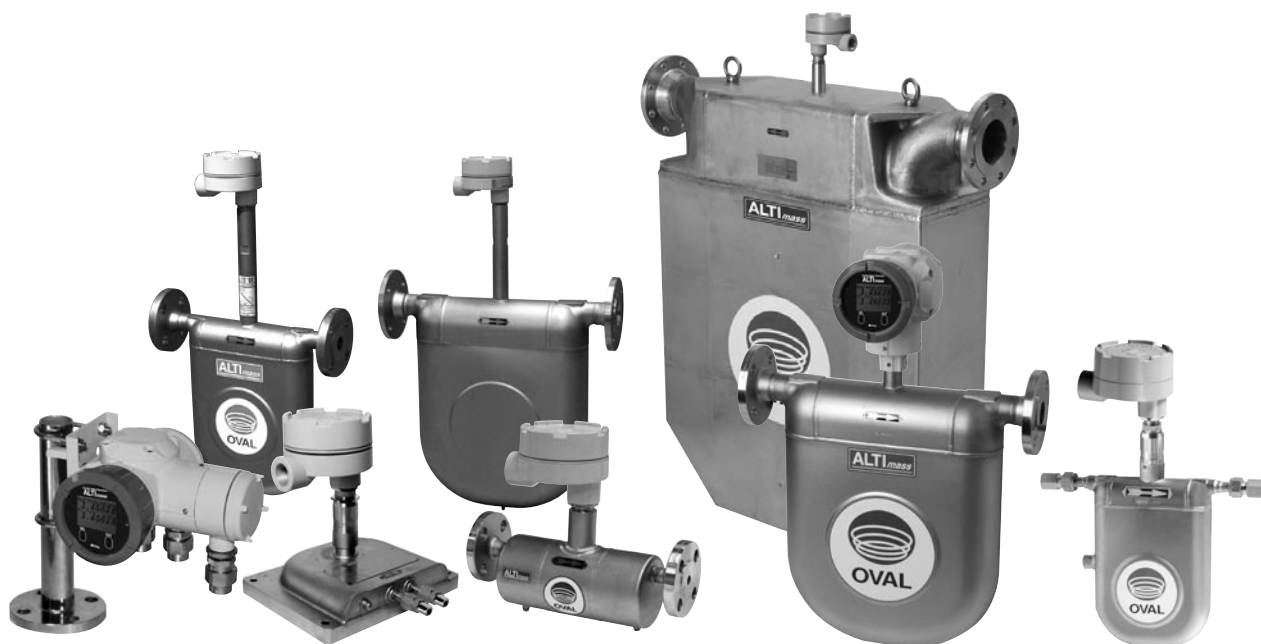




High Performance Coriolis Flowmeters

ALTI_{mass} Type U
GENERAL SPECIFICATION
GS.No.GBN120E-18


■ GENERAL

Equipped with a sophisticated transmitter (self diagnosis feature, large size display, and field reconfiguration capability using a touch panel), “ALTI_{mass} Type U” is an all round high performance Coriolis flowmeter capable of mass flow measurement at a high degree of accuracy. Particularly worth noting are its functionality in applications where measurement of extra low flows, short-duration filling process, etc. besides routine flowrate measurement.

■ FEATURES

1. Significant improvement in zero point stability error. (compared to previous transmitters)
2. High measuring accuracy of density: $\pm 0.0005 \text{ g/mL}$ (CA003 to CA250)
3. Fast response: Ten times faster than previous models.
4. Increased output signals
Pulse output (dual outputs), current output (dual outputs), and status output (single output)
5. You can reconfigure transmitter parameters using a finger touch on the touch panel (also through communication).
6. Increased self-diagnostic capabilities: checking for cable faults, pipeline vibration, and monitoring transmitter temperatures, to name a few.
7. Enhanced maintenance functions
Error logging, storing factory shipping data, and downloading programs
8. Two alarm indicators provided
9. Compatible with various communication protocols
(HART communication, FOUNDATION fieldbus communication, PROFIBUS communication, Modbus communication)

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■ GENERAL PERFORMANCE

● Flowrate

Type	Model	Inch	Flow rate									
			Guaranteed min. rate (kg/h)	Min. setting rate (kg/h)	Max. service rate (kg/h)	Max. allowable rate (kg/h)	Accuracy		Repeatability		Zero stability (kg/h)	Analog output accuracy
							Liquids	Gases	Liquids	Gases		
Standard model	CA00A	1/4"	0.024 (0.4g/min)	0.12 (2g/min)	2.4 (40g/min)	3.6 (60g/min)	±0.2% ±ZS of reading		±0.05% ±1/2 ZS of reading		0.00036 (0.006g/min)	Accuracy ±0.1% of full scale
	CA001		0.09 (1.5g/min)	0.45 (7.5g/min)	9 (150g/min)	13.5 (225g/min)					0.00135 (0.0225g/min)	
	CA003	3/8"	0.72 (0.9 ※1)	3.6	72	144 (180 ※1)	±0.1% of reading (※2)	±0.5% ±ZS of reading	±0.05% of reading (※3)	±0.25% ±1/2 ZS of reading	0.0018	
	CA006	3/8"	3.6	18	360	720					0.018	
	CA010	1/2"	12	60	1200	2400					0.06	
	CA015	1/2"	36	180	3600	7200					0.18	
Standard model and Low temperature explosionproof service model	CA025	1"	108	540	10800	21600					±0.1% ±ZS of reading (※4)	
	CA040	1-1/2"	390	1950	39000	78000	1.95					
	CA050	2"					6					
	CA080	3"	1200 (1.2t/h)	6000 (6t/h)	120000 (120t/h)	240000 (240t/h)	17.1					
	CA100	4"	3420 (3.42t/h)	17100 (17.1t/h)	342000 (342t/h)	684000 (684t/h)	35					
	CA150	6"	7000 (7t/h)	35000 (35t/h)	700000 (700t/h)	1400000 (1400t/h)	70					
	CA15H	6"	14000 (14t/h)	70000 (70t/h)	1400000 (1400t/h)	2800000 (2800t/h)						
	CA200	8"										
	CA20H	8"										
	CA250	10"										
High pressure service model	CA010	Rc3/8	24	120	840	1680	±0.2% ±ZS of reading (※5)	±0.5% ±ZS of reading	±0.1% ±1/2 ZS of reading	±0.25% ±1/2 ZS of reading	0.21	
CA015	Rc3/4	78	390	2550	5100	0.636						
High temperature service model	CA025	1"	108	540	10800	21600	±0.1% ±ZS of reading	—	±0.05% ±1/2 ZS of reading	—	1.08	
	CA040	1-1/2"	390	1950	39000	78000					3.9	
	CA050	2"									12	
	CA080	3"	1200 (1.2t/h)	6000 (6t/h)	120000 (120t/h)	240000 (240t/h)					34.2	
	CA100	4"	3420 (3.42t/h)	17100 (17.1t/h)	342000 (342t/h)	684000 (684t/h)						
CA150	6"											

※1: When maximum allowable range 180 kg/h is adopted, the minimum flow rate is 0.9 kg/h.

※2: ±ZS is applied for flow rates below 5% (2.5% in case of CA003) of the max. service rate. (within guaranteed flow range)

※3: ±1/2 ZS is applied for flow rates below 5% (2.5% in case of CA003) of the max. service rate. (within guaranteed flow range)

※4: If the higher accuracy (±0.1% of reading) is required, consult OVAL.

※5: Above max. service flow rate, the accuracy is [±0.3% ±ZS] of RD

※: If you request volume flow measurement for the purpose of taxing or transactions, contact OVAL.

※: In gas measurement, the max. permissible flow velocity varies with the type of gas and some may be beyond the bounds of measurement.

If such is the case, seek our technical assistance.

※: ZS = Zero stability error

$$\text{Zero stability error} = \frac{\text{Zero stability}}{\text{Flowrate at the moment}} \times 100\%$$

(Zero stability and flowrate during the test should read in the same measurement unit.)

● Density (Liquids)

Type	Model	Inch	Density (Liquids)			
			Metering range	Accuracy (Option)	Analog output accuracy	
Standard model	CA00A	1/4"	0.3 to 2g/mL	±0.003g/mL	Accuracy ±0.1% of full scale	
	CA001					
	CA003	3/8"				
	CA006	3/8"				
	CA010	1/2"				
	CA015	1/2"				
Standard model and Low temperature explosionproof service model	CA025	1"				
	CA040	1-1/2"				
	CA050	2"				
	CA080	3"				
	CA100	4"				
	CA150	6"				
	CA15H	6"				
	CA200	8"				
	CA20H	8"				
	CA250	10"				

Type	Model	Inch	Density (Liquids)		
			Metering range	Accuracy (Option)	Analog output accuracy
High pressure service model	CA010	Rc3/8	0.3 to 2g/mL	±0.004g/mL	Accuracy ±0.1% of full scale
	CA015	Rc3/4			
High temperature service model	CA025	1"	0.3 to 2g/mL	±0.003g/mL	
	CA040	1-1/2"			
	CA050	2"			
	CA080	3"			
	CA100	4"			
	CA150	6"			

● External appearance of the products

Standard				High pressure service model	High temperature service model	Low temperature explosionproof service model
CA00A, CA001	CA003	CA006 to CA080	CA100 to CA250	CA010, CA015	CA025 to CA150	CA025 to CA250
1/4"	3/8"	3/8" to 3"	4" to 10"	Rc3/8, Rc3/4	1" to 6"	1" to 10"
						

■ GENERAL SPECIFICATIONS

1. Sensor unit general specifications

● Standard model CA00A, CA001 and CA003

Item		Description	
Model		CA00A	CA001 CA003
Nominal size		1/4"	10mm, 3/8" (※1), DN15
Materials	Wetted parts	SUS316L	SUS316L, SUS316L+Alloy C, AlloyC (※2)
	Housing	SUS304	
	O-rings	Fluorine rubber (std.: FKM), PTFE (option)	—
Process connection		R 1/4	JIS 10, 20, 30, 40, 63K RF/ASME(JPI)150, 300, 600RF/ DIN PN 10, 16, 25, 40RF (※3), IDF Ferrule (※4), Screw
Applicable fluid		Liquid and gas	
Density range		0 to 2.0g/mL	
Temperature range		-200 to +200°C (※6)	
Tube withstand (at 20°C)		—	Wetted parts materials: SUS316L Max. 10MPa, Alloy C Max. 15MPa (Depends on flange rating)
Max. operating pressure	Liquid	15MPa at 20°C	
	Gas	0.98MPa	
Sensor housing withstand (MPa) (※5)		—	7.2
Flow direction		Bidirectional	
Explosionproof configuration		TIIS, ATEX, IECEx, KOSHA/KTL, CSA, GOST, NEPSI Refer to page 25, 26 for details.	
Dusttight, waterproof configuration		IP66 / 67	

※1: 1/2" for ASME and JPI flanged sensors.

※2: When wetted parts are made from Alloy C, only screw type connection is available.

※3: DIN flanges are available only to meters of the wet part material, "SUS316L" and "SUS316+Alloy C".

※4: For application with foods, this product does not comply with CE marking.

※5: This pressure does not represent the rated test pressure of a pressure vessel, but 1/4 of the breakdown test pressure at OVAL (distorted enclosures do not constitute a failure of the test), or the data obtained from the FEM analysis, whichever is lower (or safer).

※6: Refer to page 25, 26.

※: For products conforming to the high pressure gas safety regulations and CE marking, consult our representative.

※: Remotely located transmitter only. (with exclusive Interconnect cable)

● Standard model CA006 to CA080

Item		Description						
Model		CA006	CA010	CA015	CA025	CA040	CA050	CA080
Nominal size		10mm, 3/8"(*1), DN15	15mm, 1/2", DN15		25mm, 1", DN25	40mm, 1-1/2", DN40	50mm, 2", DN50	80mm, 3", DN80
Materials	Wetted parts	SUS316L, SUS316L + Alloy C, Alloy C						
	Housing	SUS304						
Process connection		JIS 10, 20, 30, 40, 63K RF/ASME(JPI)150, 300, 600RF/DIN PN 10, 16, 25, 40RF (*2), IDF Ferrule (*3), Screw						
Applicable fluids		Liquid and gas						
Density range		0 to 2.0g/mL						
Temperature range		-200 to +200°C (*5)						
Tube withstand (at 20°C)		9.4MPa						
Max. operating pressure		Depends on flange rating						
Sensor housing withstand (MPa) (*4)		3.8	3.0	2.2	1.6	1.8		1.4
Flow direction		Bidirectional						
Explosionproof configuration		TIIS, ATEX, IECEx, KOSHA/KTL, CSA, GOST, NEPSI Refer to page 25, 26 for details.						
Dusttight, waterproof configuration		IP66 / 67						

※1: 1/2" for ASME and JPI flanged sensors.

※2: DIN flanges are available only to meters of the wet part material, "SUS316L" and "SUS316+Alloy C".

※3: For application with foods, this product does not comply with CE marking.

※4: This pressure does not represent the rated test pressure of a pressure vessel, but 1/4 of the breakdown test pressure at OVAL (distorted enclosures do not constitute a failure of the test), or the data obtained from the FEM analysis, whichever is lower (or safer).

※5: Refer to page 25, 26. In case of non-explosionproof type, the maximum measurement temperature of integral type is 130°C. However, the product must be used within the maximum ambient temperature of 45°C.

※: For products conforming to the high pressure gas safety regulations and CE marking, consult our representative.

● Standard model CA100 to CA250

Item		Description					
Model		CA100	CA150	CA15H	CA200	CA20H	CA250
Nominal size		100mm, 4", DN100	150mm, 6", DN150		200mm, 8", DN200		250mm, 10", DN250
Materials	Wetted parts	SUS316L					
	Housing	SUS304					
Process connection		JIS 10, 20, 30K RF/ASME(JPI) 150, 300, 600RF/DIN PN 10, 16, 25, 40RF					
Applicable fluids		Liquid					
Density range		0.3 to 2.0g/mL					
Viscosity range		Max. 10000mPa·s					
Temperature range		-200 to +200°C (※1)					
Tube withstand (at 20°C)		13.56MPa		10.6MPa		8.8MPa	
Max. operating pressure		Depends on flange rating					
Flow direction		Bidirectional					
Explosionproof configuration		TIIS, ATEX, IECEx, KOSHA/KTL, CSA, GOST, NEPSI Refer to page 25, 26 for details. (※2)					
Dusttight, waterproof configuration		IP66 / 67					

*1: Refer to page 25, 26. In case of non-explosionproof type, the maximum measurement temperature of integral type is 130°C. However, the product must be used within the maximum ambient temperature of 45°C.

