

## Gas Flow Monitor, Model CMG for Natural Gas (13A) and Air

### Overview

The CMG Gas Flow Monitor is a flowmeter for measuring the fuel flow rate of gas burners. It incorporates a thermal microflow sensor developed by Azbil Corporation.

The CMG measures the volumetric flow rate under normal conditions\* without the need for temperature and pressure compensation and displays the instantaneous flow rate and the amount of total flow. Other functions include alarm contact output, analog output of instantaneous flow rate, and open collector output of totalizer pulse or events.

These functions provide finely tuned air ratio management for individual burners and flow rate management for combustion equipment.

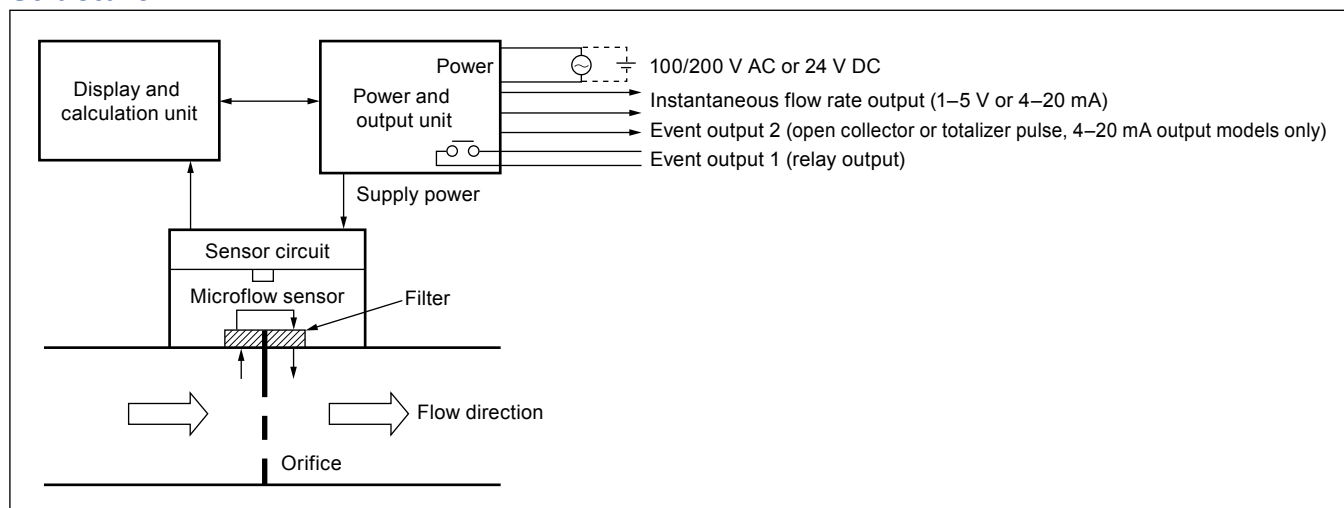
\* The factory default is 0 °C, 101.325 kPa (1 atm).

(The reference temperature can be selected from 5/10/15/20/25 °C in the function settings.)

### Features

- This compact, high-precision gas flow monitor has minimal pressure loss, and thus is optimal for burner applications. Because the direction of the display can be changed, the device can be mounted in any orientation.
- With the digital display of flow rate and Hi, Lo, OVER, ALARM LED indications, the gas flow rate can be easily measured and managed.
- Analog output of the instantaneous flow rate and scaling of the output are available for flow rate management.
- Display of the instantaneous flow rate and total flow can be switched with one press of a button, facilitating gas usage checking.
- Because this device measures mass flow rate, temperature and pressure compensation is not needed. The reference temperature for volumetric flow rate display can be selected, and the pressure conditions can also be changed easily by specifying the gas composition compensation coefficient.
- The self-diagnostic function supports troubleshooting.

### Structure



### <Excess air ratio >

The amount of air needed for complete combustion of fuel can be theoretically determined, and is referred to as the theoretical quantity of air. However, in actual combustion equipment, the theoretical quantity of air is insufficient for complete combustion. Therefore, excess air is used in order to sustain stable combustion and minimize heat loss due to exhaust gas, CO, and particulate matter.

$$\text{Excess air ratio (m)} = \frac{\text{[Quantity of air used (A)]}}{\text{[Theoretical quantity of air for combustion (AO)]}}$$

Excess air ratio is generally set at  $m = 1.1$  or higher by burner adjustment. By knowing the amount of deviation in the excess air ratio caused by foreign matter accumulation on the burner and blower filter clogging, the burner can be adjusted to achieve optimum air ratio as well as energy savings.

For the purpose of saving energy, reference and target values for the air ratio for specific types of equipment are determined by the (Japan's) laws on energy conservation.

## Specifications

Item		Description						
Model No.		CMG150	CMG250		CMG400/401		CMG500/501	
Con- nection diameter	Threaded connection	Rc ½	Rc 1		Rc 1½		Rc 2	
	Flange connection	-	-		JIS 10K		JIS 10K	
Gas type		Natural gas (13A)*1 or air (depending on the model)						
Material		Flow path: aluminum alloy (Rc thread), SCS13 (flange) Display: PBT+GF 30 %						
Measurement range		0.50–4.00 m <sup>3</sup> /h	1.00–10.00 m <sup>3</sup> /h	3.0–30.0 m <sup>3</sup> /h	8.0–80.0 m <sup>3</sup> /h	15.0–150.0 m <sup>3</sup> /h	8.0–80.0 m <sup>3</sup> /h	15.0–150.0 m <sup>3</sup> /h
Display range (see Table 1)		0.00–7.00 m <sup>3</sup> /h	0.00–16.00 m <sup>3</sup> /h	0.0–35.0 m <sup>3</sup> /h	0.0–100.0 m <sup>3</sup> /h	0.0–170.0 m <sup>3</sup> /h	0.0–100.0 m <sup>3</sup> /h	0.0–170.0 m <sup>3</sup> /h
Rated voltage		100/200 V AC or 24 V DC						
Allowable voltage		AC models: 85–110 % of the rated voltage. DC models: ±10 % of the rated voltage						
Power consumption		AC models: 2 W max., DC models: 5.5 W max.						
Flow rate display method		Volumetric flow rate converted to conditions of 0 °C and 101.325 kPa (1 atm) (5/10/15/20/25 °C can be selected as the reference temperature)						
Allowable ambient temperature, gas temperature		-10 to +60 °C (without freezing)						
Storage ambient temperature		-20 to +70 °C (without freezing)						
Ambient humidity		At 40 °C, 90 % RH (without condensation)						
Instantaneous flow rate display accuracy		In the measurement range (+10 to +40 °C) ±4%RD±1 digit  (-10 to +60 °C) ±6%RD±1 digit			In the measurement range (+10 to +40 °C) ±1%FS±1 digit [Less than 25%FS] ±4%RD±1 digit [25%FS or more]  (-10 to +60 °C) ±1.5%FS± digit [Less than 25%FS] ±6%RD±1 digit [25%FS or more]			
Instantaneous flow rate repeatability		±1 % rdg. ± 1 digit (20 °C)						
Response speed		Sampling cycle: 100 ms, response to a 0 to 100 % FS step input: 1.6 s						
Instantaneous flow rate output		1–5 V DC output Output range: 0 to 200 % of measurement range high limit (changeable by parameter setting) Accuracy: ±0.5 % FS Wiring distance: 10 m max. External load resistance: 10 kΩ min.			-			
		4–20 mA output Output range: 0 to 200 % of measurement range high limit (changeable by parameter setting) Accuracy: ±0.5 % FS External load resistance: 300 Ω max.						
Event output 1		1a contact (closed when an event occurs) Contact rating: 250 V AC, 30 V DC, 5 A (resistive load) Mechanical life: 20 million cycles Electrical life: 100,000 cycles						
Event output 2 (for 4–20 mA output models only)		Output type: NPN open collector output Load: 30 V, 50 mA max. When totalizer pulse output is selected Pulse width: 100 ms ± 20 % With measurement to 2 digits after the decimal point: select from 0.001, 0.01, 0.1 m <sup>3</sup> /pulse With measurement to 1 digit after the decimal point: select from 0.01, 0.1, 1 m <sup>3</sup> /pulse						
Operating pressure range		100 kPa max.			100 kPa max. (low-pressure models), 1.0 MPa max. (medium-pressure models)			
Pressure resistance		150 kPa max.			150 kPa max. (low-pressure models), 1.5 MPa max. (medium-pressure models)			
Pressure loss *2 (high limit for air)	Threaded connection	140 Pa	215 Pa	210 Pa	500 Pa	1300 Pa	285 Pa	550 Pa
	Flange connection	-	-	-	390 Pa	840 Pa	250 Pa	430 Pa
Straight pipe length		Not needed	Not needed	15 cm min.	10 cm min.	40 cm min.	10 cm min.	40cm min.
Conduit size		G½, 2 pieces						
Vibration resistance		5 m/s <sup>2</sup> max. at 10–60 Hz for 2 hours each in X, Y, and Z directions						
Shock resistance		500 m/s <sup>2</sup> max., 3 times in X, Y, and Z directions						

