

## GENERAL

The epoch-making sensing technologies of **MASSMAX®**6400 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 7 sizes from 8 to 100 mm it covers a wide flow rates. The Hastelloy® C-22 for the wetted parts is also available for corrosive services on request.

## FEATURES

- Cryogenic, high temperature and high pressure
- High accuracy:  $\pm 0.1\%$  of reading (+ zero stability)
- Instantaneous or totalizing mass flow, density and temperature with one instrument
- Capable of gas measurement also
- Certified TIIS and ATEX explosionproof

## STANDARD SPECIFICATIONS

- Measuring principle : Colioris force
- Meter size : 08, 10, 15, 25, 50, 80, 100 (mm) \*1
- Measuring range

Meter size	Flow rate kg/h		Flow rate kg/min	
	Max.	Min.	Max.	Min.
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

\*1 The sensor tube of Hastelloy® C-22 is available for 08 to 80 mm.

- Protection category : IP66 / 67 (IEC 60529)
  - Ambient temperature :
    - Compact type with aluminum housing converter: -40 to +65°C
    - Compact type with SS housing converter : -40 to +55°C
    - Remote type standard version : -40 to +65°C
    - Remote type high temperature version : -40 to +65°C
    - Remote type cryogenic version : -20 to +65°C
- Note : See "Explosionproof Specifications" for ambient temperature allowance of Explosionproof (Ex) version

## Fluid Specifications

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

Version	Temperature °C	Type	Material symbol
Standard version (Non Ex)	-70 to +230	Compact, Remote	S, H, D
Standard version (Ex)	-50 to +230	Compact, Remote	S, H, D
High temp. version (Non Ex- and Ex)	-50 to +400	Remote	S
Cryogenic version (Non Ex- and Ex)	-200 to +40	Remote	S
Sanitary fitting model (Non Ex- and Ex)	-70 to +150	Compact, Remote	S

Note : See "Explosionproof of specifications" for fluid temperature allowance of Explosionproof (Ex) version  
 Meter size for High temp. version 08, 10, 15 is in preparation.  
 Material symbol S: Stainless steel, H: Hastelloy® C-22, D: Duplex stainless steel UNS 31803



- Fluid temperature and pressure :

Temperature °C	Pressure MPa		Version
	Stainless steel	Hastelloy® C-22	
-200 to 20	10		Cryogenic version (Non Ex- and Ex)
-50 to 20	10	20	Standard version (Non Ex- and Ex)
50	9.5	19	Standard version (Non Ex- and Ex)
100	8.5	17.8	Standard version (Non Ex- and Ex)
150	7.5	16.5	Standard version (Non Ex- and Ex)
200	6.7	15	Standard version (Non Ex- and Ex)
230	6	14	Standard version (Non Ex- and Ex)
300	5.5		High temp. version (Non Ex- and Ex)
400	4		

"Pressure" in this table means the maximum operating pressure of the sensor tube. Besides, the maximum operating pressure of the process must be within the flange or fitting rating. The maximum operating pressure of sanitary fitting is 1 MPa.

- Density : 100 to 3000 kg/m<sup>3</sup>

## Sensor Specifications

- Process connection :
  - Flange : JIS10K, 20K or equivalent RF  
ASME Class150, 300, 600, 900, 1500 or equivalent RF, etc.
  - Sanitary fitting : ISO 2852 ferrule or others on request
- Materials of wetted parts

Material symbol	S	H	D
Applicable size mm	8 to 100	8 to 80	100
Sensor tube	Stainless steel (SS316/316L dual certified)	Hastelloy® C-22	Duplex stainless steel UNS 31803 (Equiv. to JIS SUS329J3L)
Flanges and flow splitter	Stainless steel (SS316/316L dual certified) and SS CF3M	Stainless steel *1 (SS316/316L dual certified) and Hastelloy® C-22	Duplex stainless steel UNS 31803 and SS J92205

\*1 The material symbol "H" of the flanges means the wetted parts including the gasket face are made of Hastelloy® C-22 and the non-wetted parts are made of stainless steel.  
 Non-wetted parts and others :  
 Outer housing : Stainless steel (SS316/316L dual certified)  
 Insulation jacket and trace pipe (heating pipe) : Stainless steel (SS316)

**Converter**

- Housing Material : Aluminum alloy, SS316L as an option
- Painting : Siloxane coating
- Color : Gray for converter housing, Jade green for converter cover and terminal cover
- Power Supply : 100 to 230 V AC (85 to 253 V AC)  
Option : 24 V DC (11 to 31 V DC)  
Voltages in ( ) are acceptable.
- Supply Frequency : 48 to 63 Hz
- Power Consumption : AC : approx. 22 V A, DC : approx.12 W
- Grounding : Grounding resistance must be less than 100Ω for Non-Ex version, 10Ω for Ex version
- Cable Entry : 2 × G½ Female adapter or 2 × ½ NPT Female adapter or 2 × M20 × 1.5 Female or 2 × G½ flameproof gasket adapter (for TIIIS-Ex)  
\* Max. 3 cable entries can be provided

**Indication and outputs**

- Indicator : Blue dot matrix LCD with back light 128 x 64 pixels, (59 × 31 mm)
- Functions : Changeable from 4 screens. Each screen shows maximum 3 lines of data. The data include instantaneous mass flow rate capable bar graph indication, totalizing mass, instantaneous volume flow rate, totalizing volume flow, density and temperature. Flow trend graph in %. The setting data and self-diagnosis data are also presented.
- Instantaneous mass flow rate units : kg/h, kg/min, kg/sec, t/h or others. Flow direction is indicated as "+" and "-" for forward and reverse flow respectively.
- Totalizing mass flow rate units : kg, t, g or others, in forward and reverse flow
- Density units : g/cm³, kg/m³ or others
- Temperature units : °C or others
- Current output : 4-20 mA DC Max.22 mA HART pending  
Active (powered internally) : Load resistance Max.1000Ω  
Passive (powered externally) : Voltage Max. 32 V DC  
Either flow rate, density or temperature is selectable.
- Pulse output : Open collector output (Passive)  
Load rating : Uext ≤ 32 V DC  
f max in operating menu set to f max ≤ 100Hz: I ≤ 100 mA  
open: I ≤ 0.05 mA at Uext=32 V  
close: U0, max = 0.2 V at I ≤ 10 mA  
close: U0, max = 2 V at I ≤ 100 mA  
f max in operating menu set to 100Hz < f max ≤ 10 kHz: I ≤ 20 mA  
open: I ≤ 0.05 mA at Uext=32 V  
close: U0, max = 1.5 V at I ≤ 1 mA  
close: U0, max = 2.5 V at I ≤ 10 mA  
close: U0, max = 5.0 V at I ≤ 20 mA  
Output frequency : Max 10 kHz  
Pulse rate: 36 to 36,000,000 pulse/h, (0.01 Hz to 10 kHz)
- Pulse width : Selectable from:  
1) Automatic: the 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 (Passive)  
Load rating : Uext ≤ 32 V DC I ≤ 100 mA  
open: I ≤ 0.05 mA at Uext=32 V

- close: U0, max = 0.2 V at I ≤ 10 mA  
close: U0, max = 2 V at I ≤ 100 mA
- Contents : Selectable from:  
1) No status output, set as default on delivery at factory  
2) Flow direction identification  
3) Flow over range  
4) Totalizing preset  
5) Identification of range when double ranges are used  
6) Errors and measurement alarms of flow, density, temperature and others

- Control input  
Voltage input : 8V ≤ Uext ≤ 32 V DC  
I max = 6.5 mA at Uext ≤ 24 V DC  
I max = 8.2 mA at Uext ≤ 32 V DC  
Contact closed (On): U0 ≥ 8 V with I nom = 2.5 mA  
Contact open (Off): U0 ≤ 2.5 V with I nom = 0.4 mA

- Control target : Selectable from :  
1) No control input, set as default on delivery at factory  
2) to hold output  
3) to lock output to 0%  
4) to reset totalized counter  
5) to reset errors  
6) to identify range while double ranges are used  
7) Others

- Combination of output types  
Standard : 1 × 4 to 20 mA output, 1 × Pulse output, 1 × Status output, 1 × Control input, Total 4  
Option 1 : 2 × 4 to 20 mA output, 1 × Pulse output, Total 3  
Option 2 : 3 × 4 to 20 mA output, 1 × Pulse output, Total 4  
Option 3 : 2 × 4 to 20 mA output, 2 × status output or pulse output selectable Total 4

Note : See "Converter code" table for details.

