

Main_catalog

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Golden Rules Co.,Ltd

Gas, Steam, Liquid, Oil

Mass & Total Flowmeter

Specialty Manufacture





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01

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Golden Rules Co.,Ltd

Air & Gas
Insertion type

KC-2600 Series Thermal Mass Flow Meter



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

1. THERMAL MASS FLOW METER (Gases)

1-1 Insertion type KC-2600 Series

Insertion Type Thermal Mass Flowmeter



**Gas Insertion
KC-2610GI
(IP67)**

**Gas, Insertion
KC-2620EX
(IP66)**

Features

- Rate & total, volume, mass flow indication
- Input Power DC 24 V or 100-240VAC
- Output accuracy $\pm 0.1\%$, $\pm 2.5\ \mu A$ (4~20 mA)
- Field validation of flowmeter calibration settings
Smart program interface (RS-485 standard)
- Direct mass flow monitoring eliminates need for Temperature and pressure compensation
- Simple signal Processing & calibration
- Excellent reproducibility
- Excellent long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (7-5D)
- Outstanding range ability (Turn down ratio 1000:1)
- 0.1-second response to changes in flow rate
- Ex(IP66), KC

	Ex-proof	General
Weight	5.56kg	3.5kg

Description

Golden Rules' KC-2600 Series Smart inline mass flowmeter accommodates the change measurement Requirements and instrument-validation demands of fluid flow monitoring installations.

The versatile microprocessor-based transmitter integrates the function of flow measurement, flow-range Adjustment, meter validation and diagnostics, in either a probe-mounted or remote housing.

Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port and Golden Rules Smart interface software, or via the display and magnetic switches in the instrument panel. The Golden Rules KC-2600 Series allows you to configure or change the following parameters: flow range, Totalize, time response, low flow cutoff and a calibration correction factor that compensates for flow profile Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

Performance Specification

◆ Accuracy of Point Velocity

±1.0% of Reading (Option : ±0.5 % of RD)

Repeatability

±0.2 % of Full Scale

◆ Temperature Coefficient

±0.03 % Reading / ±(10 ~ 38) °C

±0.06 % Reading / ±(25 ~ 50) °C

◆ Pressure Drop

It can be ignored within ± 50 psig (3.4 barg)

◆ Response Time

1 second 63% of final velocity value

◆ Measuring Range

0.01 ~ 66.2 m/sec

◆ Function

Rate & Total

Mass Flow Rates

Air Flow Ranges					
Pipe Size		Minimum		Maximum	
A	B	Scfm	Nm ³ /h	Scfm	Nm ³ /h
25A	1-inch	0-6	0-8.9	0-120	0-180
40A	1½-inch	0-15	0-22	0-280	0-440
50A	2-inch	0-23	0-33	0-470	0-680
80A	3-inch	0-50	0-74	0-1000	0-1500
100A	4-inch	0-90	0-130	0-1800	0-2700
150A	6-inch	0-200	0-300	0-4000	0-5900
200A	8-inch	0-350	0-520	0-7000	0-10.000
Notes: Air or N2 Flow Standard Condition :21°C(70°F) & 21°C(70°F) scfm:0°C, Nm ³ /h 17 압					

Operating Specification

◆ Fluid

Gases (Air, O2, N2, LNG, LPG Other Gas)

◆ Pressure (limitation)

Compression Fittings : 508 psig (35 barg) option

150 lb Flange, JIS 10k RF PN16 (DN) : (-40 ~ 150) °F ((-40 ~ 65) °C)
: 230 psig (16 barg)

Low Pressure Retract Valve : 100 psig (7 barg)

High Pressure Retract Valve : 1000 psig (70 barg)

◆ Pressure Drop

It can be safely ignored for pipes over 3 inches.

◆ Fluid & Ambient temp'

Gases : (-40 ~ 302) °F ((-40 ~ 150) °C)

Ambient : (-4 ~ 185) °F ((-20 ~ 85) °C)

Gas accumulation range

Up to 5 X 10⁻⁴ with helium gas

◆ Input Power (selection)

DC24 V ±10 %, 200 mA

100 ~ 240 V AC ±10 %, 10 watts

◆ Output Signal (Standard)

Linear (4 ~ 20) mA & Pulse

◆ Display

Alphanumeric 2 X 16 backlight LCD

Adjustable variables via remote control switch or Smart interface software

Adjustable : Full scale : (0 ~100) %

Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)

Time response 1 ~ 7 sec / Correction factor setting 0.5 ~ 5 /

Zero & Span

◆ Totalizer

8- digits (99,999,999 Count) in engineering units Reset table by
Software or remote control switch

◆ Software

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB
of RS-485 communication

Additional features: Zero cut-off adjustment / Linearization adjustment / Save /
Load configuration / For meter validation

Physical specifications**◆ Wetted Materials**

Sensor Probe – Ceramic + 303SS(Platinum) Option : 316SS, 316LSS

Protection Tube – 303SS (Option : 316SS, 316LSS)

◆ Enclosure

Hazardous-Area CASE (Ex d[ib] IIC T4 : IP66)

General-Area CASE (IP67)

◆ Electrical Connection

2 X ½"PF or Ex Cable Gland(SS) 22C

◆ Mounting (Selection)

¾" Compression Fitting & ¾" Male NPT (Standard)

ANSI 150lb Flange, JIS 10k RF Flange

¾" Compression Fitting & 1" Male NPT (Option)

Ball Valve System (Option)

◆ Certification

Ex (Ex d[ib] IIC T4)

CE (CASE)

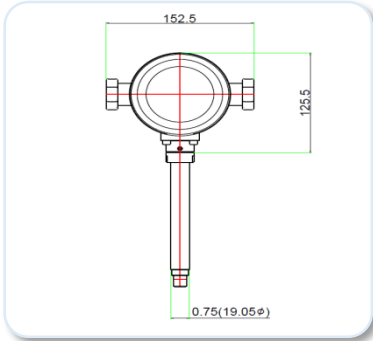
KGS Certificate

KC Certificate

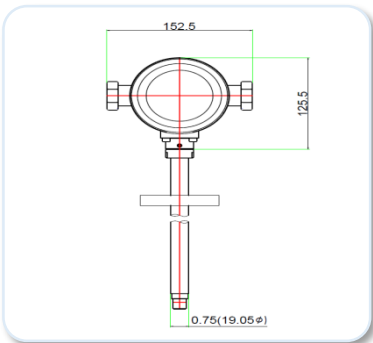
Dimensional Specification & Chart I

♣ General KC-2610GI (IP67)

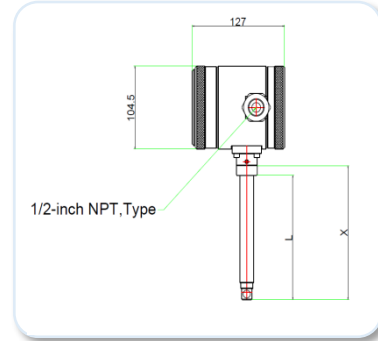
● Compression Fitting – Front View (EN2)



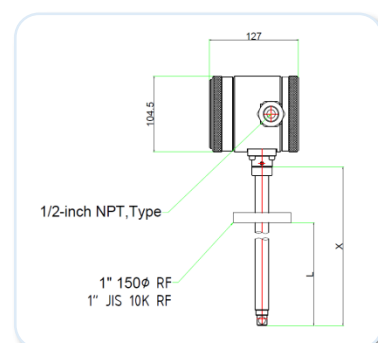
● Flange Mounting – Front View (EN2)



● Compression Fitting – Side View (EN2)

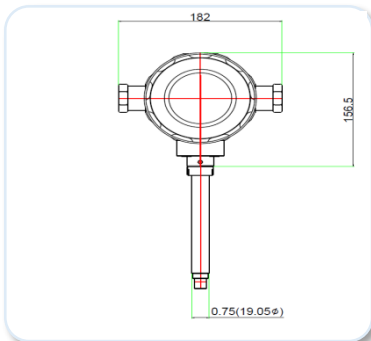


● Flange Mounting – Side View (EN2)

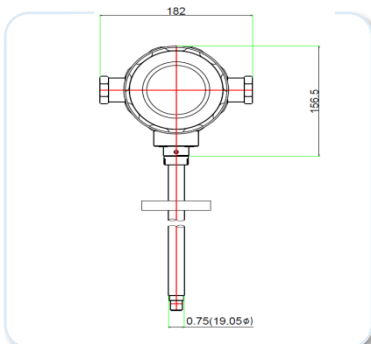


♣ Ex-proof KC-2620Ex (IP66)

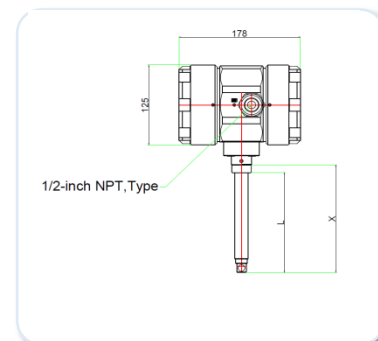
● Compression Fitting – Front View (E2)



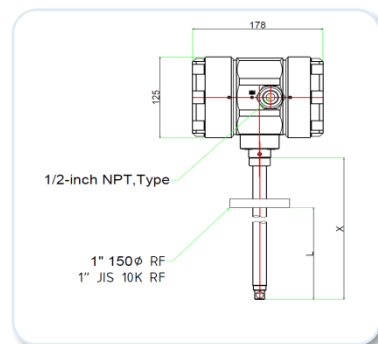
● Flange Mounting – Front View (E2)



● Compression Fitting – Side View (E2)



● Flange Mounting – Side View (E2)

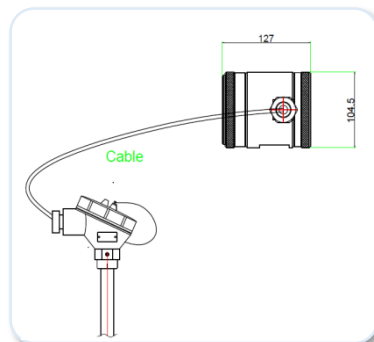
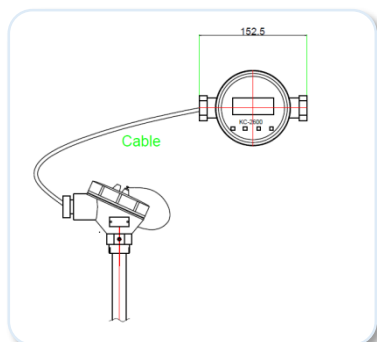


The shape of the sensor and Housing manufacturers are Subject to Change.

Dimensional Specification & Chant II

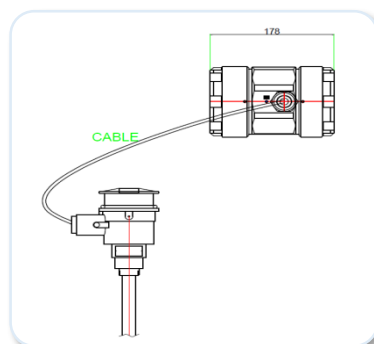
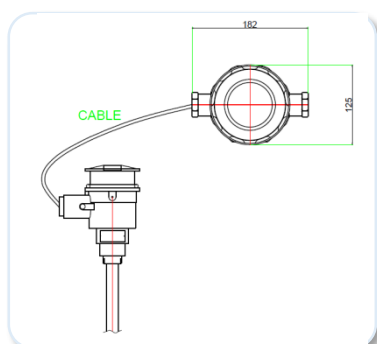
General Insertion type KC-2610GI-R

- Remote Mount Junction Box – Front View (EN4)
- Remote Mount Junction Box – Side View (EN4)



Ex-proof Insertion type KC-2620Ex-R

- Remote Mount Junction Box – Front View (E4)
- Remote Mount Junction Box – Side View (E4)



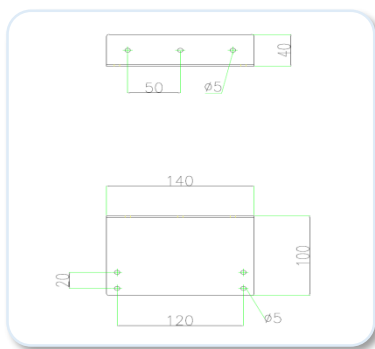
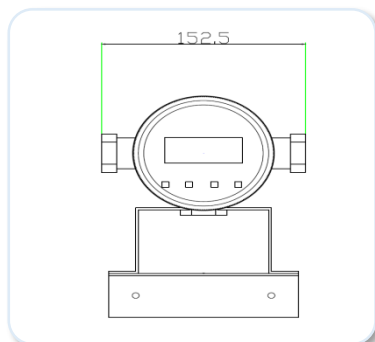
Length Chart		
Code	L	X
L06	6.0 (152.4)	7.5 (190.5)
L09	9.0 (228.6)	10.5 (266.7)
L13	13.0 (330.2)	14.5 (368.3)
L18	18.0 (457.2)	19.5 (495.3)
L24	24.0 (609.6)	25.5 (647.7)
L36	36.0 (914.4)	37.5 (952.5)

※ The shape of the sensor and Housing manufacturers are Subject to Change.

Dimensional Specification & Chart III

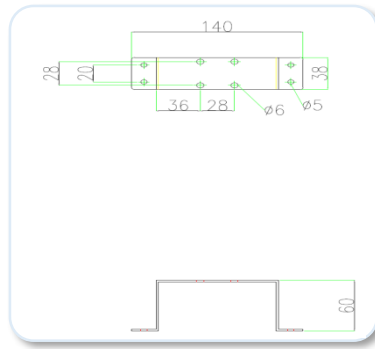
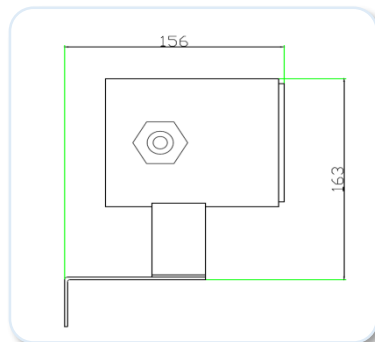
♣ General Insertion type KC-2610GI-R

● Remote Rear Bracket Electronics (EN4)



Panel mounting bracket 1

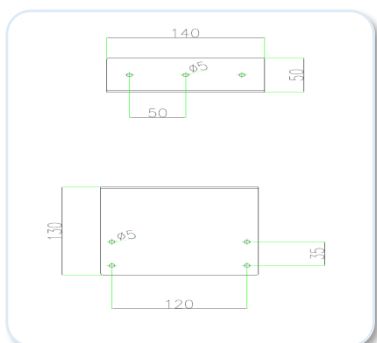
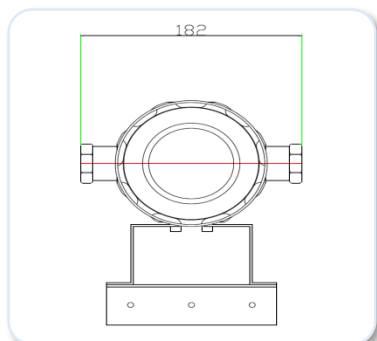
● Remote Side Bracket Mounted Electronics (EN4)



Panel mounting bracket 2

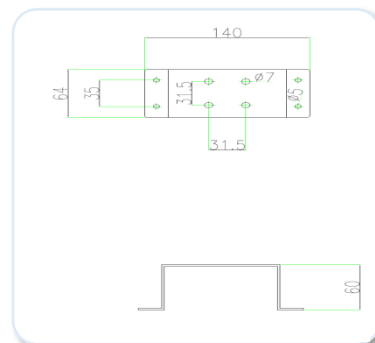
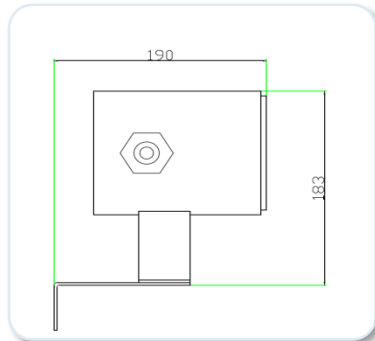
♣ Ex-proof Insertion type KC-2620Ex-R

● Remote Rear Bracket Electronics (E4)



Panel mounting bracket 1

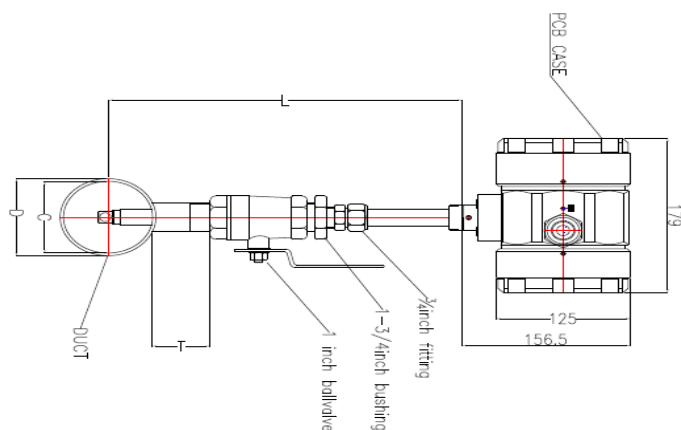
● Remote Side Bracket Mounted Electronics (E4)



Panel mounting bracket 2

Low Pressure Ball Valve Dimensional

● Side view



VARIABLE

L = Normal Probe Length

D = Duct O.D

C = Duct I.D

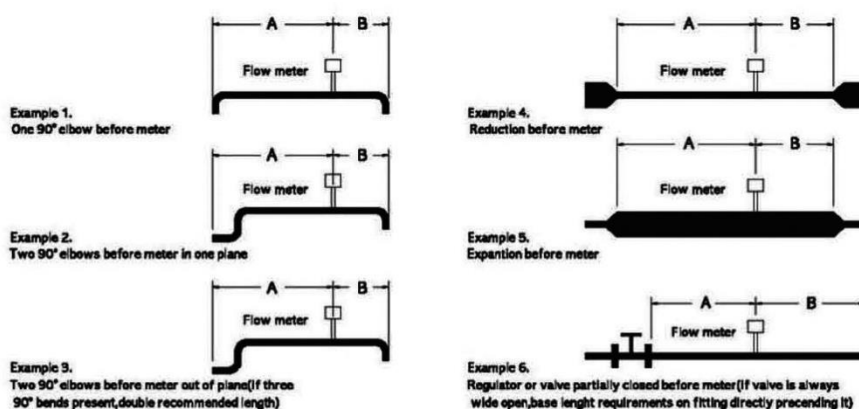
T = Height of "Threadolet" or Customer provided weldolet

All dimensions are inches. Millimeters are in parentheses.

All drawings save a ± 0.25 inch (6.4 mm) tolerance. Certified and available be on request.

Upstream & Downstream dimension (KC-2600GI insertion)

Select an installation that minimize possible distortion in the flow profile. Valves, elbows, control valves and other piping components may cause flow disturbances. Check your specific piping condition against the examples shown below. In order to achieve accurateness and repeatable performance install the flow meter using the recommended number of straight run pipe diameters upstream and downstream of the sensor.



Example	A-Upstream(1)Requirements	B-Downstream(2)Requirements
1	10~7D	5~3D
2	15~10D	5~3D
3	20~15D	10~5D
4	10~7D	5~3D
5	20~15D	10~5D
6	20~15D	5~3D

(1)Number of diameter(D)of straight pipe required between upstream disturbance and the flow meter.

(2)Number of diameter(D)of straight pipe required downstream of the flow meter.

Order Code KC-2600GI Series (Gas Insertion type)

Type Length Conn` Spec Enclosure Power Output Display Direction Cal 1 Cal 2 Pressure Option
 KC-26 - L - M - E - P - V - - - - -
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type	Code 1	Input Power	Code 8	Calibration 2 ⁹	Code 13
IP67 or IP65	10 GI	DC 24 V ±10 %, 200 mA	2	70 °F(21 °C) 14.7 psig (1.103 barg)	A
Hazardous-Area Location Enclosure	20 Ex	AC 100 ~ 240 V ±10 % (옵션)	3	32 °F(0 °C) 14.7 psig (1.103 barg)	B
Agency approved, customer specified	30	Agency approved, customer specified	W	Agency approved, customer specified	W

Length ⁴	Code 2,3	Output Signal	Code 9	Pressure Limit	Code 14
6" (15 cm)	06	RS-485S (RS-232C)	1	Low pressure	
9" (23 cm)	09	Pulse, Alarm	3	Below 43 psig (3 barg)	L
12" (30 cm)	12	DC 4~20 mA, 0~5 V DC	4	Medium pressure	M
18" (46 cm)	18	Agency approved, customer specified	W	Below 145 psig (10 barg)	
24" (61 cm)	24			High pressure	H
36" (92 cm)	36			Below 725 psig (50 barg)	(option)
Special Length	(in)				
Probe with 2" JIS 10k RF Flange	(in)-M5				
High pressure with Retractor Valve	(in)-M9				
Agency approved, customer specified	WW				

Flow Display	Code 10	Option	Code 15
No Readout	NR	Agency approved, customer specified	W
Digital Display	DD		
Agency approved, customer specified	WW		

Connection Specification	Code 4,5
None	0
Compression Fitting ² (¾" Tube X ¾" Male NPT)	10
Thread let (¾" Female NPT) Specify Pipe O.D in parentheses	2()
Compression Fitting (IP67) (½" Tube X ¾" Male NPT)	3
Curved Duct Bracket (¾" Tube Compression Fitting) Specify Duct O.D in parentheses	4()
Low Pressure Retractor Valve Specify Duct O.D in parentheses	8()
Compression Fittings (¾" Tube X 1" Male NPT)	15()
Agency approved, customer specified	WW

Enclosure ⁵	Code 6,7
Hazardous-Area Location Enclosure	2
Remote Hazardous-Area Location Enclosure(Only with Ex Meter)	3(Ft)
Remote Hazardous-Area Location Enclosure(Only with Junction Box)	4(Ft)
IP67 or IP65	N2
Remote IP67 with Junction Box	N4(Ft)
Agency approved, customer specified	WW

Direction	Code 11	Calibration 1 ⁹	Code 12
Horizontal Free or Vertical UP	1		
Horizontal Free or Vertical Down	2		
Agency approved, customer specified	W		
		Standard Calibration	A
		Air, only for 3" and large pipe size	
		Compressed Air, only for 3" and large pipe size	D
		Customer Calibration	B
		Air	
		Air equivalency (Digester Gas, Flue, Gas etc.)	C
		Nitrogen, Helium, Argon, Carbon Dioxide de Compressed Air or Digester Gas	E
		Hydrocarbon (Natural Gas, Methane, Ethane, Propane etc.)	F
		Hydrogen or Hydrogen Mixture	G
		Agency approved, customer specified	W

Note

- 1.Flange is tapped and threaded on the compression fitting
- 2.The male connector is permanently tightened with ferrule of two combined materials
- 3.Flange must be ANSI or DIN specification
- 4.Maximum length is 60-inch(1524mm)
- 5.Enclosure required for agency approvals, T6 rate at 40°C
- 6.Wire resistance must be less than 8 ohms
- 7.Turndown ratio is 100:1 min. & 1000:1 max.
- 8.SFPS is the abbreviation for standard feet per second at 14.7psia(1.01 bar(a) & 70°F (21.1 °C)
- 9.Custmoer specified calibration must not exceed temperature & pressure limitations of the 2610GI, 2620Ex Series products specifications

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Air & Gas
Thermal Mass Flow Meter
Specialty Manufacture

KC-2600

Thermal Mass Flow Meter



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

1. THERMAL MASS FLOW METER (Gases)

1-2 Inline type KC-2600 Series

Inline Type Thermal Mass Flowmeter



**Gas inline type
KC-2610GF
(IP67)**



**Gas inline type
KC-2620Ex
(IP66)**



**Gas inline MFM
KC-2610GM**



**Gas inline MFM
KC-2620Ex-GM**

Features

- Rate & total, volume, mass flow, indication
- Input Power DC 24 V or 100-240VAC
- Output accuracy $\pm 0.1\%$, $\pm 2.5\ \mu\text{A}$ (4~20 mA)
- Field validation of flowmeter calibration settings
Smart program interface (RS-485 standard)
- Direct mass flow monitoring eliminates need for
Temperature and pressure compensation
- Simple signal Processing & calibration
- Excellent reproducibility
- Excellent long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (7-5D)
- Outstanding range ability (Turn down ratio 1000:1)
- 0.1-second response to changes in flow rate
- Ex(IP66), KC

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The Golden Rules KC-2600 Series allows you to configure or change the following parameters: flow range, Totalize, time response, low flow cutoff and a calibration correction factor that compensates for flow profile Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

The information contained herein is subject to change without notice.

Performance Specification

◆ Accuracy of Point Velocity

±1.0% of Reading (Option : ±0.5 % of RD)

Repeatability

±0.2 % of Full Scale

◆ Temperature Coefficient

±0.03 % Reading / ±(10 ~ 38) °C내에서 °C

±0.06 % Reading / ±(25 ~ 50) °C내에서 °C

◆ Pressure Drop

It can be ignored within ± 50 psig (3.4 bara).