*2: For models CA15H to CA250, only TIIS, ATEX, IECEx and KOSHA/KTL are applicable.

*: For products conforming to the high pressure gas safety regulations, consult our representative.

● High pressure service model (CA010 and CA015)

Item		Description	
Model		CA010 (High pressure service)	CA015 (High pressure service)
Materials	Wetted parts	Flow tube: Alloy C, Manifold: Alloy C equivalent (CX2MW)	
	Housing	SUS304	
Process connection		Screw Rc3/8	Screw Rc3/4
Applicable fluid		Liquid and gas	
Density range		0.3 to 2.0g/mL	
Temperature range		Integrally mounted: -20 to +90°C, Separately mounted: -200 to +200°C	
Max. operating pressure		36MPa at room temperature	43MPa at room temperature
Sensor housing withstands (MPa) (*1)		3.0MPa	2.2MPa
Flow direction		Bidirectional	
Explosionproof configuration		TIIS, ATEX, IECEx, KOSHA/KTL, CSA, GOST, NEPSI Refer to page 25, 26 for details.	
Dusttight, waterproof configuration		IP66 / 67	

*1: This pressure does not represent the rated test pressure of a pressure vessel, but 1/4 of the breakdown test pressure at OVAL (distorted enclosures do not constitute a failure of the test), or the data obtained from the FEM analysis, whichever is lower (or safer).

*: For products conforming to the high pressure gas safety regulations and CE marking, consult our representative.

● High temperature service model (CA025 to CA150)

Item		Description					
Model		CA025 (High temp. service model)	CA040 (High temp. service model)	CA050 (High temp. service model)	CA080 (High temp. service model)	CA100 (High temp. service model)	CA150 (High temp. service model)
Nominal size		25mm, 1", DN25	40mm, 1-1/2", DN40	50mm, 2", DN50	80mm, 3", DN80	100mm, 4", DN100	150mm, 6", DN150
Materials	Wetted parts	SUS316L			SUS316L SUS316L + Alloy C Alloy C	SUS316L	
	Housing	SUS304					
Process connection		25 to 80mm : JIS 10, 20, 30, 40, 63K RF/ASME (JPI) 150, 300, 600RF/DIN PN 10, 16, 25, 40RF 100 and 150mm : JIS 10, 20, 30K RF/ASME (JPI) 150, 300, 600RF/DIN PN 10, 16, 25, 40RF					
Applicable fluids		Liquid					
Density range		0.3 to 2.0g/mL					
Temperature range (※1)		-40 to +350°C					
Tube withstand (at 20°C)		9.4MPa				13.5MPa	
Max. operating pressure		Depends on flange rating					
Sensor housing withstand (MPa) (※2)		1.6	1.8		1.4	-	
Flow direction		Bidirectional					
Explosionproof configuration		TIIS, ATEX, IECEx, KOSHA/KTL, CSA, GOST, NEPSI Refer to page 25, 26 for details.					
Dusttight, waterproof configuration		IP66 / 67					

Heat Tracer Specifications (CA025 to CA080 Option)

Applicable fluids	Hot water, Saturated steam, Overheated steam
Heat retention fluid max. output pressure	0.98MPa
Joint port for heat retention fluid	φ10 stainless tube
Recommended joint	Tube joint manufactured by Swagelok Company

※1: Allowable ambient temperature permitted for the sensor unit is up to 50°C

※2: This pressure does not represent the rated test pressure of a pressure vessel, but 1/4 of the breakdown test pressure at OVAL (distorted enclosures do not constitute a failure of the test), or the data obtained from the FEM analysis, whichever is lower (or safer).

※: For products conforming to the high pressure gas safety regulations, consult our representative.

※: Separately located transmitter only. (with exclusive interconnect cable)

※: Correspondence is not to be used for cooling purposes.

● Low temperature explosionproof service model (CA025 to CA250)

Item		Description									
Model		CA025	CA040	CA050	CA080	CA100	CA150	CA15H	CA200	CA20H	CA250
Nominal size		25mm, 1", DN25	40mm, 1-1/2", DN40	50mm, 2", DN50	80mm, 3", DN80	100mm, 4", DN100	150mm, 6", DN150		200mm, 8", DN200		250mm 10", DN250
Materials	Wetted parts	SUS316L, SUS316L + Alloy C, Alloy C				SUS316L					
	Housing	SUS304									
Process connection (※1)		JIS 10, 20, 30, 40, 63K RF/ ASME (JPI) 150, 300, 600RF DIN PN 10, 16, 25, 40RF (※2), IDF Ferrule (※3)				JIS 10, 20, 30K RF/ASME (JPI) 150, 300, 600RF DIN PN 10, 16, 25, 40RF (※2)					
Applicable fluids		Liquid and gas				Liquid					
Density range		0.3 to 2.0g/mL									
Temperature range		-200 to +50°C (Separately mounted only)									
Tube withstand		9.4MPa at 20°C				13.56MPa at 20°C		10.6MPa at 40°C		8.8MPa at 40°C	
Max. operating pressure		Depends on flange rating									
Sensor housing withstand (※4)		1.6MPa	1.8MPa		1.4MPa	-					
Flow direction		Bidirectional									
Explosionproof configuration		TIIS, ATEX, IECEx, KOSHA/KTL, CSA, GOST, NEPSI Refer to page 25, 26 for details. (※5)									
Dusttight, waterproof configuration		IP66 / 67									

※1: When "SUS316L" or "SUS316L+Alloy C" is selected for the materials of wetted parts, the flange material is termed as "SUS316". (CA025 to CA080)

※2: For the material of DIN flange, you cannot select "Alloy C".

※3: For application with foods, this product does not comply with CE marking.

※4: This pressure does not represent the rated test pressure of a pressure vessel, but 1/4 of the breakdown test pressure at OVAL (distorted enclosures do not constitute a failure of the test) or the data obtained from the FEM analysis, whichever is lower (or safer).

※5: For models CA15H to CA250, only TIIS, ATEX, IECEx and KOSHA/KTL are applicable.

※: For products conforming to the high pressure gas safety regulations and CE marking, consult our representative.

2. Transmitter specifications

Item	Description	
Model	PA0K	
Power supply	85 to 264VAC 50/60Hz or 20 to 30VDC (Safety rated 100 to 240VAC 50/60Hz)	
Power consumption	Max. 15W	
Ambient temperature	-40 to +55°C (*1)	
Transmission length (separate type)	Max. 200m (Dedicated cable used) (*2)	
Applicable EU directive	EMC Directive: 2004/108/EC, ATEX Directive: 94/9/EC	
Applicable EN standards	EMC: EN55011: 1998/A1: 1999/A2: 2002 Group 1, Class B EN61000-6-2: 2001/EN061326-1: 2006 ATEX: EN60079-0: 2012 EN60079-1: 2007 EN60079-11: 2012 IECEX: IEC60079-0: 2011 IEC60079-1: 2007-04 IEC60079-11: 2011	
Explosionproof configuration	TIIIS, ATEX, IECEx, KOSHA/KTL, CSA, GOST, NEPSI Refer to page 25, 26 for details.	
Dusttight, waterproof configuration	IP66 / 67	
Transmitter configuration	Integral or separately mounted	
Finish	Sensor: Munsell 10B8/4, Covers (front and rear): 2.5PB4/10	
Display	LCD display provided (128x64 dots), backlit (white, orange) Infrared light sensors: 2, LED: 2 (green, red)	
Weight	Integrally mounted model 3.6kg approx., Separately mounted model 5.0kg approx.	
Communication interface *Optional except for HART	HART (Standard)	HART protocol version 7, Bell202 (*3)
	Modbus	RS-485 Modbus protocol, Baudrate : 9600bps, 19200bps, 38400bps RTU or ASCII, Response time : 25 to 50 ms
	FOUNDATION fieldbus	AI blockx4, IT blockx2, with Link Master function
	PROFIBUS PA	AI blockx4, TOT blockx2
Damping (default)	Flow rate 0.8sec, density 4sec, temperature 2.5sec.	
Low flow cutoff (default)	Under 0.6% of max. service flow rate	
Pulse output (*5)	Open drain output (equivalent to open collector output) [Min. 10V to Max. 30V, 50mADC, ON resistance 0.6Ω or less] or Voltage pulse (Low level: 1.5V max., High level: 13V min. Output impedance: 2.2kΩ) Setting range: 0.1 to 10000Hz (Max. output 11000Hz)	
Analog output (*5)	4 to 20mADC (max. load 600Ω) Select two outputs from instant flowrate (mass or volume) temperature, and density.	
Status output (*5)	Open drain output (equivalent to open collector output) [Max. 30V, 50mADC, ON resistance 0.6Ω or less] Select one output from error (*4), flow direction, or high/low alarm (default is error)	
Status input (*5)	Contact-closure input (Form "a" contact) Short: 200Ω max., Open: 100kΩ min. Select one output from remote zero, total reset, 0% signal lock, or function off (default is function off).	

*1: Below -20°C, the display loses its visibility due to weakened contrast. Both the display and infrared sensor may exhibit slow responses below -20°C.

*2: If signal transmission length exceeds 200 meters, consult the factory.

*3: Of the two analog output systems, only analog output 1 is available for HART communication.

*4: Of error outputs, "zero is in progress" status output can also be set up.

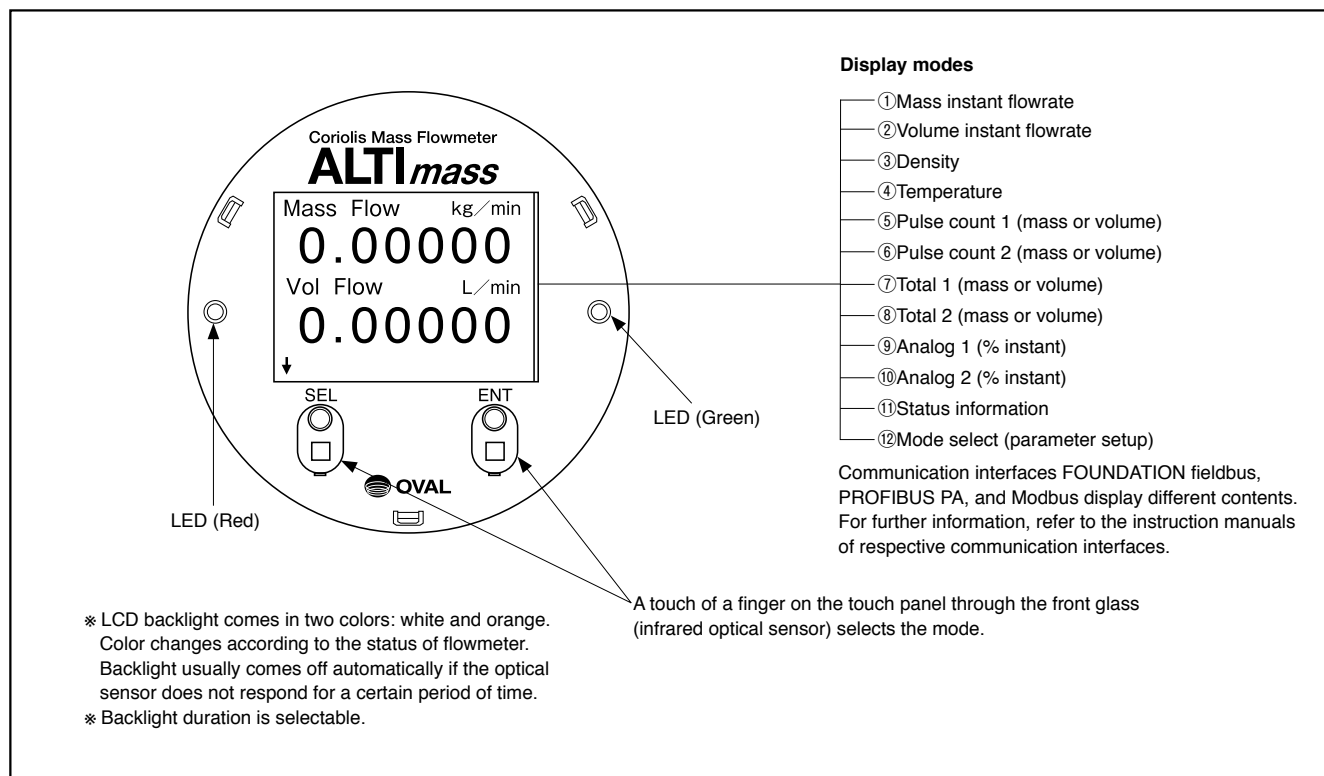
*5: When FOUNDATION fieldbus, PROFIBUS PA, or Modbus is selected as the communication interface, all input and output signals will be turned off.

*: Denoising parts are embedded in the lines between power source, output, communication, and the chassis.

