

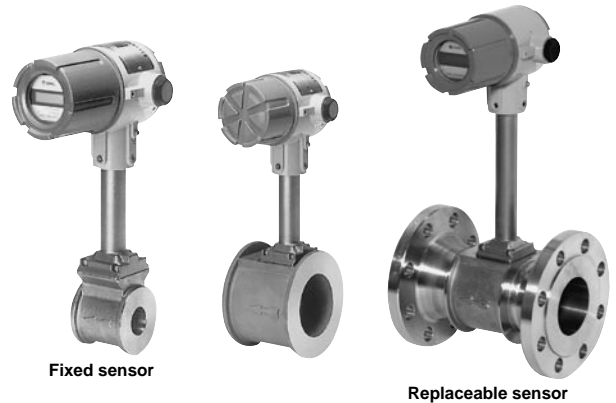


**Excellent Vortex Flowmeter
SMART TYPE EX DELTA II
SMART TYPE EX DELTA II DIA**

**GENERAL SPECIFICATION
GS.No.GBD642E-2**

GENERAL

The smart type EX DELTA II has been evolved with the smart functions of various conversion computing, intelligent functions of setting, changing, self-diagnosis and loop check with calling of range and every factor to be entered. Furthermore, additionally provided communication function utilizing a Smart Communication Unit (EL2310), can execute those operations such as setting and calling of each parameter and also communication with an upper ranked computer. There are two types of the sensors, one is fixed type and the other is replaceable type. In case of the latter, check and replacement are possible without interrupting flow measurement.



FEATURES

1. Materialization of 2 wires transmission system for cost reduction and simplification of a system to be applied.
2. Ease to data setting.
3. Maintenance cost saving means increase of security operation.
4. Maintenance operation such as range and parameter setting, and calibration can be performed.

GENERAL SPECIFICATIONS

EX DELTA II Meter Body

Item	Description		
Sensor type	Fixed sensor	Fixed sensor	Replaceable sensor
Nominal size (mm)	10, 15, 25, 40, 50, 80, 100, 150	15, 25, 40, 50, 80, 100, 150, 200, 250, 300	15, 25, 40, 50, 80, 100, 150, 200, 250, 300
Body style	Wafer type (* 10)	Flanged type (RF is standard)	
Flange rating	JIS10, 16, 20, 30K ASME/JPI150, 300 DIN PN10, 16, 25, 40		
St'd. connecting pipe	Nominal wall thickness Sch. 40 (* 1)		
Applicable fluid	Liquids, gases and steam (* 2)		
Flow range	See flow range table (P5, 6, 7, 8)		
Operating temp. range (* 3)	Ambient temperature type : -30 to +120°C Standard type : -30 to +300°C		Standard type : -30 to +300°C High temp. type : -30 to +460°C (* 4)
Max. operating pressure	Depends on flange rating (Design pressure : 5.00MPa)		
Accuracy (*10)	Refer to the following table. If multiple choices are available for accuracy, the flow range is different.		
	Nom. size (mm)	10	15, 25, 40, 50
	Applicable fluid	10	15, 25, 40, 50
	Liquids	±2% of full scale or better (* 5)	±1% of reading or better (* 7) ±1% of full scale or better (* 6) (* 8)
	Liquids (Applicable to high accuracy.)	—	±0.75% of reading or better (* 7) ±0.75% of full scale or better (* 6) (* 8)
	Gases (Standard)	±2% of full scale or better (* 5)	±1% of reading or better (* 7) ±1% of full scale or better (* 6) (* 8)
Steam (Standard)	—	—	
gases and steam (Max. flow velocity : 80m/s)	—	—	±1.5% of reading or better (* 7) ±1.5% of full scale or better (* 6) (* 8)
Repeatability	±0.2% or better		
Material	Body	SCS14A	SUS316 or SCS14A (Nom. size 200 to 300mm...Flange material is SUS316 or SFVC2A.)
	Bluff body (Delta shaped)	SUS316 or SCS14A	
	Adapter	SUS304 or SCS13A	
Installation	No restrictions to cause loss of accuracy on physical orientation (Maintainability and waterproof work for cable entry should be taken into consideration)		
Finish	Nominal size 200 to 300mm :Phthalate resin finished Munsell 2.5G8/2 (SFVC2A only)		

- * 1: If different from piping of standard nominal wall thickness, consult the factory.
- * 2: With 15mm, steam is not measurable.
- * 3: With nominal size 200 to 300mm and flange material SFVC2A, the allowable operating temperature covers a range above 0°C due to temperature limitations by flange material.
- * 4: In case of explosionproof use, the max. operating temp. is 420°C.
- * 5: Rated maximum flow regardless of the meaning of full scale and output specification.
- * 6: Full scale means rated maximum flowrate in case of pulse and analog full scale setting in case of analog.
- * 7: ±0.1% of full scale is added in case of analog output.
- * 8: With analog output
If the maximum operating flowrate (full scale) ÷ Minimum flowrate is 4 or less even if the flow range is within ±1% of full scale, ±2% of full scale shall be adopted. However, the maximum operating flowrate (full scale) shall be greater than the lower limit ±1% of reading.
- * 9: Calibration under actual flow test is required.
- * 10: As nominal size 10mm is based on ASME and JPI standards, nominal size of the piping connected shall be 15mm for standard.
- * 11: If you want to use the instrument for gas and steam measurement in the region of high pressure (high Reynolds number: 2.8x10⁶ or over), contact OVAL.

● EX DELTA II ● DIA Meter Body

Item	Description		
Sensor type	Fixed sensor	Fixed sensor	Replaceable sensor
Nominal size	15, 25, 40, 50, 80mm	50, 80mm	50, 80mm
Body style	Wafer type	Flanged type (RF is standard.)	Flanged type (RF is standard.)
Flange rating	JIS 10, 16, 20, 30K ASME/JPI 150, 300		
Applicable fluid	Liquids		
Materials	Body	SUS316 or SCS14A	
	Bluff body (Diamond shaped)	SUS316	
	Adapter	SUS304 or SCS13A	
Accuracy	Depends of use conditions (flow range). ① ±1% of reading or better (±0.1% of full scale is added in case of analog output.) ② ±1% of full scale or better (*2) (*3)		
Finish	Not painted (because of stainless steel material)		

*1: Items other than above are common with that of EX DELTA II bodies.

*2: Full scale means rated maximum flowrate in case of pulse and analog full scale setting in case of analog.

*3: With analog output

If the maximum operating flowrate (full scale) ÷ Minimum flowrate is 4 or less even if the flow range is within ±1% of full scale, ±2% of full scale shall be adopted. However, the maximum operating flowrate (full scale) shall be greater than the lower limit ±1% of reading.

■ CONVERTER SPECIFICATIONS

Item	Description	
Model	PA25 (No Display)	PA25S (w/Totalizer, Digital Indicator)
Mounting	Select one of the following : ① Integral with flowmeter ② Separate type (installed on 2" pipe)	
Waterproof configuration	IP66 (dusttight/weathertight)-IEC/EN 60529, JIS C 0920 -- NEMA TYPE 4X	
Explosionproof configuration	Select one of the followings : ① Non-explosionproof configuration ④ Flameproof configuration FM : Class 1, Div.1 Groups B, C & D ② Flameproof configuration TIIS: Exd IIB+H2T4 ⑤ Flameproof configuration NEPSI : Exd IIB+T4Gb ③ Flameproof configuration ATEX : II2G Exd IIB+H2T6 to T1 ⑥ Flameproof configuration KOSHA : Exd IIB+H2T6	
Ambient temperature	Non-explosionproof configuration : -40 to +80°C Explosionproof configuration : -20 to +60°C	Non-explosionproof configuration : -20 to +60°C Explosionproof configuration : -20 to +60°C
Ambient humidity	5 to 100%RH without dew condensation	
Material	Aluminum alloy	
Housing finish	Finished in baked melamine Finish Munsell 10B8/4 (Cover : Munsell 2.5PB4/10)	
Output (Choose any of the following.)	Current signal	Current signal, 2-wire type (used in common with power line) ① Compensated pulse (factored pulse), Pulse level: [0]: 4mA, [1]: 20mA Pulse width: 10 to 1000ms (Standard 50ms) ② Uncompensated pulse (vortex synchronized pulse), Pulse level: [0]: 4mA, [1]: 20mA, Pulse width: 200* ③ Analog 4 to 20mADC at 0 to FS, Time constant: 0 to 100s (Standard: 2.5s)
	Open collector pulse	3-wire type, NPN transistor output (Max. impressed voltage: 30VDC, Allowable current: 50mA, ON voltage: 1.5VDC or less) ① Compensated pulse (factored pulse), Pulse width: 10 to 1000ms (Standard 50ms) ② Uncompensated pulse (vortex synchronized pulse), Pulse width: 200* * : 100µs
Display (Option)	Display : 7 segments LCD Content : One of the following 4 displays is possible with switching over of an internal switch or a EL2310 ① Totalizing flow throughput : 6 digits Unit of totalizing : Same as scaled pulse output Unit of flow rate indication : Refer to (*2) · Upon power interruption, Totalized counts are held by non-volatilized memory · Totalized counts are resettable by an internal switch or EL2310 ② Actual instantaneous flowrate : 7 digits (3 1/2 digits are effective) Unit of flow rate indication : Refer to (*2) ③ % Instantaneous flowrate : Unit of display : % FS Resolution on display : 0.1% Full scale : Same as that of analog output ④ 8 scaled % Bar graph Display : % FS Full scale : Same as that of Analog output	
Power supply	12 to 45V DC (See Load Resistance Range curve) NOTE: If you connect OVAL communication unit EL2310, use power supply below 33V DC.	
Cable entry	G1/2 internal threads (Flameproof configuration TIIS and NEPSI converter is furnished with pressuretight gasket lead-in) In case of FM approved flameproof configuration, an NPT1/2 female adapter is bonded in place.	
Cable (*1)	Converter to receiving instrument : 1.25mm ² Min., 2-conductor shield cable (analog, voltage pulse type), 3-conductor shield cable (open collector pulse type) Sensor to converter : 1.25mm ² Min., 3-conductor shield cable (applicable to separate type) Finished cable outside diameter : Non-explosionproof φ 13.5mm Max Flameproof φ 8.5 to φ 11mm	
Transmission length	Converter to receiving instrument : 1km Max Sensor to converter : 200m Max (applicable to separate type)	
Communication	HART Protocol Communication (*3)	
Computation	· Actual flow rate computation (Liquid, Gas, Steam) · Temp./Press. correcting computation (Gas)	

Unit of Indicated Flowrate	Top : Instantaneous flowrate units Bottom : Total flow units	Calculation of actual flow	Calculation corrected for temp. and press.
L/min, L/h, m ³ /min, m ³ /h, kL/min, kL/h		○	×
L, m ³ , kL		○	×
L/min (normal), L/h (normal), m ³ /min (normal), m ³ /h (normal),		×	○
L (normal), m ³ (normal)		○	○
g/min, g/h, kg/min, kg/h, t/min, t/h		○	○
g, kg, t		○	○
ton (US)/min, ton (US)/h		○	○
ton (US)		○	○
gal (US) /min, gal (US) /h		○	×
gal (US)		○	×
ft ³ /sec, ft ³ /min, ft ³ /h,		○	×
ft ³		○	×
SCFS (=ft ³ /sec [standard]), SDFM (=ft ³ /min [standard]), SCFH (=ft ³ /h [standard])		×	○
SCFT (=ft ³ [standard])		×	○
lb/min, lb/h		○	○
lb		○	○

*1: In case of TIIS explosionproof type used under the ambient temperature of 50°C or higher, use a cable resistant to the temperature of 70°C or higher.

*2: Unit of Totalized flow counts of Flow and Instantaneous Flowrate Indication can be selected from following table.

*3: In case a specification for Pulse output is given, Communication function is available only under the following conditions:

- ① During flow interruption
- ② Upon Power "ON" (Continuous communication is available if starts within 15 sec. after Power "ON")

● Guidelines to set the analog output and indicator full scale are given below:
3 times the minimum flowrate ≤ Full scale ≤ 1.3 times the max. flowrate. For minimum and maximum flowrates, refer to the section "Flow Ranges".
If you want to set up a full scale outside the range above, consult the factory.

■ CONFORMITY EN DIRECTIVES

Applicable EU Directive	EMC Directive : (2004/108/EC) ATEX Directive : (94/9/EC)
Applicable EN Standards	EMC Directive : EN55011 : 1998/A1 : 1999, Group 1, Class B EN61000-6-2 : 1999 ATEX Directive : EN60079-0 : 2006 EN60079-1 : 2007

● Flange Rating and Max. Operating Pressure (MPa)

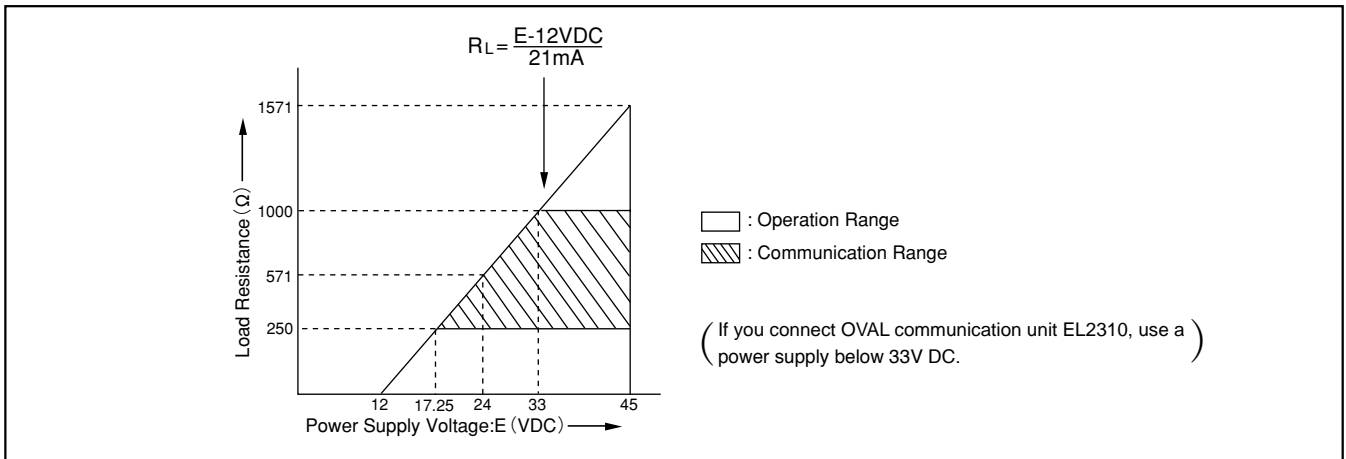
Nominal size 10 to 300mm (with material SUS316 or SCS14A)

Flange Rating Operating Temperature	JIS10K	JIS16K	JIS20K	JIS30K	ASME/ JPI 150	ASME/ JPI 300	DIN PN10	DIN PN16	DIN PN25	DIN PN40
Below 120°C	1.40	2.70	3.40	5.00	1.50	3.93	0.74	1.19	2.05	2.99
Below 220°C	1.18	1.96	2.45	4.51	1.27	3.35	0.62	1.00	1.78	2.50
220 to 300°C	0.98	1.77	2.26	4.22	1.02	3.06	0.56	0.90	1.61	2.26
300 to 350°C	—	1.57	1.96	3.82	0.84	2.96	—	—	—	—
350 to 420°C	—	—	—	2.94	0.57	2.81	—	—	—	—
420 to 460°C	—	—	—	—	0.42	2.71	—	—	—	—