◆ Response Time

1 second 63% of final velocity value

◆ Measuring Range

0.01 ~ 66.2 m/sec

◆ Function

Air, O₂, N₂, LNG, LPG Other Gas

Mass Flow Rates

Air Flow Ranges							
Pipe Size		Minimum		Maximum		Weight (kg)	
A	B	Scfm	Nm ³ /h	Scfm	Nm ³ /h	방폭	일반
8A	¼-inch	0.5	-0.7	9	14	5	3
15A	½-inch	2	3.0	40	60	5	3
20A	¾-inch	4	5.9	75	120	5	3
25A	1-inch	6	8.9	120	180	6	4
40A	1½-inch	15	22	280	440	7.2	5.2
50A	2-inch	23	33	470	680	8.6	6.6
80A	3-inch	50	74	1000	1500	11	9
100A	4-inch	90	130	1800	2700	16.2	14.2
150A	6-inch	200	300	4000	5900		
200A	8-inch	350	520	7000	10,000		

Notes: Air or N₂ Flow Standard Condition :21°C(70°F) & 21°C(70°F) scfm:0°C, Nm³/h 1atm

Operating Specification

◆ Fluid

Gases

◆ Pressure (limitation)

Compression Fittings : 508 psig (35 barg) option

150 lb Flange, JIS 10k RF PN16 DIN (-40 ~ 150) °C (-40 ~ 302) °F : 230 psig (15.9 barg)

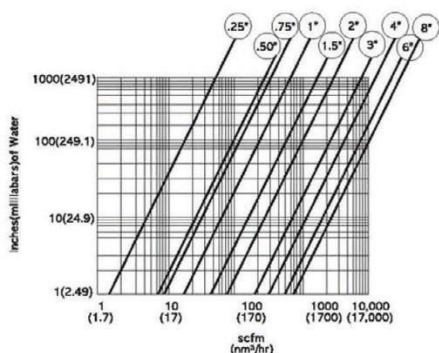
150 lb Flange, JIS 10k RF PN16 DIN 121 °C (250 °F) : 185 psig (12.8 barg)

150 lb Flange, JIS 10k RF PN16 DIN 400 °C (752 °F) : 155 psig (10.7 barg)

NPT -40 ~ 150 °C ((-40 ~ 302) °F) : 508 psig (35 barg)

High Pressure Retract Valve : 1000 psig (70 barg)

◆ Pressure Drop



◆ Fluid & Ambient temp'

Gases : (-40 ~ 302) °F ((-40 ~ 150) °C)

Ambient : (-4 ~ 185) °F ((-20 ~ 85) °C)

◆ Input Power (selection)

DC24 V ±10 %, 200 mA

(100 ~ 240) V AC ±10 %, 10 watts

◆ Output Signal

Linear (4 ~ 20) mA & Pulse

◆ Display

Adjustable variables via remote control switch or Smart interface software

Adjustable : Full scale : (0 ~100) %

Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)

Time response 1 ~ 7 sec / Correction factor setting 0.5 ~ 5 /

Zero & Span

Totalizer

8-digits (99,999,999 Count) in engineering units Reset table by
Software or remote control switch

◆ Software

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB
of RS-485 communication

Additional features: Zero cut-off adjustment / Linearization adjustment / Save /
Load configuration / For meter validation

Physical Specification**◆ Wetted Part Mat'l**

Sensor Probe – Ceramic + 303SS (Platinum) Option : 316SS, 316LSS

Flow Body – 304SS (Option 316SS, 316LSS)

Enclosure

Hazardous-Area CASE (Ex d[ib] IIC T4 : IP66)

General-Area CASE (IP67)

◆ Electrical Connection

2 X ½"NPT or Exp Cable Gland(SS) 22C

◆ Mounting (selection)

¾" Compression Fitting과 ¾" Male NPT (Standard)

ANSI 150lb Flange, JIS 10k RF Flange (Option)

¾" Compression Fitting과 1" Male NPT (Option)

Ball Valve System (Option)

◆ Certification

Ex (Ex d[ib] IIC T4)

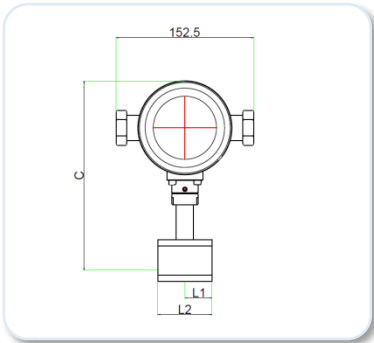
CE (CASE 전체)

KGS Certificate

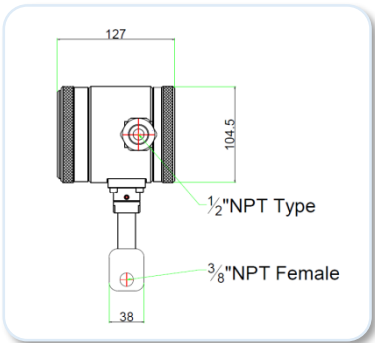
KC Certificate

Dimensional Specification & Chart I General type KC-2610BF (IP67)

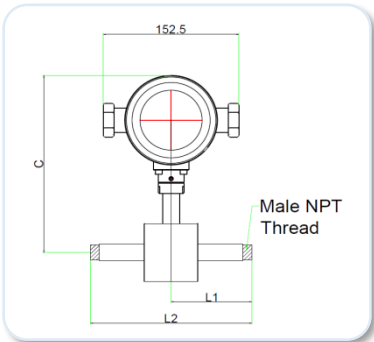
●1/4," 3/8" NPT – Front View (EN2)



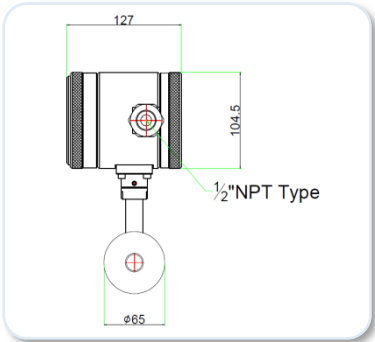
●Compression Fitting – Side View (EN2)



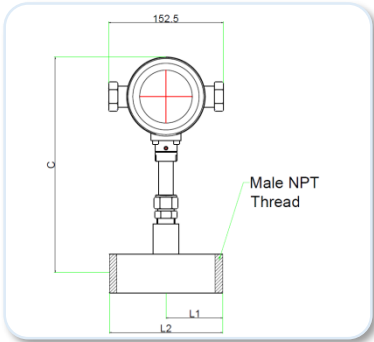
●1/2," 3/4" NPT – Front View (EN2)



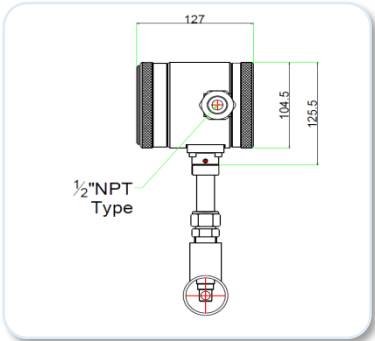
●1/2," 3/4" NPT – Side View (EN2)



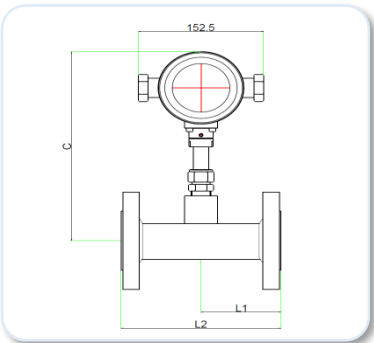
●1/4," 3/8" NPT – Front View (EN2)



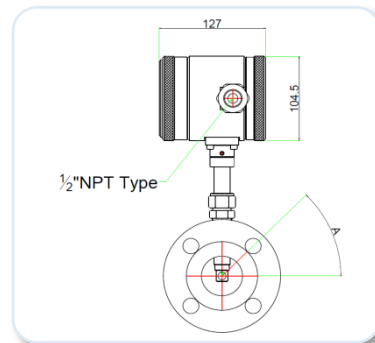
●Compression Fitting – Side View (EN2)



●1/2," 3/4" Flange – Front View (EN2)



●1/2," 3/4" Flange – Side View (EN2)



SIZE for NPT & Flange			
Size	C	L1	L2
1/4" & 3/8"	210.5	30	60
1/2"	210.5	90.7	181.4
3/4"	210.5	90.7	181.4
1"	272.5	101.5	203
1-1/2"	272.5	101.5	203
2"	272.5	101.5	203
3"	334.6	127	254
4"	334.6	127	254
6"	334.6	127	254
8"	404.6	127	254

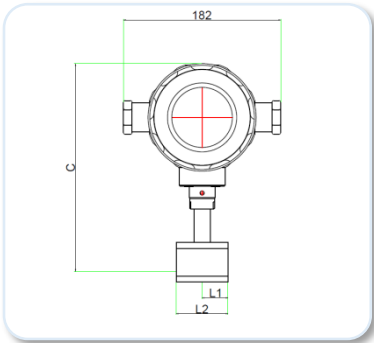
SIZE for ANSI 150# FLANGE				
Size	C	L1	L2	A
1/2"	210.5	101.5	203	45°
3/4"	210.5	101.5	203	45°

※ The shape of the sensor and Housing manufacturers are Subject to Change.

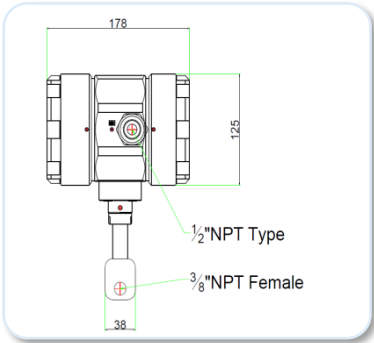
All dimensions are inches. Millimeters are in parentheses.

Dimensional Specification & Chart II Ex-proof KC-2620Ex

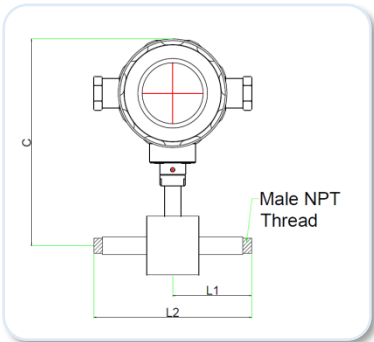
●1/4," 3/8" NPT – Front View (E2)



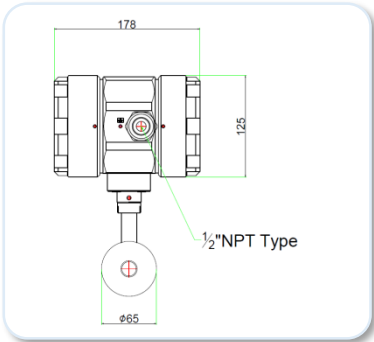
●Compression Fitting – Side View (E2)



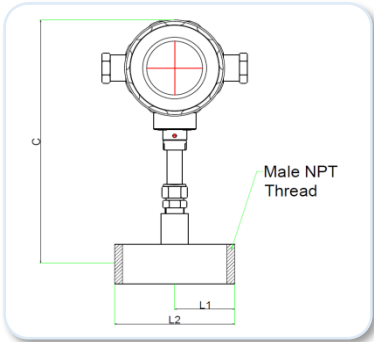
●1/2," 3/4" NPT – Front View (E2)



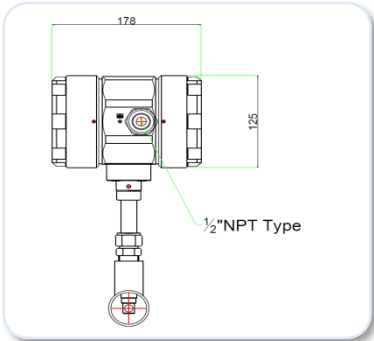
●1/2," 3/4" NPT – Side View (E2)



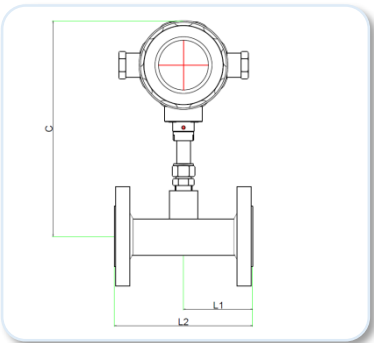
●1/4," 3/8" NPT – Front View (E2)



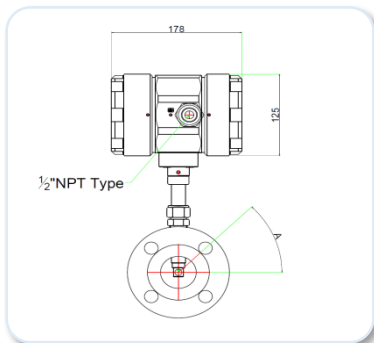
●Compression Fitting – Side View (E2)



●1/2," 3/4" Flange – Front View (E2)



●1/2," 3/4" Flange – Side View (E2)



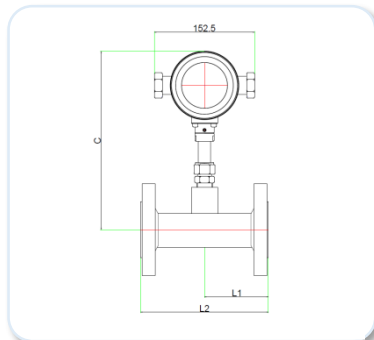
SIZE for NPT & Flange			
Size	C	L1	L2
1/4" & 3/8"	241.5	30	60
1/2"	241.5	90.7	181.4
3/4"	241.5	90.7	181.4
1"	283.5	101.5	203
1-1/2"	283.5	101.5	203
2"	283.5	101.5	203
3"	344.6	127	254
4"	344.6	127	254
6"	344.6	127	254
8"	404.6	127	254

SIZE for ANSI 150# FLANGE				
Size	C	L1	L2	A
1/2"	241.5	101.5	203	45°
3/4"	241.5	101.5	203	45°

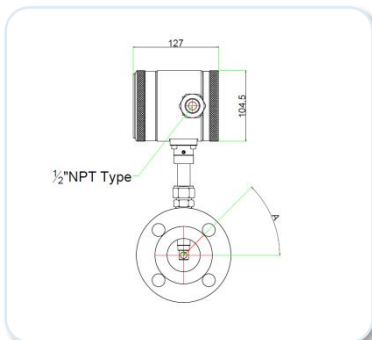
※ The shape of the sensor and Housing manufacturers are Subject to Change.

Dimensional Specification & Chart III KC-2610GF((IP67)

●1-1/2" ~ 8" – Front View (EN2)
150# Flange, JIS 10k RF Flange

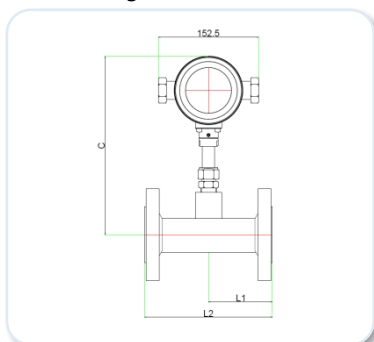


●1-1/2" ~ 8" – Side View (EN2)
150# Flange, JIS 10k RF Flange

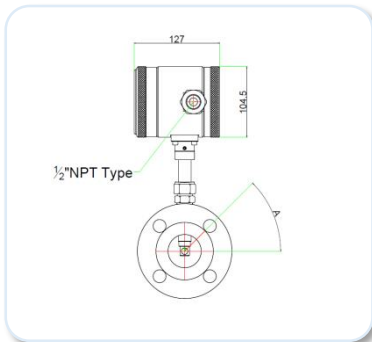


Size for ANSI 150# Flange				
Size	C	L1	L2	A
1-1/2"	283.5	101.5	203	45°
2"	283.5	101.5	203	45°
3"	344.6	127	254	45°
4"	344.6	127	254	22.5°
6"	344.6	127	254	22.5°
8"	404.6	127	254	22.5°

●DIN Flange – Front View (EN2)



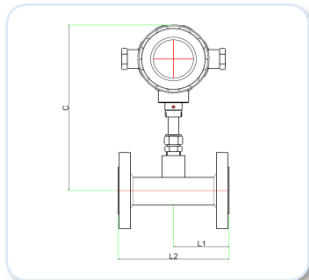
●DIN Flange – Side View (EN2)



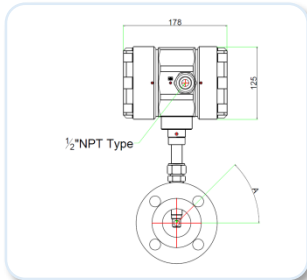
Size for PN16 DN Flange			
Size	C	L1	L2
DN40	283.5	101.5	203
DN50	283.5	101.5	203
DN80	344.6	127	254
DN100	344.6	127	254
DN150	344.6	127	254
DN200	404.6	127	254

Dimensional Specification & Chart III KC-2620Ex (Ex-proof)

●1-1/2" ~ 8" – Front View(E2)
150# Flange, JIS 10k RF Flange

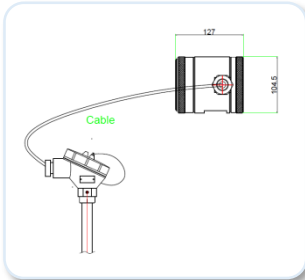


●1-1/2" ~ 8" – Side View(E2)
150# Flange, JIS 10k RF Flange

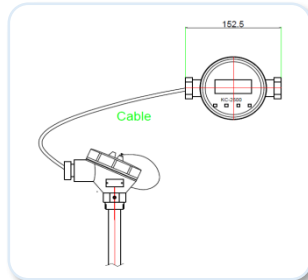


General Remot type KC-2610GF-R

●Remote Mount Junction Box – Front View(EN4)

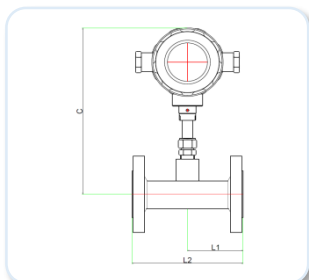


●Remote Mount Junction Box – Side View(EN4)

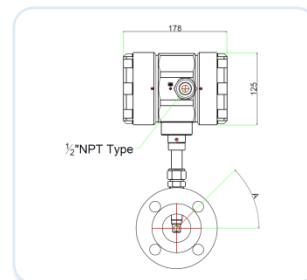


Ex-proof Remote type KC-2620Ex-R

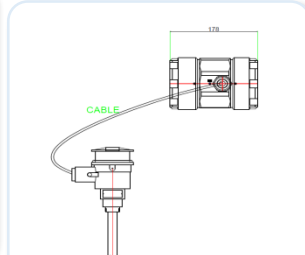
●DIN Flange – Front View(E2)



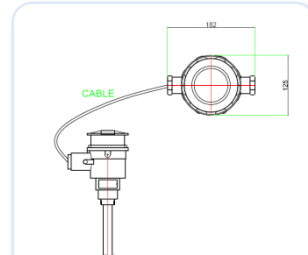
●DIN Flange – Side View(E2)



●Remote Mount Junction Box – Front View(E4)



●Remote Mount Junction Box – Side View(E4)

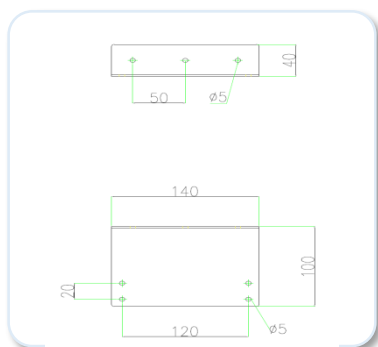
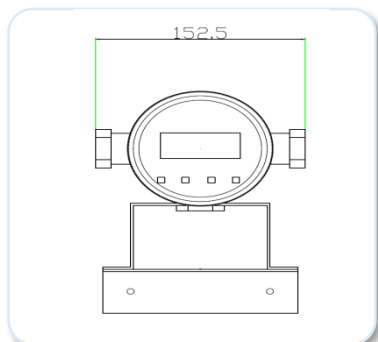


※ The shape of the sensor and Housing manufacturers are Subject to Change.

Dimensional Specification & Chart V

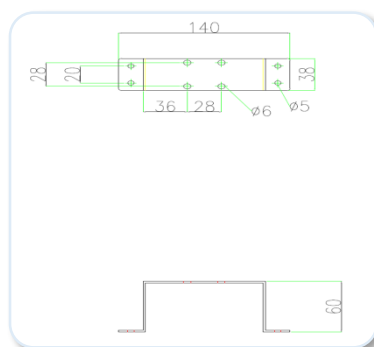
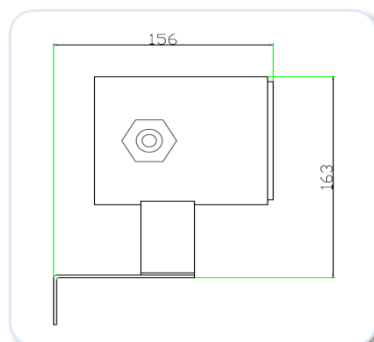
♣ General Remote type KC-2610GF-R

● Remote Rear Bracket Electronics (EN4)



● panel mounting bracket 1

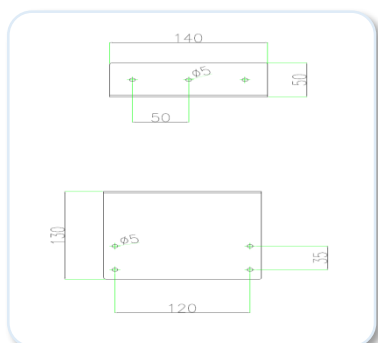
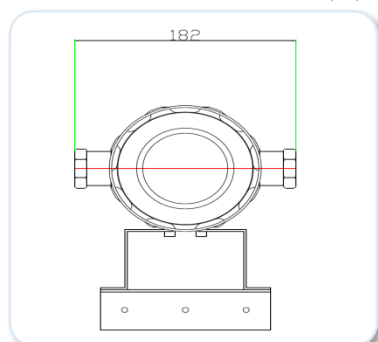
● Remote Side Bracket Mounted Electronics (EN4)



● panel mounting bracket 2

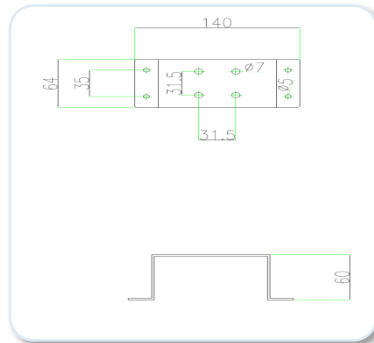
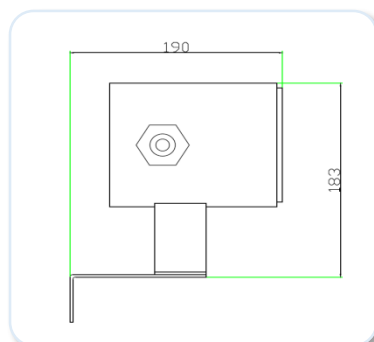
♣ Ex-proof Remote type KC-2620Ex-R

● Remote Rear Bracket Electronics (E4)



● panel mounting bracket 1

● Remote Side Bracket Mounted Electronics (E4)



● panel mounting bracket 2

Low Pressure Ball Valve Dimensional & Specification

●Side View

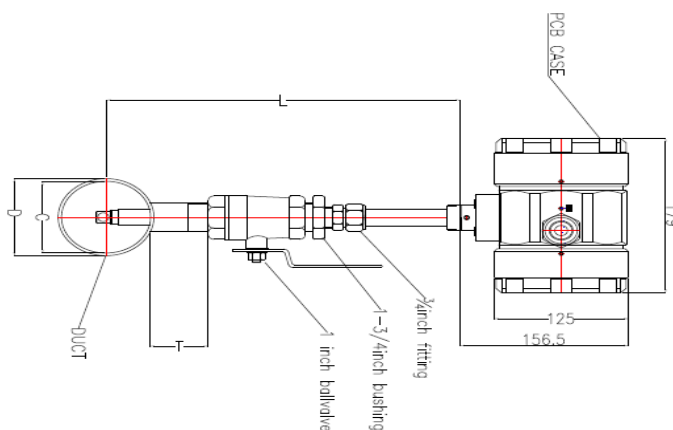
VARIABLE

L = Normal Probe Length

D = Duct O.D

C = Duct I.D

T = Height of "Threadolet" or
Customer provided weldolet



±0.25 All dimensions are inches. Millimeters are in parentheses.
All drawings save a ±0.25 inch(6.4 mm) tolerance.
Certified and available be on request.

Piping Requirement (KC-2600GF inline type)

Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-2600 Smart- IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows (in same plane)	10D	5D	62D

- Note :
- (1) Number of diameters (D) of straight pipe required between upstream disturbance and the flowmeter.
 - (2) Number of diameters (D) of straight pipe required downstream of the flowmeter.
 - (3) For comparison purposes only. Table shows number of diameter(D) of upstream straight pipe length required for an ISO Standard 5167 Orifice plate with a beta ration of 0.7
 - (4) Consult factory for pressure effects.