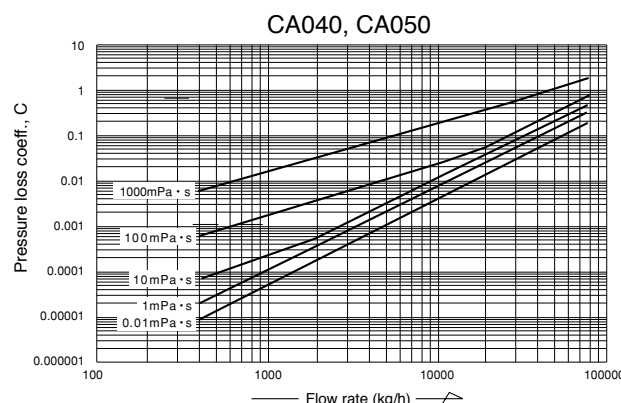
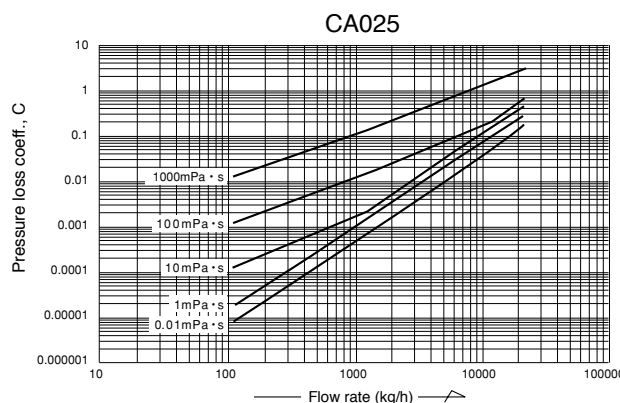
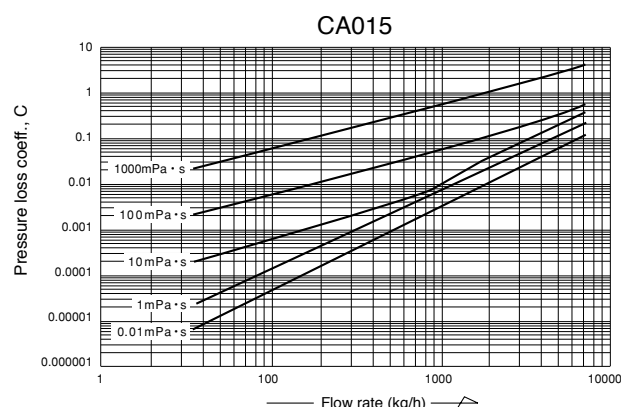
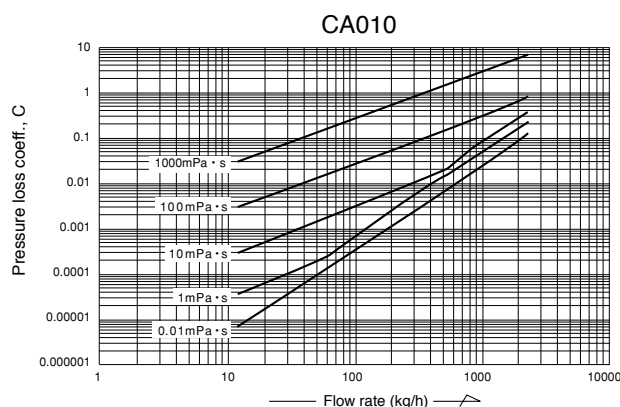
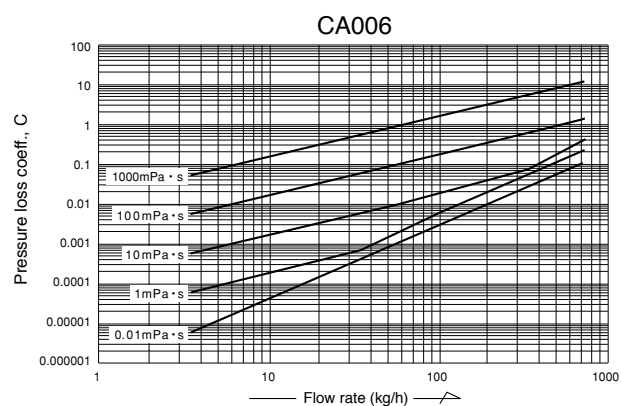
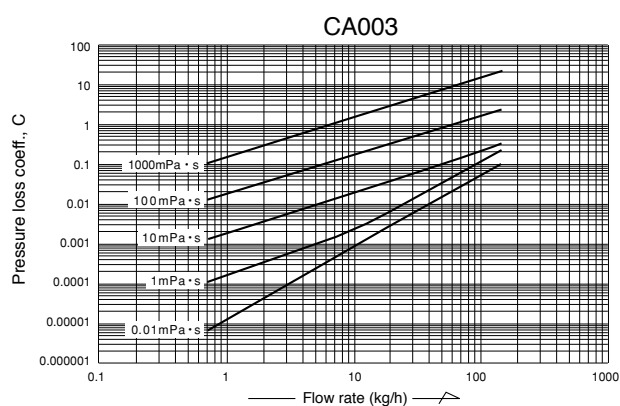
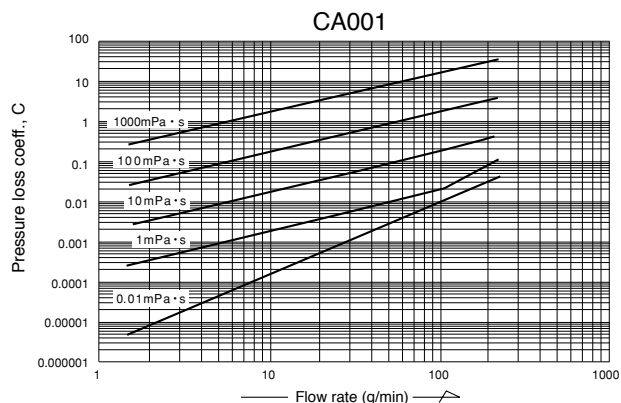
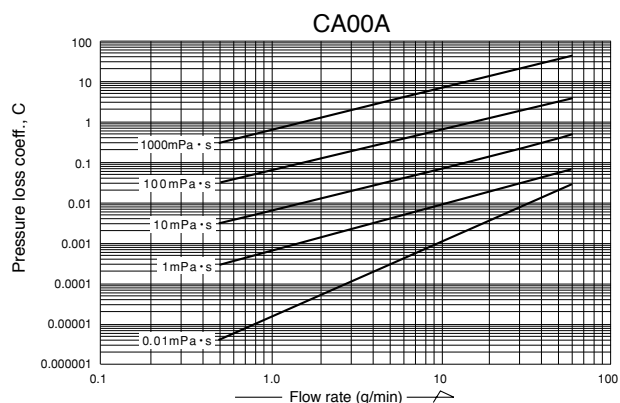
Lower the applied voltage to the following levels in order to conduct insulation test or withstand voltage test on these lines.

AC: 200V, DC: 250V

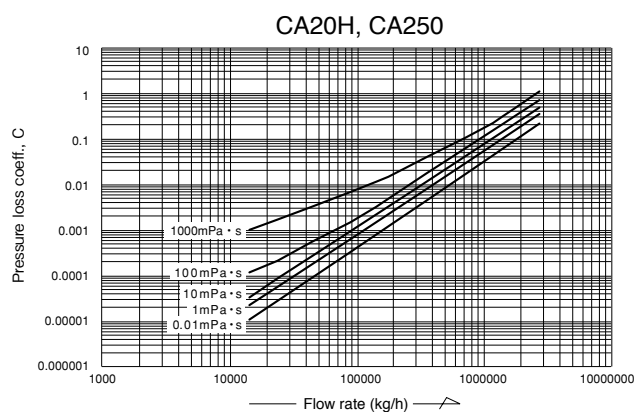
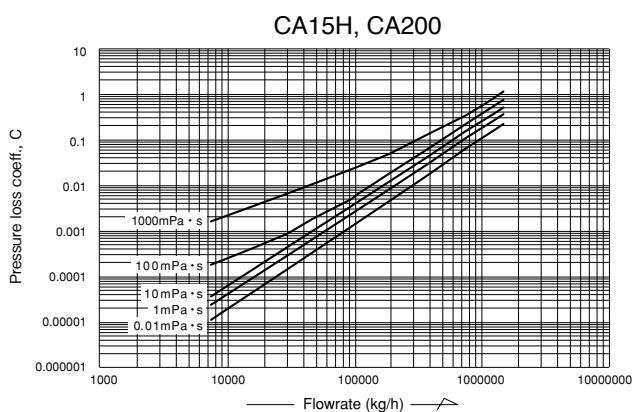
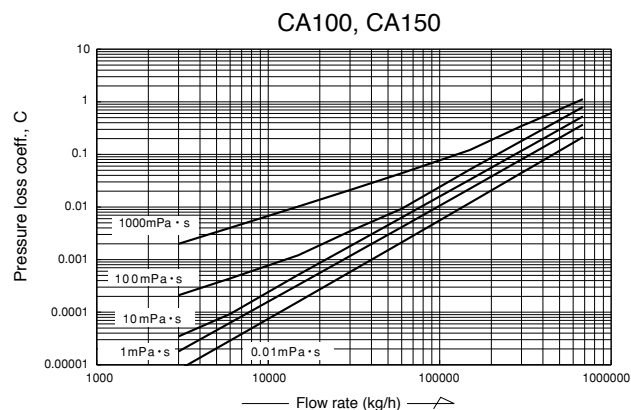
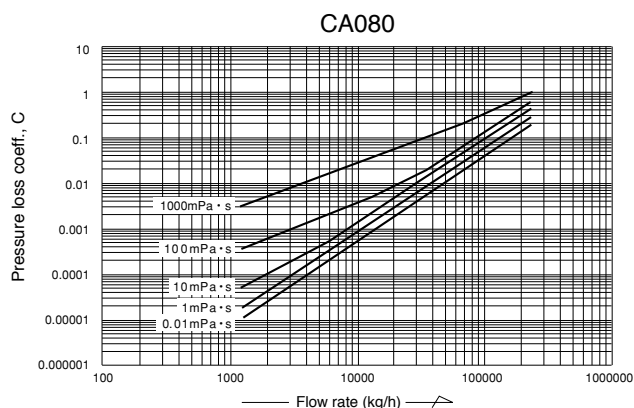
■ DISPLAY



PRESSURE LOSSES



PRESSURE LOSSES



How to determine pressure loss

- Find the pressure loss factor C from flow rate (g/min or kg/h) and viscosity (mPa·s) of parameter.
Dividing the obtained value C by specific gravity d (1 for water) gives the pressure loss. That is,

$$\Delta P = \frac{C}{d} \text{ (MPa)}$$

- For high viscosity liquids not shown in these graphs, calculate the pressure loss by the following formula:

$$\Delta P_2 = C \times \frac{\mu_2}{\mu_1} \times \frac{1}{d}$$

where ΔP_2 : Pressure loss of high viscosity liquid (MPa)

μ_1 : Max. viscosity shown in the graph (mPa·s)

μ_2 : Viscosity of high-viscosity liquid (mPa·s)

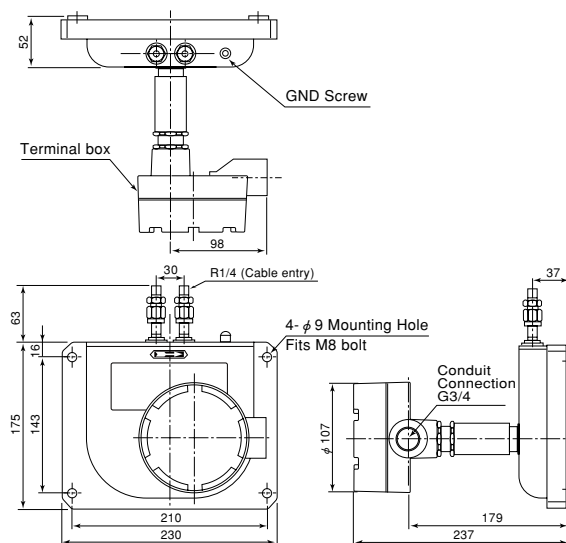
d : Specific gravity of high-viscosity liquid (1 for water)

C : Pressure loss factor found from the max.

viscosity curve at a given flow rate (g/min or kg/h).

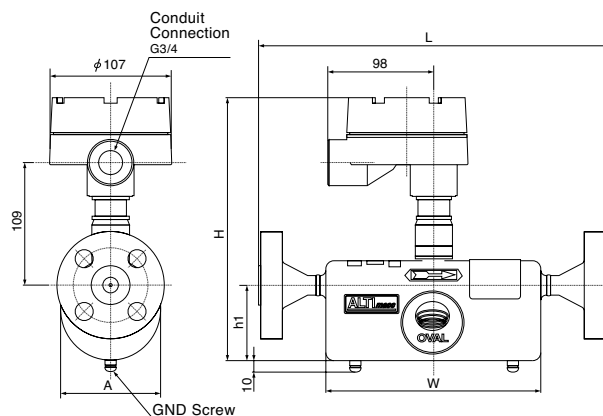
■ DIMENSIONS [Unit in mm]

- Sensor unit CA00A and CA001
- Sensor unit separately mounted / screw connection type



Weight: 9kg (Approx.)

- Sensor unit CA003
- Transmitter separately mounted / flange connection type



Model	JIS						ASME, JPI				DIN			H	h1	A	W	Approx. Weight kg (JIS 10K)
	Nom. size mm	10K	20K	30K	40K	63K	Nom. size inch	150	300	600	Nom. size DN	PN10, 16	PN25, 40					
CA003	10	275	275	293	293	313	1/2"	301	310	322	15	275	281	230	67	89.1	192	5.0

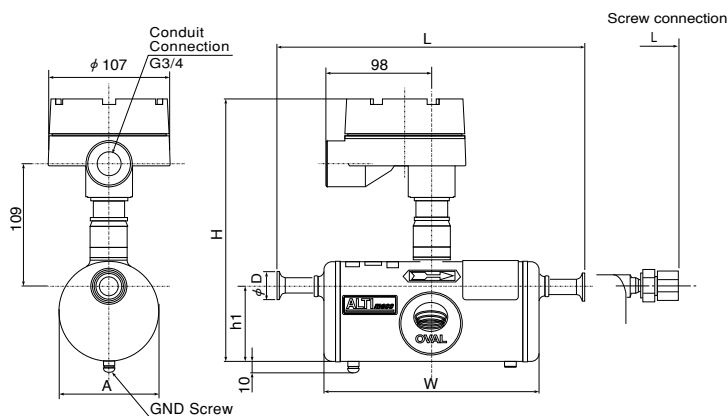
※: This table is applied to material code "S" and "M". In case of code "H", please consult our representative.

※: As long as flange O.D. and bolt holes remain the same while flange rating may differ, the flange thickness with the higher rating is chosen in the above.

※: DIN flanges are available only to meters of the material code, "S" and "M".

※: Flange size for model CA003 is 1/2" in case of ASME or JPI.

