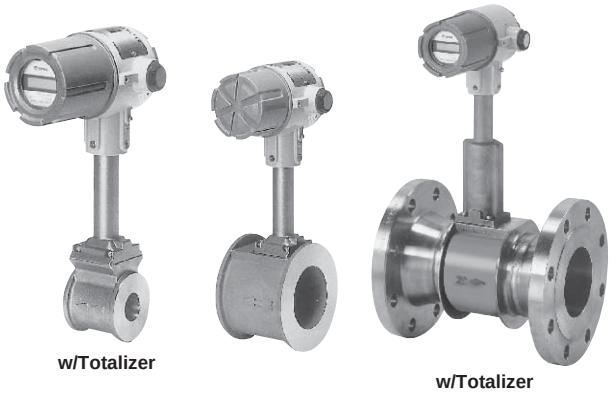
OVAL

Excellent Vortex Flowmeter
SMART TYPE EX DELTA
SMART TYPE EX DELTA•DIA

GENERAL SPECIFICATION
GS.No.GBD641-9-E

■ GENERAL

The smart type EX DELTA has newly been developed being added the following smart functions onto the existing standard type EX DELTA.
i.e.: various conversion computing, intelligent functions those of setting, changing, self-diagnosis and loop check with calling of range and every factor to be entried. Furthermore, additionally provided communication function utilizing a Smart Communication Unit (EL2300), 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 replace are possible without interrupting of metering flow.



w/Totalizer　　w/Totalizer

■ 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 increasing of security operation.
4. Maintenance operation such as range and parameter setting, and calibration can be performed.

■ GENERAL SPECIFICATIONS

●EX DELTA Meter Body

Item		Description		
Sensor type		Fixed sensor	Fixed sensor	Replaceable sensor
Nominal size		10,15, 25, 40, 50, 80, 100, 150mm	50, 80, 100, 150, 200, 250, 300mm	50, 80, 100, 150, 200, 250, 300mm
Body style		Wafer type	Flanged type(RF is standard)	Flanged type (RF is standard)
Flange rating		JIS 10, 16, 20, 30K　ANSI/JPI 150, 300		
St'd. connecting pipe		Nominal wall thickness Sch. 40		
Applicable fluid		liquids, gases and steam*1		
Flow range		See flow range table (P4, 5)		
Operating temp. range		−30～+300˚C Nominal size 200～300mm with flange material SFVC2A…0～300˚C (Temp. limitation depends on the flange material used)		Standard type :−30～+300˚C High temp. type :−30～+420˚C However, Min. temp. for Nom. size,200～300mm is specified as 0˚ due to limitation in material component
Max. operating pressure		Depends on flange rating (Design pressure :5.00MPa)		
Accuracy		Select one from the following two ranges according to the given operating conditions ① ±1% of indicated reading or better * ② ±1% of full scale or better *2 (*：In analog output, ±0.1% of full scale is added)		
Repeatability		±0.2% or better		
Material	**Body**	SCS14A Nom. size 10mm…SCS14A+SUS316	SUS316 or SCS14A (Nom. size 200～300mm…Flange material is SUS316 or SFVC2A.)	
	Bluff body (Delta shaped)	SUS316 or SCS14A		
	Adapter	SUS304 or SCS13A		
Instauration		No restrictions to cause loss of accuracy on physical orientation (Maintainability and waterproof work for cable entry should be taken into consideration)		
Coating color (Measuring Pipe)		Nominal size 10～300mm :Remains unfinished (because of stainless steel material) Nominal size 200～300mm :Diallyl phthalate resin finished Munsell 7.5G7/2.5 (SFVC2A only)		

*1:With 10mm,steam measurement is unacceptable. *2:Accuracy of 10mm in nom.size is ±2% or better with respect to the max. rated flowrate.

