



Gas Flow Monitor

Model CMG

User's Manual



Thank you for purchasing your Azbil Corporation product.

This manual contains information for ensuring the safe and correct use of the product.

Those designing or maintaining equipment that uses this product should first read and understand this manual. This manual contains information not only for installation, but also for maintenance, troubleshooting, etc. Be sure to keep it nearby for handy reference.

Azbil Corporation

Please read "Terms and Conditions" from the following URL before ordering and use.

<https://www.azbil.com/products/factory/order.html>

NOTICE

Please make sure that this manual is available to the user of the product.

Unauthorized duplication of this user's manual in part or in whole is forbidden. The information and specifications in this manual are subject to change without notice.

Considerable effort has been made to ensure that this manual is complete and accurate, but if you should find an omission or error, please contact us.

In no event is Azbil Corporation liable to anyone for any indirect, special, or consequential damages as a result of using this product.

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Conventions Used in This Manual

- The safety precautions explained below aim to prevent injury to you and others, and to prevent property damage.



WARNING Warnings are indicated when mishandling this product may result in death or serious injury.



CAUTION Cautions are indicated when mishandling this product may result in minor injury or property damage only.

- In describing the product, this manual uses the icons and conventions listed below.



Indicates that caution is required in handling.



The indicated action is prohibited.



Be sure to follow the indicated instructions.



Handling Precautions:

Information to be aware of when handling.



Note:

Indicates information that may be useful.












Indicates an item or page to which the user may refer.

(1) (2) (3):













Steps in a sequence or parts of a figure, etc.

Safety Precautions

WARNING

	<p>When using combustible gas, install the device upstream of the safety shut off valve. If air somehow enters the piping, and the sensor makes a spark due to some cause like a lightning strike when an explosive mixture is present, an explosion could occur inside the pipe.</p>
	<p>On flanged models, do not use the device or installed pipes as a footrest. Doing so might damage the device or piping, or cause a slip which might result in injury.</p>
	<p>Flanged models are heavy. Dropping them on your feet may cause injury.</p>
	<p>Do not wire the device with wet hands or when the device is powered. There is a danger of electric shock.</p> <p>Before starting the wiring work, be sure to dry your hands or use appropriate gloves, and turn off the power.</p>
	<p>Before opening the cover to wire the device, turn off the power. Otherwise there is a danger of electric shock.</p>
	<p>The device is intended for use with fuel gas 13A, air, propane, and butane. Do not use the device for other types of gases. Use of the gases having an ignition temperature lower than 365°C may cause an internal pipe explosion.</p> <p>A heater incorporated in a sensor could act as an ignition source if air has entered the piping and explosive mixed gas is produced.</p>
	<p>Use the analog outputs and alarm contact outputs on the device for monitoring the gas flow rate of a burner or other equipment. Do not use these outputs in applications where safety will be impaired when an analog output abnormality or alarm contact output malfunction occurs.</p>
	<p>Before removing, mounting, or wiring the CMG, be sure to turn off the power to the CMG and all connected devices. Failure to do so might cause electric shock.</p>
	<p>After completing the wiring work, reattach the operation panel and display before turning on the power. Otherwise there is a danger of electric shock.</p>

CAUTION

	Be sure to use this product within the flowrate range stated in the specifications. To prevent excessive flow, use a suitable means to control the supply pressure or use a throttle valve or the like to control the flowrate. If the flowrate exceeds the upper limit, both the flowrate display and the output voltage/current may indicate considerably lower values than the actual flowrate.
	If damage could result from the abnormal functioning of this device, include appropriate redundancy in the system design.
	This device is a precision instrument. Do not drop it nor subject it to shock. Doing so might damage the device.
	Do not peel off the pipe connection port seals until immediately before you connect the piping. Doing so might allow foreign objects to enter the connector port and cause defective operation.
	If pipes may contain rust, welding fumes, slag, water droplets, oil mist or dust, install a filter upstream to prevent foreign matter from entering the device. Foreign matter may cause faulty operation.
	When wiring, take care not to tug on the display. The components inside might become damaged.
	Be sure to check that the wiring is correct before you turn the power ON. Incorrect wiring may cause damage or malfunction.
	Connect the power supply last. Otherwise touching terminals by mistake may cause electric shock or damage the device.
	Make sure that the load to be connected to terminals does not exceed the rating indicated in the specifications.
	Supply power at the voltage indicated on the model number label on the device.
	Take the necessary countermeasures with the instrumentation to prevent the occurrence of backfire and to avoid any influence to the device even if backfiring occurs. Pressure increase in the piping or fire caused by backfire of the burner could damage the device.
	When disposing of the device, observe local regulations.

Contents

Conventions Used in This Manual

Safety Precautions

Chapter 1. INTRODUCTION	1
■ Introduction	1
■ Features	1
■ Model selection guide	2
 Chapter 2. NAMES AND FUNCTIONS OF PARTS	 6
 Chapter 3. MOUNTING AND WIRING	 7
■ Mounting	8
■ Behavior when the flowrate greatly exceeds the upper limit of flowrate range	10
■ Pipes	11
■ Wiring	18
 Chapter 4. OPERATION	 23
■ Displaying the flow rate	23
■ Resetting alarms	25
■ Resetting the integrated flow rate	25
■ Displaying the total flow rate	26
 Chapter 5. APPLICATION OPERATION	 28
5-1 Function Setup	28
■ Setting operation	28
■ Function setup item list	29
■ Setting operation	31
5-2 Parameter Setup	31
■ Parameter setup item list	32
 Chapter 6. MAINTENANCE AND TROUBLESHOOTING	 34
■ Troubleshooting	34

Chapter 7. SPECIFICATIONS	35
■ CMG Series specifications	35
■ Individual CMG model specifications	37
■ Pressure loss	40
■ External dimensions	42

-MEMO-

Chapter 1. INTRODUCTION

■ Introduction

The CMG Gas Flow Monitor is a flowmeter for measuring the fuel flow rate of gas burners. It uses the Micro Flow sensor chip, a thermal mass flow sensor made using Azbil Corporation proprietary technology.

The CMG measures and displays the instantaneous and integrated flow rate in normal standard state* without the need for temperature and pressure conversion.

Other functions include alarm contact output, analog output of instantaneous flow rate, and open collector output of totalizer pulse or event output.

These functions enable fine-grained air-fuel ratio management of individual burners and flow rate management of combustion equipment.

* Factory setting is 0°C, 101.325kPa (1 atmosphere). (The reference temperature can be selected from 5°C, 10°C, 15°C, 20°C and 25°C according to the function settings.)

■ Features

- Installation of the compact and high-precision CMG is simple. It can be mounted in any direction, as the direction of the display can be changed.
- Gas flow rate can be measured and managed easily on the digital flow rate display and Hi, Lo, OVER and ALARM LED displays.
- Output of the gas flow rate upper/lower limit settings and analog output of instantaneous flow rate are convenient for panel display or flow rate management purposes.
- Fuel usage can be easily understood because the instantaneous flow rate and integrated flow rate displays can be switched by one-touch operation.
The total flow rate since this device was installed can be displayed.
- Compensation of display values is not needed even if temperature and pressure change as the measurement method used is mass flow.
- A bypass structure using an orifice enables low pressure loss, and prevents the influence of mist, etc.
- Self-diagnostic functions simplify remedies during troubleshooting.

■ Model selection guide

Model selection guide

CMG I II III IV V VI VII VIII IX

● Air model

Basic model No.	I Pipe size	II Pipe shape	III Gas type	IV Flow rate range	V Output	VI Pressure	VII Commu- nication	VIII Power supply	IX Additional	Description
CMG										Gas flow monitor
	15									15A (1½B)
	25									25A (1B)
	40									40A (1½B)
	50									50A (2B)
		0								Rc thread
		1								JIS 10K flange (40A, 50A only)
			A							Air
				004						4 m³/h (normal) (CMG15) *1
				010						10 m³/h (normal) (CMG25) *1
				030						30 m³/h (normal) (CMG25) *1
				080						80 m³/h (normal) (CMG40/50) *1
				150						150 m³/h (normal) (CMG40/50) *1
					0					1 to 5 V output (4, 10, 30 m³/h only) *3
					1					4 to 20 mA + event output 2
						0				Low pressure (Rc thread only)*2
						1				Medium pressure (CMG40,80 of JIS 10K flange)*2
							0			Not available
								0		24 V DC
								1		100 V AC (50/60 Hz)
								2		200 V AC (50/60 Hz)
								3		220 V AC (50/60 Hz) *6
									00	None
									D0	With inspection report

● Fuel gas(13A-46MJ/m³) model (LNG CH₄: 88%) *4

Basic model No.	I Pipe size	II Pipe shape	III Gas type	IV Flow rate range	V Output	VI Pressure	VII Commu- nication	VIII Power supply	IX Additional processing	Description
CMG										Gas flow monitor
	15									15A (½B)
	25									25A (1B)
	40									40A (1½B)
	50									50A (2B)
		0								Rc thread
		1								JIS 10K flange (40A, 50A only)
			N							Fuel gas 13A
				004						4 m ³ /h (normal) (CMG15) *1
				010						10 m ³ /h (normal) (CMG25) *1
				030						30 m ³ /h (normal) (CMG25) *1
				080						80 m ³ /h (normal) (CMG40/50) *1
				150						150 m ³ /h (normal) (CMG40/50) *1
					0					1 to 5 V output (4, 10, 30 m ³ /h (norm.) only)*3
					1					4 to 20 mA + event output 2
						0				Low pressure (Rc thread only) *2
						1				Medium pressure (JIS 10K flange only) *2
							0			Not available
								0		24 V DC
								1		100 V AC (50/60 Hz)
								2		200 V AC (50/60 Hz)
								3		220 V AC (50/60 Hz) *6
									00	None
									D0	With inspection report

