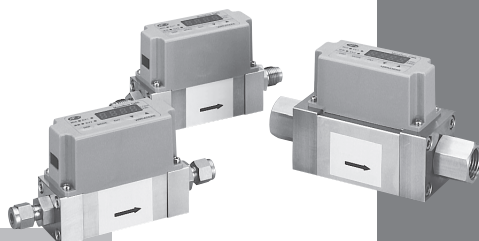




Gas Mass Flow Meter For Hydrogen and Helium Gases

Model CMS0010/0050/0200/
0500/1000/2000

User's Manual



Thank you for purchasing an Azbil Corporation product.

This manual contains information for ensuring the correct use of this product. It also provides necessary information for installation, maintenance, and troubleshooting.

This manual should be read by those who design and maintain equipment that uses this product. Be sure to keep this manual 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

Be sure that the user receives this manual before the product is used.

Copying or duplicating 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 free from inaccuracies and omissions. If you should find an error or omission, please contact the azbil Group.

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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The μ F logo, Micro Flow are trademarks of Azbil Corporation in Japan.

Conventions Used in This Manual

- The safety precautions explained in the following section aim to prevent injury to the operator and others, and to prevent property damage.

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

 **CAUTION** Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to the product.

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



Use caution when handling the product.



The indicated action is prohibited.



Be sure to follow the indicated instructions.

Handling Precautions

Handling Precautions indicate items that the user should pay attention to when handling this device



This indicates the item or page that the user is requested to refer to.



Note

Notes indicate information that might benefit the user.

(1), (2), (3):

Numbers within parentheses indicate steps in a sequence or parts of an explanation.

03, P-07

This font is used to indicate output on the 7-segment display.

[MODE] key:

This indicates keys on the control panel.

Safety Precautions

WARNING



Never allow gases that are within explosive limits (in particular, mixed gases within explosive limits that contain hydrogen) to pass through this meter or device. Doing so might result in explosion accidents.



When using this device for gases that contain hydrogen, be sure to purge the device with an inert gas (nitrogen, argon, etc.) before use. Use without purging the device with an inert gas might cause an explosion and accident. Turn off power before purge, failure to do so might result in the indication of "Err1".



CAUTION



Check the product connections and pipe connections for leakage before use. Also, check the connections for leakage regularly after the start of use. It is the user's responsibility to ensure that gas leaks can be reliably detected. This is especially important if a dangerous gas is used.



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 high limit, both the flowrate display and the output voltage/current may indicate considerably lower values than the actual flowrate.

- Behavior when the flow rate greatly exceeds the measurement range (P.7)



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



Prevent foreign matter from entering the device. If the rust, water droplet, oil mist or dust in the piping flows into the device, measurement error might occur and result in damaging the device. If there is a possibility of foreign matter entering the device, install an upstream filter, strainer, or mist trap capable of eliminating foreign matter 1 μm or greater in diameter. Be sure to inspect and replace the filter at regular intervals.



This device is exclusively for hydrogen and helium gases. It cannot be used for measurement of gases other than hydrogen and helium, and mixtures of these gases (excluding mixtures within explosive limits). Oxygen cannot be measured even if gas-contacting sections on this device are degassed. This device is set initially for hydrogen gas use before shipment. When using it for helium gas or mixed gases, the user must change the gas type setting. Use of this device for helium gas or mixed gases without changing the gas type setting might result in an error.



Before using this device for a gas containing hydrogen, check the flowrate zero point with the actual gas under actual conditions, and adjust the zero point if necessary.



CAUTION

	<p>Do not use this device outside of the operating pressure range. Also, do not subject this device to pressure beyond the rated pressure resistance range. Doing so might damage this device.</p>								
	<p>When making the pipe connections, fix the flange section of the pipe connector port in place, and turn the pipe to tighten. After connecting the piping, check for any gas leaks.</p>								
	<p>Before connecting pipes with Swagelok or VCR connections, check the instructions in the manual provided by the fitting manufacturer. When purchasing a fitting, use the following or an equivalent:</p> <table><tr><td>1/4Swagelok : Swagelok Co.,Ltd.</td><td>SS-400-1-6STSC11</td></tr><tr><td>1/2Swagelok : Swagelok Co.,Ltd.</td><td>SS-810-1-8STSC11</td></tr><tr><td>1/4VCR : Swagelok Co.,Ltd.</td><td>SS-4-VCR-1-00032SC11</td></tr><tr><td>1/2VCR : Swagelok Co.,Ltd.</td><td>SS-8-VCR-1-8STSC11 or equivalent product.</td></tr></table>	1/4Swagelok : Swagelok Co.,Ltd.	SS-400-1-6STSC11	1/2Swagelok : Swagelok Co.,Ltd.	SS-810-1-8STSC11	1/4VCR : Swagelok Co.,Ltd.	SS-4-VCR-1-00032SC11	1/2VCR : Swagelok Co.,Ltd.	SS-8-VCR-1-8STSC11 or equivalent product.
1/4Swagelok : Swagelok Co.,Ltd.	SS-400-1-6STSC11								
1/2Swagelok : Swagelok Co.,Ltd.	SS-810-1-8STSC11								
1/4VCR : Swagelok Co.,Ltd.	SS-4-VCR-1-00032SC11								
1/2VCR : Swagelok Co.,Ltd.	SS-8-VCR-1-8STSC11 or equivalent product.								
	<p>If using 1/2 or 1/4 Rc connections, do not apply too much sealant. Also, foreign matter or burrs in the pipes may cause measurement error.</p>								
	<p>This device is a precision instrument. Do not drop it nor subject it to shock. Doing so might damage the device.</p>								
	<p>When using a relay as the contact for totalized flow count reset input, use a relay designed for minute currents (with gold contacts). Failure to do so could cause faulty contact, resulting in malfunction.</p>								
	<p>Be sure to check that the wiring is correct before turning the power ON. Incorrect wiring might cause damage or malfunction.</p>								
	<p>If there is a risk of a power surge caused by lightning, use a surge absorber (surge protector). Failure to do so might cause fire or device failure.</p>								
	<p>When mounting the device, firmly fasten to prevent vibration.</p>								
	<p>Mount this device horizontally. If this device is mounted vertically, drift may occur when the flow rate is zero, resulting in an erroneous measurement.</p>								
	<p>Do not mount this device with the top surface facing down. Doing so might cause measurement error or device failure.</p>								
	<p>Do not operate the control panel keys using a sharp object such as a mechanical pencil or screwdriver. Doing so might cause faulty operation.</p>								
	<p>When carrying or installing this device, never hold it by the resin cover. Doing so could damage the cover, or the device could slip and fall, causing an injury.</p>								
	<p>Make sure that the selected analog output type matches the input type of the receiving device. The output-receiving device could be damaged if the analog output type selection is incorrect.</p>								

The Role of This Manual

A total of 2 different manuals are available for this product. Read them as necessary for your specific requirements. If a manual you require is not available, contact the azbil Group or its dealer.



Gas Mass Flow Meter For Hydrogen and Helium Gases Model CMS0 010/0050/0200/0500/1000/2000 User's Manual

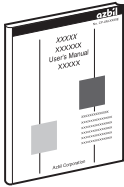
Document No. CP-SP-1118E

This manual.

This manual is supplied with the product.

Personnel in charge of the design or manufacturing of equipment that incorporates this device should read this manual thoroughly.

The manual covers safety precautions, installation, wiring, troubleshooting, and primary specifications.



Gas Mass Flow Meter User's Manual for Communication Functions

Document No. CP-SP-1184E

Personnel who use this device's communications functions should read this manual.

The manual gives an overview of communications, describes wiring, transmission protocols, communications data, and troubleshooting, and gives communications specifications.

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Conventions Used in This Manual

Safety Precautions

The Role of This Manual

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Chapter 1. Overview

■ Overview

The CMS Series Gas Mass Flow Meters measure mass flow by means of a Micro Flow thermal mass flow sensor (hereafter, μF sensor) developed by Azbil Corporation.

Integrating the μF sensor with advanced channel design technology has achieved high accuracy and high rangeability.

■ Features

- The CMS incorporates μF sensors made with silicon micromachining and thin-film technology.
The μF sensor is a highly sensitive flow speed sensor with fast response. Each of its sides is only 1.7 mm long, and it is just 0.5 mm thick.
 - Because the CMS is a mass flowmeter, its measurements are not affected by temperature or pressure.
 - High accuracy of $\pm 5\% \text{RD}^*$ and high resolution

0.01L/min (standard)	(CMS0010)
0.1L/min (standard)	(CMS0050)
1L/min (standard)	(CMS0200/0500/1000)
5L/min (standard)	(CMS2000)
 - To meet a variety of requirements, the CMS's functions include analog output, event output, totalized/reverse-totalized flow display, output scaling, gas type selection, totalizer pulse output, external contact input (totalized flow count reset input), serial data output, etc.
 - Straight pipe sections are not required before and after this device.
- * "RD" (Reading) indicates the value indicated by the device.