Item		Description			
Model No.		CMG150	CMG250	CMG400/401	CMG500/501
<b>Dielectric strength</b>		24 V DC models Terminal 5 or 6 and flow path: 1500 V AC for 1 min or 1800 V AC for 1 s AC models Terminal 1 or 2 and flow path: 1500 V AC for 1 min or 1800 V AC for 1 s Terminal 3 or 4 and flow path: 1500 V AC for 1 min or 1800 V AC for 1 s			
<b>Insulation resistance</b>		Between each terminal and flow path metal: 50 MΩ min. (with 500 V DC megger)			
<b>Protection rating</b>		IP54 (JIS C 0920), drip-proof and dust-proof structure			
<b>Mask color</b>		Natural gas (13A) models: yellow. Air models: light blue			
<b>Weight</b>	<b>Threaded connection</b>	Approx. 850 g	Approx. 800 g	Approx. 2100 g	Approx. 2000 g
	<b>Flange connection</b>	-	-	Approx. 9 kg	Approx. 10 kg
<b>Applicable standards (DC models only)</b>		EN 61010-1:2010 EN 61326-2-3:2013, EN 61326-1:2013 (to be used in an industrial electromagnetic environment) During EMC testing, the reading or output may fluctuate by the equivalent of ±8 % FS.			
<b>Installation category</b>		Overvoltage category II			
<b>Pollution degree</b>		Pollution degree 2			
<b>Altitude</b>		2000 m max.			

Terms: % rdg. : percentage of reading  
% FS : percentage of full scale output

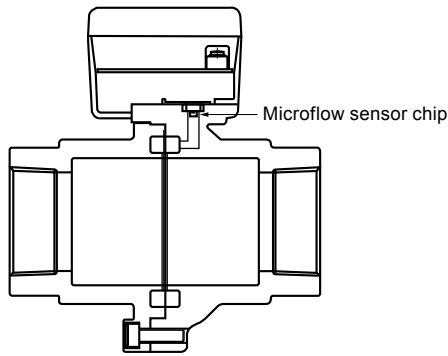
- \*1 The device was adjusted at the factory based on the composition of 13A-46MJ natural gas. For 13A-45MJ models, the factory default of the gas composition compensation coefficient parameter (No.12) is 1.029.

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

For a natural gas with a different composition than the above, please contact the azbil Group.

- \*2 The pressure loss for natural gas 13A can be calculated by multiplying the pressure loss for air by the specific gravity of 0.64.  
Ex. : To calculate the pressure loss by the CMG150 for natural gas 13A (4 m<sup>3</sup>/h), multiply the loss for air (140 Pa) by the specific gravity:  
140 Pa × 0.64 = approx. 90 Pa.

## Structure



## Filter Installation

If dust, oil mist, or water enters this device, it may cause measurement error or faulty operation.

If a gas that always contains oil mist, such as compressed air, is used, or if it is expected that pipe rust will enter the pipes, make sure to install a filter.

A special filter is available for natural gas and low-pressure air. Please contact the azbil Group for further details.

## 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	
Flow rate range m/h (normal) Measurement range (top) Display range (bottom) *1 *2 *3	Natural 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
	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
Straight pipe length for a 90° elbow *4	Upstream side	Not needed	Not needed	15 cm min.	10 cm min.	40 cm min.	10 cm min.	40 cm min.
	Downstream side	Not needed	Not needed	10 cm min.	5 cm min.	20 cm min.	5 cm min.	20 cm min.

\*1 The number of digits displayed after the decimal point for m<sup>3</sup>/h is the same as that shown in the table.

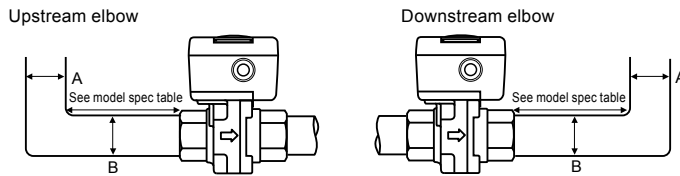
\*2 "Normal" indicates the volumetric flow rate (m<sup>3</sup>/h) converted to conditions of 0 °C and 101.325 kPa (1 atm).

\*3 The measurement range refers to the indication accuracy-guaranteed instantaneous flow rate range.

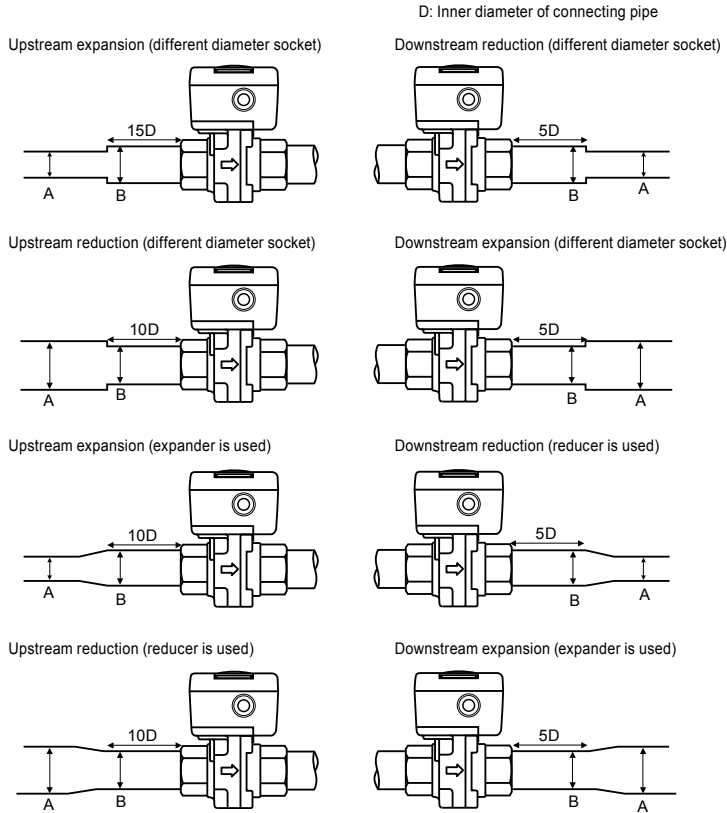
\*4 Depending on the pipe shape or other devices installed on the piping, a longer straight pipe might be needed. The downstream straight pipe length indicated above is a reference value.

