

MASSMAX 6400R Series

Coriolis Mass Flowmeter
Accurate measurement in a wide range of temperature

OUTLINE

The epoch-making sensing technologies of **MASSMAX**6400R series Coriolis flowmeter allow the accurate mass flow measurement in a wide range of temperature from cryogenic service down to -200 °C to high temperature service up to 400°C.

With 9 sizes from 80 to 200 mm, it covers a wide range of flow rates and applications.

The Hastelloy® C22 for the wetted parts is also available for corrosive services on request.

FEATURES

- ❑ Cryogenic, high temperature and high pressure
- ❑ High accuracy: ±0.1% of reading (+ zero stability)
- ❑ Instantaneous or totalizing mass flow, density and temperature with one instrument
- ❑ Capable of gas measurement also
- ❑ Compliant with Japanese standard explosionproof and DNV GL and Lloyd's ship classifications

STANDARD SPECIFICATIONS

- Measuring principle : Coriolis force
- Meter size : 08, 10, 15, 25, 40, 80, 100, 150, 200 (mm)*
- Measuring range:

Meter size	kg/h		kg/min	
	Max. flow rate	Min. flow rate	Max. flow rate	Min. flow rate
08	600	5	10	0.083
10	1,200	9	20	0.15
15	3,800	29	63.3	0.483
25	19,000	146	316.6	2.433
50	35,000	270	583.3	4.5
80	78,000	600	1,300	10
100	175,000	1,350	2,917	22
150	320,000	2,450	5,333	41
200	550,000	4,320	9,166	72

* The measuring tube of Hastelloy® C22 is available for 08 to 80 mm.

- Enclosure: IP66/67 (IEC 60529)
- Ambient temperature : -40 to +65°C (compact type Aluminum alloy converter)
-40 to +55°C (compact type: Stainless steel converter)
-40 to +65°C (remote type: Standard)
-40 to +65°C (remote type: High temperature model)
-20 to +65°C (remote type: Cryogenic model)
See [Explosionproof] for the ambient temperature range of Ex types.

Fluid specifications

- Fluid: Liquids and gasses (Consult us for gas services)
- Fluid temperature:

Model	Temperature	Type	Material
Standard model (Non-ex)	-70 to +230°C	Compact/ Remote	S/H/D
Standard model (Ex*)	-50 to +230°C	Compact/ Remote	S/H/D
High temperature model (Ex*/Non-ex)	-50 to +400°C	Remote	S/H
Cryogenic model (Ex*/Non-ex)	S: -200 to +40°C H: -196 to +40°C	Remote	S/H
Sanitary fitting model (Ex*/Non-ex)	-50/-70 to +150°C	Compact/ Remote	S

Note: See [Explosionproof] for the ambient temperature range of Ex types.

Material S: Stainless steel, H: Hastelloy® C22, D: Duplex stainless steel UNS 31803



- Fluid pressure:

Temperature	Pressure		Model
	Stainless steel	Hastelloy® C22	
-200 to 20°C	10MPa	20MPa	Cryogenic model (Ex/Non-ex)
-50 to 20°C	10MPa	20MPa	Standard model (Ex/Non-ex)
50°C	9.5MPa	19MPa	Standard model (Ex/Non-ex)
100°C	8.5MPa	18.5MPa	Standard model (Ex/Non-ex)
150°C	7.5MPa	18MPa	Standard model (Ex/Non-ex)
200°C	6.7MPa	17MPa	Standard model (Ex/Non-ex)
230°C	6MPa	16.5MPa	Standard model (Ex/Non-ex)
300°C	5.5MPa	15MPa	High temperature model (Ex/Non-ex)
400°C	4MPa	14MPa	

Note: Pressure in this table means the maximum pressure of the measuring tube. The maximum operating pressure is lower than the rated pressure of the flange or fitting. When using sanitary fitting, it is within 1MPa.

- Density : 100 to 3000 kg/m³

Sensor specifications

- Process connection :
Flange : JIS10K, 20K or equivalent RF
ASME Class 150, 300, 600, 900, 1500 or equivalent RF, etc.
- Sanitary fitting : ISO 2852 ferrule or others as optional
- Materials:
Wetted parts;

Measuring tube material (Applicable meter size)	S (Sizes 08 to 100)	H (Sizes 08 to 80)	D (Sizes 100 to 200)
Measuring tube	Stainless steel (SS316/316L dual certified)	Hastelloy® C22	Duplex stainless steel UNS 31803 (Equiv. to JIS SUS329J3L)
Flange and Flow splitter	Stainless steel (SS316/316L dual certified) and SS CF3M	Stainless steel (SS316/316L dual certified) and Hastelloy® C22*	Duplex stainless steel UNS 31803 and SS J92205

* Measuring tube material "H" of the flanges means the wetted parts including the gasket face are made of Hastelloy® C22 and the non-wetted parts are made of stainless steel.

Non Wetted Part and others;

Outer housing: Stainless steel (SS316/316L dual certified)

Insulation jacket and trace pipe: Stainless steel (SS316)

Converter

- Housing material : Aluminum alloy, SS316L as an option
- Painting : Siloxane coating
- Color : Silver for converter housing, jade green for converter cover and terminal cover
- Power supply : 100 V to 230 V AC (85 V to 253 V AC) Option; 24 V DC (11 to 31 V DC)
Voltages in parentheses indicate the acceptable voltage range.
- Supply frequency : 50/60Hz AC
- Power consumption : AC; approx. 22 VA, DC; approx.12 W
- Grounding : Grounding resistance must be less than 100Ω for Non-ex types (D-type), less than 10Ω for Ex types
- Cable Entry : G1/2 Female adapter × 2 or 1/2 NPT Female adapter × 2 or M20 × 1.5 Female thread × 2
Note: Up to 3 cable entries can be provided.

Indication and outputs

- Display : Blue dot matrix LCD with backlight 128 × 64 pixels (59 × 31 mm) Each of 4 screens shows data in up to 3 lines. Data include instantaneous mass flow rate (bar graph indication available), totalized mass flow, instantaneous volume flow rate, totalized volume flow rate, density, temperature, and instantaneous flow rate trend graph (percentage indication). Setting parameters and self-diagnosis results are also displayed.

Units of instantaneous mass flow rate

: kg/h, kg/min, kg/sec, t/h, and others
Forward and reverse flow directions are indicated with "+" or "-".

Units of totalized mass flow rate

: kg, t, g, and others
Totalization of flow rates in forward and reverse directions is possible.

Units of density : g/cm³, kg/m³, and others

Units of temperature : °C, and others

- Current output : 4 to 20 mA (max. 22 mA)
*Preparing for HART communication

Load resistance is less than 1000Ω ±5μA

Select from among instantaneous mass flow rate, density, and temperature.

- Pulse output : Open collector output
Load rating: 32 V DC 100 mA or less (≤ 100 Hz)
20 mA or less (100 Hz < f ≤ 10 kHz)
Residual voltage at close <1.5 V (load current ≤ 1 mA)
<2.5 V (load current ≤ 10 mA)
<5 V (load current ≤ 20 mA)
100 mA or less (f ≤ 100 Hz)
Residual voltage at close <0.2 V (load current ≤ 10 mA)
<2 V (load current ≤ 100 mA)
Output frequency : Max. 10 kHz
Pulse rate : 2 to 36,000,000 pulse/h (0.01 Hz to 10 kHz)
Pulse width : Selectable from:
(1) Automatic: Pulse width which makes duty 50% at full scale frequency
(2) Fixed duty ratio: Always 1:1
(3) Arbitrary setting: 0.05 to 2000 ms
- Status output : Open collector output
Load rating: 32 V DC, 100 mA or less
Residual voltage at close <0.2 V (load current ≤ 10 mA)
<2 V (load current ≤ 100 mA)

- Contents : Selectable from:
(1) No status output (default setting)
(2) Flow direction identification
(3) Flow over-range
(4) Totalization preset
(5) Range identification (when double ranges are used)
(6) Errors and measurement alarms for flow rate, density, temperature, and others
- Control input
Input voltage : 3 to 32 V DC (ON) / 2.5 V DC, 0.4 mA or less (OFF)
Max. current: 9.5 mA (input voltage ≤ 24 V DC)
Max. current: 9.5 mA (input voltage ≤ 32 V DC)
- Control target : Selectable from:
(1) No control input (default setting)
(2) Hold output
(3) Lock output at 0%
(4) Reset totalization counter
(5) Reset errors
(6) Range identification (when double ranges are used)
(7) Others
- Combination of outputs
Standard : 4 to 20 mA output × 1 or pulse output × 1 (selectable)
Option 1 : 4 to 20 mA output × 1, pulse output × 1, status output × 1, control input × 1
Option 2 : 4 to 20 mA output × 2, pulse output or status output × 1 (selectable)
Option 3 : 4 to 20 mA output × 3, pulse output or status output × 1 (selectable)
Option 4 : 4 to 20 mA output × 2, pulse output × 1, pulse output or status output × 1 (selectable)
See "Converter code" on page 17 for details.
- Low cut-off:
Current output and pulse output (can be set separately for each indication)
Range: 0 to 20% F.S. (0.1% step)
Hysteresis: 0 to 5% F.S. (0.1% step)
- Time constant:
Current output and pulse output (can be set separately for each indication)
Range: 0.1 to 100.0 sec (0.1 sec step)

Standard functions

- User-defined measuring units : Units for mass, volume, and time can be defined (max. 7 letters).
- Bi-directional flow measurement : Flow rates in both directions can be measured.
Flow direction is output as status output.
- Self-diagnosis : Error messages and status messages are displayed.
Function : CPU, memory, software, hardware, output connection
Status : Over-range, count-over, power failure
Application : Oscillating balance of measuring tube, vibration energy, other sensor circuit diagnosis
- Testing : Built-in simulator of current and pulse outputs
Allows for loop check without calibrator.
- Touch sensor (optical key) : Four touch sensors enable data to be set from outside without the need for opening the cover.
These serve as push buttons while the cover is opened.