■ Model selection guide

The following shows the model Nos. for this flow meter:

● Hydrogen model

Basic model Nos.	Flowrate range	Model	Gas-contacting material	Connection method	Gas type	Output	Optional functions				Appended No.	Description
							1	2	3	4		
CMS												Gas Mass Flow Meter
	0010											Standard flowrate range 0 to 10 L/min (standard) *1
	0050											Standard flowrate range 0 to 50 L/min (standard) *1
	0200											Standard flowrate range 0 to 200 L/min (standard) *1
	0500											Standard flowrate range 0 to 500 L/min (standard) *1
	1000											Standard flowrate range 0 to 1000 L/min (standard) *1
	2000											Standard flowrate range 0 to 2000 L/min (standard) *1
		B										With display (flow direction: left to right)
		R										With display (flow direction: right to left)
			T									SUS316
				U								9/16-18 UNF (CMS0010/0050/0200) 3/4-16 UNF (CMS0500/1000/2000)
				T								Rc 1/4 (CMS0010/0050/0200) Rc 1/2 (CMS0500/1000/2000)
				S								1/4 Swagelok (CMS0010/0050/0200) 1/2 Swagelok (CMS0500/1000/2000)
				V								1/4 VCR (CMS0010/0050/0200) 1/2 VCR or equivalent product (CMS0500/1000/2000)
					H							Hydrogen, Helium *2
						2						Analog output 0 to 5V DC / 1 to 5V DC / 4 to 20 mA DC
							0					Without optional function
							1					With RS-485 communications
								0				Without optional function
									1			Degreasing for gas-contacting parts
										0		Without options
										D		With inspection report
										Y		With traceability certificate
											0	Product version

*1 L/min (standard) indicates the volumetric flow rate per minute converted to conditions of 20 °C and 101.325 kPa (1 atm).

*2 The gas type is initially set for hydrogen use. However, the user can change this setting for helium use.

● Optional parts (sold separately)

Name	Parts No.	Remarks
Harness with dedicated connector (One harness is required for one CMS unit)	81446594-005	For non-communication models, 2 m harness (8-core) without crimp terminals
	81446594-006	For non-communication models, 5 m harness (8-core) without crimp terminals
	81446594-007	For communication models, 2 m harness (10-core) with M3.5 spade terminals
	81446594-008	For communication models, 5 m harness (10-core) with M3.5 spade terminals
Mounting bracket	81446628-001	For CMS0010/0050/0200
	81446721-001	For CMS0500/1000
	81446856-001	For CMS2000
AC adapter	81446957-001	Operating temperature range 0 to 40 °C
AC adapter connection harness	81446594-030	Necessary when the AC adapter is used

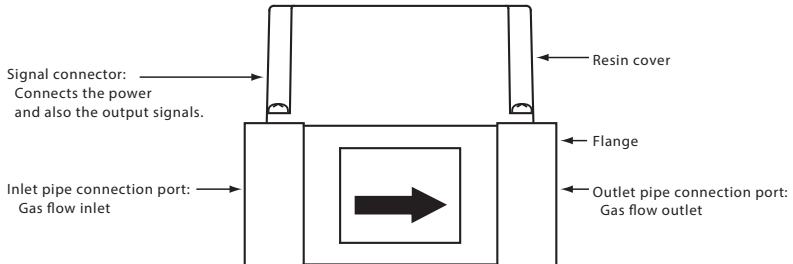
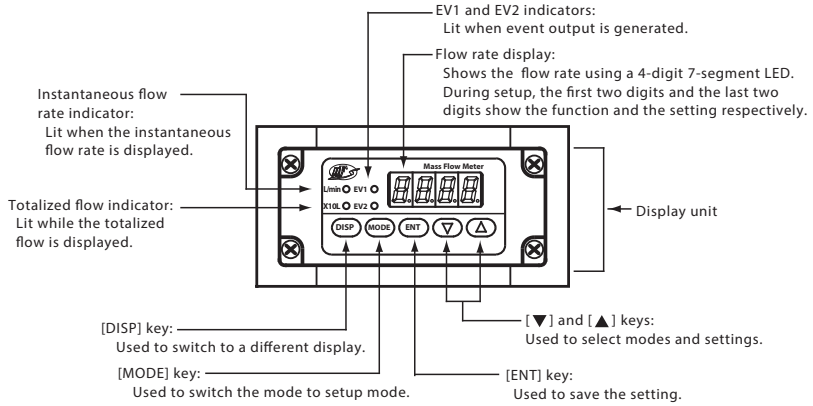
● Spare parts

Name	Parts No.	Remarks
Replacement fittings	81446834-001	Rc 1/4, a set of 2.
	81446834-002	Rc 1/2, a set of 2.
	81446833-001	1/4 Swagelok, a set of 2.
	81446833-002	1/2 Swagelok, a set of 2.
	81446895-001	1/4 VCR, a set of 2.
	81446895-002	1/2 VCR, a set of 2.

Chapter 2. Names and Functions of Parts

The following describes the names and functions of parts:

The diagram below shows CMS0500 model.



Chapter 3. Mounting and Wiring

WARNING



Never allow gases that are within explosive limits (in particular, mixed gases within explosive limits that contain hydrogen) to pass through this meter or device.

Doing so might result in explosion accidents.



When using this device for gases that contain hydrogen, be sure to purge the device with an inert gas (nitrogen, argon, etc.) before use.

Use without purging the device with an inert gas might cause an explosion and accident. Turn off power before purge, failure to do so might result in the indication of "Err1".

CAUTION



Check the product connections and pipe connections for leakage before use. Also, check the connections for leakage regularly after the start of use.

It is the user's responsibility to ensure that gas leaks can be reliably detected. This is especially important if a dangerous gas is used.



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 high 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.



Prevent foreign matter from entering the device.

If the rust, water droplet, oil mist or dust in the piping flows into the device, measurement error might occur and result in damaging the device.

If there is a possibility of foreign matter entering the device, install an upstream filter, strainer, or mist trap capable of eliminating foreign matter 1 μm or greater in diameter.

Be sure to inspect and replace the filter at regular intervals.



This device is exclusively for hydrogen and helium gases. It cannot be used for control and measurement of gases other than hydrogen and helium, and mixtures of these gases (excluding mixtures within explosive limits).









Oxygen cannot be measured even if gas-contacting sections on this device are degreased.

This device is set initially for hydrogen gas use before shipment. When using it for helium gas or mixed gases, the user must change the gas type setting.

Use of this device for helium gas or mixed gases without changing the gas type setting might result in an error.



Before using this device for a gas containing hydrogen, check the flow rate zero point with the actual gas under actual conditions, and adjust the zero point if necessary.

 CAUTION	
	Do not use this device outside of the operating pressure range. Also, do not subject this device to pressure beyond the rated pressure resistance range. Doing so might damage this device.
	When making the pipe connections, fix the flange section of the pipe connector port in place, and turn the pipe to tighten. After connecting the piping, check for any gas leaks.
	When mounting the device, firmly fasten to prevent vibration.
	If using 1/2 or 1/4 Rc connections, do not apply too much sealant. Also, foreign matter or burrs in the pipes may cause measurement error.
	Before connecting pipes with Swagelok or VCR connections, check the instructions in the manual provided by the fitting manufacturer. When purchasing a fitting, use the following or an equivalent: 1/4Swagelok : Swagelok Co.,Ltd. SS-400-1-6STSC11 1/2Swagelok : Swagelok Co.,Ltd. SS-810-1-8STSC11 1/4VCR : Swagelok Co.,Ltd. SS-4-VCR-1-00032SC11 1/2VCR : Swagelok Co.,Ltd. SS-8-VCR-1-8STSC11 or equivalent product
	This device is a precision instrument. Do not drop it nor subject it to shock. Doing so might damage the device.
	When carrying or installing this device, never hold it by the resin cover. Doing so could damage the cover, or the device could slip and fall, causing an injury.

■ Installation

● Installation location

Avoid mounting the CMS Series in the following locations:

- Locations whose operating temperature falls below -10°C and rises above 60°C
- Locations whose operating humidity exceeds 90%RH
- Locations subject to sudden changes in temperature and condensation
- Locations subject to corrosive gases and flammable gases
- Locations where there are lots of conductive substances (e.g. dust, salt or iron dust), water droplets, oil mist or organic solvents
- Locations subject to vibration or shock
- Locations subject to direct sunlight
- Locations splashed by water or rain
- Locations subject to splashing by fluids (e.g. oil, chemicals.)
- Locations where strong magnetic or electrical fields are generated

■ **Behavior when the flow rate greatly exceeds the measurement range**

If the flowrate exceeds the high limit of the range, both the displayed value and the output may be incorrect.

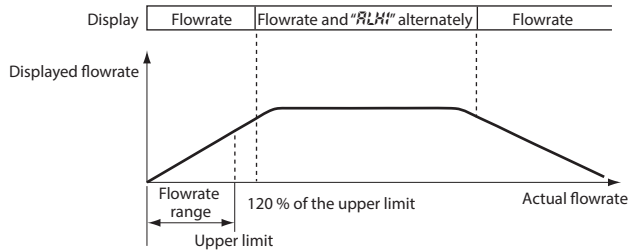
Make sure that this device is used within the flowrate range defined in the specifications.

If the flowrate exceeds the high limit by 120 %, this device will display the flowrate and “ALH1” alternately.

If the flowrate further increases, “ALH1” will not be displayed and a flowrate lower than the actual rate will be displayed.

Note that “ALH1” will also not be displayed in the case of a greatly excessive flowrate that occurred for a very short period of time.

When using this device to control the flowrate, make sure to control the supply pressure and throttle valve opening properly so that the flowrate does not exceed 120 % of the high limit of the range even when the control output is at the maximum (100 %).



■ **Piping**

● **Precautions for piping work**

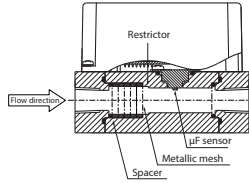
This device is a precision instrument. If even a small amount of foreign matter like dust, moisture, or oil mist enters the device, measurement error or device failure may result.

During piping work, follow the instructions below to keep foreign matter out of the device.

