



TECHNICAL GUIDANCE

Large sized differential pressure flowmeter with multi functions

O7000 Series

ORIFLOMETER®

GENERAL

The O7000 flowmeter consists of an orifice plate and a metal tube variable area flowmeter (AM7000). By measuring a bypass flow of the "large sized" pipes with a "small sized" flowmeter, the flow rate in the large pipes can be measured at low cost.

The robust and reliable local indicator can be equipped with the electric output, local flow integration with pulse output, alarm output and communication function to meet various applications.

FEATURES

- ❑ High cost performance
A large flow through an orifice in the medium to large main pipe can be measured by measuring its small bypass flow at low cost.
- ❑ Any flow direction
Bottom to top, top to bottom, left to right, right to left are acceptable.
- ❑ Multi functions for various applications
Local indication, electric transmitter, local flow integration, pulse output of integrated flow, alarm output and communications are available.
- ❑ HART communications
- ❑ Explosionproof
Certified by TIIS, KOSHA, NEPSI, ATEX and IECEx
- ❑ Protection class of indicator IP67

STANDARD SPECIFICATIONS

- Measuring fluid : Liquids (Max. viscosity 3 mPa·s) and Gasses, not suitable for slurry and steam
- Pipe sizes and available pressure taps

D·D/2 taps	100 to 500 mm (4 to 20 in.)
Corner taps	50 to 500 mm (2 to 20 in.)
Flange taps	50 to 500 mm (2 to 20 in.)
Vena contracta taps	200 to 500 mm (8 to 20 in.)

 Consult us for larger sizes, 550 mm (22 in.) or more
- Process connection
JIS 5K, 10K, 20K
ANSI or JPI CLASS 150, 300, Consult us for others.
- Fluid temperature : -20°C to 200°C
- Fluid pressure : For JIS10K class
1.4 MPa at max.120°C, 1.2 MPa at max.200°C
The maximum allowable pressure is subject to its temperature complying with the relevant flange ratings. Consult us for higher pressure services.
- Max. differential pressure
40 kPa or 60 kPa for liquids
40 kPa or 60 kPa for gasses
- Indication accuracy : ±3% F.S.
- Rangeability (Scale range):
10 : 2.5 for max. diff. press. 40 kPa
10 : 2 for max. diff. press. 60 kPa
- Protection class of indicator : Dust tight and water immersion proof, IP67



● Painted color

Painted portion	Color
Measuring tube (Only carbon steel) Indicator body	Jade green (Munsell 7.5BG4/1.5)
Indicator cover Transmitter	Light gray (Munsell N7.5)

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MODEL CODE

Basic model			Location of indicator and taps			Size of main pipe			Specifications	
07	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	—	<input type="checkbox"/>	<input type="checkbox"/>	—	<input type="checkbox"/>	<input type="checkbox"/>	
Flow direction of main pipe	1									Bottom to top
	6									Left to right
	7									Right to left
	8									Top to bottom
Indicator function	L									Local indication
	E									Electric transmitter
	H									Electric transmitter + HART communication
	T									Local integration
	R									Reed switch
	N									Proximity switch
	M									Microswitch
Explosion proof requirement	W									Dust tight and water immersion proof, non-explosion proof
	E									Flameproof
	S									Intrinsic safety
Location of indicator	—	A								Higher than main pipe
	—	B								Lower than main pipe
Pressure taps					P					D·D/2 taps
					C					Corner taps
					F					Flange taps
					V					Vena contracta taps
Size of main pipes	—	050	50 mm,	2 in.						Neither D·D/2 taps, nor vena contracta taps are applicable.
	—	065	65 mm,	2 1/2 in.						
	—	080	80 mm,	3 in.						
	—	100	100 mm,	4 in.						No vena contracta taps are applicable.
	—	125	125 mm,	5 in.						
	—	150	150 mm,	6 in.						
	—	200	200 mm,	8 in.						
	—	250	250 mm,	10 in.						
	—	300	300 mm,	12 in.						
	—	350	350 mm,	14 in.						
	—	400	400 mm,	16 in.						
	—	450	450 mm,	18 in.						
—	500	500 mm,	20 in.							

Table 1 Cable entries on indicator

Indicator function		Standard	Non standard
Electric transmission As above + HART	Other than flameproof	2-G1/2	2-M20 x 1.5, 2-NPT1/2, with weather proof connector
	Flameproof	2-G1/2	2-M20 x 1.5, 2-NPT1/2, Flameproof packing type cable gland (Shimada SXC-16BY)
Local integration	Other than flameproof	2-G3/4	2-NPT3/4, with weather proof connector
	Flameproof	2-G3/4	2-NPT3/4 Flameproof packing type cable gland (Shimada SXC-22BY)
Alarm output	Other than flameproof	G1/2	M20 x 1.5, NPT1/2, with weather proof connector
	Flameproof	2-G1/2	2-M20 x 1.5, 2-NPT1/2, Flameproof packing type cable gland (Shimada EXPC-16B)

Select the cable entry size and the required number from above "Non standard" column if required.

Table 2 Available functions for the certified flameproof products

Certified by	Explosion classification	Available functions			
		Current output	Current + HART	Local flow integration	Alarm (Micro switch type)
TIIS	Ex d IIC T4	○	○	○	○
KOSHA	Ex d IIC T6...T3	○	○	○	○
NEPSI	Ex d IIC T3 ~ T6 Gb	○	○	○	○
ATEX	II2 G Ex d IIC T6...T3	○	○	○	○
IECEX	Ex d IIC T6...T3 Gb	○	○	○	○

• The products are certified as AM7 □□□ / □□ / □ E series for flowmeter portion.

Note : Use the flameproof packing type cable glands made by Shimada Electric Co. for the flameproof flowmeters certified by TIIS with the current output, current + HART, local flow integration or alarm output.