● Fuel gas (13A-45MJ/m³) model


Basic model No.	I Pipe size	II Pipe shape	III Gas type	IV Flow rate range	V Output	VI Pressure	VII Commu- nication	VIII Power supply	IX Additional processing	Description
CMG										Gas flow monitor
	15									15A (½B)
	25									25A (1B)
	40									40A (1½B)
	50									50A (2B)
		0								Rc thread
		1								JIS 10K flange (40A, 50A only)
			G							Fuel gas 13A-45MJ (Gas composition compensation coefficient: 1.029) *5
				004						4 m ³ /h (normal) (CMG15) *1
				010						10 m ³ /h (normal) (CMG25) *1
				030						30 m ³ /h (normal) (CMG25) *1
				080						80 m ³ /h (normal) (CMG40/50) *1
				150						150 m ³ /h (normal) (CMG40/50) *1
					0					1 to 5 V output (4, 10, 30 m ³ /h (norm.) only)*3
					1					4 to 20 mA + event output 2
						0				Low pressure (Rc thread only)
						1				Medium pressure (JIS 10K flange only) *2
							0			Not available
								0		24 V DC
								1		100 V AC (50/60 Hz)
								2		200 V AC (50/60 Hz)
								3		220 V AC (50/60 Hz) *6
									00	None
									D0	With inspection report

● Propane model

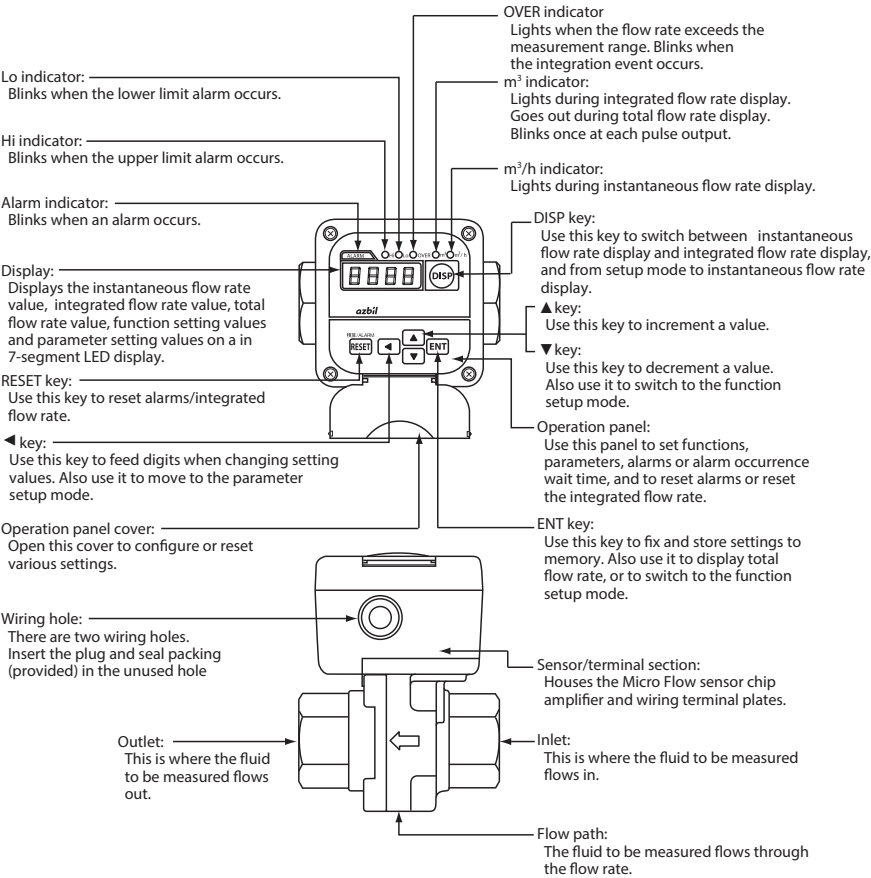
Basic model No.	I Pipe size	II Pipe shape	III Gas type	IV Flow rate range	V Output	VI Pressure	VII Commu- nication	VIII Power supply	IX Additional processing	Description
CMG										Gas flow monitor
	15									15A (½B)
	25									25A (1B)
	40									40A (1½B)
	50									50A (2B)
		0								Rc thread
			P							Propane
				002						2 m³/h (normal) (CMG15) *1
				004						4 m³/h (normal) (CMG25) *1
				010						10 m³/h (normal) (CMG25) *1
				025						25 m³/h (normal) (CMG40/50)
				050						50 m³/h (normal) (CMG40/50) *1
					0					1 to 5 V output (2, 4, 10 m³/h (normal) only)*3
					1					4 to 20 mA + event output 2
						0				Low pressure
							0			Not available
								0		24 V DC
								1		100 V AC (50/60 Hz)
								2		200 V AC (50/60 Hz)
								3		220 V AC (50/60 Hz)
									00	None
									D0	With inspection report

● Butane model

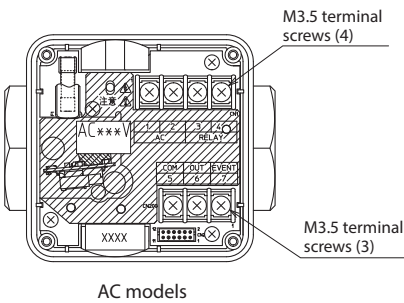
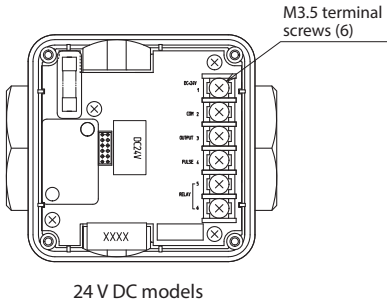
Basic model No.	I Pipe size	II Pipe shape	III Gas type	IV Flow rate range	V Output	VI Pressure	VII Commu- nication	VIII Power supply	IX Additional processing	Description
CMG										Gas flow monitor
	15									15A (½B)
	25									25A (1B)
	40									40A (1½B)
	50									50A (2B)
		0								Rc thread
			B							Butane (butane 75%, propane 25%)
				001						1 m³/h (normal) (CMG15) *1
				003						3 m³/h (normal) (CMG25) *1
				008						8 m³/h (normal) (CMG25) *1
				020						20 m³/h (normal) (CMG40/50) *1
				040						40 m³/h (normal) (CMG40/50) *1
					0					1 to 5 V output (1, 3, 8 m³/h (norm.) only) *3
					1					4 to 20 mA + event output 2
						0				Low pressure
							0			Not available
								0		24 V DC
								1		100 V AC (50/60 Hz)
								2		200 V AC (50/60 Hz)
								3		220 V AC (50/60 Hz)
									00	None
									D0	With inspection report

-
- *1. "Normal" refers to the volumetric flow rate (m^3/h) after converting to 0°C , 101.325kPa (1 atmosphere).
 - *2. For the selection of a medium pressure model, refer to "When selecting a medium pressure model for air and fuel gas ($13\text{A-}46\text{MJ}/\text{m}^3$)" on page 39.
 - *3. 1 to 5 V output models have event output 1 (relay) but not event output 2 (open collector).
For use of an integration pulse, select a 4 to 20 mA model.
 - *4. For fuel gas composition, refer to page 37. When using fuel gas with a different composition, contact the azbil Group.
 - *5. For $13\text{A-}45\text{MJ}$ fuel gas models, the factory default of the gas composition compensation coefficient parameter (No.12) is 1.029.
 : 5 - 2 Parameter Setup (page 31) (for details)
 - *6. For 220 V AC models, a JIS 10K flange connection cannot be selected.

Chapter 2. NAMES AND FUNCTIONS OF PARTS



Terminal screw position



Chapter 3. MOUNTING AND WIRING

WARNING



When using combustible gas, install the device upstream of the safety shut off valve. If air somehow enters the piping, and the sensor makes a spark due to some cause like a lightning strike when an explosive mixture is present, an explosion could occur inside the pipe.



On flanged models, do not use the device or installed pipes as a footrest. Doing so might damage the device or piping, or cause a slip which might result in injury.



Flanged models are heavy. Dropping them on your feet may cause injury.



Do not wire the device with wet hands or when the device is powered. There is a danger of electric shock.

Before starting the wiring work, be sure to dry your hands or use appropriate gloves, and turn off the power.



Before opening the cover to wire the device, turn off the power. Otherwise there is a danger of electric shock.



Handling Precautions

- When carrying the device, hold it by the flow path section. Holding it by the sensor/terminal section may damage the device.
- This device is a precision instrument. Do not drop it or subject it to shock. Doing so might damage the device.
- When connecting a CMG model with a threaded connection to the pipe, hold the inlet and outlet of the device in place and screw the pipe into the device. After connecting the piping, check for any leaks.
- Before installing flanged models, check that the piping is not tilted or off-center, which may cause leaks or other problems. After connecting the piping, check for any leaks.
- To prevent vibration of the device, attach the pipe securely.
- Do not peel the protective seals from the display before use. When performing work on the device, tools may accidentally bump against the display and scratch it.
- When using the device outdoors, mount it out of the direct sunlight and in a location where it is not splashed directly by rain.

- If the piping may contain rust, oil mist, dust, or powder, be sure to provide a strainer or filter upstream to prevent foreign matter from entering the device. Foreign matter flowing into the device might result in faulty operation.
- When wiring the device, take care not to tug on the display. The internal connections might become damaged.
- Wire 1-5V output, 4-20mA output, open collector output, and communications separately from the power line and power supply leads.
Do not wire these outputs in the same conduit as the power line and power supply leads. Doing so might cause malfunction.
- Install a switch for shutting off the main power to the device within reach of the person operating the device.
- The common mode voltage between output and ground should be less than 33V RMS, 46.7V at peak or 70 V DC, excluding power supply and relay contact output.

■ Mounting

● Installation site

Avoid mounting the CMG in locations characterized by the following:

- (1) Operating temperatures that fall below -10°C and rise above 60°C
- (2) Operating humidity that exceeds 90%RH
- (3) Sudden changes in temperature and condensation
- (4) Corrosive gases and flammable gases
- (5) Abundant conductive substances (e.g., dust, salt or iron dust) or organic solvents
- (6) Vibration or shock
- (7) Direct sunlight
- (8) Direct splashing by rain or water
- (9) Splashing by fluids (e.g., oil, chemicals)
- (10) Where it is near the electrical noise source.
- (11) Strong magnetic or electrical fields

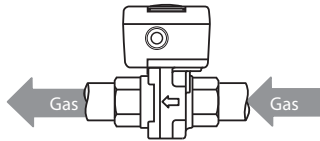
(12) Where there is a pulsating flow.