- (1) Before installing the device, thoroughly flush the inside of piping that is upstream and downstream of this device to remove welding fumes and dust.
- (2) Thoroughly clean the inside of piping that is directly connected to the device.
- (3) After steps (1) and (2), make sure that there are no welding fumes and dust before installation.

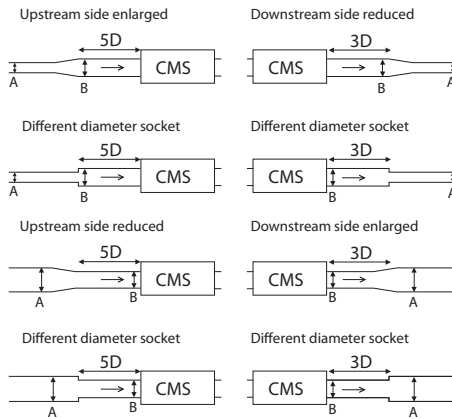
⚠ **Handling Precautions**

- 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 metallic mesh or to the Micro Flow sensor chip, measurement error or device failure may result.



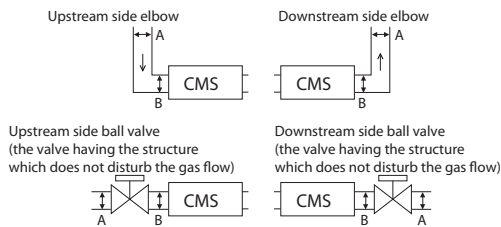
● **Straight pipe length**

If the flowmeter and the pipe have different internal diameters (diameters A and B are different), a straight pipe section is required.



D indicates the connecting port size.
 CMS0500/1000/2000: 12 mm
 CMS0010/0050/0200: 6 mm

If the flowmeter and the pipe have the same internal diameter (diameters A and B are the same), a straight pipe section is not required.



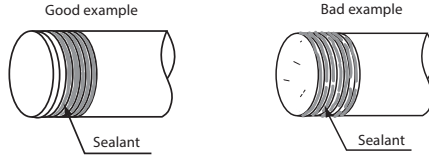
! Handling Precautions

- If a valve like a butterfly valve disturbs the flow, provide a straight pipe section whose length is five times the pipe diameter between the flowmeter and the valve.

● **Rc connection**

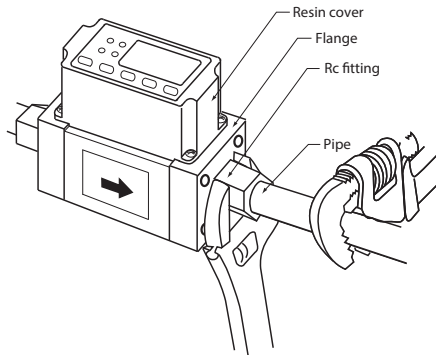
● **Coating sealant**

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



● **Piping connection**

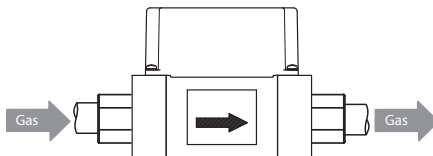
Connect pipes while gripping the Rc fitting section of the pipe connection port with a spanner or wrench.



! **Handling Precautions**

- Do not grip and turn the main unit. Doing so might damage the main unit or cause leakage.
- When connecting pipes, do not grasp the resin cover. Doing so might damage the cover.

● **Gas flow**



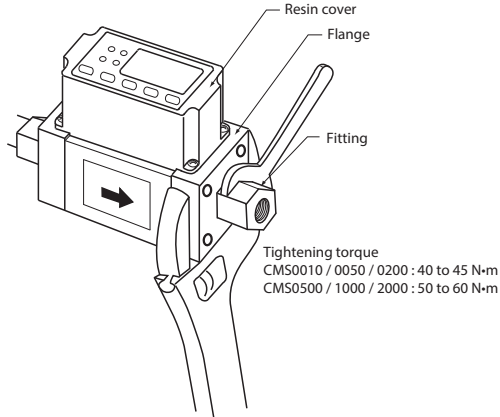
! **Handling Precautions**

- Gas must flow through the meter in the direction of the arrow on the side of the flow channel. Flow in the opposite direction cannot be measured accurately.

- UNF connection

- Fitting connection

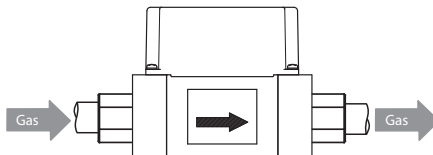
Connect a fitting while gripping the flange section of the pipe connection port with a spanner or wrench.



! Handling Precautions

- Do not grip and turn the main unit. Doing so might damage the main unit or cause leakage.
- When connecting pipes, do not grasp the resin cover. Doing so might damage the cover.
- Observe the specified tightening torque.

- Gas flow



! Handling Precautions

- Gas must flow through the meter in the direction of the arrow on the side of the flow channel.
Flow in the opposite direction cannot be measured accurately.

● Installing the flowmeter

CAUTION



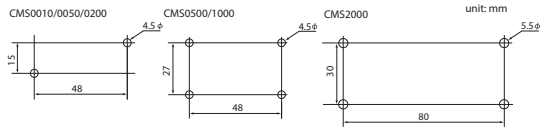
Mount this device horizontally. If it is mounted vertically, drift may occur when the flow rate is zero, resulting in an erroneous measurement.



Do not mount with the top surface facing down. Doing so might cause measurement error or device failure.

There are two ways of mounting the main unit of the CMS0010 / 0050 / 0200 / 0500 / 1000 / 2000:

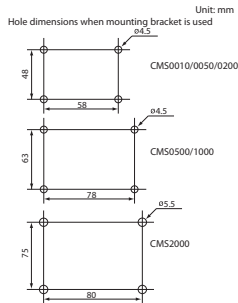
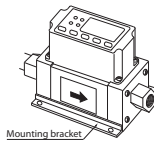
- Attach the flowmeter using the mounting screw holes (M4) on the bottom, working from the bottom of the device. Two or four screws are used depending on the model.



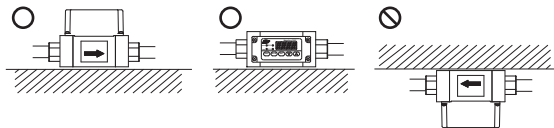
- Mount the flowmeter on the dedicated mounting bracket, and then attach the bracket with four screws from the top of the bracket.

Mounting bracket model number:

- CMS0010/0050/0200: 81446628-001
- CMS0500/1000: 81446721-001
- CMS2000: 81446856-001



Mounting orientation






Handling Precautions

- In case of vertical mounting, drift will occur when flowrate is zero. For details, please contact the azbil Group.

■ Wiring

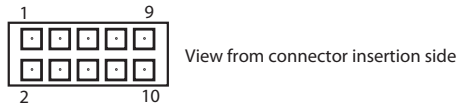
⚠ CAUTION

- 
When using a relay as the contact for totalized flow count reset input, use a relay designed for minute currents (with gold contacts). Failure to do so could cause faulty contact, resulting in malfunction.
- 
If there is a risk of a power surge caused by lightning, use a surge absorber (surge protector). Failure to do so might cause fire or device failure.
- 
Be sure to check that the wiring is correct before turning the power ON. Incorrect wiring might cause damage or malfunction.

We recommend using the harness (sold separately) with connector exclusive to CMS.

● Connector pin layout

The following shows the layout of the connector pins on this flow meter:



Compatible connector:

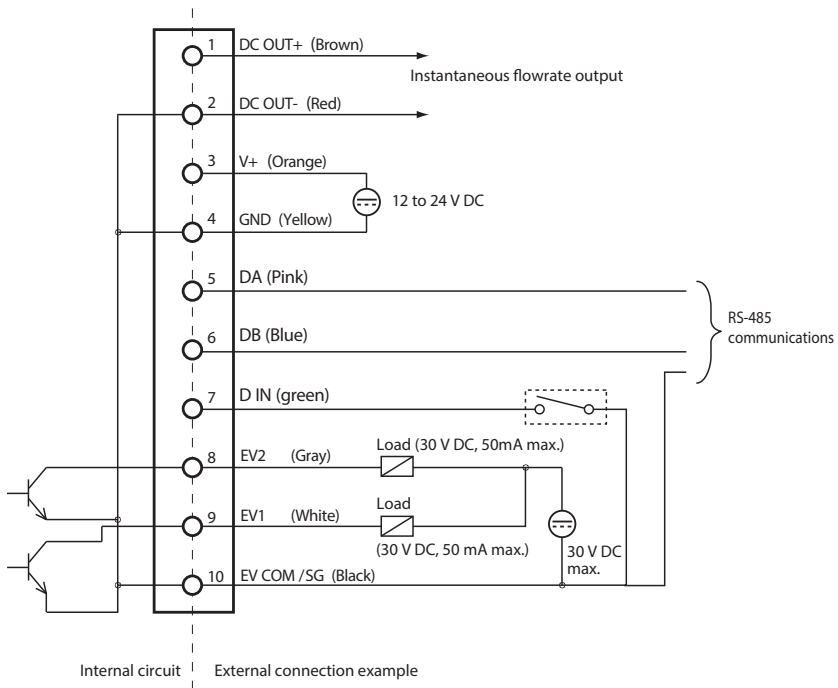
DF11-10DS-2C made by HIROSE ELECTRIC CO., LTD.