## Straight Pipe Length Guideline

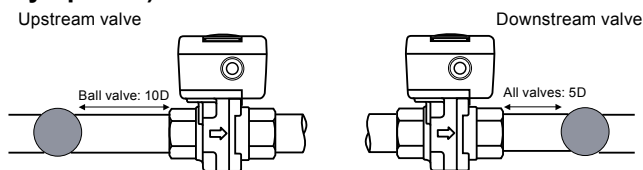
- For same-diameter piping (inner diameters **A** and **B** are the same)



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



- Valves (fully opened)



### ⚠ Handling Precautions

- If a governor, filter, or strainer disturbs the flow, please contact the azbil Group for details.
- Flow control valves, such as butterfly, needle, and globe valves, should be installed downstream of the CMG, at least 5D away from it.
- The required straight pipe length differs depending on the model.
- 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.

## Model Selection

### Air model

I II III IV V VI VII VIII IX X Example: CMG150A004000100

I	II	III	IV	V	VI	VII	VIII	IX	X	Description
Basic model No.	Connection	Pipe shape	Gas type	Flow rate range	Output	Pressure	Comm.	Power	Add'l processing	
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) *1
			A							Air
				004						4 m³/h (CMG15)
				010						10 m³/h (CMG25)
				030						30 m³/h (CMG25)
				080						80 m³/h (CMG40/50)
				150						150 m³/h (CMG40/50)
					0					1–5 V DC output (4, 10, 30 m³/h only) *2
					1					4–20 mA + Event Output 2
						0				Low pressure (Rc thread only)
						1				Medium pressure (JIS 10K flange, flow rate range: 80, 150 m³/h)
							0			No communication
								0		24 V DC
								1		100 V AC (50/60 Hz)
								2		200 V AC (50/60 Hz)
									00	None
									D0	With inspection report

### Natural gas (13A-46MJ) model

I	II	III	IV	V	VI	VII	VIII	IX	X	Description
Basic model No.	Connection	Pipe shape	Gas type	Flow rate range	Output	Pressure	Comm.	Power	Add'l processing	
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) *1
			N							Natural gas (13A-46MJ)
				004						4 m³/h (CMG15)
				010						10 m³/h (CMG25)
				030						30 m³/h (CMG25)
				080						80 m³/h (CMG40/50)
				150						150 m³/h (CMG40/50)
					0					1–5 V DC output (4, 10, 30 m³/h only) *2
					1					4–20 mA + Event Output 2
						0				Low pressure (Rc thread only)
						1				Medium pressure (JIS 10K flange only)
							0			No communication
								0		24 V DC
								1		100 V AC (50/60 Hz)
								2		200 V AC (50/60 Hz)
									00	None
									D0	With inspection report

\*1 Flange connection can be selected only for medium-pressure models.

If "Pipe shape: 1 (JIS10K flange)" is selected, "Pressure: 0 (Low pressure)" cannot be selected. (Medium-pressure models can be used for low pressure.)

\*2 Event Output 2 is not available for 1–5 V DC output models.

### Natural gas (13A-45MJ) model

I	II	III	IV	V	VI	VII	VIII	IX	X	Description	
Basic model No.	Connection	Pipe shape	Gas type	Flow rate range	Output	Pressure	Comm.	Power	Add'l processing		
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) <sup>*1</sup>
			G								Natural gas 13A-45MJ (gas composition compensation coefficient: 1.029)
				004							4 m³/h (CMG15)
				010							10 m³/h (CMG25)
				030							30 m³/h (CMG25)
				080							80 m³/h (CMG40/50)
				150							150 m³/h (CMG40/50)
					0						1–5 V DC output (4,10, 30 m³/h only) <sup>*2</sup>
					1						4–20 mA + Event Output 2
						0					Low pressure (Rc thread only)
						1					Medium pressure (JIS 10K flange only)
						0				No communication	
							0			24 V DC	
								1		100 V AC (50/60 Hz)	
								2		200 V AC (50/60 Hz)	
									00	None	
									D0	With inspection report	

\*1 Flange connection can be selected only for medium-pressure models.  
If "Connection type: 1 (JIS10K flange)" is selected, "Pressure: 0 (Low pressure)" cannot be selected. (Medium-pressure models can be used for low pressure.)

\*2 Event Output 2 is not available for 1–5 V DC output models.

**Table 1. Measurement range, indication range, and indication accuracy**

#### Air model

Model No.	Instantaneous flow rate measurement range	Indication range	No. of digits after the decimal point	Indication accuracy for instantaneous flow rate within the measurement range
CMG150A004	0.50–4.00 m³/h	0.00–7.00 m³/h	2	±4 % rdg. ± 1 digit (10 to 40 °C) ±6 % rdg. ± 1 digit (-10 to +60 °C)
CMG250A010	1.00–10.00 m³/h	0.00–16.00 m³/h		
CMG250A030	3.0–30.0 m³/h	0.0–35.0 m³/h	1	±4 % rdg. ± 1 digit (10 to 40 °C) ±6 % rdg. ± 1 digit (0 to 50 °C)
CMG40_A080	8.0–80.0 m³/h	0.0–100.0 m³/h		
CMG50_A080				
CMG40_A150	15.0–150.0 m³/h	0.0–170.0 m³/h		
CMG50_A150				
Instantaneous flow rate repeatability within measurement range: ±1 % rdg. ± 1 digit				

% rdg.: percentage of reading

% FS: percentage of full scale output

#### Natural gas (13A) model

Model No.	Instantaneous flow rate measurement range	Indication range	No. of digits after the decimal point	Indication accuracy for instantaneous flow rate within the measurement range
CMG150N004, CMG150G004	0.50–4.00 m³/h	0.00–7.00 m³/h	2	±4 % rdg. ± 1 digit (10 to 40 °C) ±6 % rdg. ± 1 digit (-10 to +60 °C)
CMG250N010, CMG250G010	1.00–10.00 m³/h	0.00–16.00 m³/h		
CMG250N030, CMG250G030	3.0–30.0 m³/h	0.0–35.0 m³/h	1	±4 % rdg. ± 1 digit (10 to 40 °C) ±6 % rdg. ± 1 digit (0 to 50 °C)
CMG40_N080, CMG40_G080	8.0–80.0 m³/h	0.0–100.0 m³/h		
CMG50_N080, CMG50_G080				
CMG40_N150, CMG40_G150	15.0–150.0 m³/h	0.0–170.0 m³/h		
CMG50_N150, CMG50_G150				
Instantaneous flow rate repeatability within measurement range: ±1 % rdg. ± 1 digit				