●EX DELTA･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　ANSI/JPI 150, 300		
Materials	**Body**	SUS316 or SCS14A		
	Bluff body (Diamond shaped)	SUS316		
	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 (Measuring Pipe)		Remains unfinished (because of stainless steel material)		

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■ CONVERTER SPECIFICATIONS

Item	Description	
Model	PA25(No Display)	PA25S (w/Totalizer, Digital Indicator)
Mounting	Select one of the followings : ①Integral with flowmeter ②Separate type (installed on 2″ pipe)	
Waterproof construction	IP66 (dusttight/weathertight)-IEC/EN 60529, JIS C 0920 -- NEMA TYPE 4X	
Explosionproof construction	Select one of the followings : ①Non-explosionproof construction ③Flameproof construction FM:Class 1, Div.1 Groups B, C & D ②Flameproof construction TIIS: ExdⅡB+H_2T4 ④Flameproof construction CSA:Class 1, Div.1 Groups B, C & D	
Ambient temperature	Non-explosionproof construction : –40~+80˚C Explosionproof construction : –20~+60˚C	Non-explosionproof construction : –20~+60˚C Explosionproof construction : –20~+60˚C
Ambient humidity	5~100%RH without dew condensation	
Material	Aluminum alloy	
Housing finish	Finished in baked melamine Finish Munsell 7.5G7/2.5 (Cover : Munsell 10G5/5.5)	
Output	Current signal 2 wires system (Both as Power line) Select one of the followings : *4 ①Scaled pulse Pulse level : 0/1=4/20mADC Pulse width : 10~1000ms (St'd : 50ms) ②Unscaled pulse (Vortex synchro-nized pulse) Pulse level : 0/1=4/20mADC Pulse width : 200μs ③Analog 4~20mADC at 0~FS Time constant : 0~100s (St'd : 2.5s)	
Display (Option)	———	Display : 7 segments LCD Content : One of the following 4 ways display is possible with switching over of an internal switch or a EL2300 ①Totalizing flow throughput : 6 digits Unit of totalizing : Same as scaled pulse output Unit of flow rate indication : Refer to *2 ・Upon power interruption, Totalized countsare held by non-volatized memory ・Totalized counts are resettable by an internal switch or EL2300 ②Actual instantaneous flow rate : 7 digits (3 1/2 digits are effective) Unit of flow rate indication : Refer to *2 ③% Instantaneous flow rate : Unit of display : % FS Discrimination : 0.1% Full scale : Same as that of analog output ④8 scaled % Bar graph Display : % FS Full scale : Same as that of Analog output
Power supply	12~45V DC (See Load Resistance Range curve) NOTE: Ifyou connect OVAL communication unit EL2300,use a power supply below 35V DC.	
Cable entry	G1/2 internal threads (Flameproof construction TIIS converter is furnished with pressuretight gasked lead-in) In case of FM/CSA approved flameproof construction, an NPT1/2 female adapter is bonded in place.	
Cable *1	Converter to receiving instrument : 1.25mm^2 Min., 2-conductor shield cable Sensor to converter : 1.25mm^2 Min., 3-conductor shield cable (applicable to separate type) Finished cable outside diameter : Non-explosionproof ϕ13.5mm Max Flame-proof ϕ8.5~ϕ11mm	
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)	

*1 : **Use cables heat resistant to 70℃ or higher.**

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

Unit of Instantaneous Flow rate / Unit of Totalized Flow	Computation: Actual Flow	Computation: Temp./Press Correcting
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)	○	○

*3 : In case a specification for Pulse output is given, Communication function is available only under the following conditions:
①During flow interruption ②Upon Power "ON" (Continuous communication is available if stared within 15 sec. after Power "ON")

*4 : If you desire to transform the factored or unfactored pulse output into an open collector output consult the factory.

● 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.

■ FLOW RANGES

●Liquid Service

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

Table A (based on specific gravity): EX DELTA

Unit in m^3/h

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	0.3	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	1.5	1.4	1.3	1.3	1.2	1.2	1.1	48
50	2.7	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	50	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·DIA

Unit in m^3/h

Nominal size mm (inch) \ 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 m^3/h

Size mm	Accuracy \ K. Viscosity	Minimum Flowrate									
		1	2	3	5	10	15	20	25	30	40
10	±2%FS		0.3	0.4	0.6	1.1					
15	±1%RD	0.8	1.6	2.4	3.9						
	±1%FS	0.4	1.2	1.8	2.9						
25	±1%RD	1.6	3.1	4.6	7.6	16					
	±1%FS				1.8	5.9	11	15	19		
40	±1%RD	2.4	4.7	7.0	12	24	35				
	±1%FS				2.8	6.5	14	22	29	35	
50	±1%RD	3.0	6.0	9.0	15	30	45	60			
	±1%FS				3.6	7.1	15	24	34	42	59
80	±1%RD		8.9	14	23	45	67	89	110	130	
	±1%FS					11	16	26	38	53	82
100	±1%RD		12	18	29	58	87	120	150	180	230
	±1%FS					14	21	28	45	55	96
150	±1%RD				43	86	130	170	220	260	340
	±1%FS							41	51	61	100
200	±1%RD					113	170	230	280	340	450
	±1%FS								68	81	110
250	±1%RD					140	210	280	350	420	560
	±1%FS										140
300	±1%RD					170	250	340	420	500	680
	±1%FS									180	230