Product	Model No.	Description
Harness with dedicated connector (One harness is required for one CMS unit.)	81446594-005	For non-communication models, 2 m harness without crimp terminals
	81446594-006	For non-communication models, 5 m harness without crimp terminals
	81446594-007	For communication models, 2 m harness with M3.5 spade terminals
	81446594-008	For communication models, 5 m harness with M3.5 spade terminals

● Connector signal names

Pin number	Signal name	Description	Remarks
1	DC OUT+	Instantaneous flowrate output +	
2	DC OUT-	Instantaneous flowrate output -	
3	V +	Power + (12 to 24V DC)	
4	GND	Power GND	
5	DA	For RS-485 communications	Do not connect for the model without RS-485 communications.
6	DB		
7	D IN	Totalized flow count reset input	
8	EV2	Event 2 output/totalizer pulse output	
9	EV1	Event 1 output/Serial data output	
10	EV COM/SG	Event output common / SG for RS-485	

● Wiring example

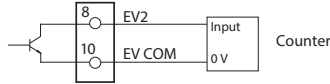


! Handling Precautions

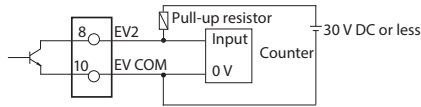
- Power source GND, instantaneous flow rate output (-), and event output common lines are all connected inside this device. If these lines are connected to an external device through a common power supply, interference will cause device failure or faulty operation.
- Take care that the event output does not exceed the output rating of this device. If a relay is used, the coil should have a built-in surge absorption diode. Otherwise device failure could occur.

● **Wiring for inputting totalizer pulse output into a counter**

- Non-voltage input type

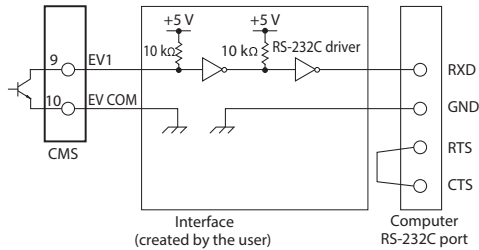


- Voltage input type



● **Wiring for using flow rate serial data output**

- Wiring example

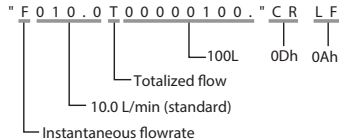


- Communication protocol

The currently displayed instantaneous flow rate data and totalized flow data are sent as ASCII code.

"F" is sent first followed by the instantaneous flow rate data, and then "T" followed by the totalized flow data.

Example: The instantaneous flow rate is 10.0 L/min (standard), and the totalized flow is 100 L.



- Communication specifications

Item	Description
Communications method	Conform to RS-232C, Start-stop transmission
Transmission speed	9600 bps
Character length	8 bits
Stop bit	2 bits
Parity	None
Data transmission cycle	100 ±10 ms

Chapter 4. Operation

⚠ CAUTION



Do not operate the console keys using a sharp object such as a mechanical pencil or screwdriver. Doing so might damage the console.



Make sure that the selected analog output type matches the input type of the receiving device. The output-receiving device could be damaged if the analog output type selection is incorrect.

■ State transition

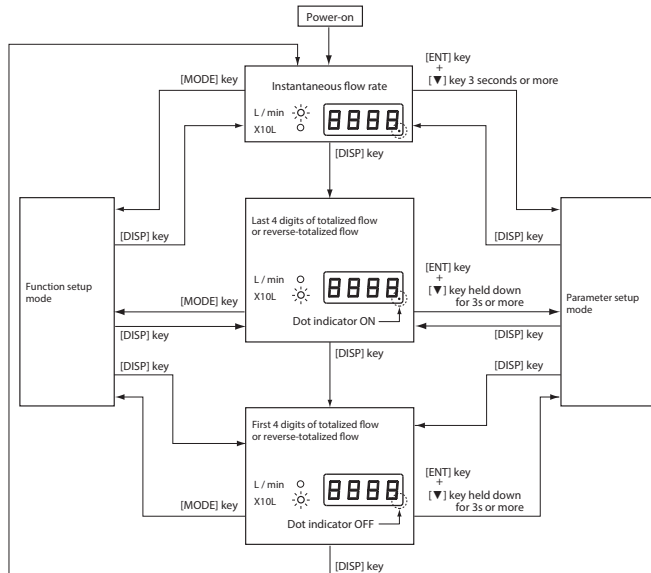
With the default settings, when the power is turned on, the display indicates the instantaneous flow rate and the instantaneous flow rate indicator lights up.

Using the CMS0500 as an example, the following diagram shows the relationship between mode transitions and the display.

If the measurement mode (function setup 02) is set to 01, or 02, when the [DISP] key is pressed while the instantaneous flow rate is being shown, the last 4 digits of the totalized flow or reverse-totalized flow are displayed.

If the [DISP] key is pressed again, the first 4 digits of the totalized flow or reverse-totalized flow are displayed. Pressing the key once more restores the instantaneous flow rate display.

If at some point in the above-described actions the power is turned OFF and then back ON again, the display status before the power was turned OFF is restored.

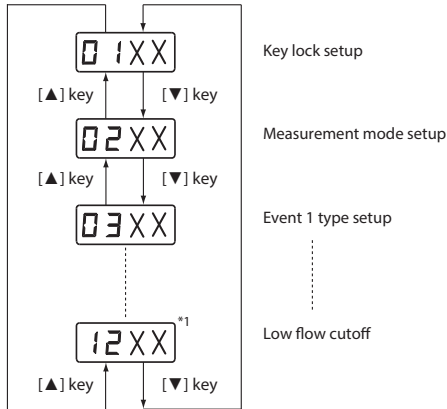


■ Function setup

The following describes how to set up each of the functions.

- To enter the setup mode, press the [MODE] key.

The upper two digits on the display blink. The upper two digits on the display indicate the function type, and the lower two digits indicate the setup.



- Pressing the [▼] key moves the setup to the next item. Pressing the [▲] key moves the setup item to the previous item.
- Pressing the [▼] key again when 12^{*2} is displayed returns the display to 01 . Pressing the [▲] key again when 01 is displayed changes the display to 12^{*2} .
- When the upper two digits are the setup item that you want to set, press the [ENT] key while it is blinking. This selects the setup item, and the lower two digits blink.
- Press the [▲] and [▼] keys to select the desired setting value, and press the [ENT] key. All four digits light.
- Make sure that the items and the setups are correct.
- To continue setup, press the [MODE] key again and repeat the setup operation.

*1 In case of the model with RS-485 communications, 30 , 31 and 32 is displayed after 12 .

*2 32 is displayed for the model with RS-485 communications.

The following table shows the function and the setup:

● Function setup menu

Mode	Function	Setting	Description	Default setting	Remarks
01	Key lock	00 01	Key lock disabled Lock ON	00	Other modes cannot be entered in a key lock state.
02	Measurement mode	00 01 02	Measure the instantaneous flow rate only. Measure the instantaneous flow rate and totalized flow Measure the instantaneous flow rate and reverse-totalized flow	01	
03	Event 1 type (EV1)	00 01 02 03 04 05 06	Not used Instantaneous flow rate high limit Instantaneous flow rate low limit Totalized flow count Reverse-totalized flow countdown Flow rate data serial output Error output	00	Totalized flow count, reverse-totalized flow countdown, and totalizer output pulse can be used only if function setup 02 is set to 01, or 02. Totalized flow count and reverse-totalized flow countdown cannot be set simultaneously. If Err 1 or Err2 occurs, error output (setting 06) is generated. It is not generated if ALH 1 (over range) occurs.
04	Event 2 type (EV2)	00 01 02 03 04 05 06 07	Not used Instantaneous flow rate high limit Instantaneous flow rate low limit Totalized flow count Reverse-totalized flow countdown Totalizer output pulse rate 1*1 Totalizer output pulse rate 2*1 Totalizer output pulse rate 3*1	00	
05	ON delay setting (EV1)	00 01	Not used Used	00	Displayed only when mode 03 is set to 01 or 02.
06	ON delay setting (EV2)	00 01	Not used Used	00	Displayed only when mode 04 is set to 01 or 02.
07	Event standby setting	00 01	Not used Used	00	Displayed only when mode 03 or 04 is set to 02. For more detail, see page 26.
08	Gas type selection	00 01 02	Gas type set by the user Hydrogen Helium	00	If the gas type is changed, the measurable flowrate range may change accordingly.  P. 26 When 08 is selected, set the conversion factor (CF) in the parameter setup mode.*4
09	Analog output scaling	00 to 04	*2	00	*3
10	Analog output type	00 01 02	0-5 V DC 1-5 V DC 4-20 mA DC	00	Check the input type of the receiving device and select the same type for the analog output type.
11	Flowrate conversion reference temperature	00 to 35	0 to 35 °C (in 1 °C increments), 101.325 kPa (1 atm) standard	20	

Mode	Function	Setting	Description	Default setting	Remarks
12	Low flow cutoff	00 01 02 03 04	No low flow cutoff Below the minimum displayed flow rate* 1 % FS 2.5 % FS 5 % FS	01	If the gas type is set to 08 (user specified), the low flow cutoff point is the set value multiplied by the CF. CF is the gas conversion factor and can be set in P-08 in parameter setup mode. * The minimum display may vary depending on the model. ☞ page 26.
30	Station address setting	00 01 to 99	Communication function disabled Station address	00	For the model with RS-485 communication only
31	Transmission speed	00 01 02	9600 bps 4800 bps 2400 bps	00	For the model with RS-485 communication only
32	Data format	00 01	8-bit data, even parity, 1 stop bit 8-bit data, no parity, 2 stop bits	00	For the model with RS-485 communication only

*1 Totalizer pulse output rate

mode	Setting	CMS0010/0050	CMS0200/0500/1000/2000
04	05	1 L/pulse	10 L/pulse
	06	10 L/pulse	100 L/pulse
	07	100 L/pulse	1000 L/pulse

*2 Analog output scaling

Unit: L/min

mode	Function	Setting	CMS0010	CMS0050	CMS0200	CMS0500	CMS1000	CMS2000
03	Analog output scaling	00	0 to 10	0 to 50	0 to 200	0 to 500	0 to 1000	0 to 2000
01		0 to 6	0 to 30	0 to 100	0 to 300	0 to 600	0 to 1000	
02		0 to 4	0 to 20	0 to 50	0 to 200	0 to 400	0 to 500	
03		0 to 2	0 to 10	0 to 20	0 to 100	0 to 200	0 to 200	
04		Desired scaling	Desired scaling	Desired scaling	Desired scaling	Desired scaling	Desired scaling	

- *3 The behavior of analog output scaling when the gas type (mode 08) is changed is different from its behavior when the gas type conversion factor (P-08) is changed.
The following examples are when mode 10 (analog output type selection) is set to 00 (0 to 5 V output).