Accuracy

- Mass flow rate (pulse output)

Liquid	5% or more of max. flow rate	±0.1% of reading (standard) ±0.05% of reading (optional)
	Less than 5% of max. flow rate	± zero stability (see below table)
Gas	±0.35% of reading + zero stability	

Meter size	Max. flow rate	Zero stability	
		Standard and Cryogenic models	High temperature model
kg/h			
08	600	< 0.03	< 0.48
10	1,200	< 0.06	< 0.096
15	3,800	< 0.19	< 0.304
25	19,000	< 0.95	< 1.52
50	35,000	< 1.75	< 2.80
80	78,000	< 3.90	< 6.24
100	175,000	< 8.75	< 14.00
150	320,000	< 16.00	< 25.60
200	550,000	< 27.50	< 44.00

Example of accuracy calculation when measuring liquid:

The accuracy in actual flow rate 6 kg/h with meter size 08 (less than 5% of the max. flow rate)

Zero stability 0.03 kg/h ÷ 6 kg/h = 0.5%

Example of accuracy calculation when measuring gas:

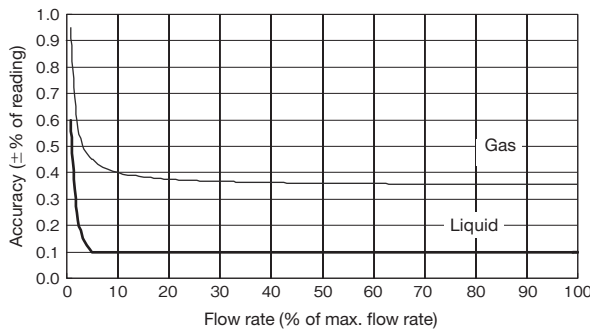
max. flow rate ÷ actual flow rate × 0.005% + 0.35% = Accuracy

The accuracy in actual flow rate 50 kg/h with meter size 08 (max. flow rate is 600 kg/h)

600 kg/h ÷ 50 kg/h × 0.005% + 0.35% = ±0.41% of reading

[Measurement error graph: Liquid as standard]

- Reference conditions: Water at 20°C, 0.1 MPa



		Measurement error (±% of reading)	
		Liquid	Gas
% of max. flow rate	100%	0.1 (standard) 0.05 (optional)	0.355
	50%		0.360
	20%		0.375
	10%		0.400
	5%		0.450
	1%	0.5	0.850

- Effects of change in process conditions (temperature/pressure):

Temperature

Standard and Cryogenic models:

±0.001% of max. flow rate per 1°C (Sizes 08 to 10)

Example

When the size changes by 1°C with size S08: 600 kg/h × 0.00001 = 0.006 kg/h

±0.00075% of max. flow rate per 1°C (Sizes 15 to 100)

High temperature model:

±0.008% of max. flow rate per 1°C (Sizes 8 to 200)

Pressure

All models:

±0.005% of max. flow rate per 0.1 MPa (Sizes 08 to 50)

±0.0055% of max. flow rate per 0.1 MPa (Sizes 80 and 100)

±0.008% of max. flow rate per 0.1 MPa (Sizes 150 and 200)

These effects should be considered when process conditions change after zero adjustment.

- Density (Indicated value)

Measuring range	100 to 3000kg/m ³
Accuracy	±1kg/m ³
Accuracy (on-site calibration)	±0.2kg/m ³

Note: Calibration with certification at the factory test to be performed as an option.

Effects of change in process conditions (temperature/pressure) on density measurements:

Within 0.015 kg/m³ per 1°C change in temperature (Sizes 08 to 200)

Within 0.038 kg/m³ per 0.1 MPa change in pressure (Size 08)

Within 0.026 kg/m³ per 0.1 MPa change in pressure (Sizes 10 and 15)

Within 0.017 kg/m³ per 0.1 MPa change in pressure (Sizes 25 to 80)

Within 0.011 kg/m³ per 0.1 MPa change in pressure (Sizes 100 to 200)

These effects should be considered when process conditions change after density calibration.

- Temperature (indicated value)

Accuracy	±0.5°C
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Ship class specifications and certification

Available for remote type Only

DNV GL: Certification number TAA00000HE Revision No. 2

Lloyd's Register: Certification number 17/20075 (E2)

Explosion Proof

- Japanese standard explosionproof
Type of protection and class:
Compact type MMM6400RC-JEx
(Certificate number: CML21JPN1739X, CML21JPN21175X)
Ex db ia IIC T6...T1 Ga/Gb
Ex db eb ia IIC T6...T1 Ga/Gb
Ex tb IIIC T270°C Db

Remote type sensor MMS6000RF-JEx
(Certificate number: CML21JPN2904X, CML21JPN21181X)
Ex ia IIC T6...T1 Ga
Ex ia IIIC T270°C Da (Standard)
Ex ia IIIC T440°C Da (High temperature model)
Ex ia IIIC T80°C Da (Cryogenic model)

Remote type converter MMC400RF-JEx
(Certificate number: CML21JPN1740X, CML21JPN21182X)
Ex db [ia] IIC T6 Gb
Ex db eb [ia] IIC T6.Gb
Ex tb IIIC T75°C Db

Compact type MMM6400RC-JEx Standard
Aluminum alloy converter housing (standard)

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +65	65	T4-T1	T105

Stainless steel converter housing (optional)

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +65	65	T4-T1	T100

Remote type MMS6000RF-JEx Standard
Aluminum alloy housing with insulation jacket

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	45	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +65	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270

Remote type MMS6000RF-JEx High temperature model
Aluminum alloy housing with insulation jacket

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +55	400	T1	T440
	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
-40 to +60	230	T2-T1	T270
	400	T1	T440
	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
-40 to +65	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
	350	T1	T390

Remote type MMS6000RF-JEx High temperature model
Stainless steel housing with insulation jacket

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +50	400	T1	T440
	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
-40 to +55	230	T2-T1	T270
	400	T1	T440
	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
-40 to +60	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
	350	T1	T390

Remote type MMS6000RF-JEx Cryogenic model
Aluminum alloy housing with jacket cover

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-25 to +65	-140 to +40	T6-T1	T80
	-160 to +40		
-20 to +65	-180 to +40		
	-200 to +40		

Explosion Proof

- ATEX explosionproof

Type of protection and class:
 Compact type MMM6400C-Ex
 (Certificate number: PTB17 ATEX 2008 X)
 II 1/2(1)G Ex db ia [ia Ga] IIC T6...T1 Ga/Gb or
 II 1/2(1)G Ex db eb ia [ia Ga] IIC T6...T1 Ga/Gb or
 II 1/2 G Ex db ia IIC T6...T1 Ga/Gb
 II 1/2 G Ex db ea ia IIC T6...T1 Ga/Gb
 II 2(1)D Ex tb [ia Da] IIIC Txxx°C Db or
 II 2D Ex tb IIIC Txxx°C Db

Remote type sensor MMS6000F-Ex
 (Certificate number: PTB17 ATEX 2007 X)
 II 1 G Ex ia IIC T6...T1 Ga or II 1 D Ex ia IIIC Txxx°C Da

Remote type converter MMC400F-Ex
 (Certificate number: PTB17 ATEX 2009 X)
 II 2(1) G Ex db [ia Ga] IIC T6 Gb
 II 2(1)G Ex db eb [ia Ga] IIC T6 Gb or
 II 2 G Ex db[ia] IIC T6 Gb or
 II 2 G Ex db eb [ia] IIC T6 Gb or
 II 2(1)D Ex tb [ia Da] IIIC T75°C Db or
 II 2D Ex tb IIIC T75°C Db

Compact type MMM6000C-Ex Standard
 Aluminum alloy converter housing (standard)

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +65	65	T4-T1	T105

Stainless steel converter housing (optional)

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +65	65	T4-T1	T100

Remote type MMS6000F-Ex Standard

Aluminum alloy housing with insulation jacket

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	45	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +65	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270

Remote type MMS6000F-Ex High temperature model

Aluminum alloy housing with insulation jacket

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +55	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +60	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +65	350	T1	T390

Remote type MMS6000F-Ex High temperature model

Stainless steel housing with insulation jacket

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +55	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +60	350	T1	T390

Remote type MMS6000F-Ex Cryogenic model

Aluminum alloy housing with jacket cover

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-25 to +65	-140 to +40	T6-T1	T80
	-160 to +40		
	-180 to +40		
-20 to +65	-180 to +40	T6-T1	T80
	-200 to +40		

Explosion Proof

- IECEx explosionproof

Type of protection and class:
 Compact type MMM6400C-Ex
 (Certificate number: IECEx PTB17.0029X)
 Ex db ia [ia Ga] IIC T6...T1 Ga/Gb or
 Ex db eb ia [ia Ga] IIC T6...T1 Ga/Gb or
 Ex ia IIC T6...T1 Ga/Gb or
 Ex eb ia IIC T6...T1 Ga/Gb or
 Ex tb [ia Da] IIC Txxx°C Db or
 Ex tb IIC Txxx°C Db

Remote type sensor MMS6000F-Ex
 (Certificate number: IECEx PTB17.0028X)
 Ex ia IIC T6...T1 Ga or II 1 D Ex ia IIC Txxx°C Da

Remote type converter MMC400F-Ex
 (Certificate number: IECEx PTB17.0030X)
 Ex db [ia Ga] IIC T6 Gb
 Ex db eb [ia Ga] IIC T6 Gb or
 Ex db[ia] IIC T6 Gb or
 Ex db eb [ia] IIC T6 Gb or
 Ex tb [ia Da] IIC T75°C Db or
 Ex tb IIC T75°C Db

Compact type MMM6000C-Ex Standard
 Aluminum alloy converter housing (standard)

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +65	65	T4-T1	T105

Stainless steel converter housing (optional)

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +65	65	T4-T1	T100

Remote type MMS6000F-Ex Standard

Aluminum alloy housing with insulation jacket

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
-40 to +65	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270

Remote type MMS6000F-Ex High temperature model

Aluminum alloy housing with insulation jacket

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +55	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +60	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +65	350	T1	T390

Remote type MMS6000F-Ex High temperature model

Stainless steel housing with insulation jacket

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-40 to +40	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +50	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +55	40	T6-T1	T80
	55	T5-T1	T95
	90	T4-T1	T130
	150	T3-T1	T190
	230	T2-T1	T270
	400	T1	T440
-40 to +60	350	T1	T390