Nominal size 200 to 300mm (with flange material SFVC2A)

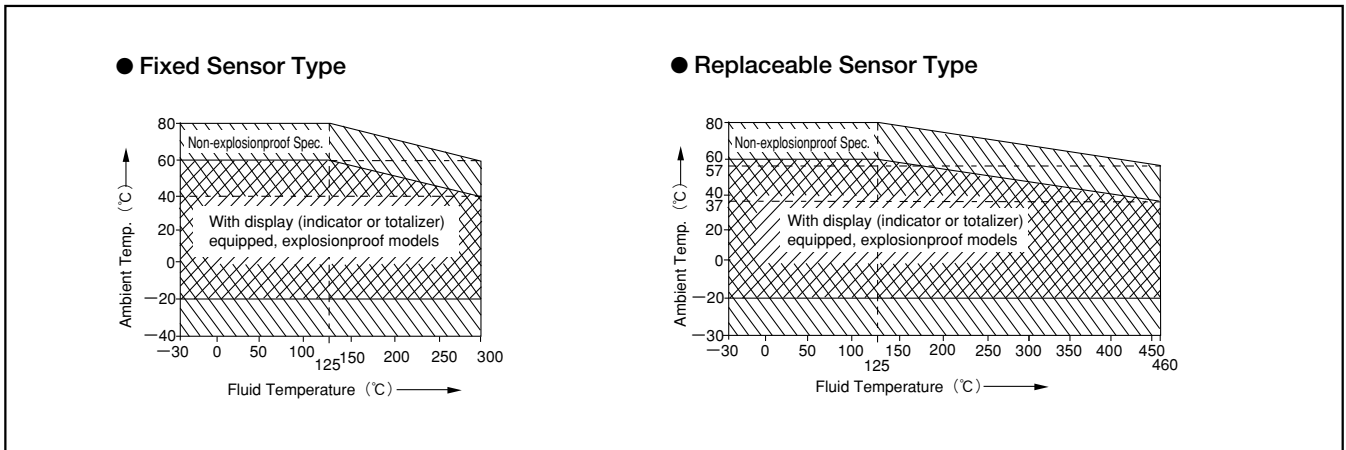
Flange Rating Operating Temperature	JIS10K	JIS16K	JIS20K	JIS30K	ASME/JPI 150	ASME/JPI 300
Below 120°C	1.40	2.70	3.40	5.00	1.69	4.59
Below 220°C	1.18	2.45	3.04	4.51	1.32	4.31
220 to 300°C	0.98	2.26	2.84	4.22	1.02	3.87
300 to 350°C	—	2.06	2.55	3.82	0.84	3.70
350 to 420°C	—	1.57	1.96	2.94	0.56	2.88

● Acceptable Load Resistance Range



● Ambient Temperature Range

If the fluid temperature exceeds 125°C, allowable ambient temperature is reduced as shown in the diagram below.



■ SCALED PULSE UNITS AND TOTALIZED INDICATED UNITS

The table below shows the scaled pulse units and totalized indicated units in volume flowrate. For fixed conversion into units other than volume flowrate, such as normal flow rate, determine it by referring to Tables A through H.

Appli- cable Fluid	Nominal Size mm (inch)	Max. Rate m ³ /h (Unscaled pulse freq., Hz)	Nom. Meter Factor L/P (Nom. unscaled pulse unit)	Output Freq. (Hz) *1 Q : Volume flow m ³ /h	Converter PA25		
					Scaled Pulse unit		
					Min.	Standard	Max.
Liquids	10 (3/8)	2.8 (453.8)	0.001714	162Q	0.1 L/P	1 L/P	100 L/P
	15 (1/2)	6.0 (312.2)	0.005338	52.0Q	1 L/P	10 L/P	100 L/P
	25 (1)	20 (344.3)	0.01613	17.2Q	1 L/P	10 L/P	1 m ³ /P
	40 (1 1/2)	48 (292.7)	0.04556	6.10Q	10 L/P	100 L/P	1 m ³ /P
	50 (2)	79 (219.2)	0.1001	2.78Q	10 L/P	100 L/P	10 m ³ /P
	80 (3)	172 (143.6)	0.3328	0.835Q	10 L/P	100 L/P	10 m ³ /P
	100 (4)	296 (108.7)	0.7567	0.367Q	10 L/P	100 L/P	10 m ³ /P
	150 (6)	645 (74.0)	2.422	0.115Q	100 L/P	1 m ³ /P	100 m ³ /P
	200 (8)	1130 (44.7)	7.021	0.0396Q	100 L/P	1 m ³ /P	100 m ³ /P
	250 (10)	1750 (35.9)	13.54	0.0205Q	1 m ³ /P	1 m ³ /P	1000 m ³ /P
300 (12)	2510 (30.0)	23.24	0.012Q	1 m ³ /P	1 m ³ /P	1000 m ³ /P	
Gases	10 (3/8)	8.5 (1378)	0.001714	162Q	1 L/P	10 L/P	100 L/P
	15 (1/2)	33 (1717)	0.005338	52.0Q	1 L/P	10 L/P	100 L/P
	25 (1)	130 (2339)	0.01613	17.2Q	10 L/P	100 L/P	1 m ³ /P
	40 (1 1/2)	290 (1768)	0.04556	6.10Q	10 L/P	100 L/P	1 m ³ /P
	50 (2)	490 (1360)	0.1001	2.78Q	100 L/P	1 m ³ /P	10 m ³ /P
	80 (3)	1380 (1152)	0.3328	0.835Q	100 L/P	1 m ³ /P	10 m ³ /P
	100 (4)	2370 (870.0)	0.7567	0.367Q	100 L/P	1 m ³ /P	10 m ³ /P
	150 (6)	5160 (591.8)	2.422	0.115Q	1 m ³ /P	10 m ³ /P	100 m ³ /P
	200 (8)	9100 (360)	7.021	0.0396Q	1 m ³ /P	10 m ³ /P	100 m ³ /P
	250 (10)	14000 (287)	13.54	0.0205Q	1 m ³ /P	10 m ³ /P	1000 m ³ /P
300 (12)	20100 (240)	23.24	0.012Q	1 m ³ /P	10 m ³ /P	1000 m ³ /P	

* 1: Depending on specials and the meter factor after meter calibration, the selectable factored pulse output units may vary.

■ EX DELTA II DIA FACTORED PULSE UNITS

Nominal Size mm (inch)	Max. Rate m ³ /h (Unfactored pulse freq., Hz)	Nom. Meter Factor (L/P)	Scaled pulse unit *		
			Minimum	Standard	Maximum
15 (1/2)	6.0 (322.5)	0.005168	1 L/P	10 L/P	100 L/P
25 (1)	20 (375.4)	0.01480	1 L/P	10 L/P	1 m ³ /P
40 (1 1/2)	48 (242.4)	0.05500	10 L/P	100 L/P	1 m ³ /P
50 (2)	79 (190.7)	0.1151	10 L/P	100 L/P	10 m ³ /P
80 (3)	172 (121.1)	0.3946	10 L/P	100 L/P	10 m ³ /P

Note: Unit of a built-in totalizer is same as the scaled pulse unit.

■ FLOW RANGES

● Liquid Service

Select the minimum flowrate from Table A (based on Sp. Gr.) or Table B (based on viscosity), whichever is greater.

Table A (based on specific gravity): EX DELTA II

Unit in m³/h

Nominal size mm	Sp. Gr.	Minimum flowrate							Max. Rate	
		0.5	0.6	0.7	0.8	0.9	1.0	1.1		1.2
10		0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	2.8
15		0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	6
25		1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.7	20
40		1.7	1.6	1.4	1.4	1.3	1.3	1.2	1.1	48
50		2.8	2.5	2.3	2.2	2.1	2.0	1.9	1.8	79
80		6.0	5.5	5.1	4.7	4.6	4.6	4.6	4.6	172
100		11	11	11	11	11	11	11	11	296
150		33	33	33	33	33	33	33	33	645
200		68	62	57	54	51	48	46	44	1130
250		149	136	126	118	111	106	101	96	1750
300		214	195	181	169	159	151	144	138	2510

Table A (based on specific gravity): EX DELTA II DIA

Unit in m³/h

Nominal size	Sp. Gr.	Minimum flowrate							Maximum Flowrate	
		0.5	0.6	0.7	0.8	0.9	1.0	1.1		1.2
15 (1/2)		0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	6
25 (1)		1.4	1.3	1.2	1.1	1.1	1.0	1.0	0.9	20
40 (1-1/2)		2.4	2.2	2.0	1.9	1.8	1.7	1.6	1.5	48
50 (2)		3.8	3.5	3.2	3.0	2.9	2.7	2.6	2.5	79
80 (3)		8.4	7.6	7.1	6.6	6.2	5.9	5.7	5.4	172

Table B (based on viscosity)

Unit in m³/h

Size mm	Accuracy	Viscosity mm²/s	Minimum flowrate											
			1	2	3	5	10	15	20	25	30	40		
10	± 2% FS													
	± 1% RD													
15	± 1% FS													
	± 1% RD													
25	± 1% FS													
	± 1% RD													
40	± 1% FS													
	± 1% RD													
50	± 1% FS													
	± 1% RD													
80	± 1% FS													
	± 1% RD													
100	± 1% FS													
	± 1% RD													
150	± 1% FS													
	± 1% RD													
200	± 1% FS													
	± 1% RD													
250	± 1% FS													
	± 1% RD													
300	± 1% FS													
	± 1% RD													

● In the shadowed area , determine on the basis of specific gravity (Table A).

● RD : Reading, FS : Full Scale

● Minimum measurable flowrate (minimum detectable flowrate)

Fluid (Viscosity 1mPa·s)

Unit in m³/h

Nominal size mm	Sp. Gr.	Measurable flowrate							
		0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2
10		0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
15		0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2
25		0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5
40		1.2	1.1	1.0	1.0	0.9	0.9	0.8	0.8
50		1.9	1.8	1.6	1.5	1.5	1.4	1.3	1.3
80		4.2	3.8	3.6	3.3	3.3	3.3	3.3	3.3
100		7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
150		24	24	24	24	24	24	24	24
200		48	43	40	38	36	34	32	31
250		105	95	88	83	78	74	71	68
300		150	137	127	118	112	106	101	97

●Gas Service

In this table, flow rates are specified in [actual] base. Therefore, in case of [normal] base, make sure to convert the flowrate to the [actual] and determine the flow range and the nominal diameter based on this table.

size mm	Accuracy	Dens.kg/m ³	Minimum flow rate (m ³ /h)										Max. flow rate (m ³ /h)
			0.38	0.7	1.2	2.0	3.6	6	11	19	34	(60)	
Table "C"	10	± 2% of Full scale	4.8	3.3	2.6	2.2	1.8	1.5	1.3	1.1	0.9	0.7	8.5
	15	± 1% of Reading	—	—	12	7.2	4.0	3.2	2.6	2.2	1.8	1.5	33
		± 1% of Full scale	9.4 ⊙	6.9 ⊙	5.4 ⊙	4.6	3.8	3.2	2.6	2.2	1.8	1.5	
	25	± 1% of Reading	68	37	22	13	10	8	7	6	5	4	130
		± 1% of Full scale	23	17	13	12	10	8	7	6	5	4	
	40	± 1% of Reading	110	57	33	20	16	13	11	9	8	6	290
		± 1% of Full scale	39	29	23	19	16	13	11	9	8	6	
	50	± 1% of Reading	134	73	43	31	26	22	18	15	12	10	490
		± 1% of Full scale	63	46	37	31	26	22	18	15	12	10	
	80	± 1% of Reading	200	108	80	67	56	47	38	32	26	22	1100 (1380)
		± 1% of Full scale	140	101	80	67	56	47	38	32	26	22	
	100	± 1% of Reading	260	174	140	115	95	80	66	55	45	37	1850 (2370)
		± 1% of Full scale	240	174	140	115	95	80	66	55	45	37	
	150	± 1% of Reading	520	380	300	260	210	180	150	120	110	110	4180 (5160)
	200	± 1% of Reading	900	670	520	440	370	310	250	250	250	250	7000 (9100)
	250	± 1% of Reading	2000	1470	1120	980	800	680	560	490	490	490	10500 (14000)
300	± 1% of Reading	2900	2100	1600	1400	1150	970	840	840	840	840	15000 (20100)	
Gas (Viscosity 0.017mPa·s)			Minimum flow rate (m³/h)										
Size mm	Dens. kg/m ³		0.38	0.7	1.2	2	3.6	6	11	19	34	60	
10			3.1	2.3	1.8	1.6	1.3	1.1	0.9	0.8	0.6	0.5	
15			6.5	4.8	3.7	3.2	2.7	2.2	1.8	1.5	1.3	1.1	
25			16	12	9.0	7.8	6.4	5.4	4.5	3.7	3.1	2.6	
40			27	20	16	14	11	9.1	7.4	6.2	5.1	4.3	
50			44	33	25	22	18	15	13	11	8.4	6.9	
80			96	71	54	47	39	33	27	23	19	16	
100			165	122	93	81	67	56	46	39	32	26	
150			359	265	202	176	145	122	100	83	69	57	
200			629	464	354	308	253	214	175	146	120	99	
250			1400	1030	738	681	560	472	386	322	265	220	
300			2000	1470	1130	976	803	677	553	461	380	315	
Table "D"	Type of Gas	Dens. kg/Nm ³	Gas pressure (MPa [gauge]) at 20°C										Gas viscosity
	Acetylene	1.175	—	—	0	0.08	0.23	0.55	0.9	1.65	3	—	0.00943 (mPa·s)
	Argon	1.785	—	—	—	0.02	0.12	0.26	0.55	1.05	2	3.6	0.0209
	Ammonia	0.771	—	0	0.07	0.21	0.42	0.75	1.45	2.55	4.6	—	0.0092
	Carbon Monoxide	1.250	—	—	0	0.07	0.21	0.42	0.85	1.55	2.8	—	0.0166
	Ethane	1.357	—	—	0	0.06	0.18	0.37	0.8	1.4	2.6	—	0.0085
	Ethylene	1.264	—	—	0	0.07	0.21	0.42	0.85	1.55	2.8	—	0.0097
	Air	1.293	—	—	0	0.07	0.20	0.4	0.85	1.5	2.7	—	0.017
	Oxygen	1.429	—	—	0	0.05	0.17	0.35	0.75	1.35	2.5	4.4	0.0192
	Hydrogen	0.0899	0.35	0.73	1.33	2.3	4.2	—	—	—	—	—	0.0084
	Carbon Dioxide	1.977	—	—	—	0.01	0.1	0.23	0.5	0.95	1.7	3.3	0.0138
	Nitrogen	1.251	—	—	—	0.07	0.21	0.42	0.85	1.55	2.8	—	0.0166
	City Gas	0.802	—	0	0.06	0.17	0.38	0.7	1.4	2.45	4.5	—	0.01
	Natural Gas	0.828	—	0	0.06	0.16	0.37	0.68	1.35	2.4	4.3	—	0.0107
	Freon-12	5.533	—	—	—	—	0	0.02	0.12	0.27	0.56	1.1	0.0127
	Propane	2.020	—	—	—	0.01	0.09	0.22	0.49	0.9	1.7	3.2	0.0075
Butane	2.703	—	—	—	0	0.04	0.14	0.34	0.65	1.2	2.4	0.0069	
Methane	0.717	—	0	0.08	0.2	0.44	0.8	1.55	2.8	—	—	0.0103	

Note: In nominal size 15mm, figures marked ⊙ indicate ±2% of Full scale. Figures in brackets () in the max. rate indicate with ±1.5% of readings. Accuracy of 10mm in nom. size is ±2% or better with respect to the max. rated flowrate.