If the gas type is changed

The analog output scaling is as shown in the above table.

Ex.: If mode 08 (gas type selection) is set to 10 (helium) for CMS0050, the flowrate measurement range and analog output scaling will be 0 to 50 L/min.

If mode 03 (analog output scaling) is also changed, 0 to 5 V will be output to indicate a flowrate within the specified range.

00: 0–50 L/min (0–5 V)

01: 0–30 L/min (0–5 V)

02: 0–20 L/min (0–5 V)

03: 0–10 L/min (0–5 V)

04: If this is selected, scaling can be set to a value from 10 to 250 % when 50 L/min is 100 % (use parameter P-03, analog output scaling).

If the gas type conversion factor is changed

If the gas type conversion factor is changed, the flowrate measurement range will change, and the analog output scaling will be different from what is shown in the above table.

Ex.: If mode $\overline{00}$ (gas type selection) is set to $\overline{08}$ (gas type set by the user) for CMS0050, and if parameter $P-\overline{08}$ (gas type conversion factor) is set to 0.500, the flowrate measurement range and analog output scaling will be 0 to 25 L/min.

If mode $\overline{04}$ (analog output scaling) is also changed, 0 to 5 V will be output to indicate a flowrate within the specified range.

$\overline{00}$: 0–25 L/min (0–5 V)

$\overline{01}$: 0–15 L/min (0–5 V)

$\overline{02}$: 0–10 L/min (0–5 V)

$\overline{03}$: 0–5 L/min (0–5 V)

$\overline{04}$: If this is selected, scaling can be set to a value from 10 to 250 % when 25 L/min is 100 % (use parameter P-09, analog output scaling).

*4. In order to measure a mixed gas or a gas other than a standard gas, the user can set a gas type conversion factor.

For an estimated conversion factor for the gas, please contact the azbil Group.

■ Parameter setup

If the key lock is ON, parameters cannot be changed.

Press the [ENT] key and [▼] key for 3 seconds or longer to change to parameter setup mode.

If the function setup item does not relate to any parameters, P- - - will be displayed.

Normally, in parameter setup mode, P- _ _ will be displayed. The last two digits on the display represent the parameter setup item.

Pressing the [▼] key displays the next item No., and pressing the [▲] key displays the previous item No.

Press the [ENT] key when the desired item No. is displayed. The current parameter will be displayed.

If the [ENT] key is pressed again, the last digit will begin blinking.



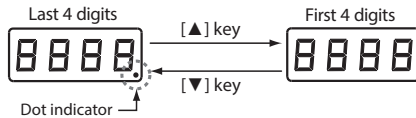
Pressing the [MODE] key moves the blinking digit to the left.

Change the value of each digit, using the [▲] or [▼] key.

To save the setting, press the [ENT] key.

If function setup items 03 and/or 04 are set to 03 or 04, set an 8-digit value in P-01, 02, and/or 07.

In this case, the first 4 digits and the last 4 digits are alternately displayed when the keys are pressed as shown below.



The following pages show the parameter setup tables.

Parameters P-01 to P-09 are displayed according to the function settings.

● CMS0010

Parameter	Item	Default setting	Setting range	Condition for display (setting in function setup mode)
P-01	Event 1 setting value (EV1)	0.00	0.00 to 99.99 (L/min)	when 03 is 01 or 02
		00000000	00000000 to 99999999 (L)	when 03 is 03 or 04
P-02	Event 2 setting value (EV2)	0.00	0.00 to 99.99 (L/min)	when 04 is 01 or 02
		00000000	00000000 to 99999999 (L)	when 04 is 03 or 04
P-03	EV1 hysteresis	0.50	0.00 to 1.00 (L/min)	when 03 is 01 or 02
P-04	EV2 hysteresis	0.50	0.00 to 1.00 (L/min)	when 04 is 01 or 02
P-05	EV1 ON delay	0	0 to 60 (s)	when 03 is 01 or 02
P-06	EV2 ON delay	0	0 to 60 (s)	when 04 is 01 or 02
P-07	Initial reverse-totalized flow	00000000	00000000 to 99999999 (L)	when 02 is 02
P-08	Gas type conversion factor	1.000	0.100 to 8.000	when 08 is 08
P-09	Analog output scaling	100	10 to 250 (%)	when 09 is 04

● CMS0050

Parameter	Item	Default setting	Setting range	Condition for display (setting in function setup mode)
P-01	Event 1 setting value (EV1)	0.0	0.0 to 999.9 (L/min)	when 03 is 01 or 02
		00000000	00000000 to 99999999 (L)	when 03 is 03 or 04
P-02	Event 2 setting value (EV2)	0.0	0.0 to 999.9 (L/min)	when 04 is 01 or 02
		00000000	00000000 to 99999999 (L)	when 04 is 03 or 04
P-03	EV1 hysteresis	5.0	0.0 to 10.0 (L/min)	when 03 is 01 or 02
P-04	EV2 hysteresis	5.0	0.0 to 10.0 (L/min)	when 04 is 01 or 02
P-05	EV1 ON delay	0	0 to 60 (s)	when 03 is 01 or 02
P-06	EV2 ON delay	0	0 to 60 (s)	when 04 is 01 or 02
P-07	Initial reverse-totalized flow	00000000	00000000 to 99999999 (L)	when 02 is 02
P-08	Gas type conversion factor	1.000	0.100 to 8.000	when 08 is 08
P-09	Analog output scaling	100	10 to 250 (%)	when 09 is 04

● CMS0200/0500/1000/2000

Parameter	Item	Default setting	Setting range	Condition for display (setting in function setup mode)
P-01	Event 1 setting value (EV1)	0	0 to 9999 (L/min) *1	when 03 is 01 or 02
		00000000	00000000 to 99999999 (X10L)	when 03 is 03 or 04
P-02	Event 2 setting value (EV2)	0	0 to 9999 (L/min) *1	when 04 is 01 or 02
		00000000	00000000 to 99999999 (X10L)	when 04 is 03 or 04
P-03	EV1 hysteresis	50. *2	0 to 100 (L/min) *2	when 03 is 01 or 02
P-04	EV2 hysteresis	50. *2	0 to 100 (L/min) *2	when 04 is 01 or 02
P-05	EV1 ON delay	0	0 to 60 (s)	when 03 is 01 or 02
P-06	EV2 ON delay	0	0 to 60 (s)	when 04 is 01 or 02
P-07	Initial reverse-totalized flow	00000000	00000000 to 99999999 (X10L)	when 02 is 02
P-08	Gas type conversion factor	1.000	0.100 to 8.000	when 08 is 08
P-09	Analog output scaling	100	10 to 250 (%)	when 09 is 04

*1 In case of gas type 08 on the CMS0200; and when P-08 (gas type conversion factor) is set to 0.100 to 0.499, the range becomes 0.0 to 999.5 (in 0.5 increments). When the factor is set to 0.500 to 8.000, the range becomes 0 to 999.9.

*2 In case of gas type 08 on the CMS0200; and when P-08 (gas type conversion factor) is set to 0.100 to 0.499, the default setting is 5.0 and the setting range becomes 0.0 to 10.0(in 0.5 increments).

! Handling Precautions

- Event output settings should be set within the measurement range.

■ Display OFF mode

If the [DISP] key is held down for at least three seconds, all display is turned off except for the instantaneous flow rate indicator, which blinks. If the [DISP] key is pressed in display OFF mode, the instantaneous flowrate is displayed.

■ Totalized flow and reverse-totalized flow

If the totalized value exceeds 99999999, the value will be reset to 0 and count will continue to accumulate. In this case, the event output will be OFF until the count reaches the setting again. The countdown stops at 0.

■ How to reset the totalized flow and reverse-totalized flow

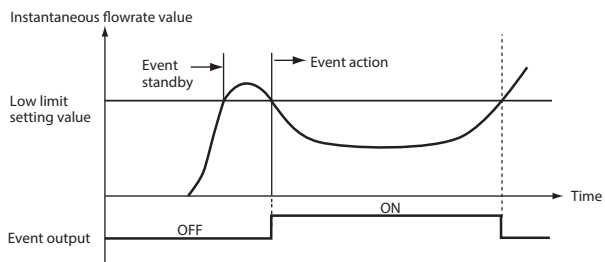
To reset, press the [▲] and [▼] keys simultaneously for at least one second while the totalized flow or reverse-totalized flow is displayed.

The totalized flow will be reset to 0, or the reverse-totalized flow will be reset to the preset initial value, and counting up or down will resume.