Order Code KC-2600GF Series (Gases inline type)

KC-26 - - E - P - V - - - - - - - -

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type	Code 1
IP67 or IP65	10GF
Hazardous-Area Location Enclosure	20Ex
MFM (IP67)	10GM

Input Power	Code 8
DC 24 V ±10 %, 200 mA	2
AC 100 ~ 240 V ±10 % (옵션)	3
Agency approved, customer specified	W

Calibration 2 ⁹	Code 13
70 °F(21 °C) 14.7 psig (1.103 barg)	A
32 °F(0 °C) 1 atm (76 mmHg)	B
Agency approved, customer specified	W

Connection type	Code 2
DIN Flange	D
ANSI Flange	A
JIS Flange	J
Agency approved, customer specified	W

Output Signal	Code 9
RS-485S	1
Pulse	3
DC 4~20 mA,	4
Agency approved, customer specified	W

Pressure limit	Code 14
Low pressure Below 43 psig (3 barg)	L
Medium pressure Below 145 psig (10 barg)	M
High pressure Below 725 psig (50 barg)	H (option)

Connection Spec ^{1,3}	Code 3,4,5		
Size	DIN	150 lb	JIS 10k
1" (DN25)	D4	F4	J4
1-1/4" (DN32)	D5	F5	J5
1-1/2" (DN40)	D6	F6	J6
2" (DN50)	D7	F7	J7
2-1/2" (DN65)	D8	F8	J8
3" (DN80)	D9	F9	J9
3-1/2" (DN90)	D10	F10	J10
4" (DN100)	D11	F11	J11
5" (DN125)	D12	F12	J12
6" (DN150)	D13	F13	J13
7" (DN175)	D14	F14	J14
8" (DN200)	D15	F15	J15
10" (DN250)	D16	F16	J16
12" (DN300)	D17	F17	J17
Agency approved, customer specified	W		

Display	Code 10
No Readout	NR
Digital Display	DD
Agency approved, customer specified	W

Option	Code 15
Agency approved, customer specified	W

Enclosure ⁵	Code 6,7
Hazardous-Area Location Enclosure	2
Remote Hazardous-Area Location Enclosure(Only with Ex Meter)	3(Ft)
Remote Hazardous-Area Location Enclosure(Only with Junction Box)	4(Ft)
IP67 or IP65	N2
Remote IP67 with Junction Box	N4(Ft)
Agency approved, customer specified	W

Flow Direction	Code 11
Horizontal Free or Vertical UP	1
Horizontal Free or Vertical Down	2
Agency approved, customer specified	W

Calibration 1 ⁹	Code 12
Standard Calibration	A
Air, only for 3" and large pipe size	
Compressed Air, only for 3" and large pipe size	D
Customer Calibration	B
Air	
Air equivalency (Digester Gas, Flue, Gas etc.)	C
Nitrogen, Helium, Argon, Carbon Dioxide Compressed Air or Digester Gas	E
Hydrocarbon (Natural Gas, Methane, Ethane, Propane etc.)	F
Hydrogen or Hydrogen Mixture	G
Agency approved, customer specified	W

Note

- 1.Flange is tapped and threaded on the compression fitting
- 2.The male connector is permanently tightened with ferrule of two combined materials
- 3.Flange must be ANSI or DIN specification
- 4.Maximum length is 60-inch(1524mm)
- 5.Enclosure required for agency approvals, T6 rate at 40°C
- 6.Wire resistance must be less than 8 ohms
- 7.Turndown ratio is 100:1 min. & 1000:1 max.
- 8.SFPS is the abbreviation for standard feet per second at 14.7psia(1.01 bar(a) & 70°F (21.1°C)
- 9.Customer specified calibration must not exceed temperature & pressure limitations of the 2610GF, 2620Ex Series products specifications

02

www.goldenrules.co.kr

Golden Rules Co.,Ltd

Thermal Mass Flow Meter
Specialty Manufacture
Bio Gas

KC-2600BI

Thermal Mass Flow Meter



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

2. THERMAL MASS FLOW METER (Bio Gas)

2-1 Insertion type KC-2600 Series

Insertion Type Thermal Mass Flowmeter

**General insertion type
KC-2610BI
(IP67)**



**Ex-proof insertion type
KC-2620Ex
(IP66)**

Features

- Rate & total, volume, mass flow indication
- Input Power DC 24 V or 100-240VAC
- Output accuracy $\pm 0.1\%$, $\pm 2.5\ \mu\text{A}$ (4~20 mA)
- Field validation of flowmeter calibration settings
Smart program interface (RS-485 standard)
- Direct mass flow monitoring eliminates need for
Temperature and pressure compensation
- Simple signal Processing & calibration
- Excellent reproducibility
- Excellent long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (7-5D)
- Outstanding range ability (Turn down ratio 1000:1)
- 0.1-second response to changes in flow rate
- Ex(IP66), KC

무게	방폭	일반
	5.56kg	3.5kg

제품소개

Golden Rules' KC-2600BI Series Smart inline mass flowmeter accommodates the change measurement Requirements and instrument-validation demands of fluid flow monitoring installations.

The versatile microprocessor-based transmitter integrates the function of flow measurement, flow-range Adjustment, meter validation and diagnostics, in either a probe-mounted or remote housing.

Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port and Golden Rules Smart interface software, or via the display and magnetic switches in the instrument panel.

The Golden Rules KC-2600BI Series allows you to configure or change the following parameters: flow range, Totalize, time response, low flow cutoff and a calibration correction factor that compensates for flow profile Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

Performance Specification

- ◆ **Accuracy of Point Velocity**
±1.0% of Reading (Option : ±0.5 % of RD)

Repeatability
±0.2 % of Full Scale

- ◆ **Temperature Coefficient**
±0.03 % Reading / ±(10 ~ 38) °C
±0.06 % Reading / ±(25 ~ 50) °C

- ◆ **Pressure Drop**
It can be ignored within ± 50 psig (3.4 barg)

- ◆ **Response Time**
1 second 63% of final velocity value

- ◆ **Measuring Range**
0.01 ~ 66.2 m/sec

- ◆ **Function**
Rate & Total

Mass Flow Rates

Air Flow Ranges					
Pipe Size (배관경)		Minimum (최소)		Maximum (최대)	
A	B	Scfm	Nm ³ /h	Scfm	Nm ³ /h
25A	1-inch	6	8.9	120	180
40A	1½-inch	15	22	280	440
50A	2-inch	23	33	470	680
80A	3-inch	50	74	1000	1500
100A	4-inch	90	130	1800	2700
150A	6-inch	200	300	4000	5900
200A	8-inch	350	520	7000	10,000

Notes: (1) 공기와 질소 유량 표준 조건:21°C(70°F) 및 21°C(70°F) scfm:0°C, Nm³/h 1기압, 기타 가스는 공장에 문의
(2)사용 가능한 플로우차트가 구비되어 있으며,공장에 문의
(3)최대 유량은 위험구역과 높은 온도 버전으로 제한되며 공장에 문의

Operating Spec'

- ◆ **Fluid**
Bio gas & Mixed gas

- ◆ **Pressure (limitation)**
Compression Fittings : 508 psig (35 barg) option
150 lb Flange, JIS 10k RF PN16 (DN) : (-40 ~ 150) °F ((-40 ~ 65) °C)
: 230 psig (16 barg)
Low Pressure Retract Valve : 100 psig (7 barg)
High Pressure Retract Valve : 1000 psig (70 barg)

- ◆ **Pressure Drop**
It can be safely ignored for pipes over 3 inches.

- ◆ **Fluid & Ambient temp'**
Gases : (-40 ~ 302) °F ((-40 ~ 150) °C)
Ambient : (-4 ~ 185) °F ((-20 ~ 85) °C)

Gas accumulation range
Up to 5 X 10⁻⁴ with helium gas

- ◆ **Input Power (selection)**
DC24 V ±10 %, 200 mA
100 ~ 240 V AC ±10 %, 10 watts

◆ Output Signal (Standard)

Linear (4 ~ 20) mA & Pulse

◆ Display

Alphanumeric 2 X 16 backlight LCD

Adjustable variables via remote control switch or Smart interface software

Adjustable : Full scale : (0 ~100) %

Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)

Time response 1 ~ 7 sec / Correction factor setting 0.5 ~ 5 /

Zero & Span

◆ Totalizer

Seven digits (9,999,999,999 Count) in engineering units Reset table by Software or remote control switch

◆ Software

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB of RS-485 communication

Additional features: Zero cut-off adjustment / Linearization adjustment / Save / Load configuration / For meter validation

Physical Specification**Wetted Materials**

Sensor Probe – Ceramic + 303SS(Platinum) Option : 316SS, 316LSS

Protection Tube – 303SS (Option : 316SS, 316LSS)

◆ Enclosure

Hazardous-Area CASE (Ex d[ib] IIC T4 : IP66)

General-Area CASE (IP67)

◆ Electrical Connection

2 X ½"PF or Ex Cable Gland(SS) 22C

◆ Mounting (Selection)

¾" Compression Fitting & ¾" Male NPT (Standard)

ANSI 150lb Flange, JIS 10k RF Flange

¾" Compression Fitting & 1" Male NPT (Option)

Ball Valve System (Option)

◆ Certification

Ex (Ex d[ib] IIC T4)

CE (CASE)

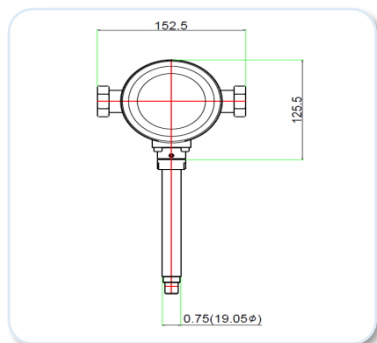
KGS Certificate

KC Certificate

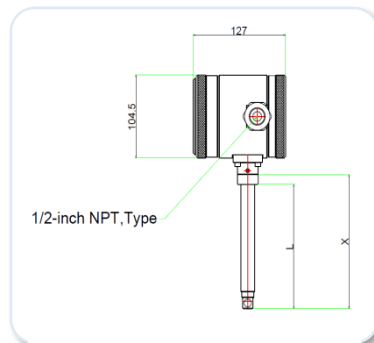
Dimensional Spec' & Chart I

General type KC-2610BI (IP67)

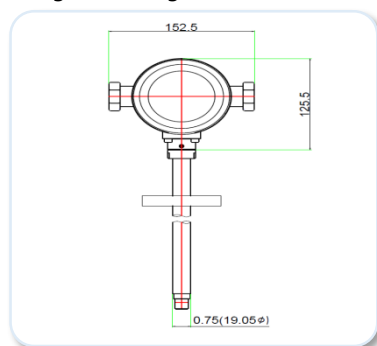
● Compression Fitting – Front View (EN2)



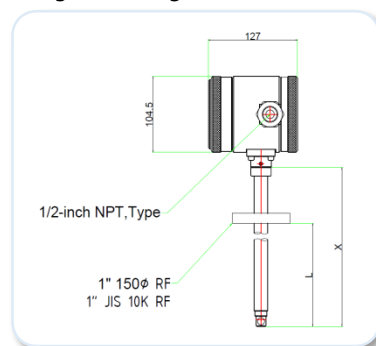
● Compression Fitting – Side View (EN2)



● Flange Mounting – Front View (EN2)

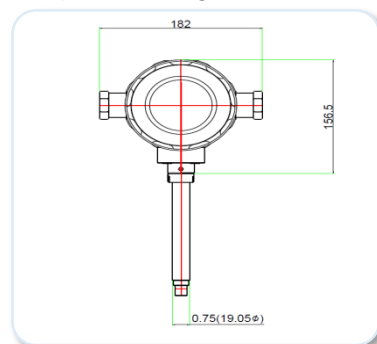


● Flange Mounting – Side View (EN2)

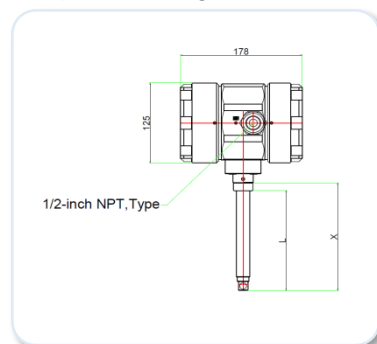


Ex-proof type KC-2620Ex (IP66)

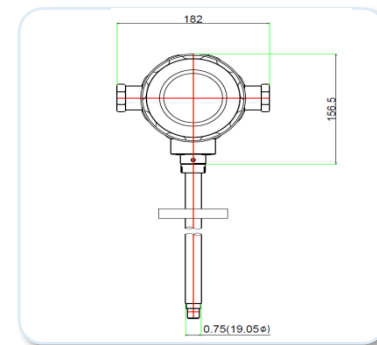
● Compression Fitting – Front View (E2)



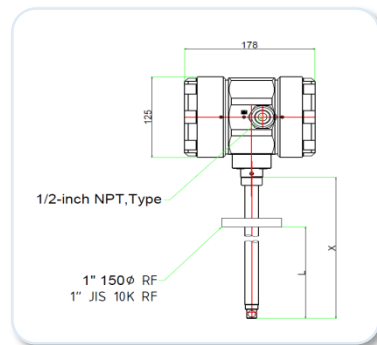
● Compression Fitting – Side View (E2)



● Flange Mounting – Front View (E2)



● Flange Mounting – Side View (E2)

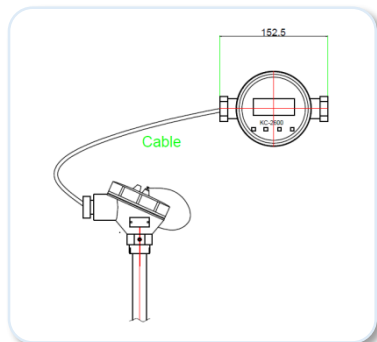


The shape of the sensor and Housing manufacturers are Subject to Change.

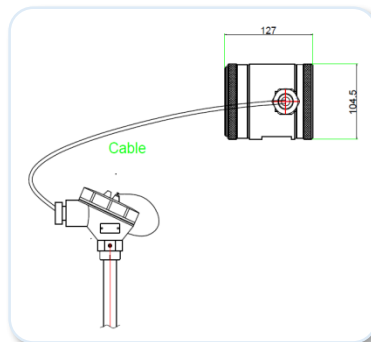
Dimensional Spec' & Chart II

♣ Genreal Remote KC-2610BI-R

● Remote Mount Junction Box – Front View (EN4)

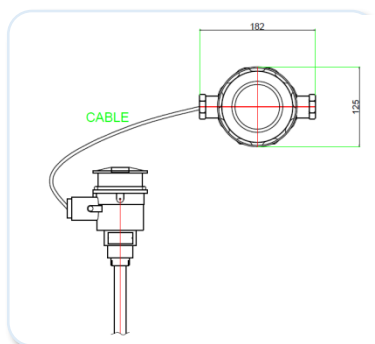


● Remote Mount Junction Box – Side View (EN4)

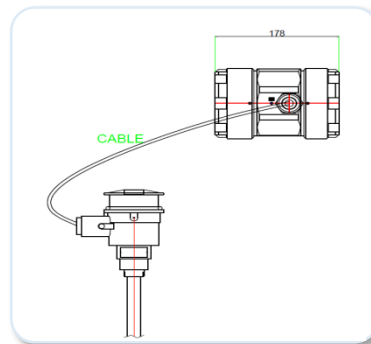


♣ Ex-proof Remote type KC-2610Ex-R

● Remote Mount Junction Box – Front View (E4)



● Remote Mount Junction Box – Side View (E4)



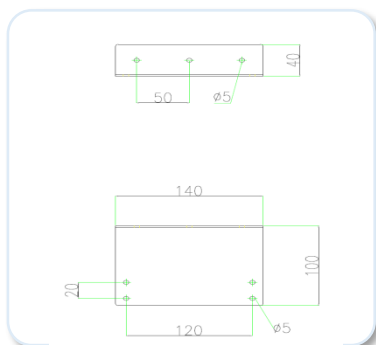
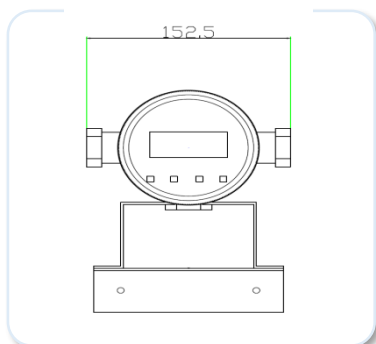
Length Chart		
Code	L	X
L06	6.0 (152.4)	7.5 (190.5)
L09	9.0 (228.6)	10.5 (266.7)
L13	13.0 (330.2)	14.5 (368.3)
L18	18.0 (457.2)	19.5 (495.3)
L24	24.0 (609.6)	25.5 (647.7)
L36	36.0 (914.4)	37.5 (952.5)

※ The shape of the sensor and Housing manufacturers are Subject to Change.

Dimensional Spec' & Chart

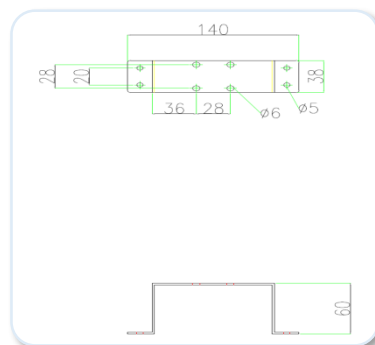
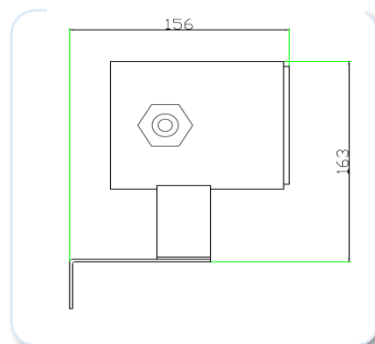
♣ General Remote type KC-2610BI-R

● Remote Rear Bracket Electronics (EN4)



Panel mounting bracket 1

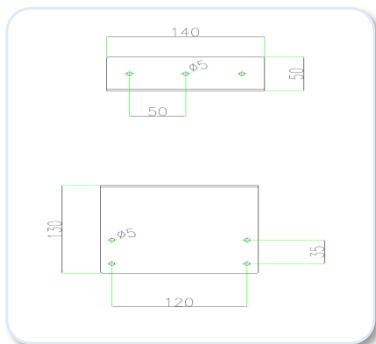
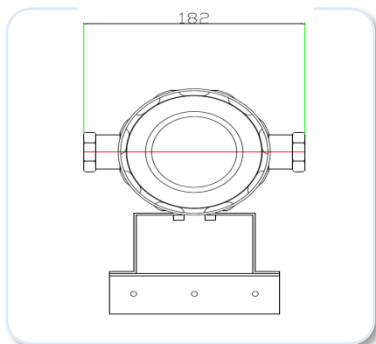
● Remote Side Bracket Mounted Electronics (EN4)



Panel mounting bracket 2

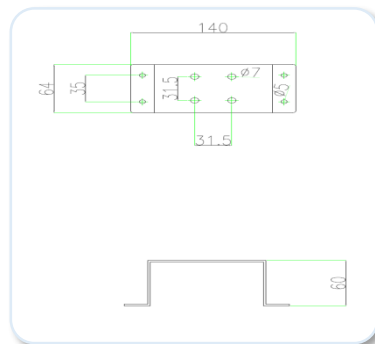
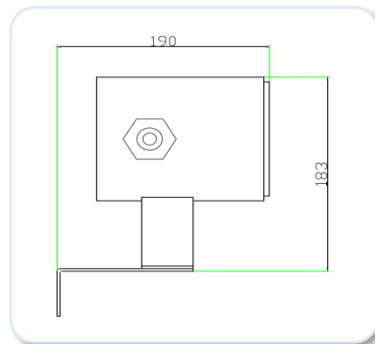
♣ Ex-proof Remote type KC-2610Ex-R

● Remote Rear Bracket Electronics (E4)



Panel mounting bracket 1

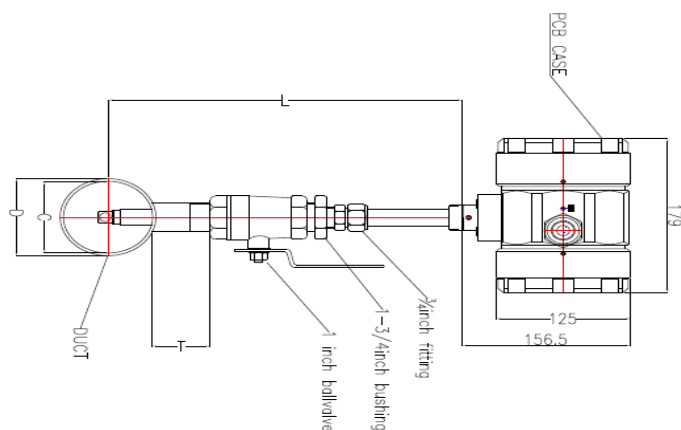
● Remote Side Bracket Mounted Electronics (E4)



Panel mounting bracket 2

Low Pressure Ball Valve Dimensiona

●side view



VARIABLE

L = Normal Probe Length

D = Duct O.D

C = Duct I.D

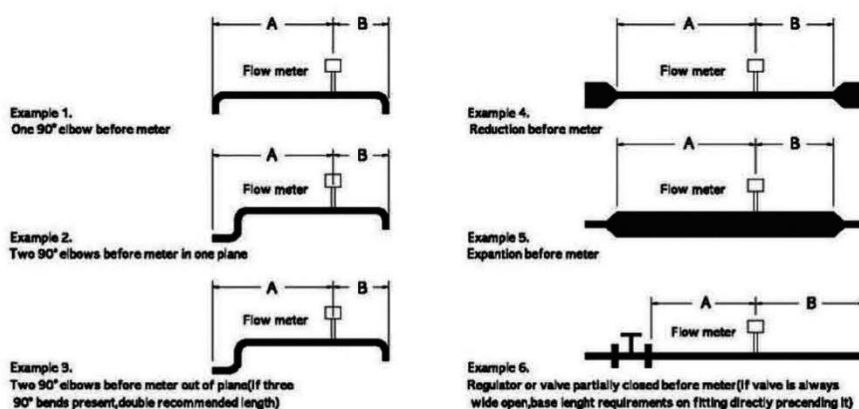
T = Height of "Threadolet" or Customer provided weldolet

All dimensions are inches. Millimeters are in parentheses.

All drawings save a ± 0.25 inch (6.4 mm) tolerance. Certified and available be on request.

Upstream & Downstream dimension (KC-2600BI insert)

Select an installation that minimize possible distortion in the flow profile. Valves, elbows, control valves and other piping components may cause flow disturbances. Check your specific piping condition against the examples shown below. In order to achieve accurateness and repeatable performance install the flow meter using the recommended number of straight run pipe diameters upstream and downstream of the sensor.



Example	A-Upstream(1)Requirements	B-Downstream(2)Requirements
1	10~7D	5~3D
2	15~10D	5~3D
3	20~15D	10~5D
4	10~7D	5~3D
5	20~15D	10~5D
6	20~15D	5~3D

(1)Number of diameter(D)of straight pipe required between upstream disturbance and the flow meter.

(2)Number of diameter(D)of straight pipe required downstream of the flow meter.

Order Code KC-2600BI Series (Bio Gas insertion)

형식 삽입길이 설치 본체 입력전원 출력 표시 창 유체방향 교정1 교정2 압력범위 선택사양

KC-26 - L - M - E - P - V - - - - - -

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type	Code 1	Input power	Code 8	Calibration2 ⁹	Code 13
IP67 or IP65	10BI	DC 24 V ±10 %, 200 mA	2	70 °F(21 °C) 14.7 psig (1.103 barg)	A
Hazardous-Area Location Enclosure	20Ex	AC 100 ~ 240 V ±10 % (옵션)	3	32 °F(0 °C) 1 atm (760 mmHg)	B
Agency approved, customer specified	30	Agency approved, customer specified	W	Agency approved, customer specified	W

Insert length ⁴	Code 2,3	Output	Code 9	Pressure limit	Code 14
6" (15 cm)	06	RS-485S (RS-232C)	1	Low pressure Below 43 psig (3 barg)	L
9"	09	Pulse, Alarm	3	Medium pressure Below 145 psig (10 barg)	M
12"	12	DC 4~20 mA, 0~5 V DC	4	High pressure Below 435 psig (30 barg)	H (option)
18"	18	Agency approved, customer specified	W		
24"	24				
36"	36				
Special Length	(in)				
Probe with 2" JIS 10k RF Flange	(in)-M5				
High Pressure with Retractor Valve	(in)-M9				
Agency approved, customer specified	W				

Display	Code 10
No Readout	NR
Digital Display	DD
Agency approved, customer specified	W

Option	Code 15
Agency approved, customer specified	W
Mail : sensor tube 316ss, 316Lss	

Mounting	Code 4,5
None	0
Compression Fitting2 (3/4" tube X 3/4" Male NPT)	10
Threadlet (3/4" Female NPT)	2()
Specify pipe O.D. in parentheses Compression Fittings (IP67) (1/2" tube X 3/4" Male NPT)	3
Curved Duct Bracket (3/4" tube Compression Fitting)	4()
Specify duct O.D. in Parentheses Low Pressure Retractor Valve	8()
Specify duct O.D. in parentheses Compression Fittings (3/4" tube X 1" Male NPT)	15()
Agency approved, customer specified	W

Flow direction	Code 11
Horizontal Free or Vertical UP	1
Horizontal Free or Vertical Down	2
Agency approved, customer specified	W

Calibration1 ⁹	Code 12
Standard Calibration	A
Air, only for 3" and large pipe size	
Compressed Air, only for 3" and large pipe size	D
Customer Calibration	B
Air	
Air equivalency (Digester Gas, Flue, Gas etc.)	C
Nitrogen, Helium, Argon, Carbon Dioxide Compressed Air or Digester Gas	E
Hydrocarbon (Natural Gas, Methane, Ethane, Propane etc.)	F
Hydrogen or Hydrogen Mixture	G
Agency approved, customer specified	W

Enclosure ⁵	Code 6,7
Hazardous-Area Location Enclosure	2
Remote Hazardous-Area Location Endosure(Only with Ex Meter)	3(Ft)
Remote Hazardous-Area Location Endosure(Only with Junction Box)	4(Ft)
IP67 or IP65	N2
Remote IP67 with Junction Box	N4(Ft)
Agency approved, customer specified	W

Note

- 1.Flange is tapped and threaded on the compression fitting
- 2.The male connector is permanently tightened with ferrule of two combined materials
- 3.Flange must be ANSI or DIN specification
- 4.Maximum length is 60-inch(1524mm)
- 5.Enclosure required for agency approvals, T6 rate at 40°C
- 6.Wire resistance must be less than 8 ohms
- 7.Turndown ratio is 100:1 min. & 1000:1 max.
- 8.SFPS is the abbreviation for standard feet per second at 14.7psia(1.01 bar(a) & 70°F (21.1°C)
- 9.Custmoer specified calibration must not exceed temperature & pressure limitations of the 2610BI, 2620Ex Series products specifications

02

www.goldenrules.co.kr

Golden Rules Co.,Ltd

Thermal Mass Flow Meter
Specialty Manufacture
Bio Gas

KC-2600BF

Thermal Mass Flow Meter



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

2. THERMAL MASS FLOW METER (Bio Gas)

2-2 Inline type KC-2600 Series

Inline Type Thermal Mass Flowmeter



General inline type KC-2610BF (IP67) **Ex-proof inline type KC-2620Ex (IP66)**



General MFM type KC-2610BM **General MFM type KC-2620Ex-BM**

Features

- Rate & total, volume, mass flow, indication
- Input Power DC 24 V or 100-240VAC
- Output accuracy $\pm 0.1\%$, $\pm 2.5\ \mu\text{A}$ (4~20 mA)
- Field validation of flowmeter calibration settings
Smart program interface (RS-485 standard)
- Direct mass flow monitoring eliminates need for Temperature and pressure compensation
- Simple signal Processing & calibration
- Excellent reproducibility
- Excellent long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (7-5D)
- Outstanding range ability (Turn down ratio 1000:1)
- 0.1-second response to changes in flow rate
- Ex(IP66), KC

Description

Golden Rules' KC-2600 Series Smart inline mass flowmeter accommodates the change measurement Requirements and instrument-validation demands of fluid flow monitoring installations.