- Sensor unit CA003
- Transmitter separately mounted / ferrule or screw connection type

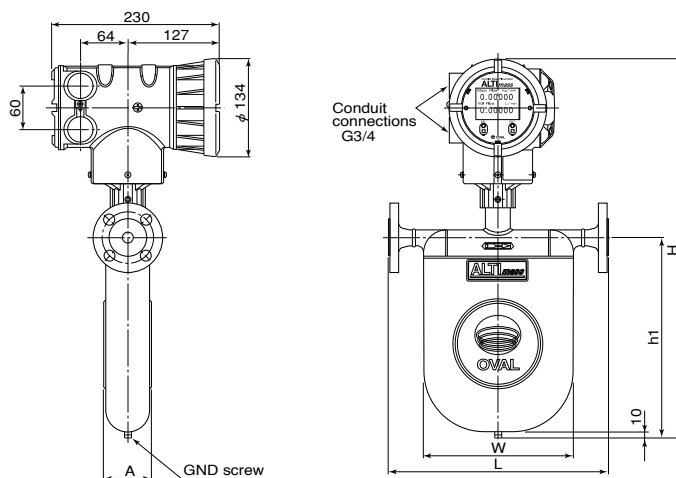


Model	Ferrule		L	H	h1	A	W	φ D	Approx. Weight (kg)
	Nom. size	Connection							
CA003	10	Ferrule 10A	265	230	67	89.1	192	34	4.5

Model	Screw		L	Approx. Weight (kg)
	Connection			
CA003	Rc 3/8		332	4.5

DIMENSIONS [Unit in mm]

- Sensor unit CA006 to CA080
- Transmitter integrally mounted / flange connection type



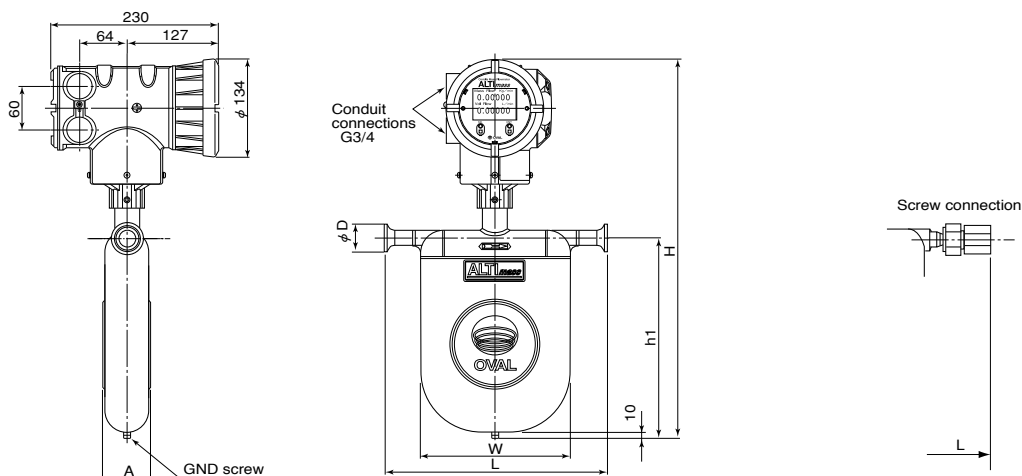
Model	JIS						ASME, JPI				DIN			H	h1	A	W	Approx. Weight kg (JIS 10K)
	Nom. size mm	10K	20K	30K	40K	63K	Nom. size inch	150	300	600	Nom. size DN	PN10, 16	PN25, 40					
		L						L				L						
CA006	10	242	242	260	260	280	1/2"	268	277	289	15	241	247	424	180	53	148	7
CA010	15	256	256	276	276	294	1/2"	282	291	303	15	256	261	462	218	53	163	7.8
CA015	15	299	299	319	319	343	1/2"	325	334	347	15	299	305	512	268	65	205	8.8
CA025	25	380	380	400	400	422	1"	411	424	437	25	376	380	580	329	83	262	13.3
CA040	40	513	513	541	541	585	1-1/2"	547	560	575	40	507	513	710	452	121	385	23
CA050	50	513	523	561	561	595	2"	550	563	582	50	513	519					
CA080	80	657	675	725	725	771	3"	699	717	737	80	659	675	880	602	174	510	57

※: This table is applied to material code "S" and "M". In case of code "H", please consult our representative.

※: As long as flange O.D. and bolt holes remain the same while flange rating may differ, the flange thickness with the higher rating is chosen in the above.

※: DIN flanges are available only to meters of the material code, "S" and "M".

- Sensor unit CA006 to CA080
- Transmitter integrally mounted / ferrule or screw connection type

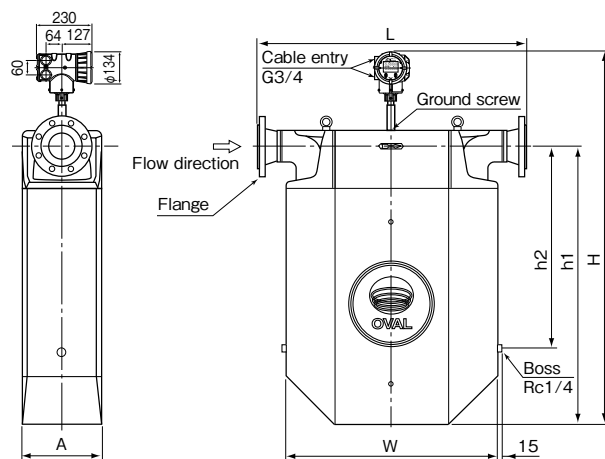


Model	Ferrule		L	H	h1	A	W	φ D	Approx. Weight (kg)
	Nom. size	Connection							
CA006	10	Ferrule 10A	231.5	434	180	53	148	34	5.7
CA010	15	Ferrule 15A	256	462	218	53	163	34	6.3
CA015	15	Ferrule 15A	289	512	268	65	205	34	7.1
CA025	25	Ferrule 25 (ISO), IDF 1S	370	580	329	83	262	50.5	10.7
CA040	40	Ferrule 38 (ISO), IDF 1.5S	493	710	452	121	385	50.5	19
CA050	50	Ferrule 51 (ISO), IDF 2S						64	
CA080	80	Ferrule 76.1 (ISO), IDF 3S	658.5	880	602	174	510	91	51

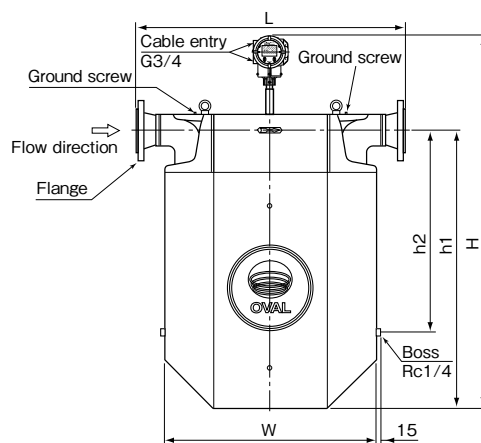
Model	Screw	L	Approx. Weight (kg)
	Connection		
CA006	Rc 3/8	296	5.7
CA010	Rc 3/8	312	6.3
CA015	Rc 3/4	382	7.1

■ DIMENSIONS [Unit in mm]

● CA100 to CA250 (Integrally mounted)



(CA100, CA150)



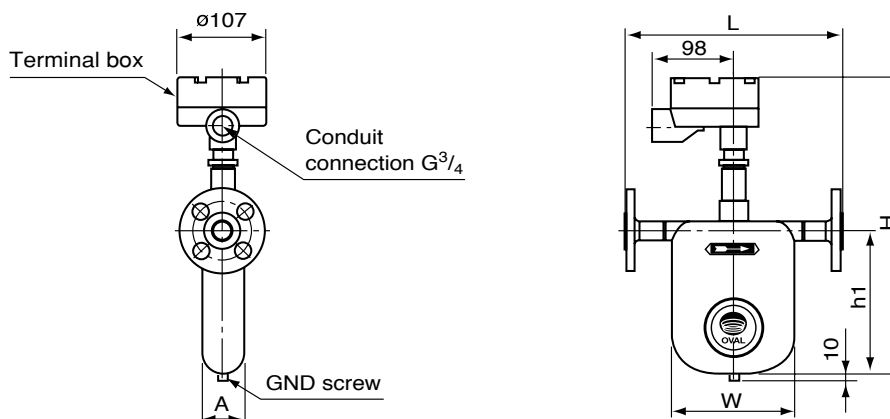
(CA15H to CA250)

Unit in mm

Model	Flange		L	H	h1	h2	A	W	Approx. Weight kg (JIS 10K)
	Nom. size	Flange rating							
CA100	100	JIS 10K	992	1403	1015	660	300	810	231
		JIS 20K	1006						
		JIS 30K	1016						
	4"	ASME, JPI 150	1018						
		ASME, JPI 300	1036						
		ASME, JPI 600	1082						
	DN100	PN 10, 16	968						
		PN 25, 40	994						
CA150	150	JIS 10K	1300	1403	1015	660	300	810	246
		JIS 20K	1320						
		JIS 30K	1330						
	6"	ASME, JPI 150	1318						
		ASME, JPI 300	1338						
		ASME, JPI 600	1388						
	DN150	PN 10, 16	1250						
		PN 25, 40	1290						
CA15H	150	JIS 10K	1015	1604	1190	851	320	810	310
		JIS 20K	1055						
		JIS 30K	1099						
	6"	ASME, JPI 150	1087						
		ASME, JPI 300	1107						
		ASME, JPI 600	1157						
	DN150	PN 10, 16	1019						
		PN 25, 40	1059						
CA200	200	JIS 10K	1330	1604	1190	851	320	810	340
		JIS 20K	1368						
		JIS 30K	1418						
	8"	ASME, JPI 150	1418						
		ASME, JPI 300	1438						
		ASME, JPI 600	1494						
	DN200	PN 10, 16	1338						
		PN 25	1374						
		PN 40	1390						
CA20H	200	JIS 10K	1330	1830	1390	960	420	1110	610
		JIS 20K	1368						
		JIS 30K	1418						
	8"	ASME, JPI 150	1418						
		ASME, JPI 300	1438						
		ASME, JPI 600	1494						
	DN200	PN 10, 16	1338						
		PN 25	1374						
		PN 40	1390						
CA250	250	JIS 10K	1699	1830	1390	960	420	1110	650
		JIS 20K	1743						
		JIS 30K	1805						
	10"	ASME, JPI 150	1773						
		ASME, JPI 300	1805						
		ASME, JPI 600	1887						
	DN250	PN 10	1705						
		PN 16	1709						
		PN 25	1745						
		PN 40	1779						

DIMENSIONS [Unit in mm]

- Sensor unit CA006 to CA080
- Transmitter separately mounted / flange connection type



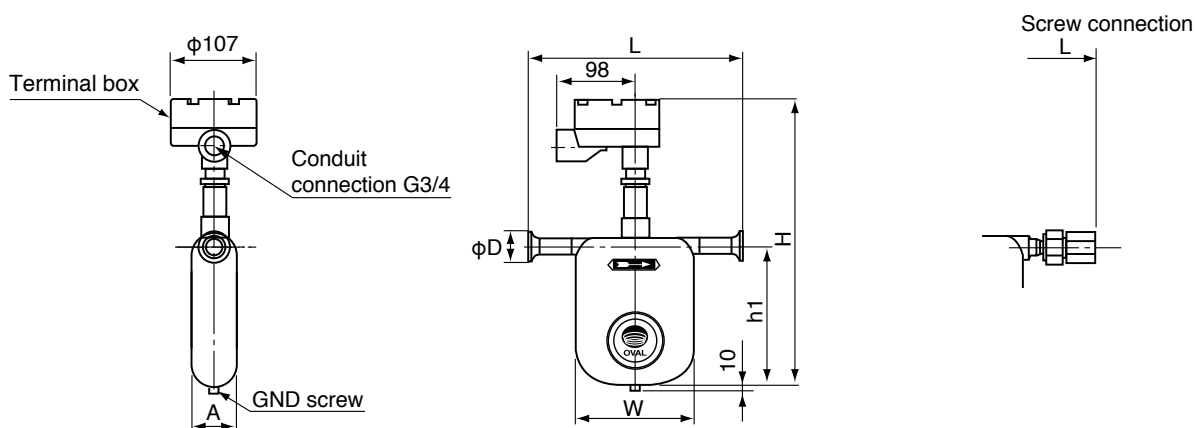
Model	JIS						ASME, JPI				DIN			H	h1	A	W	Approx. Weight kg (JIS 10K)
	Nom. size mm	10K	20K	30K	40K	63K	Nom. size inch	150	300	600	Nom. size DN	PN10, 16	PN25, 40					
		L						L				L						
CA006	10	242	242	260	260	280	1/2"	268	277	289	15	241	247	368	180	53	148	4.0
CA010	15	256	256	276	276	294	1/2"	282	291	303	15	256	261	406	218	53	163	4.7
CA015	15	299	299	319	319	343	1/2"	325	334	347	15	299	305	456	268	65	205	5.6
CA025	25	380	380	400	400	422	1"	411	424	437	25	376	380	524	329	83	262	10.4
CA040	40	513	513	541	541	585	1-1/2"	547	560	575	40	507	513	654	452	121	385	20
CA050	50	513	523	561	561	595	2"	550	563	582	50	513	519					
CA080	80	657	675	725	725	771	3"	699	717	737	80	659	675	824	602	174	510	54

※: This table is applied to material code "S" and "M". In case of code "H", please consult our representative.

※: As long as flange O.D. and bolt holes remain the same while flange rating may differ, the flange thickness with the higher rating is chosen in the above.

※: DIN flanges are available only to meters of the material code, "S" and "M".