■ Event standby

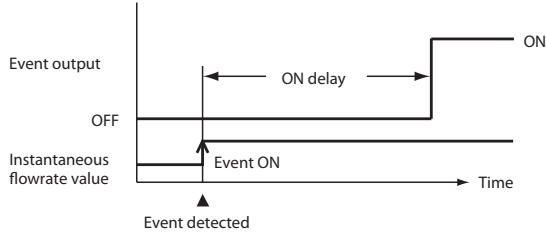
"Event standby" is enabled only on the instantaneous flowrate low limit. This function prevents erroneous operation of the low limit alarm when there is no gas flowrate, for example, when the device is started up.

There is no event action until the instantaneous flowrate value once exceeds the event low limit setting value after the power is turned ON. Event action is normal after the event low limit setting value has been exceeded once.



■ Event ON-delay

An ON-delay time (0 to 60 s) can be set for both events 1 and 2.



■ Zero flow rate calibration

If the indicated flow rate is not zero even though the actual flow rate is zero, and it seems possible that the sensor's zero point may have shifted, try the following procedure for flowrate zero calibration:

- (1) Display the instantaneous flow rate or totalized flow
- (2) Press and hold the [ENT] key.
- (3) After approx. 10 seconds have elapsed, 0.000 blinks on the flowrate display.
- (4) Press and hold [ENT] again.
- (5) After approx. 1 second, 0.000 stops blinking and remains lit. The amount of sensor output at this moment is now treated as zero.
- (6) Press [DISP] key to return to the instantaneous flow rate or totalized flow display.


[!] Handling Precautions

- Before executing zero flow rate calibration, fill the flow path completely with the gas, and make sure that the actual flow rate is stable at zero.

Chapter 5. Troubleshooting

■ Countermeasures for abnormal operation

Refer to the following table if trouble occurs:

Phenomena	Countermeasure
Nothing on display	<ul style="list-style-type: none"> • Make sure that power of correct voltage and polarity is being supplied. • Make sure that connectors are correctly connected.
$RLHI$ is displayed	The instantaneous flowrate value has exceeded 120% of the measurement range. Reduce the flowrate so that it is within the range, then normal operation will automatically resume.
$Err 1$ is displayed	Sensor error <ul style="list-style-type: none"> • Make sure that gas is not flowing excessively, or the gas is not flowing reversely. • Make sure that the purging is not performed while power is supplied. • The flowrate becomes within the range, normal operation will automatically resume. If the device does not resume normal operation, contact the azbil Group and ask for repair.
$Err 2$ is displayed	Memory data error Contact the azbil Group and ask for repair.
$Err 3$ is displayed	Heater current error of sensor. After closing the gas valve, turning the power off and then on again. If the device does not resume normal operation, contact the azbil Group and ask for repair.
$Err 4$ is displayed	Sensor heater safety circuit worked. After closing the gas valve, turning the power off and then on again. If the device does not resume normal operation, contact the azbil Group and ask for repair.
There is an output signal when the flow rate is zero.	<ul style="list-style-type: none"> • Check the piping for any gas leaks. • Check the wiring to make sure that it is correct. • If this device was installed vertically, install it horizontally. • If a shift in the flowrate zero point of the sensor is the possible cause of the phenomenon, adjust the zero point.
The flow rate is not correct.	<ul style="list-style-type: none"> • Check the piping for any gas leaks. • Check the piping and connection ports for dirt, oil or other foreign matter. If oil is adhering to these parts, contact the azbil Group. • Check the wiring to make sure that it is correct. • Check the flowrate to see that it does not deviate considerably within several seconds, or that it does not greatly exceed the measurement range.
The displayed value is lower than expected.	<ul style="list-style-type: none"> • Check if the gas contains foreign matter such as dust, rust, oil or water. If it seems that there is foreign matter in the flow meter, contact the azbil Group and ask for repair.
There should be no flow but a flow is indicated.	
Even though the displayed instantaneous flow rate is zero, the totalized flow is counting up or counting down.	<ul style="list-style-type: none"> • Check the piping for any gas leaks or check if gas flow stops. There is a possibility that a small volume gas less than the minimum display value is flowing even though the instantaneous flowrate indication is zero. The flowrate less than the minimum indication value is counted in the totalized flow. Set the low flow cutoff to prevent the count up of totalized flow (or countdown of reverse-totalized flow). ( Function setup 12, "Low flow cutoff" (page 17))

Chapter 6. Specifications

■ General specifications

Model No.		CMS0010	CMS0050	CMS0200
Item				
Applicable gas		Hydrogen, Helium. Also, it must be clean, without dust or oil mist.		
Flow range *1		10 L/min (standard)	50 L/min (standard)	200 L/min (standard)
		L/min (standard) indicates the volumetric flow rate per minute converted to conditions of 20 °C and 101.325 kPa (1 atm).		
Measurement accuracy *2 at 23 °C and 101.325 kPa (χ : measured flowrate)		0.1 $\leq \chi < 2$ L/min $\pm 1\%$ FS ± 1 digit 2 $\leq \chi \leq 10$ L/min $\pm 5\%$ RD ± 1 digit	0.5 $\leq \chi < 10$ L/min $\pm 1\%$ FS ± 1 digit 10 $\leq \chi \leq 50$ L/min $\pm 5\%$ RD ± 1 digit	2 $\leq \chi < 40$ L/min $\pm 1\%$ FS ± 1 digit 40 $\leq \chi \leq 200$ L/min $\pm 5\%$ RD ± 1 digit
Temperature characteristics *3 at -10 to +60 °C		Flow range 0 to 75 % Flow range 75 to 100 %	$\pm 0.10\%$ FS/°C ± 1 digit $\pm 0.15\%$ FS/°C ± 1 digit	
Pressure characteristics *4 0 to 1.0 MPa	Flow range 0 to 50 %	$\pm 0.3\%$ FS/ 0.1 MPa ± 1 digit max.	$\pm 0.1\%$ FS/ 0.1 MPa ± 1 digit max.	
	Flow range 50 to 100 %	$\pm 3\%$ RD ± 1 digit max.	$\pm 0.1\%$ RD/ 0.1 MPa ± 1 digit max.	$\pm 0.5\%$ RD/ 0.1 MPa ± 1 digit max.
Negative pressure characteristics *4 -0.07 to 0 MPa	Flow range 0 to 50 %	$\pm 0.5\%$ FS/ 0.01 MPa ± 1 digit max.	$\pm 0.2\%$ FS/ 0.01 MPa ± 1 digit max.	$\pm 0.5\%$ FS/ 0.01 MPa ± 1 digit max.
	Flow range 50 to 100 %	$\pm 1\%$ RD/ 0.01 MPa ± 1 digit max.	$\pm 0.5\%$ RD/ 0.01 MPa ± 1 digit max.	$\pm 1\%$ RD/ 0.01 MPa ± 1 digit max.
Operating pressure range		-0.07 to +1.0 MPa		
Pressure resistance		1.5 MPa		
Sampling cycle		100 ± 10 ms		
Output signal (instantaneous flowrate output)		0-5 V DC / 1-5 V DC : Allowable load resistance 250 k Ω min. 6 V DC max. even if flowrate exceeds range. 4-20 mA DC : Allowable load resistance 300 Ω max. 24 mA DC max. even if the flowrate exceeds range.		
Event output	Number of outputs	2		
	Output	Open collector (absolute maximum ratings: 30 V DC, 50 mA)		
	Totalizer pulse output width	100 ms $\pm 10\%$		
	Totalizer pulse output weight	1, 10, 100 L/pulse	10, 100, 1000 L/pulse	
External contact input	Number of inputs	1		
	Circuit type of other device	Non-voltage contact or open collector		
	Terminal voltage (contacts OFF)	4.5 ± 1 V		
	Terminal current (contacts ON)	Approx. 0.5 mA (current flowing to contact)		
	Allowable ON contact resistance	250 Ω max.		
	Allowable OFF contact resistance	100 k Ω min.		
	Allowable ON residual voltage	0.8 V max. (open collector on other side)		
	Allowable OFF leakage current	50 μ A max. (open collector on other side)		

CMS0500	CMS1000	CMS2000
Hydrogen, Helium. Gas must not contain corrosive components (chlorine, sulfur, acid, etc.).		
500 L/min (standard)	1000 L/min (standard)	2000 L/min (standard)
L/min (standard) indicates the volumetric flow rate per minute converted to conditions of 20 °C and 101.325 kPa (1 atm).		
5 ≤ χ < 100 L/min ±1 % FS ±1 digit	10 ≤ χ < 200 L/min ±1 % FS ±1 digit	20 ≤ χ < 400 L/min ±1 % FS ±1 digit
100 ≤ χ ≤ 500 L/min ±5 % RD ±1 digit	200 ≤ χ ≤ 1000 L/min ±5 % RD ±1 digit	400 ≤ χ ≤ 2000 L/min ±5 % RD ±1 digit
Flow range 0 to 75 % ±0.10 % FS/ °C ±1 digit		
Flow range 75 to 100 % ±0.15 % FS/ °C ±1 digit		
±0.1 % FS/ 0.1 MPa ±1 digit max.		
±0.3 % RD/ 0.1 MPa ±1 digit max.	± 0.5 % RD/0.1 MPa ±1 digit max.	
±0.2 % FS/ 0.01 MPa ±1 digit max.	± 0.5 % FS/0.01 MPa ±1 digit max.	
±0.5 % RD/ 0.01 MPa ±1 digit max.	±1 % RD/0.01 MPa ±1 digit max.	
-0.07 to +1.0 MPa		
1.5 MPa		
100 ±10 ms		
0-5 V DC / 1-5 V DC : Allowable load resistance 250 kΩ min. 6 V DC max. even if flowrate exceeds range.		
4-20 mA DC : Allowable load resistance 300 Ω max. 24 mA DC max. even if the flowrate exceeds range.		
2		
Open collector (absolute maximum ratings: 30 V DC, 50 mA)		
100 ms ±10 %		
10, 100, 1000 L/pulse		
1		
Non-voltage contact or open collector		
4.5 ±1 V		
Approx. 0.5 mA (current flowing to contact)		
250 Ω max.		
100 kΩ min.		
0.8 V max. (open collector on other side)		
50 μA max. (open collector on other side)		