The versatile microprocessor-based transmitter integrates the function of flow measurement, flow-range Adjustment, meter validation and diagnostics, in either a probe-mounted or remote housing.

Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port and Golden Rules Smart interface software, or via the display and magnetic switches in the instrument panel.

The Golden Rules KC-2600 Series allows you to configure or change the following parameters: flow range, Totalize, time response, low flow cutoff and a calibration correction factor that compensates for flow profile Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

Performance Specification

◆ Accuracy of Point Velocity

±1.0% of Reading (Option : ±0.5 % of RD)

◆ Repeatability

±0.2 % of Full Scale

◆ Temperature Coefficient

±0.03 % Reading / ±(10 ~ 38) °C 내에서 °C

±0.06 % Reading / ±(25 ~ 50) °C 내에서 °C

◆ Pressure Drop

It can be ignored within ± 50 psig (3.4 bara).

◆ Response Time

1 second 63% of final velocity value

◆ Measuring Range

0.01 ~ 66.2 m/sec

◆ Function

Flow & Total

Mass Flow Rates (질량유량)

Air Flow Ranges (공기 유량 범위)							
Pipe Size (배관경)		Minimum (최소)		Maximum (최대)		Weight	
A	B	Scfm	Nm³/h	Scfm	Nm³/h	방폭	일반
8A	1/4-inch	0.5	0.7	9	14	5kg	3kg
15A	1/2-inch	2	3.0	40	60	5kg	3kg
20A	3/4-inch	4	5.9	75	120	5kg	3kg
25A	1-inch	6	8.9	120	180	6kg	4kg
40A	1 1/2-inch	15	22	280	440	7.2kg	5.2kg
50A	2-inch	23	33	470	680	8.6kg	6.6kg
80A	3-inch	50	74	1000	1500	11kg	9kg
100A	4-inch	90	130	1800	2700	16.2kg	14.2kg
150A	6-inch	200	300	4000	5900		
200A	8-inch	50	520	7000	10,000		

Notes: Air or N2 Flow Standard Condition :21°C(70°F) &
21°C(70°F) scfm:0°C, Nm³/h 1atm

Operating Specification

◆ Fluid

Bio gas & Mixed gas

◆ Pressure (limitation)

Compression Fittings : 508 psig (35 barg) option

150 lb Flange, JIS 10k RF PN16 DIN (-40 ~ 150) °C (-40 ~ 302) °F : 230 psig (15.9 barg)

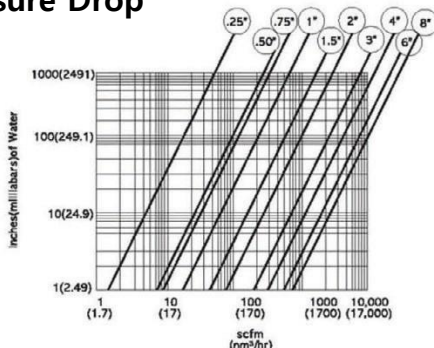
150 lb Flange, JIS 10k RF PN16 DIN 121 °C (250 °F) : 185 psig (12.8 barg)

150 lb Flange, JIS 10k RF PN16 DIN 400 °C (752 °F) : 155 psig (10.7 barg)

NPT -40 ~ 150 °C ((-40 ~ 302) °F) : 508 psig (35 barg)

High Pressure Retract Valve : 1000 psig (70 barg)

◆ Pressure Drop



◆ Fluid & Ambient temp'

Gases : (-40 ~ 302) °F ((-40 ~ 150) °C)

Ambient : (-4 ~ 185) °F ((-20 ~ 85) °C)

◆ Input Power (selection)

DC24 V ±10 %, 200 mA

(100 ~ 240) V AC ±10 %, 10 watts

◆ Output Signal

Linear (4 ~ 20) mA & Pulse

◆ Display

Adjustable variables via remote control switch or Smart interface software

Adjustable : Full scale : (0 ~100) %

Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)

Time response 1 ~ 7 sec / Correction factor setting 0.5 ~ 5 /

Zero & Span

Totalizer

Seven digits (9,999,999,999 Count) in engineering units Reset table by Software or remote control switch

◆ Software

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB of RS-485 communication

Additional features: Zero cut-off adjustment / Linearization adjustment / Save / Load configuration / For meter validation

Physical Specification**◆ Wetted Part Mat'l**

Sensor Probe – Ceramic + 303SS (Platinum) Option : 316SS, 316LSS

Flow Body – 304SS (Option 316SS, 316LSS)

Enclosure

Hazardous-Area CASE (Ex d[ib] IIC T4 : IP66)

General-Area CASE (IP67)

◆ Electrical Connection

2 X ½"NPT or Exp Cable Gland(SS) 22C

◆ Mounting (selection)

¾" Compression Fitting과 ¾" Male NPT (Standard)

ANSI 150lb Flange, JIS 10k RF Flange (Option)

¾" Compression Fitting과 1" Male NPT (Option)

Ball Valve System (Option)

◆ Certification

Ex (Ex d[ib] IIC T4)

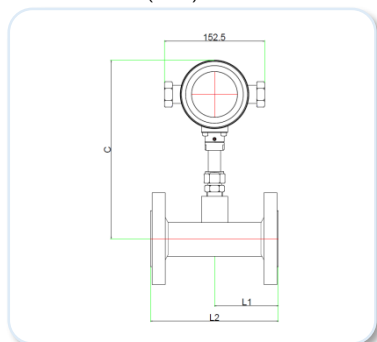
CE (CASE 전체)

KGS Certificate

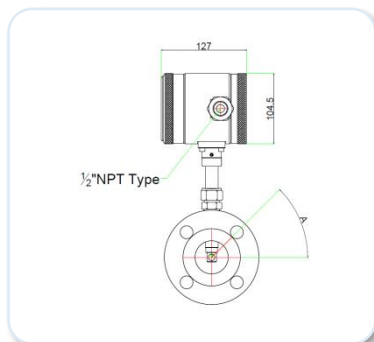
KC Certificate

I Dimension Spec' & Chart I General KC-2610GF (IP67)

- 1 1/2,"부터 8" 150lb & JIS 10k RF Flange
– Front View (EN2)

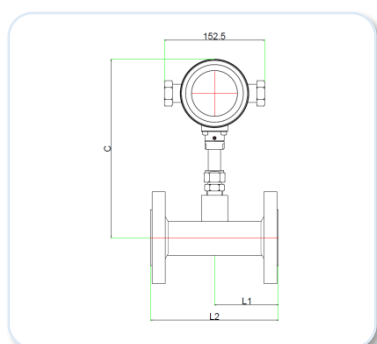


- 1 1/2,"부터 8" 150lb & JIS 10k RF Flange
– Side View (EN2)

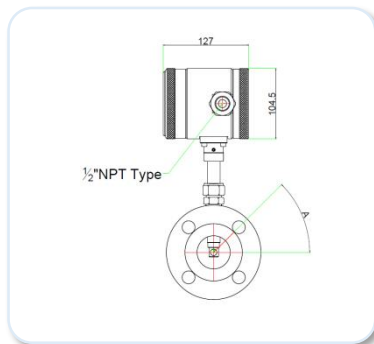


Size for ANSI 150lb Flange				
Size	C	L1	L2	A
1.5 inch	283.5	101.5	203	45°
2 inch	283.5	101.5	203	45°
3 inch	344.6	127	254	45°
4 inch	344.6	127	254	22.5°
6 inch	344.6	127	254	22.5°
8 inch	404.6	127	254	22.5°

- DIN Flange – Front View (EN2)



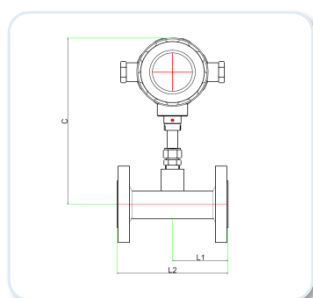
- DIN Flange – Side View (EN2)



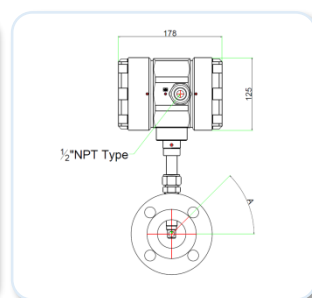
Size for DIN PN16 Flange			
Size	C	L1	L2
DN40	283.5	101.5	203
DN50	283.5	101.5	203
DN80	344.6	127	254
DN100	344.6	127	254
DN150	344.6	127	254
DN200	404.6	127	254

Dimension Spec & Chart II Ex-proof KC-2620Ex

- 1 1/2,"부터 8" 150lb & JIS 10k RF Flange
– Front View (EN2)

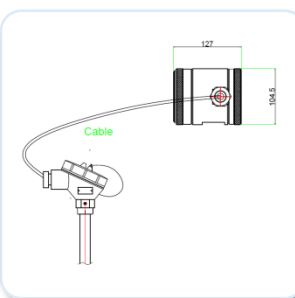


- 1 1/2,"부터 8" 150lb & JIS 10k RF Flange
– Side View (EN2)

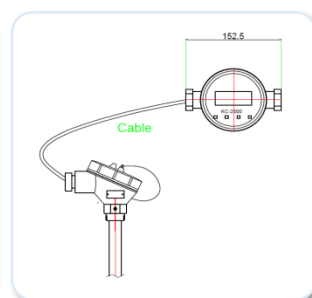


General Remote type KC-2610BF-R

- Remote Mount Junction Box
– Front View (EN4)

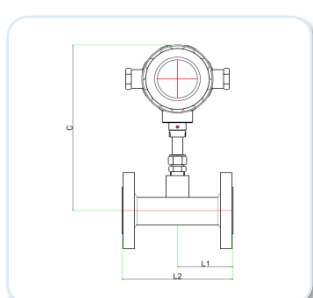


- Remote Mount Junction Box
– Front View (EN4)

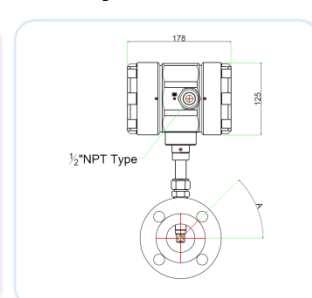


Ex-proof Remote type KC-2620Ex-R

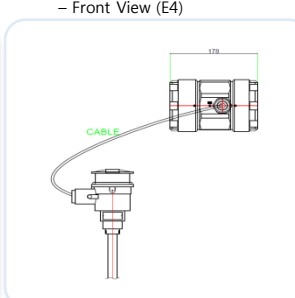
- DIN Flange – Front View (E2)



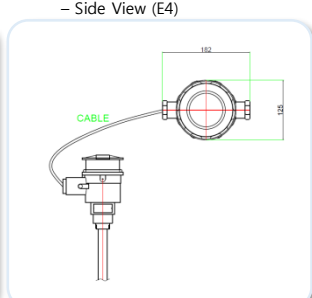
- DIN Flange – Side View (E2)



- Remote Mount Junction Box
– Front View (E4)



- Remote Mount Junction Box
– Side View (E4)

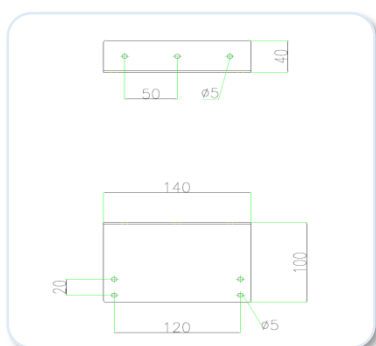
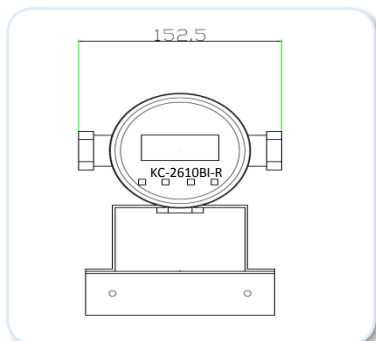


※ The shape of the sensor and Housing manufacturers are Subject to Change.

Dimensional Specification & Chart II (IP67)

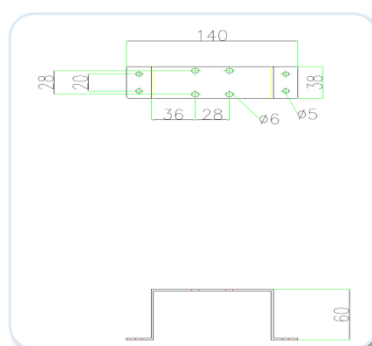
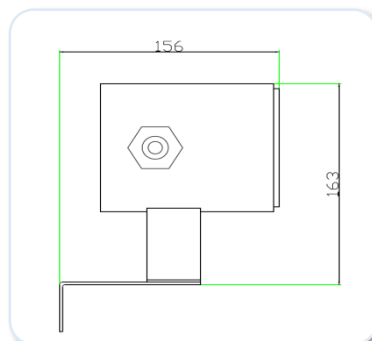
♣ General Remote type KC-2610BF-R

● Remote Rear Bracket Electronics (EN4)



●panel mounting bracket 1

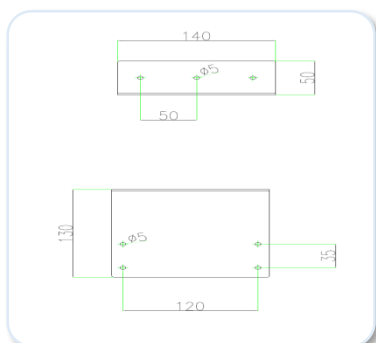
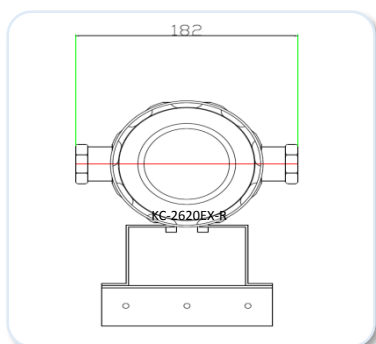
● Remote Side Bracket Mounted Electronics (EN4)



●panel mounting bracket 2

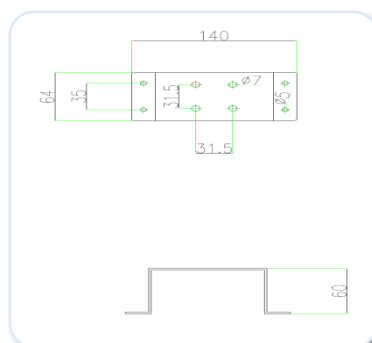
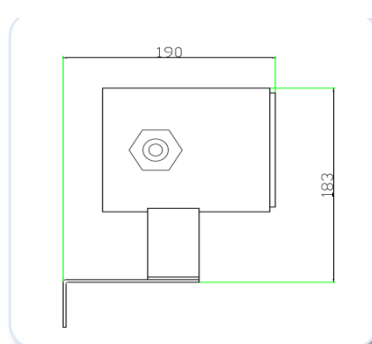
♣ Ex-proof Remote type KC-2620EX-R

● Remote Rear Bracket Electronics (EN4)



●panel mounting bracket 1

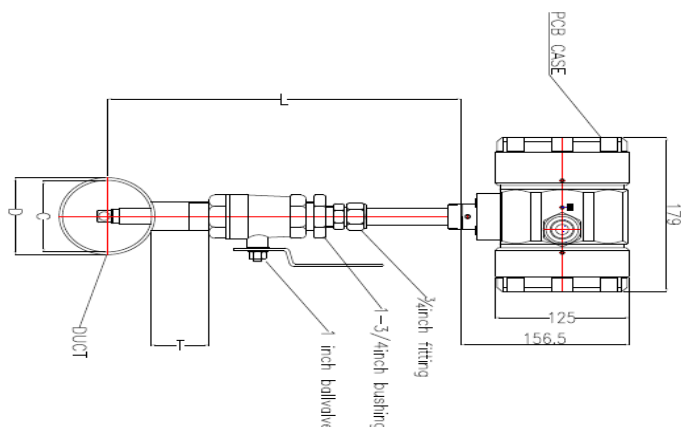
● Remote Side Bracket Mounted Electronics (EN4)



●panel mounting bracket 2

Ball Valve Low Pressure Ball Valve Dimensional & Chart III

●side view



VARIABLE

L = Normal Probe Length

D = Duct O.D

C = Duct I.D

T = Height of "Threadolet" or
Customer provided weldolet

± 0.25 inch(6.4 mm) $\forall \pm 0.25$ All dimensions are inches. Millimeters are in parentheses.
All drawings save a ± 0.25 inch(6.4 mm) tolerance.
Certified and available be on request.

Piping Requirement (KC-2600BF inline type)

Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-2600 Smart- IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows (in same plane)	10D	5D	62D

Note : (1) Number of diameters (D) of straight pipe required between upstream disturbance and the flowmeter.
(2) Number of diameters (D) of straight pipe required downstream of the flowmeter.
(3) For comparison purposes only. Table shows number of diameter(D) of upstream straight pipe length required for an ISO Standard 5167 Orifice plate with a beta ration of 0.7
(4) Consult factory for pressure effects.

Order Code KC-2600BF Series (Bio Gas inline type)

KC-26 - - E - P - V - - - - - - -

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type	Code 1
IP67 or IP65	10BF
Hazardous-Area Location Enclosure	20Ex
MFM(IP67)	30BM

Input power	Code 8
DC 24 V $\pm$ 10 %, 200 mA	2
AC 100 ~ 240 V $\pm$ 10 % (옵션)	3
Agency approved, customer specified	W

Calibration ^{2,9}	Code 13
70 °F(21 °C) 14.7 psig (1.103 barg)	A
32 °F(0 °C) 1 atm (760 mmHg)	B
Agency approved, customer specified	W

Connexion type	Code 2
DIN Flange	D
ANSI Flange	A
JIS Flange	J
Agency approved, customer specified	W

Output	Code 9
RS-485S (RS-232C)	1
Pulse, Alarm	3
DC 4~20 mA, 0~5 V DC	4
Agency approved, customer specified	W

Pressure limit	Code 14
Low pressure Below 43 psig (3 barg)	L
Medium pressure Below 145 psig (10 barg)	M
High pressure Below 435 psig (30 barg)	H (option)

Connection spec ^{1,3}	Code 3,4,5		
Size	DIN	150 lb	JIS 10k
1" (DN25)	D4	F4	J4
1-1/4" (DN32)	D5	F5	J5
1-1/2" (DN40)	D6	F6	J6
2" (DN50)	D7	F7	J7
2-1/2" (DN65)	D8	F8	J8
3" (DN80)	D9	F9	J9
3-1/2" (DN90)	D10	F10	J10
4" (DN100)	D11	F11	J11
5" (DN125)	D12	F12	J12
6" (DN150)	D13	F13	J13
7" (DN175)	D14	F14	J14
8" (DN200)	D15	F15	J15
10" (DN250)	D16	F16	J16
12" (DN300)	D17	F17	J17
Agency approved, customer specified	W		

Display	Code 10
No Readout	NR
Digital Display	DD
Agency approved, customer specified	W

Option	Code 15
Agency approved, customer specified	W
Mail : sensor tube 316ss, 316Lss	

Flow direction	Code 11
Horizontal Free or Vertical UP	1
Horizontal Free or Vertical Down	2
Agency approved, customer specified	W

Calibration ^{1,9}	Code 12
Standard Calibration	A
Air, only for 3" and large pipe size	
Compressed Air, only for 3" and large pipe size	D
Customer Calibration	B
Air	
Air equivalency (Digester Gas, Flue, Gas etc.)	C
Nitrogen, Helium, Argon, Carbon Dioxide Compressed Air or Digester Gas	E
Hydrocarbon (Natural Gas, Methane, Ethane, Propane etc.)	F
Hydrogen or Hydrogen Mixture	G
Agency approved, customer specified	W

Enclosure ⁵	Code 6,7
Hazardous-Area Location Enclosure	2
Remote Hazardous-Area Location Enclosure(Only with Ex Meter)	3(Ft)
Remote Hazardous-Area Location Enclosure(Only with Junction Box)	4(Ft)
IP67 or IP65	N2
Remote IP67 with Junction Box	N4(Ft)
Agency approved, customer specified	W

Note

- 1.Flange is tapped and threaded on the compression fitting
- 2.The male connector is permanently tightened with ferrule of two combined materials
- 3.Flange must be ANSI or DIN specification
- 4.Maximum length is 60-inch(1524mm)
- 5.Enclosure required for agency approvals, T6 rate at 40°C
- 6.Wire resistance must be less than 8 ohms
- 7.Turndown ratio is 100:1 min. & 1000:1 max.
- 8.SFPS is the abbreviation for standard feet per second at 14.7psia(1.01 bar(a) & 70°F (21.1°C)
- 9.Custmoer specified calibration must not exceed temperature & pressure limitations of the 2610BF, 2620Ex Series products specifications

03

www.goldenrules.co.kr

Golden Rules Co.,Ltd

Air & Gas
Specialty Manufacture

MFC & MFM

KC-2700 Series
Mass Flow Controller & Meter



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

3. MASS FLOW CONTROLLER & METER (MFC & MFM)

3-1 MFC & MFM KC-2700 Series



**MFC & MFM
Integral type KC-2700**



**MFC & MFM
Remote type KC-2700**

Feature

- High performance that can be adjusted in the field when a flowmeter Malfunctions Interface (RS-485 Modbus / RTU, Standard)
- No direct temperature and pressure compensation due to direct mass flow measurement
- Simple signal processing and calibration in the field
- No drive
- Excellent reproducibility / Excellent long-term stability
- Best price/performance ratio
- Easy adaptability to other applications
- The response speed (1 sec) according to the flow rate change is fast.
- Calibration function (option can be added)

Description

Golden Rule's KC-2700 series is a digital mass flow meter. It is based on a digital device where analog sensor signals are sent directly to a microprocessor. It transmits the optimum signal safely and accurately, as well as directly controlling the proportional control valve and other indicators, so it has better precision than the existing analog-based flowmeter, and can be used in various fields and a wide range of applications. The parts consist of a sensor, a base, a reducer, a control board and a proportional control valve, and the core part, the sensor, is specially designed to accurately transfer the mass of the gas and is not sensitive and has excellent reproducibility.

PID and Adaptive are provided as the control method. In particular, PID control is programmed based on a mathematical algorithm to find the optimal conditions in a given environment and add adaptive control to efficiently and quickly respond to the entire flow band. It was made to be. The product has a FND indicator and a button for easy reading and operation, so that the user can quickly and simply meet the conditions even if the product is not used for a long time, or the pressure and external environment change rapidly, and the gas condition and the valve are forced to open in the product.

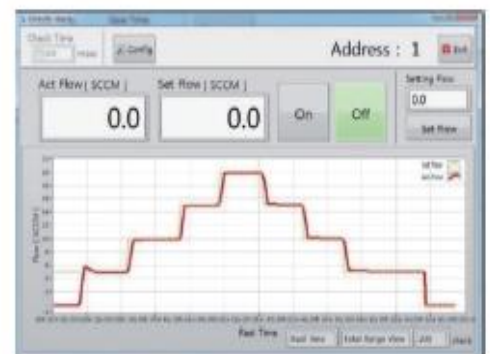
The information contained herein is subject to change without notice.