How to Determine the Minimum Flowrate

Find a value nearest (lower side) to the applicable gas pressure in Table D, follow the same column upwards and find a value intersecting the desired nominal size in Table C for the minimum flow rate. If it is desired to determine the minimum flow rate more accurately, calculate it as follows:

EXAMPLE 1

Find the minimum flow rate where: Fluid:Air, Temperature:20°C, Pressure:0.5MPa (gauge) and nominal size: 80mm.

SOLUTION:Minimum flow rate at 0.4MPa and 0.85MPa of air with respect to nominal diameter 80mm in Table D are 47m³/h and 38m³/h, respectively, from Table C. The minimum flow rate at 0.5MPa is therefore determined in proportion to as follows:

$$Q_{min} = 38 + \frac{0.85 - 0.5}{0.85 - 0.4} \times (47 - 38) \approx 45m^3/h$$

It can also be determined by calculating the actual density. Actual density of air ρ at 20°C at 0.5MPa is

$$\rho = 1.293 \times \frac{273.15}{273.15 + 20} \times \frac{0.1013 + 0.5}{0.1013} \approx 7.04kg/m^3$$

From Table C, the minimum flow rate at a density of 6 and nominal size 80mm is 47m³/h; at a density of 11 is 38m³/h. The minimum flow rate at a density of 7.04 therefore can be found in proportion to as follows:

$$Q_{min} = 38 + \frac{11 - 7.04}{11 - 6} \times (47 - 38) \approx 45m^3/h$$

EXAMPLE 2

Find the minimum flow rate and applicable nominal size where: Fluid:Carbon dioxide, Temperature: 5 to 30°C, Pressure 0.8 to 1.5MPa, Max. flow rate:1800m³/h(normal)

SOLUTION:First,we find the actual max. flow rate and determine the nominal diameter. If there is some latitude in temperature and pressure, the maximum flow rate should be calculated on the basis of the high end in temperature and the low end in pressure. The actual maximum flow rate is therefore computed as follows:

$$Q_{Max.} = 1800 \times \frac{273.15 + 30}{273.15} \times \frac{0.1013}{0.1013 + 0.8} \approx 228m^3/h$$

It follows that the nominal size is 40mm and the minimum flow rate is based on the low end in temperature and the high end in pressure. From Tables D and C, the minimum flow rate at 40mm size and 0.95MPa pressure is 9m³/h, at 1.7MPa, it is 8m³/h. We then obtain the minimum flow rate in proportional way as:

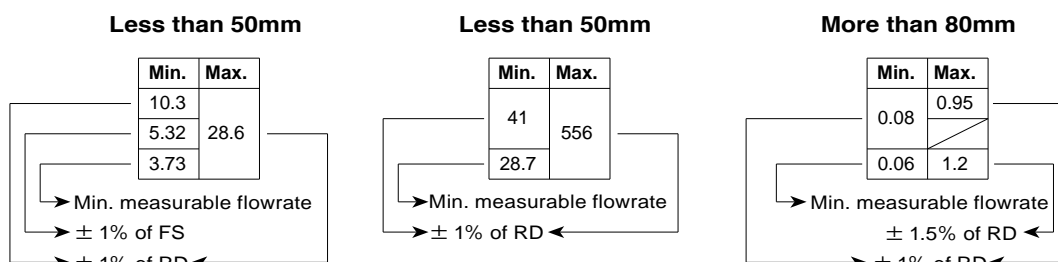
$$Q_{min} = 8 + \frac{1.7 - 1.5}{1.7 - 0.95} \times (9 - 8) \approx 8.3m^3/h$$

NOTE:In cases where obtained results of calculation are figures with decimal places, round off fraction below the decimal point in the maximum flow rate, or round out fractions to a round number in the minimum flow rate.

● Saturated Steam Service

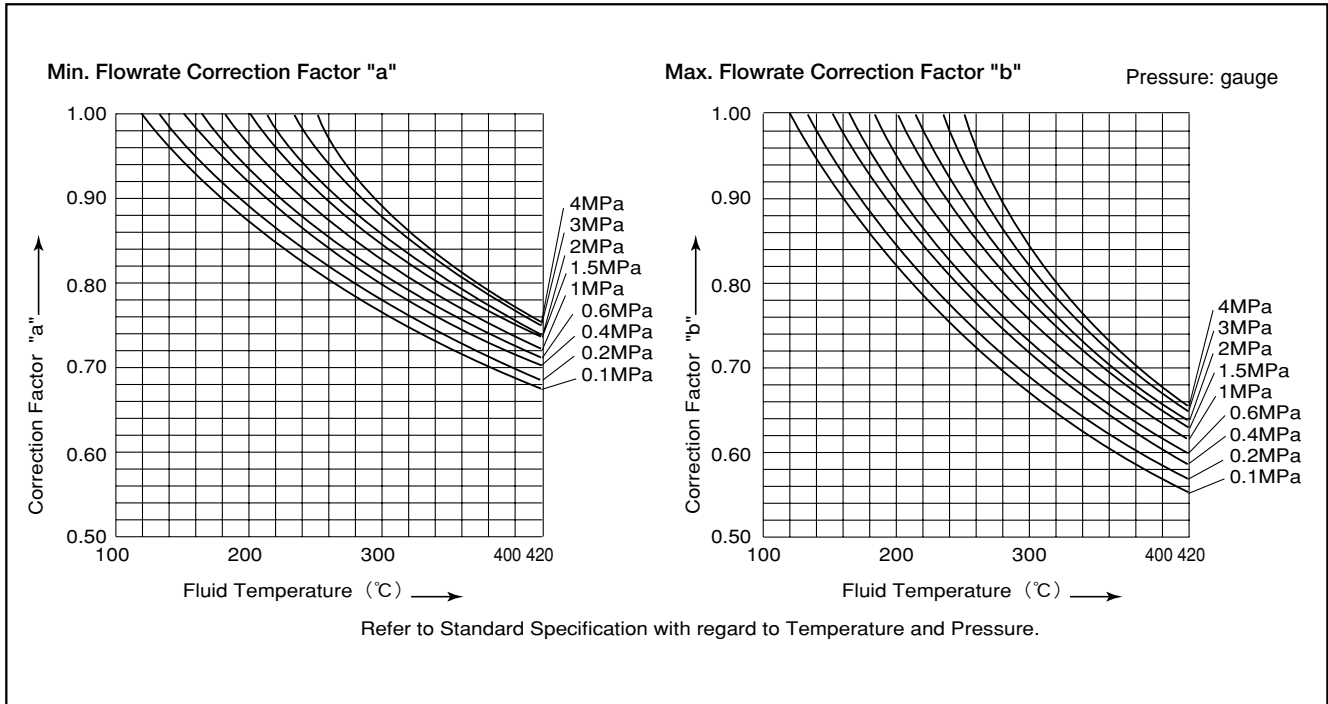
Pressure MPaG	Unit : kg/h								Unit : t/h											
	15mm (1/2")		25mm (1")		40mm (1 1/2")		50mm (2")		80mm (3")		100mm (4")		150mm (6")		200mm (8")		250mm (10")		300mm (12")	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
0.05	10.3	28.6	18.8	113	29.1	252	37.2	426	0.08	0.95	0.14	1.6	0.3	3.63	0.52	6.08	1.15	9.13	1.64	13
	5.32		13.1		22		35.9		0.06	1.2	0.1	2.06	0.21	4.48	0.37	7.91	0.8	12.1	1.15	17.4
	3.73		9.15		15.4		25.2		0.06	1.2	0.1	2.06	0.21	4.48	0.37	7.91	0.8	12.1	1.15	17.4
0.1	10.6	37.4	19.4	147	30	329	41	556	0.1	1.24	0.16	2.1	0.34	4.74	0.59	7.95	1.31	11.9	1.88	17
	6.08		15		25.1		32.7		0.07	1.56	0.11	2.69	0.24	5.86	0.42	10.3	0.914	15.9	1.32	22.8
	4.26		10.5		17.6		28.7		0.07	1.56	0.11	2.69	0.24	5.86	0.42	10.3	0.914	15.9	1.32	22.8
0.2	11	54.7	20.2	215	33	480	53.9	812	0.12	1.82	0.21	3.06	0.45	6.92	0.78	11.6	1.72	17.4	2.46	24.8
	7.99		19.7		23.1		37.8		0.09	2.28	0.15	3.92	0.31	8.55	0.55	15	1.21	23.2	1.73	33.3
	5.6		13.8		23.1		37.8		0.09	2.28	0.15	3.92	0.31	8.55	0.55	15	1.21	23.2	1.73	33.3
0.3	11.4	71.5	23.5	282	39.4	629	64.5	1060	0.15	2.38	0.25	4.01	0.53	9.06	0.93	15.1	2.06	22.7	2.95	32.5
	9.56		16.5		27.6		45.2		0.1	2.99	0.18	5.14	0.38	11.1	0.65	19.7	1.44	30.3	2.07	43.6
	6.7		16.5		27.6		45.2		0.1	2.99	0.18	5.14	0.38	11.1	0.65	19.7	1.44	30.3	2.07	43.6
0.4	11.7	88.2	27	347	45.3	775	74.2	1310	0.17	2.94	0.28	4.94	0.61	11.1	1.07	18.7	2.37	28	3.39	40.1
	11		18.9		31.8		51.9		0.12	3.69	0.2	6.33	0.43	13.8	0.75	24.3	1.66	37.4	2.37	53.7
	7.7		18.9		31.8		51.9		0.12	3.69	0.2	6.33	0.43	13.8	0.75	24.3	1.66	37.4	2.37	53.7
0.5	12.4	104	30.3	412	50.8	920	83.2	1550	0.19	3.49	0.32	5.87	0.69	13.2	1.2	22.2	2.65	33.3	3.8	47.6
	8.63		21.2		35.6		58.2		0.13	4.38	0.22	7.52	0.48	16.3	0.84	28.8	1.86	44.4	2.66	63.8
	8.63		21.2		35.6		58.2		0.13	4.38	0.22	7.52	0.48	16.3	0.84	28.8	1.86	44.4	2.66	63.8
0.6	13.6	121	33.4	477	56	1060	91.6	1790	0.21	4.04	0.35	6.79	0.76	15.3	1.32	25.7	2.92	38.5	4.19	55
	9.51		23.4		39.2		64.1		0.15	5.06	0.25	8.7	0.53	18.9	0.93	33.4	2.05	51.4	2.93	73.8
	9.51		23.4		39.2		64.1		0.15	5.06	0.25	8.7	0.53	18.9	0.93	33.4	2.05	51.4	2.93	73.8
0.8	16	153	39.1	605	65.6	1350	108	2280	0.24	5.12	0.41	8.62	0.89	19.4	1.55	32.6	3.42	48.9	4.91	69.9
	11.2		27.4		46		75.2		0.17	6.43	0.29	11	0.62	24	1.09	42.4	2.4	65.2	3.44	93.6
	11.2		27.4		46		75.2		0.17	6.43	0.29	11	0.62	24	1.09	42.4	2.4	65.2	3.44	93.6
1	18.1	186	44.4	733	74.6	1630	122	2760	0.27	6.2	0.46	10.4	1.01	23.5	1.76	39.4	3.89	59.2	5.57	84.6
	12.7		31.1		52.2		85.4		0.19	7.78	0.33	13.3	0.71	29.1	1.23	51.3	2.72	78.9	3.9	113
	12.7		31.1		52.2		85.4		0.19	7.78	0.33	13.3	0.71	29.1	1.23	51.3	2.72	78.9	3.9	113
1.5	23	266	56.5	1050	94.8	2340	155	3960	0.35	8.89	0.59	14.9	1.28	33.8	2.24	56.6	4.94	84.9	7.08	121
	16.1		39.5		66.4		109		0.24	11.1	0.41	19.1	0.9	41.7	1.57	73.6	3.46	113	4.96	162
	16.1		39.5		66.4		109		0.24	11.1	0.41	19.1	0.9	41.7	1.57	73.6	3.46	113	4.96	162
2	27.5	347	67.4	1370	114	3050	185	5160	0.41	11.5	0.7	19.4	1.52	44	2.67	73.7	5.89	110	8.83	158
	19.2		47.2		79.2		130		0.29	14.5	0.49	24.9	1.07	54.3	1.87	95.9	4.13	147	6.18	211
	19.2		47.2		79.2		130		0.29	14.5	0.49	24.9	1.07	54.3	1.87	95.9	4.13	147	6.18	211
2.5	31.6	429	77.5	1690	131	3770	213	6370	0.47	14.3	0.81	24	1.75	54.3	3.3	91	6.78	136	10.9	195
	22.1		54.3		91.1		149		0.33	17.9	0.57	30.8	1.23	67.1	2.31	118	4.75	182	7.63	261
	22.1		54.3		91.1		149		0.33	17.9	0.57	30.8	1.23	67.1	2.31	118	4.75	182	7.63	261
3	35.5	511	87.1	2010	147	4490	240	7590	0.53	17	0.91	28.6	1.97	64.8	3.93	108	7.62	162	13	232
	24.9		61		103		168		0.37	21.4	0.64	36.7	1.38	80	2.75	141	5.34	217	9.09	311
	24.9		61		103		168		0.37	21.4	0.64	36.7	1.38	80	2.75	141	5.34	217	9.09	311
4	42.9	680	106	2670	177	5970	290	10100	0.64	22.6	1.09	38.1	2.38	86.1	5.22	144	10.1	216	17.3	309
	30.1		73.7		124		203		0.45	28.4	0.77	48.8	1.67	106	3.66	187	7.03	288	12.1	414
	30.1		73.7		124		203		0.45	28.4	0.77	48.8	1.67	106	3.66	187	7.03	288	12.1	414
5	50	854	123	3360	206	7500	337	12600	0.74	28.4	1.27	47.9	2.83	108	6.56	181	12.7	271	21.7	388
	35		85.8		145		236		0.52	35.7	0.89	61.3	1.98	133	4.59	235	8.83	362	15.2	520
	35		85.8		145		236		0.52	35.7	0.89	61.3	1.98	133	4.59	235	8.83	362	15.2	520

● Explanation of tables



● **Superheated Steam Service**

The superheated steam flow range is determined by first finding the correction factors “a” and “b” for the min. rate and max. rate, respectively, from the curves below and then multiplying the applicable nominal diameter and pressure readings in the saturated steam flow range table by these correction factors.



EXAMPLE : Find the flow range of superheated steam where Nominal diameter : 50mm, Pressure : 1MPa (gauge) and Temperature 250°C

SOLUTION : From the curves, correction factors are : a = 0.890, b = 0.840. So we obtain

Min. flowrate $Q_{min} = 0.890 \times 122 = 109\text{kg/h}$

Max. flowrate $Q_{max} = 0.840 \times 2760 = 2320\text{kg/h}$

IMPORTANT: 1. In applications where flow rate momentarily exceeds the max. rate for both of gas and steam, hold that peak value within 1.6 times the max. rating.

2. In a $\pm 1\%$ of full scale specification, if the flow range is $\frac{\text{Full scale flowrate}}{\text{Min. flowrate}} < 4$, then a $\pm 2\%$ of full scale is applied.