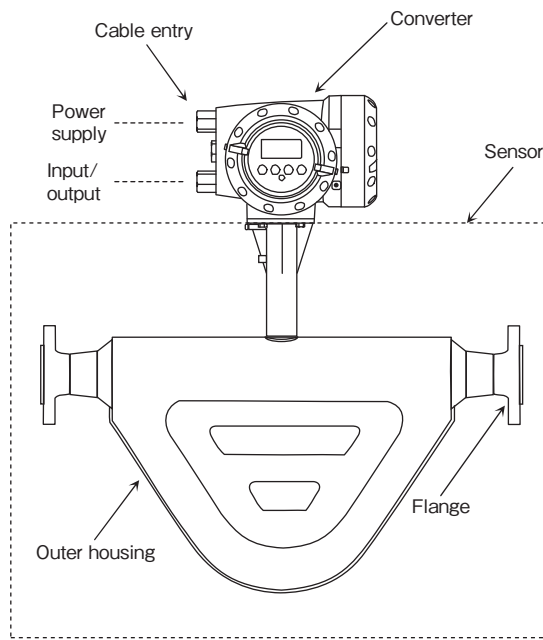
Remote type MMS6000F-Ex Cryogenic model

Aluminum alloy housing with jacket cover

Ambient temperature °C	Fluid temperature °C	Temperature class	Max. surface temperature °C
-25 to +65	-140 to +40	T6-T1	T80
	-160 to +40		
-20 to +65	-180 to +40		
	-200 to +40		

NAMES OF PARTS

[Compact type]



FLOW RANGE

Meter size	kg/h		kg/min	
	Max. flow rate	Min. flow rate	Max. flow rate	Min. flow rate
08	600	5	10	0.083
10	1,200	9	20	0.15
15	3,800	29	63.3	0.483
25	19,000	146	316.6	2.433
50	35,000	270	583.3	4.5
80	78,000	600	1,300	10
100	175,000	1,350	2,917	22
150	320,000	2,450	5,333	41
200	550,000	4,320	9,166	72

PROCESS CONNECTION

• Flange connection

Meter size	Standard	Semi standard	Optional
	JIS ¹	ASME	JIS / ASME
08	15A 20K	½" class150	10A 20K (Measuring tube material "S" only) ½" class300, 600 ½" class1500 (Measuring tube material "H" only)
10	15A 20K	½" class150	10A 20K (Measuring tube material "S" only) ½" class300, 600 ½" class1500 (Measuring tube material "H" only)
15	25A 20K	1" class150	15A 20K (Measuring tube material "S" only) ½", ¾" class150, 300, 600 (Measuring tube material "S" only) 1" class300, 600 1" class1500 (Measuring tube material "H" only)
25	40A 20K	1-½" class150	25A 20K (Measuring tube material "S" only) 1" class150, 300, 600 (Measuring tube material "S" only) 1-½" class300, 600 1-½" class1500 (Measuring tube material "H" only)
50	50A 10K * Max 300°C	2" class150	40A 20K (Measuring tube material "S" only) 50A 20K 1-½" class150, 300, 600 (Measuring tube material "S" only) 2" class300, 600 2" class1500 (Measuring tube material "H" only)
80	80A 10K * Max 300°C	3" class150	50A 10K (Max 300°C, Measuring tube material "S") 50A 20K (Measuring tube material "S" only) 80A 20K 2" class150, 300, 600 (Measuring tube material "S" only) 3" class300, 600 3" class900, 1500 (Measuring tube material "H" only)
100	100A 10K * Max 300°C, Measuring tube material "S"	4" class150 Measuring tube material "S"	* Not applicable to Measuring tube material "H" 80A 10K (Max 300°C) 80A 20K 100A 20K 3" class150, 300, 600 3" class900, 1500 ² 4" class300, 600 4" class900, 1500 ²
150	6" class150 Measuring tube material "S"	4" class150 Measuring tube material "S"	See the code table
200	8" class150 Measuring tube material "S"	6" class150 Measuring tube material "S"	See the code table

¹ JIS 20K flange is used commonly for JIS 10K for sizes 15A, 25A and 40A flange as standard (Installation dimensions of JIS 20K flange are equal to JIS10K except for the flange thickness).

² The measuring tube of ASME class 900 and 1500 with 100 in size is made of only duplex stainless steel UNS 31803 (Equiv. to JIS SUS329J3L).

• Sanitary fitting (Optional) ³

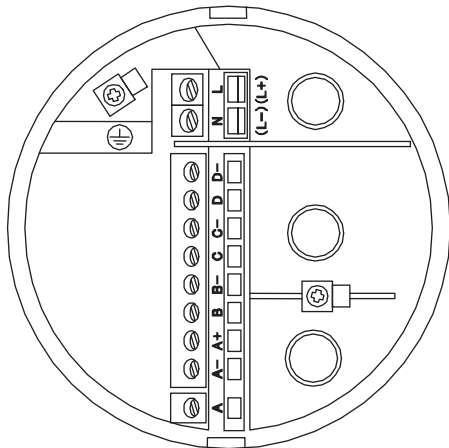
Meter size	Fittings
08	1/2 Tri-clover clamp
10	1/2 Tri-clover clamp
15	1" ISO 2852 ferrule (IDF ferrule compliant)
25	1-1/2" ISO 2852 ferrule (IDF ferrule compliant)
50	2" ISO 2852 ferrule (IDF ferrule compliant)
80	3" ISO 2852 ferrule (IDF ferrule compliant)
100	4" ISO 2852 ferrule (IDF ferrule compliant)

³ The measuring tube with sanitary fitting is made of only stainless steel SS316/316L dual certified. Use this type within fluid temperature 150°C and pressure 1MPa.

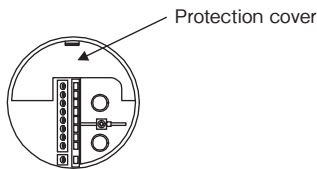
ELECTRICAL CONNECTION

[I/O terminals of MMC400RC/F converters]

- Terminal for current output × 1 and pulse output × 1 (standard output)



The power supply terminal block has a protection cover.



Terminals	Description
L / L+	L and N for AC power supply
N / L-	L+ and L- for DC power supply
⊕	Grounding

Terminals	Polarity	Description (Standard)
D-	-	Pulse or status output, frequency pulse, alarm output
D	+	
C-	-	Current output (4 to 20 mA/internal power supply)
C	+	
B-		/
B		
A+		
A-		
A		

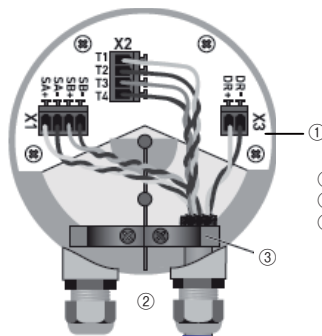
- Terminal type : Plug-in type screw terminal
- Wire cross section : 0.5 to 2.5 mm²
- Cable outside diameter : 7 to 12 mm

- Connection diagram for optional outputs (modular I/O print circuit)

Converter specifications			Option 1 Current output × 2, pulse or status output (6A8)	Option 2 Current output × 3, pulse or status output (6AA)	Option 3 Current output × 2, pulse or status output × 2 (6AE)		
Terminal	D-	-	Pulse or status output	Pulse or status output	Pulse or status output No. 1		
	D	+					
	C-	-	Current output No. 1	Current output No. 1	Current output No. 1		
	C	+					
	B-	-	/	Current output No. 2	Pulse or status output No. 2		
	B	+					
	A+		/	/	/		
	A-	-				Current output No. 2	Current output No. 3
A	+						

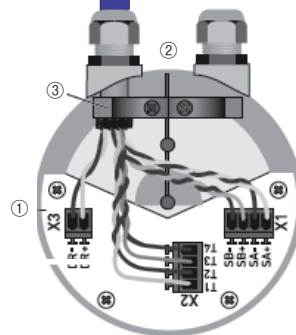
[Remote type sensor cable MMS6000RF + MMC400RF]

- MMC400RF converter
- Terminal type: Spring clamp
 - Cable: Dedicated



- ① Terminal block
- ② Cable gland
- ③ Cable fastening grip for grounding

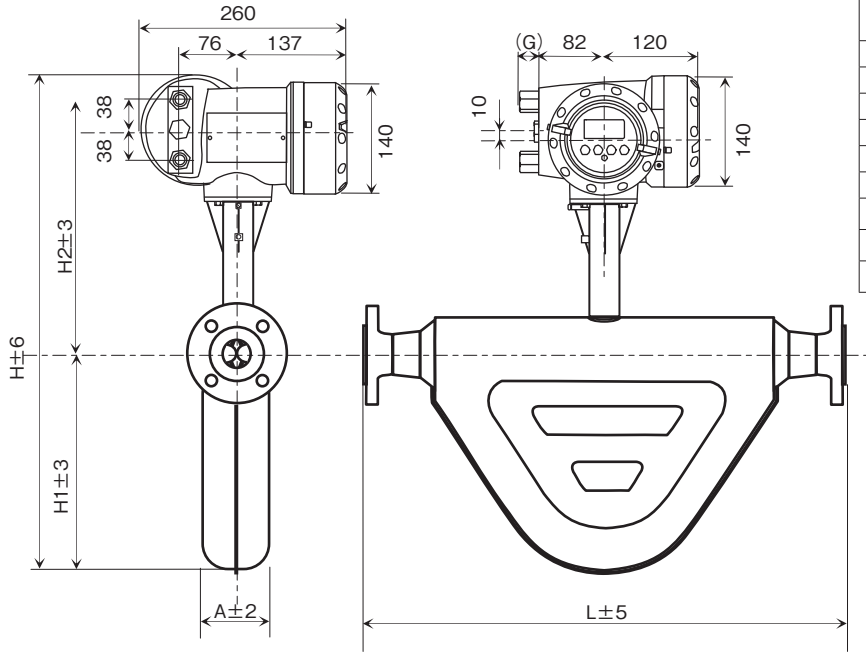
- Dedicated sensor cable
- 10-core compound cable with 0.5 mm² conductor
 - Outside diameter: Approx. 11 mm
 - Max. length: 20 m



- MMS6000RF sensor
- Terminal type: Spring clamp
 - Cable: Dedicated

DIMENSIONS [COMPACT TYPE]

• MMM6400RC compact type with flange connection



Meter size	Dimensions (mm)					Approx. mass (kg)
	L	H	H1	H2	A	
08	333 [329]	521	156	365	81	9.3
10	343 [354]	521	156	365	81	10.1
15	510 [511]	552	186	366	81	12.9
25	602 [601]	665	282	383	118	23.5
50	699 [714]	704	321	383	131	29.4
80	889[914]	839	411	419	196	58.9
100	960	898	453	445	251	94.3
150	1147	1025	555	470	273	193.6
200	1526	1222	710	512	356	443.6

1. Face-to-face dimensions "L" are for standard flanges made of stainless steel. The dimensions in square brackets are for standard flanges made of Hastelloy® C22.
2. Length "G": 26 mm for G1/2 female adapter, 1/2 NPT female adapter and Water-Proof gland.
0 mm for M20 × 1.5 female screw ATEX explosionproof construction.