Performance

- ◆ Accuracy
Within $\pm 1.0\%$ of F.S, F.S. within $\pm 0.5\%$ (25~100% of Full Scale)
- ◆ Reproducibility
 $\pm 0.3\%$ of Full Scale
- ◆ Linearity
 $\pm 0.3\%$ of Full Scale
- ◆ Control range
2 ~ 100% of Full Scale
- ◆ Control valve type
Normally closed proportional valve
- ◆ Response time
Within 1 second
- ◆ Internal pressure
980 Kpa
- ◆ Flow range
10 SCCM ~ 1,000 SLM (N2 Equivalent)
- ◆ function
Instantaneous & integrated

PC Program data

- Instantaneous flow rate display (4-digit display)Integrated
- value display and integrated alarm input (up to 8 digits)
- Valve purge (1~10min_optional)
- Input (used to remove internal moisture and foreign substances in MFC)
- Accuracy $\pm 1.0\%$, of Reading Scale
- PID value input function
- Slope function (0~1000) input (Initial reaction speed can be adjusted)
- Auto Zero function input
- Adaptive function input
- MGMR (Multi Gas Multi Range) function (option can be added)



RS - 485 PC Program

Operating Spec'

- ◆ Gas
All air and gas
- ◆ Leak range
Helium gas up to 1×10^{-8}
- ◆ Gas & environmental temperature
Ambient temperature: within $5 \sim 50\text{ }^{\circ}\text{C}$
(Accuracy guaranteed: $15 \sim 35^{\circ}\text{C}$)
- ◆ Power supply (optional)
+15VDC or +24 VDC / 500mA max
- ◆ Output signal (optional)
 $0 \sim 5\text{VDC}$, $0 \sim 10\text{VDC}$, $0 \sim 20\text{mA}$, $4 \sim 20\text{mA}$
- ◆ Display & Key
4 Digit – 7 segments, adjustable 4 Teck S/W with display
- ◆ Digital interface (basic)
RS-485S (Modbus / RTU, basic)
- ◆ Certificate
CE

Physical Spec'

- ◆ Gas & environmental temperature
Ambient temperature: within $5 \sim 50\text{ }^{\circ}\text{C}$
(Accuracy guaranteed: $15 \sim 35^{\circ}\text{C}$)
- ◆ Power supply (optional)
+15VDC or +24 VDC / 500mA max
- ◆ Output signal (optional)
 $0 \sim 5\text{VDC}$, $0 \sim 10\text{VDC}$, $0 \sim 20\text{mA}$, $4 \sim 20\text{mA}$
- ◆ Display & Key
4 Digit – 7 segments, adjustable 4 Teck S/W with display
- ◆ Digital interface (basic)
RS-485S (Modbus / RTU, basic)

MFC & MFM Application KC-2700C & 2700M Display

Integral display part_1

(Top Display, Operation Keys, Lamp) & Power Adapter and PC

- 1.Type with integrated display and input mode on the top of the flowmeter
(4Digit-7Segment, 4TectS/W and 3color 2Lamp
- 2.Universal Power Adapter 15~24VDC (over 500mA) power available
- 3.Communication (RS-485) mode available.
- 4.Order Specification_Display : LT



Integral display part_1

(Top Display, Operation Keys, Lamp) & Power Adapter and PC

- 1.Type with integrated display and input mode on the top of the flowmeter
- 2.Universal (over 500mA) power supply available
- 3.Communication (RS-485) mode available
- 4.Order specification_LF



Separate display part_1

(KC-7000S) & POWER

- 1.Separate display type and input mode
- 2.Internal power supply type
3. No communication (RS-485) mode in the KRO-7000S body.
Use of "RS-232C" PC communication (separate connection possible in the MFC body)
- 4.Order specification_RF



Separate display part_1

(KC-7000S) & POWER

- 1.There is a device that connects each MFC with a separate display unit_1 (RD-701) and bundles power and communication (RS-485) at the same time, so users can conveniently control multiple MFCs.
- 2.(4ch_60W, 8ch_120W) Power supply built-in type.
- 3.Communication (RS-485) mode available
- 4.Order specification_RT



External analog IN/OUT, POWER

1. With analog board, flow and set values are exchanged with analog signals.
- 2.Power supply (+15V~24VDC) built-in type can be selected
- 3.Communication (RS-485) mode available
- 4.Order specification_In/Out Signal: Select N,A,B,C,D



03

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Golden Rules Co.,Ltd

Air Inline type
Specialty Manufacture

MFM

KC-7720 Series
High temperature type



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

3. MASS FLOW METER (MFM)

3-2 High Temp' type MFM KC-7720M Series



**High Temp' type MFM
KC-7720M**

Feature

- Close loop control applied
- Power DC 24V (Standard)
- 24-bit analog-to-digital converter (ADC)
- Output Accuracy $\pm 0.1\%$, $\pm 2.5\ \mu\text{A}$ (4 to 20 mA) & Pulse Basic
- High performance that can be adjusted in the field when a flowmeter
- Malfunctions Interface (RS-485) basic
- Direct mass flow measurement does not require separate temperature and pressure compensation.
- Simple signal processing and calibration in the field
- Excellent reproducibility
- Excellent long-term stability
- Best price/performance ratio
- Easy adaptability to other applications
- No drive
- There are few straight pipe parts of the upper pipe.(7D ~ 5D)
- Suitable for a wide flow range. (Turn Down 1000: 1)
- The response speed (1 sec) according to the flow rate change is fast.

Description

Golden Rules' KC-7720M Series Smart inline mass flowmeter accommodates the change measurement Requirements and instrument-validation demands of fluid flow monitoring installations.

The versatile microprocessor-based transmitter integrates the function of flow measurement, flow-range Adjustment, meter validation and diagnostics, in either a probe-mounted or remote housing.

Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port and Golden Rules Smart interface software, or via the display and magnetic switches in the instrument panel.

The Golden Rules KC-7720M Series allows you to configure or change the following parameters: flow range, Totalize, time response, low flow cutoff and a calibration correction factor that compensates for flow profile Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

제품성능

◆ Accuracy

±1.5% of F.S (Option: ±1.0%)

◆ Repeatability

±2.0 % of Full Scale

◆ Temp' Compensation

±0.3 % Reading / ±(10 ~ 38) °C내에서 °C

±0.6 % Reading / ±(25 ~ 50) °C내에서 °C

◆ Pressure Compensation

±50 psia (3.4 bara)

◆ Response Time

1 Sec

◆ Measuring Range

(0.01 ~ 66.2) m/sec

◆ Function

Flow Rate

Mass Flow Rates

Air Flow Ranges				
Pipe Size		Minimum	Maximum	Weight
A	B			
8A	1/4-inch	0 ~ 100SCCM	0 ~ 100SLPM	3kg
10A	3/8 - inch	0 ~ 100SLPM	0 ~ 300SLPM	3kg
15A	1/2-inch	0 ~ 400SLPM	0 ~ 700SLPM	3kg
20A	3/4-inch	0 ~ 800SLPM	0 ~ 3,000SLPM	3kg

Notes: (1) Air & nitrogen flow standard conditions: 21°C (70°F) and 21°C (70°F)
scfm: 0°C, Nm³/h 1 atm, other gas, contact company

(2) Available flow charts are available, contact the company

(3) The maximum flow rate is limited to hazardous areas and high temperature versions, contact the company.

운전사양

◆ Fluid

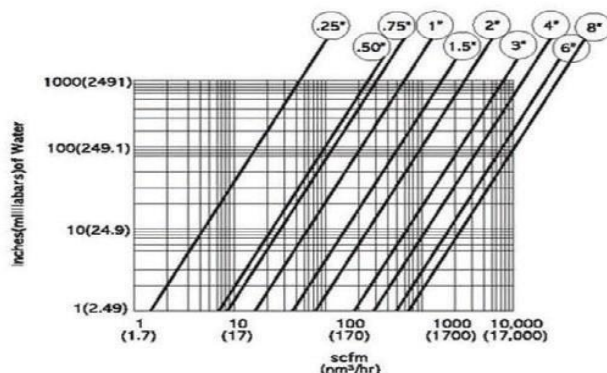
All Gases

◆ Gases Pressure Range

- 3bar
- 10bar
- 30bar

◆ Pressure Loss

0.15



◆ Gases & Ambient temp'

Gases : -40 ~ 302 °F (-40 ~ 150 °C)

Ambient : -4 ~ 185 °F (-20 ~ 85 °C)

◆ Input Power

DC24 V $\pm$ 10 %, 200 mA

◆ Output Signal (Standard)

Linear 4 ~ 20mA, 4-Wire

◆ LCD Display

Alphanumeric 2 X 16 backlight LCD

Adjustable variables via remote control switch or Smart interface software

Adjustable : Full scale : (0 ~100) %

Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)

Time response 1 ~ 7 sec / Correction factor setting 0.5 ~ 5 /

Zero & Span

◆ Totalizer

10-digits (9,999,999,99.9 Count) in engineering units Reset table by

Software or remote control switch

◆ Software

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB of RS-485 communication

Additional features: Zero cut-off adjustment / Linearization adjustment / Save / Load configuration / For meter validation

Physical Spec'**◆ Wetted Material**

Flow Body – 304SS(Optional: 316LSS),

O-ring – Viton(Optional: FFKM)

◆ Enclosure

IP56

◆ Electrical Connection

9 Pin D-Sub

◆ Mounting (Selection)

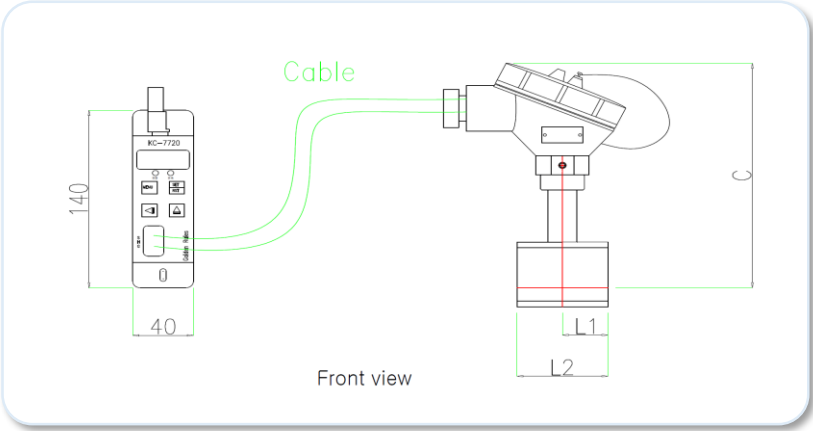
1/4", 3/8", 1/2", 3/4"

◆ Certification

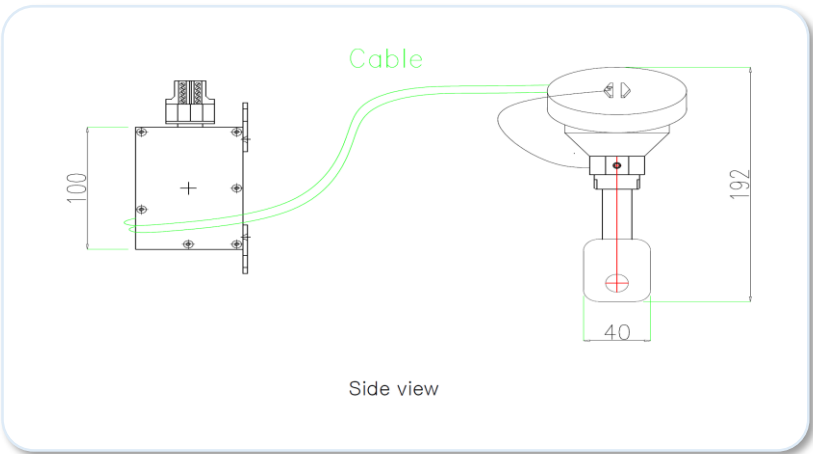
KC

Dimensional Specification & Chart I (KC-7720M)

●1/4", 3/8", 1/2", 3/4" NPT – Front view



●1/4", 3/8", 1/2", 3/4" NPT – Side view



SIZE for NPT			
Size	C	L1	L2
1/4"	177	30	60
3/8"	177	30	60
1/2"	177	30	60
3/4"	177	30	60

※ The shape of the sensor and Housing manufacturers are Subject to Change.

Piping Requirement (KC-7720M inline type)

Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7720M Smart- IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows (in same plane)	10D	5D	62D

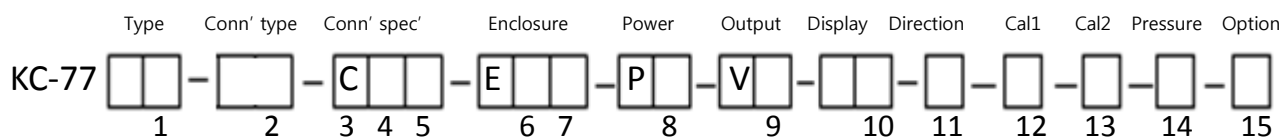
Note : (1) Number of diameters (D) of straight pipe required between upstream disturbance and the flowmeter.
 (2) Number of diameters (D) of straight pipe required downstream of the flowmeter.
 (3) For comparison purposes only. Table shows number of diameter(D) of upstream straight pipe length required for an ISO Standard 5167 Orifice plate with a beta ration of 0.7
 (4) Consult factory for pressure effects.

제품특징

장점

- Microprocessor converter MC
- Fast maintenance with 100% localization
- Turndown ratio 1000:1 basic
- Instantaneous flow rate indication (LED)
- Mass flow measurement method
- Simple signal processing and calibration in the field
- DC24V, DC4~20mA, RS-485 basic function
- Fast response time, high accuracy, excellent durability, low price
- Excellent reproducibility, excellent long-term stability
- Best price/performance ratio, no moving parts
- Easy adaptability to other applications
- Wide flow range (NPT ¼" ~ ¾")
- Less direct pipe section of upper piping (10~5D)
- Fast response speed according to flow rate change (1 second)
- For high temperature gas: -40~150°C
- 10Bar Basic

Order Code - KC-7720M Series (High temp' type)



Type	Code 1
Gases	20M
Agency approved, customer specified	W

Input power	Code 8
DC 24 V $\pm 10\%$, 200 mA	2
Agency approved, customer specified	W

Calibration1(Air)	Code 12
Standard Calibration	A
Air, only for 1/2"(15A) and large pipe size	
Compressed Air, only for 1/2"(15A) and large pipe size	D
Customer Calibration	B
Air	

Connection type	Code 2
Female screw	1
LOK	2
VCR(Optional)	3
Agency approved, customer specified	W

Output	Code 9
RS-485S	1
DC 4~20 mA	4
Agency approved, customer specified	W

Calibration2	Code 13
70 °F(21 °C) 14.7 psig (1.103 barg)	A
32 °F(0 °C) 14.7 psig (1.103 barg)	B
Agency approved, customer specified	W

Connection spec'	Code 3, 4, 5	
SIZE	NPT	PT
1/4"	N1	P1
3/8"	N2	P2
1/2"	N3	P3
3/4"	N4	P4
Agency approved, customer specified	W	

LED display	Code 10
No Readout	NR
Digital display	DD
Agency approved, customer specified	W

Pressure Limit	Code 14
Low pressure	L
Below 43 psig (3 barg)	
Medium pressure	M
Below 145 psig (10 barg)	
High pressure	H (option)
Below 435 psig (30 barg)	

Enclosure ⁵	Code 6,7
IP56 Remote control	N2
Agency approved, customer specified	W

Flow direction	Code 11
Horizontal Free or Vertical UP	1
Horizontal Free or Vertical Down	2
Agency approved, customer specified	W

Option	Code 15
Agency approved, customer specified	W
Sensor Probe : 316LSS	
Sensor Tube : 316SS, 316LSS	

Note

1. Screws should be classified into 1/4", 3/8", 1/2", and 3/4".
2. The flowmeter body requires T6 (104°F [40°C]) by the approval of the relevant agency.
3. Wire resistance should be 8Ω or less.
4. The turndown ratio is from 100:1 minimum to 1000:1 maximum.
5. SFPS stands for Standard Feet per Seconds and is based on 14.7 psia (1.01 bara) 70°F (21.1°C).
6. The customer's specifications must not exceed the temperature and pressure limits of Golden Rule's KC-7720 M series products.

04

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Golden Rules CO.,Ltd

Air insertion type
Specialty Manufacture

KC-2600AI Air Velocity Meter



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

4. AIR VELOCITY METER

4-1 Insertion type KC-2600AI Series



Features

- Velocity flow indication
- Input Power DC 24 V or 100-240VAC
- Output accuracy $\pm 0.1\%$, $\pm 2.5\ \mu\text{A}$ (4~20 mA)
- Field validation of flowmeter calibration settings
- Smart program interface (RS-485 standard)
- Simple signal Processing & calibration
- Excellent reproducibility
- Excellent long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (7-5D)
- Outstanding range ability (Turn down ratio 1000:1)
- 0.1-second response to changes in flow rate
- Ex(IP66), KC

	Ex-proof	General
Weight	5.56kg	3.5kg

Description

Golden Rules' KC-2600AI Series Smart Velocity accommodates the change measurement Requirements and instrument-validation demands of fluid Velocity monitoring installations. The versatile microprocessor-based transmitter integrates the function of Velocity flow measurement, Velocity flow -range Adjustment, meter validation and diagnostics, in either a probe-mounted or remote housing. Velocity flow, as well as other configuration variables are displayed on the meter's optional 2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port and Golden Rules Smart interface software, or via the display and magnetic switches in the instrument panel. The Golden Rules KC-2600AI Series allows you to configure or change the following parameters: Velocity flow range, time response, low flow cutoff and a calibration correction factor that compensates for Velocity flow profile Velocity Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

The information contained herein is subject to change without notice.

Performance Specification

◆ Accuracy of Point Velocity

$\pm 1.5\%$ of F.S (Option : $\pm 1.0\%$ of F.S)

Repeatability

$\pm 0.5\%$ of Full Scale

◆ Pressure Drop

It can be ignored within ± 50 psig (3.4 barg)

◆ Response Time

1 second 63% of final velocity value

◆ Measuring Range

0.01 ~ 66.2 m/sec (Steel sensor : 40 m/sec)

◆ Function

Velocity Flow

Operating Specification

◆ Fluid

All Air

◆ Pressure (limitation)

Compression Fittings : 508 psig (35 barg) option

150 lb Flange, JIS 10k RF PN16 (DN) : $(-40 \sim 150) ^\circ\text{F}$ ($(-40 \sim 65) ^\circ\text{C}$)
: 230 psig (16 barg)

Low Pressure Retract Valve : 100 psig (7 barg)

High Pressure Retract Valve : 1000 psig (70 barg)

◆ Pressure Drop

It can be safely ignored for pipes over 3 inches. (0.14 Bar)

◆ Fluid & Ambient temp'

Air : $-40 \sim +150 ^\circ\text{C}$ ($-40 \sim 302 ^\circ\text{F}$), Steel sensor $-20 \sim +85 ^\circ\text{C}$ ($-4 \sim 185 ^\circ\text{F}$)

Ambient : $-20 \sim +85 ^\circ\text{C}$ ($-4 \sim 185 ^\circ\text{F}$)

◆ Gas accumulation range

Up to 5×10^{-4} with helium gas

◆ Input Power (selection)

DC24 V $\pm 10\%$, 200 mA

100 ~ 240 V AC $\pm 10\%$, 10 watts

◆ Output Signal (Standard)

Linear DC 4 ~ 20 mA

◆ Display

Alphanumeric 2 X 16 backlight LCD

Adjustable variables via remote control switch or Smart interface software

Adjustable : Full scale : (0 ~100) %

Flow: m/s, Nm/s ...

Time response 1 ~ 7 sec / Correction factor setting 0.5 ~ 5 /

Zero & Span

◆ Software

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB of RS-485 communication

Additional features: Zero cut-off adjustment / Linearization adjustment / Save / Load configuration / For meter validation

Physical specifications

◆ Wetted Materials

Sensor Probe – Ceramic + 303SS(Platinum) Option : 316SS, 316LSS

Protection Tube – 304SS (Option : 316SS, 316LSS)

Steel Sensor Type – 304SS

◆ Enclosure

Hazardous-Area CASE (Ex d[ib] IIC T4 : IP66)

General-Area CASE (IP67)

◆ Electrical Connection

2 X ½"PF or Ex Cable Gland(SS) 22C

M12 Connector (Steel sensor type)

◆ Mounting (Selection)

¾" Compression Fitting & ¾" Male NPT (Standard)

ANSI 150lb Flange, JIS 10k RF Flange

¾" Compression Fitting & 1" Male NPT (Option)

Ball Valve System (Option)

◆ Certification

Ex (Ex d[ib] IIC T4)

CE (CASE)

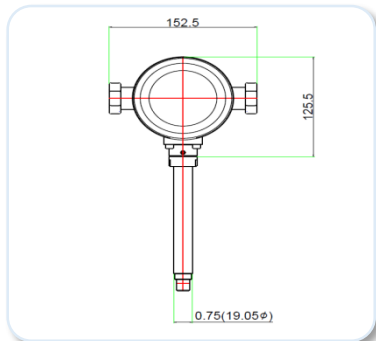
KGS Certificate

KC Certificate

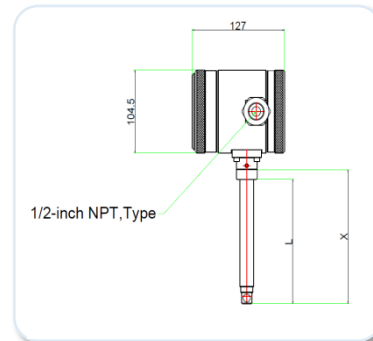
Dimensional Specification & Chart I

♣ General KC-2610AI (IP67)

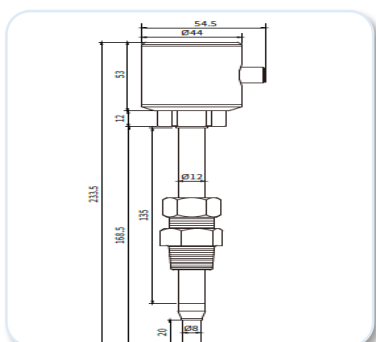
● Compression Fitting – Front View (EN2)



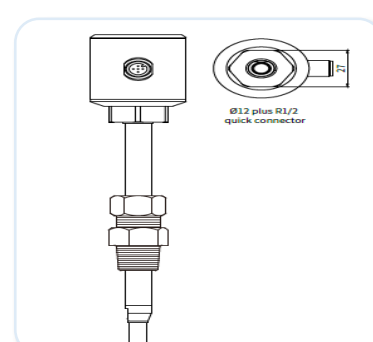
● Compression Fitting – Side View (EN2)



● Steel Sensor type Mounting – Front View (EN2)

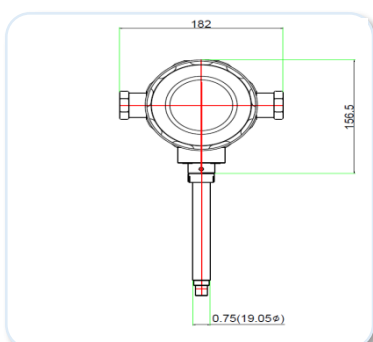


● Steel Sensor type Mounting – Side View (EN2)

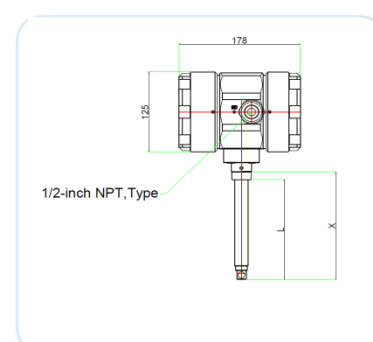


♣ Ex-proof KC-2620Ex-AI (IP66)

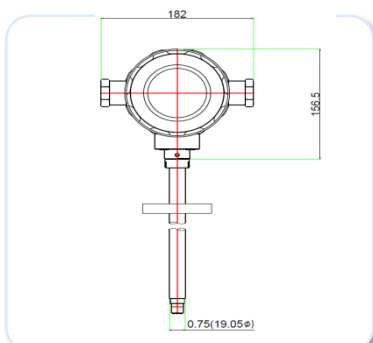
● Compression Fitting – Front View (E2)



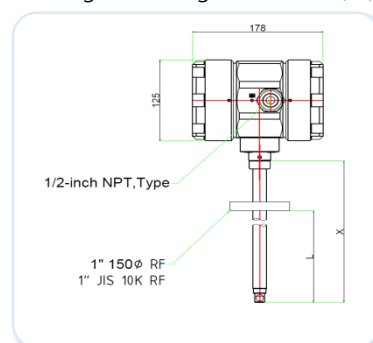
● Compression Fitting – Side View (E2)



● Flange Mounting – Front View (E2)



● Flange Mounting – Side View (E2)

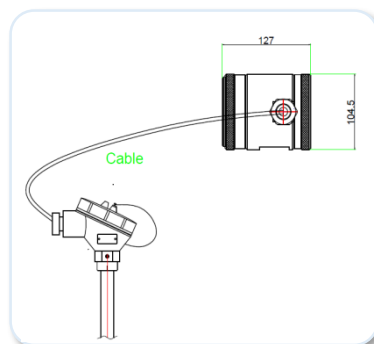
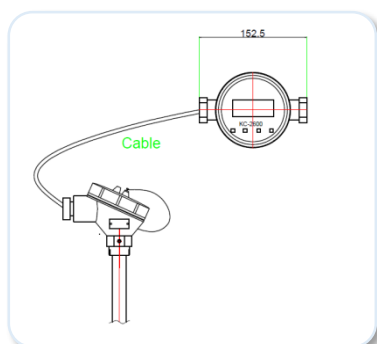


The shape of the sensor and Housing manufacturers are Subject to Change.

