



## Gas Mass Flowmeter

# CMS Series



## High Performance and High Rangeability Next-Generation Flow Meters

The CMS series is a next-generation mass flowmeter equipped with Yamatake's  $\mu$ F (Micro Flow) sensor, which can detect even the slightest gas flows. It combines the superb performance of the  $\mu$ F sensor not available before and Yamatake's original rectification mechanism to realize high accuracy, high resolution, and high rangeability, at the cost of a conventional float type flowmeter. Available in a range of functions, the CMS series employs a unique method of measuring gas flow rate that is also resistant to changes in temperature and pressure.



# High Accuracy and High Reliability Made Possible by $\mu$ F Sensor

High rangeability with  $\pm 3\%RD$  accuracy.

(\* Standard Model only)



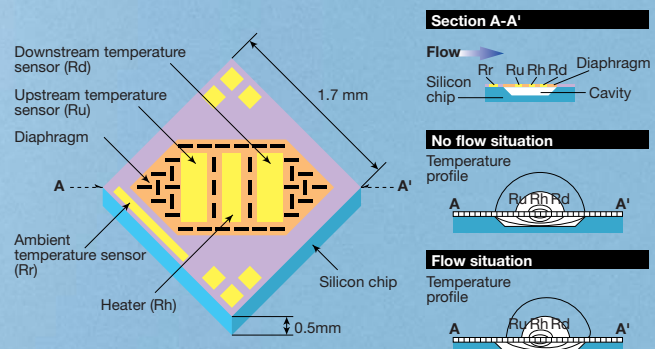
"standard" indicates the volume flow per minute converted to the conditions of 20°C and 1 atmospheric pressure.

## Structure and features of $\mu$ F (Micro Flow) sensor

• Manufactured by silicon micro-machining and thin-film technologies, this thermal type flow sensor is a mere 1.7mm (squared) and 0.5mm thickness.

• The use of ultra-precision machining technology minimizes variations in element layout and thermal capacity. High resolution of 1 mm/s in flow speed and high-speed response of approx. 2ms are achieved at the sensor chip level.

[Principle of Measurement] When gas flow does not exist, the temperature distribution around the heater is symmetric. When the gas starts to flow from Ru to Rd, the temperature at Ru upstream begins to decrease, while the temperature at Rd downstream increases, thus causing a distortion in the symmetry in temperature distribution. This temperature difference between Ru and Rd is used to calculate the mass velocity (velocity x density).



# Solutions to a range of application needs...

## Need: A low cost and high accuracy / resolution mass flowmeter

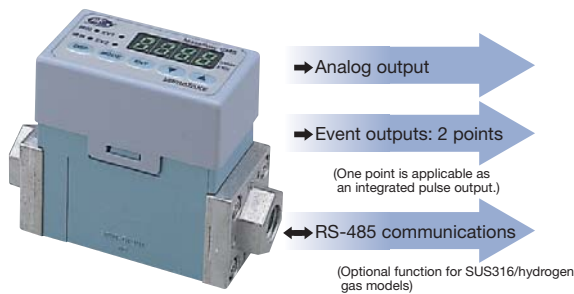
The CMS series is equipped with a Micro Flow sensor to offer high accuracy of  $\pm 3\%$  RD, repeatability of 0.5% FS and wide rangeability of 100:1, all at low cost.

## Need: A suitable model

A broad selection of the CMS series is available to meet any application and price range. Choose a suitable model according to flow rate range, gas passage material, types of gas measured, etc.

## Need: A mass flowmeter with a variety of functions

The CMS series offers a variety of functions, such as instantaneous /integrated flow rate indication, analog output, integrated pulse output, event output (2 points) and analog output scaling function and RS-485 communications.



## Need: Elbow piping on the upstream side

To obtain stable measurement, a conventional flowmeter requires a long straight piping area at the upstream side. The CMS series, however, can assure stable measurement without a straight piping area, due to the superior performance of  $\mu F$  sensor and Yamatake's rectification mechanism. It can even be connected to an elbow pipe, allowing for easy design of piping layout.

## Need: Monitoring multiple mass flowmeters by one indicator



A maximum of five CMS units can be connected to a single, dedicated CMW100A multi-channel indicator. This space-saving multi-channel indicator can monitor such functions as instantaneous flow rate indication, flow rate status indication (Hi/OK/Lo) and alarm output function.

## Need: Low pressure gas measurement

Only 500Pa pressure loss [when the primary pressure is 49kPa for the CMS200] due to a special measurement method on the flow path wall.