*The suitable cable diameter for the cable gland attached to the product:

* Φ 8 to 12 mm (Standard size Φ 10 to 12 mm) for SXC-16BY

* Φ 12 to 16 mm (Standard size Φ 14 to 16 mm) for SXC-22BY

* Φ 6 to 12 mm (Standard size Φ 10 to 16 mm) for EXPC-16B

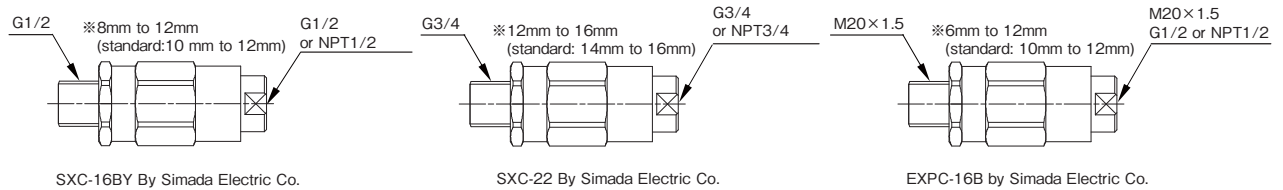


Table 3 Available functions for the certified intrinsically safe products

Certified by	Explosion classification	Available functions			
		Current output	Current + HART	Local flow integration	Alarm
TIIS	Ex ia IIC T6	○	○	—	*1
	Ex ia IIC T5	—	—	—	*1
KOSHA	Ex ia IIC T3 ... T6	○	○	—	○
NEPSI	Ex ia IIC T3 ~ T6 Gb	○	○	—	○
ATEX	II2 G Ex ia IIC T3 ... T6 Gb	○	○	—	○

• The products are certified as AM7 □□□ / □□ / □ I series for flowmeter portion.

*1: The intrinsically safe circuit for the products using the reed switch or microswitch is effective when the intrinsically safe circuit barrier is used in combination with the products. See table 5 for the recommended safety barriers. The product using a proximity switch is classified as T5 in the temperature classification. Consult us for details.

Table 4 Rating of the intrinsically safe circuit for current output, current + HART types

	Current output Current + HART
Max. voltage for intrinsically safe circuit	28 V DC
Max. current for intrinsically safe circuit	93 mA
Max. power consumption for intrinsically safe circuit	650 mW
Capacitance inside intrinsically safe circuit	5 nF
Inductance inside intrinsically safe circuit	0.2 mH

Table 5 Rating of the intrinsically safe circuit for alarm output types

	Reed switch type	Proximity switch type		Microswitch type
		Certified by TIIS	Other than TIIS	
Max. voltage for intrinsically safe circuit	30 V DC	10.5 V DC	16 V DC	30 V DC
Max. current for intrinsically safe circuit	500 mA	13 mA	25 mA	500 mA
Max. power consumption for intrinsically safe circuit	—	34 mW	64 mW	—
Capacitance inside intrinsically safe circuit	—	150 nF	150 nF	—
Inductance inside intrinsically safe circuit	—	150 μH	150 μH	—
Recommended relay barrier	EB3C by IDEC	KFD2-SR2-Ex.1 W by P & F ^{Note}		EB3C by IDEC

Note : The intrinsically safe circuit for the products using the proximity switch is certified by TIIS as a combination with following intrinsically safe circuit barriers made by P & F. Use them together with the products.

Intrinsically safe circuit barriers certified by TIIS : KFD2-SR2-Ex.1 W for 1 channel

KFD2-SR2-Ex.2 W for 2 channels

MAXIMUM FLOW RANGE FOR EACH MAIN PIPE SIZE

Main pipe size		Flow rate of water in m ³ /h (Density 1.0 g/cm ³ , Viscosity 1.0 mPa·s)		Flow rate of air in m ³ /h(nor) at 0°C and 1 atm	
		Diff. pressure 40kPa	Diff. pressure 60kPa	Diff. pressure 40kPa	Diff. pressure 60kPa
50 mm	2 in.	3 to 25	4 to 35	80 to 710	90 to 900
65 mm	2 1/2 in.	4 to 45	4 to 50	90 to 1200	110 to 1400
80 mm	3 in.	5 to 60	6 to 80	120 to 1700	140 to 2100
100 mm	4 in.	8 to 100	9 to 120	200 to 3000	230 to 3500
125 mm	5 in.	12 to 160	15 to 200	290 to 4600	350 to 5400
150 mm	6 in.	15 to 200	20 to 300	410 to 6000	490 to 7200
200 mm	8 in.	30 to 400	35 to 500	730 to 10000	850 to 13000
250 mm	10 in.	40 to 600	50 to 800	1100 to 17000	1400 to 20000
300 mm	12 in.	60 to 900	70 to 1000	1600 to 24000	1900 to 29000
350 mm	14 in.	80 to 1000	90 to 1200	2000 to 30000	2300 to 36000
400 mm	16 in.	100 to 1500	120 to 1600	2600 to 40000	3100 to 48000
450 mm	18 in.	120 to 1600	150 to 2000	3200 to 52000	3900 to 60000
500 mm	20 in.	150 to 2000	200 to 3000	4000 to 60000	4900 to 72000

The full scale of flowmeter can be set within the flow ranges in each main pipe size.

The rangeability is 10 : 2.5 for the maximum differential pressure 40 kPa and 10 :2 for 60 kPa.

Note 1 The figures above flow range are calculated when using SGP pipe, a JIS code name for an ordinary piping. When using other pipes than SGP, obtain the correct figures by multiplying the above figures by ("the inside diameter of a pipe used" / "the inside diameter of SGP pipe")².