% rdg.: percentage of reading

% FS: percentage of full scale output

## Parameter List

No.	Item displayed	Name	Initial value	Setting range	Remarks
1	<i>R. 11</i>	Instantaneous flow rate upper limit alarm	(Measurement range upper limit) m <sup>3</sup> /h (normal)	(0–400 % of measurement range upper limit) m <sup>3</sup> /h (normal)	The alarm detection condition must be selected in function setting $\zeta$ -02.
2	<i>R. H. H4</i>	Hysteresis for instantaneous flow rate upper limit alarm	(2 % of measurement range upper limit) m <sup>3</sup> /h (normal)	(0–200 % of measurement range upper limit) m <sup>3</sup> /h (normal)	
3	<i>R. Lo 12</i>	Instantaneous flow rate lower limit alarm	(Measurement range lower limit) m <sup>3</sup> /h (normal)	(0–200 % of measurement range upper limit) m <sup>3</sup> /h (normal)	
4	<i>R. L. H4</i>	Hysteresis for instantaneous flow rate lower limit alarm	(2 % of measurement range upper limit) m <sup>3</sup> /h (normal)	(0–200 % of measurement range upper limit) m <sup>3</sup> /h (normal)	
5	<i>R. dLY</i>	Delay timing for instantaneous flow rate alarm judgment	60.0 s	0.0 to 999.9 s	
6	<i>E. SP. L</i>	Total flow event setting (last 4 digits)	0 m <sup>3</sup>	0 to 99,999,999 m <sup>3</sup>	The setting is valid only when total flow event output is selected in function setting $\zeta$ -03 or $\zeta$ -04.
7	<i>E. SP. H</i>	Total flow event setting (first 4 digits)			
8	<i>E. L. dL</i>	Total flow reset delay time	10.0 s	0.0 to 999.9 s	The setting is valid only if function setting $\zeta$ -05 is set for automatic reset after the total flow reset delay time.
9	<i>b/RS</i>	Instantaneous flow rate bias (PV bias)	0 m <sup>3</sup> /h	(-20 to +20 % of measurement range upper limit) m <sup>3</sup> /h (normal)	
10	<i>oUt. H</i>	Instantaneous flow rate output 5 V (20 mA) scaling	(Measurement range upper limit) m <sup>3</sup> /h (normal)	(0–400 % of measurement range upper limit) m <sup>3</sup> /h (normal)	
11	<i>oUt. L</i>	Instantaneous flow rate output 1 V (4 mA) scaling	0 m <sup>3</sup> /h	(0–200 % of measurement range upper limit) m <sup>3</sup> /h (normal)	
12	<i>GRS. L</i>	Gas composition compensation coefficient	1.000	0.100 to 4.000	CMG___G initial value: 1.029

Note "Normal" indicates the volumetric flow rate (m<sup>3</sup>/h) converted to conditions of 0 °C and 101.325 kPa (1 atm).

\*1 Specify a flow rate that is lower than the display range upper limit. An alarm will not be issued if the upper limit value or higher is set.

\*2 If "Lower limit alarm 1" is selected for function setting C-02, if the flow rate is lower than the measurement range lower limit, an alarm will not be issued even if the flow rate is below the lower limit alarm setting.