## Specifications

### ● Resin and aluminum models

Model No.	Resin model		Aluminum model
Compatible gas types	<b>CMS0020</b>	<b>CMS0050</b>	<b>CMS1500</b>
	Air, nitrogen, argon and carbon dioxide. Gas must be dry and without corrosive components (chlorine, sulfur, acid, etc.). It must also be clean, without dust or oil mist.		
Air flow range [Note 1]	0 to 20L/min(standard)	0 to 50L/min(standard)	0 to 1500L/min(standard)
	"Standard" refers to the flow rate after conversion to 20°C, 101.325kPa (1 atmosphere).		
Max. measured flow rate for each gas (at 1 atm, 20°C) [Note 2]	Air/nitrogen	20 L/min	50 L/min
	Argon	20 L/min	50 L/min
	Carbon dioxide	10 L/min	25 L/min
Measurement accuracy at 20°C, 1 atm	0.2 ≤ x < 4L/min	±1% FS ± 1digit	±1% FS ± 1digit
	4 ≤ x ≤ 20L/min	±5% RD ± 1digit	±5% RD ± 1digit
	150 ≤ x ≤ 1500L/min	±5% RD ± 1digit	±5% RD ± 1digit
Minimum display	0.1 L/min		15 L/min
Display resolution	0.1 L/min		5 L/min
Operating temperature	0 to 50°C (guaranteed accuracy temperature range: 10 to 35°C)		
Storage temperature	-20 to +70°C		
Operating humidity	10 to 90% RH (no condensation allowed)		
Connection method	Rc 1/4"		Rc 1"
Body material	PBT		Aluminum
Case material	ABS		Polycarbonate
Operating pressure	0 to 0.5MPa		0 to 0.5MPa
Pressure resistance	0.7MPa		1MPa
Mounting position	Horizontal, flow direction: left → right		
Rated voltage	12 to 24Vdc		
Sampling cycle	100ms ± 20ms		
Output signal (instantaneous flow rate)	0 to 5Vdc (min. allowable load resistance 10kΩ) No more than 5.7V is output even if the range is exceeded.		4—20mAdc / 0—5Vdc / 1—5Vdc selectable
Event output	Open collector output: 2 points		
Event functions	Specify from among instantaneous flow rate upper/lower limit, cumulative flow countup, reverse-cumulative flow countdown, totalizer pulse output (event 2 only), flow rate data serial output (event 1).		
External contact input	1 (reserved for reset of cumulative count, no-voltage contact)		
Electrical connection	Harness with special connector (sold separately)		
Display	4-digit 7-segment LED, selectable between instantaneous flow rate and cumulative flow		
Weight	Approx. 280g		Approx. 3000g

### ● SUS model

Model No.	CMS9500	CMS0002	CMS0005	CMS0020	CMS0050	CMS0200	CMS0500
Compatible gas types	Air, nitrogen, oxygen (oxygen model only), argon, carbon dioxide, city gas 13A (limited to LNG: 45/46MJ), methane(100%), propane (100%) and butane (100%). Gas must be dry and without corrosive components (chlorine, sulfur, acid, etc.). It must also be clean, without dust or oil mist.						
Air flow range [Note 1]	0 to 500 mL/min(standard)	0 to 2 L/min(standard)	0 to 5 L/min(standard)	0 to 20 L/min(standard)	0 to 50 L/min(standard)	0 to 200 L/min(standard)	0 to 500 L/min(standard)
	"Standard" refers to the flow rate after conversion to 20°C, 101.325kPa (1 atmosphere).						
Max. measured flow rate for each gas (at 1 atm, 20°C) [Note 2]	Air/nitrogen	500 mL/min	2 L/min	5 L/min	20 L/min	50 L/min	200 L/min
	Oxygen [Note 3]	500 mL/min	2 L/min	5 L/min	20 L/min	50 L/min	200 L/min
	Argon	500 mL/min	2 L/min	5 L/min	20 L/min	50 L/min	200 L/min
	Carbon dioxide	250 mL/min	1 L/min	3.3 L/min	10 L/min	25 L/min	100 L/min
	City gas 13A [Note 4]	400 mL/min	1.5 L/min	4.5 L/min	15 L/min	40 L/min	150 L/min
	Methane	500 mL/min	2 L/min	5 L/min	20 L/min	50 L/min	200 L/min
	Propane	140 mL/min	0.5 L/min	1.7 L/min	5 L/min	14 L/min	50 L/min
Butane	100 mL/min	0.4 L/min	1.25 L/min	5 L/min	12 L/min	50 L/min	
Measurement accuracy at 20°C, 1 atm	5 ≤ x < 100mL/min	±1% FS ± 1digit	±1% FS ± 1digit	±1% FS ± 1digit	±1% FS ± 1digit	±1% FS ± 1digit	±1% FS ± 1digit
	100 ≤ x ≤ 500mL/min	±3% RD ± 1digit	±3% RD ± 1digit	±3% RD ± 1digit	±3% RD ± 1digit	±3% RD ± 1digit	±3% RD ± 1digit
	500 ≤ x ≤ 500L/min	±3% RD ± 1digit	±3% RD ± 1digit	±3% RD ± 1digit	±3% RD ± 1digit	±3% RD ± 1digit	±3% RD ± 1digit
Minimum display	1 mL/min	0.01 L/min		0.1 L/min		1 L/min	
Display resolution	1 mL/min	0.01 L/min		0.1 L/min		1 L/min	
Operating temperature	0 to 50°C						
Storage temperature	-20 to +70°C						
Operating humidity	10 to 90% RH (no condensation allowed)						
Connection method	Rc 1/4"					Rc 1/2"	
Body material	SUS303 and SUS316						
Case material	Polycarbonate						
Operating pressure	-0.07 to +1.0MPa						
Pressure resistance	1.5MPa						
Mounting position	Horizontal, flow direction: left → right						
Rated voltage	12 to 24Vdc						
Sampling cycle	100ms ± 10ms						
Output signal (instantaneous flow rate)	0—5Vdc / 1—5Vdc / 4—20mA, selectable using control panel keys						
Event output	Open collector output: 2 points						
Event functions	Specify from among instantaneous flow rate upper/lower limit, cumulative flow countup, reverse-cumulative flow countdown, totalizer pulse output (event 2 only), flow rate data serial output (event 1).						
External contact input	1 (reserved for reset of cumulative count, no-voltage contact)						
Electrical connection	Harness with special connector (sold separately)						
Display	4-digit 7-segment LED, selectable between instantaneous flow rate and cumulative flow						
Weight	Approx. 800g		Approx. 1400g		Approx. 2000g		