- Sensor unit CA006 to CA080
- Transmitter separately mounted / ferrule or screw connection type

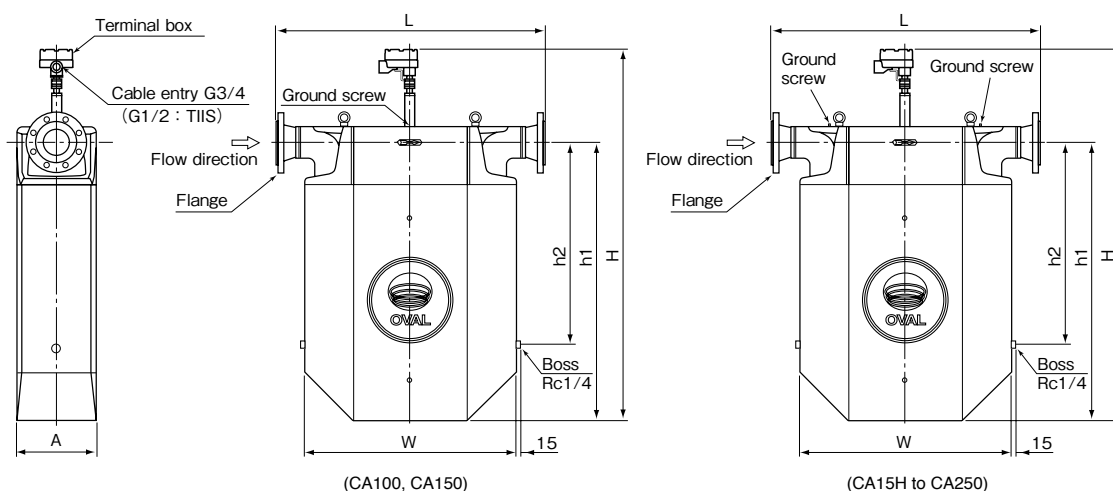


Model	Ferrule Connection		L	H	h1	A	W	φ D	Approx. Weight (kg)
	Nom. size								
CA006	10	Ferrule 10A	231.5	368	180	53	148	34	2.8
CA010	15	Ferrule 15A	256	406	218	53	163	34	3.4
CA015	15	Ferrule 15A	289	456	268	65	205	34	4.2
CA025	25	Ferrule 25 (ISO), IDF 1S	370	524	329	83	262	50.5	7.8
CA040	40	Ferrule 38 (ISO), IDF 1.5S	493	654	452	121	385	50.5	16
CA050	50	Ferrule 51 (ISO), IDF 2S						64	
CA080	80	Ferrule 76.1 (ISO), IDF 3S	658.5	824	602	174	510	91	48

Model	Screw Connection	L	Approx. Weight (kg)
CA006	Rc 3/8	296	2.8
CA010	Rc 3/8	312	3.4
CA015	Rc 3/4	382	4.2

■ DIMENSIONS [Unit in mm]

● CA100 to CA250 (Separately mounted)



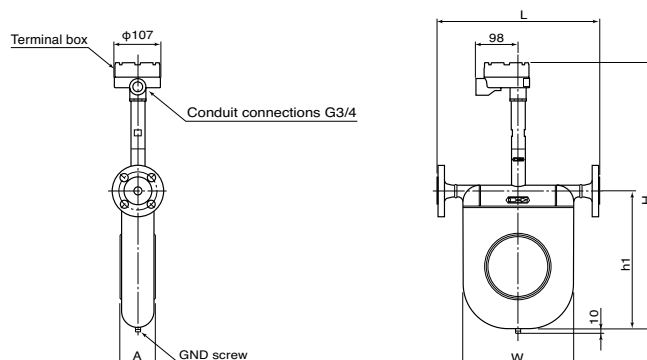
Unit in mm

Model	Flange		L	H	h1	h2	A	W	Approx. Weight kg (JIS 10K)
	Nom. size	Flange rating							
CA100	100	JIS 10K	992	1353	1015	660	300	810	231
		JIS 20K	1006						
		JIS 30K	1016						
	4"	ASME, JPI 150	1018						
		ASME, JPI 300	1036						
		ASME, JPI 600	1082						
	DN100	PN 10, 16	968						
		PN 25, 40	994						
CA150	150	JIS 10K	1300	1353	1015	660	300	810	246
		JIS 20K	1320						
		JIS 30K	1330						
	6"	ASME, JPI 150	1318						
		ASME, JPI 300	1338						
		ASME, JPI 600	1388						
	DN150	PN 10, 16	1250						
		PN 25, 40	1290						
CA15H	150	JIS 10K	1015	1554	1190	851	320	810	310
		JIS 20K	1055						
		JIS 30K	1099						
	6"	ASME, JPI 150	1087						
		ASME, JPI 300	1107						
		ASME, JPI 600	1157						
	DN150	PN 10, 16	1019						
		PN 25, 40	1059						
CA200	200	JIS 10K	1330	1554	1190	851	320	810	340
		JIS 20K	1368						
		JIS 30K	1418						
	8"	ASME, JPI 150	1418						
		ASME, JPI 300	1438						
		ASME, JPI 600	1494						
	DN200	PN 10, 16	1338						
		PN 25	1374						
CA20H	200	PN 40	1390	1780	1390	960	420	1110	610
		JIS 10K	1330						
		JIS 20K	1368						
	8"	JIS 30K	1418						
		ASME, JPI 150	1418						
		ASME, JPI 300	1438						
		ASME, JPI 600	1494						
	DN200	PN 10, 16	1338						
		PN 25	1374						
CA250	250	PN 40	1390	1780	1390	960	420	1110	650
		JIS 10K	1699						
		JIS 20K	1743						
	10"	JIS 30K	1805						
		ASME, JPI 150	1773						
		ASME, JPI 300	1805						
		ASME, JPI 600	1887						
	DN250	PN 10	1705						
		PN 16	1709						
		PN 25	1745						
		PN 40	1779						

*: Approximate weights in the table above are of JIS 10K.

■ DIMENSIONS [Unit in mm]

- Sensor unit CA025 (High temperature service model) to CA080 (High temperature service model)
- Transmitter separately mounted / flange connection type

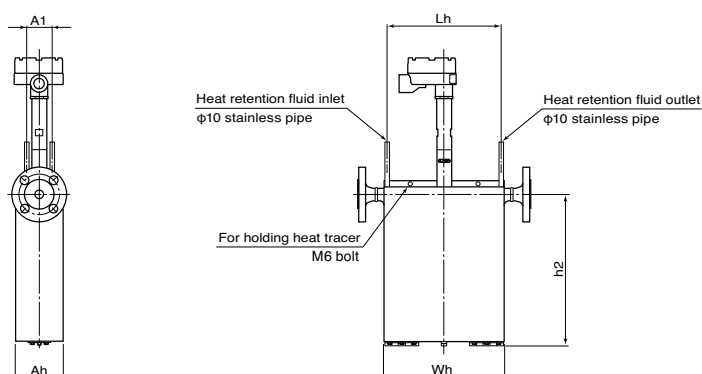


Model	JIS						ASME, JPI				DIN			H	h1	A	W	Approx. weight kg (JIS 10K)
	Nom. size mm	10K	20K	30K	40K	63K	Nom. size inch	150	300	600	Nom. size DN	PN10, 16	PN25, 40					
		L						L				L						
CA025 (High temp. service model)	25	380	380	400	400	422	1"	411	424	437	25	376	380	638	329	83	262	10.9
CA040 (High temp. service model)	40	513	513	541	541	585	1-1/2"	547	560	575	40	507	513	768	452	121	385	20.3
CA050 (High temp. service model)	50	513	523	561	561	595	2"	550	563	582	50	513	519					20.7
CA080 (High temp. service model)	80	657	675	725	725	771	3"	699	717	737	80	659	675	960	602	174	510	54.1

※: As long as flange O.D. and bolt holes remain the same while flange rating may differ, the flange thickness with the higher rating is chosen in the above.

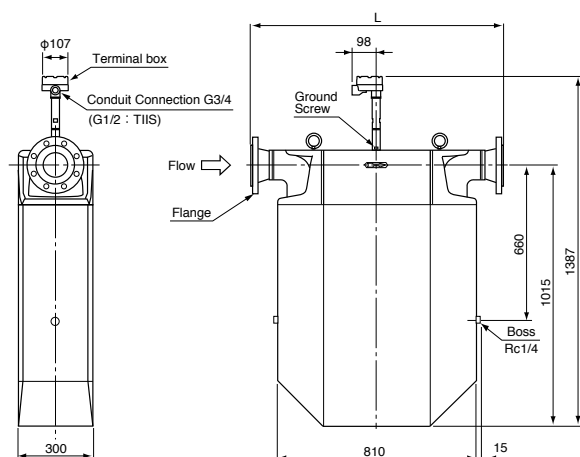
※: DIN flanges are available only to meters of the material code, "S" and "M".

- Sensor unit with Heat Tracer : CA025 to CA080
- Transmitter separately mounted / flange connection type



Sensor unit model	Nom. size	Compatible With Heat Tracer	Lh	h2	Ah	A1	Wh	Approx. weight kg (JIS 10K)
CA025	25 (1")	HT1-025A	254	340	106	56	268	16.9
CA040	40 (1-1/2")	HT1-040A	376	464	144	70	390	31.8
CA050	50 (2")							32.2
CA080	80 (3")	HT1-080A	501	612	198	110	545	75.1

- Sensor unit CA100 (High temperature service model) and CA150 (High temperature service model)
- Transmitter separately mounted / flange connection type



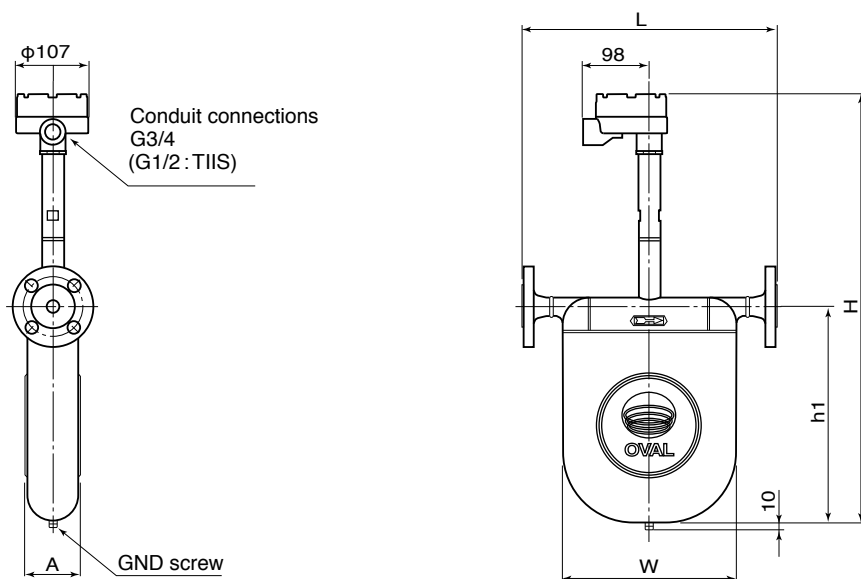
Model	Flange		L	Approx. Weight kg (JIS 10K)
	Nom. size	Flange rating		
CA100	100	JIS 10K	992	231
		JIS 20K	1006	235
		JIS 30K	1016	241
	4"	ASME, JPI 150	1018	237
		ASME, JPI 300	1036	245
		ASME, JPI 600	1082	255
CA150	DN100	PN 10, 16	968	231
		PN 25, 40	994	241
	150	JIS 10K	1300	246
		JIS 20K	1320	253
		JIS 30K	1330	265
	6"	ASME, JPI 150	1318	248
		ASME, JPI 300	1338	265
		ASME, JPI 600	1388	292
	DN150	PN 10, 16	1250	246
		PN 25, 40	1290	265

※: Approximate weights in the table above are of JIS 10K.

For specifications of other flange ratings, see the approval drawing (or delivery specification).

■ DIMENSIONS [Unit in mm]

- Sensor unit CA025 (Low temperature explosionproof service model) to CA080 (Low temperature explosionproof service model)
- Transmitter separately mounted / flange connection type



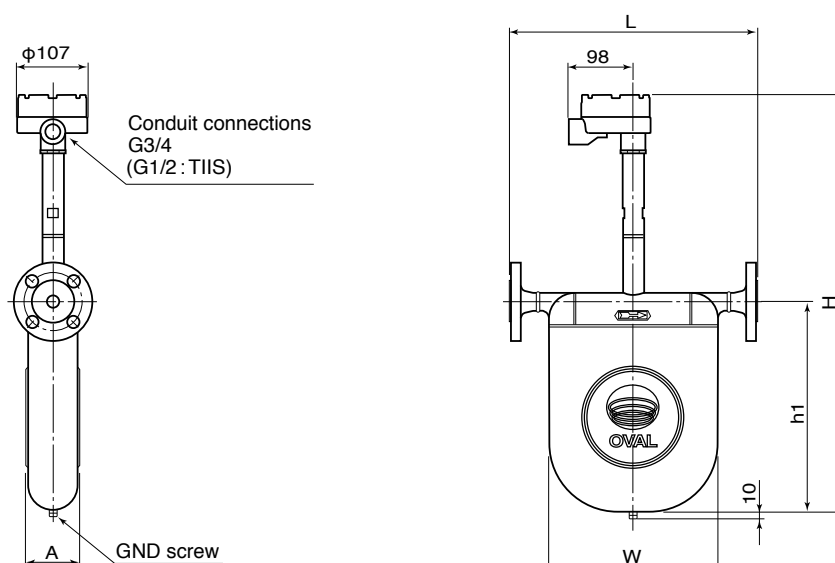
Model	JIS						ASME, JPI				DIN			H	h1	A	W	Approx. weight kg (JIS 10K)
	Nom. size mm	10K	20K	30K	40K	63K	Nom. size inch	150	300	600	Nom. size DN	PN10, 16	PN25, 40					
		L						L				L						
CA025	25	380	380	400	400	422	1"	411	424	437	25	376	380	660	329	83	262	10.9
CA040	40	513	513	541	541	585	1-1/2"	547	560	575	40	507	513	790	452	121	385	20.3
CA050	50	513	523	561	561	595	2"	550	563	582	50	513	519					21
CA080	80	657	675	725	725	771	3"	699	717	727	80	659	675	960	602	174	510	54

※: This table is applied to material code "S" and "M". In case of code "H", please consult our representative.

※: As long as flange O.D. and bolt holes remain the same while flange rating may differ, the flange thickness with the higher rating is chosen in the above.

※: DIN flanges are available only to meters of the material code, "S" and "M".