SCALED PULSE UNIT FOR FIXED CONVERSION

When it is required that a volume flow rate (flow rate in terms of volume) be reduced to the equivalent flow rate under standard conditions (normal flow rate) or to the mass flow rate in a fixed conversion by multiplying a conversion factor, the scaled pulse unit is determined by the unit selector graphs given below.

- ※: Available factored pulse units may vary depending on nonstandard models and on the meter factor after meter calibration.
- ※: Fixed converted data is corrected under certain conditions (pressure, temperature, density). Therefore, some error may occur when your service condition is different from the preset value.

Case	Fluid Type	Type of Conversion	Reference
1	Gases	Conversion under standard conditions (normal flowrate)	Tables A, B
2	Saturated Steam	Conversion to mass flowrate	Tables C, D
3	Gases, Super-heated steam	Conversion to mass flowrate	Tables E, F
4	Liquids	Conversion to mass flowrate	Tables G, H

Factored Pulse Units for Fixed Conversion into Standard State (normal flowrate)

1. "Conversion factor" is calculated by the following equation;

$$\text{Conversion factor} = \frac{273.15}{T + 273.15} \times \frac{P + 0.101322}{0.101322} \times \frac{Z_0}{Z}$$

(Except where significant influence is anticipated, it is assumed that $Z_0 / Z = 1$)

where T = Operating temp. (°C)

P = Operating press. (MPa [gauge])

Z₀ = Compressibility coefficient under standard conditions.

Z = Compressibility coefficient under operating conditions.

2. Follow your way to the right in the nominal bore size column of the given meter in Table A and find the segment number (①, ②, etc.) that agrees with the conversion factor you have just computed. Example: Nom. size 50mm, $0.735 \leq \text{⑥} < 0.999$
3. In Table B, find the scaled pulse unit relative to the segment number.

Table A • Conversion Factor – Segment Graph

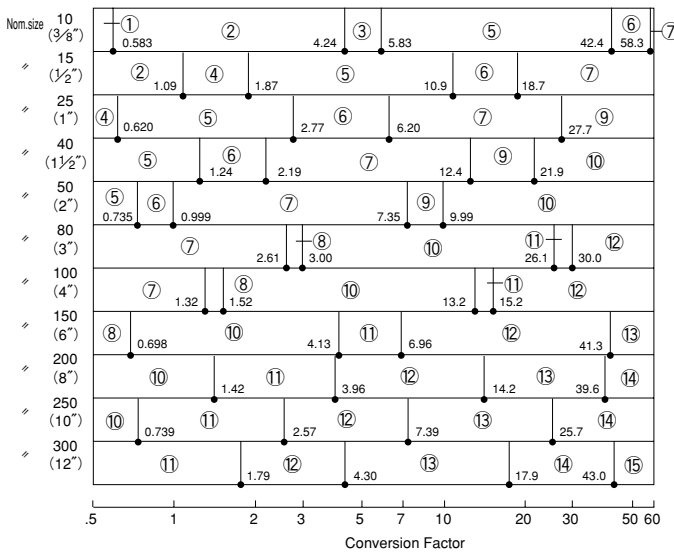


Table B • Segment – Scaled Pulse Output

Segment No.	Scaled pulse output unit : [normal]		
	Minimum	Standard	Maximum
①	1 L/P	1 L/P	10 L/P
②		10 L/P	100 L/P
③			100 L/P
④	10 L/P		100 L/P
⑤		100 L/P	1 m³/P
⑥			1 m³/P
⑦	100 L/P	1 m³/P	10 m³/P
⑧			100 m³/P
⑨			10 m³/P
⑩	1 m³/P	10 m³/P	100 m³/P
⑪			1000 m³/P
⑫	10 m³/P	100 m³/P	1000 m³/P
⑬			10000 m³/P
⑭	100 m³/P	1000 m³/P	10000 m³/P
⑮			100000 m³/P

Factored Pulse Units for Saturated Steam Measurement

1. Follow your way to the right in the nominal size column of the given meter in Table C and find the segment number (①, ②, etc.) that agrees with the saturated steam pressure.
2. In Table D, find the scaled pulse unit relative to the segment number.

Table C • Pressure (Gas Pressure) – Segment Graph

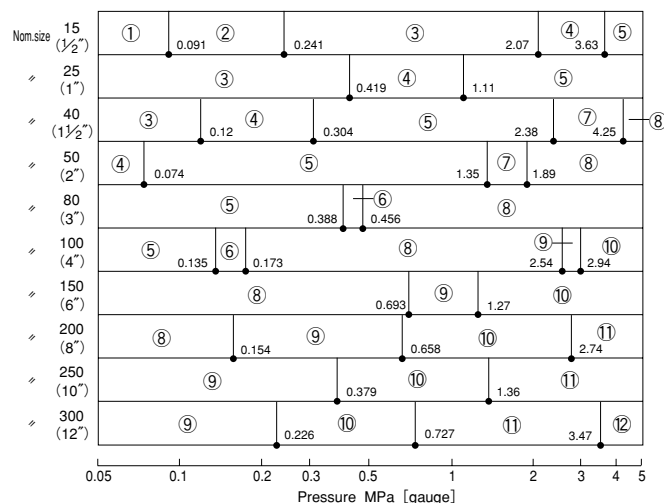


Table D • Segment – Scaled Pulse Output

Segment No.	Scaled pulse output unit : [normal]		
	Minimum	Standard	Maximum
①	1 g/P	10 g/P	100 g/P
②		100 g/P	100 g/P
③	10 g/P		1 kg/P
④			1 kg/P
⑤	100 g/P	1 kg/P	10 kg/P
⑥			100 kg/P
⑦			10 kg/P
⑧	1 kg/P	10 kg/P	100 kg/P
⑨			1 t/P
⑩	10 kg/P	100 kg/P	1 t/p
⑪			10 t/P
⑫	100 kg/P	1 t/P	10 t/P

● Factored Pulse Units for Fixed Conversion into Mass Flowrate (Superheated steam and gas)

1. Follow your way to the right in the nominal size column of the given meter in Table E and find the segment Number (①, ② etc.) that agrees with the density when in use.

2. In Table E, find the scaled pulse unit relative to the segment number.

Table E ● Density – Segment Graph

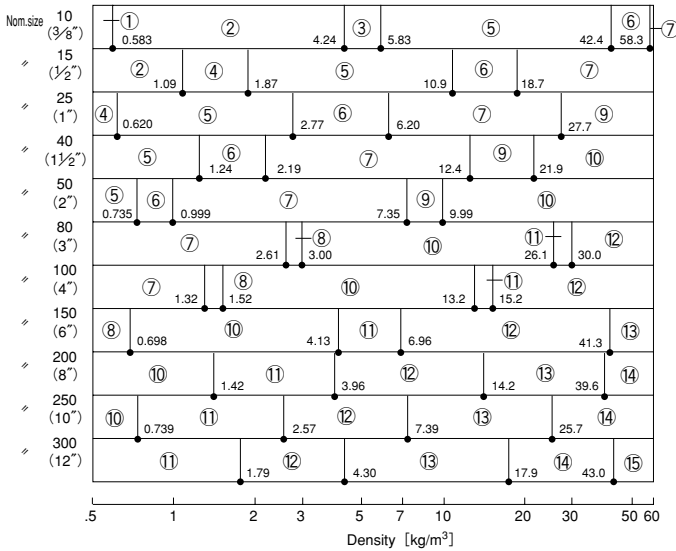


Table F ● Segment – Scaled Pulse Output

Segment No.	Scaled pulse output unit : [normal]		
	Minimum	Standard	Maximum
①	1 g/P	1 g/P	10 g/P
②			100 g/P
③			100 g/P
④	10 g/P	100 g/P	100 g/P
⑤			1 kg/P
⑥	100 g/P	1 kg/P	1 kg/P
⑦			10 kg/P
⑧			100 kg/P
⑨	1 kg/P	10 kg/P	10 kg/P
⑩			100 kg/P
⑪			1 t/P
⑫	10 kg/P	100 kg/P	1 t/P
⑬			10 t/P
⑭	100 kg/P	1 t/P	10 t/P
⑮			100 t/P

● Factored Pulse Units for Fixed Conversion into Mass Flowrate (Liquids)

- Follow your way to the right in the nominal size column of the given meter in Table G and find the segment Number (①, ② etc.) that agrees with the density when in use.
- In Table H, find the scaled pulse unit relative to the segment number.

Table G ● Specific Gravity – Segment Graph

● EX DELTA II

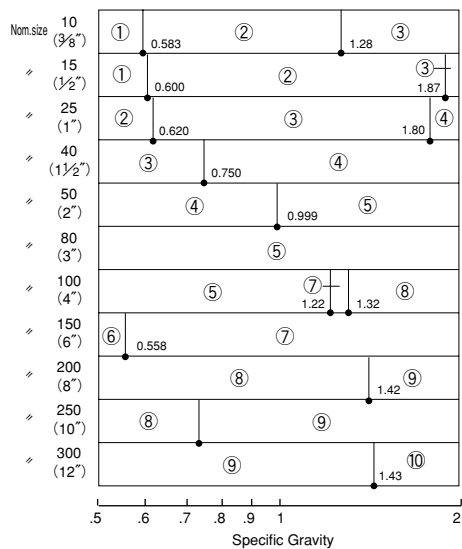
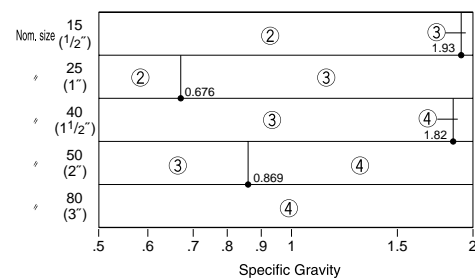


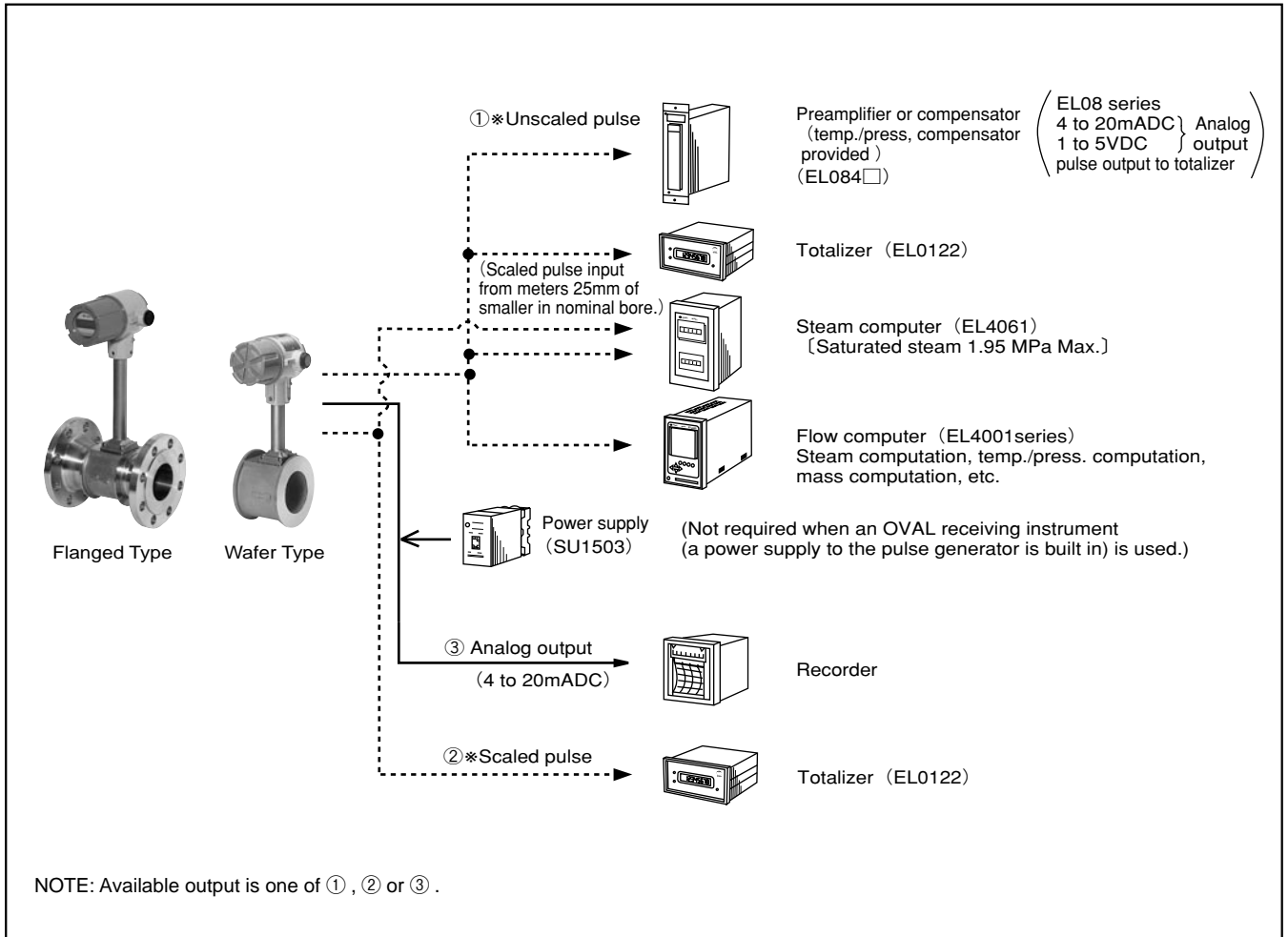
Table H ● Segment – Scaled Pulse Output

Segment No.	Scaled Pulse Output Unit : [normal]		
	Minimum	Standard	Maximum
①	100 g/P	1 kg/P	10 kg/P
②	1 kg/P	10 kg/P	100 kg/P
③	1 kg/P	10 kg/P	1 t/P
④	10 kg/P	100 kg/P	1 t/P
⑤	10 kg/P	100 kg/P	10 t/P
⑥	10 kg/P	100 kg/P	100 t/P
⑦	100 kg/P	1 t/P	10 t/P
⑧	100 kg/P	1 t/P	100 t/P
⑨	100 kg/P	1 t/P	1000 t/P
⑩	1 t/P	10 t/P	1000 t/P

● EX DELTA II DIA

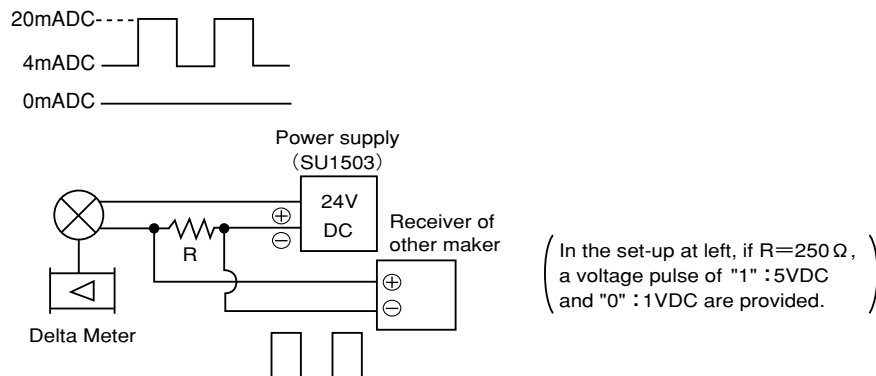


■ HOOK-UP WITH RECEIVING INSTRUMENTS



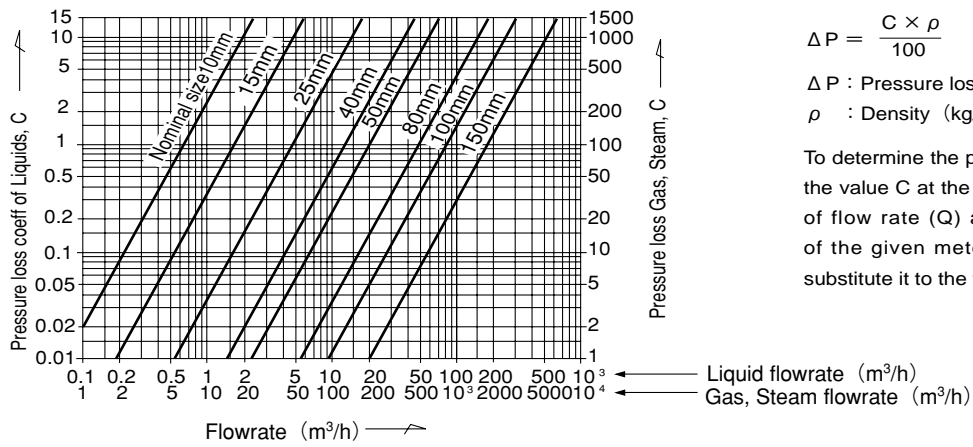
- Shown above are typical examples. Depending on individual applications and specifications, hookup with many other electrical instruments are acceptable.
- For any arrangement with an electrical instrument, indicator, etc. other than those supplied by OVAL, an external power supply is required. Use OVAL Model SU1503 power supply.
- As to individual receiving instruments, see respective General Specification sheets.