Dimensional Specification & Chant II

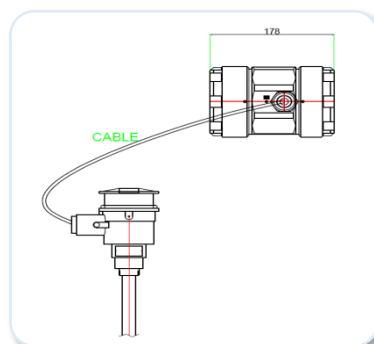
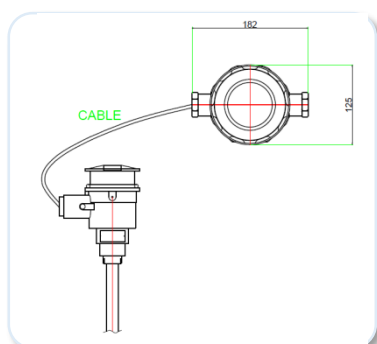
General Insertion type KC-2610AI-R

- Remote Mount Junction Box – Front View (EN4)
- Remote Mount Junction Box – Side View (EN4)



Ex-proof Insertion type KC-2620Ex-AI-R

- Remote Mount Junction Box – Front View (E4)
- Remote Mount Junction Box – Side View (E4)



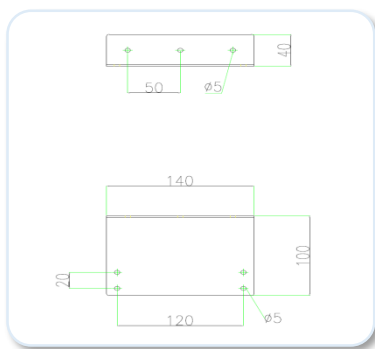
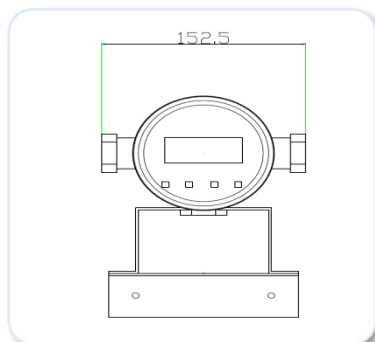
Length Chart		
Code	L	X
L06	6.0 (152.4)	7.5 (190.5)
L09	9.0 (228.6)	10.5 (266.7)
L13	13.0 (330.2)	14.5 (368.3)
L18	18.0 (457.2)	19.5 (495.3)
L24	24.0 (609.6)	25.5 (647.7)
L36	36.0 (914.4)	37.5 (952.5)

※ The shape of the sensor and Housing manufacturers are Subject to Change.

Dimensional Specification & Chart III

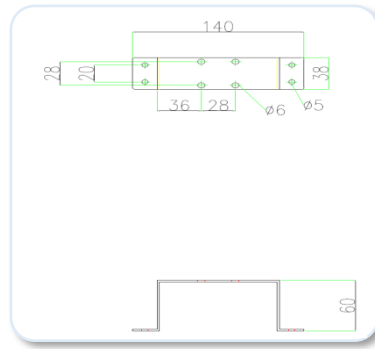
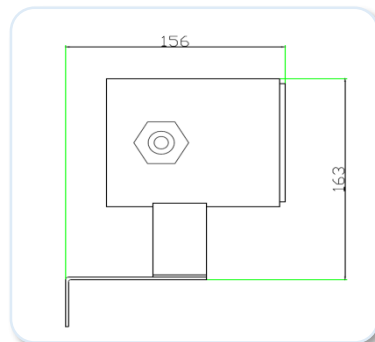
General Insertion type KC-2610AI-R

Remote Rear Bracket Electronics (EN4)



Panel mounting bracket 1

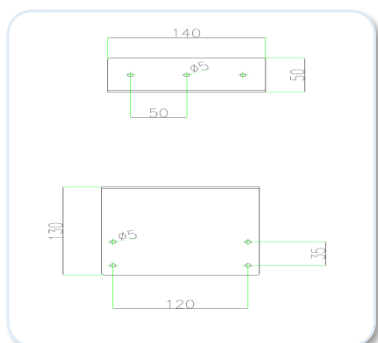
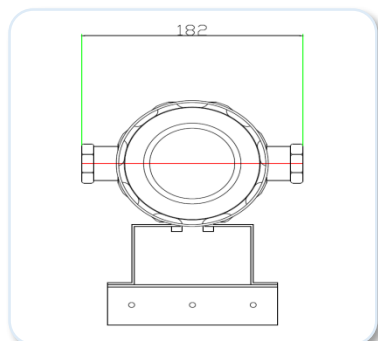
Remote Side Bracket Mounted Electronics (EN4)



Panel mounting bracket 2

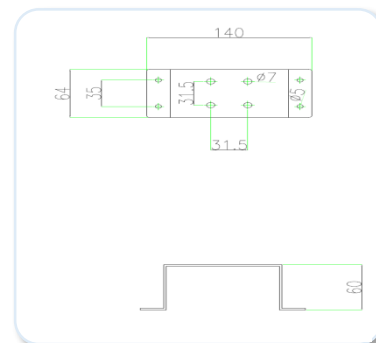
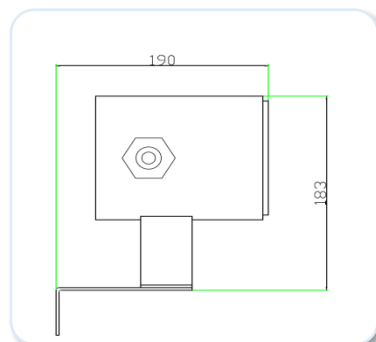
Ex-proof Insertion type KC-2620Ex-AI-R

Remote Rear Bracket Electronics (E4)



Panel mounting bracket 1

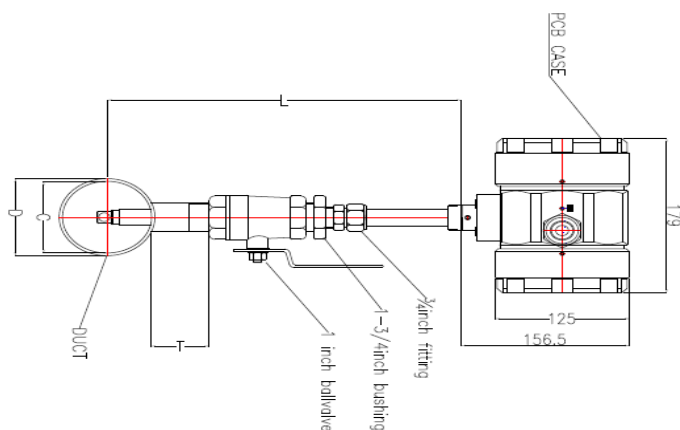
Remote Side Bracket Mounted Electronics (E4)



Panel mounting bracket 2

Low Pressure Ball Valve Dimensional

●Side view



VARIABLE

L = Normal Probe Length

D = Duct O.D

C = Duct I.D

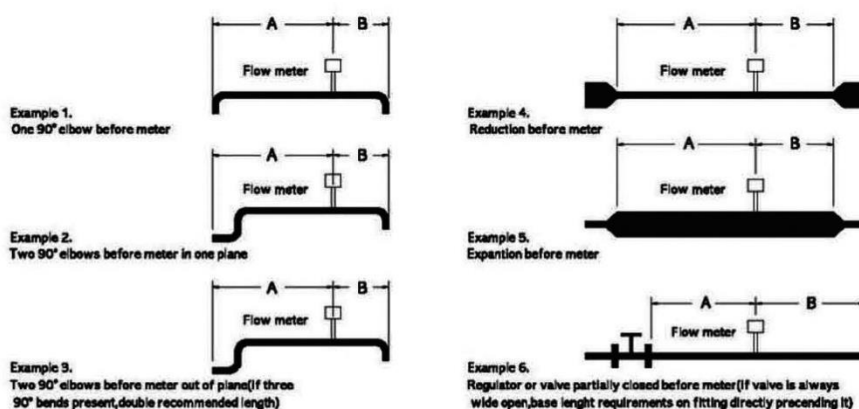
T = Height of "Threadolet" or Customer provided weldolet

All dimensions are inches. Millimeters are in parentheses.

All drawings save a ± 0.25 inch (6.4 mm) tolerance. Certified and available be on request.

Upstream & Downstream dimension (KC-2600AI insertion)

Select an installation that minimize possible distortion in the flow velocity profile, Valves, elbows, control valves and other piping components may cause flow velocity disturbances. Check your specific piping condition against the examples shown below. In order to achieve accurateness and repeatable performance install the flow meter using the recommended number of straight run pipe diameters upstream and downstream of the sensor.



Example	A-Upstream(1)Requirements	B-Downstream(2)Requirements
1	10~7D	5~3D
2	15~10D	5~3D
3	20~15D	10~5D
4	10~7D	5~3D
5	20~15D	10~5D
6	20~15D	5~3D

(1)Number of diameter(D)of straight pipe required between upstream disturbance and the flow meter.
(2)Number of diameter(D)of straight pipe required downstream of the flow meter.

Order Code KC-2600AI Series (Air Velocity Meter)

Type Length Conn` Spec Enclosure Power Output Display Direction Cal 1 Cal 2 Pressure Option
 KC-26 - L - M - E - P - V - - - - - -
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type	Code 1	Input Power	Code 8	Calibration 2 ⁹	Code 13
IP65 / IP67 Ceramic sensor type	10AI	DC 24V ±10%, 200 mA	2	70 °F(21 °C) 14.7 psig (1.103 barg)	A
IP65 / I67 Steel sensor type	10SI	AC 100 ~ 240 V ±10 % (옵션)	3	32 °F(0 °C) 14.7 psig (1.103 barg)	B
Hazardous-Area Location	20Ex-AI	Agency approved, customer specified	W	Agency approved, customer specified	W

Length ⁴	Code 2,3	Output Signal	Code 9	Pressure Limit	Code 14
6" (15 cm) Steel sensor type	06	RS-485S	1	Low pressure Below 43 psig (3 barg)	L
9" (23 cm)	09	DC 0 ~ 10V (Steel sensor only)	3	Medium pressure Below 145 psig (10 barg)	M
12" (30 cm)	12	DC 4~20 mA	4	High pressure Below 725 psig (50 barg)	H (option)
18" (46 cm)	18	Agency approved, customer specified	W		
24" (61 cm)	24				
36" (92 cm)	36				
Special Length	(in)				
Probe with 2" JIS 10k RF Flange	(in)-M5				
High pressure with Retractor Valve	(in)-M9				
Agency approved, customer specified	W				

Connection Specification	Code 4,5
None	0
Compression Fitting ² (¾" Tube X ¾" Male NPT)	10
Thread let (¾" Female NPT) Specify Pipe O.D in parentheses	2()
Compression Fitting (IP67) (½" Tube X ¾" Male NPT)	3
Curved Duct Bracket (¾" Tube Compression Fitting) Specify Duct O.D in parentheses	4()
Low Pressure Retractor Valve Specify Duct O.D in parentheses	8()
Compression Fittings (¾" Tube X 1" Male NPT)	15()
Agency approved, customer specified	W

Enclosure ⁵	Code 6,7
Hazardous-Area Location Enclosure	2
Remote Hazardous-Area Location Enclosure(Only with Ex Meter)	3(Ft)
Remote Hazardous-Area Location Enclosure(Only with Junction Box)	4(Ft)
IP67 or IP65	N2
Remote IP67 with Junction Box	N4(Ft)
Agency approved, customer specified	W

Flow Display	Code 10
No Readout	NR
Digital Display	DD
Agency approved, customer specified	W

Direction	Code 11
Horizontal Free or Vertical UP	1
Horizontal Free or Vertical Down	2
Agency approved, customer specified	W

Calibration 1 ⁹	Code 12
Standard Calibration	A
Air, only for 3" and large pipe size	
Compressed Air, only for 3" and large pipe size	D
Customer Calibration	B
Air	
Air equivalency	C
Compressed Air	E
N2	F
Blower Air	G
Agency approved, customer specified	W

Note

- 1.Flange is tapped and threaded on the compression fitting
- 2.The male connector is permanently tightened with ferrule of two combined materials
- 3.Flange must be ANSI or DIN specification
- 4.Maximum length is 60-inch(1524mm)
- 5.Enclosure required for agency approvals, T6 rate at 40°C
- 6.Wire resistance must be less than 8 ohms
- 7.Turndown ratio is 100:1 min. & 1000:1 max.
- 8.SFPS is the abbreviation for standard feet per second at 14.7psia(1.01 bar(a) & 70°F (21.1 °C)
- 9.Custmoer specified calibration must not exceed temperature & pressure limitations of the 2610AI, 2620Ex-AISeries products specifications

05

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Golden Rules Co.,Ltd

Air
FN-Mass Flow Meter
KC-7730 Series



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

05 FN-MASS FLOWMETER (Orifice,Flow nozzle,V-cone, Pitot tube)

5-1. D/P-type FN-Mass type KC-7730A Series



Air type FN-Mass Flowmeter
KC-7730A Series

Features

- Mixed gas Automatic Calculator (4~20mA input : Basic Mode)
- Rate, integrated, volume, mass flow, temp', pressure, density indication
- Input Power DC 24 V, < 100mA
- Output accuracy $\pm 0.1\%$, $\pm 2.5\ \mu\text{A}$ (4~20 mA, 4-Wire)
- Field validation of flowmeter calibration settings
Smart program interface (RS-485 standard)
- Direct mass flow monitoring eliminates need for
Temperature and pressure compensation
- Simple signal Processing & calibration
- Excellent reproducibility & long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (10-5D)
- Outstanding range ability (Turn down ratio 10:1)
- 0.1-second response to changes in flow rate
- Hydrogen gas measurement for high pressure at hydrogen charging
stations (max. 1380 Bar)
- High temperature fluid measurement up to 400°C
- CE, Ex(IP67)

Description

Golden Rules' KC-7730A Series D/P type FN-Mass flowmeter accommodates the change measurement Requirements and instrument-validation demands of fluid flow monitoring installations.

The versatile microprocessor-based transmitter integrates the function of flow measurement, flow-range Adjustment, meter validation and diagnostics, in either a Flange-mounted or remote housing.

Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port and Golden Rules Smart interface software, or via the display and remote switches in the instrument panel.

The Golden Rules KC-7730A Series allows you to configure or change the following parameters : flow range, Totalize, time response, low flow cut-off and a calibration correction factor that compensates for flow profile Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

Performance Specifications

◆ Accuracy of Point Velocity

±0.5% of F.S / ±0.5% of R.D
(Option : ±0.75% of R.D)

◆ Repeatability

±0.5% of Full Scale

◆ Sensor Accuracy

< 0.2% of span

◆ Pressure Loss

0.1 ~ Below 0.3 Bar

◆ Response Time

0.1 second

◆ Measuring Range

0.1 ~ 100 m/sec

◆ Function

rate, total, volume, mass, density, temp', pressure, energy indication

Mass Flow Rates (Air)

Air Flow Ranges							
Pipe Size (배관경)		Minimum (최소)		Maximum (최대)		Weight (중량)	
A	B	Nm3/m	Nm'/h	Nm3/m	Nm'/h	방폭	일반
15A	1/2-inch	0.13	8.0	1.33	80	5kg	3kg
20A	3/4-inch	0.27	16	2.7	160	5kg	3kg
25A	1-inch	0.4	24	120	240	6kg	4kg
40A	1 1/2-inch	0.98	59	9.8	590	7.2kg	5.2kg
50A	2-inch	1.53	92	15.3	920	8.6kg	6.6kg
80A	3-inch	3.3	200	33.3	2000	11kg	9kg
100A	4-inch	5.83	350	58.3	3500	16.2kg	14.2kg
150A	6-inch	12.7	760	127	7600		
200A	8-inch	21.7	1300	217	13.000		

Notes: Air & N2 flow standard conditions : 21°C(70°F) &
21°C(70°F) scfm:0°C Nm'/h 1Atm

Operating Specifications

◆ Fluid

Compressure Air, Other Gas

◆ Input Power

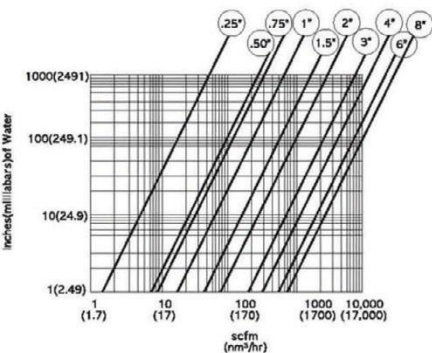
DC 24 V ±10 %, < 100 mA

◆ Output Signal

Linear 4 ~ 20 mA, 4Wire
Hart 2-Wire, Pulse (Option)

◆ Process Drop

15.5 kpa



◆ Fluid & Ambient temperature

Air : -40 ~ 100 °C (-40 ~ 212 °F)

Ambient : -4 ~ 185 °F (-20 ~ 85 °C)

◆ Pressure (limitations)

Compression fitting : 500 psig (35 barg)

150 lb, JIS 10k RF, PN16 DIN Flange ((-40 ~ 150) °C ((-40 ~ 302) °F)) : 230 psig (15.9 barg)

150 lb, JIS 10k RF, PN16 DIN Flange (121 °C (250 °F)) : 185 psig (12.8 barg)

150 lb, JIS 10k RF, PN16 DIN Flange (400 °C (752 °F)) : 155 psig (10.7 barg)

NPT ((-40 ~ 150) °C ((-40 ~ 302) °F)) : 508 psig (35 barg)

◆ Displays

Alphanumeric 2 X 16 backlight LCD

Adjustable variables via remote control switch or Smart interface software

Adjustable : Full scale : (0 ~100) %

Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)

Time response 0.1 sec / Correction factor setting 0.5 ~ 5 /

Zero & Span

◆ Totalizer

Seven digits (9,999,999,99.9 Count) in engineering units Reset table by

Software or remote control switch

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB of RS-485 communication

Additional features: Zero cut-off adjustment / Linearization adjustment / Save /

Load configuration / For meter validation

Physical Specification**◆ Wetted Materials**

D/P Sensor – 304SS (Option : 316SS, 316LSS)

Flow inline Body – 304SS (Option : 316SS, 316LSS)

◆ Enclosure

Hazardous-Area Enclosure CASE (Ex d IIC T6 : IP67)

General-Area Enclosure CASE (IP67)

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

◆ Mounting (Selection)

ANSI 150lb Flange, JIS 10k RF Flange, other

◆ Certification

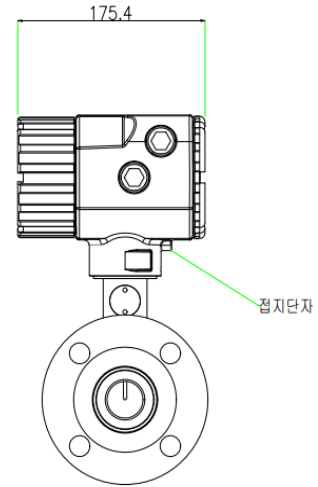
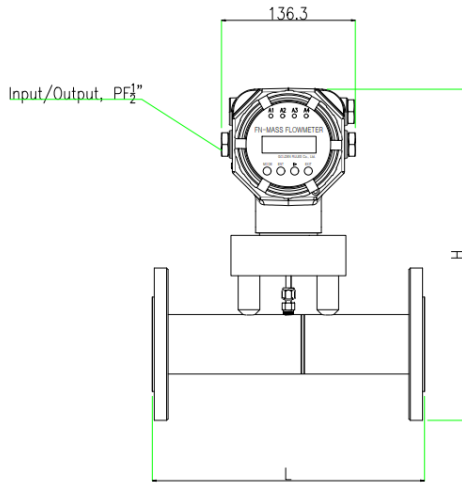
CE (CASE 전체)

KGS Certificate

Atex Certificate

Ex (Ex d IIC T6)

Dimensional Spec' & Chart KC-7730A



※ The shape of the sensor and Housing manufacturers are subject to change

Unit : mm

Size	H	L
15A	375	266
20A	380	266
25A	390	276
32A	402	276
40A	406	286
50A	420	306
65A	442	308
80A	442	328
100A	451	349
125A	508	409
150A	540	451
200A	575	522
250A	626	602
300A	684	672

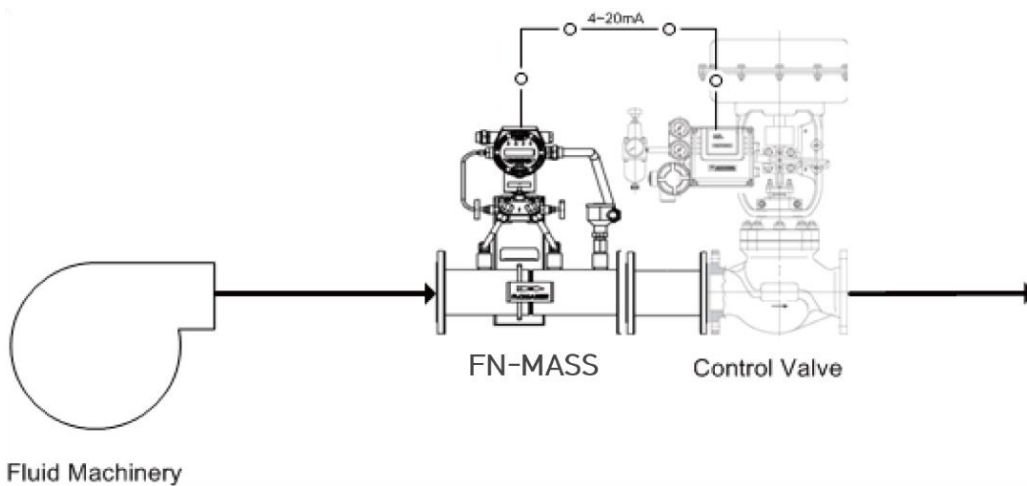
The D/P type FN-Mass flow meter realizes the following control with the current output signal.

01 – Mass flow(kg/h) Control

02 – Energy flow(MJ/h) Control

03 – Volume flow(m³/h) Control

04 – Pressure(kPa) Control



It responds to customers' needs with a fast response speed and can realize energy savings due to $\pm 0.5\%$ precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7730A D/P type FN-Mass)

Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730A Smart- IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows (in same plane)	10D	5D	62D

Note : (1) Number of diameters (D) of straight pipe required between upstream disturbance and the flowmeter.
 (2) Number of diameters (D) of straight pipe required downstream of the flowmeter.
 (3) For comparison purposes only. Table shows number of diameter(D) of upstream straight pipe length required for an ISO Standard 5167 Orifice plate with a beta ration of 0.7
 (4) Consult factory for pressure effects.

Order Code KC-7730A Series (D/P type FN-Mass)

KC-77 - - E - P - V - - - - - - - -

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type	Code 1
Compressure Air	30A
Blower Air	30BA
N2, Ar, CO2,	30G
Hazardous-Area Location Endosure	FM153B
Agency approved, customer specified	W

Connection form	Code 2
DIN Flange	D
ANSI Flange	A
JIS Flange	J
Agency approved, customer specified	W

Connection Spec' ^{1,3}	Code 3,4,5		
Size	DIN	150 lb	JIS 10k
1/2" (DN15)	D2	F2	J2
3/4" (DN20)	D3	F3	J3
1" (DN25)	D4	F4	J4
1-1/4" (DN32)	D5	F5	J5
1-1/2" (DN40)	D6	F6	J6
2" (DN50)	D7	F7	J7
2-1/2" (DN65)	D8	F8	J8
3" (DN80)	D9	F9	J9
4" (DN100)	D11	F11	J11
5" (DN125)	D12	F12	J12
6" (DN150)	D13	F13	J13
8" (DN200)	D15	F15	J15
10" (DN250)	D16	F16	J16
12" (DN300)	D17	F17	J17
Agency approved, customer specified	W		

Enclosure ⁵	Code 6,7
Hazardous-Area Location Enclosure	2
IP67	N2
Agency approved, customer specified	W

Input Power	Code 8
DC 24 V ±10 %, < 100 mA	2
Agency approved, customer specified	W

Output (Selection)	Code 9
RS-485S & 4-20mA, 4Wire (Std.)	1
DC 4-20 mA , 2Wire (Option)	2
Agency approved, customer specified	W

Display	Code 10
No Readout	NR
Digital Display	DD
Agency approved, customer specified	W

Flow Direction	Code 11
Horizontal Left to Right or Vertical UP	1
Horizontal Right to Left or Vertical Down	2
Agency approved, customer specified	W

Calibration ^{1,9} (Air)	Code 12
Standard Calibration	A
Air, only for 3/8" and large pipe Size	
Compressed Air, only for 1" and large pipe size	D
Customer Calibration	B
Agency approved, customer specified	W

Calibration ^{2,9} (Air)	Code 13
70 °F(21 °C) 14.7 psig (1.103 barg)	A
32 °F(0 °C) 14.7 psig (1.103 barg)	B
Agency approved, customer specified	W

Pressure Limit	Code 14
Low pressure	L
Below 145 psig (10 barg)	
Agency approved, customer specified	W

Option	Code 15
Material : 316SS, 316LSS	H
Agency approved, customer specified	W

05

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Golden Rules Co.,Ltd

Gas, Steam
FN-Mass Flow Meter
KC-7730 Series



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

05 FN-MASS FLOWMETER (Orifice, Flow nozzle, V-cone, Pitot tube)

5-1. D/P-type FN-Mass type KC-7730 Series



Gas
KC-7730G

Steam
KC-7730S



Superheated Steam
KC-7730SF-H

Features

- Mixed gas Automatic Calculator (4~20mA input : Basic Mode)
- Rate, integrated, volume, mass flow, temp', pressure, density indication
- Input Power DC 24 V, < 100mA
- Output accuracy $\pm 0.1\%$, $\pm 2.5\ \mu\text{A}$ (4~20 mA, 4-Wire)
- Field validation of flowmeter calibration settings
Smart program interface (RS-485 standard)
- Direct mass flow monitoring eliminates need for
Temperature and pressure compensation
- Simple signal Processing & calibration
- Excellent reproducibility & long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (10-5D)
- Outstanding range ability (Turn down ratio 10:1)
- 0.1-second response to changes in flow rate
- Hydrogen gas measurement for high pressure at hydrogen charging
stations (max. 1380 Bar)
- High temperature fluid measurement up to 400°C
- CE, Ex(IP67)

Description

Golden Rules' KC-7730 Series D/P type FN-Mass flowmeter accommodates the change measurement Requirements and instrument-validation demands of fluid flow monitoring installations.