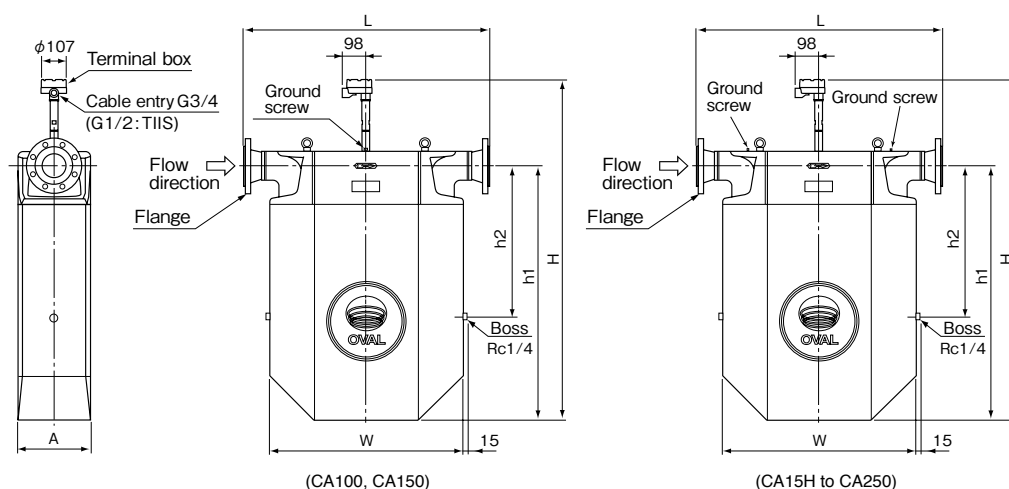
- Sensor unit CA025 (Low temperature explosionproof service model) to CA080 (Low temperature explosionproof service model)
- Transmitter separately mounted / ferrule connection type



Model	Ferrule		L	H	h1	A	W	ϕ D	Approx. Weight (kg)
	Nom. size	Connection							
CA025	25	Ferrule 25 (ISO), IDF 1S	370	660	329	83	262	50.5	8.3
CA040	40	Ferrule 38 (ISO), IDF 1.5S	493	790	452	121	385	50.5	17
CA050	50	Ferrule 51 (ISO), IDF 2S						64	
CA080	80	Ferrule 76.1 (ISO), IDF 3S	658.5	960	602	174	510	91	48

■ DIMENSIONS [Unit in mm]

● Low temperature explosionproof service model: CA100 to CA250



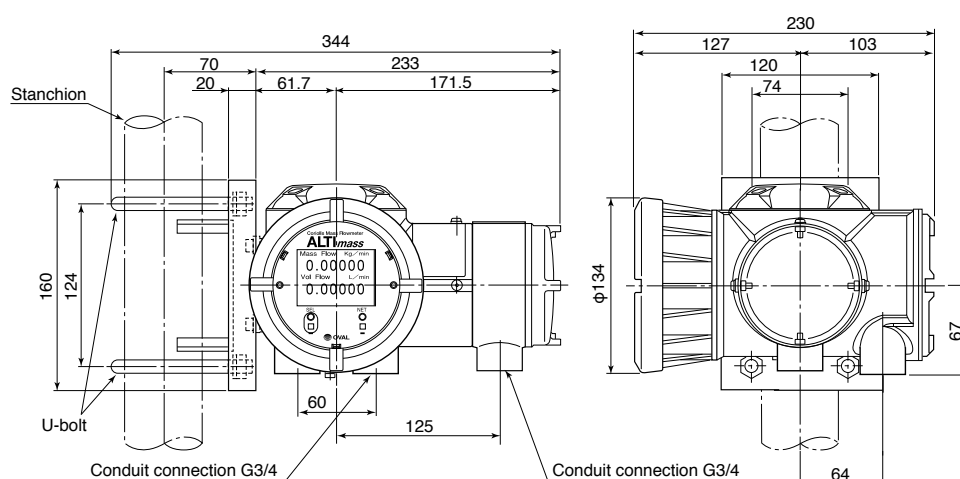
Unit in mm

Model	Flange		L	H	h1	h2	A	W	Approx. Weight kg (JIS 10K)
	Nom. size	Flange rating							
CA100 (Low temperature explosionproof service model)	100	JIS 10K	992	1387	1015	660	300	810	231
		JIS 20K	1006						
		JIS 30K	1016						
	4"	ASME, JPI 150	1018						
		ASME, JPI 300	1036						
		ASME, JPI 600	1082						
	DN100	PN 10, 16	968						
		PN 25, 40	994						
CA150 (Low temperature explosionproof service model)	150	JIS 10K	1300	1387	1015	660	300	810	246
		JIS 20K	1320						
		JIS 30K	1330						
	6"	ASME, JPI 150	1318						
		ASME, JPI 300	1338						
		ASME, JPI 600	1388						
	DN150	PN 10, 16	1250						
		PN 25, 40	1290						
CA15H (Low temperature explosionproof service model)	150	JIS 10K	1015	1588	1190	851	320	810	310
		JIS 20K	1055						
		JIS 30K	1099						
	6"	ASME, JPI 150	1087						
		ASME, JPI 300	1107						
		ASME, JPI 600	1157						
	DN150	PN 10, 16	1019						
		PN 25, 40	1059						
CA200 (Low temperature explosionproof service model)	200	JIS 10K	1330	1588	1190	851	320	810	340
		JIS 20K	1368						
		JIS 30K	1418						
	8"	ASME, JPI 150	1418						
		ASME, JPI 300	1438						
		ASME, JPI 600	1494						
	DN200	PN 10, 16	1338						
		PN 25	1374						
CA20H (Low temperature explosionproof service model)	200	JIS 10K	1330	1814	1390	960	420	1110	610
		JIS 20K	1368						
		JIS 30K	1418						
	8"	ASME, JPI 150	1418						
		ASME, JPI 300	1438						
		ASME, JPI 600	1494						
	DN200	PN 10, 16	1338						
		PN 25	1374						
CA250 (Low temperature explosionproof service model)	250	JIS 10K	1699	1814	1390	960	420	1110	650
		JIS 20K	1743						
		JIS 30K	1805						
	10"	ASME, JPI 150	1773						
		ASME, JPI 300	1805						
		ASME, JPI 600	1887						
	DN250	PN 10	1705						
		PN 16	1709						
		PN 25	1745						
		PN 40	1779						

*: Approximate weights in the table above are of JIS 10K. For specifications of other flange ratings, see the approval drawing (or delivery specification).

■ DIMENSIONS [Unit in mm]

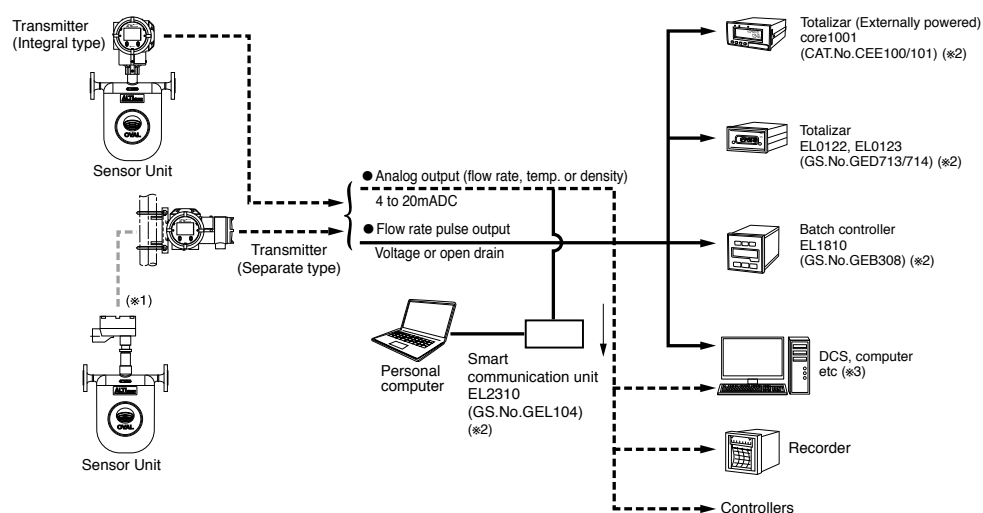
● Separately located transmitter



※: While stanchion mounting hardware (U-bolts) are furnished as standard accessories, the stanchion itself must be provided by the customer.

■ REMOTE MEASURING SYSTEM

● HART protocol

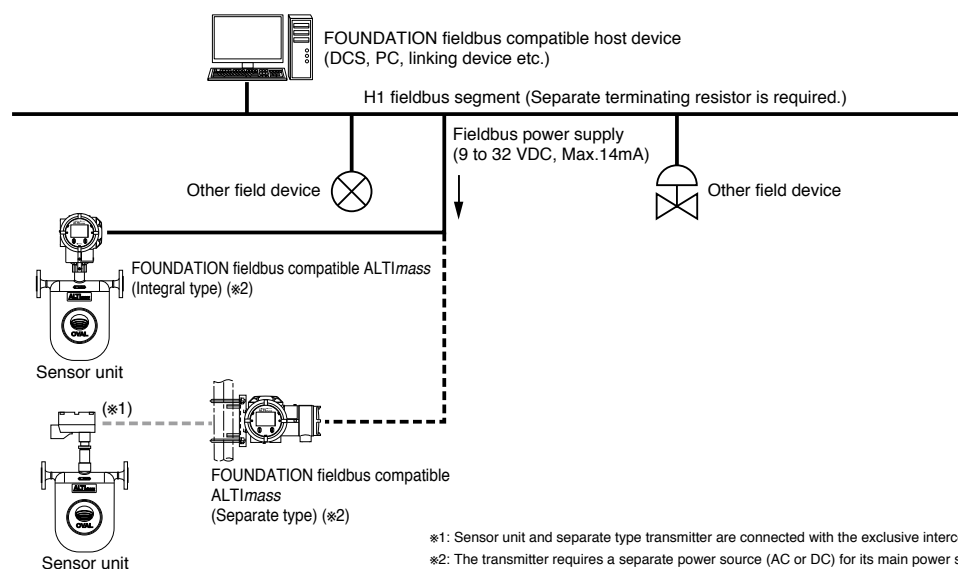


※1: In case of the separate type, the sensor unit and transmitter are connected with exclusive cable.

※2: For detailed information about companion instruments, see respective product catalogs and GS sheets.

※3: Only HART protocol version 7 model is capable of communication.

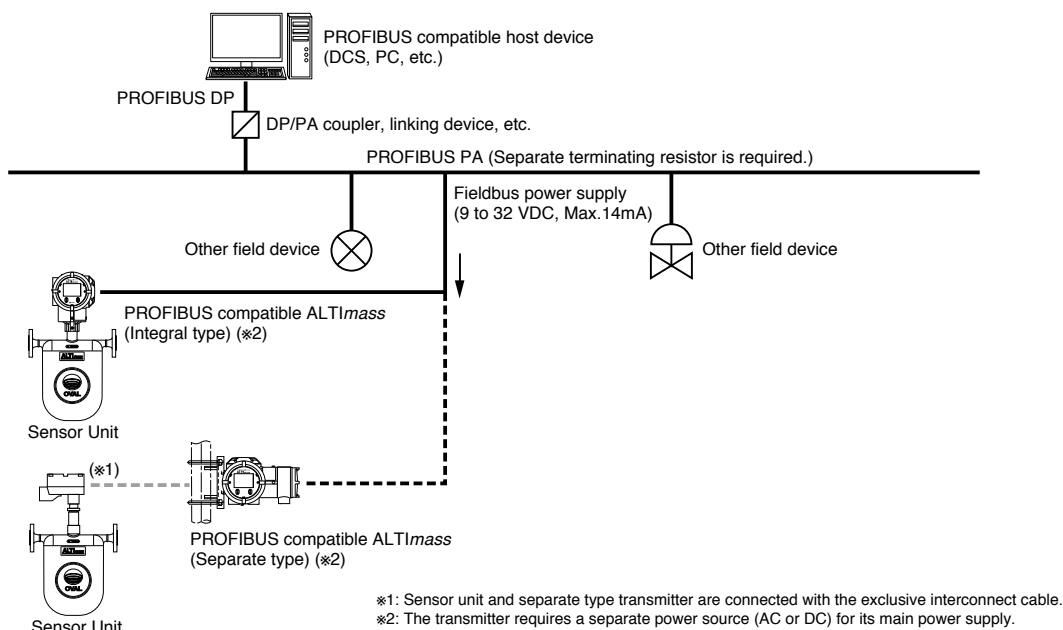
● FOUNDATION fieldbus



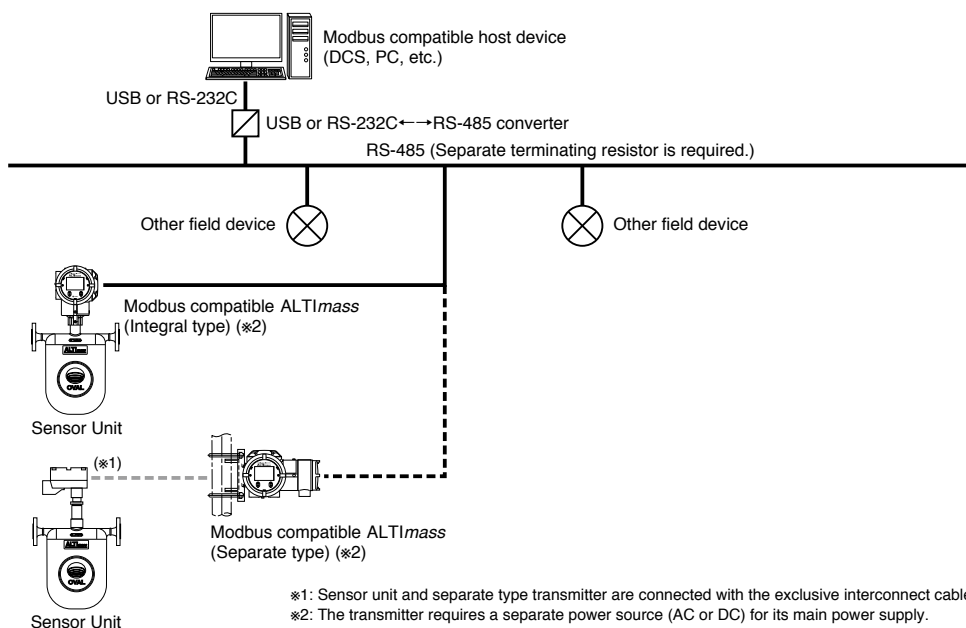
※1: Sensor unit and separate type transmitter are connected with the exclusive interconnect cable.

※2: The transmitter requires a separate power source (AC or DC) for its main power supply.