The inside diameter of SGP pipe

Main pipe size (Nominal)	mm	50	65	80	100	125	150	200	250	300	350	400	450	500
		inch	2	2 1/2	3	4	5	6	8	10	12	14	16	18
Inside diameter (Actual)	mm	52.9	67.9	80.7	105.3	130.8	155.2	204.7	254.2	304.7	339.8	390.6	441.4	492.2

Note 2 The maximum flow rate of water is the flow rate based on the flow measurement of water of its density 1.0 g/cm³ and viscosity 1.0 mPa·s. When measuring liquids of which density is not 1.0 g/cm³, convert the flow rate to water by the following formula and refer to above table.

$$Q_w = Q \times \sqrt{\frac{\gamma_o \times 6.6}{7.6 - \gamma_o}}$$

Q_w : Flow rate converted to water

Q : Flow rate of actual liquid

γ_o : Density of actual liquid in g/cm³

Note 3 The maximum flow rate of air is the flow rate based on the flow measurement of air at 0°C and 1atm. When measuring conditions are different, convert the flow rate to the air by the following formula and refer to above table.

$$Q_A = Q \times C_v \times C_t \times C_p$$

Q_A : Flow rate converted to air

Q : Flow rate of actual gas

C_v : Density conversion factor

$$C_v = \sqrt{\frac{\gamma}{1.293}}$$

γ : Gas density [kg/m³ (nor)]

C_t : Temperature conversion factor

$$C_t = \sqrt{\frac{273+t}{273}}$$

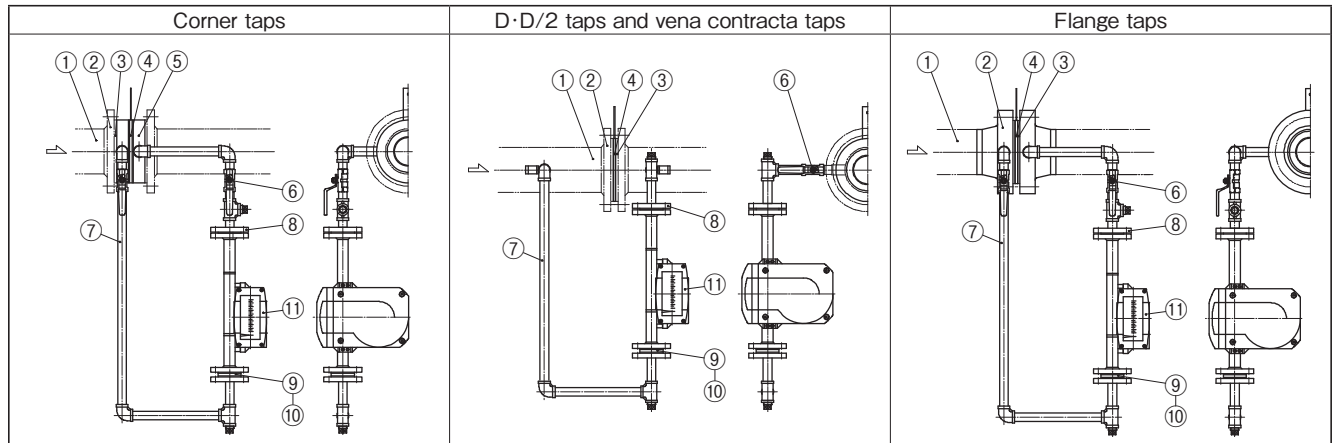
t : Temperature for actual fluid [°C]

C_p : Pressure conversion factor

$$C_p = \sqrt{\frac{0.1013}{0.1013+p}}$$

p : Pressure for actual fluid [MPa]

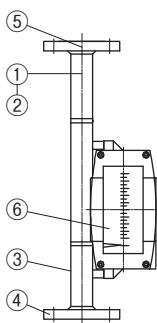
MATERIALS AND SCOPE OF SUPPLY



No.	Description	Materials		
		Class 1	Class 2	Class 3
1	Main pipe	Customer's scope of supply		
2	Flanges in main pipe	Customer's scope of supply or our scope of supply on request		
	Flange taps	S25C or SFVC2A	SUS304	SUS316
3	Gaskets in main pipe	Customer's scope of supply or our scope of supply on request		
4	Main orifice plate	SUS304	SUS304	SUS316
5	Orifice ring for corner taps	SS400	SUS304	SUS316
6	1/2" ball valves	C3771BE	SUS14A	SUS14A
7	1/2" pipes *1	SGP white	SUS304	SUS316
8	Companion flanges, bolts, nuts	SS400/SS400	SUS304/SS400	SUS316/SS400
9	Bypass orifice	SUS304	SUS304	SUS316
10	Gaskets for installing flowmeter	Non-asbestos for liquids or NBR for gasses as standard. Other types are available on request.		
11	Flowmeter	See "Materials used for flowmeter"		

*1 The piping materials from item No. 1 "main pipe" to item No.6 "1/2" ball valves" are supplied by customers for the D·D/2 taps and vena contracta taps.