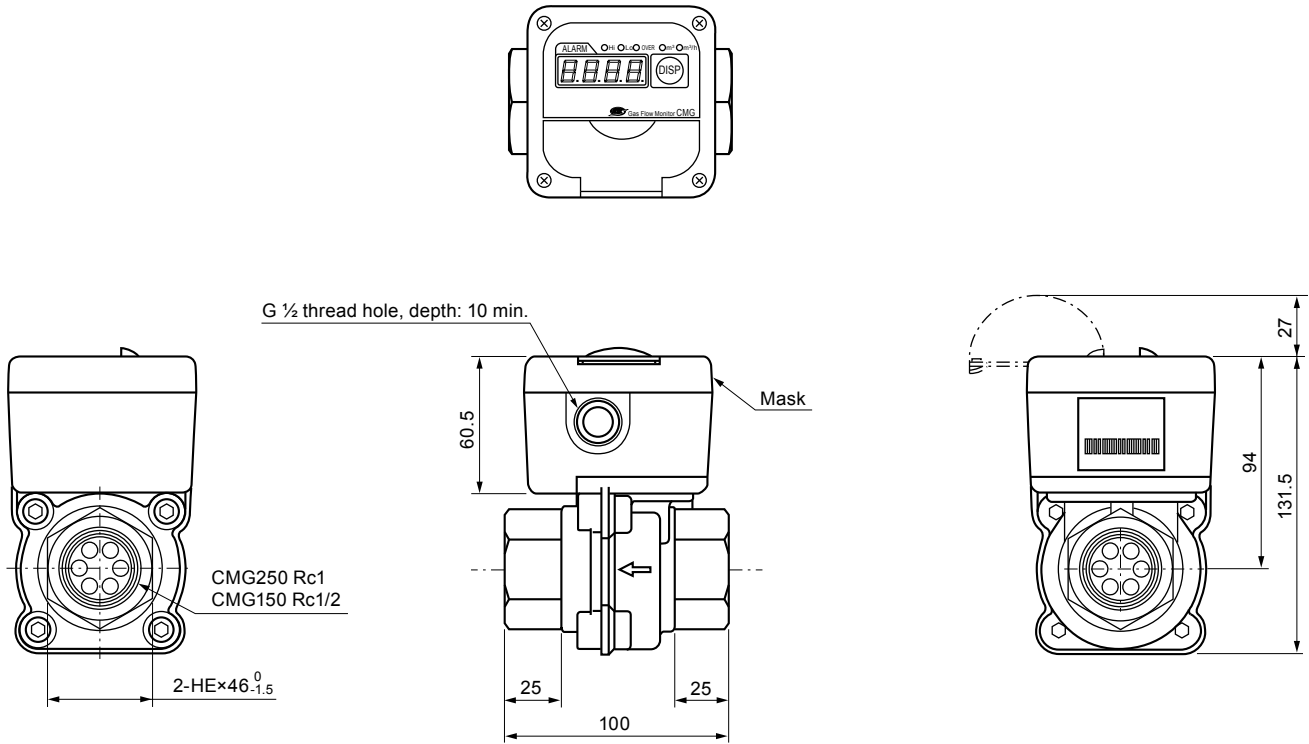
## Settings

Item displayed	Name	Settings and description	Initial value	Remarks															
ℓ-01	Key lock	0: OFF 1: ON	0	The key lock can be turned off even when the keys are locked.															
ℓ-02	Conditions for flow rate alarm detection	0: No alarm detection 1: Upper limit alarm detection only 2: Lower limit alarm 1 detection only 3: Upper limit alarm and lower limit alarm 1 detection 4: Lower limit alarm 2 detection only 5: Upper limit alarm and lower limit alarm 2 detection	0	The flow rate that triggers an alarm can be specified in parameter setup mode. Lower limit alarm 1: Alarm will not occur if the flow rate is below the measurement range lower limit. Lower limit alarm 2: Alarm will occur if the flow rate is below the measurement range lower limit.															
ℓ-03	Event output 1 (relay) function	0: Not used (always OFF) 1: ON when an upper limit alarm occurs 2: ON when a lower limit alarm occurs 3: ON when upper or lower limit alarm occurs 4: ON when a total flow event occurs	3																
ℓ-04	Event output 2 (open collector) function	0: Not used (always OFF) 1: ON when an upper limit alarm occurs 2: ON when a lower limit alarm occurs 3: ON when upper or lower limit alarm occurs 4: ON when a total flow event occurs 5: Totalizer pulse output	5	This function is available only for models with event outputs.															
ℓ-05	Flow rate alarm reset method	0: Reset by pressing the [RESET] key 1: Reset by pressing the [RESET] key or automatic reset when the flow rate returns to normal	0																
ℓ-06	Total flow reset method	0: Reset disabled 1: Reset by pressing the [RESET] key 2: Automatic reset after the total flow reset delay time when a total flow event occurs 3: Automatic reset after the total flow reset delay time when the [RESET] key is pressed or a total flow event occurs	1																
ℓ-07	Lifetime total flow reset method	0: Reset disabled 1: Reset by pressing the [RESET] key	0	The total flow is reset when the lifetime total flow is reset.															
ℓ-08	Reference temperature	0: 0 °C, 101.325 kPa (1 atm) 1: 5 °C, 101.325 kPa (1 atm) 2: 10 °C, 101.325 kPa (1 atm) 3: 15 °C, 101.325 kPa (1 atm) 4: 20 °C, 101.325 kPa (1 atm) 5: 25 °C, 101.325 kPa (1 atm)	0	The reference temperature can be switched.															
ℓ-09	Pulse rate	<table border="1"> <thead> <tr> <th></th> <th>2 digits after the decimal point</th> <th>1 digit after the decimal point</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0.001 m<sup>3</sup>/pulse</td> <td>0.01 m<sup>3</sup>/pulse</td> </tr> <tr> <td>1</td> <td>0.01 m<sup>3</sup>/pulse</td> <td>0.01 m<sup>3</sup>/pulse</td> </tr> <tr> <td>2</td> <td>0.1 m<sup>3</sup>/pulse</td> <td>0.1 m<sup>3</sup>/pulse</td> </tr> <tr> <td>3</td> <td>0.1 m<sup>3</sup>/pulse</td> <td>1 m<sup>3</sup>/pulse</td> </tr> </tbody> </table>		2 digits after the decimal point	1 digit after the decimal point	0	0.001 m <sup>3</sup> /pulse	0.01 m <sup>3</sup> /pulse	1	0.01 m <sup>3</sup> /pulse	0.01 m <sup>3</sup> /pulse	2	0.1 m <sup>3</sup> /pulse	0.1 m <sup>3</sup> /pulse	3	0.1 m <sup>3</sup> /pulse	1 m <sup>3</sup> /pulse	1	The pulse rate differs depending on whether the measurement range includes 2 digits after the decimal point or 1 digit after the decimal point.
	2 digits after the decimal point	1 digit after the decimal point																	
0	0.001 m <sup>3</sup> /pulse	0.01 m <sup>3</sup> /pulse																	
1	0.01 m <sup>3</sup> /pulse	0.01 m <sup>3</sup> /pulse																	
2	0.1 m <sup>3</sup> /pulse	0.1 m <sup>3</sup> /pulse																	
3	0.1 m <sup>3</sup> /pulse	1 m <sup>3</sup> /pulse																	

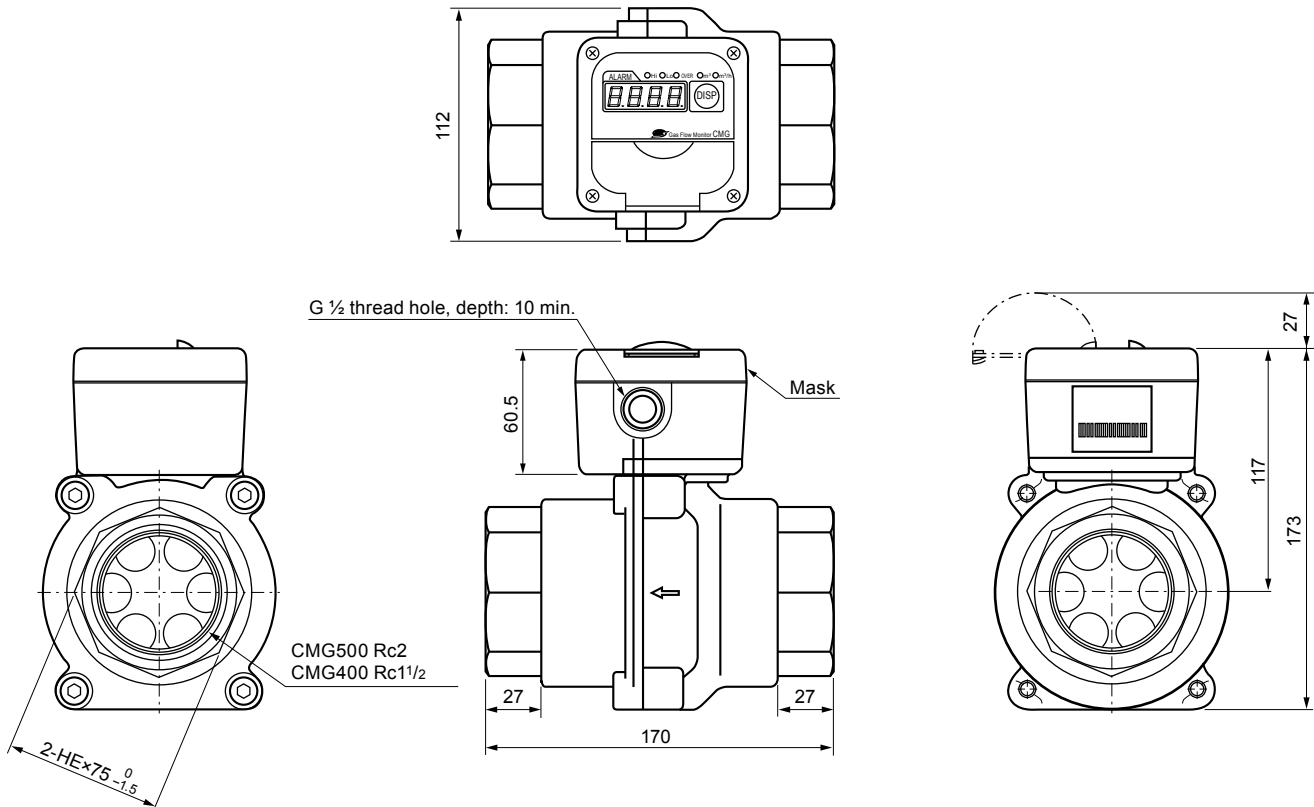
## External Dimensions

### • CMG150/250

(Unit: mm)