- Low cut-off  
Current output and pulse output can be set separately per each indication.  
Range : 0.0 to 20.0% F.S.
- Time constant  
Current output and pulse output can be set separately per each indication.  
Range : 0.1 to 100.0 seconds

**Standard functions**

- Arbitrary measuring units can be set freely  
Mass or volume flow rate, and per time is prescribed freely in maximum 7 letters.
- Bi-directional flow measuring  
Forward or reverse flow is measurable. Flow direction is output as status output.
- Self-diagnosis : Error and status messages are presented.  
Functioning : CPU, memory, software, hardware, output connection  
Status : Over-range, count-over, power failure  
Application : Oscillation balance of sensor tube, vibration energy, other sensor circuit diagnosis
- Testing : Built-in current and pulse simulation outputs  
allow loop check without calibrator.
- 4 mechanical and 4 optical keys for operator control of signal converter with out opening the housing.

**Accuracy**

- Mass Flow (Pulse output)

Liquid	5% or more of Max. flow rate	±0.1% of reading
	Less than 5% of Max. flow rate	± Zero stability (See below table)
Gas	±0.35% of reading + Zero stability	

Size	Max. flow rate	Zero stability
	kg/h	
08	600	< 0.03
10	1,200	< 0.06
15	3,800	< 0.19
25	19,000	< 0.95
50	35,000	< 1.8
80	78,000	< 3.9
100	175,000	< 8.8

An example of accuracy calculation : When measuring liquid less than 5% of the max. flow rate

The accuracy in actual flow rate 6 kg/h with the size 08  
Zero stability 0.03 kg/h ÷ 6 kg/h = 0.5%

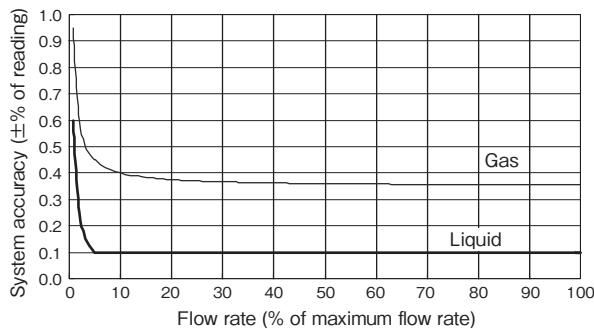
An example of accuracy calculation : When measuring gas  
Max. flow rate ÷ actual flow rate × 0.005% + 0.35% = Accuracy

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

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

[Accuracy graph : Liquid]

- Reference conditions : Water of 20°C and 0.1 MPa



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

- Effects of change in process conditions

Temperature effect

: ±0.001%/°C of Max. flow rate for size 08 to 10

±0.00075%/°C of Max. flow rate for size 15 to 100

Pressure effect

: ±0.005%/0.1 MPa of Max. flow rate for size 08 to 50

±0.0055%/0.1 MPa of Max. flow rate for size 80 and 100

Above figures shows the case where a process condition changes after zero adjustment.

- Density (Indicated value)

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

\* Calibration with certification at the factory test to be performed as an option.

- Temperature (Indicated value)

Accuracy	± 0.5°C
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**Explosionproof specifications**

• TIS explosionproof type

1) Compact type

MMM6400C-JEx

- a) Type of protection and class : Sensor Ex ia IIC T4  
 Converter Ex d [ia] IIC T4  
 Terminal box Ex d IIC T4

Ambient temperature : -20 to +60°C  
 Fluid temperature : -50 to +65°C

- b) Type of protection and class : Sensor Ex ia IIC T3  
 Converter Ex d [ia] IIC T3  
 Terminal box Ex d IIC T3

Ambient temperature : -20 to +50°C  
 Fluid temperature : -50 to +150°C

- c) Type of protection and class : Sensor Ex ia IIC T2  
 Converter Ex d [ia] IIC T2  
 Terminal box Ex d IIC T2

Ambient temperature : -20 to +50°C  
 Fluid temperature : -50 to +230°C

2) Remote type sensor

MMS6000F-JEx

- a) Type of protection and class : Ex ia IIC T6  
 Ambient temperature : -20 to +60°C  
 Fluid temperature : -200 to +40°C

- b) Type of protection and class : Ex ia IIC T3  
 Ambient temperature : -20 to +60°C  
 Fluid temperature : -50 to +150°C

- c) Type of protection and class : Ex ia IIC T2  
 Ambient temperature : -20 to +60°C  
 Fluid temperature : -50 to +230°C

- d) Type of protection and class : Ex ia IIC T1  
 Ambient temperature : -20 to +60°C  
 Fluid temperature : -50 to +400°C

3) Remote type converter

MMC400F-JEx

Type of protection and class : Ex d [ia] IIC T6  
 Ambient temperature : -20 to +60°C

• ATEX explosionproof

1) Compact type (converter with aluminum housing)

Type of protection and class:

- II 1/2 G Ex db ia IIC T6...T1 Ga/Gb
- II 1/2 G Ex db eb ia IIC T6...T1 Ga/Gb
- II 2 D Ex tb IIIC T270°C Db, etc.

MMM6400C-Ex (standard version)

Temperature class	Fluid temperature	Maximum surface temperature	Ambient temperature
T6-T1	-50°C to +40°C	80°C	-40°C to +40°C
T3-T1	-50°C to +150°C	190°C	
T2-T1	-50°C to +230°C	270°C	
T6-T1	-50°C to +40°C	80°C	-40°C to +50°C
T3-T1	-50°C to +150°C	190°C	
T2-T1	-50°C to +230°C	270°C	
T4-T1	-50°C to +65°C	105°C	-40°C to +65°C

2) Remote type sensor

Type of protection and class:

- II 1G Ex ia IIC T6...T1 Ga
- II 1D Ex ia IIIC T270°C Da
- II 1D Ex ia IIIC T440°C Da

MMM6000F-Ex (standard version)

(Aluminum terminal box + insulation jacket)

Temperature class	Fluid temperature	Maximum surface temperature	Ambient temperature
T6-T1	-50°C to +40°C	80°C	-40°C to +40°C
T3-T1	-50°C to +150°C	190°C	
T2-T1	-50°C to +230°C	270°C	
T6-T1	-50°C to +40°C	80°C	-40°C to +55°C
T3-T1	-50°C to +150°C	190°C	
T2-T1	-50°C to +230°C	270°C	
T6-T1	-50°C to +40°C	80°C	-40°C to +65°C
T3-T1	-50°C to +150°C	190°C	
T2-T1	-50°C to +230°C	270°C	

MMM6000F-Ex (high-temperature version)

(Aluminum terminal box + insulation jacket)

Temperature class	Fluid temperature	Maximum surface temperature	Ambient temperature
T6-T1	-50°C to +40°C	80°C	-40°C to +40°C
T2-T1	-50°C to +230°C	270°C	
T1	-50°C to +400°C	440°C	
T6-T1	-50°C to +40°C	80°C	-40°C to +55°C
T2-T1	-50°C to +230°C	270°C	
T1	-50°C to +400°C	440°C	
T6-T1	-50°C to +40°C	80°C	-40°C to +60°C
T2-T1	-50°C to +230°C	270°C	
T1	-50°C to +400°C	440°C	
T1	-50°C to +350°C	390°C	-40°C to +65°C