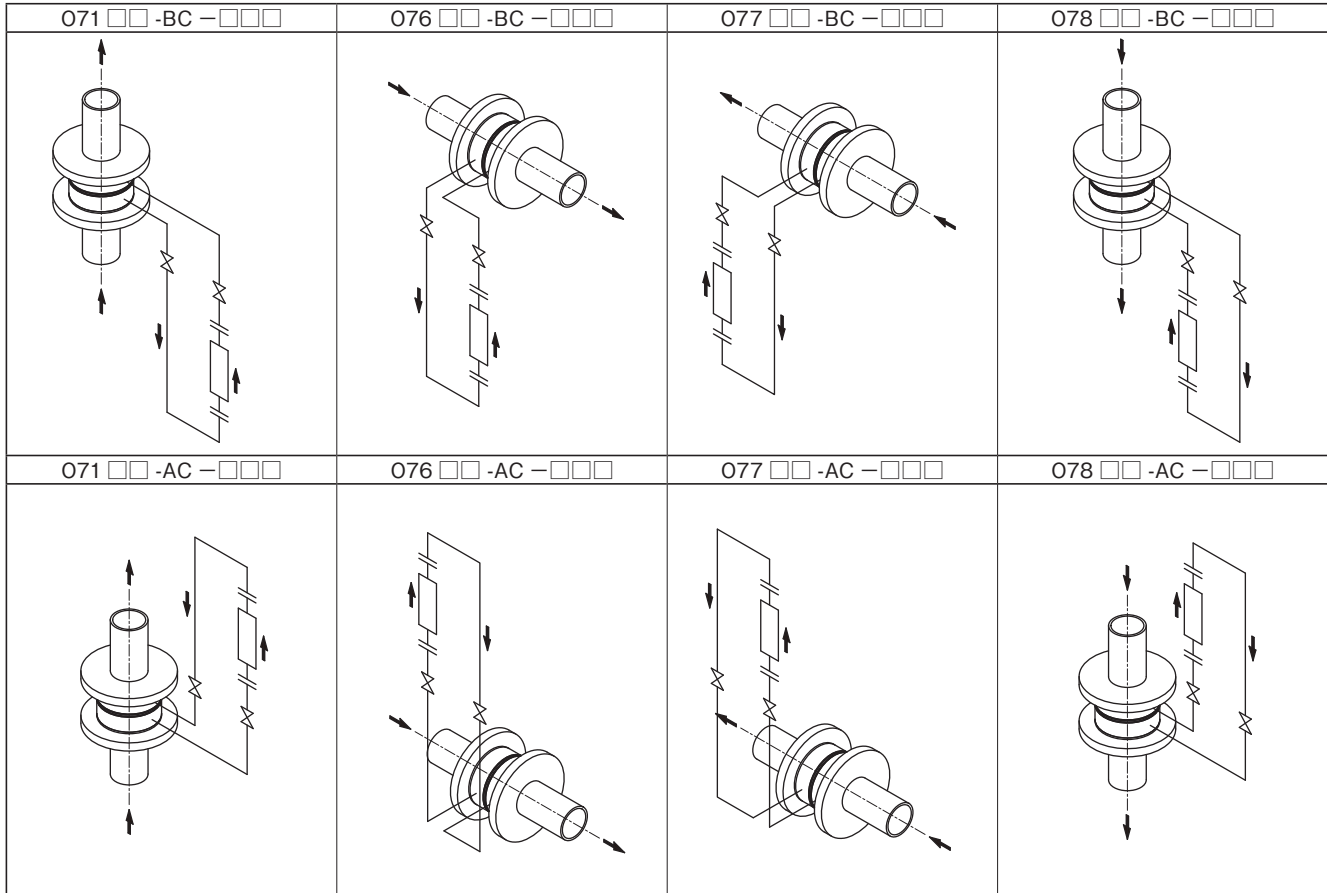
"Materials used for flowmeter"



No.	Description	Materials		
		Class 1	Class 2	Class 3
1	Metering tube	SUS304	SUS304	SUS316
2	Float assembly	SUS304	SUS304	SUS316
3	Body	SUS304	SUS304	SUS316
4	Flange	SS400	SUS304	SUS316
5	Stopper	SUS304	SUS304	SUS316
6	Case	ADC12	ADC12	ADC12