Model No.		CMS0010	CMS0050	CMS0200	
Item	Flowrate display	7-segment LED 4-digit			
	Instantaneous flowrate	Min. display	0.01 L/min (standard)	0.1 L/min (standard)	1 L/min (standard) *5
		Resolution	0.01 L/min (standard)	0.1 L/min (standard)	1 L/min (standard) *5
	Totalized flow	Display unit	1 L		10 L
		Display range	0 to 99999999		
Data storage		Data is written to memory every 10 min (Totalized flow can be reset by operating the keys or external contact input.)			
Status display	Instantaneous flow rate LED indicator, totalized flow LED indicator, event LED indicators				
Power supply	Rated voltage	12 to 24 V DC			
	Supply voltage range	11.4 to 25.2 V DC			
	Current consumption	100 mA max.			
	Electrical interface	Harness with dedicated connector (sold separately)			
Operating temperature range		-10 to +60 °C			
Operating humidity range		10 to 90 % RH (without condensation)			
Storage temperature range		-20 to +70 °C (without condensation)			
Connection method		9/16-18 UNF Rc 1/4 1/4 Swagelok 1/4 VCR			
Mounting orientation		Horizontal mounting (The display unit should not face downward.)			
Main unit material		SUS316			
Case material		Polycarbonate			
Material of gas contacting parts		SUS316, fluoro-resin rubber			
Weight		Approx. 800 g			
Standards compliance		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 ±20 % FS.			

*1 The following tables show the maximum measurable flow rate and output voltage for each gas type: (The output at the maximum measurable flow rate is indicated as the voltage.)

Gas type	CMS0010		CMS0050	
	Max. measurable flow rate [L/min (standard)]	Output voltage [V]	Max. measurable flow rate [L/min (standard)]	Output voltage [V]
Hydrogen	10	5	50	5
Helium	10	5	50	5
User-specified	10 x Gas type conversion factor	5	50 x Gas type conversion factor	5

Gas type	CMS0200		CMS0500	
	Max. measurable flow rate [L/min (standard)]	Output voltage [V]	Max. measurable flow rate [L/min (standard)]	Output voltage [V]
Hydrogen	200	5	500	5
Helium	200	5	500	5
User-specified	200 x Gas type conversion factor	5	500 x Gas type conversion factor	5

Gas type	CMS1000		CMS2000	
	Max. measurable flow rate [L/min (standard)]	Output voltage [V]	Max. measurable flow rate [L/min (standard)]	Output voltage [V]
Hydrogen	1000	5	2000	5
Helium	1000	5	2000	5
User-specified	1000 x Gas type conversion factor	5	2000 x Gas type conversion factor	5

CMS0500	CMS1000	CMS2000
7-segment LED 4-digit		
1 L/min (standard)		5 L/min (standard)
1 L/min (standard)		5 L/min (standard)
10 L		
0 to 99999999		
Data is written to memory every 10 min. (Totalized flow can be reset by operating the keys or external contact input.)		
Instantaneous flow rate LED indicator, totalized flow LED indicator, event LED indicators		
12 to 24 V DC		
11.4 to 25.2 V DC		
100 mA max.		
Harness with dedicated connector (sold separately)		
-10 to 60 °C		
10 to 90 % RH (without condensation)		
-20 to +70 °C (without condensation)		
3/4-16 UNF		
Rc 1/2		
1/2 Swagelok		
1/2 VCR or equivalent product		
Horizontal mounting. (The display unit should not face downward.)		
SUS316		
Polycarbonate		
SUS316, fluoro-resin rubber		
Approx. 1400 g		Approx. 2000 g
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 $\pm 20\%$ FS.		

*2 Measurement flowrate \bar{X} L/min (standard).

*3 Amount of change on a flowrate referenced to 23 °C at -10 to +60 °C, 101.325 kPa state.

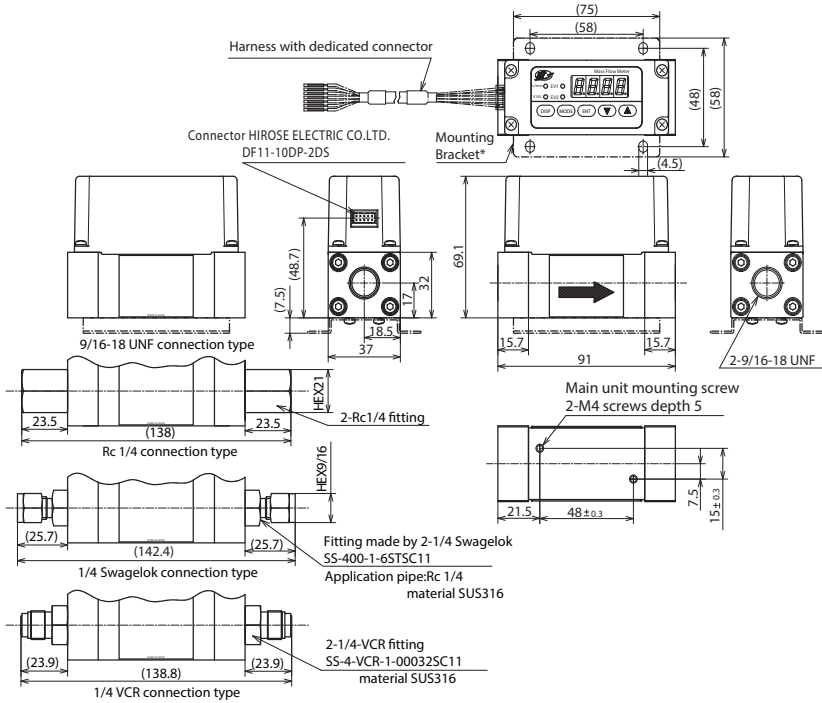
*4 Amount of change on a flowrate referenced to atmospheric pressure in a 23 °C, -0.07 to +1.0 MPa state.
Only for the flow range 50 to 100 % in the CMS0010, this specifies for the full range of 0 to 1.0 MPa.

*5 When the gas type conversion factor has been set to 0.100 to 0.499, the minimum display and display resolution becomes 0.5 L/min (standard).

■ External dimensions

● CMS0010/0050/0200

unit: mm



*Optional Parts (Sold separately)

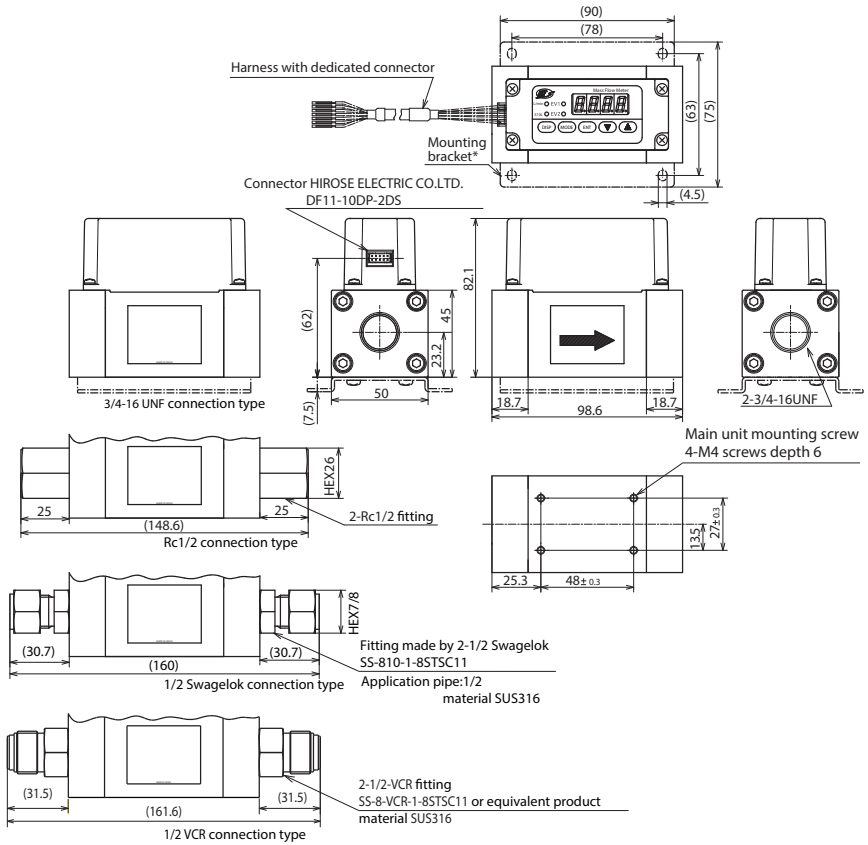
Harness with dedicated
connector : Model No. 81446594-XXX
Mounting bracket : Model No. 81446628-001

Note

- The upper figure shows CMS0200.