MMM6000F-Ex (cryogenic version)

(Aluminum terminal box + jacket cover)

Temperature class	Fluid temperature	Maximum surface temperature	Ambient temperature
T6-T1	-200°C to +40°C	80°C	-20°C to +65°C

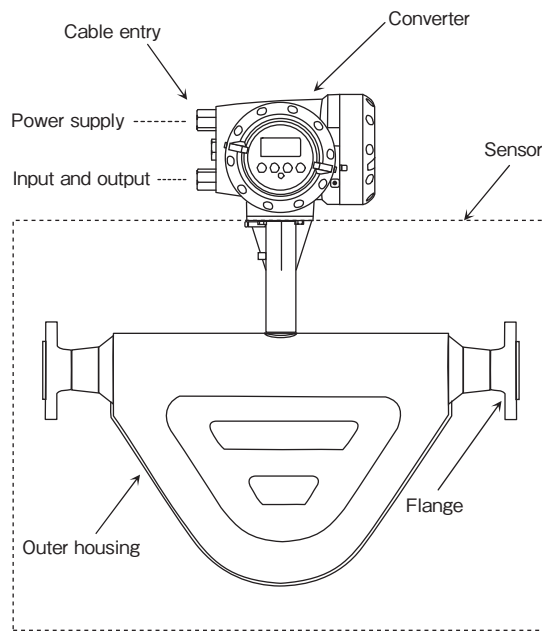
3) Remote type converter (converter with aluminum housing)

MMC400F-Ex

Type of protection and class : II 2 G Ex db [ia] IIC T6 Gb, etc.  
 Ambient temperature : -40°C to +65°C

**NAME OF EACH PART**

[Compact type]



**FLOW RANGE**

Meter size	Flow rate kg/h		Flow rate kg/min	
	Max.	Min.	Max.	Min.
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

**PROCESS CONNECTION**

• Flange connection

Meter size	Standard	Semi-standard	Option
	JIS*1	ASME	JIS and ASME
08	15 A 20 K	1/2" class 150	10A 20K (Material symbol S) 1/2" class 300, 600 1/2" class 1500 (Material symbol H)
10	15 A 20 K	1/2" class 150	10A 20K (Material symbol S) 1/2" class 300, 600 1/2" class 1500 (Material symbol H)
15	25 A 20 K	1" class 150	15A 20K (Material symbol S) 1/2", 3/4" class 150, 300, 600 (Material symbol S) 1" class 300, 600 1" class 1500 (Material symbol H)
25	40 A 20 K	1-1/2" class 150	25A 20K (Material symbol S) 1" class 150, 300, 600 (Material symbol S) 1-1/2" class 300, 600 1-1/2" class 1500 (Material symbol H)
50	50 A 10 K * Max 300 °C	2" class 150	40A 20K (Material symbol S) 50A 20K 1-1/2" class 150, 300, 600 (Material symbol S) 2" class 300, 600 2" class 1500 (Material symbol H)
80	80 A 10 K * Max 300 °C	3" class 150	50A 10K (Max.300°C, Material symbol S) 50A 20K (Material symbol S) 80A 20K 2" class 150, 300, 600 (Material symbol S) 3" class 300, 600 3" class 900, 1500 (Material symbol H)
100	100 A 10 K * Max 300 °C Material symbol S	4" class 150 Material symbol S	* Not applicable to Material symbol H 80A 10K (Max.300°C) 80A 20K 100A 20K 3" class 150, 300, 600 3" class 900, 1500 (*2) 4" class 300, 600 4" class 900, 1500 (*2)

\*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 sensor 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 (Option)\*3

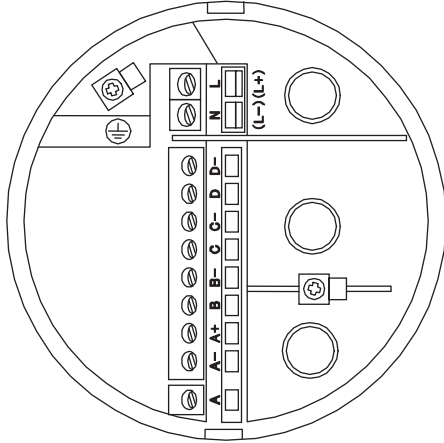
Meter size	Fitting
08	1/2 Tri-clover clamp
10	1/2 Tri-clover clamp
15	1" ISO 2852 ferule (equivalent to IDF ferrule)
25	1-1/2" ISO 2852 ferule (equivalent to IDF ferrule)
50	2" ISO 2852 ferule (equivalent to IDF ferrule)
80	3" ISO 2852 ferule (equivalent to IDF ferrule)
100	Not available

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

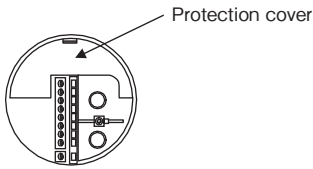
**ELECTRICAL CONNECTION**

[Input and output terminals of converter] MMC400C / F

- 1 x current output, 1 x pulse output, 1 x status output, 1 x control input, as standard input and outputs.



The power supply terminal block has a protection cover.



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

Terminals	Polarity	Description for standard outputs
D-	-	Pulse or status output
D	+	
C-	-	Status output
C	+	
B-	-	Control input or status output
B	+	
A+	+	Current output 4 to 20 mA (internal power supply)
A-	-	
A	-	

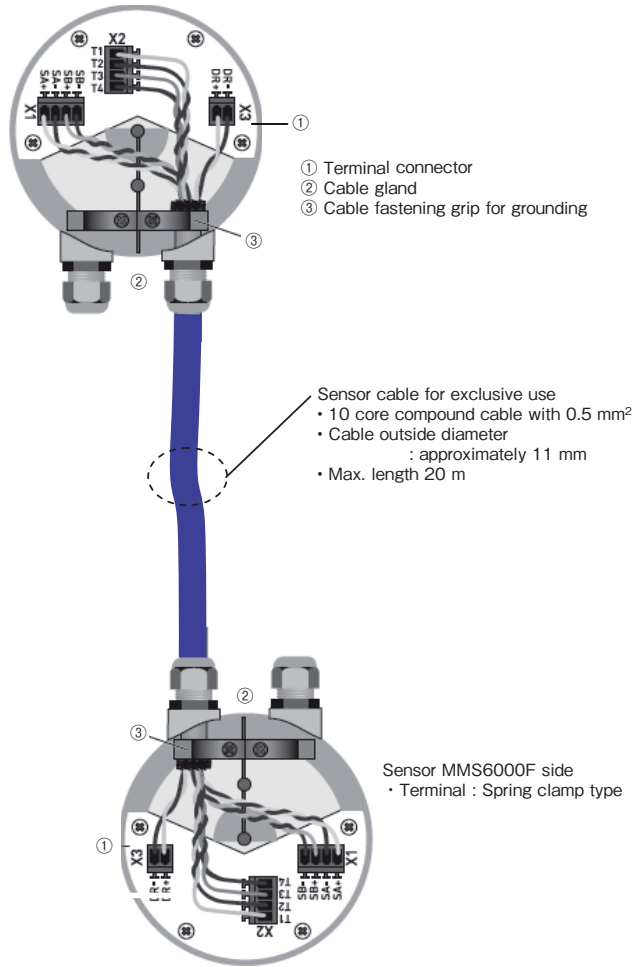
- Terminal type : Plug-in type screw terminal
- Cross section of conductor : 0.5 to 2.5 mm<sup>2</sup>
- Cable outside diameter : 7 to 12 mm

- Connection diagram for optional outputs (Modular I/O)