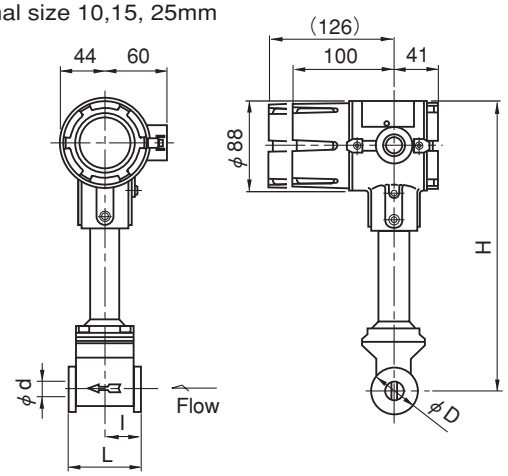
Beyond Measurement

- In the shadowed area ▭, determine on the basis of specific gravity (Table A).
- RD : Reading, FS : Full Scale

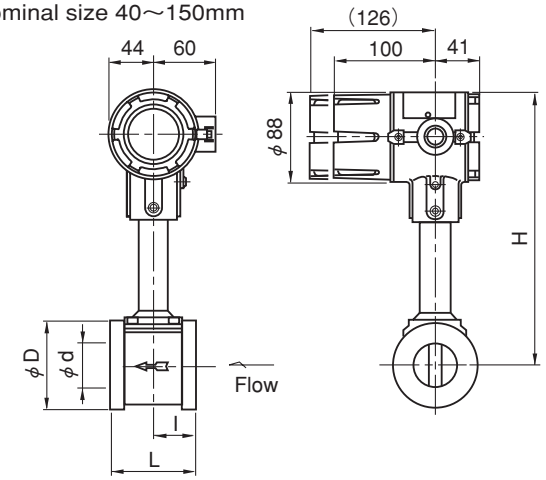
■ EX DELTA OUTLINE DIMENSIONS [INTEGRAL TYPE] (Unit in mm)

Wafer Type

● Nominal size 10,15, 25mm



● Nominal size 40～150mm

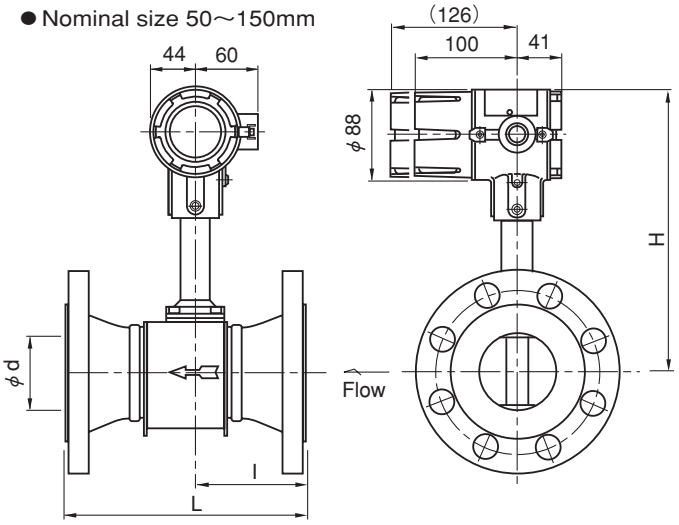


Nominal size mm (inch)	L	l	φd (Meter I.D)	φD	H	Approx. Mass (kg)	
						No Display	w/Display
10 (3/8″)	65	32.5	10	40	277	2.6	2.9
15 (1/2″)	65	32.5	14.5	40	277	2.6	2.9
25 (1″)	65	32.5	26.6	67	277	3.2	3.5
40 (1 1/2″)	80	40	37.6	81	262	3.9	4.2
50 (2″)	80	40	48.5	91	266	4.0	4.3
80 (3″)	100	40	72.4	126	282	6.8	7.1
100 (4″)	125	48	95.2	156.2	302	10.5	10.8
150 (6″)	165	54	140.3	214.9	332	20.4	20.7