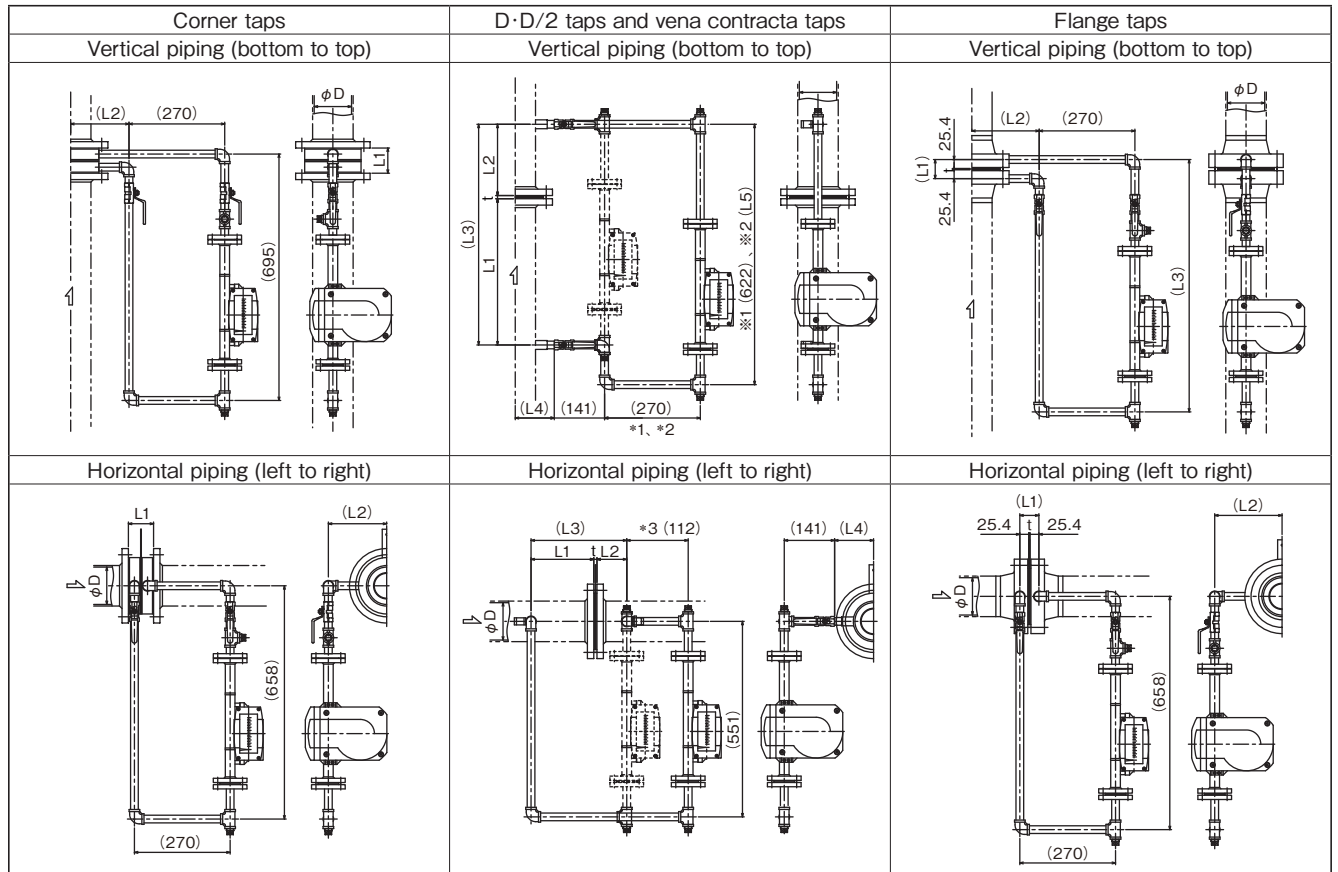
FLOW DIRECTION AND PIPING CONFIGURATION

Corner taps



The flow direction and piping configuration are shown in the above drawings when corner taps are used. Even when other taps are used or pipe sizes are different, the configuration is basically same. However, some modification may be necessary depending on the taps and size.

TYPICAL PIPING ARRANGEMENT FOR JIS 10 K FLANGE RATING



*1 Flow direction is "bottom to top" with a 350 mm or smaller in main pipe size. The dotted line shows the case of which flow direction is "bottom to top" with a 400 mm or larger in main pipe size.

*2 Flow direction is "top to bottom" with all main pipe sizes.

*3 The main pipe size is 150 mm or smaller. The dotted line shows the case of which main pipe size is 200 mm or larger.

Main pipe size	Corner taps		D · D/2 taps						Flange taps				
	L1 (* 4)	L2	L1 (* 5)	L2 (* 5)	t (* 6)	L3	L4	L5	t (* 7)	L1	L2	L3	
50 mm	2 in	68	137							3	53.8	162	712
65 mm	2 1/2 in	68	147							3	53.8	172	712
80 mm	3 in	68	152							3	53.8	177	712
100 mm	4 in	71	164	102	47	9	158	110	709	3	53.8	190	712
125 mm	5 in	71	180	128	59	9	196	130	747	3	53.8	210	712
150 mm	6 in	71	195	152	71	10	233	145	784	4	54.8	225	713
200 mm	8 in	71	220	202	95	10	307	170	858	4	54.8	250	713
250 mm	10 in	71	251	251	119	11	381	205	932	5	55.8	285	714
300 mm	12 in	71	274	302	144	11	457	230	1008	5	55.8	307	714
350 mm	14 in	71	296	337	162	11	510	250	1061	5	55.8	330	714
400 mm	16 in	71	328	388	186	12	586	285	1137	6	56.8	365	715
450 mm	18 in	71	355	438	212	12	662	315	1213	6	56.8	395	715
500 mm	20 in	71	383	489	237	12	738	345	1289	6	56.8	422	715

*4 The dimension L1 includes the thickness of gasket: 1.5 mm for 80 mm or smaller, 3 mm for 100 mm or larger.

*5 The dimensions L1 and L2 are obtained from the inside diameter of JIS SGP pipe. Use $L1 = D - 3$ and $L2 = D/2 - (t \cdot 3)$ instead, for other types of pipes where D means inside diameter of the pipe.

*6 The dimension t includes the thickness of gasket 3 mm.

*7 The dimension t is the thickness of main pipe orifice. Gasket thickness 1.5 mm for 80 mm or smaller and 3 mm for 100 mm or larger.

● Vena contracta taps

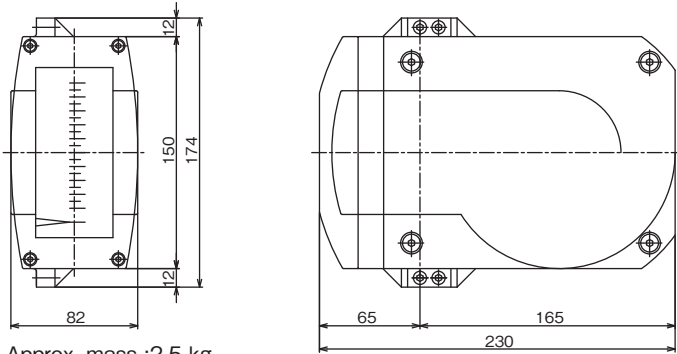
The location of taps is different from D·D/2 taps depending on the ratio of the orifice to pipe diameter. Consult us.

INDICATOR FUNCTION

Local indication

Ambient temp. : -30 to 80°C

Dimensions of indicator



Approx. mass : 2.5 kg

Local indication+ Current output, or Local indication + Current output + HART

Power supply voltage : 10 to 30 V DC between transmitter terminals
 10 to 28 V DC for intrinsically safe circuit
 12 to 30 V DC for TIIS or KOSHA flameproof

Current output : 4 to 20 mA DC
 (Effective output range : 4.0 to 21.6 mA At abnormal condition, however, 22.8 mA or 3.75 mA as an option can be output.)

Allowable load resistance : Less than 830 Ω (580 Ω or less/24 V DC) for current output
 230 to 830 Ω for current output + HART
 (The load resistance more than 230 Ω is needed for HART)
 Determine the allowable load resistance for each supply voltage using following formula.
 Allowable load resistance \leq (Power supply voltage [V] - 10) / 0.024 [Ω]
 The allowable load resistance includes the one of circuit wiring.

Output accuracy : \pm 1.0% F.S. (Against flow calibration)

Low cut off : 0 to 20%F.S. (default 7% F.S.)

Damping : 0 to 20 s (default 1s)

Cable entry : 2-G1/2 (Standard). Select one from Table 1 Cable entries on indicator on page 2 for others
 Note : The packing type cable gland model SXC-16BY made by Shimada Electric Co. shall be used for the TIIS
 Flameproof construction. The cable entry of indication part has only G1/2.