Converter specifications		Polarity	Option 1 2 x current outputs 1 x pulse or status output (6 A8)	Option 2 3 x current outputs 1 x pulse or status output (6 AA)	Option 3 2 x current outputs, 2 x status or pulse outputs (6 AE)
Terminals	D-	-	Pulse or status output	Pulse or status output	Pulse or status output No.1
	D	+			
	C-	-	Current output No.1 (internal power)	Current output No.1 (internal power)	Current output No.1 (internal power)
	C	+			
	B-	-	Current output No.2 (internal power)	Current output No.2 (internal power)	Pulse or status output No.2
	B	+			
	A+	+	Current output No.2 (internal power)	Current output No.3 (internal power)	Current output No.2 (internal power)
	A-	-			
	A	+			

[Remote type sensor cable] MMS6000F + MMC400F

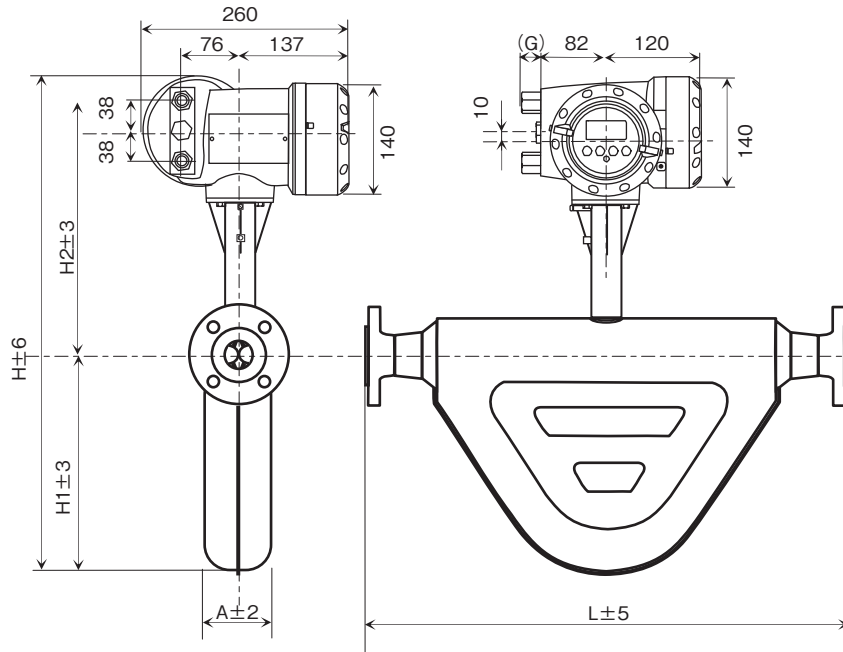
- Converter MMC400F side
- Terminal : Spring clamp type





**DIMENSIONS [COMPACT TYPE]**

Compact type MMM6400C with flange connections



Size	Dimension mm					Mass kg
	L	H	H1	H2	A	
08	341 {328}	531	156	375	81	9.3
10	353 {353}	531	156	375	81	10.1
15	510 {510}	562	186	376	81	12.9
25	600 {600}	675	282	393	118	23.5
50	715 {715}	719	326	393	130	29.4
80	915 {915}	839	411	428	188	58.9
100	1022	1002	547	455	243	94.3

- Face to face dimensions "L" are those of standard flanges made of stainless steel. The "L" in {} are those of standard flanges made of Hastelloy® C-22.
- Length "G" in above drawing
  - 26 mm : with G½ female adapter
  - 26 mm : with ½NPT female adapter
  - 26 mm : with waterproof cable gland
  - 0 mm : ATEX explosionproof with M20 x 1.5
  - 85 mm for TIIS explosionproof construction.

Note : Face to face dimensions "L" in above drawings are those of standard flanges. See below table for dimensions of optional flanges.

Face to face dimensions "L" in mm for the models with the optional flanges and sensor tubes made of SS316/316L dual certified

Size	"L" in mm																											
	JIS 20K / 10 K (lower line)						ASME Class150						ASME Class300						ASME Class600									
	15A	25A	40A	50A	80A	100A	½"	¾"	1"	1.5"	2"	3"	4"	½"	¾"	1"	1.5"	2"	3"	4"	½"	¾"	1"	1.5"	2"	3"	4"	
S08	<b>341</b>						361							371							383							
S10	<b>341</b>						373							383							395							
S15	<b>510</b>	514					530	540	546					540	550	558					552	562	572					
S25		<b>600</b>	610						632	644						644	658						658	674				
S50			709	<b>715</b>	<b>715</b>				743	747						757	759						773	779				
S80				<b>895</b>	<b>915</b>					926	939						939	957						959	977			
S100					<b>986</b>	<b>1022</b>					1010	1022							1028	1042					1048	1086		

Face to face dimensions "L" in bold letters are those of standard flanges.

Face to face dimensions "L" in mm for the models with the optional flanges and sensor tubes made of Hastelloy® C-22 or duplex stainless steel UNS 31803)

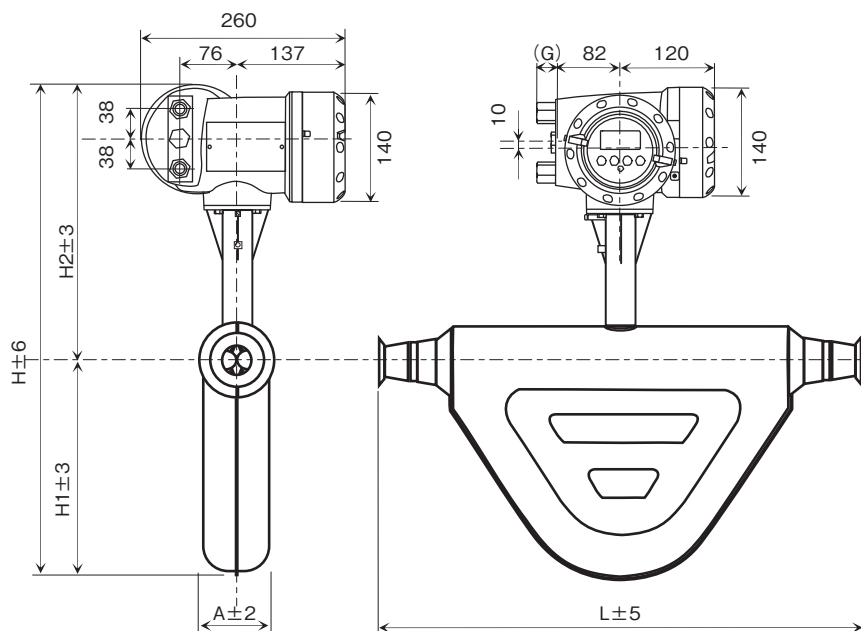
Size	"L" in mm																									
	JIS 20K 10 K (lower line)					ASME Class 150,300,600					ASME Class900*					ASME Class1500										
	15 A	25 A	40 A	50 A	80 A	½"	1"	1.5"	2"	3"	½"	1"	1.5"	2"	3"	4"	½"	1"	1.5"	2"	3"	4"				
H08	<b>328</b>					328					328					328					328					
H10	<b>353</b>					353					353					353					353					
H15		<b>510</b>					510					510					510					510				
H25			<b>600</b>					600					600					600					600			
H50				<b>715</b>	<b>715</b>				715					715					715					715		
H80					<b>915</b>					915					915					915					915	
D100																1086	1122								1118	1130

Face to face dimensions "L" in bold letters are those of standard flanges.

\*1 As the flange dimensions both ASME class900 and class1500 in ½ through 2 inches are identical, they are used in common.