- Notes 1. Flow rate range for air. Using the control panel keys, user can select the desired gas type and can also change the scaling of the analog output.  
2. The flowmeter can also be used for some gases not listed in this table by means of the gas type conversion factor function. For details, contact Yamatake Corporation.  
3. Only models with the catalog listing CMS\_ \_ \_ \_ B \_ \_ S \_ \_ \_ 1 \_ \_ are for oxygen use.  
4. City gas 13A is based on the gases shown below, which are produced from LNG. If the composition of your 13A is different, contact Yamatake Corporation.

Gas type name	Calorific value (MJ)	Methane (%)	Ethane (%)	Propane (%)	Butane (%)
City gas 13A-46MJ	46.04655	88	5.8	4.5	1.7
City gas 13A-45MJ	45.007	88.9	6.8	3.1	1.2



# CMS Series



## Specifications

### SUS316 model

Model No.	CMS9500	CMS0002	CMS0005	CMS0020	CMS0050	CMS0200	CMS0500	
Compatible gas types	Air, nitrogen, oxygen (oxygen model only), argon, carbon dioxide, city gas 13A (limited to LNG: 45/46MJ), methane (100%), propane (100%) and butane (100%). Gas must be dry and without corrosive components (chlorine, sulfur, acid, etc.). It must also be clean, without dust or oil mist.							
Air flow range [Note 1]	0 to 500 mL/min(standard)	0 to 2 L/min(standard)	0 to 5 L/min(standard)	0 to 20 L/min(standard)	0 to 50 L/min(standard)	0 to 200 L/min(standard)	0 to 500 L/min(standard)	
	"Standard" refers to the flow rate after conversion to 20°C, 101.325kPa (1 atmosphere).							
Max. measured flow rate for each gas (at 1 atm, 20°C) [Note 2]	Air/nitrogen	500 mL/min	2 L/min	5 L/min	20 L/min	50 L/min	200 L/min	
	Oxygen [Note 3]	500 mL/min	2 L/min	5 L/min	20 L/min	50 L/min	200 L/min	
	Argon	500 mL/min	2 L/min	5 L/min	20 L/min	50 L/min	200 L/min	
	Carbon dioxide	250 mL/min	1 L/min	3.3 L/min	10 L/min	25 L/min	100 L/min	
	City gas 13A [Note 4]	400 mL/min	1.5 L/min	4.5 L/min	15 L/min	40 L/min	150 L/min	
	Methane	500 mL/min	2 L/min	5 L/min	20 L/min	50 L/min	200 L/min	
	Propane	140 mL/min	0.5 L/min	1.7 L/min	5 L/min	14 L/min	50 L/min	
Butane	100 mL/min	0.4 L/min	1.25 L/min	5 L/min	12 L/min	50 L/min		
Measurement accuracy at 20°C, 1 atm	5 ≤ x < 100 mL/min ±1% FS±1digit 100 ≤ x ≤ 500 mL/min ±3% RD±1digit	0.02 ≤ x < 0.4 L/min ±1% FS±1digit 0.4 ≤ x ≤ 2 L/min ±3% RD±1digit	0.05 ≤ x < 1 L/min ±1% FS±1digit 1 ≤ x ≤ 5 L/min ±3% RD±1digit	0.2 ≤ x < 2 L/min ±1% FS±1digit 2 ≤ x ≤ 20 L/min ±3% RD±1digit	0.5 ≤ x < 5 L/min ±1% FS±1digit 5 ≤ x ≤ 50 L/min ±3% RD±1digit	2 ≤ x < 20 L/min ±1% FS±1digit 20 ≤ x ≤ 200 L/min ±3% RD±1digit	5 ≤ x < 50 L/min ±1% FS±1digit 50 ≤ x ≤ 500 L/min ±3% RD±1digit	
Minimum display	1 mL/min	0.01 L/min		0.1 L/min		1 L/min		
Display resolution	1 mL/min	0.01 L/min		0.1 L/min		1 L/min		
Operating temperature	-10 to +60°C							
Storage temperature	-20 to +70°C							
Operating humidity	10 to 90% RH (no condensation allowed)							
Connection method	9/16-18 UNF, Rc 1/4", 1/4" Swagelok, and 1/3" VCR or equiv., selectable by model No.					3/4-16 UNF, Rc 1/2", 1/2" Swagelok, and 3/8" VCR or equiv., selectable by model No.		
Body material	SUS316							
Case material	Polycarbonate							
Operating pressure	-0.07 to +1.0MPa							
Pressure resistance	1.5MPa							
Mounting position	Horizontal, flow direction: left → right							
Rated voltage	12 to 24Vdc							
Sampling cycle	100ms±10ms							
Output signal (instantaneous flow rate)	0—5Vdc / 1—5Vdc / 4—20mA, selectable using control panel keys							
Event output	2 open collector outputs							
Event functions	Specify from among instantaneous flow rate upper/lower limit, cumulative flow countup, reverse-cumulative flow countdown, totalizer pulse output (event 2 only), flow rate data serial output (event 1).							
External contact input	1 (reserved for reset of cumulative count, no-voltage contact)							
Electrical connection	Harness with special connector (sold separately)							
Display	4-digit 7-segment LED, selectable between instantaneous flow rate and cumulative flow							
Weight	Approx. 800g					Approx. 1400g		Approx. 2000g