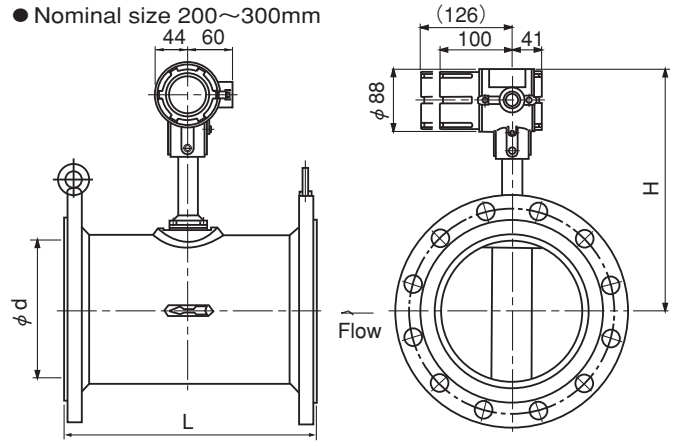
Flanged Type

■Fixed Sensor Type

● Nominal size 50～150mm



● Nominal size 200～300mm



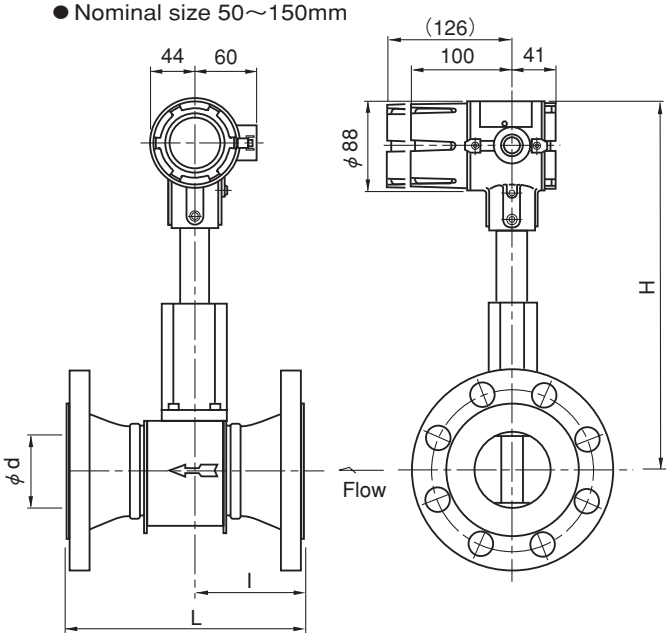
Nominal size mm (inch)	Frange Rating	L	l	φd (Meter I.D)	H	Approx. Mass (kg)	
						No Display	w/Display
50 (2″)	JIS 10K	173	86.5	48.5	266	9.0	9.3
	JIS 20K(16K)	181	90.5			9.2	9.5
	JIS 30K	191	95.5			11.3	11.6
	ANSI 150	204	102			9.9	10.2
	JPI 150					10.0	10.3
	ANSI 300	217	108.5			11.8	12.1
	JPI 300						
80 (3″)	JIS 10K	219	99.5	72.4	282	15.2	15.5
	JIS 20K(16K)	233	106.5			17.9	18.2
	JIS 30K	243	111.5			21.9	22.2
	ANSI 150	237	108.5			18.0	18.3
	JPI 150						
	ANSI 300	255	117.5			22.5	22.8
	JPI 300						
100 (4″)	JIS 10K	250	110.5	95.2	302	21.2	21.5
	JIS 20K(16K)	264	117.5			25.2	25.5
	JIS 30K	274	122.5			31.8	32.1
	ANSI 150	274	122.5			26.5	26.8
	JPI 150					26.6	26.9
	ANSI 300	294	132.5			36.0	36.3
	JPI 300					36.2	36.5
150 (6″)	JIS 10K	322	132.5	140.3	332	43.7	44.0
	JIS 20K(16K)	342	142.5			52.8	53.1
	JIS 30K	352	147.5			66.4	66.7
	ANSI 150	340	141.5			46.5	46.8
	JPI 150					46.6	46.9
	ANSI 300	359	151			65.6	65.9
	JPI 300					66.0	66.3
200 (8″)	—	350	—	199.9	347	38.3	39.1
250 (10″)	—	450	—	248.8	369	68.8	69.1
300 (12″)	—	500	—	297.9	391	88.8	89.1

Note: Figures in the brackets show the dimensions for built-in display

Note: In case of explosionproof construction rated FM/CSA, an NPT1/2 female thread adapter is bonded to the cable connection.