● Compact type MMM6400C with sanitary connections

ISO2852 ferrule



Size	Dimension mm					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

Length "G" in above drawing

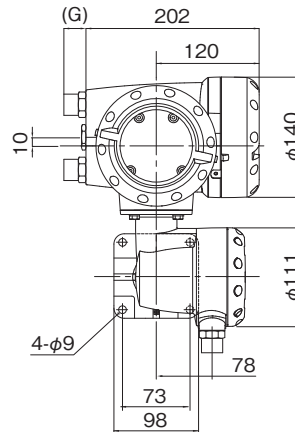
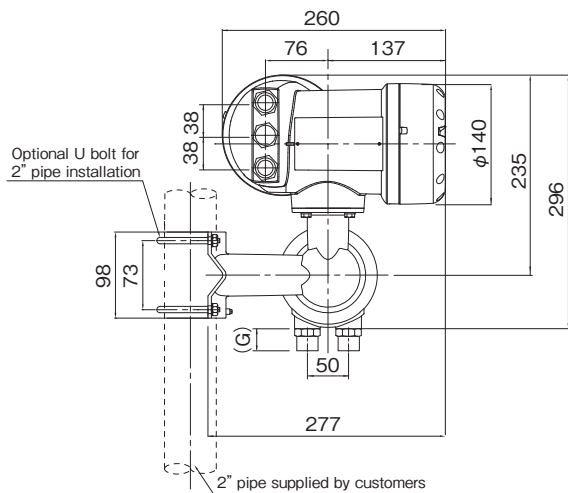
- 26 mm : with G½ female adapter
- 26 mm : with ½NPT female adapter
- 26 mm : with waterproof cable gland
- 0 mm : ATEX explosionproof with M20 x 1.5 female screw
- 85 mm for TIIS explosionproof construction.

Size	Connector and its size
08	½" Tri-Clover clamp
10	½" Tri-Clover clamp
15	1" ISO2852 ferrule
25	1-½" ISO2852 ferrule
50	2" ISO2852 ferrule
80	3" ISO2852 ferrule



**DIMENSIONS [REMOTE TYPE]**

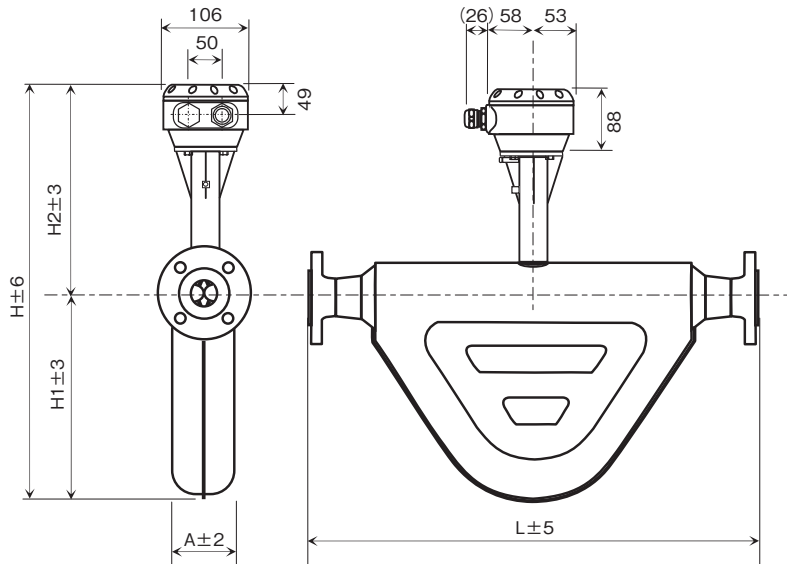
● Remote type converter MMC400F



- Length "G" in above drawing
- 26 mm : with G½ female adapter
  - 26 mm : with ½NPT female adapter
  - 26 mm : with waterproof cable gland
  - 0 mm : ATEX explosionproof with M20 x 1.5 female screw
  - 85 mm for TIIS explosionproof construction.

Converter mass : Approx. 5.8 kg

● Remote type sensor MMS6000F with flange connections

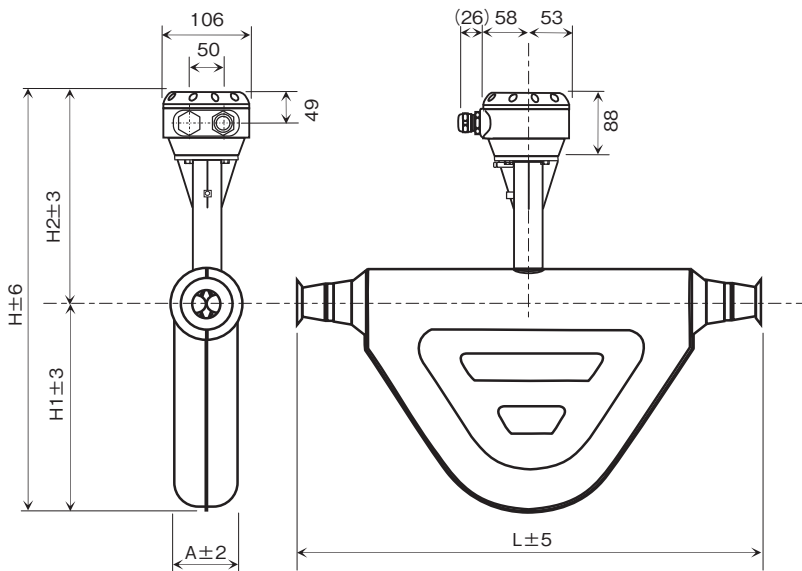


Size	Dimension mm					Mass kg
	L	H	H1	H2	A	
08	341 {328}	451 491	156	295 335	81	5.8
10	353 {353}	451 491	156	295 335	81	6.6
15	510 {510}	482 522	186	296 336	81	9.4
25	600 {600}	598 635	282	316 353	118	19.9
50	715 {715}	642 679	326	316 353	130	25.9
80	915 {915}	759 799	411	348 388	188	55.4
100	1022	922 962	547	375 415	243	90.8

1. Face to face dimensions "L" are those of standard flanges made of stainless steel. The "L" in {} are those of standard flanges made of Hastelloy® C-22. See the tables of face to face dimension "L" of optional flanges on the previous page.
2. The figures on the upper line in the column H and H2 are those of standard version up to +230°C and cryogenic version down to -200°C. The figures on the lower line are those of high temperature version up to +400°C.

● Remote type sensor MMS6000F with sanitary connections

ISO2852 ferrule

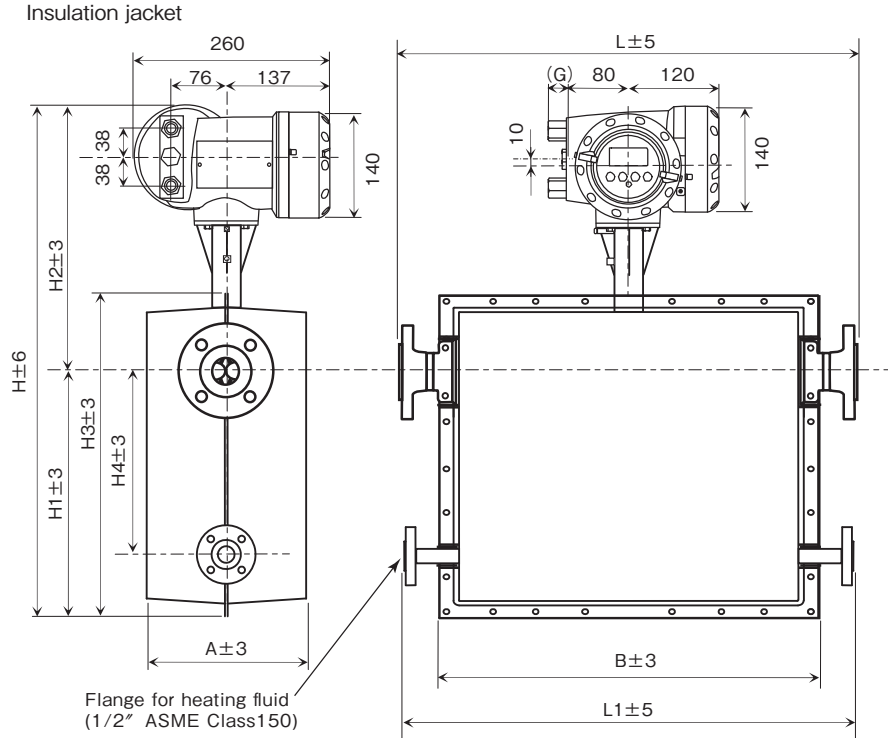


Size	Dimension mm					Mass kg
	L	H	H1	H2	A	
08	308	451	156	295	81	5.8
10	320	451	156	295	81	6.6
15	477	482	186	296	81	9.4
25	563	598	282	316	118	19.9
50	662	642	326	316	130	25.9
80	842	759	411	348	188	55.4

Size	Connector and its size
08	½" Tri-Clover clamp
10	½" Tri-Clover clamp
15	1" ISO2852 ferrule
25	1-½" ISO2852 ferrule
50	2" ISO2852 ferrule
80	3" ISO2852 ferrule

**DIMMENSIONS WITH INSULATION JACKET**

● Compact type MMM6400C with flange connections



Note: Above insulation jacket with trace pipe (heating pipe) has flanges for heating steam or liquids. The jacket cover without the trace pipe for cryogenic version and high temperature version without requirement for the trace pipe has no flanges for heating media.

