarm instant flow rate" or "Low alarm instant flow rate" can be set with any value for each output point)	
Analog output	4 to 20mADC (load resistance: see Section 5.3 "acceptable load resistance range")		
Cable	1 meter of vinyl-sheathed, 4-conductor (individual elements 0.25mm^2, φ6.3 O.D.) cable furnished (standard) (Not furnished with models without output capability)		
Transmission distance	1 kilometer max. (when CVVS: 1.25 to 2.0mm^2 cable is used) If using both analog output and pulse/alarm output, the transmission distance is 100m max. (when CVVS: 1.25 to 2.0mm^2 cable is used)		
Power source (※2)	Battery pack or external power source		
	Battery pack	Lithium battery: 3.6VDC 5400mAh Battery life: 8 years (varies with operating conditions) Storage life: 10 years	
	External power source	12 to 50VDC±10%	Pulse output : Current capacity 10mA or more Analog output : Current capacity 30mA or more
Ambient temperature range	-10 to +60°C (no condensing)		
Material	Polycarbonate (black)		
Configuration	IP65 (Install under the eaves)		

➡ **NOTE:** ※ 1: Adjustable with button operation within the range of 1 to 999ms in 1ms increments. Shown above are default settings.
※ 2: Display functions and pulse output functions can be used just with the dedicated battery pack without an external power source.
(With an external power source, there is no need to worry about the battery life. The power will be automatically switched to battery power in case of power shut-down.)
An external power source is necessary for analog output.

13.3 Accuracy and Flow Ranges

Model \ Accuracy / Nom. dia., mm		+1 −5 % of RD	±1% of RD	±1% of FS
GAL50	15	75 to 1200 L/h	180 to 1200 L/h	75 to 1200 L/h
GAL52	20	190 to 3000 L/h	450 to 3000 L/h	190 to 3000 L/h
GAL53	20	320 to 5500 L/h	750 to 5500 L/h	320 to 5500 L/h
GAL55	25	650 to 10000 L/h	1.5 to 10 m^3/h	650 to 10000 L/h
GAL56	40	1.3 to 20 m^3/h	3 to 20 m^3/h	1.3 to 20 m^3/h

13.4 Register Measurement Units and Pulse Generation Units

: Standard

Model	Total flow Units L(m^3)	Factored pulse		Factored pulse width				Unfactored pulse		Max. flowrate m^3/h
		Unit pulse L(mL)	Max. frequency Hz	1ms	50ms	100ms	200ms	Nom. meter factor mL/P	Max. frequency Hz	
50	0.01	(10)	33.3	○	–	–	–	7.908	42.15	1.2
	0.1	(100)	3.33	○	○	○	–			
	1	1	0.333	○	○	○	○			
52	0.1	(100)	8.3	○	○	–	–	19.328	43.12	3
	1	1	0.83	○	○	○	○			
	(0.01)	10	0.083	○	○	○	○			
53	0.1	(100)	15.3	○	–	–	–	35.03	43.61	5.5
	1	1	1.53	○	○	○	○			
	(0.01)	10	0.153	○	○	○	○			
55	0.1	(100)	27.8	○	–	–	–	69.21	40.14	10
	1	1	2.78	○	○	○	–			
	(0.01)	10	0.278	○	○	○	○			
56	1	1	5.6	○	○	–	–	149.31	37.21	20
	(0.01)	10	0.56	○	○	○	○			
	(0.1)	100	0.056	○	○	○	○			