Note: Face-to-face dimension "L" in the table above are for standard flanges. See the table below for optional flanges.

L (face-to-face dimension) for optional flanges using measuring tube made of stainless steel (SS316/316L dual certified)

Meter size	Dimensions (mm)																											
	JIS 20K / 10K (lower row)							ASME Class150							ASME Class300							ASME Class600						
	10A	15A	25A	40A	50A	80A	100A	1/2"	3/4"	1"	1.5"	2"	3"	4"	1/2"	3/4"	1"	1.5"	2"	3"	4"	1/2"	3/4"	1"	1.5"	2"	3"	4"
S08	331	333					361							371								383						
S10	343	345					373							383								395						
S15		502	510				530	540	546					540	550	558						552	562	572				
S25			596	602					632	644						644	658							658	674			
S50				701	703					743	747						757	759							773	779		
S80					883	901				927	939						939	959							959	979		
S100					879	889																					1050	1088
Meter size					100A	150A	200A				4"	6"	8"				4"	6"	8"						4"	6"	8"	
S150					1205	1187				1195	1219						1213	1239							1259	1289		
S200					1580	1570	1564	1526				1588	1614						1608	1634						1658	1690	

Numbers in boldface are face-to-face dimensions "L" for standard flanges.

L (face-to-face dimension) for optional flanges using measuring tube made of Hastelloy® C22 or Duplex stainless steel UNS 31803

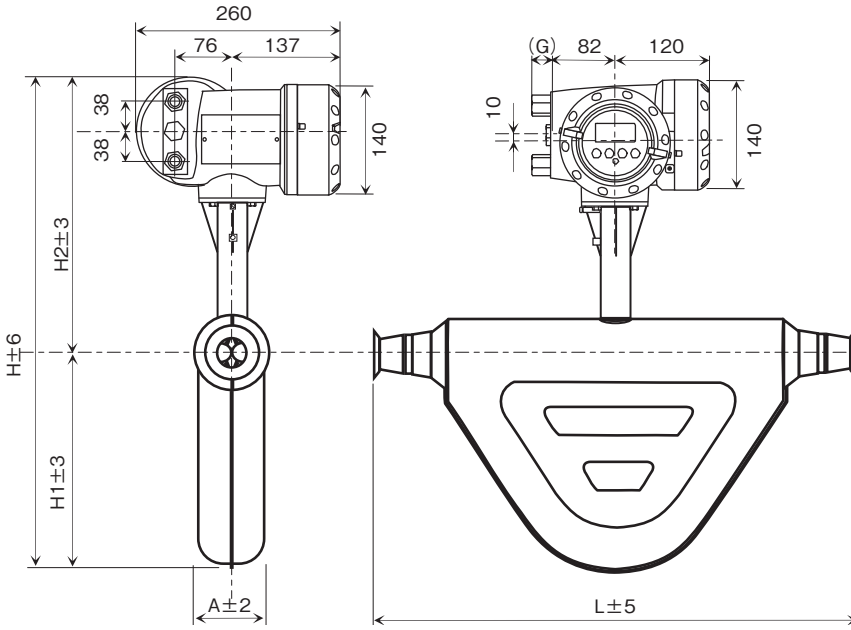
Meter size	Dimensions (mm)																										
	JIS 20K 10K (lower row)					ASME Class 150, 300					ASME Class600, 900 (lower row) *					ASME Class1500											
	15A	25A	40A	50A	80A	1/2"	1"	1.5"	2"	3"	1/2"	1"	1.5"	2"	3"	4"	6"	8"	1/2"	1"	1.5"	2"	3"	4"	6"	8"	
H08	329					329					336								336								
H10	354					354					361								361								
H15		511					511						518							518							
H25			601					601						608	608						608						
H50				714	714				714						721	721							721				
H80					914	914				914					921	921							921				
D100															1088	1112							1118	1132			
D150																1283	1335								1303	1397	
D200																	1704	1748								1766	1850

Numbers in boldface are face-to-face dimensions "L" for standard flanges.

* As the flange dimensions of both ASME class 900 and class 1500 in 1/2 " to 2" are identical, they are used in common.

• MMM6400RC compact type with sanitary connection

ISO 2852 ferrule



Meter size	Dimensions (mm)					Approx. mass (kg)
	L	H	H1	H2	A	
08	308	531	156	375	81	9.3
10	320	531	156	375	81	10.1
15	477	562	186	376	81	12.9
25	563	675	282	393	118	23.5
50	662	719	326	393	130	29.4
80	842	839	411	428	188	58.9
100	916	898	453	445	251	94.3

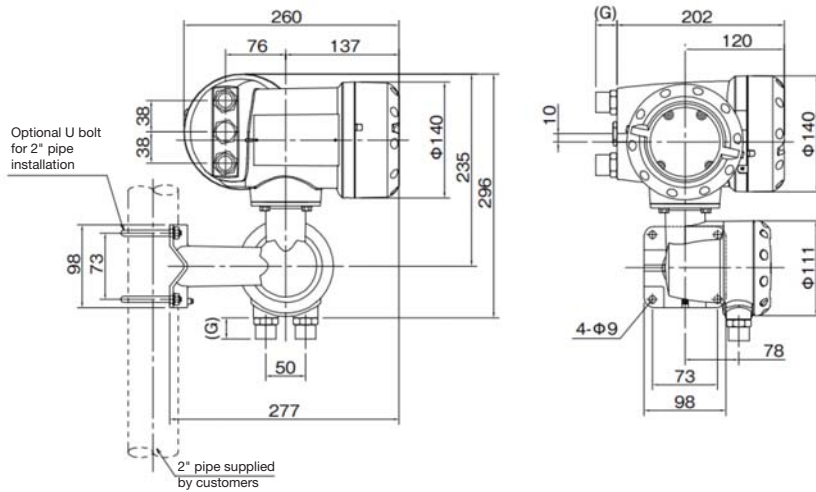
Length "G": 26 mm for G1/2 female adapter, 1/2 NPT female adapter and Water-Proof gland.

0 mm for M20 × 1.5 female screw ATEX explosionproof construction.

Meter size	Fittings
08	1/2 Tri-clover clamp
10	1/2 Tri-clover clamp
15	1" ISO 2852 ferrule
25	1-1/2" ISO 2852 ferrule
50	2" ISO 2852 ferrule
80	3" ISO 2852 ferrule
100	4" ISO 2852 ferrule

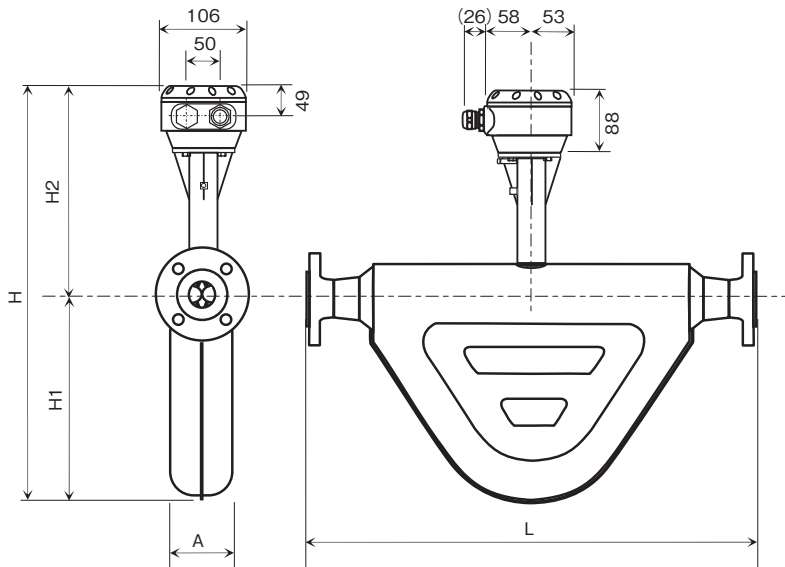
DIMENSIONS [REMOTE TYPE]

• MMC400F remote type converter



Length "G": 26 mm for G1/2 female adapter, 1/2 NPT female adapter and Water-Proof gland. 0 mm for M20 × 1.5 female screw ATEX explosionproof construction. 85 mm for Japanese standard explosionproof construction.

• MMS6000RF remote type sensor with flange connection

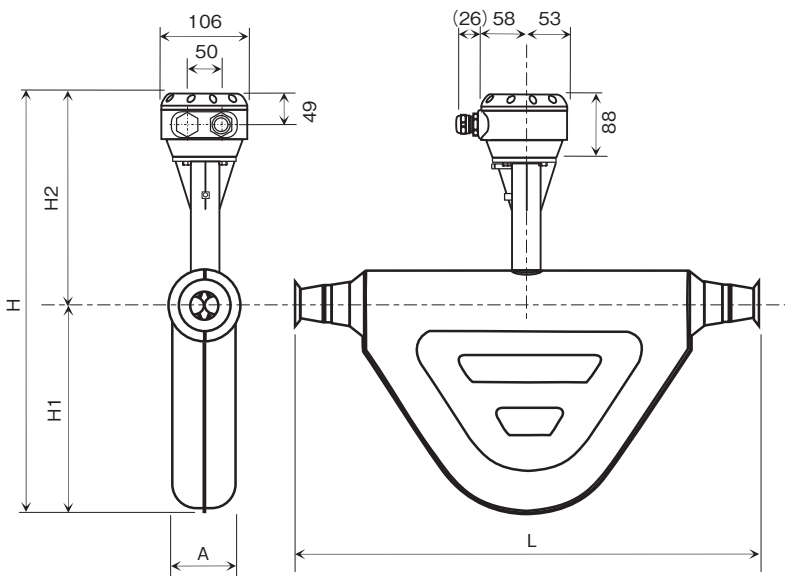


Meter size	Dimensions (mm)					Approx. mass (kg)
	L	H	H1	H2	A	
08	333 [329]	464	156	308	81	5.8
10	343 [354]	464	156	308	81	6.6
15	510 [511]	494	186	308	81	9.4
25	602 [601]	608	282	326	118	19.9
50	699 [714]	647	321	326	131	25.9
80	889 [914]	772	411	361	196	55.4
100	960	848	453	388	251	90.8

Face-to-face dimensions "L" are for standard flanges made of stainless steel. The dimensions in square brackets are for standard flanges made of Hastelloy® C22. See the table on p.9 for optional flanges.