### Hydrogen/helium gas model (SUS316)

Model No.	CMS0010	CMS0050	CMS0200	CMS0500	CMS1000	CMS2000
Compatible gas types	Hydrogen and helium. Gas must be dry and without corrosive components (chlorine, sulfur, acid, etc.). It must also be clean, without dust or oil mist.					
Flow range [Note 5]	0 to 10 L/min(standard)	0 to 50 L/min(standard)	0 to 200 L/min(standard)	0 to 500 L/min(standard)	0 to 1000 L/min(standard)	0 to 2000 L/min(standard)
	"Standard" refers to the flow rate after conversion to 20°C, 101.325kPa (1 atmosphere).					
Max. measured flow rate for each gas (at 1 atm, 20°C) [Note 6]	Hydrogen	10 L/min	50 L/min	200 L/min	500 L/min	1000 L/min
	Helium	10 L/min	50 L/min	200 L/min	500 L/min	1000 L/min
Measurement accuracy at 20°C, 1 atm	0.1 ≤ x < 2 L/min	0.5 ≤ x < 10 L/min	2 ≤ x < 40 L/min	5 ≤ x < 100 L/min	10 ≤ x < 200 L/min	20 ≤ x < 400 L/min
	±1% FS±1digit	±1% FS±1digit	±1% FS±1digit	±1% FS±1digit	±1% FS±1digit	±1% FS±1digit
	2 ≤ x ≤ 10 L/min	10 ≤ x ≤ 50 L/min	40 ≤ x ≤ 200 L/min	100 ≤ x ≤ 500 L/min	200 ≤ x ≤ 1000 L/min	400 ≤ x ≤ 2000 L/min
Minimum display	0.01 L/min	0.1 L/min	1 L/min	1 L/min	1 L/min	5 L/min
Display resolution	0.01 L/min	0.1 L/min	1 L/min	1 L/min	1 L/min	5 L/min
Operating temperature	-10 to +60°C					
Storage temperature	-20 to +70°C					
Operating humidity	10 to 90% RH (no condensation allowed)					
Connection method	9/16-18 UNF, Rc 1/4", 1/4" Swagelok, and 1/3" VCR or equiv., selectable by model No.			3/4-16 UNF, Rc 1/2", 1/2" Swagelok, and 3/8" VCR or equiv., selectable by model No.		
Body material	SUS316					
Case material	Polycarbonate					
Operating pressure	-0.07 to +1.0MPa					
Pressure resistance	1.5MPa					
Mounting position	Horizontal, flow direction: left → right					
Rated voltage	12 to 24Vdc					
Sampling cycle	100ms±20ms					
Output signal (instantaneous flow rate)	0—5Vdc / 1—5Vdc / 4—20mA, selectable using control panel keys					
Event output	2 open collector outputs					
Event functions	Instantaneous flow rate upper/lower limit, cumulative flow countup, reverse-cumulative flow countdown, totalizer pulse output (event 2 only), flow rate data serial output (event 1).					
External contact input	1 (reserved for reset of cumulative count, no-voltage contact)					
Electrical connection	Harness with special connector (sold separately)					
Display	4-digit 7-segment LED, selectable between instantaneous flow rate and cumulative flow					
Weight	Approx. 800g			Approx. 1400g		Approx. 2000g