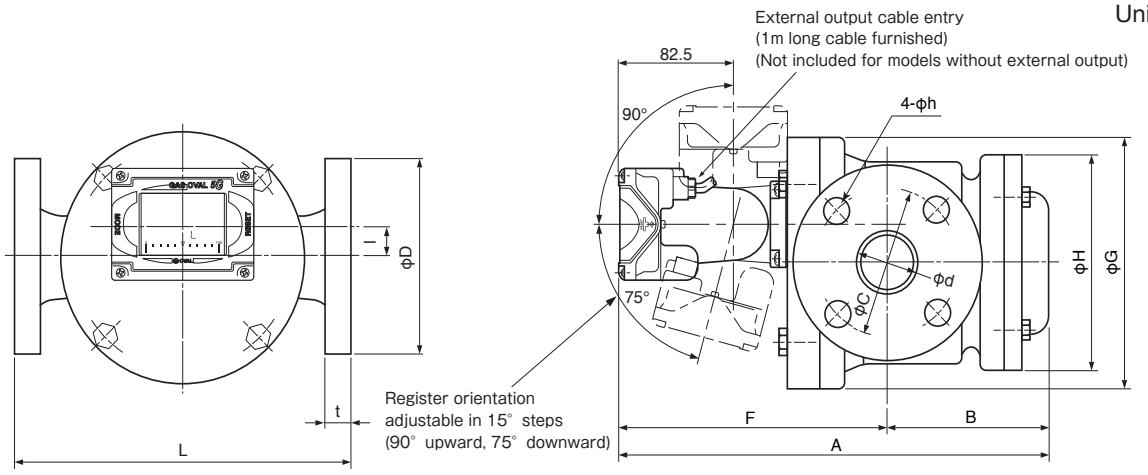
14. PRODUCT CODE EXPLANATION

Item	Product Code ①②③④⑤⑥⑦–⑧⑨⑩–⑪⑫⑬	Description
Model	G A L	Gas OVAL (Gas Meter)
Meter size	5 0	Nominal dia. 15 mm
	5 2	20 mm
	5 3	20 mm
	5 5	25 mm
	5 6	40 mm (※1)
Material	L	Meter body: Aluminum alloy Rotors: Special resin
Process connection	3 –	Flanged (JIS 10K FF)
Register	5 G	Gas OVAL-5G (indoor use, non-explosionproof)
Function	0 –	Non-explosionproof
Pulse generator	0 0	No output capability (Local display only)
	3 0	Factored pulse (pulse width 1ms) + Unfactored pulse (※2)
	5 0	Factored pulse (pulse width 50ms) + Unfactored pulse (※2)
	6 0	Factored pulse (pulse width 100ms) + Unfactored pulse (※2)
	7 0	Factored pulse (pulse width 250ms) + Unfactored pulse (※2)
	3 1	Factored pulse (pulse width 1ms) + Unfactored pulse (※2) + Analog output or Analog output only (※3)
	5 1	Factored pulse (pulse width 50ms) + Unfactored pulse (※2) + Analog output
	6 1	Factored pulse (pulse width 100ms) + Unfactored pulse (※2) + Analog output
	7 1	Factored pulse (pulse width 250ms) + Unfactored pulse (※2) + Analog output
Version code	A	Always "A"

➡ **NOTE:** ※ 1 : When ordering meter size 56:
If intended use is flammable gas measurement in EU member countries, please select the EX register model with ATEX explosionproof specification regardless of explosionproof requirement.
※ 2 : Unfactored pulse width is fixed at 2ms.
※ 3 : If using analog output only, "Factored pulse (1ms) + Unfactored pulse (2ms) + Analog output" will be the specification. Wire analog output lines (2 lines of the power wire) and leave the ends of pulse output (SIG.1 and SIG.2) cables open (not connected).

15. OUTLINE DIMENSIONS

Unit: mm



Meter size	L	d	D	t	C	h	A	B	F	G	H	I	Weight kg
50	150	15	95	16	70	15	219.5	57	162.5	100	100	6.0	2.2
52	200	20	100	18	75	15	230.5	63	167.5	120	120	10.0	3.1
53	200	20	100	18	75	15	255.5	75.5	180	120	120	10.0	3.5
55	230	25	125	18	90	19	274.5	90	186.5	155	155	14.5	6.3
56	250	40	140	20	105	19	309.5	117	192.5	180	155	20.5	9.1