* The un-factored and factored pulse output levels are "1" : 20mADC and "0" : 4mADC, respectively, as illustrated below. Therefore, if you plan to use any instrument designed to accept a voltage pulse signal, couple a resistor in series as shown. The resistance value of load resistor is given in the Acceptance Load Resistance Range on Page 3.



■ PRESSURE LOSS

● Nominal size 10 to 150mm

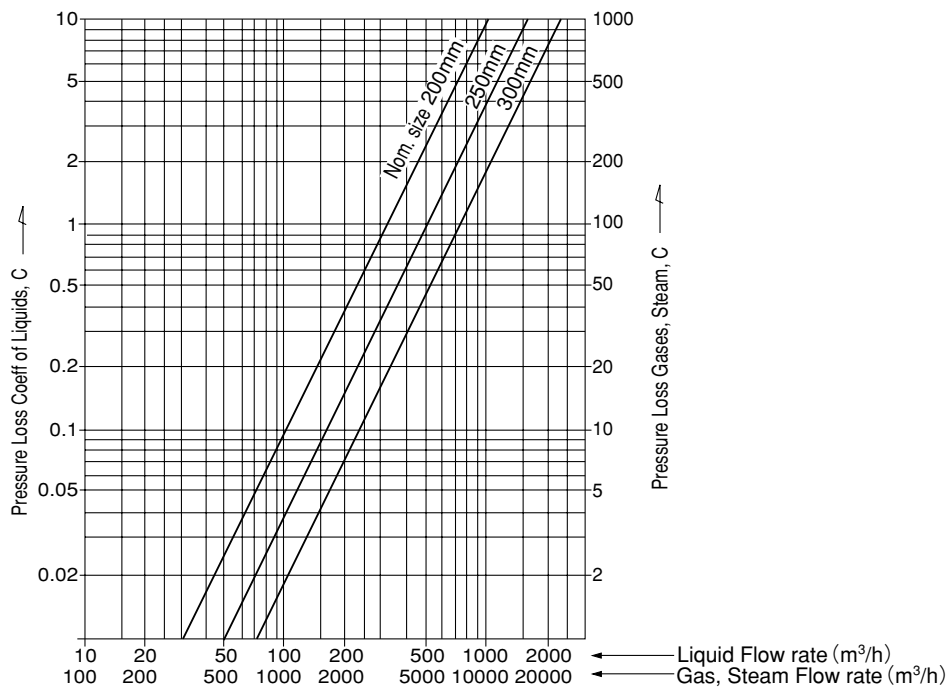


$$\Delta P = \frac{C \times \rho}{100}$$

ΔP : Pressure loss (kPa)
 ρ : Density (kg/m^3)

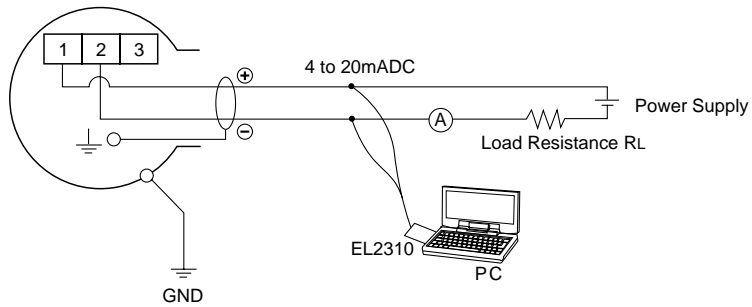
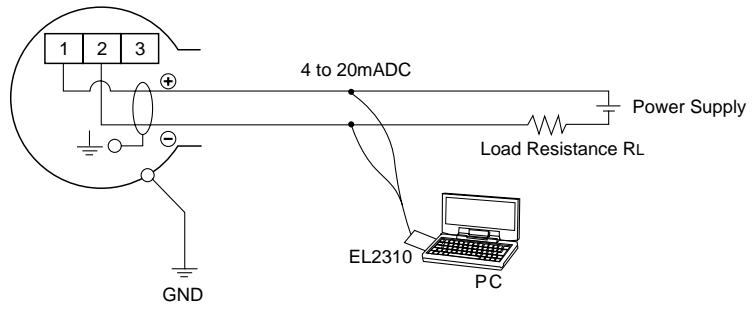
To determine the pressure loss, find the value C at the intersecting point of flow rate (Q) and slanted line of the given meter diameter and substitute it to the formula above.

● Nominal size 200, 250, 300mm

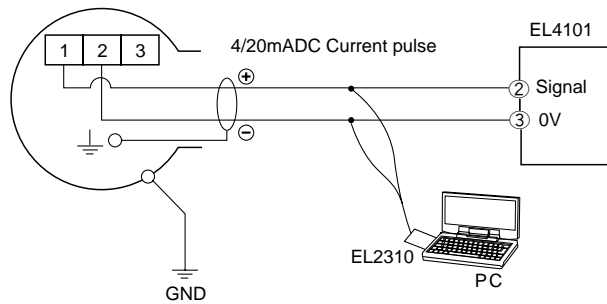
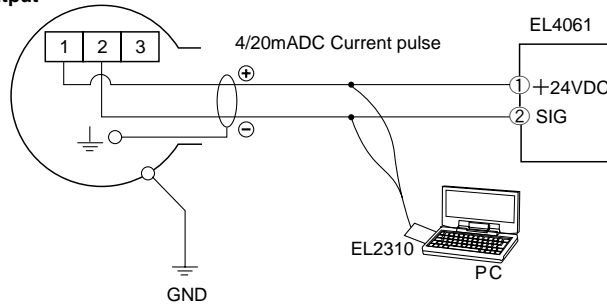


■ WIRING CONNECTIONS (an example)

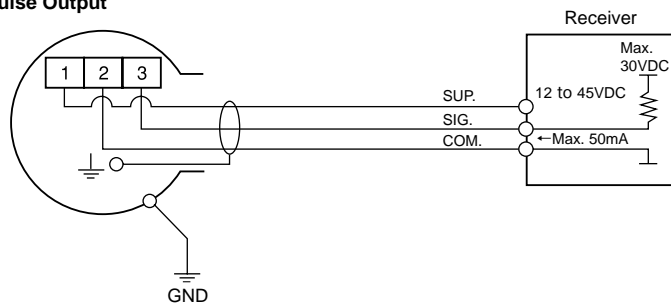
Analog Output



Voltage Pulse Output



Open collector Pulse Output

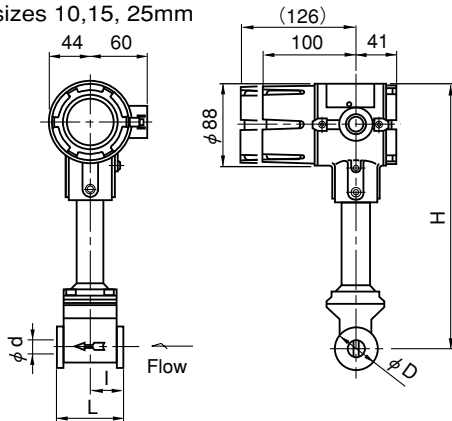


※For EL2310 : Smart Communication Unit. Refer to GS No.GEL104E.

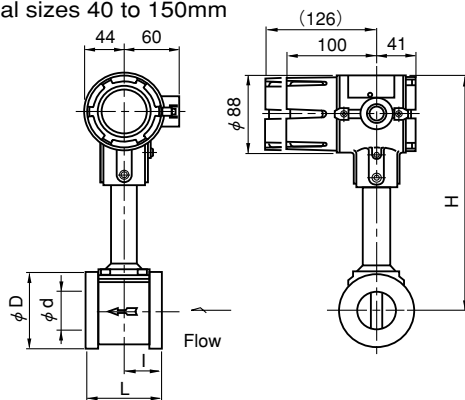
EX DELTA II OUTLINE DIMENSIONS [INTEGRAL TYPE] (Unit in mm)

Wafer Type

- Nominal sizes 10,15, 25mm



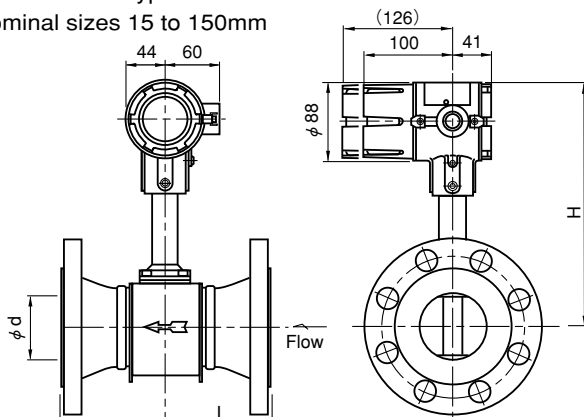
- Nominal sizes 40 to 150mm



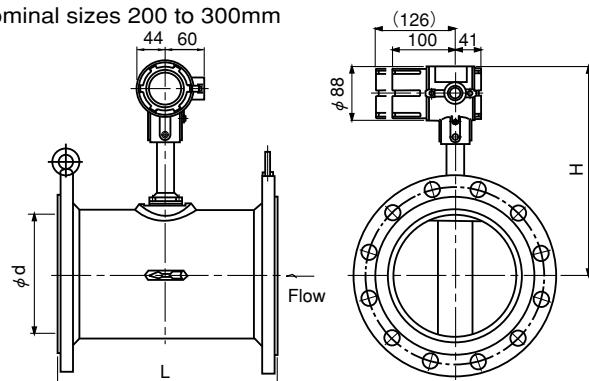
Flanged Type

- Fixed Sensor Type

- Nominal sizes 15 to 150mm



- Nominal sizes 200 to 300mm



Nominal size mm (inch)	L	I	φ d (Meter I.D)	φ D	H	Approx. Weight (kg)	
						No Display	w/Display
10 (3/8")	65	32.5	10	40	276	2.6	2.9
15 (1/2")	65	32.5	14.5	40	276	2.6	2.9
25(1")	65	32.5	26.6	67	276	3.2	3.5
40 (1-1/2")	80	40	37.6	81	261	3.9	4.2
50 (2")	80	40	48.5	91	265	4.0	4.3
80 (3")	100	40	72.4	126	281	6.8	7.1
100 (4")	125	48	95.2	156.2	301	10.5	10.8
150 (6")	165	54	140.3	214.9	331	20.4	20.7

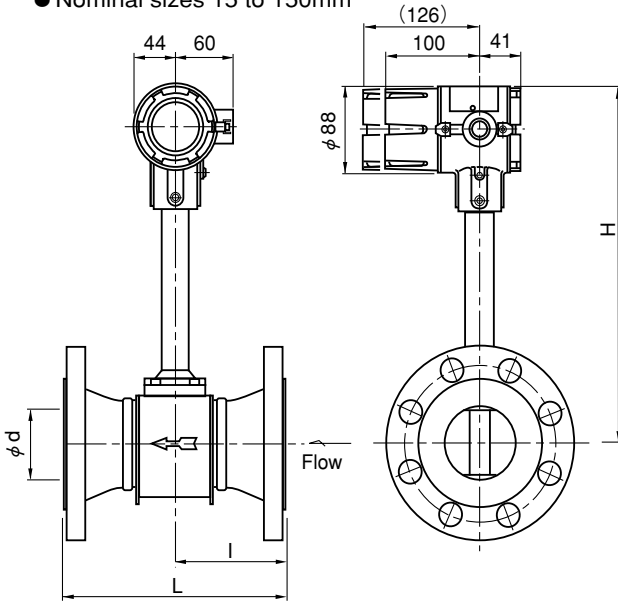
Nominal size mm (inch)	Flange Rating	L	I	φ d (Meter I.D)	H	Approx. Weight (kg)		
						No Display	w/Display	
15 (1/2")	JIS 10K(16K)	142	71	14.5	276	3.9	4.2	
	JIS 20K	152	76			5.3	5.6	
	JIS 30K		158			79	3.5	3.8
	ASME 150	83.5				4.1	4.4	
	JPI 150					167	83.5	4.1
	ASME 300	JPI 300					167	83.5
25 (1")	JIS 10K(16K)	152	76	26.6	276	5.9	6.2	
	JIS 20K	158	79			6.9	7.2	
	JIS 30K		174			87	5.1	5.4
	ASME 150	93				6.3	6.6	
	JPI 150					186	93	6.3
	ASME 300	JPI 300					186	93
40 (1-1/2")	JIS 10K(16K)	171	85.5	37.6	261	8.0	8.3	
	JIS 20K	175	87.5			8.4	8.7	
	JIS 30K	185	92.5			10.5	10.8	
	ASME 150	201	100.5			8.0	8.3	
	JPI 150		213			106.5	8.0	8.3
	ASME 300	10.4				10.7	10.4	10.7
	JPI 300					213	106.5	10.4
	50 (2")	JIS 10K					173	86.5
JIS 20K(16K)		181	90.5	9.2	9.5			
JIS 30K		191	95.5	11.3	11.6			
ASME 150		204	102	9.9	10.2			
JPI 150			217	108.5	10.0	10.3		
ASME 300		11.8		12.1	11.8	12.1		
JPI 300	217			108.5	11.8	12.1		
80 (3")		JIS 10K		219	99.5	72.4	281	15.2
	JIS 20K(16K)	233	106.5	17.9	18.2			
	JIS 30K	243	111.5	21.9	22.2			
	ASME 150	237	108.5	18.0	18.3			
	JPI 150		255	117.5	22.5			22.8
	ASME 300	22.5		22.8	22.5			22.8
JPI 300	255			117.5	22.5	22.8		
100 (4")		JIS 10K		250	110.5	95.2	301	21.2
	JIS 20K(16K)	264	117.5	25.2	25.5			
	JIS 30K	274	122.5	31.8	32.1			
	ASME 150	274	122.5	26.5	26.8			
	JPI 150		294	132.5	26.6			26.9
	ASME 300	36.0		36.3	36.0			36.3
JPI 300	36.2			36.5	36.2	36.5		
150 (6")		JIS 10K		322	132.5	140.3	331	43.7
	JIS 20K(16K)	342	142.5	52.8	53.1			
	JIS 30K	352	147.5	66.4	66.7			
	ASME 150	340	141.5	46.5	46.8			
	JPI 150		359	151	46.6			46.9
	ASME 300	65.6		65.9	65.6			65.9
JPI 300	66.0			66.3	66.0	66.3		
200 (8")		---		350	---	199.9	346	38.3
250 (10")	---	450	---	248.8	368	68.8	69.1	
300 (12")	---	500	---	297.9	390	88.8	89.1	

*: Irrespective of flange rating, a flange thickness having a higher rating is selected as long as the flange O.D. and bolt holes remain the same.