Size	Dimension mm				Mass kg
	L	L1	A	B	
08	341 {328}	435	232	283	12.4
10	353 {353}	435	232	283	13.2
15	510 {510}	590	226	440	17.4
25	600 {600}	692	254	542	30.5
50	715 {715}	715	266	565	37.3
80	915 {915}	891	322	741	71.6
100	1022	956	372	806	110

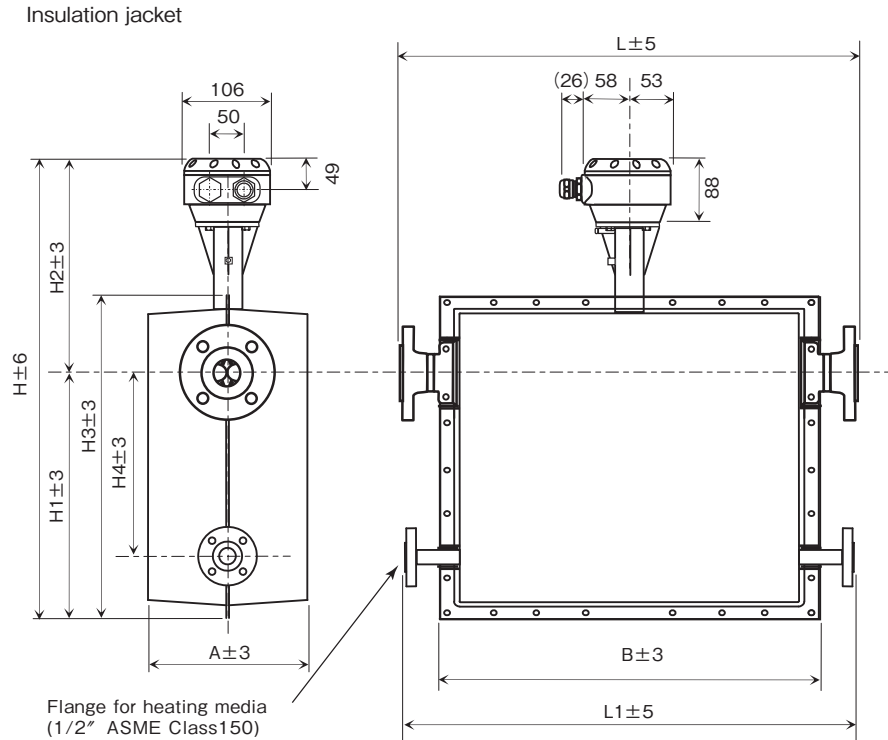
Size	Dimension mm				
	H	H1	H2	H3	H4
08	573	198	375	315	100
10	573	198	375	315	100
15	597	221	376	344	130
25	709	316	393	453	210
50	749	356	393	499	230
80	879	451	428	622	320
100	1041	586	455	682	340

1. Face to face dimensions "L" are those of standard flanges made of stainless steel. The "L" in {} are those of standard flanges made of Hastelloy® C-22.  
See the tables of face to face dimension "L" of optional flanges on the previous page.

2. The figures on the upper line in the column H and H2 are those of standard version up to +230°C and cryogenic version down to -200°C. The figures on the lower line are those of high temperature version up to +400°C.

Length "G" in above drawing  
 • 26 mm : with G½ female adapter  
 • 26 mm : with ½NPT female adapter  
 • 26 mm : with waterproof cable gland  
 • 0 mm : ATEX explosionproof with M20 x 1.5 female screw  
 • 85 mm for TIIS explosionproof construction.

● Remote type MMS6000F with flange connections

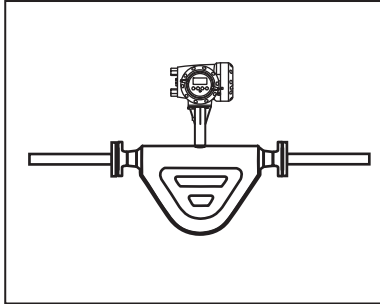


Size	Dimension mm				Mass kg
	L	L1	A	B	
08	341 {328}	435	232	283	12.4
10	353 {353}	435	232	283	13.2
15	510 {510}	590	226	440	17.4
25	600 {600}	692	254	542	30.5
50	715 {715}	715	266	565	37.3
80	915 {915}	891	322	741	71.6
100	1022	956	372	806	110

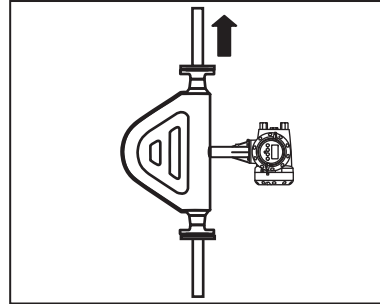
Size	Dimension mm				
	H	H1	H2	H3	H4
08	493 533	198	295 335	315	100
10	493 533	198	295 335	315	100
15	517 557	221	296 336	344	130
25	632 669	316	316 353	453	210
50	672 709	356	316 353	499	230
80	799 839	451	348 388	622	320
100	961 1001	586	375 415	682	340

## CAUTIONS ON INSTALLATION

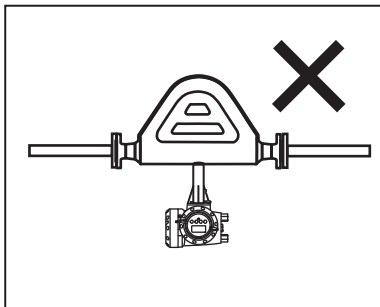
### Liquids



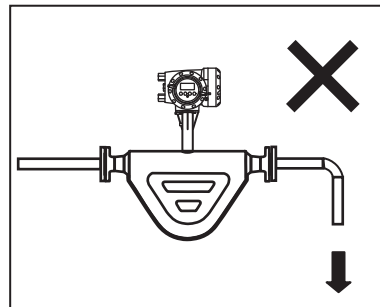
① When installing the flowmeter on the horizontal line, place the converter or the terminal box of remote type above the sensor tube.



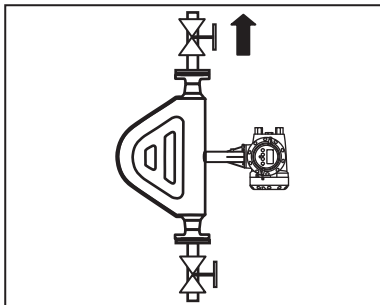
② When installing the flowmeter on the vertical line, install it in upward flow direction.



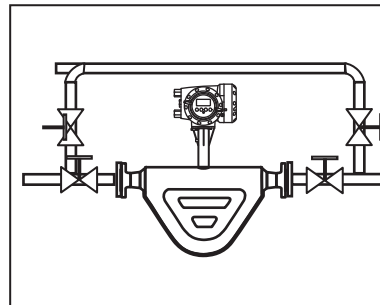
③ Do not put it upside-down. Otherwise, gasses or bubbles accumulate easily in the sensor tube, leading to a measuring error.