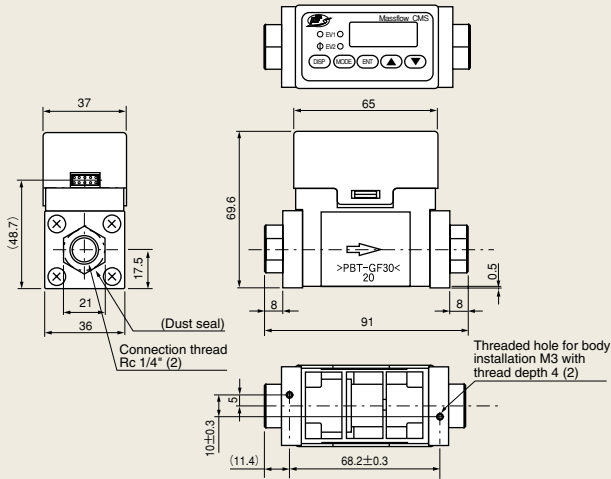
- Notes
- Flow rate range for hydrogen and helium. Using the control panel keys, user can change the scaling of the analog output.
  - The flowmeter can also be used for mixed gases containing hydrogen or helium gases by means of the gas type conversion factor function. For details, contact Yamatake Corporation.



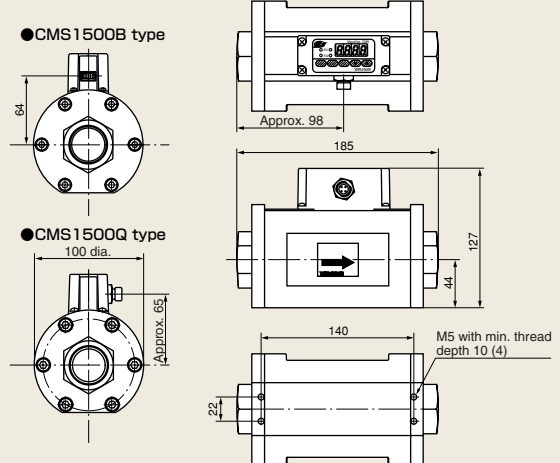
## External Dimensions

(unit:mm)