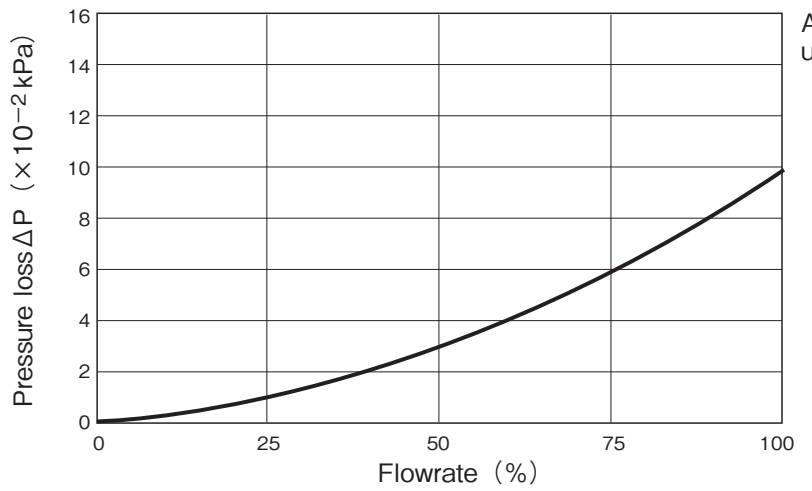
16. STRAINER

To safeguard the meter against foreign solids and debris in the fluid, do not fail to provide a strainer upstream of the meter.

16.1 General Specifications

Item		Description
Nominal dia.		15 (1/2"), 20 (3/4"), 25 (1"), 40 (1•1/2")
Max. operating pressure		0.97 MPa
Hydraulic test pressure		1.47 MPa
Connecting flange		JIS 10K FF
Materials	Meter body	Copper alloy (CAC406)
	Filter net	SUS304 (100 or 200 mesh screen)
Finish		Munsell 2.5G 8/2

16.2 Pressure Losses



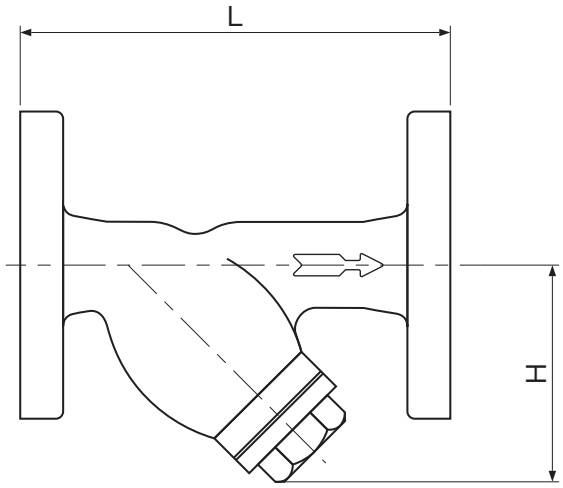
Air at room temperature
under atmosphenic pressure

※Ratio to the maximum flowrate of GAS OVAL to be connected

16.3 Product Code Explanation

Item	Product Code								Description
	①	②	③	–	④	⑤ ⑥	⑦	⑧	
Model	Y	F	1						Strainer
Application					1				For use with Gas Oval
Nominal dia.						1 3			15 mm (for Gas OVAL meter size 50)
						1 4			20 mm (for Gas OVAL meter size 52 and 53)
						1 5			25 mm (for Gas OVAL meter size 55)
						1 7			40 mm (for Gas OVAL meter size 56)
Material							A		Meter body: Copper alloy (CAC406) Screen: Stainless steel (SUS304)
Process connection								1	Flanged, JIS 10K FF

16.4 Outline Dimensions



Material Nominal dia. mm	CAC406			Screen mesh
	L mm	H (approx.) mm	Approx. weight kg	
15	125	60	2.5	200
20	140	70	3.0	100
25	160	80	4.5	100
40	190	105	6.5	100

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