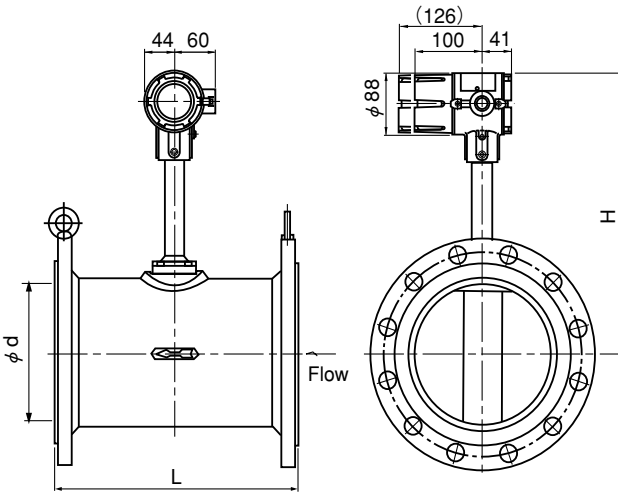
Note: Figures in the brackets show the dimensions with built-in display.
 Note: Dim. ϕ D is the I.D. of bluff body.
 Note: In case of explosionproof configuration rated FM, an NPT1/2" female thread adapter is bonded to the cable connection.

■ Replaceable Sensor Type

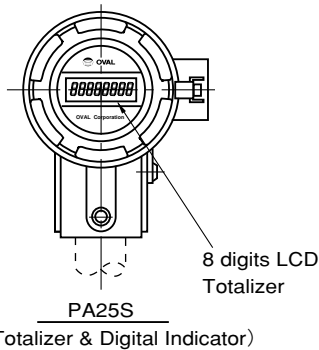
● Nominal sizes 15 to 150mm



● Nominal sizes 200 to 300mm



● Converter



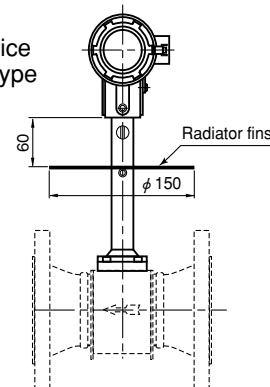
(w/Totalizer & Digital Indicator)

- 1 Direction of mounting of the converter is changeable with 90° step being rotated around the center of a mounting bracket.
- 2 Direction of a display is also changeable with 90° step being rotated within the converter.

Nominal size mm (inch)	Flange Rating	L	I	ϕ d (Meter I.D.)	H	Approx. Weight (kg)	
						No Display	w/Display
15 (1/2")	JIS 10K(16K)	142	71	14.5	345	4.5	4.8
	JIS 20K						
	JIS 30K	152	76			5.9	6.2
	ASME 150	158	79			4.1	4.4
	JPI 150						
	ASME 300	167	83.5			4.7	5
JPI 300							
25 (1")	JIS 10K(16K)	152	76	26.6	345	6.5	6.8
	JIS 20K						
	JIS 30K	158	79			7.5	7.8
	ASME 150	174	87			5.7	6
	JPI 150						
	ASME 300	186	93			6.9	7.2
JPI 300							
40 (1-1/2")	JIS 10K(16K)	171	85.5	37.6	342	8.6	8.9
	JIS 20K						
	JIS 30K	175	87.5			9.0	9.3
	ASME 150	185	92.5			11.1	11.4
	JPI 150						
	ASME 300	201	100.5			8.6	8.9
JPI 300							
50 (2")	JIS 10K	173	86.5	48.5	346	9.6	9.9
	JIS 20K(16K)						
	JIS 30K	181	90.5			9.8	10.1
	ASME 150	191	95.5			11.9	12.2
	JPI 150						
	ASME 300	204	102			10.5	10.8
JPI 300							
80 (3")	JIS 10K	219	99.5	72.4	362	15.8	16.1
	JIS 20K(16K)						
	JIS 30K	233	106.5			18.5	18.8
	ASME 150	243	111.5			22.5	22.8
	JPI 150						
	ASME 300	237	108.5			18.6	18.9
JPI 300							
100 (4")	JIS 10K	250	110.5	95.2	382	21.8	22.1
	JIS 20K(16K)						
	JIS 30K	264	117.5			25.8	26.1
	ASME 150	274	122.5			32.4	32.7
	JPI 150						
	ASME 300	274	122.5			27.1	27.4
JPI 300							
150 (6")	JIS 10K	322	132.5	140.3	412	44.3	44.6
	JIS 20K(16K)						
	JIS 30K	342	142.5			53.4	53.7
	ASME 150	352	147.5			67.0	67.3
	JPI 150						
	ASME 300	340	141.5			47.1	47.4
JPI 300							
200 (8")	—	350	—	199.9	427	39.4	39.7
250 (10")	—	450	—	248.8	449	69.4	69.7
300 (12")	—	500	—	297.9	471	89.4	89.7

*: Irrespective of flange rating, a flange thickness having a higher rating is selected as long as the flange O.D. and bolt holes remain the same.

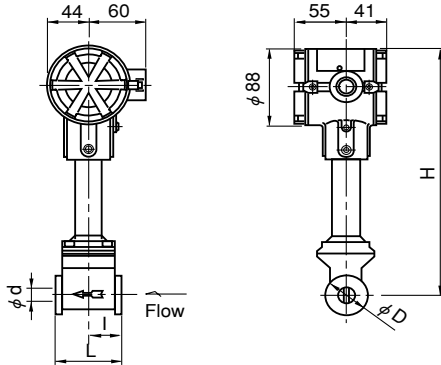
■ High-temperature service Replaceable Sensor Type



EX DELTA II OUTLINE DIMENSIONS [SEPARATE TYPE] (Unit in mm)

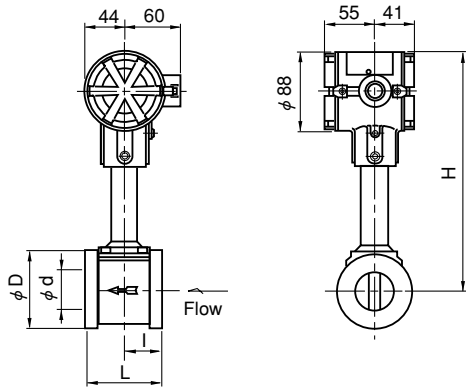
Wafer Type

● Nominal sizes 10, 15, 25mm



Nominal size (mm)	L	I	φ d (Meter I.D)	φ D	H	Approx. Weight (kg)
10 (3/8")	65	32.5	10	40	276	2.4
15 (1/2")	65	32.5	14.5	40	276	2.4
25(1")	65	32.5	26.6	67	276	3.0
40 (1-1/2")	80	40	37.6	81	261	3.7
50 (2")	80	40	48.5	91	265	3.8
80 (3")	100	40	72.4	126	281	6.6
100 (4")	125	48	95.2	156.2	301	10.3
150 (6")	165	54	140.3	214.9	331	20.2

● Nominal sizes 40 to 150mm

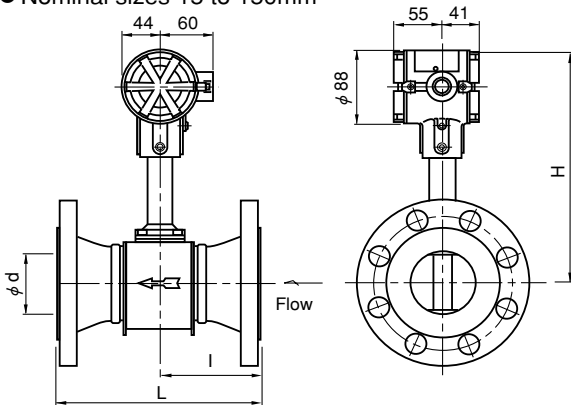


Nominal size (mm)	Flange Rating	L	I	φ d (Meter I.D)	H	Approx. Weight (kg)
15 (1/2")	JIS 10K(16K)	142	71	14.5	276	3.7
	JIS 20K					5.1
	JIS 30K	152	76			3.3
	ASME 150					3.9
	JPI 150	167	83.5			3.9
	ASME 300					3.9
25 (1")	JIS 10K(16K)	152	76	26.6	276	5.7
	JIS 20K					6.7
	JIS 30K	158	79			4.9
	ASME 150					6.1
	JPI 150	174	87			4.9
	ASME 300					6.1
40 (1-1/2")	JIS 10K(16K)	171	85.5	37.6	261	7.8
	JIS 20K					8.2
	JIS 30K	185	92.5			10.3
	ASME 150					7.8
	JPI 150	201	100.5			7.8
	ASME 300					10.2
50 (2")	JIS 10K	173	86.5	48.5	265	8.8
	JIS 20K(16K)					9.0
	JIS 30K	191	95.5			11.1
	ASME 150					9.7
	JPI 150	204	102			9.8
	ASME 300					11.6
80 (3")	JIS 10K	219	99.5	72.4	281	15.0
	JIS 20K(16K)					17.7
	JIS 30K	243	111.5			21.7
	ASME 150					17.8
	JPI 150	237	108.5			17.8
	ASME 300					22.3
100 (4")	JIS 10K	250	110.5	95.2	301	21.0
	JIS 20K(16K)					25.0
	JIS 30K	274	122.5			31.6
	ASME 150					26.3
	JPI 150	274	122.5			26.4
	ASME 300					35.8
150 (6")	JIS 10K	294	132.5	140.3	331	36.0
	JIS 20K(16K)					43.5
	JIS 30K	352	147.5			52.6
	ASME 150					66.2
	JPI 150	340	141.5			46.3
	ASME 300					65.4
200 (8")	—	350	—	199.9	346	38.6
250 (10")	—	450	—	248.8	368	68.6
300 (12")	—	500	—	297.9	390	88.6

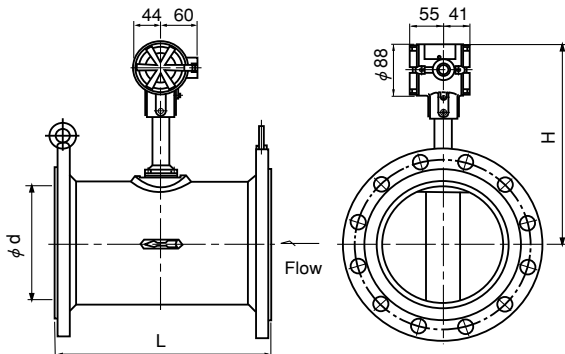
Flanged Type

■ Fixed Sensor Type

● Nominal sizes 15 to 150mm



● Nominal sizes 200 to 300mm

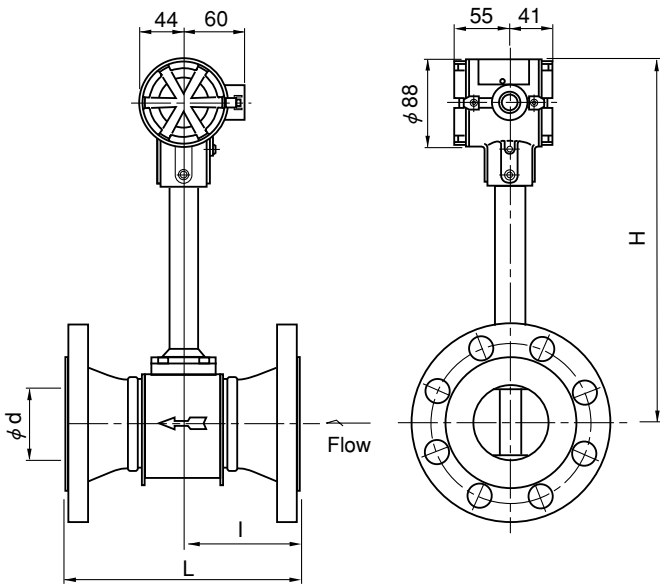


*: Irrespective of flange rating, a flange thickness having a higher rating is selected as long as the flange O.D. and bolt holes remain the same.

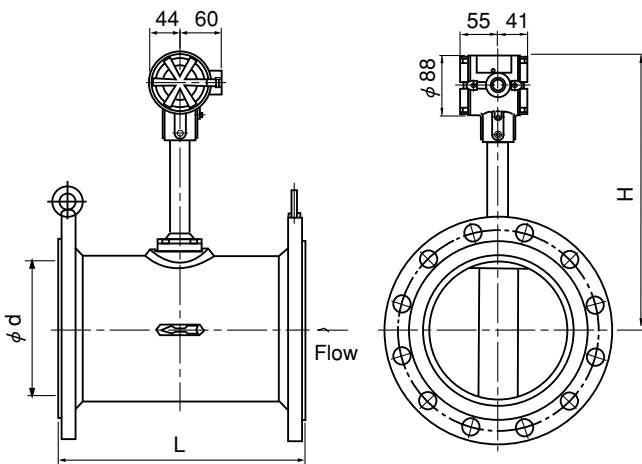
Note: Figures in the brackets show the dimensions with built-in display.
 Note: Dim. ϕD is the I.D. of bluff body.
 Note: In case of explosionproof configuration rated FM/CSA, an NPT1/2" female thread adapter is bonded to the cable connection.