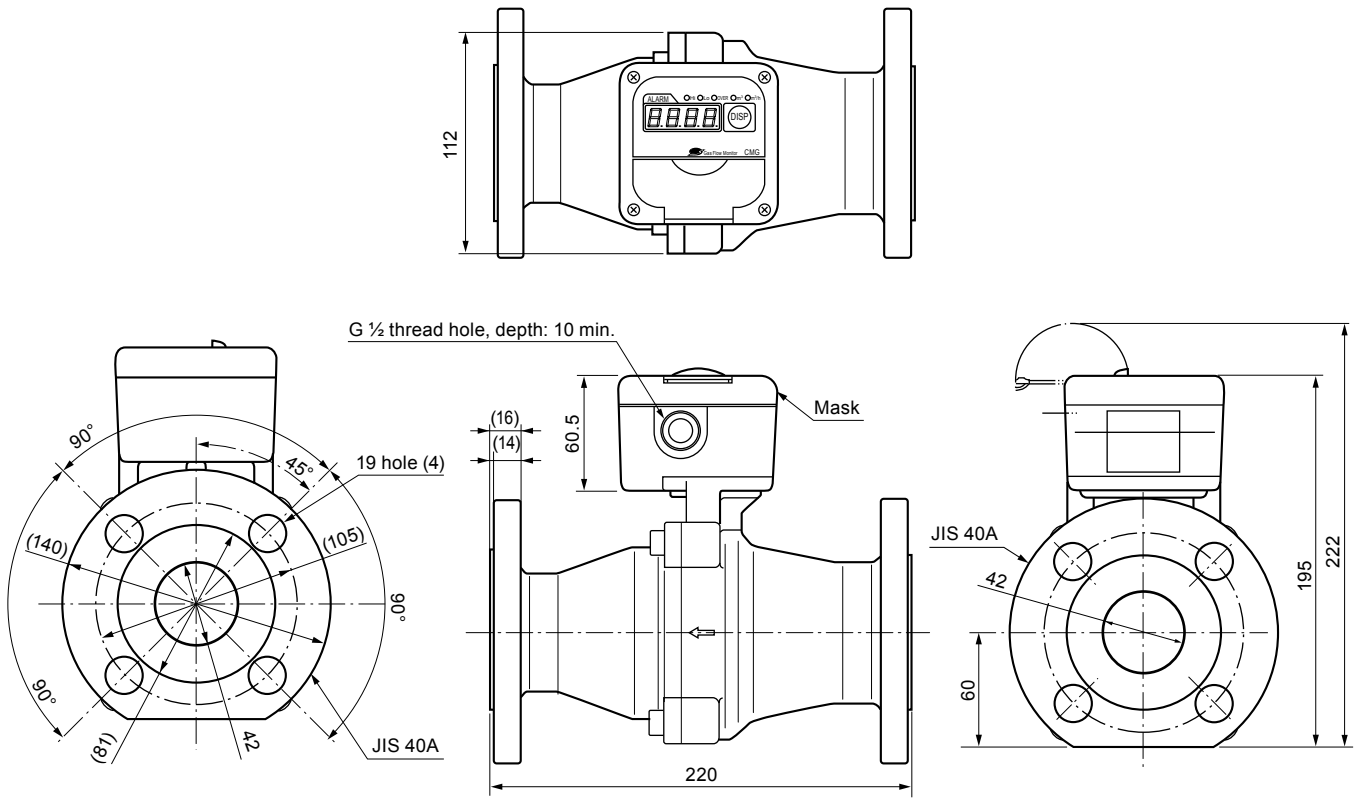


### • CMG400/500

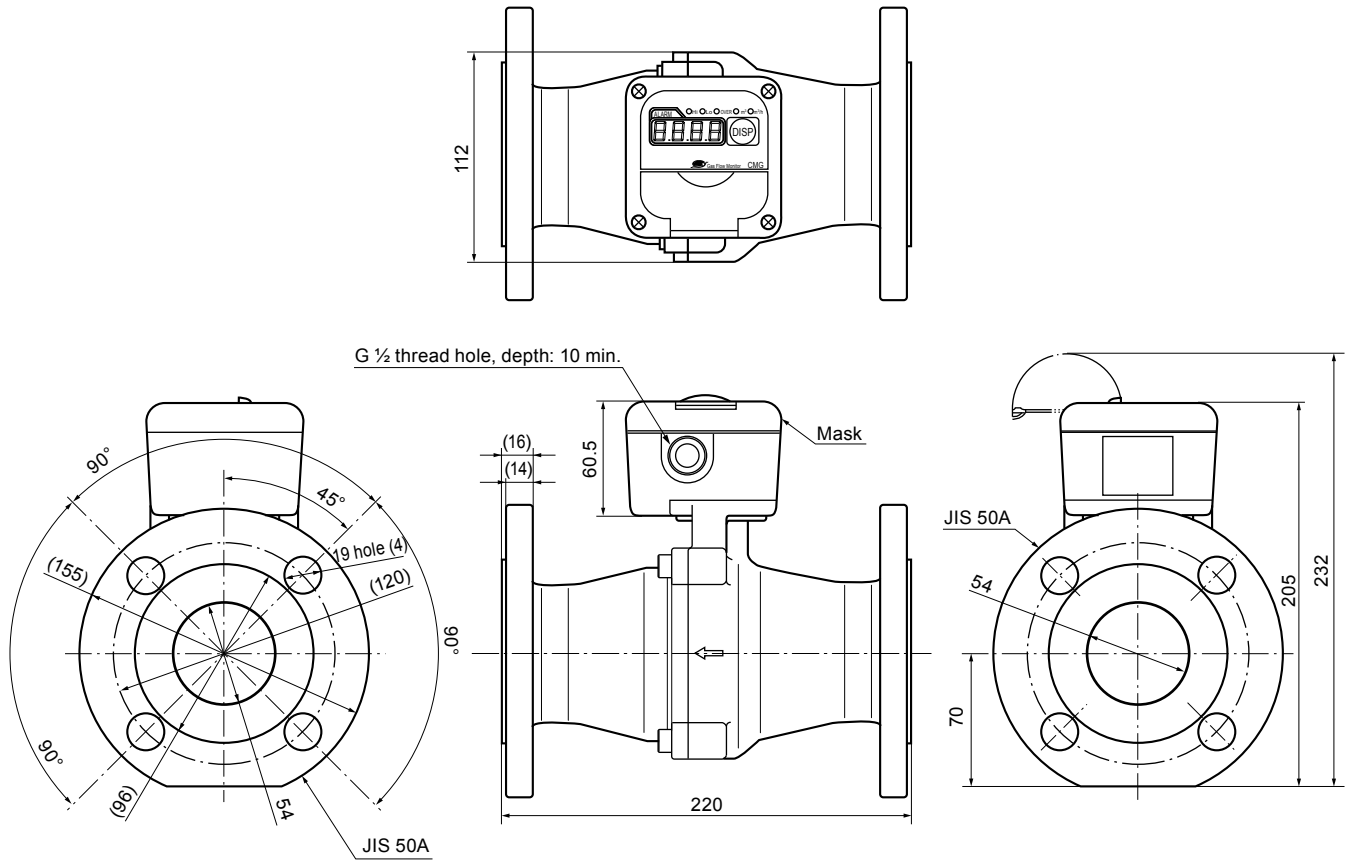


● CMG401

(Unit: mm)