### CMS0020/0050 (Resin model)

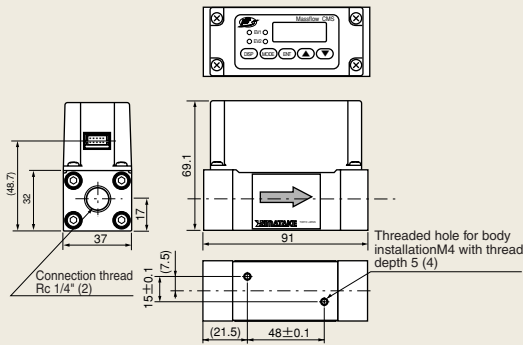


### CMS1500 (Aluminum model)

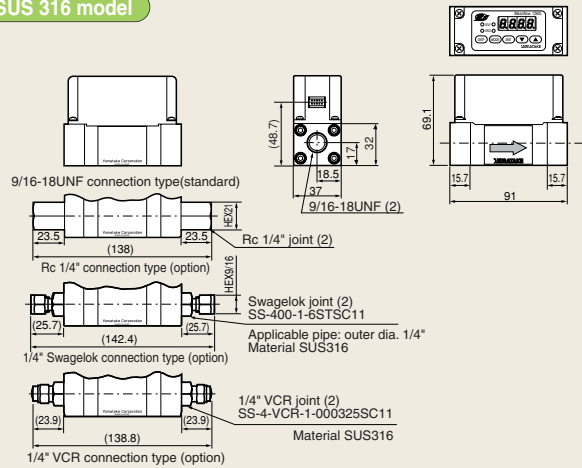


### CMS9500/0002/0005/0020/0050 (SUS model and SUS316 model)

#### SUS model

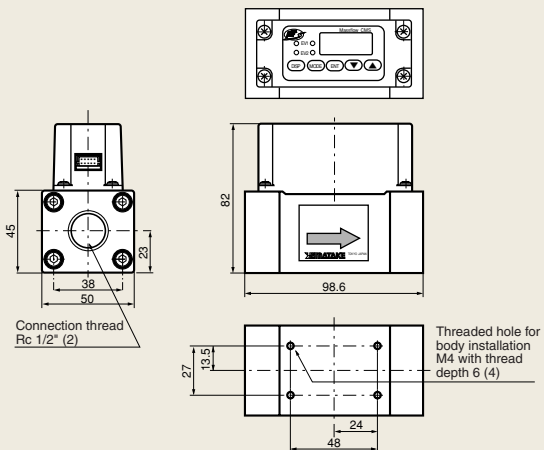


#### SUS 316 model

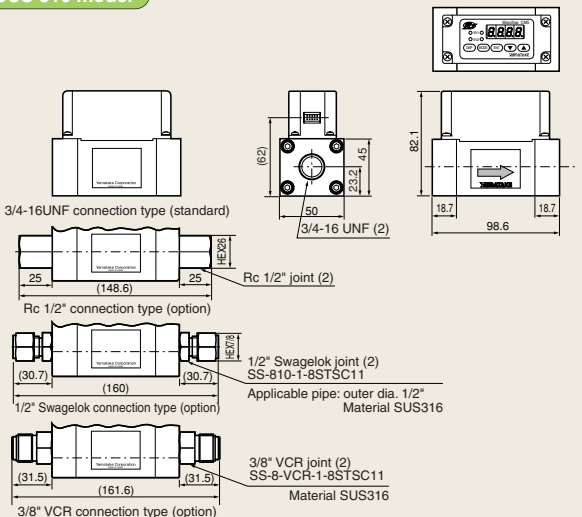


### CMS0200 (SUS model and SUS316 model)

#### SUS model



#### SUS 316 model



# CMS Series

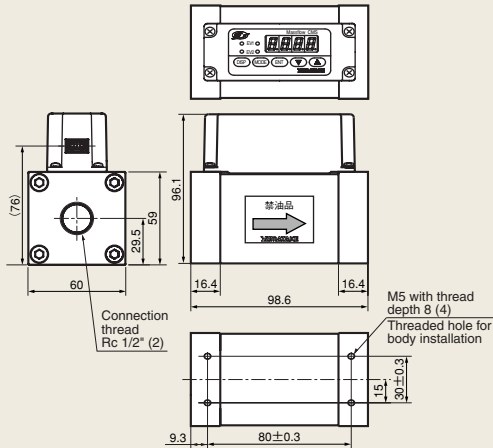


## External Dimensions

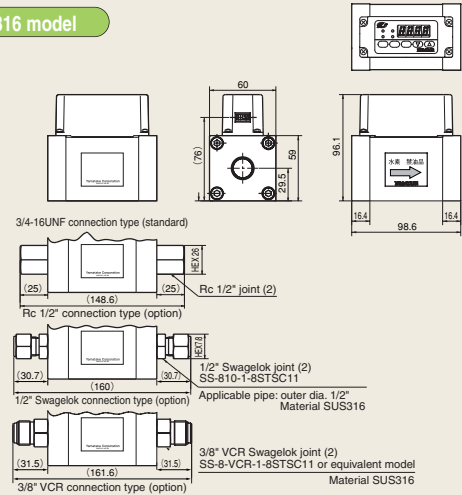
(unit:mm)

### CMS0500 (SUS model and SUS316 model)

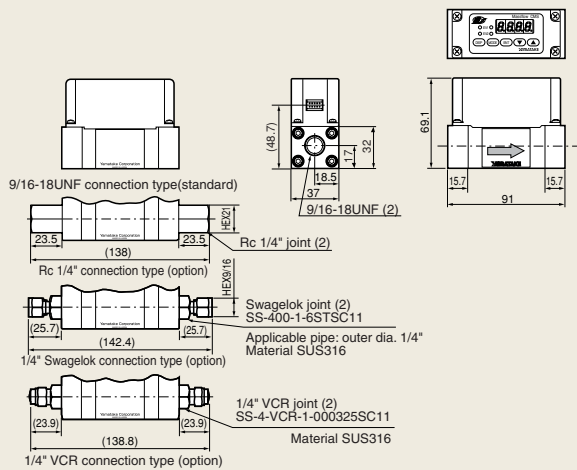
#### SUS model



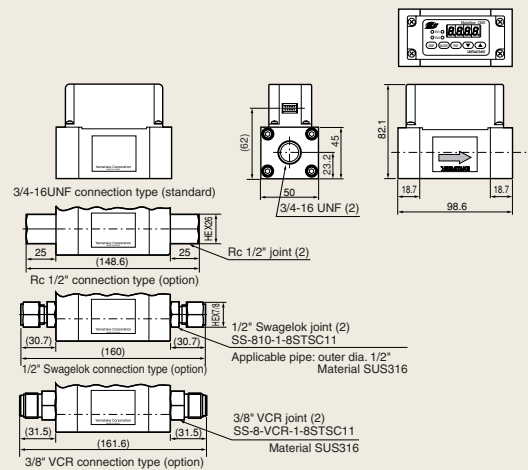
#### SUS 316 model



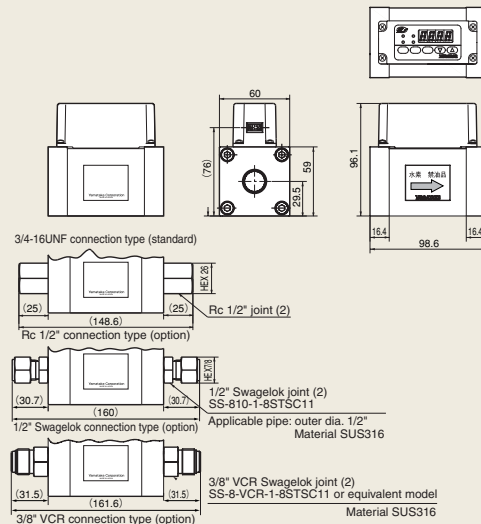
### CMS0010/0050/0200 (Hydrogen/helium model (SUS316))