1) One cause is flexible piping (regardless of the material) with an accordionshape inner surface and a length of 500mm or more. Flexible piping (such as a rubber hose) with a flat inner surface does not cause pulsation.

2) Another cause is a reciprocating or rotary type gas booster or a flow meter having rotary motion like a Roots meter.

(13) Where soot or moisture generation in the piping is expected due to fluctuation in gas composition, etc.

● **Gas flow**



! Handling Precautions

- Make sure that the gas flows into the device in the direction indicated by the FLOW arrow on the side of the flow path. Otherwise, the flow rate cannot be measured correctly.

■ Behavior when the flowrate greatly exceeds the upper limit of flowrate range



CAUTION



Be sure to use this product within the flow rate range stated in the specifications. To prevent excessive flow, use a suitable means to control the supply pressure or use a throttle valve or the like to control the flow rate.

If the flow rate exceeds the upper limit, both the flow rate display and the output voltage/current may indicate considerably lower values than the actual flow rate.



If damage could result from the abnormal functioning of this device, include appropriate redundancy in the system design.

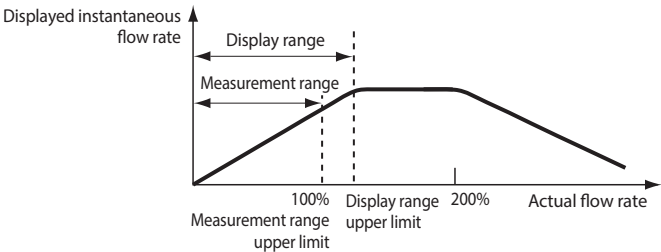
If the flow rate exceeds the maximum measurable value, an incorrect value may be displayed and output. Be sure to use this device within the measurement range stated in the specifications.

If the flow rate exceeds the maximum measurable value, the output value will stop increasing and stay at the highest value. If the maximum flow rate that can be displayed is exceeded, the displayed value will also stop increasing.

Furthermore, if the flow rate exceeds 200 % of the upper limit of the measurement range, both the displayed and the output values may decrease, giving a false value that is within the measurement range.

Please also note that, if an excessive flow rate (200 % or more) is reached in a very short period of time, a false value that is within the measurement range may be displayed or output.

When using this device to control the flow rate, make sure to control the supply pressure and throttle valve opening properly so that the flow rate does not exceed the upper limit of the measurement range even when the control output is at the maximum.

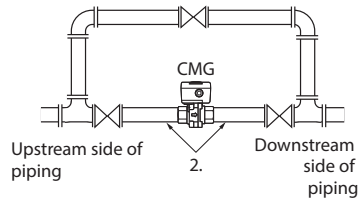


■ Pipes

This device is a precision instrument. If foreign matter such as dust, oil mist or water enters the device, it may cause measurement error or faulty operation. When

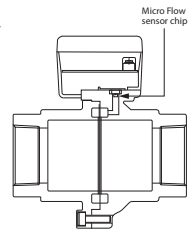
installing piping, be sure to follow the procedures below to prevent foreign matter from entering the device.

- (1) Before installing the device, be sure to flush the upstream and downstream piping thoroughly to remove welding fume particulate and dust.
- (2) Be sure to wipe the inside of the pipe to be directly connected to this device.
- (3) After the above two operations are complete, check to be sure that there is no welding fume particulate or dust, and then install the device.



! Handling Precautions

- If foreign matter cannot be fully eliminated by flushing or wiping, or if the regular presence of foreign matter can be expected, be sure to install a filter. If dust, oil or moisture adheres to the Micro Flow sensor chip, measurement error or faulty operation may result.



● Filter installation

If there is a possibility of foreign matter or oil mist regularly entering the device, install an upstream filter, etc., that can eliminate foreign matter 1 μm or greater in diameter and oil at a concentration of 0.01 mg/m^3 . Be sure to inspect and replace the filter at regular intervals.

Name: Mist separator

Model No.: MFF100/200

Specifications: For details, refer to;

Azbil Corporation's Specification seat
(Japanese)CP-SS-1824.

- **Straight pipe section**

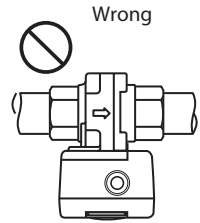
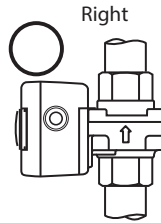
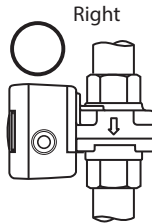
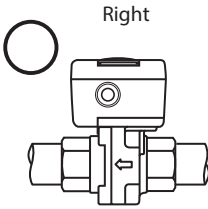
To be sure the straight pipe section is long enough, refer to pages 37-39.

● Mounting position

CAUTION



- Do not mount so that the display is facing down. Doing so might cause error or other malfunction.
- This device can be used with the display facing up $\pm 90^\circ$.



! Handling Precautions

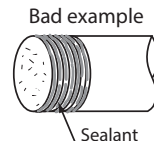
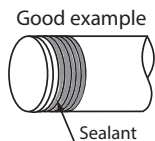
- The length of the required straight pipe connection varies according to the model number.
For air and natural gas at 500 kPa or above or for butane and propane at 50 kPa or above, install the device on a horizontal pipe with the display facing upward, or on a vertical pipe. If the display faces in another direction on horizontal piping, the zero point might shift. For details, see ■ Individual CMG model specifications (page 37).

● Screw connection

- Coating sealant
Coat with an appropriate amount of sealant. Do not coat the top two threads of the screw.
Remove any dirt, burrs or piping cutting oil from inside the pipes.

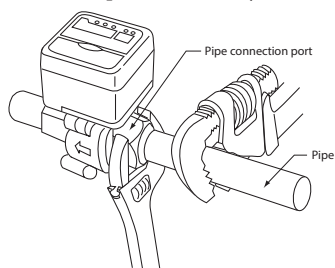
! Handling Precautions

- Do not overdo the sealant, and do not allow dirt, burrs or piping cutting oil to enter the pipes, as this might cause measurement error.



● Connecting pipes

Connect pipes while gripping the hexagonal section of the pipe connection port on the body with a wrench.



! Handling Precautions

- Do not grip the display or sensor/terminal section. Doing so might damage the body or cause leakage.
- Do not tighten the pipe at a torque that exceeds the maximum tightening torque.

Model No.	Max. Tightening Torque
CMG150	50N·m
CMG250	125N·m
CMG400	200N·m
CMG500	250N·m

● **Flange connection**

- Gasket

A gasket is required for connecting the flange.

The following table shows the internal diameters dimensions of the gaskets:

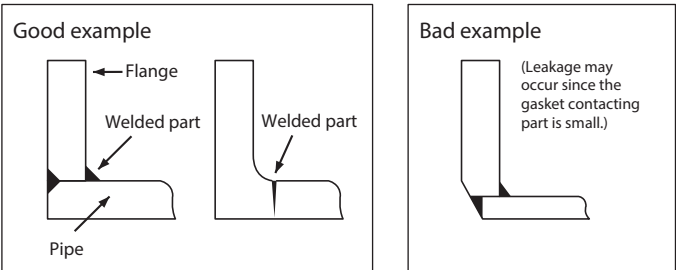
Pipe Size (mm)	Internal diameters (mm)
40	49
50	61

! Handling Precautions

- If the gasket inner diameter is too small, the flow speed distribution may be disturbed and adversely influence accuracy.
- If the gasket inner diameter is too large, leakage may occur.
- Align the inner diameters of the piping and the flowmeter, and attach so that the gasket does not protrude into the inside of the piping. If it does, leakage might result.

● **Flange Shape**

Use a flange that ensures a large contact area with the gasket.

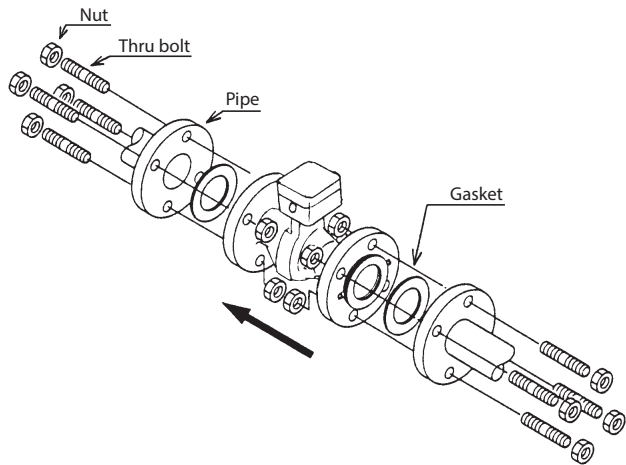


● Mounting

The figure below shows how to actually mount the flowmeter. Before installing the flowmeter, be sure to flush the piping to remove any foreign objects inside.

! Handling Precautions

Do not flush the piping with the flowmeter attached. Doing so might cause foreign objects to enter the flowmeter and cause error.

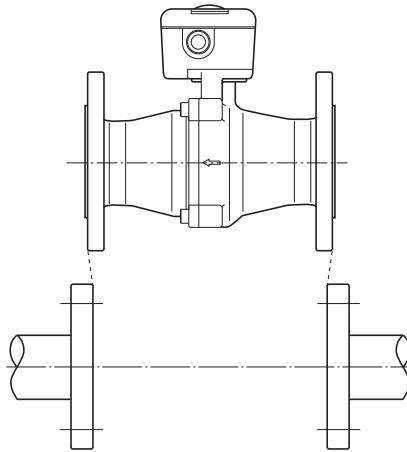


Tighten according to the torque in the following table:

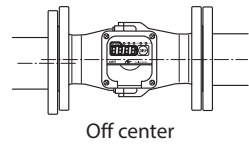
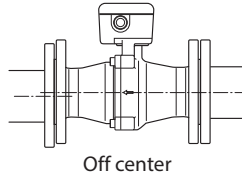
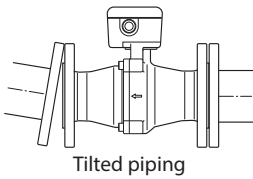
Aperture/Flange Rating	Torque (N·m)
40mm JIS10K	22 to 32
50mm JIS10K	24 to 34

! Handling Precautions





- Tighten bolts so that they are uniformly tight. If leakage does not stop after tightening bolts, gradually tighten the bolts more a little at a time.
- Tighten bolts within the specified tightening torque. Otherwise, the bolts may be damaged.
- Do not mount as shown in the following figure. Doing so might cause leakage.