● PROFIBUS

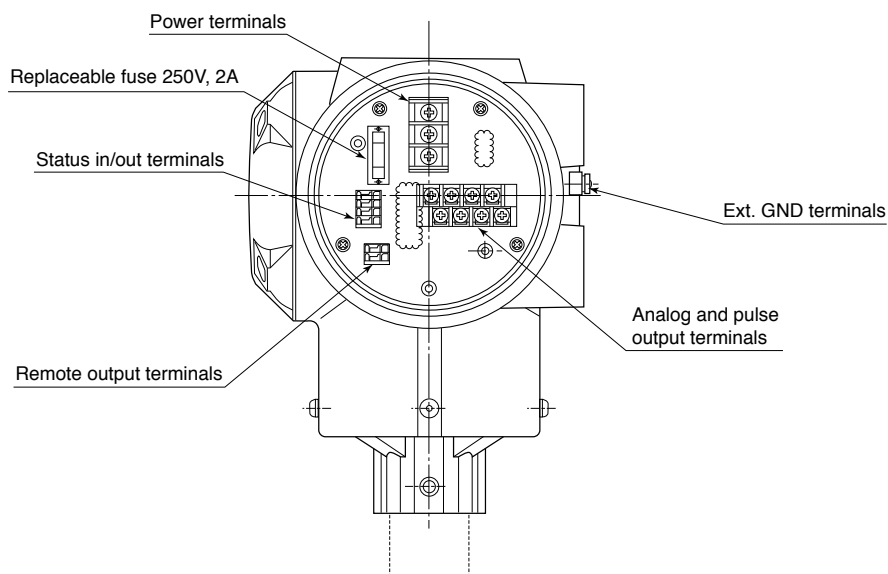


● Modbus



■ WIRING DIAGRAM

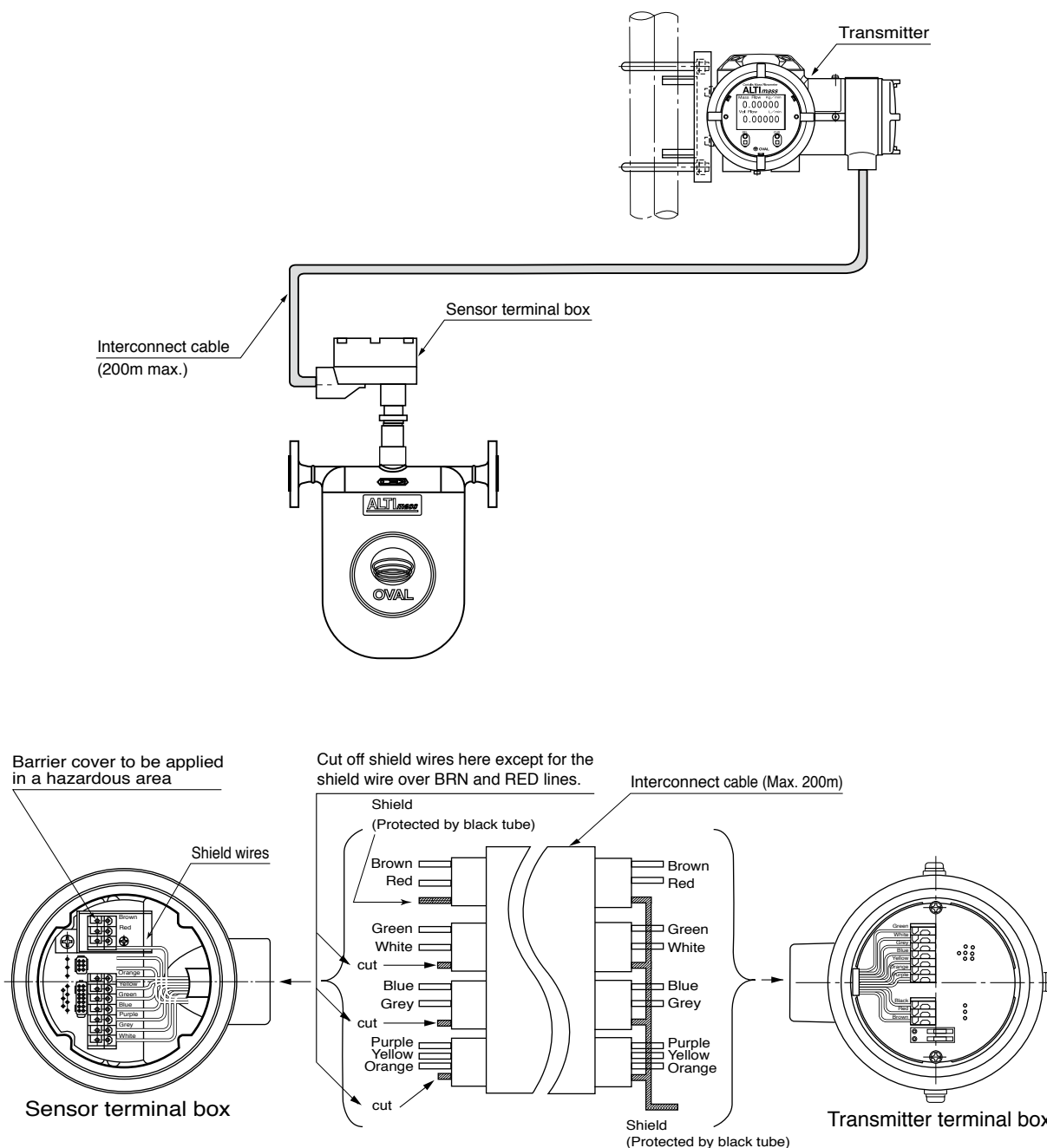
● Transmitter power and input/output signal wiring



● Terminal identification and description

Item	Label	Description	Remarks
Signal	A1 (+)	Analog output 1 (4 to 20mA)	1. Max. load resistance is 600Ω for analog output 1 and 2. 2. Pulse output (voltage pulse) transmission length is Max. 10m (at 10kHz) Max. 100m (at 1kHz) Max. 1km (at 100Hz) finished O.D: 0.75sq 3. In case of TIIS explosionproof type used under the ambient temperature of 45°C or higher, use a cable resistant to the temperature of 75°C or higher. 4. These input and output signals are invalid for FOUNDATION fieldbus, PROFIBUS PA and Modbus communications.
	A1 (–)		
	A2 (+)	Analog output 2 (4 to 20mA)	
	A2 (–)		
	P1 (+)	Pulse output 1 (voltage/open drain output)	
	P1 (–)		
	P2 (+)	Pulse output 2 (voltage/open drain output)	
	P2 (–)		
	S.I. (+)	Status input (contact input)	
	S.I. (–)		
	S.O (+)	Status output (open drain output)	
	S.O (–)		
I/O (+)	Expanded in/out (Modbus communication, etc.)	Modbus communication: Max.transmission length1200m at 0.75sq FOUNDATION fieldbus or PROFIBUS PA communication: Max. transmission length 1900m at 0.8sq	
I/O (–)			
Power	L (+)	Power (with DC power: +)	
	GND	Earth ground	
	N (–)	Power (with DC power: –)	

● Wiring between Sensor Unit and Separately Mounted Transmitter



NOTE 1. Do not fail to use dedicated interconnect cable.

2. Shield wire preparation

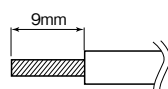
(1) Transmitter end:

As shown in the above figure, bundle shield wires colored in brown/red, green/white, blue/grey and purple/yellow/orange and cover the wires with a black tube. Then connect only one wire to the terminal box (black) taking care to avoid potential contact with the housing or conductive parts.

(2) Sensor end:

As shown in the figure, cover the brown/red shield wire with a black tube and connect it to the terminal box taking care to avoid potential contact with the housing or conductive parts. Clip all shield wires except brown/ red as shown in the above figure.

(3) Recommended cable end treatment:



※: Use of a crimp pin terminal is not necessary.

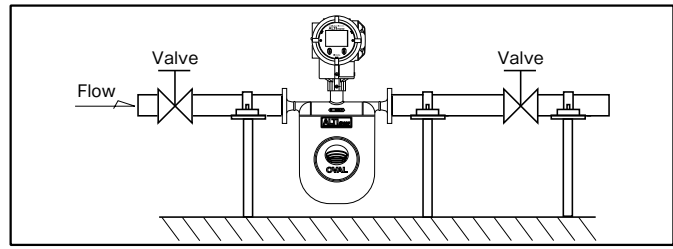
■ STANDARD INSTALLATION

1. Typical Installation (See figure at right.)

- 1) Avoid pipeline stresses on the meter.
- 2) The meter should be supported near and between connections to the process pipelines.
- 3) Avoid supporting the meter body directly.
- 4) Pipeline should be arranged such that the meter is constantly filled with the process fluid. Avoid, however, installing it in a pocket where slurries may build up.
- 5) Provide a valve downstream of the meter to allow zeroing by obtaining a true zero flow. We recommend to provide another valve upstream of the meter for servicing or maintenance.

2. Precautions at Installation

- 1) Locate the meter at least one meter from large transformers, motors, or other sources of electromagnetic induction. Also avoid installation near the sources of excessive vibration, such as motors and pumps.
- 2) In case of measurement of a process fluid which requires heat retention, heat trace may be applied directly to the sensor body. Heat trace should be held below 200°C. Explosionproof models require the temperature to be held below their maximum allowable levels.
- 3) To ensure consistent volume flow and density measurements, heat retention is suggested.
- 4) The sensor unit is of gastight construction. To prevent dew condensation inside in a low temperature application, it is filled with argon gas. For this reason, avoid dropping or giving it impact shocks.
- 5) In a horizontal run, install the sensor unit with the transmitter up as shown in the figure.



- 6) A control valve should be located downstream of the meter. In an arrangement where cavitation may possibly take place, locate it at least 5 meters away.
- 7) To ensure consistent and accurate measurement, the Coriolis flowmeter should be placed in an environment where pipeline oscillation is held below 0.3G.
- 8) Sudden temperature change may damage the performance of the flowmeter. Keep the temperature change of the fluid within $\pm 12^{\circ}\text{C}/\text{min.}$ for both heating and cooling.

3. Prevention of Cavitation

Cavitation can causes a loss of meter accuracy in measurement. Maintain line pressure that will not cause cavitation upstream and downstream of the meter for this reason. Avoid making such an arrangement as to open the line to the atmosphere immediately downstream of the meter. Care must be taken particularly with high vapor pressure liquids. In practice, we recommend to keep the back pressure in the meter (downstream pressure) above the value calculated by the formula below:

$$P_d = 3\Delta P + 1.3P_v$$

P_d : Downstream pressure (MPa[absolute])

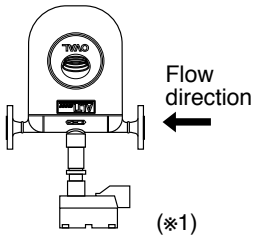
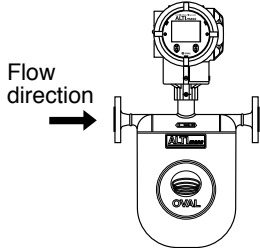
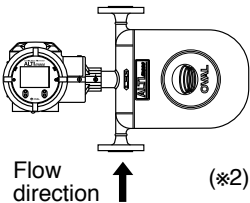
ΔP : Pressure loss across the meter (MPa)

P_v : Steam pressure of the process fluid at measurement (MPa[absolute])

4. Physical orientation

(1) CA003 thru CA250

Recommended physical orientation varies with the type of process fluid. [No. 2 in the figure below shows basic orientation for liquid service.]

	Horizontal run		Vertical run
	No.1	No.2	No.3
Orientation			
Fluids	● Gases ● Slurries	● Liquids	● Slurries (requiring cleaning) ● Liquids ● Gases

*1: For installation orientation in No. 1, we recommend the separately mounted transmitter. If the integrally mounted transmitter is preferred, contact OVAL.

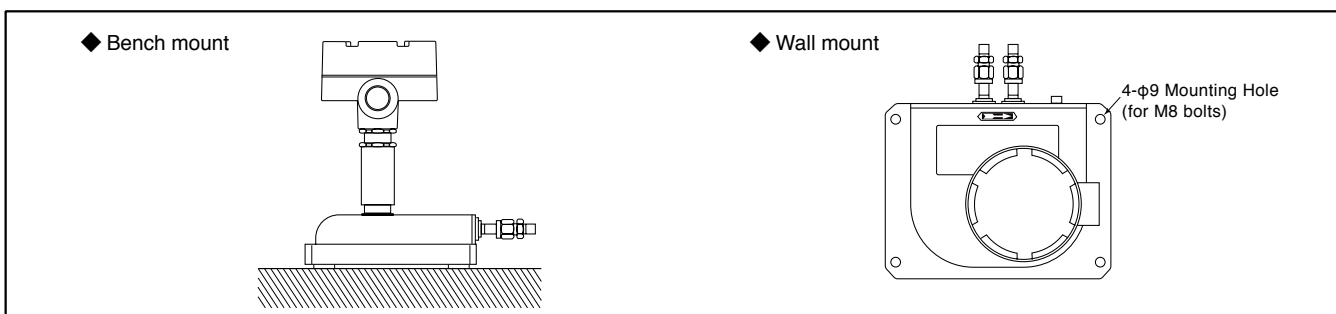
*2: The measuring tube of the CA003 is in double-loop configuration without self-draining feature.

*: Do not forget to specify the physical orientation when you order.

(2) CA00A and CA001

The instrument can be installed either on a bench or a wall. The following physical orientation is suggested.

(In wall mounting, secure the instrument with bolts, using the mounting holes provided on the sensor unit.)



[illegible]

*8: "2" and "3" for the product code ⁽¹⁶⁾ are not available. (in preparation)

■ PRODUCT CODE EXPLANATION (CA100 to CA250)

Item	Product Code																		Description	Selector Chart			
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱		CA100, CA150 CA15H, CA200, CA20H, CA250 High temp. service: CA100, CA150 (below 350°C) Low temp. explosionproof service: CA100, CA150, CA15H, CA200, CA20H, CA250			
Model	C	A																	ALTI ^{mass} Type U				
Nominal size			1	0	0														100mm connection (4")				
			1	5	0														150mm connection (6")				
			1	5	H														150mm connection (6")				
			2	0	0														200mm connection (8")				
			2	0	H														200mm connection (8")				
			2	5	0														250mm connection (10")				
Fluid category						L													Liquid service				
Temp. category (※1)							2												Standard (below 200°C)			×	×
							3												High temperature service (below 350°C)		×		×
							4												Low temperature explosionproof service (−200°C to +50°C)		×	×	
Pressure category								1											Standard				
Major parts material									S										SUS316L				
Process connection										C									JIS 10K				
										D									JIS 20K				
										E									JIS 30K				
										H									ASME 150				
										J									ASME 300				
										K									ASME 600				
										L									JPI 150				
										M									JPI 300				
										N									JPI 600				
										P									DIN PN 10				
										Q									DIN PN 16				
										R									DIN PN 25				
										S									DIN PN 40				
Transmitter construction (※2)										Z									Other than above				
											1								Integrally mounted				
Power source											2								Separately mounted				
												1							20 to 30VDC				
Analog output (※3, 4, 5)												2							85 to 264VAC (Safety rated 100 to 240VAC), 50/60Hz				
													A						Output 1: Mass flow Output 2: Mass flow				
													B						Output 1: Mass flow Output 2: Density				
													C						Output 1: Mass flow Output 2: Temperature				
													D						Output 1: Mass flow Output 2: Volume flow (true density)				
													E						Output 1: Mass flow Output 2: Volume flow (fixed density)				
													F						Output 1: Density Output 2: Temperature				
													G						Output 1: Volume flow (true density) Output 2: Density (true density)				
													H						Output 1: Volume flow (fixed density) Output 2: Density				
													J						Output 1: Volume flow (true density) Output 2: Temperature				
													K						Output 1: Volume flow (fixed density) Output 2: Temperature				
													X						Non-output In the case of FOUNDATION fieldbus, PROFIBUS, Modbus communication				
Pulse output (※3, 4, 5)													A						Output 1: Mass flow				
													B						Output 1: Volume flow (true density)				
													C						Output 1: Volume flow (fixed density)				
													D						Output 1: Mass flow Output 2: Mass flow				
													E						Output 1: Mass flow Output 2: Volume flow (true density)				
													F						Output 1: Mass flow Output 2: Volume flow (fixed density)				
													G						Output 1: Vol. flow (true dens.) Output 2: Vol. flow (true dens.)				
													H						Output 1: Vol. flow (fixed dens.) Output 2: Vol. flow (fixed dens.)				
													J						Output 1: Volume flow (true dens.) Output 2: Mass flow				
													K						Output 1: Volume flow (fixed dens.) Output 2: Mass flow				
Pulse output type (※3)													X						Non-output In the case of FOUNDATION fieldbus, PROFIBUS, Modbus communication				
													0						Non-output In the case of FOUNDATION fieldbus, PROFIBUS, Modbus communication				
													1						Open drain pulse (equivalent to open collector pulse) (standard)				
Communication interface																			Voltage pulse				
														1					HART communication				HART protocol version 7, Bell202
														2					FOUNDATION fieldbus H1 communication (※3)				ITK version6
														3					PROFIBUS PA communication (※3)				Profile version3.02
Explosionproof rating																			Modbus communication (※3)				RS-485 Modbus protocol
																			0 Non-explosionproof				
																			1 TIIS (※6)				
																			2 ATEX, IECEx				
																			3 KOSHA/KTL (※6, ※7)				
																			4 CSA (※6, ※7)				
																			5 GOST (※6, ※7)				
Explosionproof temperature class																			7 NEPSI (※6, ※7)				In preparation
																			0 Non-explosionproof				
																			1 Sensor unit: Temp. class T1, separate transmitter only, CA100 to CA150 (high temp. service model) only				
																			2 Sensor unit: Temp. class T2, separate transmitter only				
																			3 Sensor unit: Temp. class T3, separate transmitter only				
																			4 Sensor unit: Temp. class T4				
																			5 Sensor unit: Temp. class T5, (−200°C to +50°C), Low temp. explosionproof service only				

※1: Explosionproof specifications are restricted based on temperature class.