● CMS0500/1000

unit: mm



* Optional Parts (Sold separately)

Harness with dedicated
connector : Model No. 81446594-XXX

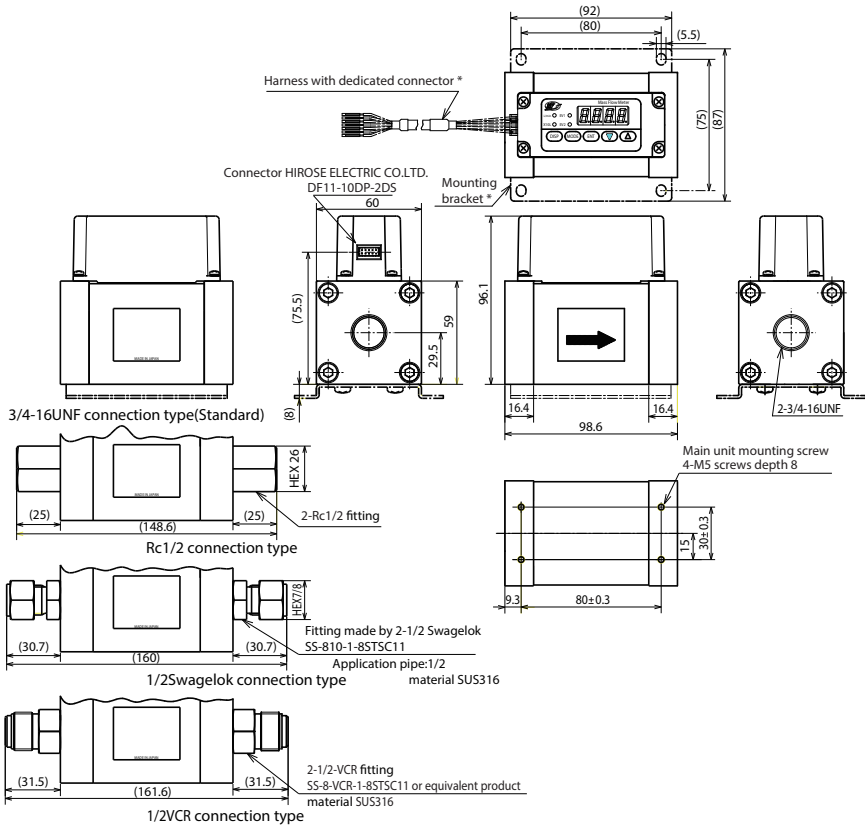
Mounting bracket : Model No. 81446721-001

Note

- The upper figure shows CMS0500.

● CMS2000

unit: mm



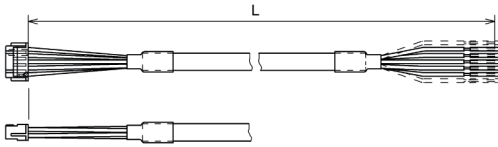
* Optional Parts (Sold separately)

Harness with dedicated
connector : Model No. 81446594-XXX

Mounting bracket : Model No. 81446856-001

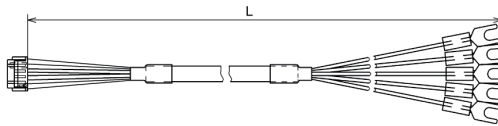
● **Harness with dedicated connector, 81446594-ITEM**

ITEM:005, 006



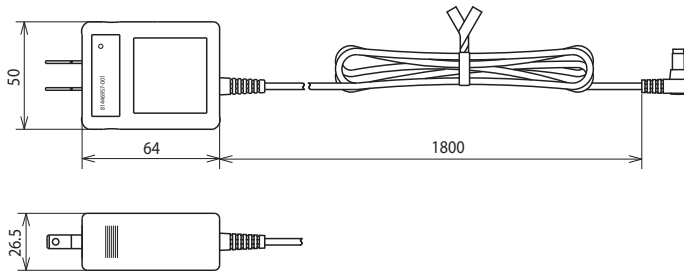
ITEM	L(mm)	No. of wire
005	2000 $^{+50}_0$	8
006	5000 $^{+250}_0$	8
007	2000 $^{+80}_0$	10
008	5000 $^{+250}_0$	10

ITEM:007, 008



● **AC adapter, 81446957-001**

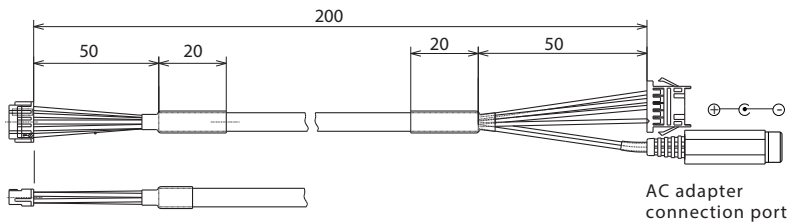
unit: mm



Note : The 81446594-030 AC adapter connection harness is necessary when supplying AC power to the CMS.

● **AC adapter connection harness, 81446594-030**

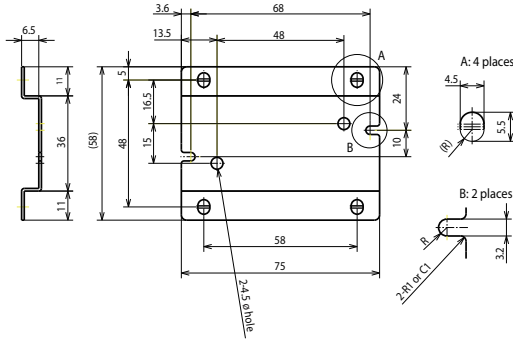
unit: mm



● Mounting bracket, 81446628-001 (CMS0010/0050/0200)

Material: SUS304

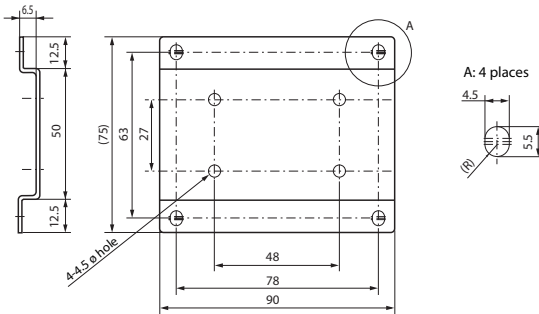
unit: mm



● Mounting bracket, 81446721-001 (CMS0500/1000)

Material: SUS304

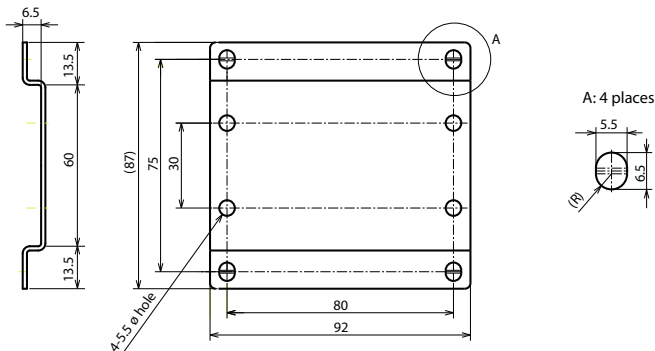
unit: mm



● Mounting bracket, 81446856-001 (CMS2000)

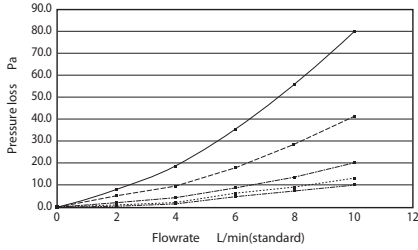
Material: SUS304

unit: mm

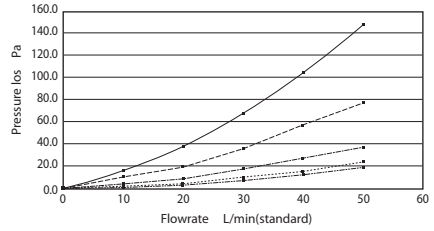


■ Pressure loss

• CMS0010



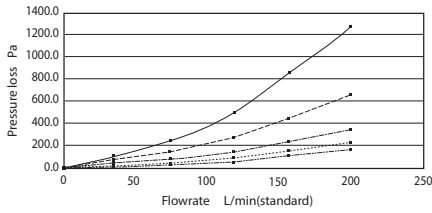
• CMS0050



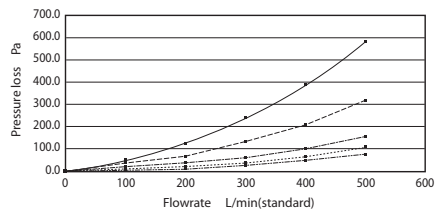
Primary pressure



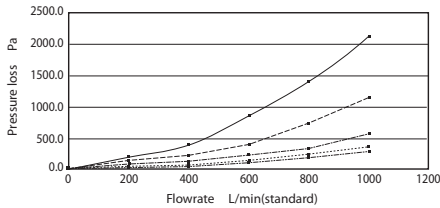
• CMS0200



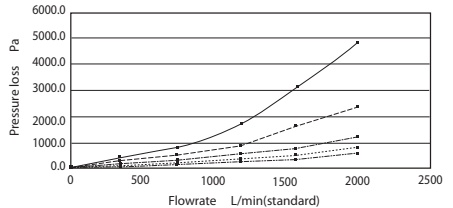
• CMS0500



• CMS1000



• CMS2000



Primary pressure



Memo

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Specifications are subject to change without notice. (11)

Azbil Corporation
Advanced Automation Company

1-12-2 Kawana, Fujisawa
Kanagawa 251-8522 Japan

URL: <https://www.azbil.com>

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