■ Replaceable Sensor Type

● Nominal sizes 15 to 150mm



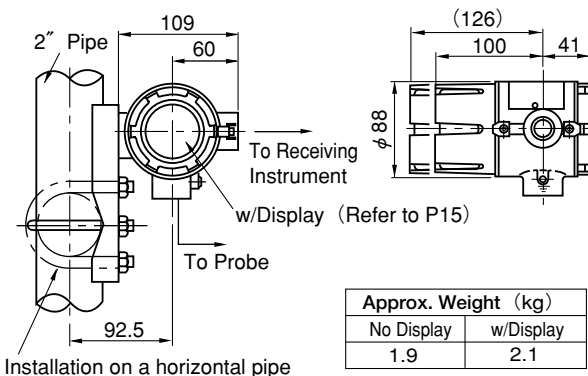
● Nominal sizes 200 to 300mm



Nominal size (mm)	Flange Rating	L	I	ϕd (Meter I.D.)	H	Approx. Weight (kg)
15 (1/2")	JIS 10K(16K)	142	71	14.5	345	4.3
	JIS 20K					5.7
	JIS 30K	152	76			3.9
	ASME 150					4.5
	JPI 150	158	79			
	ASME 300	167	83.5			
25 (1")	JIS 10K(16K)	152	76	26.6	345	6.3
	JIS 20K					7.3
	JIS 30K	158	79			5.5
	ASME 150					6.7
	JPI 150	174	87			
	ASME 300	186	93			
40 (1-1/2")	JIS 10K(16K)	171	85.5	37.6	342	8.4
	JIS 20K	175	87.5			8.8
	JIS 30K	185	92.5			10.9
	ASME 150					8.4
	JPI 150	201	100.5			8.4
	ASME 300	213	106.5			10.8
50 (2")	JIS 10K	173	86.5	48.5	346	9.4
	JIS 20K(16K)	181	90.5			9.6
	JIS 30K	191	95.5			11.7
	ASME 150					10.3
	JPI 150	204	102			10.4
	ASME 300	217	108.5			12.2
80 (3")	JIS 10K	219	99.5	72.4	362	15.6
	JIS 20K(16K)	233	106.5			18.3
	JIS 30K	243	111.5			22.3
	ASME 150					18.4
	JPI 150	237	108.5			22.9
	ASME 300	255	117.5			
100 (4")	JIS 10K	250	110.5	95.2	382	21.6
	JIS 20K(16K)	264	117.5			25.6
	JIS 30K	274	122.5			32.2
	ASME 150					26.9
	JPI 150	274	122.5			27.0
	ASME 300	294	132.5			36.4
150 (6")	JIS 10K	322	132.5	140.3	412	44.1
	JIS 20K(16K)	342	142.5			53.2
	JIS 30K	352	147.5			66.8
	ASME 150					46.9
	JPI 150	340	141.5			47.0
	ASME 300	359	151			66.0
200 (8")	—	350	—	199.9	427	39.4
250 (10")	—	450	—	248.8	449	69.4
300 (12")	—	500	—	297.9	471	89.4

※: Irrespective of flange rating, a flange thickness having a higher rating is selected as long as the flange O.D. and bolt holes remain the same.

SEPARATE TYPE CONVERTER



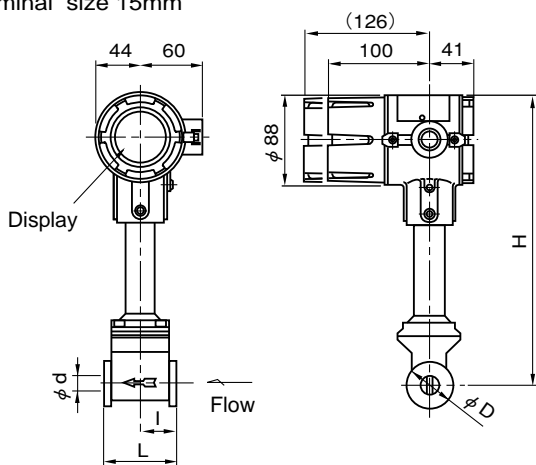
Approx. Weight (kg)	
No Display	w/Display
1.9	2.1

EX DELTA II •DIA OUTLINE DIMENSIONS (Unit in mm)

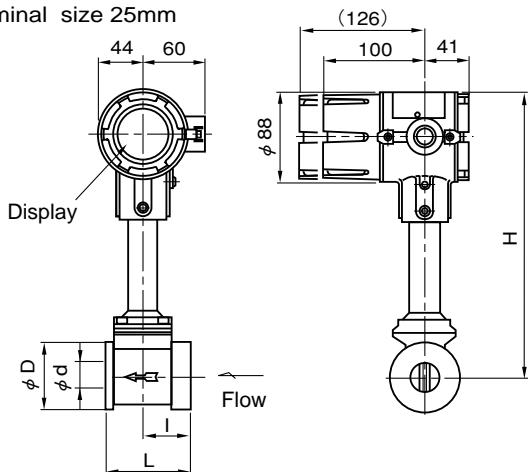
[INTEGRAL PREAMP TYPE]

Wafer Type

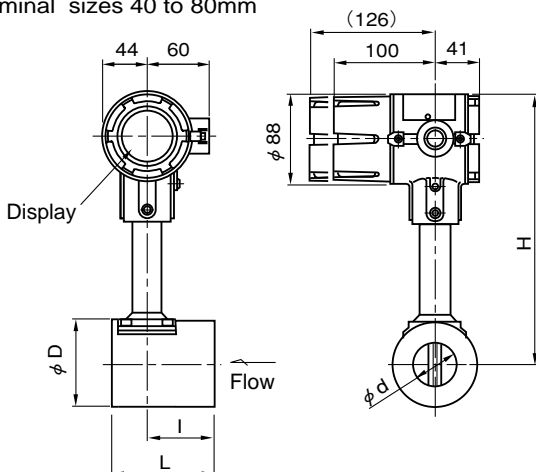
●Nominal size 15mm



●Nominal size 25mm



●Nominal sizes 40 to 80mm

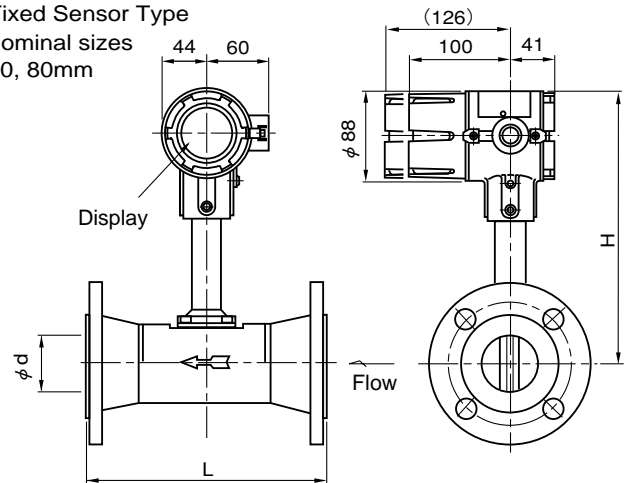


Nominal size (mm)	L	I	φ d (Meter i.D.)	φ D	H	Approx. Weight (kg)	
						Non Display	w/Display
15 (1/2")	65	32.5	14.5	40	276	2.6	2.9
25 (1")	80	47.5	26.6	67	276	3.2	3.5
40 (1 1/2")	100	67	41.2	82	261	3.9	4.2
50 (2")	125	85	52.7	92	265	4.0	4.3
80 (3")	125	85	78.1	127	281	6.8	7.1

Flanged Type

■Fixed Sensor Type

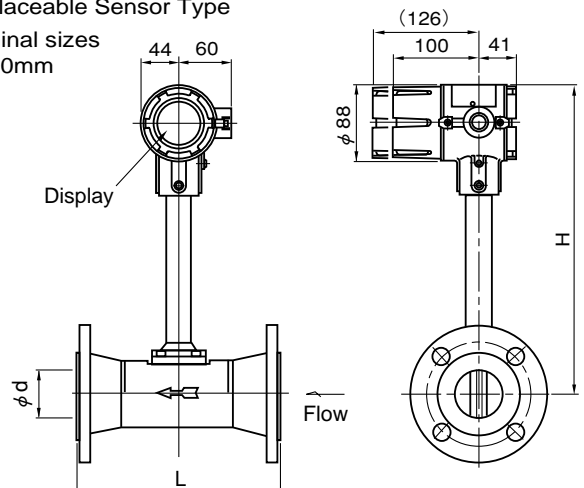
●Nominal sizes 50, 80mm



Nominal size (mm)	L	φ d (Meter i.D.)	H
50 (2")	229	52.7	265
80 (3")	254	78.1	281

■Replaceable Sensor Type

●Nominal sizes 50, 80mm

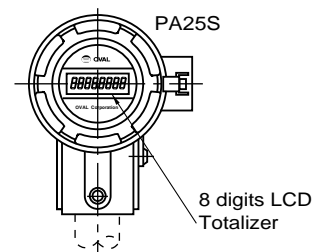


Nominal size (mm)	L	φ d (Meter i.D.)	H
50 (2")	229	52.7	346
80 (3")	254	78.1	362

High-temperature service, replaceable model is provided with radiator fins on the adapter. (See P15)

※ : Irrespective of flange rating, a flange thickness having a higher rating is selected as long as the flange O.D. and bolt holes remain the same.

● Converter PA25S (w/Totalizer)

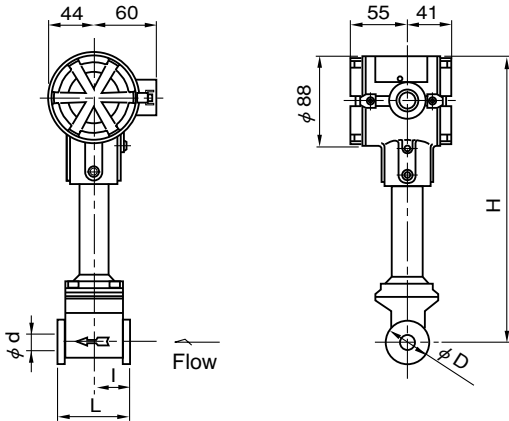


1. Direction of mounting of the converter is changeable with 90° step being rotated around the center of a mounting bracket.
2. Direction of a display is also changeable with 90° step being rotated within the converter.

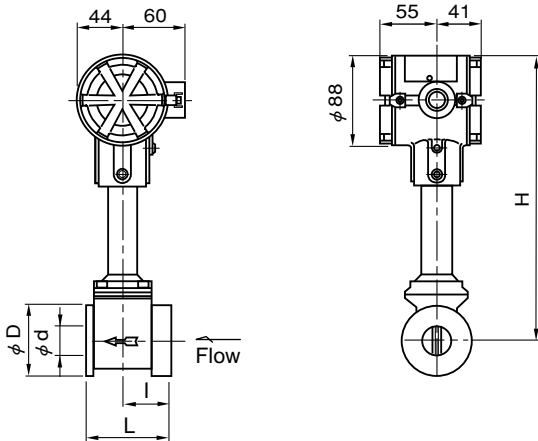
[SEPARATE-MOUNT PREAMP TYPE]

Wafer Type

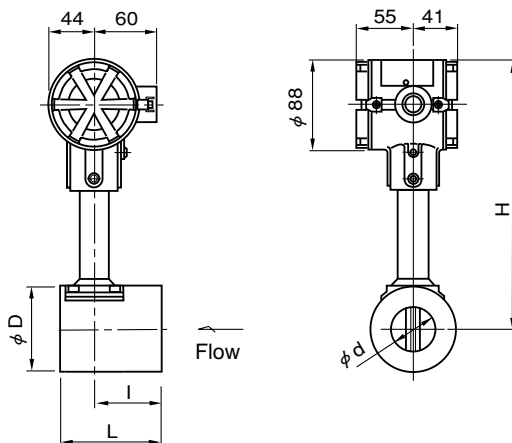
●Nominal size 15mm



●Nominal size 25mm



●Nominal sizes 40 to 80mm

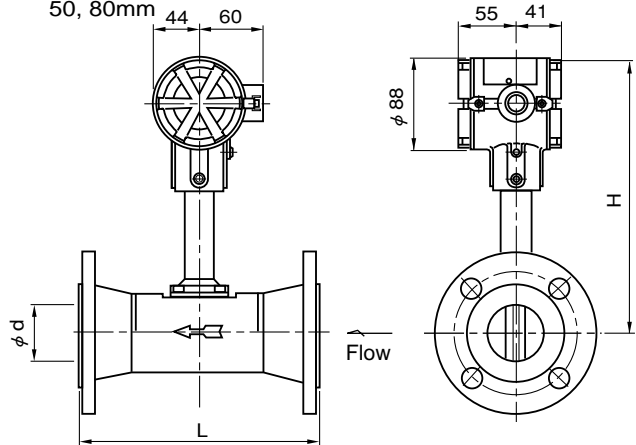


Nominal size (mm)	L	I	φ d (Meter i.D.)	φ D	H	Approx. Weight(kg)
15 (1/2")	65	32.5	14.5	40	276	2.4
25 (1")	80	47.5	26.6	67	276	3.0
40 (1 1/2")	100	67	41.2	82	261	3.7
50 (2")	125	85	52.7	92	265	3.8
80 (3")	125	85	78.1	127	281	6.6

Flanged Type

■Fixed Sensor Type

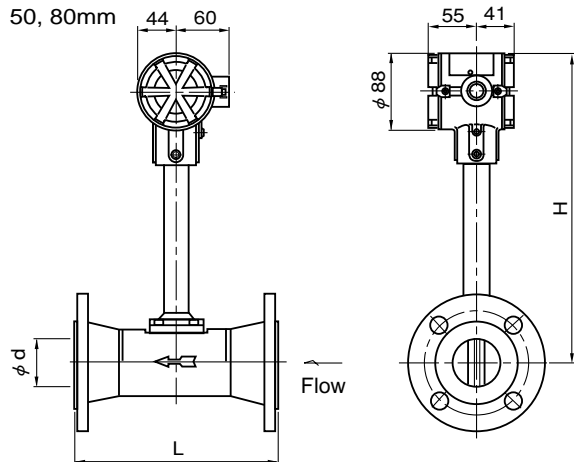
●Nominal sizes 50, 80mm



Nominal size (mm)	L	φ d (Meter i.D.)	H
50 (2")	229	52.7	265
80 (3")	254	78.1	281

■Replaceable Sensor Type

●Nominal sizes 50, 80mm

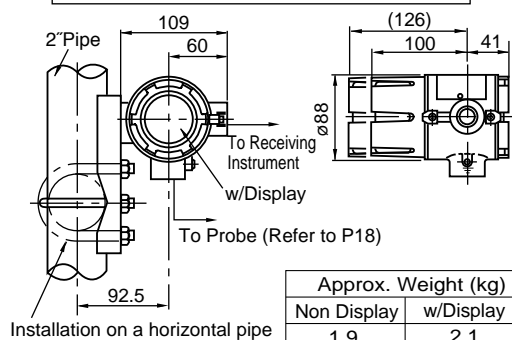


Nominal size (mm)	L	φ d (Meter i.D.)	H
50 (2")	229	52.7	346
80 (3")	254	78.1	362

High-temperature service, replaceable model is provided with radiator fins on the adapter. (See P17)

※ : Irrespective of flange rating, a flange thickness having a higher rating is selected as long as the flange O.D. and bolt holes remain the same.

SEPARATE-MOUNT PREAMP



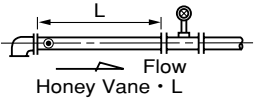
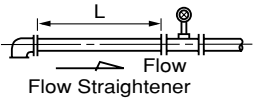
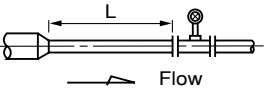
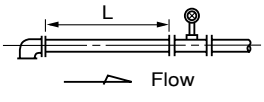
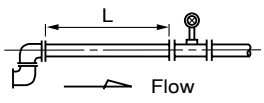
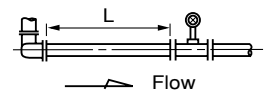
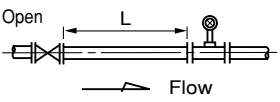
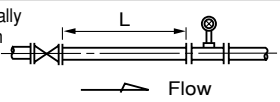
Approx. Weight (kg)	
Non Display	w/Display
1.9	2.1

■ INSTALLATION CONDITIONS

1. TYPICAL PIPING INSTRUCTIONS

It is generally required that the flow pattern of a fluid flowing in and out of an inferential type flow meter be as uniform as possible for higher accurate metering performance. All account of this, proper flow straightening measures have to be applied for piping installation of EX DELTA II. The standard piping instructions are shown in the following table.