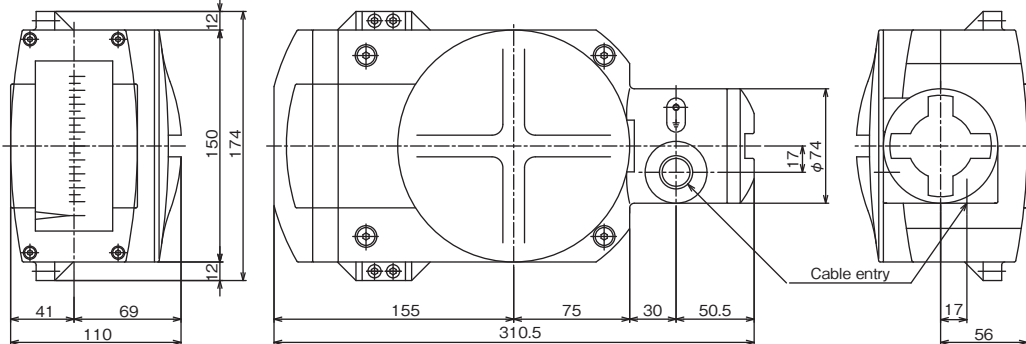
Enclosure of transmitter : Dust tight and water immersion proof IP67
 : Intrinsically safe Ex ia IIC T3...T6 (The temperature class of TIIS certified products is T6.)
 : Flameproof Ex d IIC T3...T6 (The temperature class of TIIS certified products is T4.)

Ambient temp. : Dust tight and water immersion proof -20 to 70°C
 : Intrinsically safe -20 to 60°C
 : Flameproof -20 to 55°C For TIIS certified products
 -20 to 60°C For other certified products

Insulation resistance : 20 MΩ or more / 500 V DC (between batch of power supply terminal and indicator case)

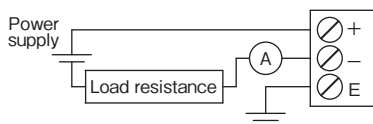
Withstand voltage : 500 V AC/1min (between batch of power supply terminal and indicator case)

Dimensions of indicator



Approx. mass : 3.7 kg

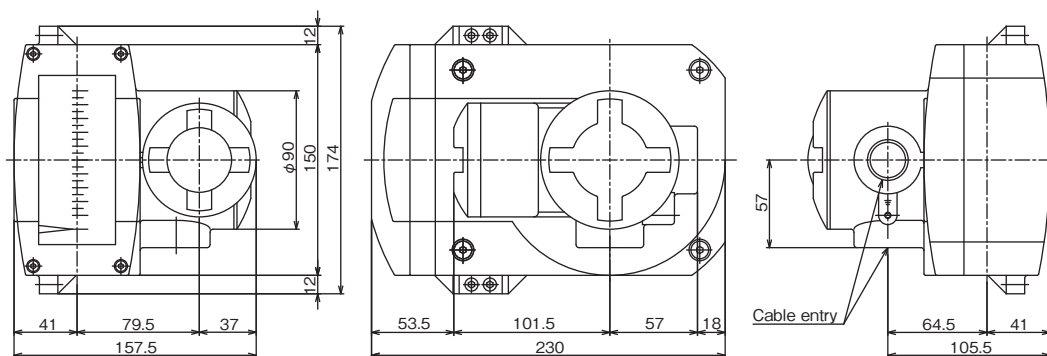
Terminal and wiring



● Local indication+ Current output + Local integration + Integration pulse (or alarm), or Local indication + Current output +Local integration + Integration pulse (or alarm) + Hart

- Integration : 6 digit red LCD (With 8 digit scaling and reset function)
- Count rate : Less than 10Hz (Less than 36000 c/h)
- Pulse or Alarm output : NPN Open collector 2 point select output (Pulse width : 30 ms, 50 ms, 100 ms, 200 ms, 500 ms)
: 1 point alarm + pulse output, or 2 points alarm output
(Alarms are selectable from the flow rate or the integrated flow alarm.)
: Max. voltage 30 V DC, max. current 50 mA
(The power supply circuit and the output circuit are insulated.)
Reverse-connected protection, Residual voltage when turning it on more less 1.2 V (10 mA)
- Integration accuracy : ±1.0% F.S. (Against flow calibration)
- Power supply : 16 to 30 V DC (Voltage between transmitter terminals)
- Current consumption : Less than 60 mA
- Current output : 4 to 20 mA DC
(Effective output range : 4.0 to 21.6 mA At abnormal condition, however, 22.8 mA or 3.75 mA as an option can be output.)
- Allowable load resistance : Less than 830 Ω (580 Ω or less/24 V DC) for current output
230 to 830 Ω for current output + HART (The load resistance more than 230 Ω is needed for HART)
Determine the allowable load resistance for each supply voltage using following formula.
Allowable load resistance ≤ (Power supply voltage [V] - 10) / 0.024 [Ω]
The allowable load resistance includes the one of circuit wiring.
- Output accuracy : ±1.0% F.S.(Against flow calibration)
- Low cut off : 0 to 20% F.S. (default 7% F.S.)
- Damping : 0 to 20s (default 1s)
- Cable entry : 2-G3/4 (Standard). Select one from Table 1 Cable entries on indicator on page 2 for others
Note : The packing type cable gland model SXC -22BY made by Shimada Electric Co. shall be used for the TIIS
flameproof construction. The cable entry of indication part has only G3/4.
- Enclosure of transmitter : Dust tight and water immersion proof IP67
: Flameproof Ex d IIC T3...T6 (The temperature class of TIIS certified products is T4.)
- Ambient temp. : Dust tight and water immersion proof -20 to 70° C
: Flameproof -20 to 55° C For TIIS certified products
-20 to 60° C For other certified products
- Insulation resistance : 20 MΩ or more/500 V DC
(between batch of power supply terminal and indicator case)
- Withstand voltage : 500 V AC/1min
(between batch of power supply terminal and indicator case)

Dimensions of indicator



Approx. mass : 3.8 kg

Terminal and wiring



Terminal No.	1	2	3	4	5	6	7	8	9	10
Terminal wiring	DO1+	DO1 -	DO2+	DO2 -	/	R+	R -	PS+	PS -	FG