The versatile microprocessor-based transmitter integrates the function of flow measurement, flow-range Adjustment, meter validation and diagnostics, in either a Flange-mounted or remote housing.

Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port and Golden Rules Smart interface software, or via the display and remote switches in the instrument panel.

The Golden Rules KC-7730 Series allows you to configure or change the following parameters : flow range, Totalize, time response, low flow cut-off and a calibration correction factor that compensates for flow profile Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

Performance Specifications

- ◆ **Accuracy of Point Velocity**
±0.5% of F.S / ±1.0% of R.D
(Option : ±0.1% of F.S / ±0.5% of R.D)
- ◆ **Repeatability**
±0.5% of Full Scale
- ◆ **Sensor Accuracy**
< 0.05% of span
- ◆ **Pressure Loss**
0.1 ~ Below 0.3 Bar
- ◆ **Response Time**
0.1 second
- ◆ **Measuring Range**
0.1 ~ 100 m/sec
- ◆ **Function**
rate, total, volume, mass, density, temp', pressure, energy indication

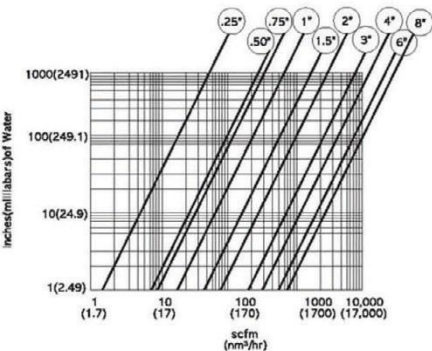
Mass Flow Rates (Air)

Air Flow Ranges							
Pipe Size (배관경)		Minimum (최소)		Maximum (최대)		Weight (중량)	
A	B	Nm3/m	Nm³/h	Nm3/m	Nm³/h	방폭	일반
15A	1/2-inch	0.13	8.0	1.33	80	5kg	3kg
20A	3/4-inch	0.27	16	2.7	160	5kg	3kg
25A	1-inch	0.4	24	120	240	6kg	4kg
40A	1 1/2-inch	0.98	59	9.8	590	7.2kg	5.2kg
50A	2-inch	1.53	92	15.3	920	8.6kg	6.6kg
80A	3-inch	3.3	200	33.3	2000	11kg	9kg
100A	4-inch	5.83	350	58.3	3500	16.2kg	14.2kg
150A	6-inch	12.7	760	127	7600		
200A	8-inch	21.7	1300	217	13,000		

Notes: Air & N2 flow standard conditions : 21°C(70°F) &
21°C(70°F) scfm:0°C Nm³/h 1Atm

Operating Specifications

- ◆ **Fluid**
Steam, Gas
- ◆ **Input Power**
DC 24 V ±10 %, < 100 mA
- ◆ **Output Signal**
Linear 4 ~ 20 mA, 4Wire
Hart 2-Wire, Pulse (Option)
- ◆ **Process Drop**
15.5 kpa



◆ Fluid & Ambient temperature

Gas : -40 ~ 100 °C (-40 ~ 212 °F) Option : 110 ~ 400 °C (230 ~ 752 °F)
Steam : -20 ~ 200 °C (-4 ~ 392 °F) Option : 210 ~ 400 °C (410 ~ 752 °F)
Ambient : -4 ~ 185 °F (-20 ~ 85 °C)

◆ Pressure (limitations)

Compression fitting : 500 psig (35 barg)
150 lb, JIS 10k RF, PN16 DIN Flange ((-40 ~ 150) °C ((-40 ~ 302) °F)) : 230 psig (15.9 barg)
150 lb, JIS 10k RF, PN16 DIN Flange (121 °C (250 °F)) : 185 psig (12.8 barg)
150 lb, JIS 10k RF, PN16 DIN Flange (400 °C (752 °F)) : 155 psig (10.7 barg)
NPT ((-40 ~ 150) °C ((-40 ~ 302) °F)) : 508 psig (35 barg)

◆ Displays

Alphanumeric 2 X 16 backlight LCD
Adjustable variables via remote control switch or Smart interface software
Adjustable : Full scale : (0 ~100) %
Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)
Time response 0.1 sec / Correction factor setting 0.5 ~ 5 /
Zero & Span

◆ Totalizer

Seven digits (9,999,999,99.9 Count) in engineering units Reset table by
Software or remote control switch

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB
of RS-485 communication
Additional features: Zero cut-off adjustment / Linearization adjustment / Save /
Load configuration / For meter validation

Physical Specification**◆ Wetted Materials**

D/P Sensor – 304SS (Option : 316SS, 316LSS)
Flow inline Body – 304SS (Option : 316SS, 316LSS)

◆ Enclosure

Hazardous-Area Enclosure CASE (Ex d IIC T6 : IP67)
General-Area Enclosure CASE (IP67)

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

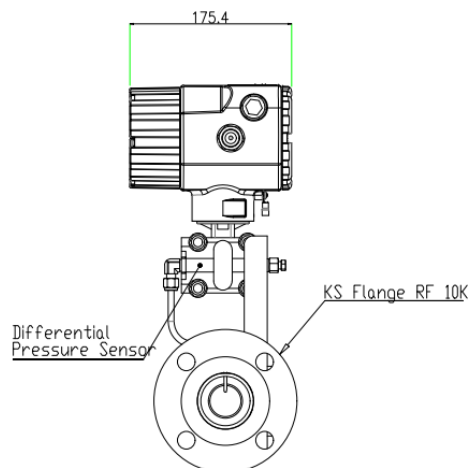
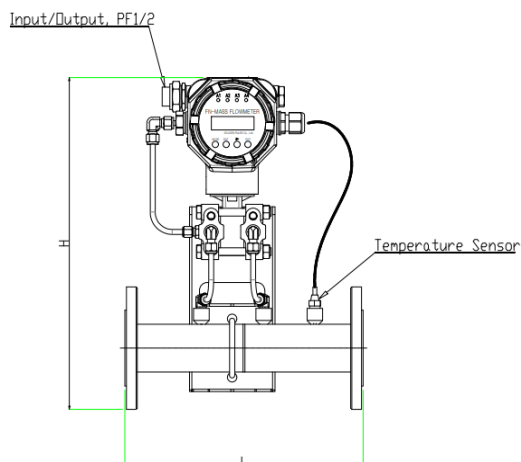
◆ Mounting (Selection)

ANSI 150lb Flange, JIS 10k RF Flange, other

◆ Certification

CE (CASE 전체)
KGS Certificate
Atex Certificate
Ex (Ex d IIC T6)

Dimensional Spec' & Chart KC-7730



※ The shape of the sensor and Housing manufacturers are subject to change

Unit : mm

Size	H	L
15A	375	266
20A	380	266
25A	390	276
32A	402	276
40A	406	286
50A	420	306
65A	442	308
80A	442	328
100A	451	349
125A	508	409
150A	540	451
200A	575	522
250A	626	602
300A	684	672

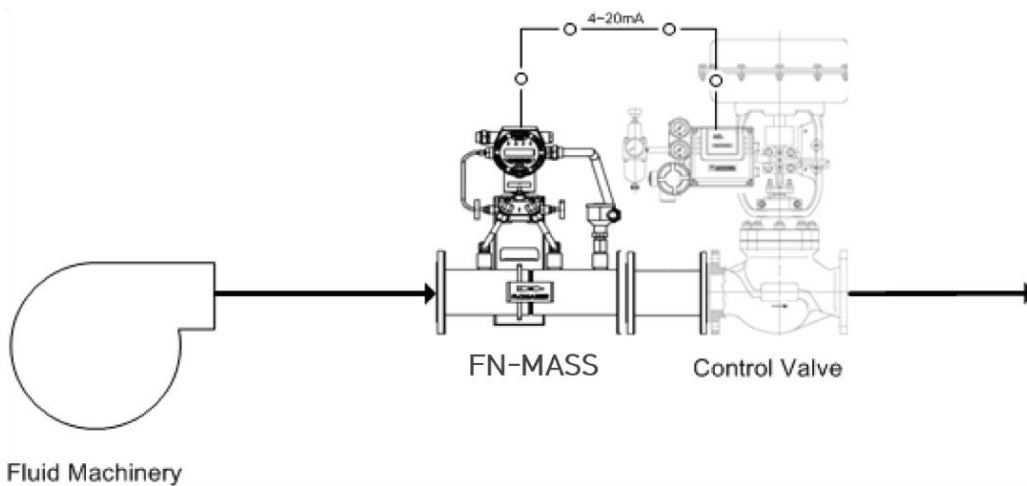
The D/P type FN-Mass flow meter realizes the following control with the current output signal.

01 – Mass flow(kg/h) Control

02 – Energy flow(MJ/h) Control

03 – Volume flow(m³/h) Control

04 – Pressure(kPa) Control



It responds to customers' needs with a fast response speed and can realize energy savings due to $\pm 0.5\%$ precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7730 D/P type FN-Mass)

Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730 Smart- IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows (in same plane)	10D	5D	62D

Note : (1) Number of diameters (D) of straight pipe required between upstream disturbance and the flowmeter.
 (2) Number of diameters (D) of straight pipe required downstream of the flowmeter.
 (3) For comparison purposes only. Table shows number of diameter(D) of upstream straight pipe length required for an ISO Standard 5167 Orifice plate with a beta ration of 0.7
 (4) Consult factory for pressure effects.

Order Code KC-7730 Series (D/P type FN-Mass)

Modeling: KC-77

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Type Flange Conn` Spec Enclosure Power Output Display Direction Cal 1 Cal 2 Pressure Option
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type	Code 1
Gas	30G
Mixture	30M
Steam	30S
Hazardous-Area Location Endorsure	FM153B
Agency approved, customer specified	W

Connection form	Code 2
DIN Flange	D
ANSI Flange	A
JIS Flange	J
Agency approved, customer specified	W

Connection Spec' 1,3	Code 3,4,5		
Size	DIN	150 lb	JIS 10k
1/2" (DN15)	D2	F2	J2
3/4" (DN20)	D3	F3	J3
1" (DN25)	D4	F4	J4
1-1/4" (DN32)	D5	F5	J5
1-1/2" (DN40)	D6	F6	J6
2" (DN50)	D7	F7	J7
2-1/2" (DN65)	D8	F8	J8
3" (DN80)	D9	F9	J9
4" (DN100)	D11	F11	J11
5" (DN125)	D12	F12	J12
6" (DN150)	D13	F13	J13
8" (DN200)	D15	F15	J15
10" (DN250)	D16	F16	J16
12" (DN300)	D17	F17	J17
Agency approved, customer specified			W

Enclosure ⁵	Code 6, 7
Hazardous-Area Location Enclosure	2
IP67	N2
Agency approved, customer specified	W

Input Power	Code 8
DC 24 V $\pm 10\%$, < 100 mA	2
Agency approved, customer specified	W

Output (Selection)	Code 9
RS-485S & 4-20mA, 4Wire (Std.)	1
DC 4~20 mA , 2Wire (Option)	2
Agency approved, customer specified	W

Display	Code 10
No Readout	NR
Digital Display	DD
Agency approved, customer specified	W

Flow Direction	Code 11
Horizontal Left to Right or Vertical UP	1
Horizontal Right to Left or Vertical Down	2
Agency approved, customer specified	W

Calibration 1 ^o (Air)	Code 12
Standard Calibration	A
Air, only for 3/8" and large pipe size	
Compressed Air, only for 1" and large pipe size	D
Customer Calibration	B
Agency approved, customer specified	W

Calibration 2 ⁹ (Air)	Code 13
70 °F(21 °C) 14.7 psig (1.103 barg)	A
32 °F(0 °C) 14.7 psig (1.103 barg)	B
Agency approved, customer specified	W

Pressure Limit	Code 14
Low pressure Below 145 psig (10 barg)	L
Medium pressure Below 435 psig (30 barg)	M (Option)
High pressure Below 5,801 psig (400 barg)	H (Option)

Option	Code 15
Material : 316SS, 316LSS	H
Agency approved, customer specified	W

05

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Golden Rules Co.,Ltd

H2, Special Gas
FN-Mass Flow Meter
KC-7730-FM153BEx Series



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

05 FN-MASS FLOWMETER (H2 Gas)

5-1. D/P-type FN-Mass type KC-7730-FM153BEx

Features

- Mixed gas Automatic Calculator (4~20mA input : Basic Mode)
- Rate, integrated, volume, mass flow, temp', pressure, density indication
- Input Power DC 24 V, < 100mA
- Output accuracy $\pm 0.1\%$, $\pm 2.5\ \mu\text{A}$ (4~20 mA, 4-Wire)
- Field validation of flowmeter calibration settings
Smart program interface (RS-485 standard)
- Direct mass flow monitoring eliminates need for
Temperature and pressure compensation
- Simple signal Processing & calibration
- Excellent reproducibility & long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (10-5D)
- Outstanding range ability (Turn down ratio 10:1)
- 0.1-second response to changes in flow rate
- Hydrogen gas measurement for high pressure at hydrogen charging
stations (max. 1380 Bar)
- High temperature fluid measurement up to 400°C
- CE, Ex(IP67)



H2, Special Gas type
KC-7730-FM153BEx

Description

Golden Rules' KC-7730-FM153BEx Series D/P type FN-Mass flowmeter accommodates the change measurement Requirements and instrument-validation demands of fluid flow monitoring installations.

The versatile microprocessor-based transmitter integrates the function of flow measurement, flow-range Adjustment, meter validation and diagnostics, in either a Flange-mounted or remote housing.

Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port and Golden Rules Smart interface software, or via the display and remote switches in the instrument panel.

The Golden Rules KC-7730-FM153BEx Series allows you to configure or change the following parameters : flow range, Totalize, time response, low flow cut-off and a calibration correction factor that compensates for flow Profile Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

Performance Specifications

- ◆ **Accuracy of Point Velocity**
±0.5% of F.S / ±1.0% of R.D
(Option : ±0.1% of F.S / ±0.5% of R.D)
- ◆ **Repeatability**
±0.5% of Full Scale
- ◆ **Sensor Accuracy**
< 0.05% of span
- ◆ **Pressure Loss**
0.1 ~ Below 0.3 Bar
- ◆ **Response Time**
0.1 second
- ◆ **Measuring Range**
0.1 ~ 100 m/sec
- ◆ **Function**
rate, total, volume, mass, density, temp', pressure, energy indication

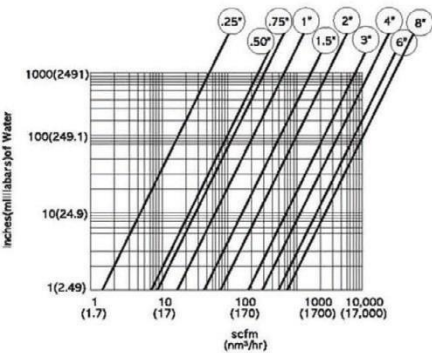
Mass Flow Rates (Air)

Air Flow Ranges							
Pipe Size (배관경)		Minimum (최소)		Maximum (최대)		Weight (중량)	
A	B	Nm3/m	Nm³/h	Nm3/m	Nm³/h	방폭	일반
15A	1/2-inch	0.13	8.0	1.33	80	5kg	3kg
20A	3/4-inch	0.27	16	2.7	160	5kg	3kg
25A	1-inch	0.4	24	120	240	6kg	4kg
40A	1 1/2-inch	0.98	59	9.8	590	7.2kg	5.2kg
50A	2-inch	1.53	92	15.3	920	8.6kg	6.6kg
80A	3-inch	3.3	200	33.3	2000	11kg	9kg
100A	4-inch	5.83	350	58.3	3500	16.2kg	14.2kg
150A	6-inch	12.7	760	127	7600		
200A	8-inch	21.7	1300	217	13.000		

Notes: Air & N2 flow standard conditions : 21°C(70°F) &
21°C(70°F) scfm:0°C Nm³/h 1Atm

Operating Specifications

- ◆ **Fluid**
Steam, Gas
- ◆ **Input Power**
DC 24 V ±10 %, < 100 mA
- ◆ **Output Signal**
Linear 4 ~ 20 mA, 4Wire
Hart 2-Wire, Pulse (Option)
- ◆ **Process Drop**
15.5 kpa



◆ Fluid & Ambient temperature

H2, Special Gas : -40 ~ 100 °C (-40 ~ 212 °F) Option : 110 ~ 400 °C (230 ~ 752 °F)
Ambient : -4 ~ 185 °F (-20 ~ 85 °C)

◆ Pressure (limitations)

Compression fitting : 500 psig (35 barg)
150 lb, JIS 10k RF, PN16 DIN Flange ((-40 ~ 150) °C ((-40 ~ 302) °F)) : 230 psig (15.9 barg)
150 lb, JIS 10k RF, PN16 DIN Flange (121 °C (250 °F)) : 185 psig (12.8 barg)
150 lb, JIS 10k RF, PN16 DIN Flange (400 °C (752 °F)) : 155 psig (10.7 barg)
NPT ((-40 ~ 150) °C ((-40 ~ 302) °F)) : 508 psig (35 barg)

◆ Displays

Alphanumeric 2 X 16 backlight LCD
Adjustable variables via remote control switch or Smart interface software
Adjustable : Full scale : (0 ~100) %
Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)
Time response 0.1 sec / Correction factor setting 0.5 ~ 5 /
Zero & Span

◆ Totalizer

Seven digits (9,999,999,99.9 Count) in engineering units Reset table by
Software or remote control switch

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB
of RS-485 communication
Additional features: Zero cut-off adjustment / Linearization adjustment / Save /
Load configuration / For meter validation

Physical Specification**◆ Wetted Materials**

D/P Sensor – 304SS (Option : 316SS, 316LSS)
Flow inline Body – 304SS (Option : 316SS, 316LSS)

◆ Enclosure

Hazardous-Area Enclosure CASE (Ex d IIC T6 : IP67)
General-Area Enclosure CASE (IP67)

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

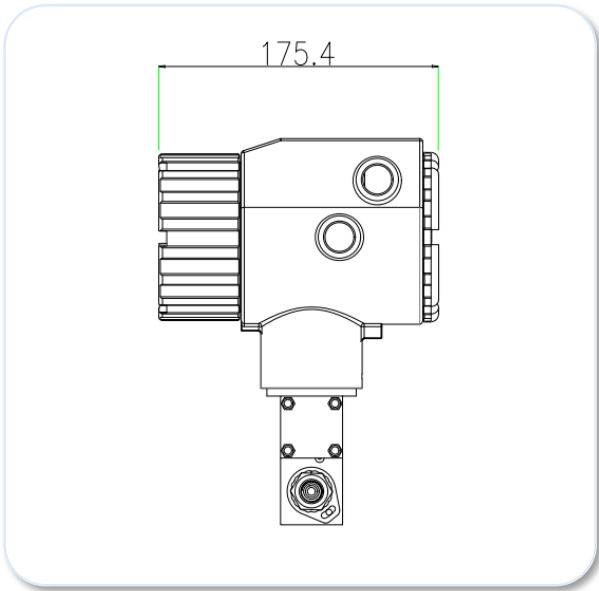
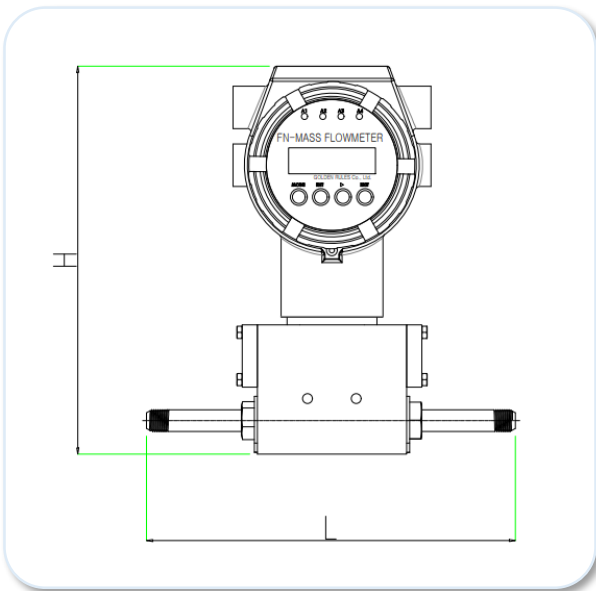
◆ Mounting (Selection)

ANSI 150lb Flange, JIS 10k RF Flange, other

◆ Certification

CE (CASE 전체)
KGS Certificate
Atex Certificate
Ex (Ex d IIC T6)

Dimensional Spec' & Chart KC-7730H-FM153BEx



※ The shape of the sensor and Housing manufacturers are subject to change

Unit : mm

Size	H	L
¼", 3/8" Thread / Lok	255.1	242.3
1/2" Lok / Flange	256.1 / 375	246.1 / 266
(3/4" Lok	257.6	253.9
1" Flange	358.5	379.7
32A	402	276
40A	406	286
50A	420	306
65A	442	308
80A	442	328
100A	451	349
125A	508	409
150A	540	451
200A	575	522
250A	626	602

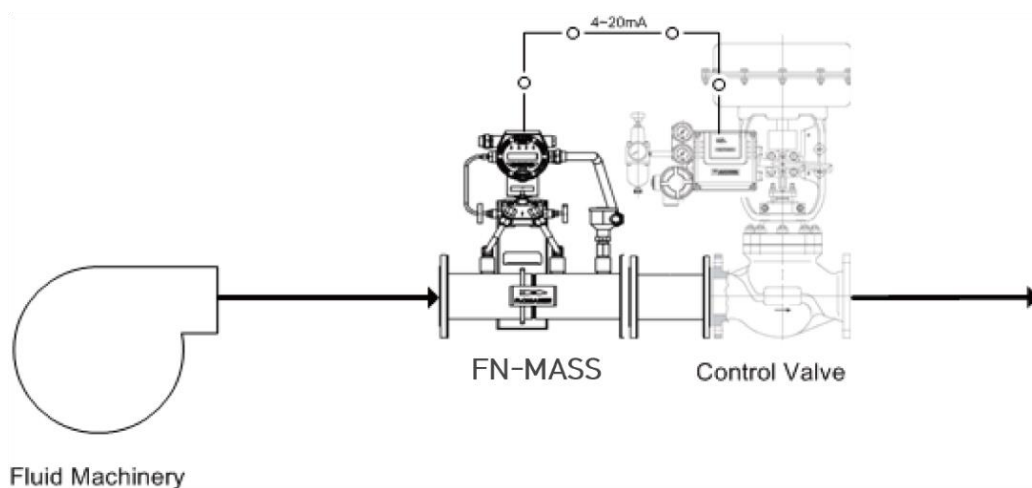
The D/P type FN-Mass flow meter realizes the following control with the current output signal.

01 – Mass flow(kg/h) Control

02 – Energy flow(MJ/h) Control

03 – Volume flow(m³/h) Control

04 – Pressure(kPa) Control



It responds to customers' needs with a fast response speed and can realize energy savings due to $\pm 0.5\%$ precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7730-FM153BEx)

Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730-FM153BEx Smart- IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows (in same plane)	10D	5D	62D

Note : (1) Number of diameters (D) of straight pipe required between upstream disturbance and the flowmeter.
 (2) Number of diameters (D) of straight pipe required downstream of the flowmeter.
 (3) For comparison purposes only. Table shows number of diameter(D) of upstream straight pipe length required for an ISO Standard 5167 Orifice plate with a beta ration of 0.7
 (4) Consult factory for pressure effects.