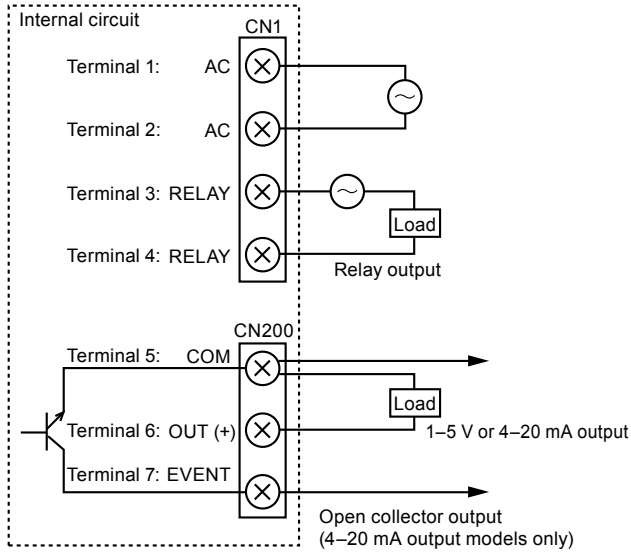


● CMG501



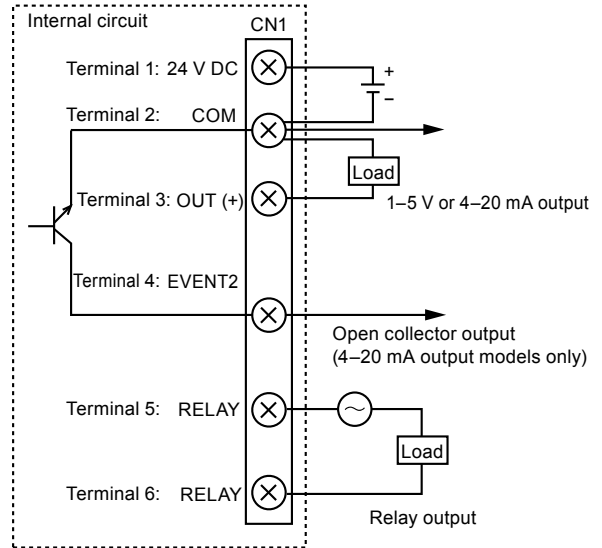
# Wiring Diagram

## • AC model



Terminal No.	Signal name	Description
1	AC	Power
2	AC	Power
3	RELAY	Event output 1, contact output
4	RELAY	Event output 1, contact output
5	COM	Common
6	OUT	Analog output (+)
7	EVENT	Event output 2, NPN open collector, totalizer pulse

## • DC model

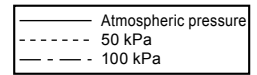


Terminal No.	Signal name	Description
1	24 V DC	Power
2	COM	Common
3	OUT	Analog output (+)
4	EVENT2	Event output 2, NPN open collector, totalizer pulse
5	RELAY	Event output 1, contact output
6	RELAY	Event output 1, contact output

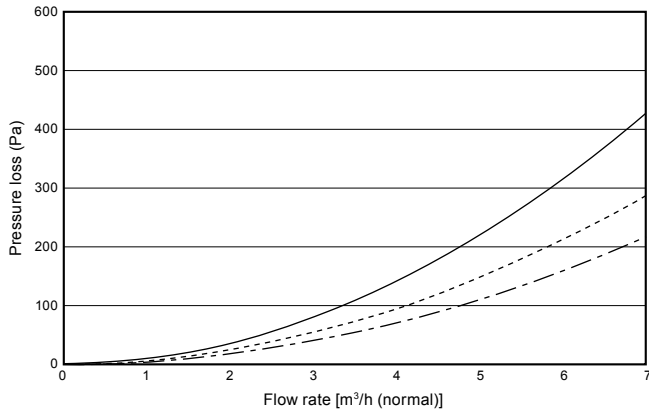
## Pressure Loss

- Air model / Natural gas (13A) model with Rc thread connection**

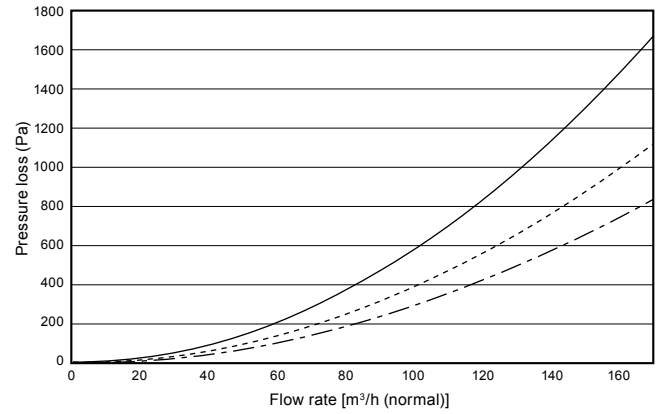
The following pressure loss is for air. For natural gas (13A), multiply the loss for air by the specific gravity of 0.64.