Note DO : Contact output R : 4 to 20 mA analog current output PS : Power supply FG : Grounding

● Local indication + Alarm output

[Common specifications to all types]

- Alarm point : 2 points (1 point high alarm, 1 point low alarm or 2 points high and low alarm)
- Cable entry : G1/2 (Standard). Select one from Table 1 Cable entries on indicator on page2 for others.
- Enclosure of transmitter : Dust tight and water immersion proof IP67
- : Intrinsically safe To be used in combination with the safety barrier provided by customers. See table 3 and 5 on page 3.
- Insulation resistance : 100 MΩ or more/500 V DC (between batch of power supply terminal and indicator case)

[Reed switch]

- Type of switch : Self-holding reed switch with "a" and "b" contact
- Contact rating : Reed switch (SPST) 10 VA AC, 10 W DC as resistance load
Max. 125 V AC/0.5 A, Max. 100 V DC/0.5 A
- Setting accuracy : ±1.5% F.S. (Against flow calibration)
Note :While switch is on, and if any other flow rate than the alarm setting value is indicated, it may result in causing wrong accuracy.
- Reset span : Less than 10% F.S. (Against flow calibration)
- Ambient temp. : Intrinsically safe : -10 to 60°C (the temperature is subject to the safety barrier used for the intrinsically safe circuit)
- Withstand voltage : 1500 V AC/1 min (between batch of power supply terminal and indicator case)

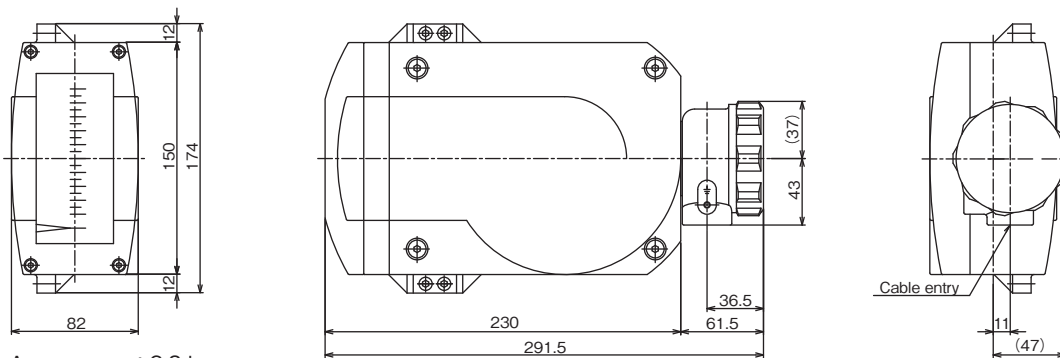
[Proximity switch]

- Type of switch : Proximity switch
- Power supply : 8 V DC
- Contact output : Proximity switch complying with NAMUR, ON : 1mA/OFF: 3mA or more
- Setting accuracy : ±1.5% F.S. (Against flow calibration)
- Reset span : Less than 1.5% F.S. (Against flow calibration)
- Ambient temp. : Dust tight and water immersion proof : -25 to 80°C
Intrinsically safe : -20 to 60°C For TIIS certified products
: -20 to 50°C For other certified products (the temperature is subject to the safety barrier used for the intrinsically safe circuit)
- Withstand voltage : 500 V DC/1 min (between batch of power supply terminal and indicator case)

[Micro switch]

- Type of switch : Micro switch with "c" contact
- Contact rating : 250 V AC/5A as resistance load
- Setting accuracy : ±1.5% F.S. (Against flow calibration)
Note :While switch is on, and if any other flow rate than the alarm setting value is indicated, it may result in causing wrong accuracy.
- Reset span : Less than 20% F.S. (Against flow calibration) (2 points alarm : less than 30% F.S.)
- Ambient temp. : Dust tight and water immersion proof : -25 to 80°C
Intrinsically safe : -20 to 60°C (the temperature is subject to the safety barrier used for the intrinsically safe circuit)
- Withstand voltage : 1500 V AC/1 min (between batch of power supply terminal and indicator case)

Dimensions of indicator

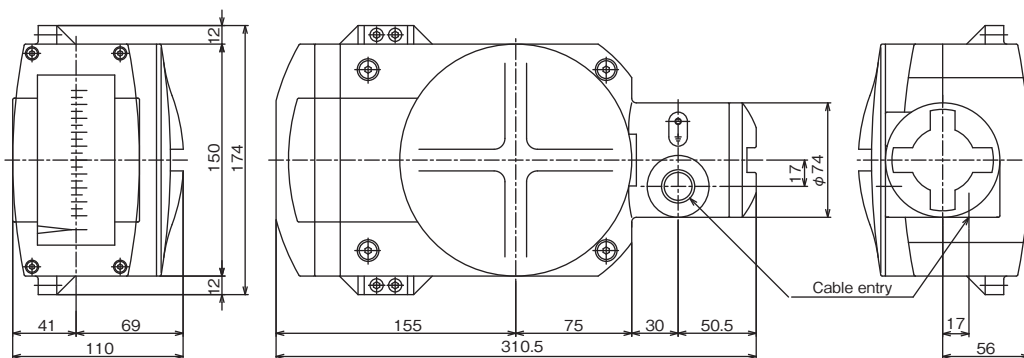


Terminal and wiring

Reed switch type				Proximity switch type				Micro switch type			
Terminal No.	1	2	3	Terminal No.	1	2	3	Terminal No.	1	2	3
High alarm	Terminals for high alarm			High alarm	+	-		High alarm	COM.	NC.	NO.
Terminal No.	4	5	6	Terminal No.	4	5	6	Terminal No.	4	5	6
Low alarm	Terminals for low alarm			Low alarm	+	-		Low alarm	COM.	NC.	NO.
Note: Terminals 4 and 5 are not used for one high alarm. Likewise 1 and 2 are not used for one low alarm.				Note: Terminals 4 and 5 are not used for one high alarm. Likewise 1 and 2 are not used for one low alarm.				Note: Terminals 4, 5, 6 are not used for one high alarm. Likewise 1, 2, 3 are not used for one low alarm.			