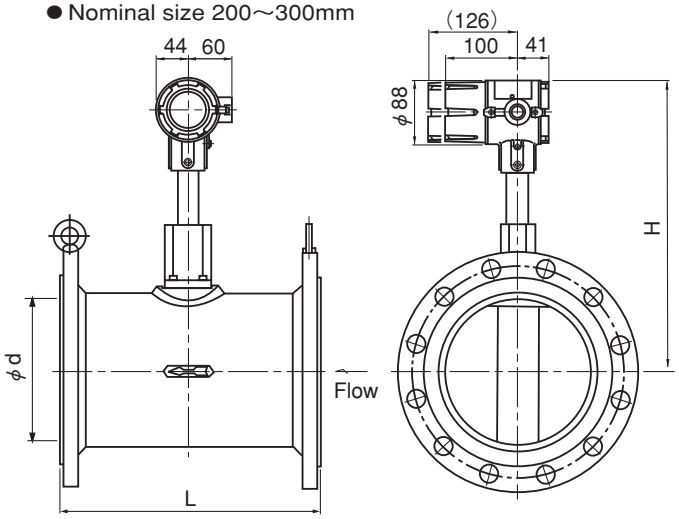
■Replaceable Sensor Type

● Nominal size 50～150mm

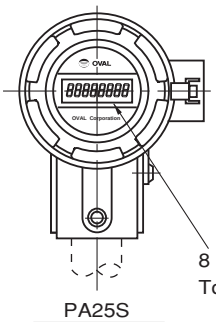


Nominal size mm (inch)	Frange Rating	L	l	φd (Meter I.D)	H	Approx. Mass (kg)	
						No Display	w/Display
50 (2″)	JIS 10K	173	86.5	48.5	347	9.6	9.9
	JIS 20K(16K)	181	90.5			9.8	10.1
	JIS 30K	191	95.5			11.9	12.2
	ANSI 150	204	102			10.5	10.8
	JPI 150					10.6	10.9
	ANSI 300	217	108.5			12.4	12.7
	JPI 300						
80 (3″)	JIS 10K	219	99.5	72.4	363	15.8	16.1
	JIS 20K(16K)	233	106.5			18.5	18.8
	JIS 30K	243	111.5			22.5	22.8
	ANSI 150	237	108.5			18.6	18.9
	JPI 150						
	ANSI 300	255	117.5			23.1	23.4
	JPI 300						
100 (4″)	JIS 10K	250	110.5	95.2	383	21.8	22.1
	JIS 20K(16K)	264	117.5			25.8	26.1
	JIS 30K	274	122.5			32.4	32.7
	ANSI 150	274	122.5			27.1	27.4
	JPI 150					27.2	27.5
	ANSI 300	294	132.5			36.6	36.9
	JPI 300					36.8	37.1
150 (6″)	JIS 10K	322	132.5	140.3	413	44.3	44.6
	JIS 20K(16K)	342	142.5			53.4	53.7
	JIS 30K	352	147.5			67.0	67.3
	ANSI 150	340	141.5			47.1	47.4
	JPI 150					47.2	47.5
	ANSI 300	359	151			66.2	66.5
	JPI 300					66.6	66.9
200 (8″)	—	350	—	199.9	428	39.4	39.7
250 (10″)	—	450	—	248.8	450	69.4	69.7
300 (12″)	—	500	—	297.9	472	89.4	89.7