• MMS6000RF remote type sensor with sanitary connection

ISO 2852 ferrule



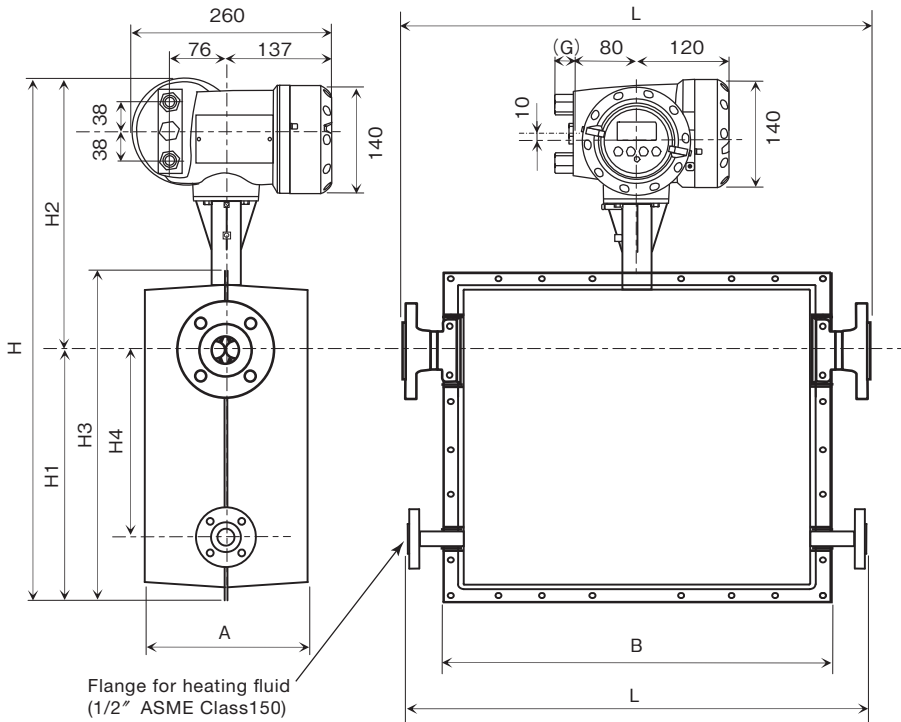
Meter size	Dimensions (mm)					Approx. mass (kg)
	L	H	H1	H2	A	
08	312	464	156	308	81	5.8
10	322	464	156	308	81	6.6
15	485	494	186	308	81	9.4
25	571	608	282	326	118	19.9
50	670	647	321	326	131	25.9
80	851	772	411	361	196	55.4
100	916	848	453	388	251	90.8

Meter size	Fittings
08	1/2 Tri-clover clamp
10	1/2 Tri-clover clamp
15	1" ISO 2852 ferrule
25	1-1/2" ISO 2852 ferrule
50	2" ISO 2852 ferrule
80	3" ISO 2852 ferrule
100	4" ISO 2852 ferrule

DIMENSIONS [WITH INSULATION JACKET]

• **MMM6400RC compact type with flange connection**

Insulation jacket for sizes 08 to 100



Note: The jacket in the figure has flanges for heating steam or liquid. The flanges for heating fluid will not be provided when only cryogenic or high temperature jacket cover is specified.

Meter size	Dimensions (mm)				Approx. mass (kg)
	L	L1	A	B	
08	333 [329]	435	232	283	12.4
10	343 [354]	435	232	283	13.2
15	510 [511]	550	226	440	17.4
25	602 [601]	660	254	542	30.5
50	699 [714]	685	266	565	37.3
80	889 [914]	860	322	741	71.6
100	960	925	372	806	110

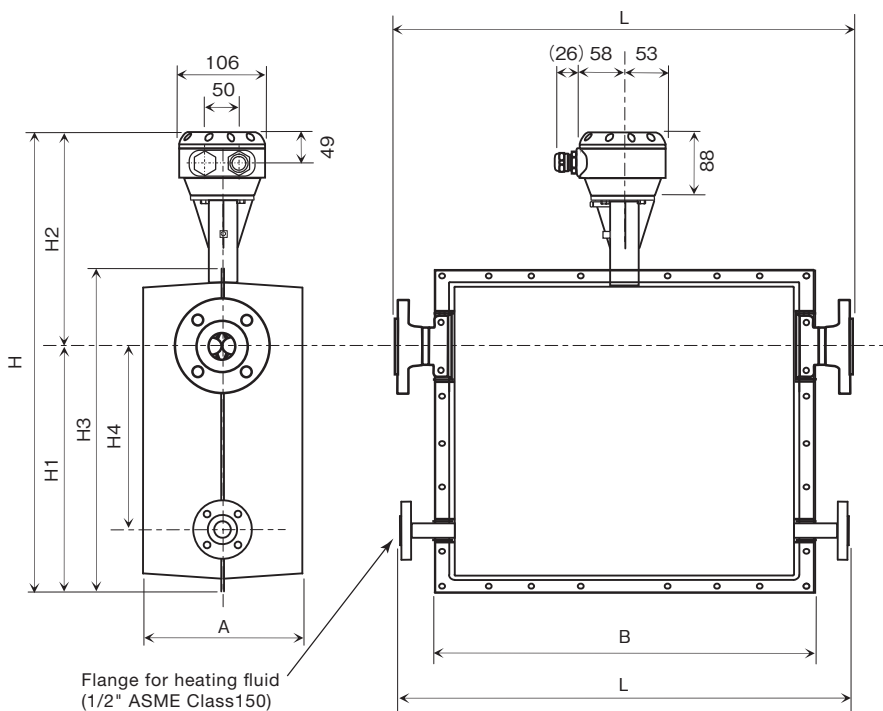
Meter size	Dimensions (mm)				
	H	H1	H2	H3	H4
08	563	198	365	315	100
10	563	198	365	315	100
15	587	221	366	344	130
25	699	316	383	453	210
50	739	356	383	499	230
80	870	451	419	622	320
100	931	486	445	682	340

1. Face-to-face dimensions "L" are for standard flanges made of stainless steel. The dimensions in square brackets are for standard flanges made of Hastelloy® C22. See the table on p.9 for optional flanges.
2. In the remote type table, the numbers on the upper rows in the "H" and "H2" are those of standard model up to +230°C and cryogenic model down to -200°C. And the numbers on the lower rows are those of high temperature model up to +400°C.

Length "G": 26 mm for G1/2 female adapter, 1/2 NPT female adapter and Water-Proof gland.
 0 mm for M20 × 1.5 female screw ATEX explosionproof construction.
 85 mm for Japanese standard explosionproof construction.

• **MMS6000RF remote type with flange connection**

Insulation jacket



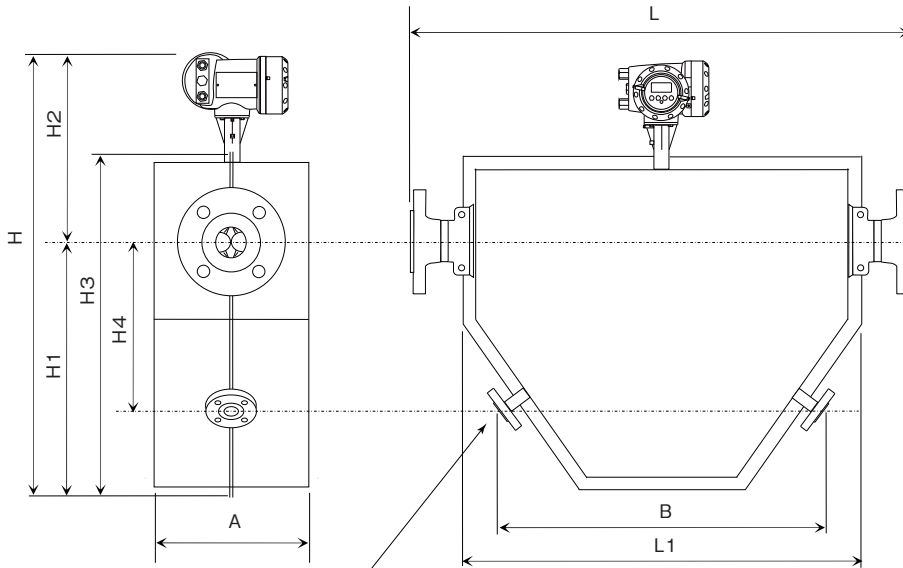
Meter size	Dimensions (mm)				Approx. mass (kg)
	L	L1	A	B	
08	333 [329]	435	232	283	12.4
10	343 [354]	435	232	283	13.2
15	510 [511]	550	226	440	17.4
25	602 [601]	660	254	542	30.5
50	699 [714]	685	266	565	37.3
80	889 [914]	860	322	741	71.6
100	960	925	372	806	110

Meter size	Dimensions (mm)				
	H	H1	H2	H3	H4
08	506 546	198	308 348	315	100
10	506 546	198	308 348	315	100
15	529 569	221	308 348	344	130
25	642 682	316	326 366	453	210
50	682 722	356	326 366	499	230
80	812 852	451	361 401	622	320
100	874 914	486	388 428	682	340

DIMENSIONS [WITH INSULATION JACKET]

• **MMM6400RC compact type with flange connection**

Insulation jacket for sizes 150 and 200



Flange for heating fluid
 Size 150 : 1/2" ASME Class150
 Size 200 : 3/4" ASME Class150

Meter size	Dimensions (mm)				Approx. mass (kg)
	L	L1	A	B	
150	1147	1036	441	847	221
200	1526	1408	500	1135	493

Meter size	Dimensions (mm)				
	H	H1	H2	H3	H4
150	1138	668	470	918	493
200	1369	857	512	1230	506

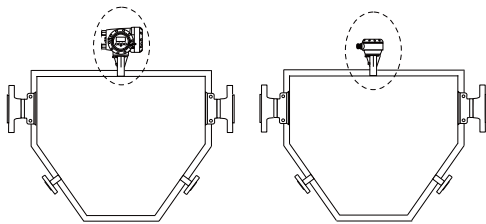
1. Face-to-face dimensions "L" are for standard flanges made of stainless steel. The dimensions in square brackets are for standard flanges made of Hastelloy® C22. See the table on p.9 for optional flanges.
2. In the remote type table, the numbers on the upper rows in the "H" and "H2" are those of standard model up to +230°C and cryogenic model down to -200°C. And the numbers on the lower rows are those of high temperature model up to +400°C.