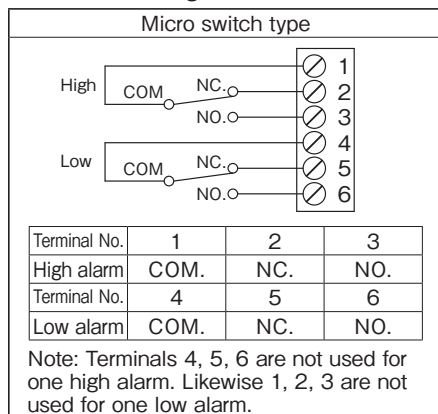
● Local indication + Alarm output (Flameproof)

- Alarm point : 2 points (1 point high alarm, 1 point low alarm or 2 points high and low alarm)
- Switch : Micro switch (c contact)
- Rating : 125 V AC/1A or 30 V DC/1A
- Setting accuracy : ±1.5% F.S. (Against flow calibration)
 Note: While switch is on, and if any other flow rate than the alarm setting value is indicated, it may result in causing wrong accuracy.
- Reset span : Less than 15% F.S. (Against flow calibration), less than 20% F.S. when 2 alarm contacts work simultaneously.
- Cable entry : G1/2 (Standard). Select one from Table 1 Cable entries on indicator on page 2 for others
 Note : The packing type cable gland model EXPC-16B made by Shimada Electric Co. shall be used for the TIIS flameproof construction. The cable entry of indication part has only M20 x 1.5.
- Enclosure of transmitter : Dust tight and water immersion proof IP67
 Flameproof Ex d IIC T3...T6 (The temperature class of TIIS certified products is T4.)
- Ambient temp. : Dust tight and water immersion proof -25 to 80°C
 Flameproof -20 to 55°C For TIIS certified products
 -20 to 60°C For other certified products
- Insulation resistance : 100 MΩ or more / 500 V DC (between batch of power supply terminal and indicator case)
- Withstand voltage : 1500 V AC/1 min (between batch of power supply terminal and indicator case)
- Dimensions of indicator

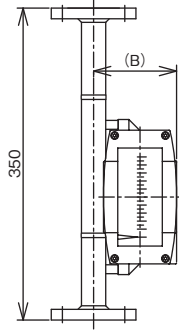


Approx. mass : 3.7 kg

Terminal and wiring



DIMENSIONS OF FLOWMETER



Functions of indicator	Dimension "B" in mm
Local indicator	94
Local indication + Current output	122
Local indication + Current output + HART	
Local indication + Current output + Local integration + Integration pulse (or alarm) output	169
Local indication + Current output + Local integration + Integration pulse (or alarm) output + HART	
Local indication + Alarm output	94
Local indication + Alarm output (Flameproof)	122

Appearance of flowmeter varies with the function of the indicator.

SUGGESTIONS ON INSTALLATION

1. Upstream and downstream straight runs

In order to keep measurement in the predetermined accuracy, the straight runs of pipes are required. Their lengths vary depending on the diameter ratio of contraction device and piping arrangement. Refer to JIS Z 8762-2:2007.

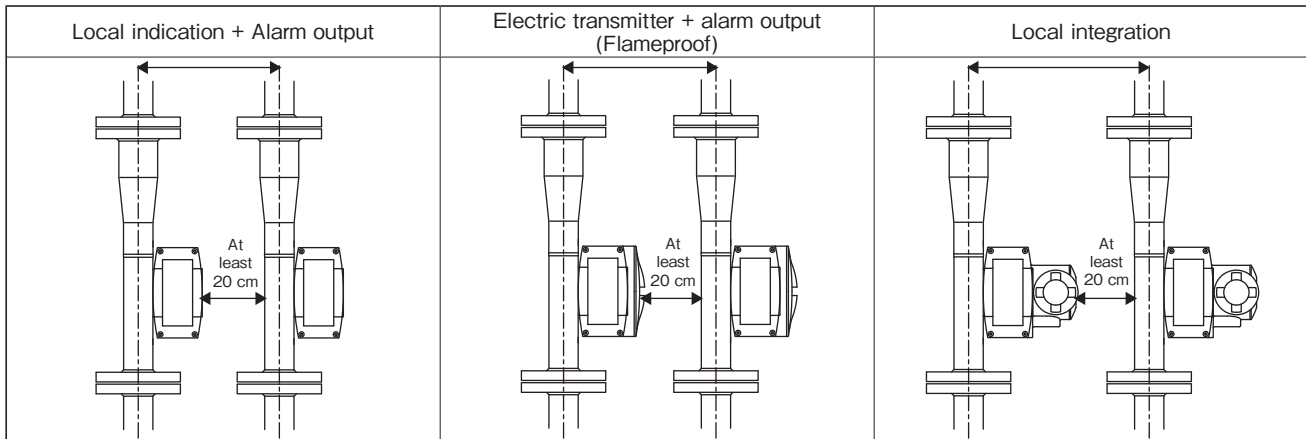
The following table shows the approximate figures of required straight runs.

	An elbow or tees	A valve (Gate valve is fully opened)
Upstream straight runs	10 D	12 D
Downstream straight runs	4 D	4 D

• D is the inside diameter of pipe.

• The straight runs are measured from the upstream surface of the main orifice plate.

- Provide the bypass piping as specified in the PRODUCT SPECIFICATION. The pressure loss of the bypass piping has been taken into account by our calculation.
- If you need bypass pipes of which sizes are different from those of standard ones due to a piping design, contact us.
- The flowmeter measures the flow rate by measuring a displacement of the float with a magnet coupling which might be influenced by the existence of the magnet field nearby. Install the flowmeter where no magnet field exists to avoid this. When installing a flowmeter near other flowmeters or magnetic materials, keep a distance at least 20 cm to avoid the interference and to keep a space for the maintenance as shown in the following drawings.



* Specification is subject to change without notice.

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