● Nominal size 200～300mm



● Converter



PA25S

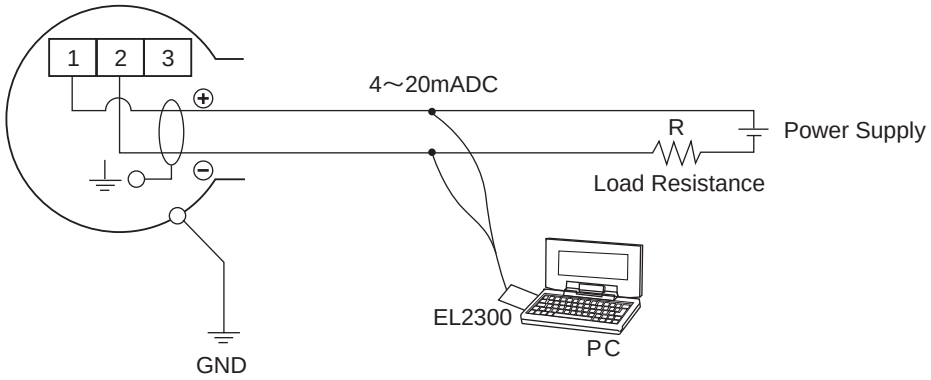
(w/Totalizer & Digital Indicator)

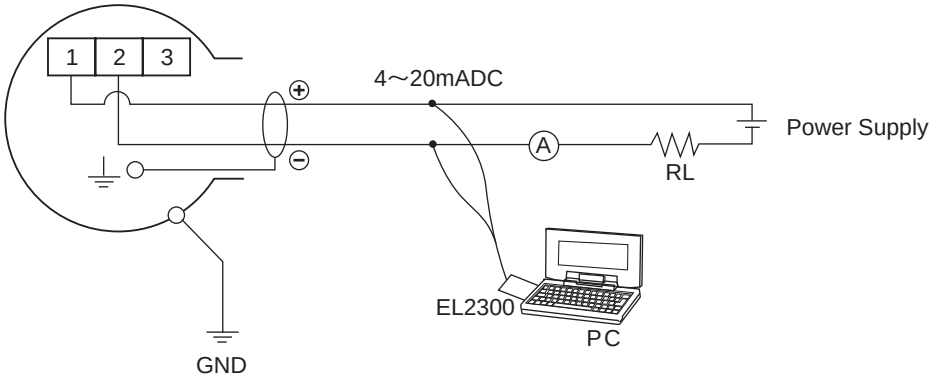
①Direction of mounting of the converter is changeable with 90˚ step being rotated around the center of a mountong bracket.

②Direction of a display is also changeable with 90˚ step being rotated within the converter.