Length "G": 26 mm for G1/2 female adapter, 1/2 NPT female adapter and Water-Proof gland.
 0 mm for M20 × 1.5 female screw ATEX explosionproof construction.
 85 mm for Japanese standard explosionproof construction.

Note: The jacket in the figure has flanges for heating steam or liquid.

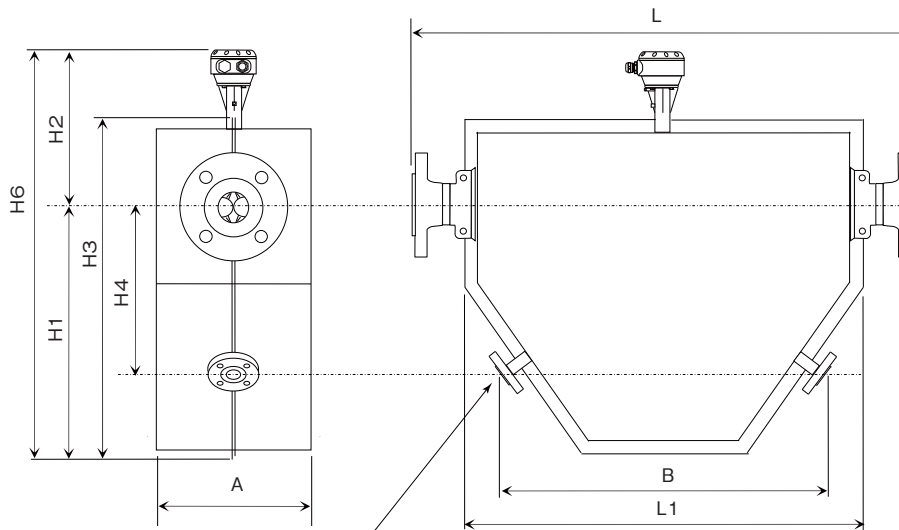
The flanges for heating fluid will not be provided when only cryogenic or high temperature jacket cover is specified (for both compact and remote types).

The dimensions of the compact type converter and the remote type terminal box (circled by dashed lines in the figures below) are the same as those for sizes 08 to 100 shown on the previous page.



• **MMS6000RF remote type with flange connection**

Insulation jacket for sizes 150 and 200



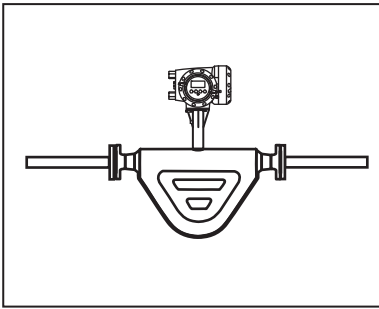
Flange for heating fluid
 Size 150 : 1/2" ASME Class150
 Size 200 : 3/4" ASME Class150

Meter size	Dimensions (mm)				Approx. mass (kg)
	L	L1	A	B	
150	1147	1036	441	847	218
200	1526	1408	500	1135	490

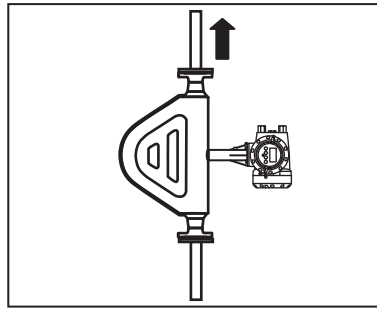
Meter size	Dimensions (mm)				
	H	H1	H2	H3	H4
150	1138	668	470	918	493
200	1369	857	512	1230	506

INSTALLATION NOTES

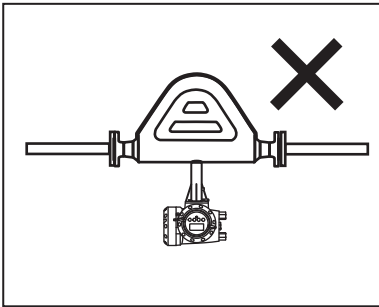
Liquids



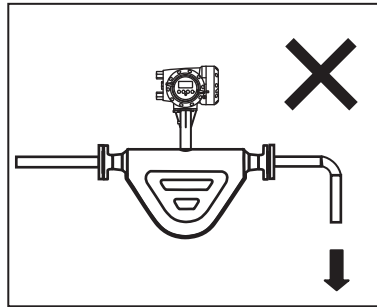
① When installing the flowmeter on the horizontal line, place the converter or the terminal box of remote type above the measuring tube.



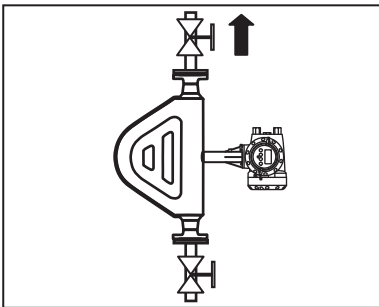
② When installing the flowmeter on the vertical line, install it in upward flow direction.



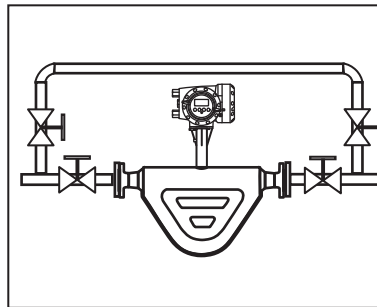
③ Do not put it upside-down. Otherwise, gasses or bubbles accumulate easily in the sensor tube, leading to a measuring error.



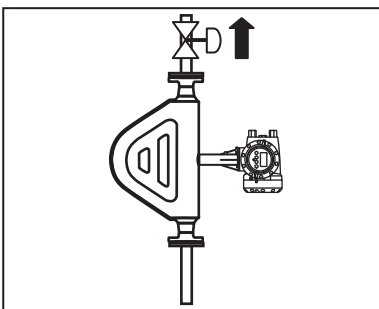
④ When installing the flowmeter on the horizontal line, make the upstream and downstream pipings be filled with liquids. Do not bend these pipings downward at the vicinity of flowmeter. To avoid unnecessary accumulation of gasses, do not install the flowmeter on the upper part of associated pipings in such processes containing air or gas.



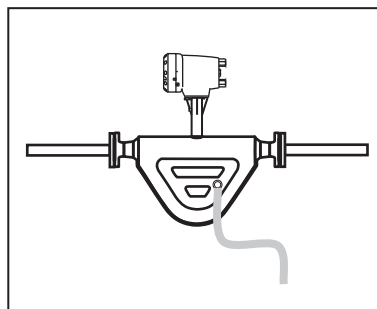
⑤ When installing the flowmeter on the vertical line, provide with stop valves at both upstream and downstream to keep the flowmeter to be filled with liquids, which is necessary to perform zero adjustment.



⑥ It is highly recommended to equip with bypass and stop valves for maintenance purpose.



⑦ Install a control valve downstream if required to avoid the cavitations caused by throttling of valve.



⑧ If the flowmeter is used for measuring gasses whose pressure exceeds 1 MPa, a bursting (safety valve: 3/4 NPT male on the flowmeter side) is provided on the back side of the detector housing. It is highly recommended to release pressure with a hose in case of emergency.

Gasses

Installation methods	①	②	③	④	⑤	⑥	⑦	⑧
Correct or not	No	Yes	Yes	No	Yes	No	Yes	Yes

Note: Arrange the pipings so that no condensate from the wet gasses is left inside the measuring tube.

MODEL AND SPECIFICATION CODES

- Measuring tube material: "S" Stainless Steel SS316/316L dual certified (standard)

Specifications	Compact type (Sensor + Converter)	Remote type	
General purpose (non explosionproof)	MMM6400RC-S□□	MMS6000RF-S□□	MMC400RF
Japanese standard explosionproof	MMM6400RC-JEx-S□□	MMS6000RF-JEx-S□□ MMS6000RF-CD-JEx-S□□ Cryogenic model MMS6000RF-HT-JEx-S□□ High temperature model	MMC400RF-JEx
ATEX/IECEx explosionproof	MMM6400C-Ex-S□□	MMS6000F-Ex-S□□	MMC400F-Ex

Note: □□: 08 to 80 are assigned as size codes.