- Do not exert unnecessary force on the narrow section between flange surfaces. Doing so might damage the device.



■ Wiring

 CAUTION	
	Prevent the load connected to the output terminal from exceeding the rating indicated in the specifications. Failure to do so might cause damage.
	Be sure to check that the wiring is correct before you turn the power ON. Incorrect wiring might cause damage or malfunction.
	After completing the wiring work, reattach the operation panel and display before turning on the power. Otherwise there is a danger of electric shock.

The following table describes the meaning of symbols indicated on the terminal layout label on the CMG:

Symbol	Meaning
---	Direct current

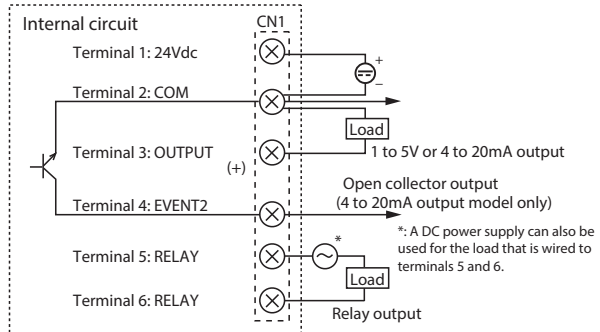
● Removing the operation panel/display

Required tool: Phillips screwdriver

- (1) Loosen the four screws on the operation panel/display using the Phillips screwdriver.
- (2) Gently lift up the operation panel/display, and disconnect its power lead connectors.

● Wiring the 24 V DC power supply model

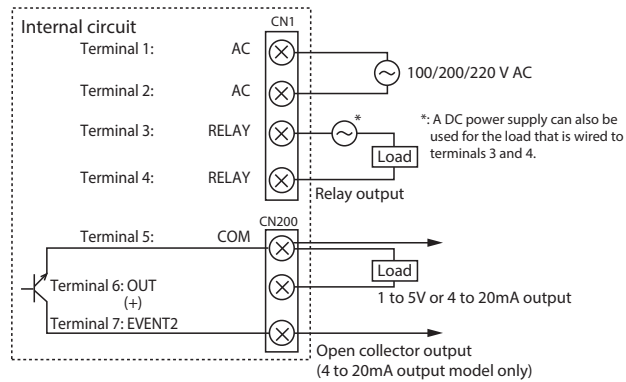
The following shows wiring of the 24 V DC power supply model and connection names:



Terminal No.	Connection Name	Description
1	24 V DC	Power supply
2	COM	Common
3	OUTPUT	Analog output (+)
4	EVENT2	Event output 2 NPN open collector, integrated pulse
5	RELAY	Event output 1 contact output (relay output)
6	RELAY	Event output 1 contact output (relay output)

● Wiring the AC power supply model

The following shows wiring of the AC power supply model and connection names:



Terminal No.	Connection Name	Description
1	AC	Power supply
2	AC	Power supply
3	RELAY	Event output 1 contact output (relay output)
4	RELAY	Event output 1 contact output (relay output)
5	COM	Common
6	OUT	Analog output (+)
7	EVENT2	Event output 2 NPN open collector, integrated pulse

! Handling Precautions

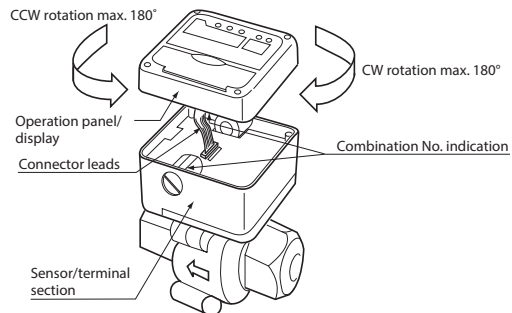
- Use crimped terminal lugs, which enable a reliable connection to terminals.
- Use crimped terminal lugs that are compatible with M3.5 screws.
- Limit the terminal screw tightening torque to 0.8N·m.
- Use a JIS C 3401 control cable (CVV, etc.) of maximum outer diameter of 2.2mm for wiring.
- If waterproofing is required, be sure to use the seal connector (Azbil Corporation model: PA4-N2, PA4-N4 or equivalent product) for reliable sealing.
- When wiring to terminal 2 (COM) on a 24 V DC power supply type, wire the analog output lead separately from the power lead. Otherwise, a voltage drop caused by the power current may influence the accuracy of the analog output.

- Take care that event output 2 (the open collector output) does not exceed the output rating of this device. When driving a relay, be sure to use one with a built-in coil surge absorption diode. Failure to do so might cause faulty operation.

● Mounting the operation panel/display

On this device, the operation panel/display can be rotated up to 180° to an easy-to-view position. Follow the procedure below to mount the operation panel/display:

- (1) Connect the connectors of the leads from the operation panel/display to the sensor/terminal section.
- (2) Rotate the display to the most easily visible position.
- (3) Fasten the operation panel/display onto the sensor/terminal section with screws.



! Handling Precautions

- The maximum screw tightening torque is 1.0N·m. The IP54 seal might be impaired if screws are too tight or too loose.
- Arrange the leads connecting the sensor/terminal section and the operation panel/display so they are not unnecessarily twisted or pinched when fitting the sections together.
- Prevent the leads connecting the sensor/terminal section and the operation panel/display from being damaged.
- Do not rotate the operation panel/display beyond 180° to the left or right. This section may be rotated to the left or right if it is mounted upside down.

- Use an operation panel/display and a sensor/terminal section with the same combination of combination numbers.

Combination numbers differ from device to device as each device is adjusted individually. If different combination numbers are combined, accuracy can no longer be guaranteed. The combination numbers are each displayed on the operation panel/display and sensor/terminal section.

Chapter 4. OPERATION



CAUTION



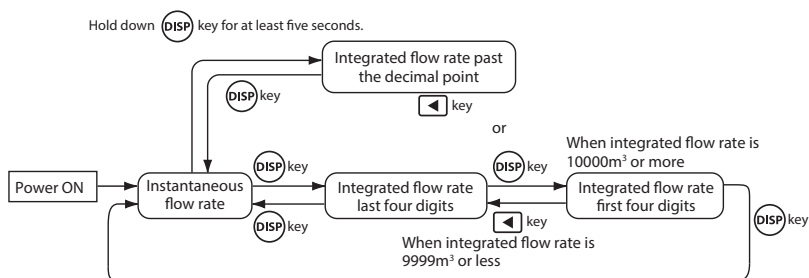
Do not operate the keys with a mechanical pencil, screwdriver or other sharp-tipped object. Doing so might damage the keys.

■ Displaying the flow rate

The following values can be alternated on the 4-digit, 7-segment LED display:

- (1) Instantaneous flow rate
- (2) Integrated flow rate

The following shows the operation flow for displaying the flow rate:



● Displaying the instantaneous flow rate and integrated flow rate

When the power is turned ON, the m^3/h indicator lights to indicate the instantaneous flow rate. To display the integrated flow rate, press the **DISP** key.

- ▶ The m^3 indicator lights to indicate the integrated flow rate.
- The display is a 4-digit display. However, the integrated flow rate is displayed as eight digits, divided into the first four digits and the last four digits. In all, an integrated flow rate up to **99999999** can be displayed.
- When the last four digits are displayed, the decimal point lights to the right of the last digit.

When the integrated flow rate is **9999** m^3 or less, pressing the **DISP** key again returns the display to the instantaneous flow rate display.

When the integrated flow rate is 10000 m^3 or more, pressing the **(DISP)** key displays the first four digits of the integrated flow rate.

You can also alternately display the first four digits and the last four digits by repeatedly pressing the **◀** key.

For example, if initial reading is 1234 and the 2nd reading is 56 , the integrated flow rate is 561234 m^3 .

If the **(DISP)** key is held down for at least five seconds when switching to the integrated flow rate display from the instantaneous flow rate display, digits past the decimal point for the integrated flow rate are displayed.

! Handling Precautions

- When the flow rate exceeds the upper limit of the measurement range, the OVER indicator light, and goes out after the flow rate returns to within the measurement range.
- The integrated flow rate factory setting is 0 .
- The integrated flow rate indication returns to 0 after 99999999 is exceeded.
- The flow rate is integrated even if the flow rate is outside of the measurement range. Regard integrated values as a means for grasping the whole quantity of flow.

■ Resetting alarms

When a flow rate alarm detection condition is selected (an item from 1 to 5 in function setup item $\zeta-02$; see page 29), an alarm is set.

To reset the alarm, press the **RESET** key.

► The alarm indicator goes out, and the alarm output relay turns OFF.

! Handling Precautions

- Alarms are also reset by turning the power OFF.
- The alarm recurs after the alarm occurrence wait time when the flow rate exceeds the preset alarm value after the flow monitor is re-energized.

■ Resetting the integrated flow rate

Hold the **RESET** key down for at least two seconds while the integrated flow rate is displayed.

► The integrated value becomes 0.

! Handling Precautions

- Holding down the **RESET** key for two seconds or more while an alarm is occurring merely stops the alarm; it does not reset integrated values. In this case, reset the alarm after the flow rate has returned to within the preset alarm range, and then hold down the **RESET** key again for two seconds or more.

■ Displaying the total flow rate

This function displays the total flow rate since the device was installed. Reset cannot be performed by the same reset operation used for integrated flow rate.

- (1) Press the **(DISP)** key until the integrated flow rate is displayed.
 - ▶ The m^3 indicator turns on.
- (2) Press and hold the **(ENT)** key for 1 second or longer.
 - ▶ The m^3 indicator turns off and the lower 4 digits of the total flow rate are displayed for 5 seconds. Then, the m^3 indicator automatically turns on, and the display shows the integrated flow rate again.

The total flow rate is displayed 4 digits at a time in the same way as the integrated flow rate, and a maximum of 8 digits, **99999999**, can be displayed. If the total flow rate is 10,000 m^3 or more, pressing the **(DISP)** key during the 5 seconds when the lower 4 digits of the total flow rate are displayed will display the upper 4 digits.