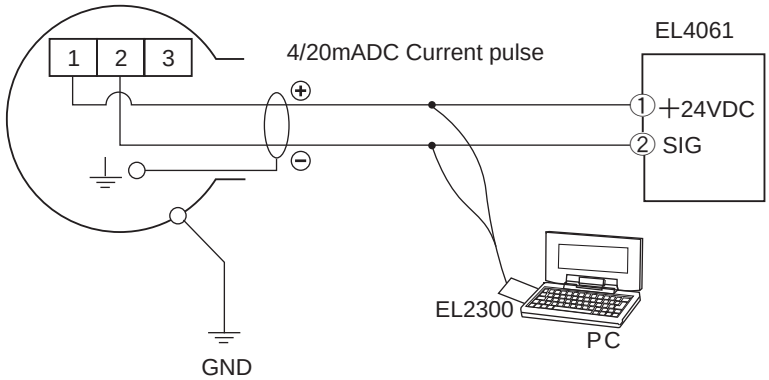
■ WIRING CONNECTIONS（an example）

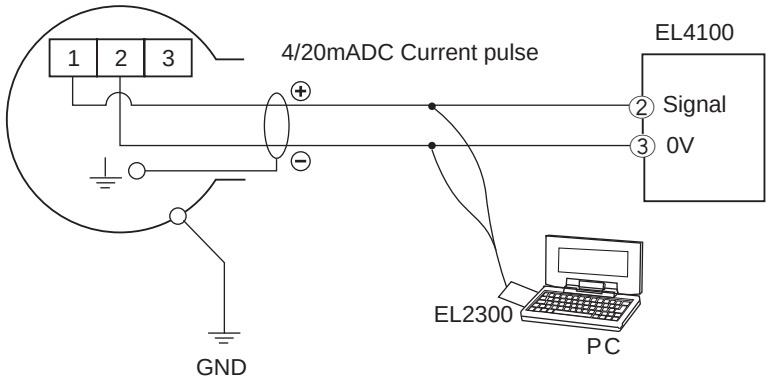
Analog Output





Pulse Output





※For EL2300 : Smart Communication Unit. Refer to GS No.GEL102-E

■ EX DELTA PRODUCT CODE EXPLANATION

Item	Code No. ①②	③	④	⑤⑥⑦	—	⑧	⑨	⑩	⑪	—	⑫	⑬	⑭	⑮	Description	
Model	**V X**														EX DELTA	
Body style		**W**													Wafer type（Nominal size: 10~150mm）	Fixed sensor type
		F													Flanged type（size: 50~300mm）RF is St'd.	
		R													Flanged type（size: 50~300mm）RF is St'd.	Replaceable sensor type
Application			**1**												Standard	
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 10~150mm） SUS316 （Nominal size 200~300mm）	
						C									SUS316＋SFVC2A（Nominal size 200~300mm）	Note 1
						Z									Other than above	
Flange rating							**1**								JIS 10K	
							2								JIS 16K	
							3								JIS 20K	
							4								JIS 30K	
							5								ANSI 150	Note 2
							6								ANSI 300	Note 2
							7								JPI 150	
							8								JPI 300	
							9								Others	
Sensor construction								**1**							Nominal size＞40mm	
								2							Nominal size＝10,15, 25mm（Separate sensor type）	
Applicable fluid									**G**						Gas, Steam（＜300℃）	Note 3
									L						Liquid（＜300℃）	
									S						High temp. application for Gas, Steam（Over 300℃ and ＜420℃）	Note 3
									H						High temp. application for Liquid （Over 300℃ and ＜420℃）	
										—						
Converter construction											**1**				Integral type	
											2				Separate type	
Explosionproof construction												**0**			None（non-explosionproof）	
												1			Flameproof construction (TIIS)	Note 4
												3			Flameproof construction (FM)	
												4			Flameproof construction (CSA)	
Display													**0**		None	
													1		Totalizer, Digital Indicator	Note 5
Output Signal														**4**	Unscaled pulse: Smart type	
														5	Scaled pulse: Smart type	
														6	Analog: Smart type	

Note 1. Body material for a meter with 200~300mm nominal size, Pipe;SUS316＋Flange;SFVC2A, however, not applicable for approved object in high pressure security regulation.
Note 2. Flange serration for ANSI standard : ASME/ANSI B 16.5－1996.
Note 3. With 10mm,steam measurement is unacceptable.
Note 4. Make it sure to use Pressure tight packing in case.
Note 5. Display item is selected by Internal switch or EL2300 from one of the following items:
（1）6 digits Totalizer
（2）Digital instantaneous flowrate indicator
（3）% instantaneous flowrate indicator
（4）8 divided bar graph indicator.

■ When making inquiries, please specify the following:

Fill in the blanks or check ☐with ✓ mark.

Item	Description
1. Fluid to the metered	
2. Flow range	Max._____ Normal_____ Min._____ ☐m^3/h〔normal〕 ☐m^3/h〔actual〕 ☐kg/h
3. Temp. range	Max._____ Normal_____ Min._____ ℃
4. Press. range	Max._____ Normal_____ Min._____ ☐MPa〔gauge〕
5. Density or Sp. Gr.	Density____ ☐kg/m^3〔normal〕, ☐kg/m^3〔actual〕 Sp. Gr. _____
6. Viscosity	_____☐mPa･s, ☐mm^2/s at _____℃
7. Connections	Nominal size ____ ☐mm, ☐″, Flange rating ☐JIS _____ KRF ☐ANSI____ RF
8. Flow straightening pipe	☐Req'd（Flow straightener and downstream pipe） ☐Not req's（Prepare a straight pipe of specified length, I.D., Sch. No.）
9. Compensation	☐Temp./Press. comp. ☐Pressure comp. ☐Temp. comp.
10. Compensation range	Temp. _____ ～ _____℃ , Pressure _____ ～ _____MPa〔gauge〕
11. Compensation ref.	Ref. temp. _____ ℃ Press. ref. _____ MPa〔gauge〕
12. Compensation coeff.（gas measurement）	Z（service conditions）＝ Zo（standard conditions）＝
13. Accuracy test	☐Req'd ☐Not Req'd
14. Converter	Type：☐Integral construction ☐Separate construction Explosionproof construction：☐Non-explosionproof ☐Flameproof
15. Output	☐Unscaled pulse, ☐Scaled pulse, Pulse unit _____ / P ☐Analog output, Full scale_____ ～ _____/ h
16. Receiving instrument	☐Separate-mount LCD counter ☐Remotely located receiver（Specify model and spec.）
17. Miscellaneous	