[Sensor code]

MMM6400RC-S□□ / MMS6000RF-S□□ [Stainless steel Measuring tube for standard, cryogenic and high temperature models]

Sensor Spec. Code	VE	4	S	0	0	K	2	Description	Std.
Sensor Code	VE							MMS6000 Sensor	○
Meter Size	71							Meter Size 08	○
	72							Meter Size 10	○
	73							Meter Size 15	○
	74							Meter Size 25	○
	75							Meter Size 50	○
	76							Meter Size 80	○
	(Fixed code)	4						Always 4	○ : Standard △ : Semi-standard
Measuring Tube Material	S						Stainless Steel SS316/316L dual certified	▲ : Option	○
Measuring Tube Surface Finish	0						Standard	Meter size	○
	2						Polished Ra = 0.8μm	08 10 15 25 50 80	
Process connection	TH							10A JIS20K flange	○ ○ ○ - - - ○
	UH							15A JIS20K flange	○ ○ ○ - - - ○
	VH							25A JIS20K flange	- - ○ ○ - - ○
	WH							40A JIS20K flange	- - - ○ ○ - - ○
	XG							50A JIS10K flange (max. temperature up to 300°C)	- - - - ○ ○ ○
	XH							50A JIS20K flange	- - - - ▲ ▲
	YG							80A JIS10K flange (max. temperature up to 300°C)	- - - - - ○ ○
	YH							80A JIS20K flange	- - - - - ▲
	KD							1/2"ASME Class 150 flange	△ △ △ - - -
	KE							1/2"ASME Class 300 flange	▲ ▲ ▲ - - -
	KF							1/2"ASME Class 600 flange	▲ ▲ ▲ - - -
	LD							3/4"ASME Class 150 flange	- - △ - - -
	LE							3/4"ASME Class 300 flange	- - ▲ - - -
	LF							3/4"ASME Class 600 flange	- - - ▲ - - -
	MD							1"ASME Class 150 flange	- - △ △ - - -
	ME							1"ASME Class 300 flange	- - ▲ ▲ - - -
	MF							1"ASME Class 600 flange	- - - ▲ - - -
	ND							1-1/2"ASME Class 150 flange	- - - △ △ - - -
	NE							1-1/2"ASME Class 300 flange	- - - ▲ ▲ - - -
	NF							1-1/2"ASME Class 600 flange	- - - - ▲ ▲ - - -
	PD							2"ASME Class 150 flange	- - - - △ △ △
	PE							2"ASME Class 300 flange	- - - - ▲ ▲
	PF							2"ASME Class 600 flange	- - - - ▲ ▲
	RD							3"ASME Class 150 flange	- - - - - △
RE							3"ASME Class 300 flange	- - - - - ▲	
RF							3"ASME Class 600 flange	- - - - - ▲	
KR							1/2 Tri-clover clamp	▲ ▲ - - - -	
LR							3/4 Tri-clover clamp	▲ ▲ - - - -	
MT							1" ISO 2852 ferrule (IDF-compliant)	- - ▲ - - -	
NT							1-1/2" ISO 2852 ferrule (IDF-compliant)	- - - ▲ - - -	
PT							2" ISO 2852 ferrule (IDF-compliant)	- - - - ▲ - -	
RT							3" ISO 2852 ferrule (IDF-compliant)	- - - - - ▲	
(Fixed code)	0						Always 0		○
(Fixed code)	K						Always K		○
Insulation Jacket	0							Without	○
	1							Jacket cover only for high temperature model	
	2							Jacket cover only for cryogenic model	
	5							Heating jacket by steam and liquid with 1/2" ASME Class 150 flange (1MPa 230°C / 0.5MPa 400°C)	
Explosionproof Approvals	0							Without	○
	1							ATEX explosionproof (Ex)	
	R							IECEx explosionproof (Ex)	
Sanitary Approvals *1 "Measuring tube surface finish Ra = 0.8 μm" is mandatory	0							Without	○
	1							EHEDG *1	
	2							3A *1	
Type	0							Compact type (max. temperature up to 230°C)	○
	1							Remote type (aluminum alloy wiring terminal housing)	
	2							Remote type (stainless steel wiring terminal housing)	
Calibration	0							Standard 3-point flow calibration	○
	1							5-point flow calibration	
	A							3-point flow calibration + density calibration (water: temperature, 3-point)	
	B							5-point flow calibration + density calibration (water: temperature, 3-point)	
	D							5-point flow calibration + UKAS-certified calibration (ISO/IEC 17025)	
	R							0.05% 5-point flow calibration + UKAS-certified calibration (ISO/IEC 17025)	
Process Requirements (model)	0							Without	○
	1							Degreasing wetted parts	
	C							Cryogenic model (-200 to 40°C, remote type only)	
	D							Cryogenic model with degreasing (-200 to 40°C, remote type only)	
	T							High temperature model (-50 to +400°C, remote type with jacket cover or heating jacket only)	
Application (liquid, gas)	0							Liquid	○
	1							Gas (pressure 1 MPa or lower)	
	G							Gas (pressure 1 MPa or higher) with safety valve	
(Fixed code)	2						Always 2	○	
Converter type	6							Compact type (standard temperature up to 230°C. High temperature / cryogenic model cannot be selected)	○
	7							Remote type	
Special specifications	00							Without	○
	00/Z							Special	○

Note: Special requirements not included in the above coding system should be designated by adding "Z" at the end of the code. Consult us for the availability of such requirements before ordering.

• Measuring tube material: "S" Stainless Steel SS316/316L dual certified (standard)

Specifications	Compact type (Sensor + Converter)	Remote type	
		Sensor	Converter
General purpose (non explosionproof)	MMM6400RC-S□□	MMS6000RF-S□□	MMC400RF
Japanese standard explosionproof	MMM6400RC-JEx-S□□	MMS6000RF-JEx-S□□□ MMS6000RF-CD-JEx-S□□□ Cryogenic model MMS6000RF-HT-JEx-S□□□ High temperature model	MMC400RF-JEx
ATEX/IECEx explosionproof	MMM6400C-Ex-S□□	MMS6000F-Ex-S□□	MMC400F-Ex

Note: □□□: 100 or 150 or 200 are assigned as size codes.

[Sensor code]

MMM6400RC-S□□□ / MMS6000RF-S□□□ [Stainless steel Measuring tube for standard, cryogenic and high temperature models]

Sensor Spec. Code	VE	4	S	0	0	K											2	Description				Std.
Sensor Code	VE																					
Meter Size	77															MMS6000 Sensor					○	
	78															Meter Size 100					○	
	79															Meter Size 150					○	
(Fixed code)	4															Meter Size 200					○	
Measuring Tube Material	S															Always 4					○ : Standard	
Measuring Tube Surface Finish	0															Stainless Steel SS316/316L dual certified					△ : Semi-standard	
	2															Standard					▲ : Option	
																Polished Ra = 0.8µm					○	
Process connection	YG															80A JIS10K flange (max. temperature up to 300°C)	○	-	-	○		
	YH															80A JIS20K flange	▲	-	-	○		
	ZG															100A JIS10K flange (max. temperature up to 300°C)	○	-	-	○		
	ZH															100A JIS20K flange	▲	-	-	○		
	RD															3"ASME Class 150 flange	▲	-	-	○		
	RE															3"ASME Class 300 flange	▲	-	-	○		
	RF															3"ASME Class 600 flange	▲	-	-	○		
	SD															4"ASME Class 150 flange	△	○	-	○		
	SE															4"ASME Class 300 flange	▲	▲	-	○		
	SF															4"ASME Class 600 flange	▲	▲	-	○		
	ST															4" ISO 2852 ferrule (IDF-compliant)	▲	-	-	○		
	4D															6"ASME Class 150 flange	-	▲	○	○		
	4E															6"ASME Class 300 flange	-	▲	▲	○		
	4F															6"ASME Class 600 flange	-	▲	▲	○		
	5D															8"ASME Class 150 flange	-	-	▲	○		
	5E															8"ASME Class 300 flange	-	-	▲	○		
5F															8"ASME Class 600 flange	-	-	▲	○			
(Fixed code)	0															Always 0					○	
(Fixed code)																Always K					○	
Insulation Jacket	0															Without					○	
	1															Jacket cover only for high temperature model					○	
	2															Jacket cover only for cryogenic model					○	
	5															Heating jacket by steam and liquid Size 100 and 150: 1/2" ASME Class 150 flange (1MPa 230°C / 0.5MPa 400°C) Size 200: 3/4" ASME Class 150 flange (1MPa 230°C / 0.5MPa 400°C)					○	
Explosionproof Approvals	0															Without					○	
	1															ATEX explosionproof (Ex)					○	
	R															IECEx explosionproof (Ex)					○	
	9															Japanese standard explosionproof (JEx)					○	
Sanitary Approvals *1 "Measuring tube surface finish Ra = 0.8 µm" is mandatory	0															Without (for sizes 150 and 200)					○	
	1															EHEDG ¹¹					○	
	2															3A ¹¹					○	
Type	0															Compact type (max. temperature up to 230°C)					○	
	1															Remote type (aluminum alloy wiring terminal housing)					○	
	2															Remote type (stainless steel wiring terminal housing)					○	
Calibration * 2 Only sizes 150 and 200 can be selected	0															Standard 3-point flow calibration					○	
	1															5-point flow calibration					○	
	A															3-point flow calibration + density calibration (water: temperature, 3-point)					○	
	B															5-point flow calibration + density calibration (water: temperature, 3-point)					○	
	D															5-point flow calibration + UKAS-certified calibration (ISO/IEC 17025)					○	
	R															10-point flow calibration + UKAS-certified calibration (ISO/IEC 17025) ¹²					○	
Process Requirements (model)	0															0.05% 5-point flow calibration + UKAS-certified calibration (ISO/IEC 17025)					○	
	1															Standard					○	
	C															Degreasing wetted parts					○	
	D															Cryogenic model (-200 to 40°C, remote type only)					○	
	T															Cryogenic model with degreasing (-200 to 40°C, remote type only)					○	
Application (liquid, gas)	0															High temperature model (-50 to +400°C, remote type with jacket cover or heating jacket only)					○	
	1															Liquid					○	
	G															Gas (pressure 1 MPa or lower)					○	
(Fixed code)																Gas (pressure 1 MPa or higher) with safety valve					○	
Converter type	2															Always 2					○	
	6															Compact type (standard temperature up to 230°C. High temperature / cryogenic model cannot be selected)					○	
Special specifications	7															Remote type					○	
	00															Without					○	
	00/Z															Special					○	

Note: Special requirements not included in the above coding system should be designated by adding "/Z" at the end of the code. Consult us for the availability of such requirements before ordering.