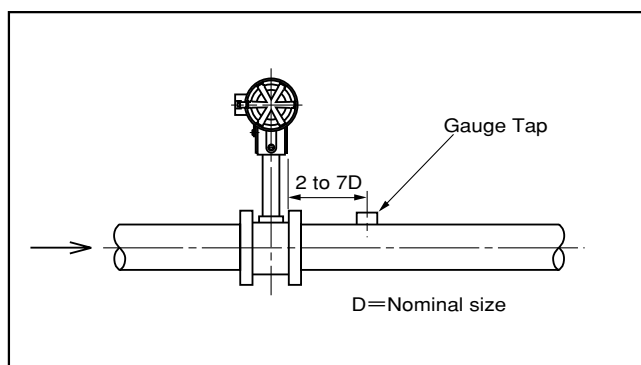
(1) Use an OVAL flow straightener or provide a specified straight pipe (ISO-5167 compliant).

No.	Piping Arrangement	Straight Pipe Length (L)	Remark
1	 OVAL's Flow-Straightener	8D	Refer to Point 4 on P21. Applicable to Nominal size, > 25mm
	 Flow Straightener	12D	
2	 Reducer	15D Min.	A concentric reducer is installed at the upstream of a meter.
3	 Elbow	23D Min.	An elbow is installed at the upstream of a meter.
	 Elbow	25D Min.	Two elbows are installed at the upstream of a meter.
	 Elbow	40D Min.	Two elbows are vertically installed at the upstream of a meter.
4	Fully Open  Fully open gate valve	15D Min.	A full-open gate valve is installed at the upstream of a meter.
5	Partially Open  Partially open gate valve	50D Min.	A partially open gate valve, sharp orifice or something that markedly disturbs the flow pattern is upstream of a meter.

Note 1: Sch. 40 pipe is standard in the application above. Use Sch. 40 pipe for standard piping. If you plan to use pipes different in nominal pipe thickness, consult the factory.

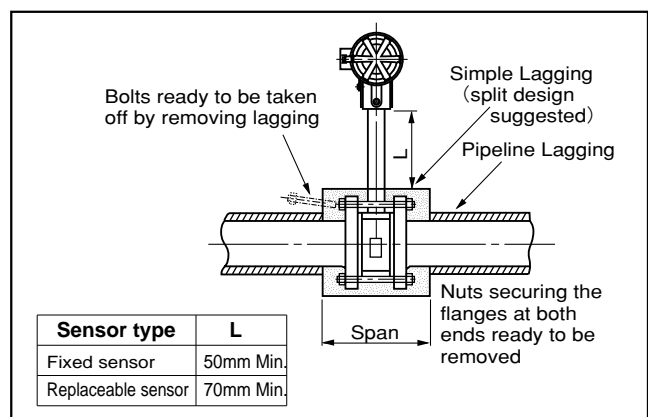
2: A short pipe section, 5D or longer shall be provided downstream of the meter.

3: For pressure detection, provide the probe downstream of the flowmeter (see figure below). To avoid disturbances in the flow, temperature detection should be made downstream of the flowmeter and, at the same time, upstream of the control valve.



2. LAGGING WORK

If it is desired to thermally insulate the pipeline, simple lagging (without mortar finish) is suggested to facilitate servicing. This arrangement will permit taking off the flowmeter connecting bolts without destroying the lagging.



※ With high-temperature service, replaceable model, the required length is L=40mm min. from radiator fins.

※ If heat retention is required, lagging should be made no more than dim. "L" below the neck of preamplifier.

3. ITEMS TO BE NOTED IN PROCESS CONDITION

(1) Prevention of Cavitation:

For liquid flow application, line pressure higher than a value calculated from the following equation shall be applied in order to prevent the flow from cavitation.

$$P \geq 2.60 \Delta P + 1.25P_o \text{ (MPa [absolute])}$$

where, P : Line pressure (MPa)

ΔP : Pressure loss (MPa)

P_o : Vapor pressure of a liquid (MPa [absolute])

(2) Pressure fluctuation:

In case EX DELTA II is installed in the line where blower such as a roots blower and compressor those can generate fluctuated pressure, performance of the flowmeter can be affected by flow fluctuation.

Allowable fluctuation pressure is calculated from the following equation.

$$N < 22 \rho V^2 \text{ (Pa)}$$

where, N : Fluctuation pressure (Pa)

ρ : Density (kg/m³)

V : Min. Velocity (m/s)

Even at shutdown, pressure pulsation in the process fluid can produce a false output. If pressure pulsation is excessive, take the following measures:

- ① Locate the source of flow fluctuation downstream of the flowmeter.
- ② Install a pulsation attenuator.
- ③ At shutdown of the flow, shut off valves upstream and downstream of the flowmeter.
- ④ Provide a digital filter (to prevent false pulse output at shutdown).

4. SPACE SAVING (Reduction of Meter run)

In case span of the meter run is limited due to limit of installation space and a specified straight pipe can not be secured, combination of Honey vane · S and a short length pipe composing Honey vane · L is useful for reduction of total length of the upstream straight pipe.

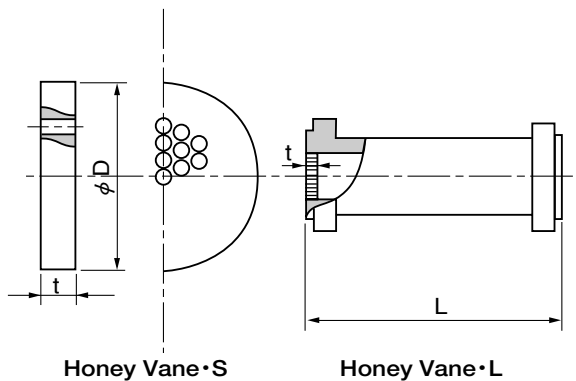
EX DELTA II · SS providing a built-in Honey vane is available with accuracy $\pm 2\%$ RD for liquid service. Consult the factory for accuracy requirement.

●Honey Vane

Outline Dimensions

Nom.size (mm)	øD *1 (mm)	Honey Vane·S	Honey Vane·L
		t (mm)	L (mm)
25	75	3.5	200
40	90	5.4	320
50	105	6.9	400
80	134	10.2	640
100	159	13.3	800
150	220	19.6	1200
200	268	26	1600
250	331	32.3	2000
300	376	38.7	2400

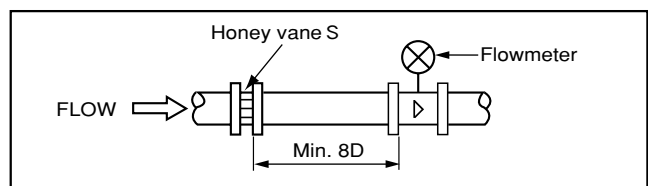
*1 : JIS10K



© Flange face to face span of EX DELTA II · SS is the same as that of standard EX DELTA II . (Refer to P14,15)

● Installation of Honey Vane S

- ① Locate the Honey Vane S upstream of the flowmeter.
- ② Provide a short pipe (8D or longer) between Honey Vane S and flowmeter.
- ③ Regarding the bolts and nuts used for connecting JPI flange, adopt unified screw threads. If you want to use metric screw threads, contact OVAL.



■ EX DELTA II PRODUCT CODE EXPLANATION

Item	Code No.																Description	
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯		
Model	V	X															EX DELTA II	
Body style	W																Wafer type (Nominal size: 10 to 150mm)	Fixed sensor type
	F																Flanged type (Size: 15 to 300mm) RF is standard	
	R																	Flanged type (Size: 15 to 300mm) RF is standard
Application	1																Standard (Triangular bluff body)	
Nominal size	0	1	0	-													10mm	
	0	1	5	-													15mm	
	0	2	5	-													25mm	
	0	4	0	-													40mm	
	0	5	0	-													50mm	
	0	8	0	-													80mm	
	1	0	0	-													100mm	
	1	5	0	-													150mm	
	2	0	0	-													200mm	
2	5	0	-													250mm		
3	0	0	-													300mm		
Material	N																SCS14A (Nominal size 10 to 150mm) SUS316 (Nominal size 200 to 300mm)	
	C																SUS316 + SFVC2A (Nominal size 200 to 300mm)	(* 1)
	Z																Other than above	
Flange rating	1																JIS 10K	
	2																JIS 16K	
	3																JIS 20K	
	4																JIS 30K	
	5																ASME 150	(*2)
	6																ASME 300	(*2)
	7																JPI 150	
	8																JPI 300	
	A																DIN PN10	
	B																DIN PN16	
C																DIN PN25		
D																DIN PN40		
9																Others		
Sensor configuration	1																Nominal size > 40mm (Integral sensor type)	
	2																Nominal size = 10, 15, 25mm (Separate sensor type)	
Applicable fluid	K	-															Gas (< 120°C) (Fixed sensor)	
	E	-															Liquid (< 120°C) (Fixed sensor)	
	G	-															Gas, Steam (< 300°C)	(*3)
	L	-															Liquid (< 300°C)	
	S	-															High temp. application for Gas, Steam (< 460°C) (Replaceable sensor)	(*3)
	H	-															High temp. application for Liquid (< 460°C) (Replaceable sensor)	
Converter configuration	1																Integral type	
	2																Separate type	
Explosionproof configuration	0																None (non-explosionproof)	
	1																Flameproof configuration (TIS)	(*4)
	2																Flameproof configuration (ATEX)	
	4																Flameproof configuration (FM)	
	7																Flameproof configuration (NEPSI)	(*4)
	8																Flameproof configuration (KOSHA)	
Display	0																None	
	1																Totalizer, Digital Indicator	(*5)
Output Signal	4																Unscaled pulse (current pulse)	
	5																Scaled pulse (current pulse)	
	6																Analog	
	D																Unfactored pulse (open collector pulse)	
	E																Factored pulse (open collector pulse)	
Version code																	B	

(*1) : Body material for a meter with 200 to 300mm nominal size, Pipe; SUS316 + Flange; SFVC2A, however, not applicable to approved meters in high pressure safety regulation.

(*2) : Flange serration for ASME standard : ASME B 16.5-2003.

(*3) : With 10mm, steam is not measurable.

(*4) : Make sure to use pressure tight packing in case.

(*5) : Display item is selected by internal switch or EL2310 from one of the following items:

- (1) 6 digits Totalizer
- (2) Instantaneous flowrate indicator
- (3) % instantaneous flowrate indicator
- (4) 8 divided bar graph indicator.

■ EX DELTA II DIA PRODUCT CODE EXPLANATION

Item	Product Code																Description			
	①	②	③	④	⑤	⑥	⑦	—	⑧	⑨	⑩	⑪	—	⑫	⑬	⑭		⑮	⑯	
Model	V	X																	EX DELTA II	
Body style		W																	Wafer type	Fixed sensor type (*4)
		F																	Flanged type RF is standard	
		R																		Flanged type RF is standard
Application			2																Diamond shaped bluff body	
Nominal size				0	1	5	—												15mm	
				0	2	5	—												25mm	
				0	4	0	—												40mm	
				0	5	0	—												50mm	
				0	8	0	—												80mm	
Material								N											SCS14A (Nominal sizes 15, 25 wafer type)	
								C											SUS316	
								Z											Special (other than above)	
Flange rating									1										JIS 10K	
									2										JIS 16K	
									3										JIS 20K	
									4										JIS 30K	
									5										ASME 150	(*1)
									6										ASME 300	(*1)
									7										JPI 150	
									8										JPI 300	
									A										DIN PN10	
									B										DIN PN16	
									C										DIN PN25	
								D										DIN PN40		
								9										Other		
Sensor configuration									2										Separate sensor type	
Applicable fluid										E	—								Liquid (< 120°C) (Fixed sensor)	
										L	—								Liquid (< 300°C)	
										H	—								High temp. application for Liquid (< 460°C) (Replaceable sensor)	
Converter configuration											1								Integral type	
											2								Separate type	
Explosionproof configuration											0								None (non-explosionproof)	
											1								Flameproof configuration (TIS)	(*2)
											2								Flameproof configuration (ATEX)	
											4								Flameproof configuration (FM)	
											7								Flameproof configuration (NEPSI)	(*2)
											8								Flameproof configuration (KOSHA)	
Display											0								None	
											1								Totalizer, Digital Indicator	(*3)
Output Signal												4							Unscaled pulse (current pulse)	
												5							Scaled pulse (current pulse)	
												6							Analog	
													D						Unfactored pulse (open collector pulse)	
													E						Factored pulse (open collector pulse)	
Version code																		B		

- (* 1) : Flange serration for ASME standard : ASME B 16.5-2003 .
- (* 2) : Make sure to use pressure tight packing in case.
- (* 3) : Display item is selected by internal switch or EL2310 from one of the following items:
 - (1) 6 digits Totalizer
 - (2) Instantaneous flowrate indicator
 - (3) % instantaneous flowrate indicator
 - (4) 8 divided bar graph indicator.
- (* 4) : Applicable item.

Nominal size (mm)	15	25	40	50	80
Wafer type	○	○	○	○	○
Flanged type	△	△	△	○	○

○ : Standard △ : Option

■ When making inquiries, please specify the following:

Fill in the blanks or tick in .

Item	Description
1. Fluid to be metered	
2. Flow range	Max. _____ Normal _____ Min. _____ <input type="checkbox"/> m ³ /h (normal) <input type="checkbox"/> m ³ /h (actual) <input type="checkbox"/> kg/h
3. Temp. range	Max. _____ Normal _____ Min. _____ °C
4. Press. range	Max. _____ Normal _____ Min. _____ <input type="checkbox"/> MPa (gauge)
5. Density or Sp. Gr.	Density _____ <input type="checkbox"/> kg/m ³ (normal) , <input type="checkbox"/> kg/m ³ (actual) Sp. Gr. _____
6. Viscosity	_____ <input type="checkbox"/> mPa·s, <input type="checkbox"/> mm ² /s at _____ °C
7. Connections	Nominal size _____ <input type="checkbox"/> mm, <input type="checkbox"/> ", Flange rating <input type="checkbox"/> JIS _____ KRF <input type="checkbox"/> ASME/JPI _____ RF <input type="checkbox"/> DIN PN _____
8. Flow straightening pipe	<input type="checkbox"/> Req'd (Flow straightener and downstream pipe) <input type="checkbox"/> Not req'd (Prepare a straight pipe of specified length, I.D., Sch. No.)
9. Compensation	<input type="checkbox"/> Temp./Press. comp. <input type="checkbox"/> Pressure comp. <input type="checkbox"/> Temp. comp.
10. Compensation range	Temp. _____ to _____ °C , Pressure _____ to _____ MPa (gauge)
11. Compensation ref.	Ref. temp. _____ °C Press. ref. _____ MPa (gauge)
12. Compensation coeff. (gas measurement)	Z (service conditions) = _____ Zo (standard conditions) = _____
13. Accuracy test	<input type="checkbox"/> Req'd <input type="checkbox"/> Not Req'd
14. Converter	Type : <input type="checkbox"/> Integral configuration <input type="checkbox"/> Separate configuration Explosionproof configuration : <input type="checkbox"/> Non-explosionproof <input type="checkbox"/> Flameproof
15. Output	<input type="checkbox"/> Unscaled pulse, <input type="checkbox"/> Scaled pulse, Pulse unit _____ / P <input type="checkbox"/> Analog output, Full scale _____ to _____ / h
16. Receiving instrument	<input type="checkbox"/> Separate-mount LCD counter <input type="checkbox"/> Remotely located receiver (Specify model and spec.)
17. Miscellaneous	



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