※2: If temperature of the fluid exceeds 80°C, only "Separately mounted" type is available for the transmitter construction.

※3: When FOUNDATION fieldbus, PROFIBUS, or Modbus is selected for communication interface, product code categories of analog output is "X" and pulse output is "X" (pulse output type: "0").

※4: When "Volume flow (fixed density)" is selected for analog output or pulse output, fixed density will be applied.

※5: Simultaneous output of both "Volume flow (fixed density)" and "Volume flow (true density)" for analog output and pulse output is not available.

※6: "2" and "3" for the product code ⑱ are not available. (in preparation)

※7: CA15H to CA250 models are not applicable. (in preparation)

■ Explosionproof specification

(1) TIIS Explosionproof

● Integral type

- Transmitter symbol: Ex d [ib] IIC T4 X
- Transmitter and detector ambient temperature: -40°C to +55°C
- Explosionproof applied temperature: +59°C
- Detector symbol: Ex ib IIB/IIC T4
- Communication: HART, Modbus

※ When the ambient temp. exceeds 45°C, make sure to use power source and output cable with heat-resistant of +75°C and over.

※ If the group of the detector is IIB, compatible gas subject to explosionproof configuration is limited to IIB as well.

● Separate type

- Transmitter symbol: Ex d [ib] IIC T6 X
- Transmitter ambient temp.: -40°C to +55°C
- Detector symbol: Ex ib IIB/IIC T1, T2, T3, T4, T5
- Communication: HART, Modbus

※ When the ambient temp. exceeds 45°C, make sure to use power source and output cable with heat-resistant of +75°C and over.

※ Explosion specifications such as group, temperature class, ambient temperature, and fluid temperature vary depending on the combination of transmitter and detector.

Refer to the table below for the explosionproof specification of each combination. The blank cells indicate unavailable combination.

	Temperature class (Xmtr-detector: spec.)	T1 (Xmtr-detector: separate type)		T2 (Xmtr-detector: separate type)		T3 (Xmtr-detector: separate type)	
	Group	IIB	IIC	IIB	IIC	IIB	IIC
Model Ambient temp./ Fluid temp.	CA00A	—	—	—	—	-40°C to +60°C/ -40°C to +150°C	—
	CA001	—	—	—	—		—
	CA003	—	—	—	-20°C to +60°C/ -20°C to +200°C	—	-20°C to +60°C/ -20°C to +150°C
	CA006/CA010	—	—	-20°C to +60°C/ -20°C to +200°C	—	-40°C to +60°C/ -40°C to +150°C	—
	CA015	—	—		—		—
	CA025	-20°C to +60°C/ -20°C to +350°C	—		—		—
	CA040/CA050		—		—		—
	CA080	—	-20°C to +60°C/ -20°C to +350°C		—		—
	CA100/CA150	—		—	-40°C to +60°C/ -40°C to +200°C	—	-40°C to +60°C/ -40°C to +150°C
	CA15H/CA200	—	—	—			
	CA20H/CA250	—	—	—			

	Temperature class (Xmtr-detector: spec.)	T4 (Xmtr-detector: integral type)		T4 (Xmtr-detector: separate type)		T5 (Xmtr-detector: separate type)	
	Group	IIB	IIC	IIB	IIC	IIB	IIC
Model Ambient temp./ Fluid temp.	CA00A	—	—	-40°C to +60°C/ -40°C to +80°C	—	—	—
	CA001	—	—		—	—	—
	CA003	—	—	—	-20°C to +60°C/ -20°C to +90°C	—	—
	CA006/CA010	-20°C to +60°C/ -20°C to +80°C	—	-40°C to +60°C/ -40°C to +80°C	—	—	—
	CA015		—		—	—	—
	CA025		—		—	—	-20°C to +50°C/ -200°C to +50°C
	CA040/CA050		—	-40°C to +60°C/ -40°C to +70°C	—	—	
	CA080		—	-40°C to +60°C/ -40°C to +80°C	—	—	
	CA100/CA150	—	-40°C to +60°C/ -40°C to +80°C	—	-40°C to +60°C/ -40°C to +80°C	—	
	CA15H/CA200	—		—		—	
	CA20H/CA250	—		—		—	

(2) ATEX, IECEx Explosionproof

● Integral type

- Transmitter symbol: II2G Ex d ib IIC T4 Gb
- Transmitter and detector ambient temperature: -40°C to +55°C
- Fluid temperature: -40°C to +80°C
- Detector symbol: II2G Ex ib IIC T4
- Detector to be connected: CA006 to CA250
- Communication: HART, Modbus, PROFIBUS and FOUNDATION fieldbus (FISCO)

● Separate type

- Transmitter symbol: II2G Ex d [ib] IIC T6 Gb
- Transmitter ambient temperature: -40°C to +55°C
- Detector symbol: II2G Ex ib IIC T1, T2, T3, T4, T5
- Communication: HART, Modbus, PROFIBUS and FOUNDATION fieldbus (FISCO)

Detector ambient temperature (Separate type only)	-40°C to +60°C -20°C to +50°C	Other than high temperature sensors High and low temperature sensors
Fluid temperature (Separate type only)	Temperature class: T1	-20°C to +350°C: CA025 to CA150
	Temperature class: T2	-40°C to +200°C: CA003 to CA250
	Temperature class: T3	-40°C to +130°C
	Temperature class: T4	-40°C to +80°C
	Temperature class: T5	-200°C to +50°C: CA025 to CA250

(3) KOSHA/KTL Explosionproof**● Integral type**

- Transmitter symbol: Ex d IIC T4
- Transmitter and detector ambient temperature: –40°C to +55°C
- Fluid temperature: –40°C to +80°C
- Detector symbol: Ex ib IIC T4
- Detector to be connected: CA006 to CA250
- Communication: HART, Modbus

● Separate type

- Transmitter symbol: Ex d [ib] IIC T6
- Transmitter ambient temp.: –40°C to +55°C
- Detector symbol: Ex ib IIC T1, T2, T3, T4, T5
- Communication: HART, Modbus

Detector ambient temperature (Separate type only)	–40°C to +60°C –20°C to +50°C	Other than high and low temperature sensors High and low temperature sensors
Fluid temperature (Separate type only)	Temperature class: T1	–20°C to +350°C: CA025 to CA150
	Temperature class: T2	–40°C to +200°C: CA003 to CA250
	Temperature class: T3	–40°C to +130°C
	Temperature class: T4	–40°C to +80°C
	Temperature class: T5	–200°C to +50°C: CA025 to CA250

(4) CSA Explosionproof**● Integral type**

- Transmitter symbol: Class I, Zone 1, Ex d ib IIB T4 Gb
Class I, Zone 1, AEx d ib IIB T4 Gb (Integral type)
- Transmitter and detector ambient temperature: –40°C to +55°C
- Fluid temperature: –40°C to +80°C
- Detector symbol: Class I, Zone 1, Ex ib IIB T4 Gb
Class I, Zone 1, AEx ib IIB T4 Gb
- Detector to be connected: CA006 to CA150
- Communication: HART, Modbus

● Separate type

- Transmitter symbol: Class I, Zone 1, Ex d [ib] IIB T6 Gb
Class I, Zone 1, AEx d [ib] IIB T6 Gb
- Transmitter ambient temp.: –40°C to +55°C
- Detector symbol: Class I, Zone 1, Ex ib IIC T1, T2, T3, T4, T5 Gb
Class I, Zone 1, AEx ib IIC T1, T2, T3, T4, T5 Gb
- Communication: HART, Modbus

Detector ambient temperature (Separate type only)	–40°C to +60°C –20°C to +50°C	Other than high and low temperature sensors High and low temperature sensors
Fluid temperature (Separate type only)	Temperature class: T1	–20°C to +350°C: CA025 to CA150
	Temperature class: T2	–40°C to +200°C: CA003 to CA150
	Temperature class: T3	–40°C to +130°C
	Temperature class: T4	–40°C to +80°C
	Temperature class: T5	–200°C to +50°C: CA025 to CA150

(5) GOST Explosionproof**● Integral type**

- Transmitter symbol: 1 Ex d ib IIC T4X
- Transmitter and detector ambient temperature: –40°C to +55°C
- Fluid temperature: –40°C to +80°C
- Detector symbol: 1 Ex ib IIC T4
- Detector to be connected: CA006 to CA150
- Communication: HART, Modbus

● Separate type

- Transmitter symbol: 1 Ex d [ib] IIC T6X
- Transmitter ambient temp.: –40°C to +55°C
- Detector symbol: 1 Ex ib IIC T1, T2, T3, T4, T5
- Communication: HART, Modbus

Detector ambient temperature (Separate type only)	–40°C to +60°C –20°C to +50°C	Other than high temperature sensors High and low temperature sensors
Fluid temperature (Separate type only)	Temperature class: T1	–20°C to +350°C: CA025 to CA150
	Temperature class: T2	–40°C to +200°C: CA003 to CA150
	Temperature class: T3	–40°C to +130°C
	Temperature class: T4	–40°C to +80°C
	Temperature class: T5	–200°C to +50°C: CA025 to CA250

(6) NEPSI Explosionproof**● Integral type**

- Transmitter symbol: Ex d ib IIC T4 Gb
- Transmitter and detector ambient temperature: –40°C to +55°C
- Fluid temperature: –40°C to +80°C
- Detector symbol: Ex ib IIC T4 Gb
- Detector to be connected: CA006 to CA080
- Communication: HART, Modbus

● Separate type

- Transmitter symbol: Ex d [ib] IIC T6 Gb
- Transmitter ambient temp.: –40°C to +55°C
- Detector symbol: Ex ib IIC T1, T2, T3, T4, T5 Gb
- Communication: HART, Modbus

Detector ambient temperature (Separate type only)	–40°C to +60°C –20°C to +50°C	Other than high temperature sensors High and low temperature sensors
Fluid temperature (Separate type only)	Temperature class: T1	–20°C to +350°C: CA025 to CA150
	Temperature class: T2	–40°C to +200°C: CA003 to CA150
	Temperature class: T3	–40°C to +130°C
	Temperature class: T4	–40°C to +80°C
	Temperature class: T5	–200°C to +50°C: CA025 to CA150

(Fill in the form below to the extent possible. Further details will be finalized in later consultation.)

- Fill in the blanks. Tick the boxes ☐ that apply.

1. Sensor unit	CA		
2. Process fluid (※1)	Name: SP. gr : Viscosity : Concentration : %		
3. Flow range	Max. Normal Full scale ☐ kg/h ☐ Others		
4. Fluid temperature	Max. °C Normal °C Min. °C		
5. Operating pressure	Max. MPa Normal MPa Min. MPa		
6. Ambient temperature	Max. °C Min. °C		
7. Fluid flow direction	☐ Left → Right ☐ Right → Left ☐ Bottom → Top (☐ Top → Bottom) Orientation: See sketch on page 23.		
8. Nominal size	mm or inch		
9. Required accuracy	± % of reading ± % of full scale		
10. Process connection	☐ Flanged connection (Flange rating) ☐ Ferrule connection ☐ Screw connection		
11. Explosionproof	☐ Not required ☐ TIIS ☐ ATEX ☐ IECEx ☐ KOSHA ☐ CSA ☐ GOST ☐ NEPSI		
12. Power supply	V ☐ AC ☐ DC		
13. Output specifications	Pulse output	☐ Volt. pulse: [0]: 1.5V [1]: 13VDC min. Out. impedance: 2.2kΩ	
		☐ Open drain output (equivalent to open collector output) [Min.10V to Max. 30V, 50mADC, ON resistance 0.6Ω or less]	
		☐ Output frequency: Any point from 0.1 to 10000Hz at full scale Two outputs from flow rate (mass or volume).	
	Analog output	4 to 20mADC Max. load: 600Ω	
		2 outputs from instant. flow rate (mass, volume), temp. or density (option)	
	Additional damping	0 to 200s. (variable)	
Alarm output	Slug flow	High g/mL	Low g/mL
14. Communication protocol	☐ HART ☐ FOUNDATION fieldbus ☐ PROFIBUS ☐ Modbus (Address:)		
15. Transmission length	Sensor unit () m	Transmitter () m	Receiving instrument
16. Receiver	☐ Totalizer ☐ Indicator ☐ Recorder ☐ Flow controller ☐ Batch controller		
	☐ Density computer ☐ Computer ☐ Others		
17. Exclusive cable length	In case of separately- mounted type m (Max. 200m)		
18. In case of separate type transmitter	☐ Stanchion type w/bracket and 2" U bolts		
19. No. of units required			
20. Application			
21. Other considerations			
22. Pressure-resistant packing	☐ Standard ☐ ATEX directive compliant ☐ ATEX directive compliant for earthed cable		

*1: Special fluids, such as of high viscosity or slurries, should be stated precisely and in detail.

The specification as of July, 2015 is stated in this GS Sheet. Specifications and design are subject to change without notice.

Sales Representative:

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