[Converter code]

MMC400RC/RF

Converter spec. code	VE	54	4					2	0	0	2					0	0		Description	Std.
Converter code	VE	54																	MMC400R converter	○
(Fixed code)			4																Always 4	○
Type			4																Compact type	○
			H																Remote type (mandatory for ship class, high temperature, and cryogenic models)	
Power supply			A																100 to 230 V AC	○
			1																12 to 24 V DC	
Explosionproof Approval			0																Without	○
			1																ATEX explosionproof (Ex)	
			F																IECEx explosionproof (Ex)	
			9																Japanese standard explosionproof (JEx)	
Cable entries for input, output, and power supply			0																M20 × 1.5 female for ATEX explosionproof	
			4																1/2NPT female adapter	
			5																G1/2 female adapter	○
			6																M20 × 1.5 with waterproof gland	
		9																G1/2 flameproof gasket adapter for Japanese standard explosionproof		
Language for indication			2																English	○
(Fixed code)			0	0															Always 00	○
Converter housing			1																Aluminum alloy	○
			2																SS316L (compact type)	
			3																SS316L (remote type)	
(Fixed code)			2																Always 2	○
Output			6	0	0														4 to 20 mA × 1, pulse or status × 1 (selectable)	○
			6	E	K														4 to 20 mA × 1, pulse × 1, status × 1, control input × 1	
			6	A	8														4 to 20 mA × 2, pulse or status × 1 (selectable)	
			6	A	A														4 to 20 mA × 3, pulse or status × 1 (selectable)	
			6	A	E														4 to 20 mA × 2, pulse × 1, pulse or status × 1 (selectable)	
Measurement			0																Mass flow rate, density, temperature as standard	○
(Fixed code)			0																Always 0	○
Sensor cable			0																Without (compact type)	○
			4																5 m cable (only for remote type)	
			1																10 m cable (only for remote type)	
			5																20 m cable (only for remote type)	
Special specifications			00																Without	
			00/Z																Special	

Note: Special requirements not included in the above coding system should be designated by adding "/Z" at the end of the code. Consult us for the availability of such requirements before ordering.

- Measuring tube material: "H" Hastelloy® C22 (optional)

Specifications	Compact type (Sensor + Converter)	Remote type	
		Sensor	Converter
General purpose (non explosionproof)	MMM6400RC-H□□	MMS6000RF-H□□	MMC400RF
Japanese standard explosionproof	MMM6400RC-JEx-H□□	MMS6000RF-JEx-H□□ MMS6000RF-CD-JEx-H□□ Cryogenic model MMS6000RF-HT-JEx-H□□ High temperature model	MMC400RF-JEx
ATEX/IECEX explosionproof	MMM6400C-Ex-H□□	MMS6000F-Ex-H□□	MMC400F-Ex

Note: □□: 08 to 80 are assigned as size codes.

[Sensor code]

MMM6400RC-H□□ / MMS6000RF-H□□ [Hastelloy® C22 Measuring tube for high pressure]

Sensor Spec. Code	VE	4	H	0	0	K	0	0	2	Description	Std.
Sensor Code	VE									MMS6000 Sensor	○
Meter Size	71									Meter Size 08	○
	72									Meter Size 10	○
	73									Meter Size 15	○
	74									Meter Size 25	○
	75									Meter Size 50	○
	76									Meter Size 80	○
(Fixed code)	4									Always 4	○
Measuring Tube Material		H								Hastelloy® C22	○
Measuring Tube Surface Finish		0								Standard	○
Process connection	UH									15A JIS20K flange	○
	VH									25A JIS20K flange	○
	WH									40A JIS20K flange	○
	XG									50A JIS10K flange (max. temperature up to 300°C)	○
	XH									50A JIS20K flange	○
	YG									80A JIS10K flange (max. temperature up to 300°C)	○
	YH									80A JIS20K flange	○
	KD									1/2"ASME Class 150 flange	○
	KE									1/2"ASME Class 300 flange	○
	KF									1/2"ASME Class 600 flange	○
	K2									1/2"ASME Class 1500 flange	○
	MD									1"ASME Class 150 flange	○
	ME									1"ASME Class 300 flange	○
	MF									1"ASME Class 600 flange	○
	M2									1"ASME Class 1500 flange	○
	ND									1-1/2"ASME Class 150 flange	○
	NE									1-1/2"ASME Class 300 flange	○
	NF									1-1/2"ASME Class 600 flange	○
	N2									1-1/2"ASME Class 1500 flange	○
	PD									2"ASME Class 150 flange	○
	PE									2"ASME Class 300 flange	○
	PF									2"ASME Class 600 flange	○
P2									2"ASME Class 1500 flange	○	
RD									3"ASME Class 150 flange	○	
RE									3"ASME Class 300 flange	○	
RF									3"ASME Class 600 flange	○	
R1									3"ASME Class 900 flange	○	
R2									3"ASME Class 1500 flange	○	
(Fixed code)	0									Always 0	○
(Fixed code)						K				Always K	○
Insulation Jacket	0									Without	○
	1									Jacket cover only for high temperature model	○
	5									Heating jacket by steam and liquid with 1/2" ASME Class 150 flange (1MPa 230°C / 0.5MPa 400°C)	○
Explosionproof Approvals	0									Without	○
	1									ATEX explosionproof (Ex)	○
	R									IECEX explosionproof (Ex)	○
	9									Japanese standard explosionproof (JEx)	○
Sanitary Approvals	0								Without, always 0	○	
Type	0									Compact type (max. temperature up to 230°C)	○
	1									Remote type (aluminum alloy wiring terminal housing)	○
	2									Remote type (stainless steel wiring terminal housing)	○
Calibration	0									Standard 3-point flow calibration	○
	1									5-point flow calibration	○
	A									3-point flow calibration + density calibration (water: temperature, 3-point)	○
	B									5-point flow calibration + density calibration (water: temperature, 3-point)	○
	D									5-point flow calibration + UKAS-certified calibration (ISO/IEC 17025)	○
	R									0.05% 5-point flow calibration + UKAS-certified calibration (ISO/IEC 17025)	○
Process Requirements (model)	0									Standard	○
	1									Degreasing wetted parts	○
	C									Cryogenic model (-200 to 40°C, remote type only)	○
	D									Cryogenic model with degreasing (-200 to 40°C, remote type only)	○
	T									High temperature model (-50 to +400°C, remote type with jacket cover or heating jacket only)	○
Application (liquid, gas)	0									Liquid	○
	1									Gas (pressure 1 MPa or lower)	○
	G									Gas (pressure 1 MPa or higher) with safety valve	○
(Fixed code)	2								Always 2	○	
Converter type	6									Compact type (standard temperature up to 230°C. High temperature / cryogenic model cannot be selected)	○
	7									Remote type	○
Special specifications	00									Without	○
	00/Z									Special	○

Note: Special requirements not included in the above coding system should be designated by adding "/Z" at the end of the code. Consult us for the availability of such requirements before ordering.

[Converter code]

Note: See "Converter code" on page 17 for details.

- Measuring tube material: "D" Duplex stainless steel UNS 31803 [Equiv. to JIS SUS329J3L] (optional)

Specifications	Compact type (Sensor + Converter)	Remote type	
		Sensor	Converter
General purpose (non explosionproof)	MMM6400RC-D100	MMS6000RF-D100	MMC400RF
Japanese standard explosionproof	MMM6400RC-JEx-D100	MMS6000RF-JEx-D100	MMC400RF-JEx
ATEX/IECEX explosionproof	MMM6400C-Ex-D100	MMS6000F-Ex-D100	MMC400F-Ex

Note: □□□: 100 or 150 or 200 are assigned as size codes.

[Sensor code]

MMM6400RC-D□□□ / MMS6000RF-D□□□ [Duplex stainless steel UNS 31803 Measuring tube for high pressure]

Sensor Spec. Code	VE	4	D	0	0	K	0	2	Description	Std.	
Sensor Code	VE								MMS6000 Sensor	○	
Meter Size	77								Meter Size 100	○	
	78								Meter Size 150	○ : Standard △ : Semi-standard ▲ : Option	
	79								Meter Size 200		
(Fixed code)		4							Always 4	○	
Measuring Tube Material			D						Duplex stainless steel UNS 31803 [Equiv. to JIS SUS329J3L]	Meter Size	○
Measuring Tube Surface Finish		0							Standard	100 - -	○
Process connection			R1						3"ASME Class 900 flange	▲ - -	
			R2						3"ASME Class 1500 flange	▲ - -	
			S1						4"ASME Class 900 flange	▲ - -	
			S2						4"ASME Class 1500 flange	▲ - -	
			41						6"ASME Class 900 flange		
			42						6"ASME Class 1500 flange		
			51						8"ASME Class 900 flange		
		52						8"ASME Class 1500 flange			
(Fixed code)				0					Always 0		○
(Fixed code)						K			Always K		○
Insulation Jacket					0				Without		○
					1				Jacket cover only for high temperature model		
					5				Heating jacket by steam and liquid Size 100 and 150: 1/2" ASME Class 150 flange (1MPa 230°C / 0.5MPa 400°C) Size 200: 3/4" ASME Class 150 flange (1MPa 230°C / 0.5MPa 400°C)		
Explosionproof Approvals							0		Without		○
							1		ATEX explosionproof (Ex)		
							R		IECEX explosionproof (Ex)		
							9		Japanese standard explosionproof (JEx)		
Sanitary Approvals						0		Without, always 0		○	
Type							0		Compact type (max. temperature up to 230°C)		○
							1		Remote type (aluminum alloy wiring terminal housing)		
							2		Remote type (stainless steel wiring terminal housing)		
Calibration							0		Standard 3-point flow calibration		○
							1		5-point flow calibration		
							A		3-point flow calibration + density calibration (water: temperature, 3-point)		
							B		5-point flow calibration + density calibration (water: temperature, 3-point)		
							D		5-point flow calibration + UKAS-certified calibration (ISO/IEC 17025)		
						R		0.05% 5-point flow calibration + UKAS-certified calibration (ISO/IEC 17025)			
Process Requirements (model)							0		Standard		○
							1		Degreasing wetted parts		
Application (liquid, gas)							0		Liquid		
							1		Gas (pressure 1 MPa or lower)		
							G		Gas (pressure 1 MPa or higher) with safety valve		
(Fixed code)							2		Always 2		○
Converter type							6		Compact type (standard temperature up to 230°C. High temperature / cryogenic model cannot be selected)		○
							7		Remote type		
Special specifications							00		Without		○
							00/Z		Special		

Note: Special requirements not included in the above coding system should be designated by adding "/Z" at the end of the code. Consult us for the availability of such requirements before ordering.

[Converter code]

Note: See "Converter code" on page 17 for details.

STANDARD ACCESSORIES

- Data sheet for setting : 1 set
- Instruction manual : 1 set

OPTIONS

- Waterproof cable gland for G1/2 cable connection (code: WG)
- Number of cable entries for external connection: 3 (code: 3G)
- U bolt for 2" pipe installation (code: PM)

SPECIFICATION CODES WHEN ORDERING

1. Model and specifications

Examples

Model: MMM6400RC-S15

Sensor Code : VE734S0UH0K00000002600

Converter Code : VE5444A052001260000000

2. Options as requested

Specify them with their codes.

* Specification is subject to change without notice.

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