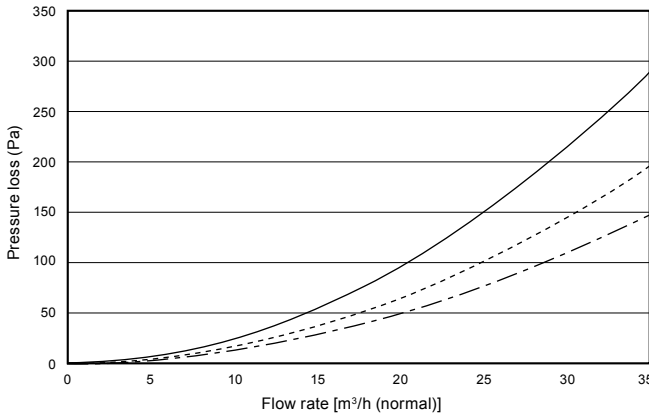
- CMG150A004, CMG150N004, CMG150G004



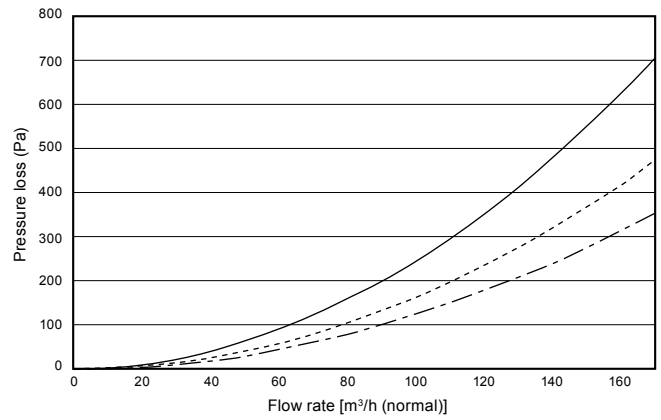
- CMG400A150, CMG400N150, CMG400G150



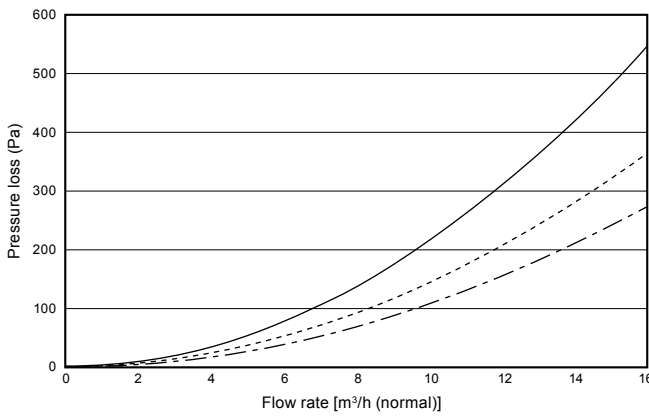
- CMG250A030, CMG250N030, CMG250G030



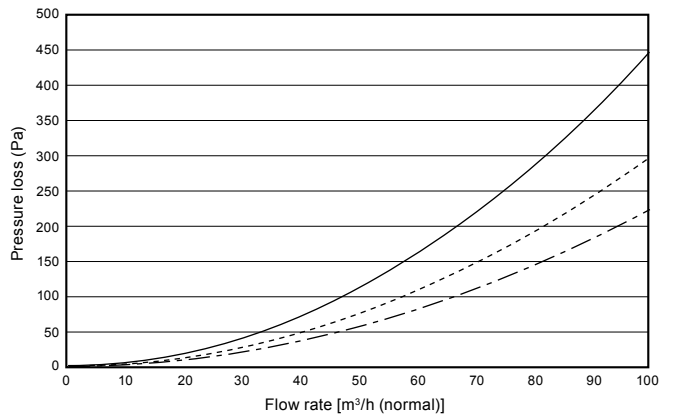
- CMG500A150, CMG500N150, CMG500G150



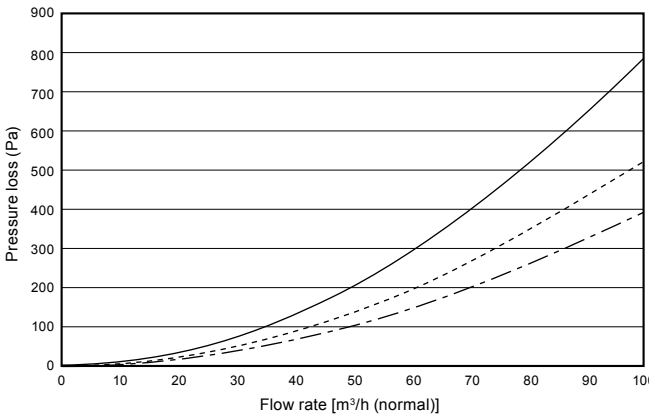
- CMG250A010, CMG250N010, CMG250G010



- CMG500A080, CMG500N080, CMG500G080

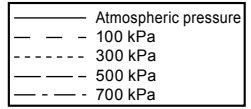


- CMG400A080, CMG400N080, CMG400G080

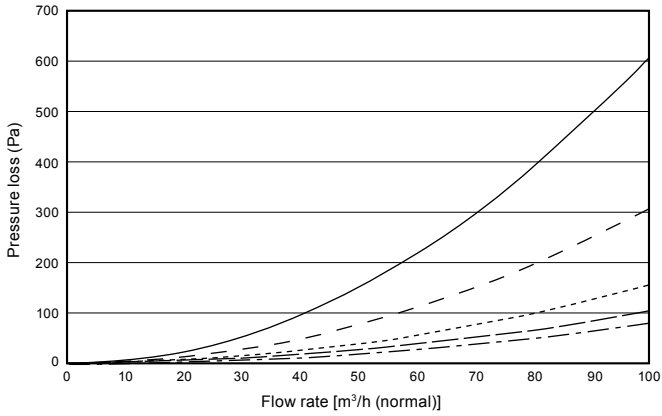


• **Air model / Natural gas (13A) model with JIS10K flange connection**

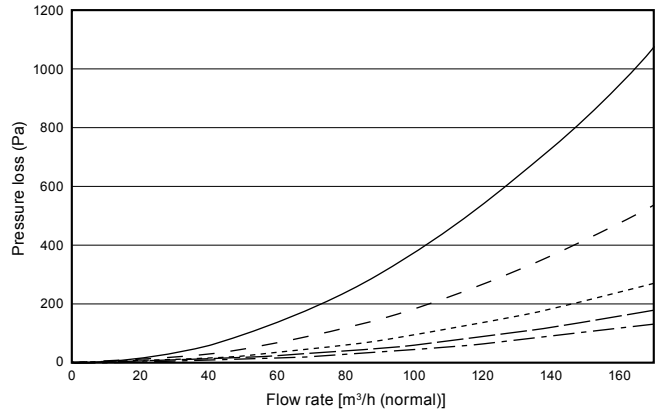
The following pressure loss is for air. For natural gas (13A), multiply the loss for air by the specific gravity of 0.64.



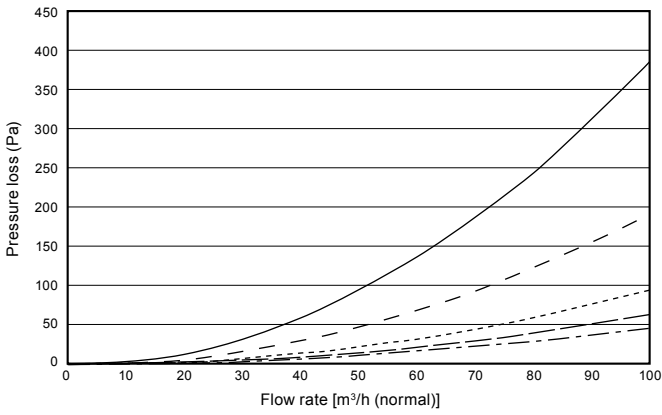
• CMG401A080\_1, CMG401N080\_1, CMG401G080\_1



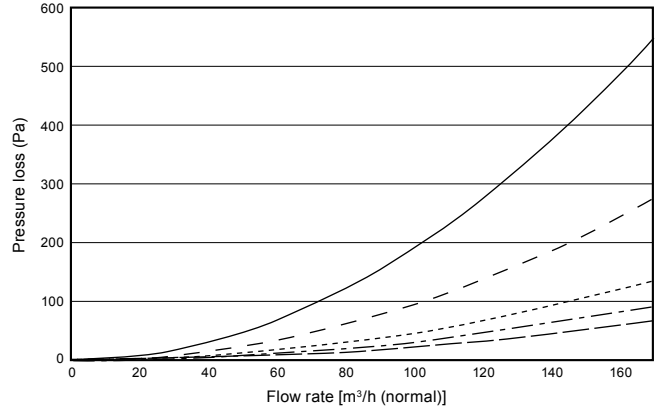
• CMG401A150\_1, CMG401N150\_1, CMG401G150\_1



• CMG501A080\_1, CMG501N080\_1, CMG501G080\_1



• CMG501A150\_1, CMG501N150\_1, CMG501G150\_1



## Instructions for Proper Use

1. If this device is used with flammable gases, install the device upstream of the safety shutoff valve. If air should enter the piping, and the sensor makes a spark due to some cause such as lightning discharge when an explosive gas mixture is present, an explosion may occur inside the pipe. The device is protected from excess voltage or power short-circuit by an internal safety circuit and fuse.
2. Take necessary countermeasures with the instrumentation to prevent occurrence of backfire and to avoid any effect on the device even if backfiring should occur.

Pressure increase in the piping, or a fire caused by backfire of the burner, may damage the device.

3. Each model is designed for specific gases. Do not use the device for a fluid other than the gases specified for that model. If this device is used for a gas with an ignition temperature lower than the specified gases, and if air should enter the piping so that there is an explosive gas mixture, the heating element in the sensor may cause an explosion inside the piping.
4. If there is a pulsating flow in the piping, there may be an error in the measurements of this device. Do not install the device where pulsation exists, regardless of the model, gas type, supply gas pressure, or installation method. Please contact the azbil Group for further details.

Pulsation occurs in:

- 1) A 500 mm or longer flexible pipe of any material with an accordion-shape inner surface  
Note that flexible piping with a smooth inner surface (e.g., a rubber hose) does not cause pulsation.
  - 2) Piping on which a reciprocating or rotary type gas booster or a flow meter with rotary motion such as a Roots meter is installed
5. For rusted piping, or when measuring air containing dust, etc., install a strainer upstream of the device to prevent foreign matter from entering. Foreign matter can cause faulty operation.
  6. If the device is used outdoors, protection from direct sunlight and rain is needed.
  7. Install this device in a place without vibration.  
Gas flow in the flow path caused by vibration may result in erroneous readings.

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

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

*Specifications are subject to change without notice.*

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