### CMS0500/1000 (Hydrogen/helium model (SUS316))



### CMS2000 (Hydrogen/helium model (SUS316))



## Selection guide

### ■ Resin model: 20 and 50L ranges only Example: CMS0020BPRN00000

Selection		Description	
Basic model No.	CMS ↓	↓	Gas Mass Flowmeter
Flow rate range	0020	○	Air flow rate range 0 to 20L/min (standard) [Notes 1 and 4]
	0050	○	Air flow rate range 0 to 50L/min (standard) [Notes 1 and 4]
Display	B	○	Includes display. Instantaneous flow rate output/totalizing function, event output
Material	P	○	Resin
Connection	R	○	Rc 1/4"
Gas type	N	○	Air/nitrogen (can also be set for carbon dioxide [Note 4])
Output	0	○	0-5Vdc
Option (1)	0	○	(None)
Option (2)	0	○	(None)
Option (3)	0	○	(None)
Option (4)	0	○	(None)
	D	○	Inspection results provided
Design code	Y	○	Traceability certificate provided
	0	○	Product version

### ■ Aluminum model: 1500L range only Example: CMS1500QARN200000

Selection		Description	
Basic model No.	CMS ↓	↓	Gas Mass Flowmeter
Flow rate range	1500	○	Air flow rate range 0 to 1500L/min (standard) [Notes 1, 4]
Display	B	○	Includes display. Instantaneous flow rate output + totalizing function + event output + totalizer pulse output + cumulative flow reset input
	Q	○	Includes display. Instantaneous flow rate output (threaded connector)
Material	A	○	Aluminum
Connection	R	○	Rc 1"
Gas type	N	○	Air/nitrogen, argon, carbon dioxide
Output	2	○	4-20mA / 0-5Vdc / 1-5Vdc selectable
Option (1)	1	○	RS-485 communications
Option (2)	0	○	(None)
Option (3)	0	○	(None)
Option (4)	0	○	(None)
	D	○	Inspection results provided
Design code	0	○	Product version

### ■ SUS model Example: CMS9500BSRN200000

Selection		Description	
Basic model No.	CMS ↓	↓	Gas Mass Flowmeter
Flow rate range	9500	○	Air flow rate range 0 to 500mL/min (standard) [Notes 1, 3]
	0002	○	Air flow rate range 0 to 2L/min (standard) [Notes 1, 3]
	0005	○	Air flow rate range 0 to 5L/min (standard) [Notes 1, 3]
	0020	○	Air flow rate range 0 to 20L/min (standard) [Notes 1, 3]
	0050	○	Air flow rate range 0 to 50L/min (standard) [Notes 1, 3]
	0200	○	Air flow rate range 0 to 200L/min (standard) [Notes 1, 3]
	0500	○	Air flow rate range 0 to 500L/min (standard) [Notes 1, 3]
Display	B	○	Includes display. Flow direction: left → right
Material	S	○	SUS303 and SUS316
Connection	R	○	Rc 1/2" (CMS0200/0500)
	R	○	Rc 1/4" (CMS9500/0002/0005/0020/0050)
Gas type	N	○	Air/nitrogen (changeable to standard gases [Note 3])
Output	S	○	Oxygen [Note 2]
	2	○	4-20mA / 0-5Vdc / 1-5Vdc selectable
Option (1)	0	○	(None)
Option (2)	0	○	(None)
Option (3)	0	○	(None)
Option (4)	1	○	Gas-contacting parts treated to be oil-inhibited
	0	○	(None)
Option (4)	D	○	Inspection results provided
	Y	○	Traceability certificate provided
Design code	0	○	Product version

• A circle (o) denotes availability.

Notes 1. "Standard" refers to the flow rate after conversion to 20°C, 101.325kPa (1 atmosphere).

2. When oxygen (gas type: S) is selected, make sure to specify "1: Gas-contacting parts treated to be oil-inhibited" for option (3). Note that resin and hydrogen models cannot be used for oxygen.

3. Gas type is set to air/nitrogen at the factory. The user can change to any of the gas types listed below using the control panel keys. A change in gas type can result in a change in flow rate range. Consequently, when selecting a gas type, make sure to check the maximum measurable flow rate for the gas type in the specifications of the relevant model. Compatible gas types: air/nitrogen, argon, carbon dioxide, city gas 13A (produced from LNG, 88% methane, calorific value of 45MJ or 46MJ), methane (100%), propane (100%), butane (100%). For other gas types, contact Yamatake Corporation.

4. Compatible gas types for resin and aluminum models are air/nitrogen, argon and carbon dioxide only. The user can change to any of these gas types using the control panel keys. A change in gas type can result in a change in flow rate range. Consequently, when selecting a gas type, make sure to check the maximum measurable flow rate for the gas type in the specifications of the relevant model.

5. Gas type is set to hydrogen at the factory. Change to helium with the gas type selection function. The maximum measurable flow rate is the same for hydrogen and helium.