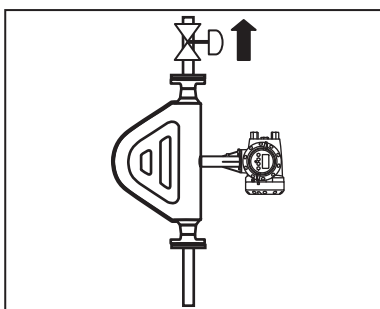
④ When installing the flowmeter on the horizontal line, make the upstream and downstream pipings be filled with liquids. Do not bend these pipings downward at the vicinity of flowmeter. To avoid unnecessary accumulation of gasses, do not install the flowmeter on the upper part of associated pipings in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



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.

### Gasses

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

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

MODEL AND SPECIFICATION CODE

☐ Sensor tube material symbol : S (Stainless steel SS316L/316 dual certified) [Standard]

Specification	Compact type (Integrated type sensor and converter)	Remote type	
		Sensor	Converter
General purpose (Non explosionproof)	MMM6400C-S☐☐	MMS6000F-S☐☐	MMC400F
TIIS explosionproof	MMM6400C-JEx-S☐☐	MMS6000F-JEx-S☐☐	MMC400F-JEx
ATEX explosionproof	MMM6400C-Ex-S☐☐	MMS6000F-Ex-S☐☐	MMC400F-Ex

Note : One figure from "08" to "100" in above ☐☐ is assigned as a meter size code.

[Sensor Code]

MMM6400C-S☐☐ / MMS6000F-S☐☐ [Stainless steel sensor tube for standard, cryogenic and high temperature versions]

Sensor Spec Code	VE	4	S	0	0	K				02	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	○
	77										Meter size 100	○
(Fixed code)	4										always 4	○
Sensor Tube Material		S									Stainless steel SS316L/316 dual certified	○
Sensor Tube Surface Finish	0										Standard	○
	2										Polished Ra = 0.8 μm	○
Process Connection	TH										10 A JIS20 K Flanges	○
	UH										15 A JIS20 K Flanges	○
	VH										25 A JIS20 K Flanges	○
	WH										40 A JIS20 K Flanges	○
	XG										50 A JIS10 K Flanges (Max.300°C)	○
	XH										50 A JIS20 K Flanges	○
	YG										80 A JIS10 K Flanges (Max.300°C)	○
	YH										80 A JIS20 K Flanges	○
	ZG										100 A JIS10 K Flanges (Max.300°C)	○
	ZH										100 A JIS20K Flanges	○
	KD										½" ASME class 150 Flanges	○
	KE										½" ASME class 300 Flanges	○
	KF										½" ASME class 600 Flanges	○
	LD										¾" ASME class 150 Flanges	○
	LE										¾" ASME class 300 Flanges	○
	LF										¾" ASME class 600 Flanges	○
	MD										1" ASME class 150 Flanges	○
	ME										1" ASME class 300 Flanges	○
	MF										1" ASME class 600 Flanges	○
	ND										1-½" ASME class 150 Flanges	○
	NE										1-½" ASME class 300 Flanges	○
	NF										1-½" ASME class 600 Flanges	○
	PD										2" ASME class 150 Flanges	○
	PE										2" ASME class 300 Flanges	○
	PF										2" ASME class 600 Flanges	○
	RD										3" ASME class 150 Flanges	○
	RE										3" ASME class 300 Flanges	○
RF										3" ASME class 600 Flanges	○	
SD										4" ASME class 150 Flanges	○	
SE										4" ASME class 300 Flanges	○	
SF										4" ASME class 600 Flanges	○	
KR										½" Triclover Clamp	○	
LR										¾" Triclover Clamp	○	
MT										1" ISO2852 Ferrule (equivalent to IDF)	○	
NT										1-½" ISO2852 Ferrule (equivalent to IDF)	○	
PT										2" ISO2852 Ferrule (equivalent to IDF)	○	
RT										3" ISO2852 Ferrule (equivalent to IDF)	○	
ST										4" ISO2852 Ferrule (equivalent to IDF)	○	
(Fixed code)	0										always 0	○
Outer housing material						K					SS316	○
Insulation jacket	0										Without	○
	1										Jacket cover only for high temperature version	○
	2										Jacket cover only for cryogenic version	○
	5										Heating jacket type by liquids and steam with ASME 150 flanges (1MPa 230°C/0.5MPa 400°C)	○
Explosionproof Approval	0										Without	○
	1										ATEX	○
	9										TIIS	○
Hygenic / Sanitary Approvals *1 Sensor tube surface finish 0.8 μm is mandatory	0										Without	○
	1										EHEDG *1	○
	2										3A *1	○
Type	0										Compact type (Max.230°C)	○
	1										Remotetype with aluminum terminal box	○
	2										Remote type with stainless steel terminal box	○
Calibration	0										Standard 3 point flow calibration	○
	1										5 point flow calibration	○
	A										3 point flow calibration + density calibration for water at 3 point temperature	○
	B										5 point flow calibration + density calibration for water at 3 point temperature	○
	C										3 point flow calibration + density calibration for water and other 2 kinds of liquids	○
calibrationProcess Requirements (Version)	D										5 point flow calibration + UKAS calibrationProcess	○
	0										Standardd version	○
	1										Degreasing wetted parts	○
	C										Cryogenic version (-200°C to 40°C) Remote type only	○
	D										Cryogenic version + degreasing (-200°C to 40°C) Remote type only	○
T										High temperature version (-50°C to +400°C) Remote type only.Jacket cover or heating jacket Meter size for High temp. version 08, 10 15 is in preparation	○	
(Fixed code)	02										always 2	○
Converter type	3										Compact type (Max.230°C) Not applicable to high temperature nor cryogenic version	○
	4										Remote typeSpecial	○
Special features	blank										Without	○
	/Z										Involved	○

Note Special requirements not designated above coding system should be described with mark "/Z" at the end of a series of coding. Consult TOKYO KEISO for such requirements before ordering.

[Converter Code]

Converter spec. code	VE	53	4					2	0	0	2					0	0			Description	Std.	
Converter code	VE	53																		MMC400 converter	○	
(Fixed code)			4																	always 4	○	
Type			4																	Compact type (Integral)	○	
			H																	Remote type		
Power supply			A																	100 to 230 V AC	○	
			1																	12 to 24 V DC		
Explosionproof Approval				0																Without	○	
				1																ATEX explosionproof		
				9																TIIS explosionproof		
Cable entries for input and output, and power supply				0																With M20×1.5 female for ATEX explosionproof		
				4																With ½ NPT female adapter		
				5																With G ½ female adapter	○	
				6																With waterproof cable gland		
			9																	G ½ flameproof gasket adapter for TIIS explosionproof		
Language for indication								2												English	○	
(Fixed code)									0	0										always 00	○	
Converter housing											1									Aluminum alloy	○	
											2									SS316L for compact type		
											3									SS316L for remote type		
(Fixed code)											2									always 2		
Output and input											1	0	0							1×4 to 20 mA, 1×pulse output, 1× status output, 1×control input	○	
											6	A	8							2×4 to 20 mA, 1×pulse or status output (selectable)		
											6	A	A							3×4 to 20 mA, 1×pulse or status output (selectable)		
											6	A	E							2×4 to 20 mA, 1×pulse output, 1× pulse or status output (selectable)		
Measuring valuables																0				Mass flow rate, density, temperature as standard	○	
(Fixed code)																	0			always 0	○	
Sensor cable																				0	Without, compact type or customers's supply	○
																				4	5 m cable delivered only for remote type	
																				1	10 m cable delivered only for remote type	
																				5	type20 m cable delivered only for remote type	
Special requirements																				blank	Without	
																				/ Z	Involved	

Note Special requirements not designated above coding system should be described with mark “/Z” at the end of a series of coding. Consult TOKYO KEISO for such requirements before ordering.