At this time, you can alternately display the upper and lower 4 digits with the **(◀)** key.

If the **(DISP)** key is pressed when the total flow rate is 9999 m^3 or less or while its upper 4 digits are displayed, the integrated flow rate will be displayed again.

! Handling Precautions

- The total flow rate indication returns to 0 after **99999999** is exceeded.
 - Integrated flow rate and total flow rate values are held in memory even if the power is turned OFF.
 - On models that display values down to two digits past the decimal point, data is written into memory when the ones digit changes or one hour after the previous writing.
 - On models that display values down to one digit past the decimal point, data is written into memory when the tens digit changes or one hour after the previous writing.
- Integrated values that have not been written to memory are discarded when the power is turned OFF.











-
- The total flow rate reset setting can be configured to either the enabled or disabled condition using the function setup.
 - If the "Reset is performed by key switch" setting has been selected, press the **RESET** key for 2 seconds or more while displaying the total flow rate. The total flow rate and integrated flow rate will be reset and initialized to "0."

Chapter 5. APPLICATION OPERATION



5 - 1 Function Setup

■ Setting operation

Follow the procedure below to set functions such as alarm detection and event output assignments.

- (1) Press the  key to display the instantaneous flow rate.
 - ▶ The m³/h indicator lights.
- (2) Hold the  and  keys down simultaneously for 3 seconds.
 - ▶ Item No. C-01 is displayed on the 7-segment display, and the mode changes to function setup mode.
- (3) Press the  or  key to select the desired setup item, and press the  key.
 - ▶ The current setting blinks on the 7-segment display.
- (4) Press the  or  key to select the desired setting.
- (5) When the desired setting has been selected, press the  key to finalize the setting.
 - ▶ After approx. one second, the item number is redisplayed, and the setting is updated.
- (6) If there are other required setup items, return to step (3) above to repeat the procedure. If there are no other setup items, proceed to step (7).
- (7) Press the  key.
 - ▶ The display changes from the function setup mode to the instantaneous flow rate display.

Handling Precautions

- If you do nothing for one minute after entering the function setup mode, the display automatically returns to the instantaneous flow rate display.
- If you press the  key without pressing the  key after carrying out the operation in step (4), the setting remains at the previous value without being updated.

■ Function setup item list











Item Displayed	Item Description	Settings and Description	Factory Setting	Remarks
ℰ-01	Key lock	0: Key lock disabled 1: All settings key-locked	0	The key lock can be disabled even while it is enabled.
ℰ-02	Flow rate alarm detection condition selection	0: Alarm detection is not performed. 1: Only the upper limit alarm is detected. 2: Only lower limit alarm 1 is detected. 3: Upper limit alarm and lower limit alarm 1 are detected. 4: Only lower limit alarm 2 is detected. 5: Upper limit alarm and lower limit alarm 2 are detected.	0	The alarm detection flow rate is set in the parameter setup mode. Lower limit alarm 1: A flow rate less than the lower limit of the measurement range is not judged to be an alarm. Lower limit alarm 2: A flow rate less than the lower limit of the measurement range is judged to be an alarm.
ℰ-03	Event output 1 (relay) function assignment	0: Not used (OFF at all times) 1: ON when upper limit alarm occurs 2: ON when lower limit alarm occurs 3: ON when upper limit alarm or lower limit alarm occurs 4: ON when integration event occurs	3	
ℰ-04	Event output 2 (open collector) function assignment	0: Not used (OFF at all times) 1: ON when upper limit alarm occurs 2: ON when lower limit alarm occurs 3: ON when upper limit alarm or lower limit alarm occurs 4: ON when integration event occurs 5: Integrated pulse output	5	This item is enabled only for models having the optional event output function.

ℓ-05	Flow rate alarm	0: Only reset by key switch 1: Reset by key switch or auto- matic reset by normal recovery of flow rate		0			
ℓ-06	reset method selection Integrated flow rate reset method selection	0: Reset disabled. 1: Reset by key switch only 2: Only automatic reset after the integration reset delay time when the integration event occurs 3: Reset by key switch or auto- matic reset after the integra- tion reset delay time when the integration event occurs		1			
ℓ-07	Total flow rate reset method selection	0: Reset disabled. 1: Reset by key switch		0	The integrated flow rate is also reset when the total flow rate is reset.		
ℓ-08	Reference temperature selection	0: 0°C 101.325kPa (1 atmosphere) 1: 5°C 101.325kPa (1 atmosphere) 2: 10°C 101.325kPa (1 atmosphere) 3: 15°C 101.325kPa (1 atmosphere) 4: 20°C 101.325kPa (1 atmosphere) 5: 25°C 101.325kPa (1 atmosphere)		0	The reference temperature of the flow rate output can be switched.		
ℓ-09	Pulse rate selection		Significant digits in the instantaneous flow rate display	1	The pulse rate differs depending on the number of significant digits.		
			2 digits after the decimal point			1 digit after the decimal point	
		Setting No.	0			0.001m³/1 pulse	0.01m³/1 pulse
			1			0.01m³/1 pulse	0.01m³/1 pulse
			2			0.1m³/1 pulse	0.1m³/1 pulse
			3			0.1m³/1 pulse	1m³/1 pulse



5-2 Parameter Setup

■ Setting operation

Follow the procedure below to set parameters such as the flow rate alarm upper and lower limit values and alarm detection delay times.

- (1) Press the  key to display the instantaneous flow rate.
 - ▶ The m³/h indicator lights.
- (2) Hold the  key down for 3 seconds.
 - ▶ Item [R, H] is displayed on the 7-segment display, and the mode changes to parameter setup mode.
- (3) Press the  or  key to select the desired setup item, and press the  key.
 - ▶ The current setting blinks on the segment display.
- (4) Press the  or  key to change to the desired value. The digit to be changed can be moved by using the  key.
- (5) When the desired setting has been selected, press the  key to finalize the setting.
 - ▶ After approx. one second, the item number is redisplayed, and the setting is updated.
- (6) If there are other required setup items, return to step (3) above to repeat the procedure. If there are no other setup items, proceed to step (7).
- (7) Press the  key.
 - ▶ The display changes from the parameter setup mode to the instantaneous flow rate display.

Handling Precautions

- If there is no input for one minute after the parameter setup mode begins, the display automatically returns to the instantaneous flow rate display.
- If you press the  key without pressing the  key after carrying out the operation in step (4), the setting remains at the previous value without being updated.

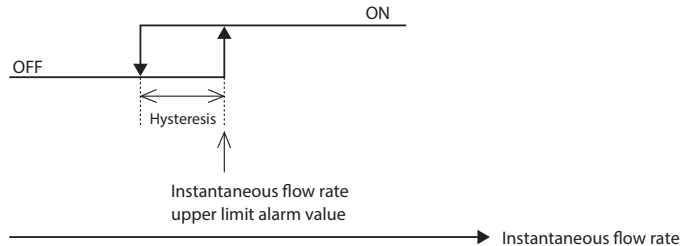
■ Parameter setup item list

No.	Item displayed	Item Description	Factory Setting	Setting Range	Remarks
1	<i>R. HI</i> ^{(*)1}	Instantaneous flow rate upper limit alarm	(Upper limit of measurement range) m ³ /h (normal)	(0 to 400% of measurement upper limit) m ³ /h (normal)	Selection of an alarm detection condition is required in function setup <i>C-02</i> .
2	<i>R. H. HY</i>	Hysteresis for instantaneous flow rate upper limit alarm	(Within 2% of measurement upper limit) m ³ /h (normal)	(0 to 200% of measurement upper limit) m ³ /h (normal)	
3	<i>R. LO</i> ^{*2}	Instantaneous flow rate lower limit alarm	(Lower limit of measure range) m ³ /h (normal)	(0 to 200% of measurement upper limit) m ³ /h (normal)	
4	<i>R. L. HY</i>	Hysteresis for instantaneous flow rate lower limit alarm	(Within 2% of measurement upper limit) m ³ /h (normal)	(0 to 200% of measurement upper limit) m ³ /h (normal)	
5	<i>R. dLY</i>	Delay timing for instantaneous flow rate alarm judgment	60.0s	0.0 to 999.9s	
6	<i>E. SP. L</i>	Integration event setup (lower four digits)	0m ³	0 to 99,999,999m ³	Value set is valid only when selecting integration event output in either <i>C-03</i> or <i>C-04</i> of function setup.
7	<i>E. SP. H</i>	Integration event setup (upper four digits)			
8	<i>E. C. dL</i>	Integration reset delay time	10.0s	0.0 to 999.9s	Value set is valid only when selecting automatic reset by integration reset delay in <i>C-06</i> of function setup.
9	<i>bIAS</i>	Instantaneous flow rate bias (PV bias)	0m ³ /h	(-20 to +20% of measurement upper limit) m ³ /h (normal)	
10	<i>OUT. H</i>	Instantaneous flow rate output 5V (20mA) scaling	(Upper limit of measurement range)m ³ /h (normal)	(0 to 400% of measurement upper limit) m ³ /h (normal)	
11	<i>OUT. L</i>	Instantaneous flow rate output 1V (4mA) scaling	0m ³ /h	(0 to 200% of measurement upper limit) m ³ /h (normal)	
12	<i>GRS. C</i>	Gas composition compensation coefficient	1.000	0.100 to 4.000	^{*3}

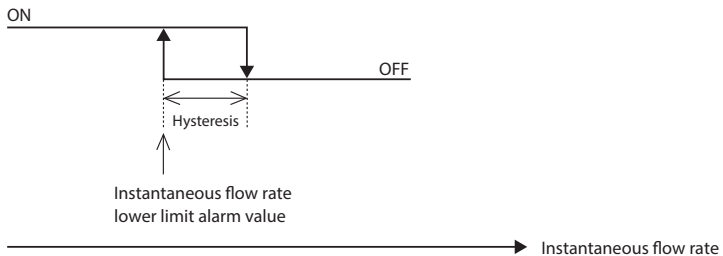
Note) "Normal" refers to the volumetric flow rate (m³/h) after converting to 0°C, 101.325kPa (1 atmosphere).