### ■ SUS316 model Example: CMS9500BTTN200000

Selection		Description	
Basic model No.	CMS ↓	↓	Gas Mass Flowmeter
Flow rate range	9500	○	Air flow rate range 0 to 500mL/min (standard) [Notes 1, 3]
	0002	○	Air flow rate range 0 to 2L/min (standard) [Notes 1, 3]
	0005	○	Air flow rate range 0 to 5L/min (standard) [Notes 1, 3]
	0020	○	Air flow rate range 0 to 20L/min (standard) [Notes 1, 3]
	0050	○	Air flow rate range 0 to 50L/min (standard) [Notes 1, 3]
	0200	○	Air flow rate range 0 to 200L/min (standard) [Notes 1, 3]
	0500	○	Air flow rate range 0 to 500L/min (standard) [Notes 1, 3]
Display	B	○	Includes display. Flow direction: left → right
Material	T	○	SUS316
Connection	U	○	UNF connection: 9/16-18 UNF (CMS9500/0002/0005/0020/0050), 3/4-16 UNF (CMS0200/0500)
	T	○	Rc 1/4" (CMS9500/0002/0005/0020/0050), Rc 1/2" (CMS0200/0500)
	S	○	1/4" Swagelok (CMS9500/0002/0005/0020/0050), 1/2" Swagelok (CMS0200/0500)
	V	○	1/4" VCR (CMS9500/0002/0005/0020/0050), 3/8" VCR or equiv., (CMS0200/0500)
Gas type	N	○	Air/nitrogen (changeable to standard gases [Note 3])
Output	S	○	Oxygen [Note 2]
	2	○	0-5Vdc
Option (1)	0	○	(None)
Option (2)	1	○	RS-485 communications
	0	○	(None)
Option (3)	0	○	(None)
	1	○	Gas-contacting parts treated to be oil-inhibited
Option (4)	0	○	(None)
	D	○	Inspection results provided
Design code	Y	○	Traceability certificate provided
	0	○	Product version

### ■ Hydrogen/helium gas model (SUS316) Example: CMS0010BTTN200000

Selection		Description	
Basic model No.	CMS ↓	↓	Gas Mass Flowmeter
Flow rate range	0010	○	Air flow rate range 0 to 10L/min (standard) [Note 1]
	0050	○	Air flow rate range 0 to 50L/min (standard) [Note 1]
	0200	○	Air flow rate range 0 to 200L/min (standard) [Note 1]
	0500	○	Air flow rate range 0 to 500L/min (standard) [Note 1]
	1000	○	Air flow rate range 0 to 1000L/min (standard) [Note 1]
	2000	○	Air flow rate range 0 to 2000L/min (standard) [Note 1]
	Display	B	○
Material	T	○	SUS316
Connection	U	○	UNF connection: 9/16-18 UNF (CMS0010/0050/0200), 3/4-16 UNF (CMS0500/1000/2000)
	T	○	Rc connection: Rc 1/4" (CMS0010/0050/0200), Rc 1/2" (CMS0500/1000/2000)
	S	○	Swl connection: 1/4" Swagelok (CMS0010/0050/0200), 1/2" Swagelok (CMS0500/1000/2000)
Option (3)	V	○	VCR connection: 1/4" VCR (CMS0010/0050/0200), 3/8" VCR or equiv. (CMS0500/1000/2000)
	0	○	(None)
Gas type	H	○	Hydrogen, helium [Note 5]
Output	2	○	4-20mA / 0-5Vdc / 1-5Vdc selectable
Option (1)	0	○	(None)
Option (2)	1	○	RS-485 communications
	0	○	(None)
Option (3)	1	○	Gas-contacting parts treated to be oil-inhibited
	0	○	(None)
Option (4)	D	○	Inspection results provided
	Y	○	Traceability certificate provided
Design code	0	○	Product version

## Optional parts (sold separately)

◆ A dedicated harness is required for each CMS flowmeter. Please order the harness when ordering the CMS.

Name	Applicable models	Harness length	Part No.
Harness with special connector	• Resin and SUS models	2m	81446594-005
	• SUS316/hydrogen/helium models without RS-485 communications	5m	81446594-006
	• CMS1500B	2m	81446594-007
	• Models with RS-485 communications	5m	81446594-008
	• Resin/SUS/SUS316 models (CMS9500/0002/0005/0020/0050)	—	81446628-001
Mounting bracket	• Hydrogen/helium gas models (CMS0010/0050/0200)	—	81446721-001
	• SUS/SUS316 models (CMS0200)	—	81446721-001
	• Hydrogen/helium gas models (CMS0500/1000)	—	81446856-001
	• SUS/SUS316 models (CMS0500)	—	81446856-001
	• Hydrogen/helium gas models (CMS2000)	—	81446856-001

### ⚠ CAUTION

The product has been designed, developed and manufactured for general purpose applications for machinery and equipment. The product shall be handled with extra caution to provide fail-safe and/or redundant design in the applications that require strict safety as those listed below.

• applications pertaining to the protection of human life • applications pertaining directly to controlling transportation equipment and machinery (start/stop control, etc.)

• applications pertaining to aircraft • applications pertaining to spacecraft • applications pertaining to nuclear reactors

Do not use this device in applications where the device's functions are directly responsible for human safety.

Specifications are subject to change without notice.

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