□ Sensor tube material symbol : H (Hastelloy® C-22) [Option]

Specification	Compact type (Integrated type sensor and converter)	Remote type	
		Sensor	Converter
General purpose (Non explosionproof)	MMM6400C-H □□	MMS6000F-H□□	MMC400F
TIIS explosionproof	MMM6400C-JEx-H □□	MMS6000F-JEx-H□□	MMC400F-JEx
ATEX explosionproof	MMM6400C-Ex-H □□	MMS6000F-Ex-H□□	MMC400F-Ex

Note : One figure from “15” to “80” in above □□ is assigned as a meter size code.

[Sensor Code]

MMM6400C-H□□ / MMS6000F-H□□ (Hastelloy® C-22 sensor tube for high pressure service)

Sensor spec. code	VE	4	H	0	0	K	0	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						○ ○ : Standard
	76							Meter size 80						○ △ : Semi-standard
(Fixed Code)	4							always 4						○ ▲ : Option
Sensor Tube Material	H							Hastelloy® C-22						○
Sensor Tube Surface Finish	0							Standard						○
Process Connection	UH							15 A JIS20 K Flanges						○
	VH							25 A JIS20 K Flanges						○
	WH							40 A JIS20 K Flanges						○
	XG							50 A JIS10 K Flanges (Max. 300°C)						○
	XH							50 A JIS20 K Flanges						○
	YG							80 A JIS10 K Flanges (Max. 300°C)						○
	YH							80 A JIS20 K Flanges						○
	ZG							100 A JIS10 K Flanges (Max. 300°C)						○
	ZH							100 A JIS20 K Flanges						○
	KD							½" ASME class 150 Flanges						○
	KE							½" ASME class 300 Flanges						○
	KF							½" ASME class 600 Flanges						○
	K2							½" ASME class 1500 Flanges						○
	MD							1" ASME class 150 Flanges						○
	ME							1" ASME class 300 Flanges						○
	MF							1" ASME class 600 Flanges						○
	M2							1" ASME class 1500 Flanges						○
	ND							1-½" ASME class 150 Flanges						○
	NE							1-½" ASME class 300 Flanges						○
	NF							1-½" ASME class 600 Flanges						○
	N2							1-½" ASME class 1500 Flanges						○
	PD							2" ASME class 150 Flanges						○
	PE							2" ASME class 300 Flanges						○
PF							2" ASME class 600 Flanges						○	
P2							2" ASME class 1500 Flanges						○	
RD							3" ASME class 150 Flanges						○	
RE							3" ASME class 300 Flanges						○	
RF							3" ASME class 600 Flanges						○	
R1							3" ASME class 900 Flanges						○	
R2							3" ASME class 1500 Flanges						○	
(Fixed Code)	0							always 0						○
Outer housing material	K							SS316						○
Insulation jacket	0							Without						○
	1							Jacket cover only for high temperature version						○
	5							Heating jacket type by liquids and steam with ½" ASME 150 flanges (1MPa 230°C)						○
Explosionproof Approval	0							Without						○
	1							ATEX						○
	9							TIIS						○
Hygienic/Sanitary Approval	0						Without, always 0						○	
Type	0							Compact type (Max.230°C)						○
	1							Remote type with aluminum terminal box						○
	2							Remote type with stainless steel terminal box						○
Calibration	0							Standard 3 point flow calibration						○
	1							5 point flow calibration						○
	A							3 point flow calibration + density calibration for water at 3 point temperature						○
	B							5 point flow calibration + density calibration for water at 3 point temperature						○
	C							3 point flow calibration + density calibration for water 3 point temp. and other 2 liquids						○
D							3 point flow calibration + UKAS calibrationProcess						○	
Process Requirements	0							Standard						○
	1							Degreasing wetted parts						○
(Fixed Code)	0							always 0						○
Converter type	3							Compact type (Max.230°C) Not applicable to high temperature nor cryogenic version						○
	4							Remote type						○
Special features	blank							Without						○
	/ Z							Involved						○

Note Special requirements not designated above coding system should be described with mark “/Z” at the end of a series of coding. Consult TOKYO KEISO for such requirements before ordering.

[Converter Code] \*Refer also to the converter code.



Sensor tube material symbol : D Duplex stainless steel UNS 31803 (Equiv. to JIS SUS329J3L) [Option]

Specification	Compact type (Integrated type sensor and converter)		Remote type	
			Sensor	Converter
General purpose (Non explosionproof)	MMM6400C-D100		MMS6000F-D100	MMC400F
TIIS explosionproof	MMM6400C-JEx-D100		MMS6000F-JEx-D100	MMC400F-JEx
ATEX explosionproof	MMM6400C-Ex-D100		MMS6000F-Ex-D100	MMC400F-Ex

Note Only meter size "100" is available.

[Sensor Code]

MMM6400C-D100 / MMS6000F-D100 [Duplex stainless steel sensor tube for high pressure services]

Sensor Spec Code	VE	4	D	0	0	K	0									Description	Std.
Sensor Code	VE															MMS6000 Sensor	○
Meter Size		77														Meter Size 100	○
																	○ : Standard △ : Semi-standard ▲ : Option
(Fixed Code)		4														always 4	○
Sensor Tube Material			D													Duplex stainless steel UNS 31803 (Equiv. to JIS SUS329J3L)	Meter size ○
Sensor Tube Surface Finish				0												Standard	100 - - ○
Process Connection					R1											3" ASME class 900 Flanges	▲ - -
					R2											3" ASME class 1500 Flanges	▲ - -
					S1											4" ASME class 900 Flanges	▲ - -
					S2											4" ASME class 1500 Flanges	▲ - -
(Fixed Code)				0												always 0	○
Outer housing material						K										SS316	○
Insulation jacket					0											Without	○
					1											Jacket cover only for high temperature version	
					5											Heating jacket type by liquids and steam with ½" ASME 150 flanges (1MPa 230°C)	
Explosionproof Approval					0											Without	○
					1											ATEX	
					9											TIIS	
Hygienic/Sanitary Approval				0												Without, always 0	○
Type					0											Compact type (Max.230°C)	○
					1											Remote type with aluminum terminal box	
					2											Remote type with stainless steel terminal box	
Calibration					0											Standard 3 point flow calibration	○
					1											5 point flow calibration	
					A											3 point flow calibration + density calibration for water at 3 point temperature	
					B											5 point flow calibration + density calibration for water at 3 point temperature	
					C											3 point flow calibration + density calibration for water 3 point temp. and other 2 liquids	
calibrationProcess requirements					0											Standard	○
					1											Degreasing wetted parts	
(Fixed Code)					0											always 0	○
Converte type															3	Compact type (Max.230°C) Not applicable to high temperature nor cryogenic version	○
															4	Remote type	
Special feautres															blank	Without	○
															/Z	Involved	

Note Special requirements not designated above coding system should be described with mark "/Z" at the end of a series of coding. Consult TOKYO KEISO for such requirements before ordering.

[Converter Code]

\*Refer also to the converter code.

## STANDARD ACCESSORIES

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- Data sheet of setting :1 set
- Instruction Manual :1 set

## OPTIONS

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- Water-proof cable gland for cable connection "G1/2", Model code "WG"
- Number of cable entries for external connection "3", Model code "3G"
- Metal fixtures for 2" pipe mount, Model code "PM"

## SPECIFICATION CODES WHEN ORDERING

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### 1. Model and specifications

#### Examples

Model : MMM6400C-S15  
Sensor Code : VE734S0UH0K00000023  
Converter Code : VE5344A0520012100000

### 2. Options as requested

Specify them with their codes.

\* Specification is subject to change without notice.

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