- *1. Be certain to set a flow rate that is less than the display upper limit. Alarm detection will not operate if flow rate is set above the display upper limit.
- *2. If "lower limit alarm1" has been selected in function setup F-02 , alarm detection will not operate when the flow rate is less than the lower limit of the measurement range, even if the flow rate is below the lower limit alarm value.
- *3. The value is set to 1.029 for 13A-45MJ fuel gas models.

● Instantaneous flow rate upper limit alarm operation



● Instantaneous flow rate lower limit alarm operation



Chapter 6. MAINTENANCE AND TROUBLESHOOTING

■ Troubleshooting

When trouble occurs, refer to the following table:

Problem	Remedy
Nothing is displayed.	<ul style="list-style-type: none"> • Make sure that the power supply voltage and polarity are correct. • Check the connectors connecting the display to the sensor/terminal section for disconnection or faulty contact. • Check if the fuse is burned out. If so, contact us for repair.
Err1 is displayed alternately with the flow rate value.	<ul style="list-style-type: none"> • Check the connectors connecting the display to the sensor/terminal section for disconnection and faulty contact. • If there is no problem with the connectors, there is something wrong with the sensor. The possible causes of the problem are condensation or foreign matter on the sensor, failure of the sensor, etc. In the case of sensor failure, contact us for repair.
Err2 is displayed alternately with the flow rate value.	<ul style="list-style-type: none"> • The probable cause is an error in the memory, which is individually adjusted for each sensor. Err2 is displayed, but the operation continues with provisional data in spite of the error. Readjustment by Azbil Corporation is necessary.
The display is other than 0.00. (including a minus display) even though the instantaneous flow rate should be zero.	<ul style="list-style-type: none"> • Check the shut-off valve and piping for any leaks. • Product characteristics may have changed. Contact us for repair.
A minus is displayed for the instantaneous flow rate.	Make sure that the arrow marked on the flow path matches the direction of gas flow. Correct the directions if it is reversed.
Indicated flow rate varies significantly.	<ul style="list-style-type: none"> • Check if the straight pipe section is long enough. If not, install a straight pipe of the specified length. • There may be a pulsating flow in the pipe. • There may be foreign matter on the sensor. Contact us for repair.

! Handling Precautions

- Err2 (memory error) indicates that the individual adjustment data for the flowmeter's internal sensor has been lost. Accuracy cannot be guaranteed if use of the flowmeter is continued in this state. Ask for repair.

Chapter 7. SPECIFICATIONS

■ CMG Series specifications

Item		Specifications
Applicable gas		Fuel gas (13A-46MJ/m ³)*1, air (depends on the model), propane*2, butane*3
Material		Flow path section: aluminum alloy (Rc thread), SCS13 (flange) Display section: PBT (GF 30%)
Operating pressure		100 kPa max. (low-pressure models), 1.0 MPa max. (medium-pressure models)
Pressure resistance		150 kPa max. (low-pressure models), 1.5 MPa max. (medium-pressure models)
Allowable ambient temperature, gas temperature		-10 to +60 °C (without freezing)
Storage ambient temperature		-20 to +70 °C (without freezing)
Allowable ambient humidity		40°C, 90%RH or less (without condensation)
Rated voltage		24 V DC, 100/200/220 V AC
Allowable voltage		24 V DC: ±10 % of the rated voltage 100/200/220 V AC: 85 to 110 %
Power consumption		24 V DC: 5.5W or less. AC model: 2W or less
Flow rate display method		Flow quantity adjusted for 0°C and 101.325kPa (1 atmospheric pressure)
Instantaneous flow rate repeatability		±1%RD±1 digit (20°C)
Response speed		Sampling cycle 100ms, 0 →100% step response 1.6s
Instantaneous flow rate output	1 to 5 V DC voltage output	Output range: 0 to 400% of measurement range upper limit (scalable) flow rate output voltage Accuracy: ±0.5%FS output Wiring distance: within 10m External load resistance: 10kΩ or more
	4 to 20mA current output	Output range: 0 to 400% of measurement range upper limit (scalable) Accuracy: ±0.5%FS Load resistance: 300Ω max.
Event output 1		1a contact (closes at event generation) Contact rating: 250 V AC, 30 V DC, 5A (resistance load) Mechanical life: 20 million cycles Electrical life: 70,000 cycles
Event output 2 (4 to 20mA output model only)		Output configuration: NPN open collector output Output rated: 30V 50mA max. When integrated pulse output is selected: Pulse width: 100ms±20% For measurement to 2 digits after the decimal point range: Select either a 0.001m ³ /pulse, 0.01m ³ /pulse or 0.1m ³ /pulse For measurement to 1 digit after the decimal point range: Select either a 0.01m ³ /pulse, 0.1m ³ /pulse or 1m ³ /pulse
Conduit size		G ½, 2 pieces

Item		Specifications
Vibration resistance		5m/s ² or less, 10 to 60Hz, for 2 hours each in X, Y and Z directions
Shock resistance		500m/s ² or less, 3 times each in X, Y and Z directions
Voltage resistance	24 V DC power supply model	Between terminal 5 and flow path, and between terminal 6 and flow path: 1500 V AC for 1min or 1800 V AC for 1s
	AC power supply model	Between terminals 1/2 and flow path: 1500 V AC for 1min or 1800 V AC for 1s Between terminals 3/4 and flow path: 1500 V AC for 1min or 1800 V AC for 1s
Insulation resistance		Between each terminal and flow path metal parts: min. 50MΩ (500Vmegger dc)
Protection		IP54 (JIS C 0920) splash-proof and dustproof structure
Applicable standards*4		EN61010-1 EN61326-2-3, EN61326-1 (To be used in an industrial electromagnetic environment) During EMC testing, the reading or output may fluctuate by the equivalent of ± 8 % FS.
Over-voltage category*4		II
Pollution degree*4		2
Elevation*4		2000m or less

*1. Models for fuel gas 13A are adjusted at the factory based on either of the following two types of gas.

Gas type (as used by Azbil Corporation)	Calorific value MJ/m ³ (N)	Methane (%)	Ethane (%)	Propane (%)	Butane (%)
Fuel gas 13A-46MJ/m ³	46.04655	88	5.8	4.5	1.7
Fuel gas 13A-45MJ/m ³	45.007	88.9	6.8	3.1	1.2

When used for fuel gas with a different composition than the above, contact the azbil Group.

*2. Propane gas composition: propane 98%, (class B)

*3. Butane gas composition: butane 75%, propane 25%

*4. DC models only

■ Individual CMG model specifications

Item		Specifications							
Model No.		CMG15		CMG25		CMG40		CMG50	
Piping size	Thread connection	Rc 1/2"	Rc 1"		Rc 1 1/2"		Rc 2"		
	Flange connection	-	-		40A JIS 10K RF		50A JIS 10K RF		
Fuel gas (13A-46MJ/m ³), air		In the measurement range When the ambient temperature is +10 to +40 °C: ±4 % rdg. ± 1 digit When the ambient temperature is -10 to +60 °C (excluding the above range): ±6 % rdg. ± 1 digit			In the measurement range When the ambient temperature is +10 to +40 °C: ±1 % FS ± 1 digit: when the flow rate is less than 25 % FS ±4 % rdg. ± 1 digit: when the flow rate is 25 % FS or more When the ambient temperature is -10 to +60 °C (excluding the above range): ±1.5 % FS ± 1 digit: when the flow rate is less than 25 % FS ±6 % rdg. ± 1 digit: when flow rate is 25 % FS or more				
Propane, butane		In the measurement range When the ambient temperature is +10 to +40 °C: ±6 % rdg. ± 1 digit			In the measurement range When the ambient temperature is +10 to +40 °C: ±1.5 % FS ± 1 digit: when the flow rate is less than 25 % FS ±6 % rdg. ± 1 digit: when flow rate is 25 % FS or more				
Flow rate range *1	Fuel gas(13A)	0.50 to 4.00	1.00 to 10.00	3.0 to 30.0	8.0 to 80.0	15.0 to 150.0	8.0 to 80.0	15.0 to 150.0	
m/h (normal) *2	Air	0.00 to 7.00	0.00 to 16.00	0.0 to 35.0	0.0 to 100.0	0.0 to 170.0	0.0 to 100.0	0.0 to 170.0	
Measurement *3 range (top)	Propane	0.20 to 2.00	0.40 to 4.00	1.00 to 10.00	2.5 to 25.0	5.0 to 50.0	2.5 to 25.0	5.0 to 50.0	
		0.00 to 3.00	0.00 to 6.00	0.00 to 12.00	0.0 to 30.0	0.0 to 55.0	0.0 to 30.0	0.0 to 55.0	
Display range (bottom)	Butane	0.10 to 1.00	0.30 to 3.00	0.80 to 8.00	2.0 to 20.0	4.0 to 40.0	2.0 to 20.0	4.0 to 40.0	
		0.00 to 1.50	0.00 to 4.50	0.00 to 10.00	0.0 to 25.0	0.0 to 45.0	0.0 to 25.0	0.0 to 45.0	
Straight pipe connection length for pipe with 90° bent *4	Upstream side	Not required	Not required	15cm or more	10cm or more	40cm or more	10cm or more	40cm or more	
	Downstream side	Not required	Not required	10cm or more	5cm or more	20cm or more	5cm or more	20cm or more	
Pressure loss upper limit value for air	Thread connection	140Pa	215Pa	210Pa	500Pa	1300Pa	285Pa	550Pa	
	Flange connection	-	-	-	390Pa	840Pa	250Pa	430Pa	
Mass	Rc thread	Approx. 850g	Approx. 800g		Approx. 2100g		Approx. 2000g		
	Flange	-	-		Approx. 9 kg		Approx. 10 kg		

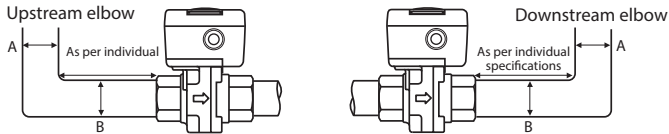
*1. The number of digits displayed after the decimal point for m³/h is the same as that shown in the table.

*2. "Normal" refers to the volumetric flow rate (m³/h) after converting to 0°C, 101.325 kPa (1 atmosphere).

- *3. The measurement range is the flow rate range in which instantaneous flow rate display accuracy is stipulated.
- *4. Straight pipe longer than the length specified above may be required depending on the pipe shape or other devices mounted on the piping. The length of downstream straight pipe section is a standard value.

Straight pipe section (rough guidelines)

- Same diameter pipe (diameters A and B and the same)

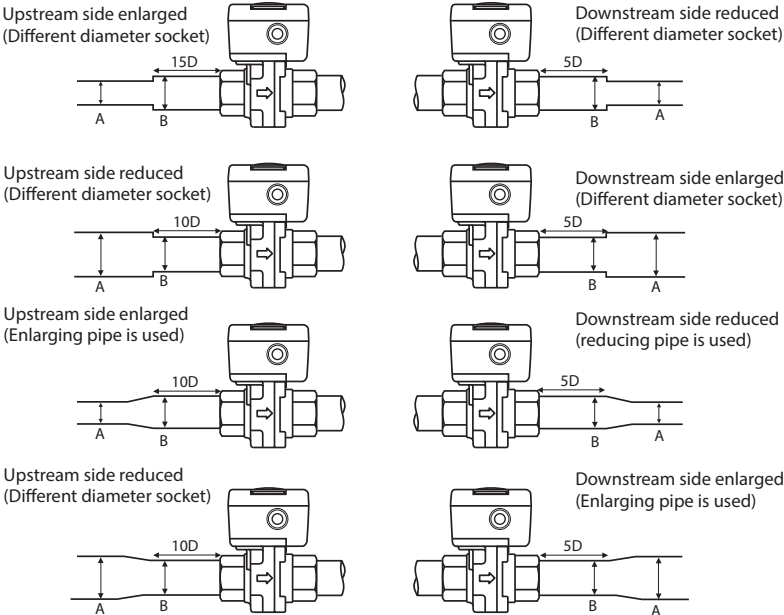


- For different-diameter piping (inner diameters A and B are different by 1 size*)

D: Inner dia. of connecting pipe

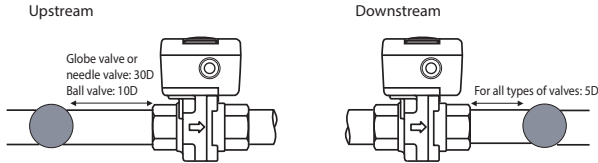
* The table on the right shows diameters larger or smaller by 1 size than those of each model.

Model No.	1 size up	1 size down
CMG15	10A	20A
CMG25	20A	32A
CMG40	32A	50A
CMG50	40A	65A



- Valves (fully open)

D: Inner dia. of connecting pipe



! Handling Precautions

- If a governor, filter, or strainer disturbs the flow, contact the azbil Group.
- Flow control valves, such as butterfly, needle, and globe valves, should be installed downstream of the CMG, at least 5D away from it.

● When selecting a medium pressure model for air and fuel gas (13A-46MJ/m³)

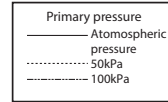
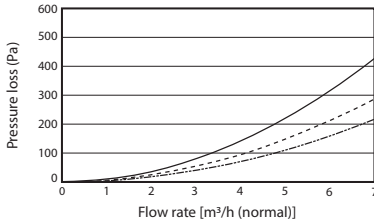
On a medium pressure model for air and fuel gas (13A-46MJ/m³), only the following combinations can be selected:

Pipe size	Pipe shape	Gas type	Flow rate range	Output	Power supply
40, 50	JIS 10K flange	Air Fuel gas (13A)	80, 150m ³ /h	4 to 20mA + event output	24 V DC 100/200 V AC

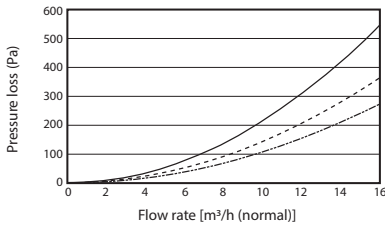
■ Pressure loss

- For Rc thread, the data shows pressure loss for air.

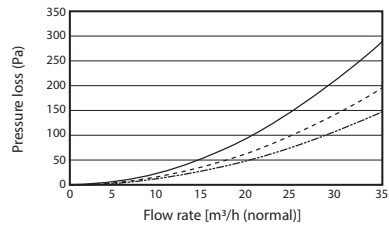
CMG150A004, CMG150N004, CMG150G004,
CMG150P002, CMG150B001



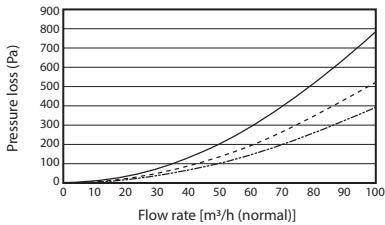
CMG250A010, CMG250N010, CMG250G010,
CMG250P004, CMG250B003



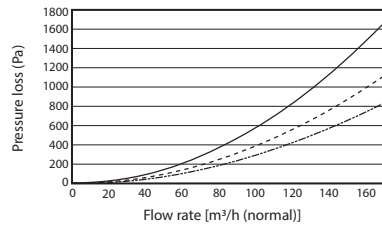
CMG250A030, CMG250N030, CMG250G030,
CMG250P010, CMG250B008



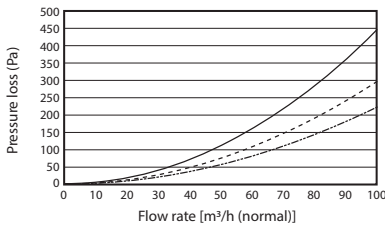
CMG400A080, CMG400N080, CMG400G080,
CMG400P025, CMG400B020



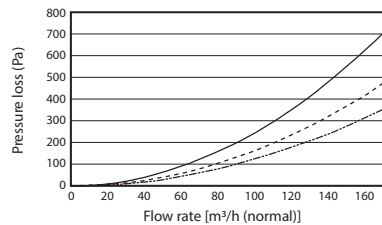
CMG400A150, CMG400N150, CMG400G150,
CMG400P050, CMG400B040



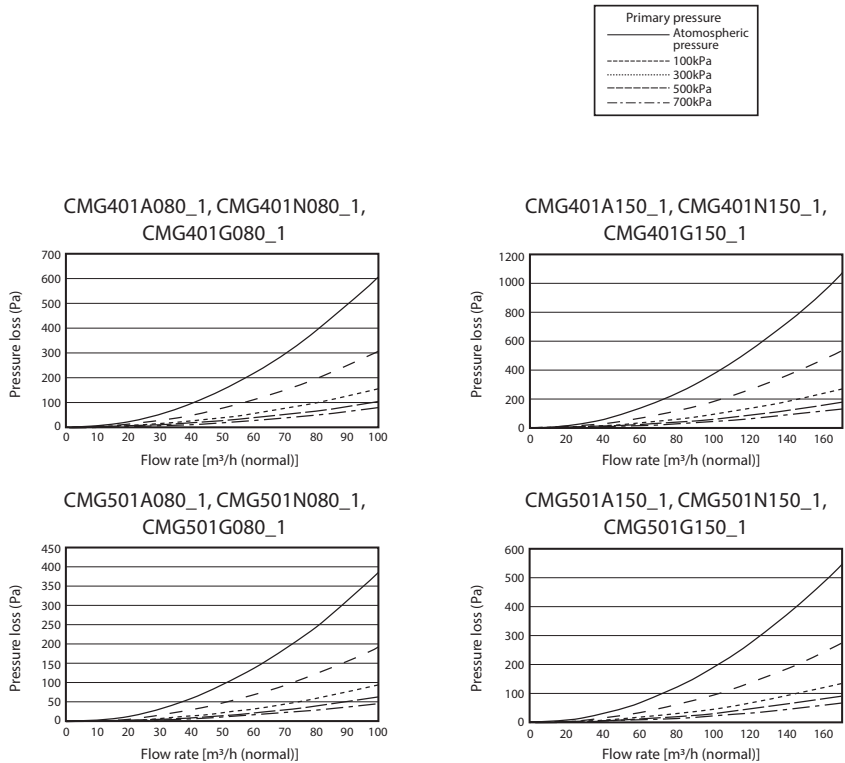
CMG500A080, CMG500N080, CMG500G080,
CMG500P025, CMG500B020



CMG500A150, CMG500N150, CMG500G150,
CMG500P050, CMG500B040



- For air and fuel gas (13A) models with JIS10K flange, the data shows pressure loss for air.



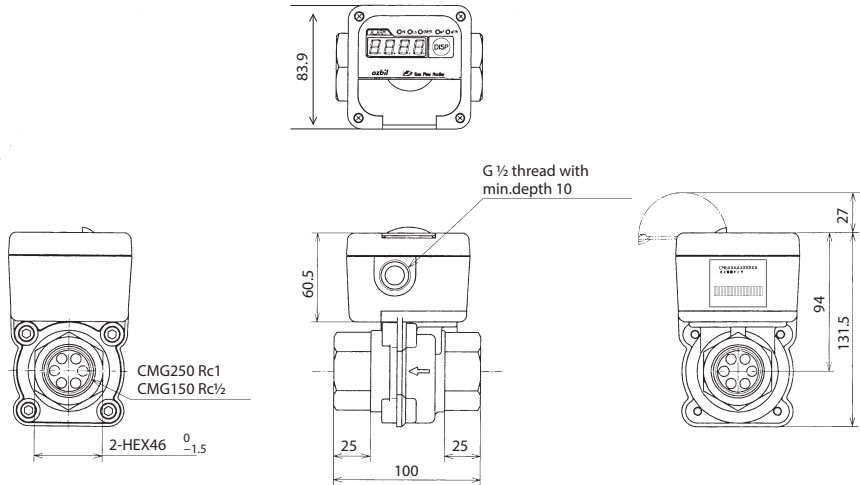
The values for the gases other than air can be obtained by multiplying the specific gravities shown in the table below.

Applicable gas	The specific gravity
Fuel gas 13A (methane 88%)	0.64
Propane (class B)	1.57
Butane (butane 75%, propane 25%)	1.93

■ External dimensions

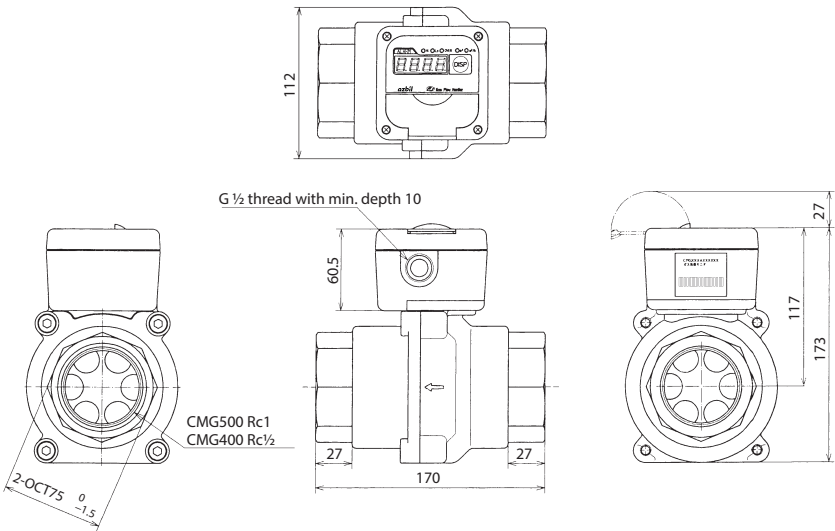
● CMG150/250

Unit: mm



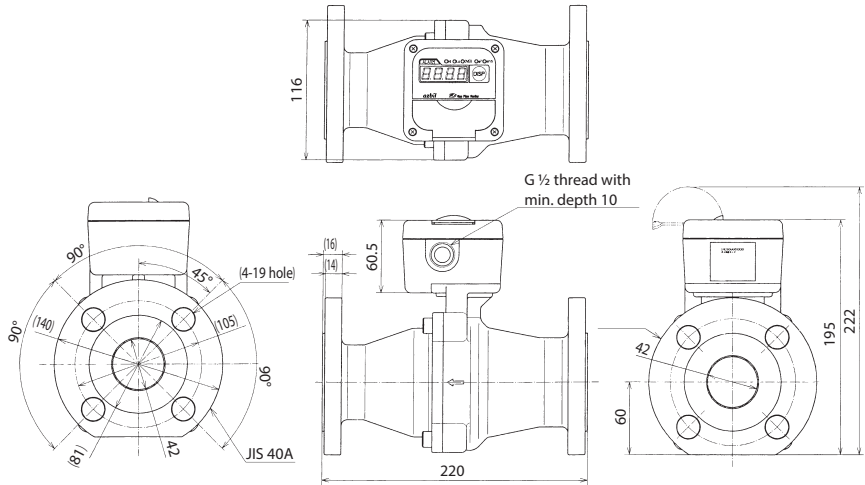
● CMG400/500

Unit: mm



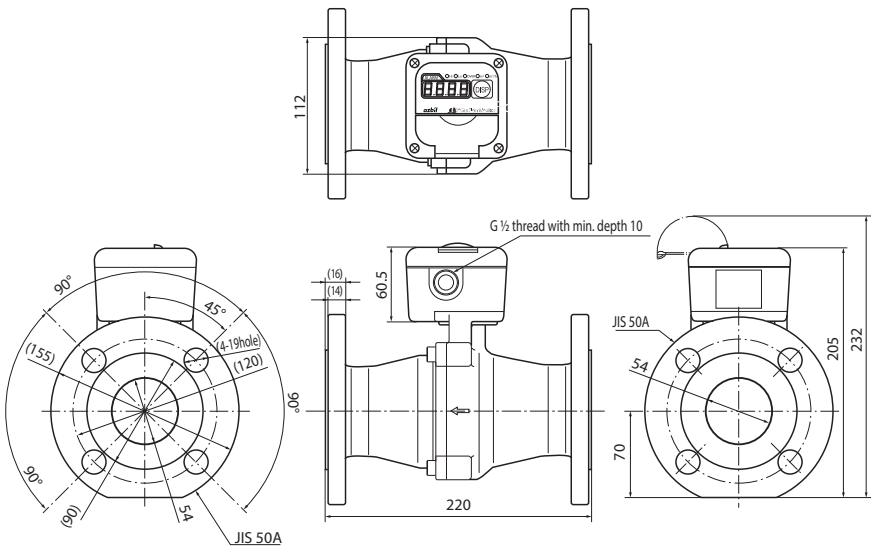
● CMG401

Unit: mm



● CMG501

Unit: mm



Revision History of CP-SP-1113E

Date	Rev.	(New) Page No.	Description
July 2001	1		
Apr. 2003	2	ii iii iv, v 2 3 11 23 25 26 27, 28	Description changed on the 2nd item in WARNING. Item added in CAUTION. Old iii, iv pages. *3 added to the medium pressure model. *3 description added. Symbol table added. Fuse model No. for 24Vdc type changed. *3 description changed. Item of "When selecting a medium pressure model for air and city gas (13A)" added. Old pages 26 and 27.
Dec. 2003	3	2, 3 11 18 20 24 25 26, 27	*3 changed. Symbol of direct current changed. The power supply symbol changed to the one of a model complying with CE. C-09 the description on "setup item and description" and "remarks" changed. Setup range of No.1, 10 : 0 to 200% changed to 0 to 400%. Setup range of No.2 to 4, 11 : 0 to 100% changed to 0 to 200%. Setup range of No.9 : -10 to +10% changed to -20 to +20%. Setup range of No.12 : 0.600 to 1.400 changed to 0.100 to 4.000. Output range of instantaneous flowrate output : 200% changed to 400%. Decimal point 2 digits of event output 2 : 0.1m ³ /pulse added. Decimal point 1 digit 1m ³ /pulse added. Applicable standards added. "Measurement range *2", "display range" changed to "Flowrate range m ³ /h(normal) *1", "measurement range(upper) *2", "display range (lower)". 13A(N) changed to City gas (13A). Moved from 26 page. Old 27, 28 page.

Date	Rev.	(New) Page No.	Description
Apr. 2004	4	1 7 16 18 20 25 26 27, 28	Description added to the 4th item in Features. Description added in CAUTION. Description added to the 2nd line from the top. Description added to the 3rd item in Handling Precautions, also the 4th item added. Description on C-04 changed in Remarks column. No.9 and 11 factory setting values changed from 0m ³ to 0m ³ /h. Specifications table changed on the item of "Upstream straight pipe connection". Item of "Straight pipe section (guide line)" added. Item of ●When selecting a medium pressure model for●●●●●, moved from page 25. Old 26 and 27 page.
Sep. 2004	5	25	*3 : Description added.
Dec. 2005	6	25, 26	D: Connection piping size added.
May 2005	7	All page 4 5 7 8-10 13 14 16 17 18, 20 24 25 26, 27	"Flowrate" to "Flow rate" changed. "Zero adjustment" removed from the description of RESET key and ENT key. Description clarified. Item of ■Pipes added. Pages changed from 7-28. One item added to Handling Precautions. Two sections of Handling Precautions combined. Description clarified on ■Resetting alarms. Description clarified on ■Displaying the total flowrate. Description clarified on ■Setting operation. Description clarified on replacing the fuse in CAUTION. Order of specifications changed. Event output 1: Electrical life changed from 100,000 to 70,000 cycles. Event output 2: "Load" changed to "Output rated." Straight pipe section: Illustration changed.
Oct. 2005	8	All page 4 12	"City gas" to "Natural gas" changed. Description of operation panel changed. Note added to figure of ●Wiring 24Vdc power supply model.
Dec. 2005	9	7 12 13	Model No. of mist separator added. Description of terminal 5,6 added. Note added to figure of ●Wiring the AC power supply model. Terminal 7 "EVENT" to "EVENT2" changed. Description of terminal 3,4 added.

Date	Rev.	(New) Page No.	Description
Apr. 2006	10	ii iii 5 6 12, 13 23 25 26 28,29 30,31	Item added in WARNING. Description changed on the 3rd item in CAUTION. Item added in CAUTION. The common mode voltage between output and ground are changed. Item of 11. and 12. added. Description on the Terminal: EVENT2 added. Item added on the table. Items of ■Common specifications added. Note *1 added. ■Pressure loss added. Old 28, 29 page
July 2006	11	29	Description of pressure loss for the gass other than air added.
June 2007	12	ii iv, 25 iv, 26 1 5 6	Description changed on the 3rd item and 5th item in CAUTION. ■Common specifications changed to ■CMG Series specifications. ■Individual specifications changed to ■Individual CMG model specifications. Description changed in ■Introduction. Description changed on 3rd item in ■Features. Description changed on 8th item in Handling Precautions. Item of ●installation site added.
Oct. 2007	13	ii 7 8 to 32	CAUTION: Item 1, 2 added. ■Behavior when the flowrate greatly exceeds the upper limit of flowrate range added. Old 7 to 31 pages.
Feb. 2008	14	2 22 27	*4 description added. Remaks of item No.12 added. ■CMG series specifications Note 1 changed.
Nov. 2008	15	28	Governor, filter or strainer added in the Handling Precautions.
Sep. 2010	16	ii 2, 3 3 20 28	WARNING: Item 6 changed. "2" added to "event output". Note *3 changed. Pulse rate selection: explanation changed. Handling Precautions: changed.
Sep. 2011	17	Inside front cover ii 11	The URL was changed. A WARNING was changed. Internal diameters of the gaskets were changed.
Apr. 2012	18		Company name changed.
Dec. 2020	19	All page cover	"Natural gas" to "Fuel gas" changed. The μFTM trademark added .

Date	Rev.	(New) Page No.	Description
Apr. 2022	20	ii, 8, 19 39 45	Item added in WARNING. "EN61010-1:2010" to "EN61010-1:2010+A1:2019" changed. "HEX" to "OCT" changed.
Mar. 2023	21	i iii 3 5 6 7 10 11 20 34 35 36 40, 41	Explanations of icons were added. A caution about a fuse was deleted. "Conventions Used in This Manual" was moved to page i. 220 V DC models were added. A note was added. Figures of 24 V DC model and AC model were changed. Descriptions of handling precautions were changed. The description and graph were changed. Filter installation: the description was changed and the figure was deleted. Wiring the AC power supply model: "220 V AC" was added to the figure. Troubleshooting: descriptions were changed. "How to replace the fuse" were deleted. Rated voltage & allowable voltage: 220 V AC was added. A note about DC models was added. Model numbers were changed.



Specifications are subject to change without notice. (11)

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