Order Code KC-7730H-FM153BEx (D/P type FN-Mass)

KC-77 - - E - P - V - - - - - - -

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type	Code 1
H2 Gas 100% or H2 Mixture	30H
Special Gas	30P
Other Gas	30O
Hazardous-Area Location Endosure	FM153B
Agency approved, customer specified	W

Connection form	Code 2
LOK : ¼", 3/8", ½", ¾", 1"	L
VCR : ¼", 3/8", ½", ¾", 1"	V
DIN / ANSI / JIS Flange	D / A / J
Agency approved, customer specified	W

Connection Spec' ^{1,3}	Code 3,4,5		
Size	DIN	150 lb	JIS 10k
1/2" (DN15)	D2	F2	J2
3/4" (DN20)	D3	F3	J3
1" (DN25)	D4	F4	J4
1-1/4" (DN32)	D5	F5	J5
1-1/2" (DN40)	D6	F6	J6
2" (DN50)	D7	F7	J7
2-1/2" (DN65)	D8	F8	J8
3" (DN80)	D9	F9	J9
4" (DN100)	D11	F11	J11
5" (DN125)	D12	F12	J12
6" (DN150)	D13	F13	J13
8" (DN200)	D15	F15	J15
10" (DN250)	D16	F16	J16
12" (DN300)	D17	F17	J17
Agency approved, customer specified	W		

Enclosure ⁵	Code 6,7
Hazardous-Area Location Enclosure	2
IP67	N2
Agency approved, customer specified	W

Input Power	Code 8
DC 24 V ±10 %, < 100 mA	2
Agency approved, customer specified	W

Output (Selection)	Code 9
RS-485S & 4-20mA, 4Wire (Std.)	1
DC 4-20 mA , 2Wire (Option)	2
Agency approved, customer specified	W

Display	Code 10
No Readout	NR
Digital Display	DD
Agency approved, customer specified	W

Flow Direction	Code 11
Horizontal Left to Right or Vertical UP	1
Horizontal Right to Left or Vertical Down	2
Agency approved, customer specified	W

Calibration 1 ⁹ (Air)	Code 12
Standard Calibration	A
Air, only for 3/8" and large pipe Size	
Compressed Air, only for 1" and large pipe size	D
Customer Calibration	B
Agency approved, customer specified	W

Calibration 2 ⁹ (Air)	Code 13
70 °F(21 °C) 14.7 psig (1.103 barg)	A
32 °F(0 °C) 14.7 psig (1.103 barg)	B
Agency approved, customer specified	W

Pressure Limit	Code 14
Low pressure	L
Below 145 psig (10 barg)	
Medium pressure	M
Max. 5,801 psig (400 barg)	(Option)
High pressure	H
Max.. 20,015 psig (1,380 barg)	(Option)

Option	Code 15
Mat'l : 316, 316LSS / Temp' : 400°C	H
Agency approved, customer specified	W

06

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Golden Rules Co.,Ltd

Liquid, Oil

FN-Mass Flow Meter

KC-7730 Series



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

05 FN-MASS FLOWMETER (Liquid, Oil)

5-1. D/P-type FN-Mass type KC-7730 Series



Liquid, Oil type
KC-7730L

Features

- Mixed gas Automatic Calculator (4~20mA input : Basic Mode)
- Rate, integrated, volume, mass flow, temp', pressure, density indication
- Input Power DC 24 V, < 100mA
- Output accuracy $\pm 0.1\%$, $\pm 2.5\ \mu\text{A}$ (4~20 mA, 4-Wire)
- Field validation of flowmeter calibration settings
- Smart program interface (RS-485 standard)
- Direct mass flow monitoring eliminates need for Temperature and pressure compensation
- Simple signal Processing & calibration
- Excellent reproducibility & long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (10-5D)
- Outstanding range ability (Turn down ratio 10:1)
- 0.1-second response to changes in flow rate
- Hydrogen gas measurement for high pressure at hydrogen charging stations (max. 1380 Bar)
- High temperature fluid measurement up to 400°C
- CE, Ex(IP67)

Description

Golden Rules' KC-7730 Series D/P type FN-Mass flowmeter accommodates the change measurement Requirements and instrument-validation demands of fluid flow monitoring installations.

The versatile microprocessor-based transmitter integrates the function of flow measurement, flow-range Adjustment, meter validation and diagnostics, in either a Flange-mounted or remote housing.

Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port and Golden Rules Smart interface software, or via the display and remote switches in the instrument panel.

The Golden Rules KC-7730 Series allows you to configure or change the following parameters : flow range, Totalize, time response, low flow cut-off and a calibration correction factor that compensates for flow profile Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

Performance Specifications

◆ Accuracy of Point Velocity

±0.5% of F.S / ±1.0% of R.D

(Option : ±0.1% of F.S / ±0.5% of R.D)

◆ Repeatability

±0.5% of Full Scale

◆ Sensor Accuracy

< 0.05% of span

◆ Pressure Loss

0.1 ~ Below 0.3 Bar

◆ Response Time

0.1 second

◆ Measuring Range

0.1 ~ 100 m/sec

◆ Function

rate, total, volume, mass, density, temp', pressure, energy indication

Operating Specifications

◆ Fluid

Liquid, Oil

◆ Input Power

DC 24 V ±10 %, < 100 mA

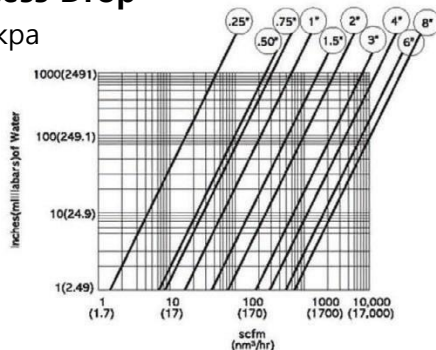
◆ Output Signal

Linear 4 ~ 20 mA, 4Wire

Hart 2-Wire, Pulse (Option)

◆ Process Drop

15.5 kpa



Refer to the chart and look for the meter for a range of 6.62 to the Specified full scale (upper limit range).

Select a full scale speed of 1 to 3 m/s.

Ensure that the overall flow rate used during the final design phase is maintained.

Within a 6.62 radius of the current flow

Table Flow Velocity vs. Flow Volume
Unit : m³/h

Size (mm)		Flow rate		Weight	
A	B	3m/s	6.62m/s	방쪽	일반
15A	1/2 "	1.9	4.5	5kg	3kg
20A	3/4 "	3.4	7.5	5kg	3kg
25A	1 "	5.3	11.7	6kg	4kg
32A	1 1/4 "	8.7	19.2	6.9kg	4.9kg
40A	1 1/2 "	13.6	30.0	7.2kg	5.2kg
50A	2 "	21.2	46.8	8.6kg	6.6kg
65A	2 1/2 "	35.8	79.1	10.2g	98.2g
80A	3 "	54.3	119.8	11kg	9kg
100A	4 "	84.8	187.2	16.2kg	14.2kg
125A	5 "	132.5	292.5		
150A	6 "	190.8	421.2		
200A	8 "	229.3	748.7		
250A	10 "	530.1	1169.9		
300A	12 "	763.4	1684.6		
350A	14 "	1,039	2292.9		
400A	16 "	1,357	2994.8		
450A	18 "	1,717	3790.3		
500A	20 "	2,121	4679.4		
600A	24 "	3,054	6738.4		

◆ Fluid & Ambient temperature

Liquid, Oil : -40 ~ 100 °C (-40 ~ 212 °F) Option : 110 ~ 400 °C (230 ~ 752 °F)
Ambient : -4 ~ 185 °F (-20 ~ 85 °C)

◆ Pressure (limitations)

Compression fitting : 500 psig (35 barg)
150 lb, JIS 10k RF, PN16 DIN Flange ((-40 ~ 150) °C ((-40 ~ 302) °F)) : 230 psig (15.9 barg)
150 lb, JIS 10k RF, PN16 DIN Flange (121 °C (250 °F)) : 185 psig (12.8 barg)
150 lb, JIS 10k RF, PN16 DIN Flange (400 °C (752 °F)) : 155 psig (10.7 barg)
NPT ((-40 ~ 150) °C ((-40 ~ 302) °F)) : 508 psig (35 barg)

◆ Displays

Alphanumeric 2 X 16 backlight LCD
Adjustable variables via remote control switch or Smart interface software
Adjustable : Full scale : (0 ~100) %
Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)
Time response 0.1 sec / Correction factor setting 0.5 ~ 5 /
Zero & Span

◆ Totalizer

Seven digits (9,999,999,99.9 Count) in engineering units Reset table by
Software or remote control switch

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB
of RS-485 communication
Additional features: Zero cut-off adjustment / Linearization adjustment / Save /
Load configuration / For meter validation

Physical Specification**◆ Wetted Materials**

D/P Sensor – 304SS (Option : 316SS, 316LSS)
Flow inline Body – 304SS (Option : 316SS, 316LSS)

◆ Enclosure

Hazardous-Area Enclosure CASE (Ex d IIC T6 : IP67)
General-Area Enclosure CASE (IP67)

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

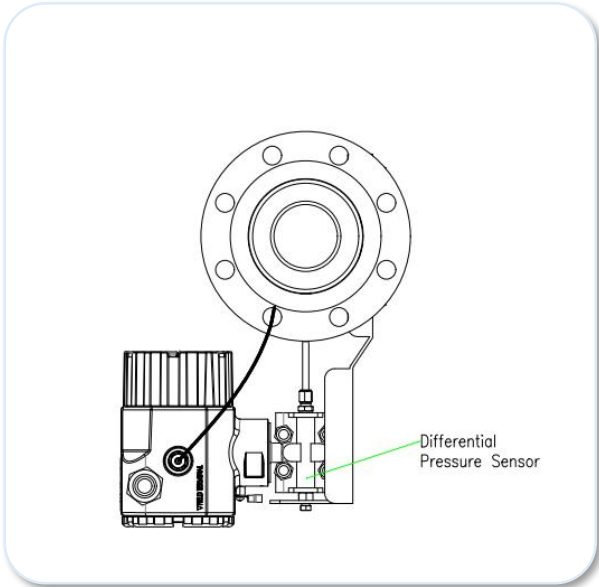
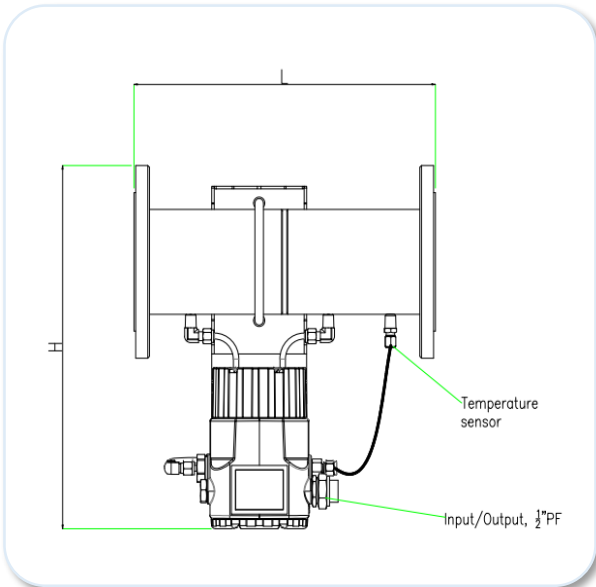
◆ Mounting (Selection)

ANSI 150lb Flange, JIS 10k RF Flange, other

◆ Certification

CE (CASE 전체)
KGS Certificate
Atex Certificate
Ex (Ex d IIC T6)

Dimensional Spec' & Chart KC-7730



※ The shape of the sensor and Housing manufacturers are subject to change

Unit : mm

Size	H	L
15A	375	266
20A	380	266
25A	390	276
32A	402	276
40A	406	286
50A	420	306
65A	442	308
80A	442	328
100A	451	349
125A	508	409
150A	540	451
200A	575	522
250A	626	602
300A	684	672

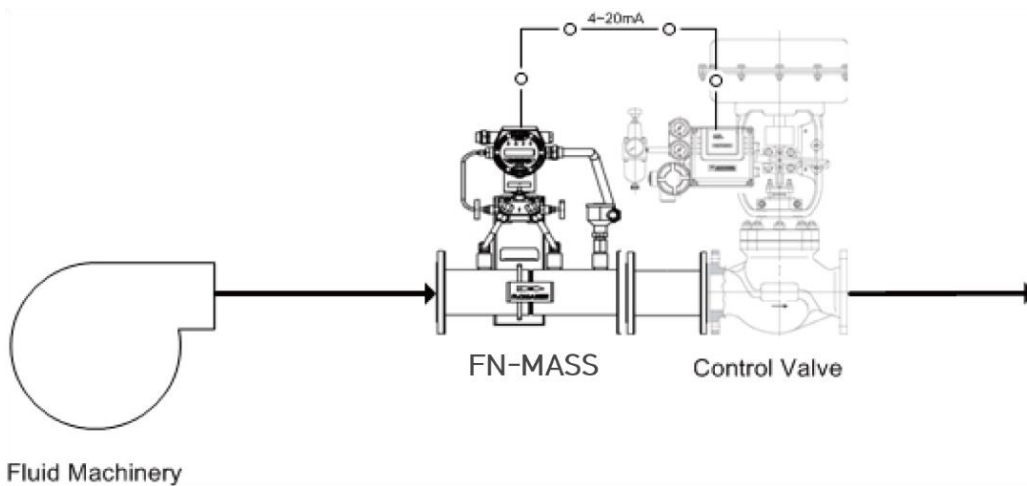
The D/P type FN-Mass flow meter realizes the following control with the current output signal.

01 – Mass flow(kg/h) Control

02 – Energy flow(MJ/h) Control

03 – Volume flow(m³/h) Control

04 – Pressure(kPa) Control



It responds to customers' needs with a fast response speed and can realize energy savings due to $\pm 0.5\%$ precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7730 D/P type FN-Mass)

Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730 Smart- IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows (in same plane)	10D	5D	62D

Note : (1) Number of diameters (D) of straight pipe required between upstream disturbance and the flowmeter.
 (2) Number of diameters (D) of straight pipe required downstream of the flowmeter.
 (3) For comparison purposes only. Table shows number of diameter(D) of upstream straight pipe length required for an ISO Standard 5167 Orifice plate with a beta ration of 0.7
 (4) Consult factory for pressure effects.

Order Code KC-7730 Series (D/P type FN-Mass)

KC-77 - - **E** - **P** - **V** - - - - - - -

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type Flange Conn` Spec Enclosure Power Output Display Direction Cal 1 Cal 2 Pressure Option

Type	Code 1
Liquid	30L
Chemical Liquid	30C
Oil	30O
Hazardous-Area Location Endosure	FM153B
Agency approved, customer specified	W

Connection form	Code 2
DIN Flange	D
ANSI Flange	A
JIS Flange	J
Agency approved, customer specified	W

Connection Spec ^{1,3}	Code 3,4,5		
Size	DIN	150 lb	JIS 10k
1/2" (DN15)	D2	F2	J2
3/4" (DN20)	D3	F3	J3
1" (DN25)	D4	F4	J4
1-1/4" (DN32)	D5	F5	J5
1-1/2" (DN40)	D6	F6	J6
2" (DN50)	D7	F7	J7
2-1/2" (DN65)	D8	F8	J8
3" (DN80)	D9	F9	J9
4" (DN100)	D11	F11	J11
5" (DN125)	D12	F12	J12
6" (DN150)	D13	F13	J13
8" (DN200)	D15	F15	J15
10" (DN250)	D16	F16	J16
12" (DN300)	D17	F17	J17
Agency approved, customer specified			W

Enclosure ⁵	Code 6, 7
Hazardous-Area Location Enclosure	2
IP67	N2
Agency approved, customer specified	W

Input Power	Code 8
DC 24 V $\pm 10\%$, < 100 mA	2
Agency approved, customer specified	W

Output (Selection)	Code 9
RS-485S & 4-20mA, 4Wire (Std.)	1
DC 4~20 mA , 2Wire (Option)	2
Agency approved, customer specified	W

Display	Code 10
No Readout	NR
Digital Display	DD
Agency approved, customer specified	W

Flow Direction	Code
Horizontal Left to Right or Vertical UP	1
Horizontal Right to Left or Vertical Down	2
Agency approved, customer specified	W

Calibration 1 ⁹ (Air)	Code 12
Standard Calibration	A
Air, only for 3/8" and large pipe size	
Compressed Air, only for 1" and large pipe size	D
Customer Calibration	B
Agency approved, customer specified	W

Calibration 2 ⁹ (Air)	Code 13
70 °F(21 °C) 14.7 psig (1.103 barg)	A
32 °F(0 °C) 14.7 psig (1.103 barg)	B
Agency approved, customer specified	W

Pressure Limit	Code
Low pressure Below 145 psig (10 barg)	L
Medium pressure Max. 5,801 psig (400 barg)	M (Option)
High pressure Max. 20,015 psig (1,380 barg)	H (Option)

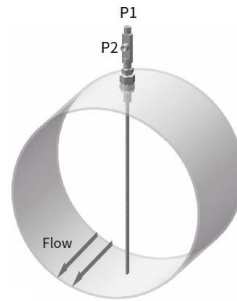
Option	Code 15
Material : 316SS, 316LSS	H
Agency approved, customer specified	W

FLOW MEASUREMENT PRINCIPLE

■ D/P type FN-Mass Flow Sensing



Flow Nozzle type



Pitot tube type

KC-7730 Series Measurement Sensor

Golden Rule's unique FN-Mass Flow meter guarantees excellent accuracy of industrial flowmeters, and robustness and reliability in the case of high pressure and high pressure.

As a differential pressure measurement method, the sensor is a new mass flow meter that uses an orifice plate, flow nozzle to measure the flow rate by using a proprietary patented technology while minimizing pressure loss.

It is a new-concept mass flow transmitter that derives flow through high-level calculations under the conditions of variable physical properties of real fluids.

It is a measuring instrument that is capable of engineering in demanding conditions at industrial sites and is developed with domestic proprietary technology to minimize industrial loss and secure technological freedom, and to have excellent accuracy and stability.

In addition, it can be used in various fluids, and supplements the required intuition of the existing differential pressure flowmeter through various experimental data to maintain the desired degree in the short intuition.

By configuring the communication network (RS-485), you can monitor the progress of the mass flow meter, and install an automatic valve to control the mass flow of user settings.

The flow nozzle and orifice are manufactured according to ISO-5167 standard and ISO-9001 quality management system.

Flow Calculator

Term	Real gas	Perfect gas
Equation of state	$pV = ZRT$	$pV = RT$
Compressibility factor	Z	$Z = 1$
Isothermal deviation factor	$Y = \frac{p}{V} \left(\frac{\partial V}{\partial p} \right)_T = 1 - \frac{p}{Z} \left(\frac{\partial Z}{\partial p} \right)_T$	$Y = 1$
Isobaric deviation factor	$X = \frac{T}{V} \left(\frac{\partial V}{\partial T} \right)_p = 1 - \frac{T}{Z} \left(\frac{\partial Z}{\partial T} \right)_p$	$X = 0$
Isentropic exponent (κ)	$\kappa = - \frac{V}{p} \left(\frac{\partial p}{\partial V} \right)_s = \frac{\gamma}{Y}$	$\kappa = \gamma = \frac{c_p}{c_v}$

Gas expansion coefficient

$$\varepsilon = \sqrt{\left(\frac{\kappa \tau^{2/\kappa}}{\kappa - 1} \right) \left(\frac{1 - \beta^4}{1 - \beta^4 \tau^{2/\kappa}} \right) \left(\frac{1 - \tau^{(\kappa-1)/\kappa}}{1 - \tau} \right)}$$

κ = isentropic exponent

τ = pressure ratio

β = diameter ratio

Flow Calculator

$$q_m = \frac{C}{\sqrt{1 - \beta^4}} \varepsilon \frac{\pi}{4} d^2 \sqrt{2 \Delta p \rho_1}$$

$$q_v = \frac{q_m}{\rho_1}$$

q_m = mass flow rate[kg/s]

q_v = volumetric flow rate[m³/s]

ρ_1 = upstream density[kg/m³]

Δp = differential pressure[Pa]

APPLICATION

◆ Simply select to suit the application

Application	Type		Mass Flowmeter	
			D/P-type	FN-MASS FLOWMETER
Object of Measurement	Liquid		○	
	Gas		○	
	Vaper		○	
	steam		○	
Application	control		○	
	Monitor		○	
	Supply		○	
Operating condition	Temperature		Gas	– 40 to 100°C (Option:400°C)
			Liquid & Oil	–40 to 100°C(Option:400°C)
			Steam	–20 to 200°C(Option:400°C)
	Pressure		10 barg / 400 barg / Max 1,380 barg	
	Pressure loss		Negligible	
	Range ability		Large	
Installing condition	Bore		Ø15 to Ø500	
	Straight	upstream	7D	
	Pipe length	downstream	3D	
	Piping work		Required	
	Explosion-proofing		○	
Performance	Accuracy		Gas	±0.5% F.S(Option: 0.1%)
			Liquid	±0.5% F.S(Option: 0.1%)
			Steam	±0.5% F.S(Option: 0.1%)
	Velocity		Gas	0.1~100 m/s
			Liquid	0.1~100 m/s
			Steam	0.1~100 m/s

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Golden Rules Co.,Ltd

Liquid, Oil, Gas

Coriolis Mass Flow Meter

KC-7740 Series



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

6 CORIOLIS MASS FLOWMETER (Liquid, Oil, Gas)

6-1. inline type KC-7740 Series

Coriolis Mass Flowmeter



Liquid, Oil, Gas
KC-7740 Series

Features

- Rate, integrated, volume, mass flow, temp', density indication
- Input Power AC 85 ~ 265V(50/60Hz), DC 18 ~ 36 V
- Output accuracy $\pm 0.005\%$ F.S, $\pm 2.5 \mu\text{A}$ (HART 4~20 mA)
- Field validation of flowmeter calibration settings
Smart program interface (RS-485 standard)
- Direct mass flow monitoring eliminates need for
Temperature and pressure compensation
- Simple signal Processing & calibration (5 ~ 8 calibration points)
- Excellent reproducibility
- Excellent long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (10~5D)
- Outstanding range ability (Turn down ratio 20:1)
- 0.1-second response to changes in flow rate
- CE, IP65, IP67

Description

Golden Rules' KC-7740 Series Smart Coriolis mass flowmeter accommodates the change measurement Requirements and instrument-validation demands of fluid flow monitoring installations.

The versatile microprocessor-based transmitter integrates the function of flow measurement, flow-range Adjustment, meter validation and diagnostics, in either a Flange-mounted or remote housing.

Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port and Golden Rules Smart interface software, or via the display and remote switches in the instrument panel.

The Golden Rules KC-7740 Series allows you to configure or change the following parameters : flow range, Totalize, time response, low flow cut-off and a calibration correction factor that compensates for flow profile Flow variations. Golden Rules's Smart interface software guides you through a procedure to fully validate Instrument performance. The meter is available with variety of input signal, mounting and packaging option.

Performance Specifications

◆ Accuracy of Point Velocity

Gas & Liquid : F.S $\pm 0.5\%$

Liquid : F.S of $\pm 0.2\%$ (Option: $\pm 0.1\%$)

◆ Repeatability

$\pm 0.25\%$ $\pm 0.1\%$ $\pm 0.05\%$ of Full Scale

Density Measuring

Density range : 0.2 ~ 2.0 g/cm³

Basic error : ± 0.002 g/cm³

Repeatability : 0.001 g/cm³

◆ Response Time

0.1 second

◆ Measuring Range & Velocity

5 ~ 200,000 kg/h & 0.2 ~ 3 m/sec

◆ Function

rate, total, volume, mass, density, temp'

▲ Liquid Flow Range(kg/h)

Size	Allowable flow range	Normal flow range for accuracy 0.1% & 0.15%	Normal flow range for accuracy 0.2% & 0.5%	Stability of zero point (kg/h)
0.1"	1.2 ... 120	10 ... 120	5 ... 120	0.004
1/2"	20 ... 3,000	200 ... 3,000	150 ... 3,000	0.3
1"	80 ... 8,000	600 ... 8,000	400 ... 8,000	0.8
1 1/2"	240 ... 24,000	2,400 ... 24,000	1,200 ... 32,000	3
2"	500 ... 36,000	5,000 ... 36,000	2,500 ... 36,000	5
3"	800 ... 120,000	8,000 ... 120,000	6,000 ... 140,000	12
4"	1,500 ... 200,000	15,000 ... 200,000	10,000 ... 200,000	20

Operating Specifications

◆ Fluid

Liquid, Oil, Gas ...

◆ Input Power (Selection)

AC 85~265V 50/60Hz, DC 18~36V

◆ Output Signal (Selection)

4~20mA & Impulse(0~10kHz, $\pm 0.001\%$ F.S/°C)

RS-485+Impulse+4~20mA

HART+Impulse+4~20 mA

(2x4~20mA for options)

◆ 압력 강하

0.15 kpa

◆ Fluid & Ambient temperature

Gas & Liquid : -50 ~ +125 °C (-58 ~ 257 °F) Option : -50 ~ +250 °C (-58 ~ 482 °F)
Ambient : -40 ~ 55 °C (-40 ~ 131 °F)

◆ Pressure (limitations)

NPT : 500 psig (35 barg)
JIS 10K RF Flange, ANSI 150# RF Flange
(Option : max. 63 Bar)

◆ Displays

Alphanumeric 2 X 16 backlight LCD
Adjustable variables via remote control switch or Smart interface software
Adjustable : Full scale : (0 ~100) %
Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)
Time response 1 ~ 7 sec / Correction factor setting 0.5 ~ 5 /
Zero & Span

◆ Totalizer

Seven digits (9,999,999.9 Count) in engineering units Reset table by
Software or remote control switch

◆ Software

Smart interface Windows® -based Software 8MB RAM of RAM, preferred 16MB
of RS-485 communication
Additional features: Zero cut-off adjustment / Linearization adjustment / Save /
Load configuration / For meter validation

Physical Specification**◆ Wetted Materials**

Measuring Tube – 316LSS
Body – 304LSS

◆ Enclosure

General-Area Enclosure CASE (IP67)

◆ Electrical Connections

2 X ½" PF

◆ Process Connection (Selection)

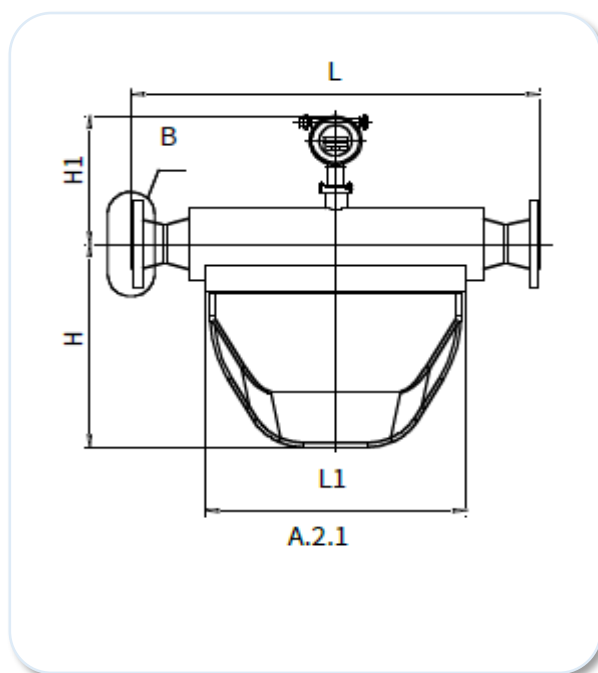
ANSI 150lb Flange, JIS 10k RF Flange, others

◆ Certification

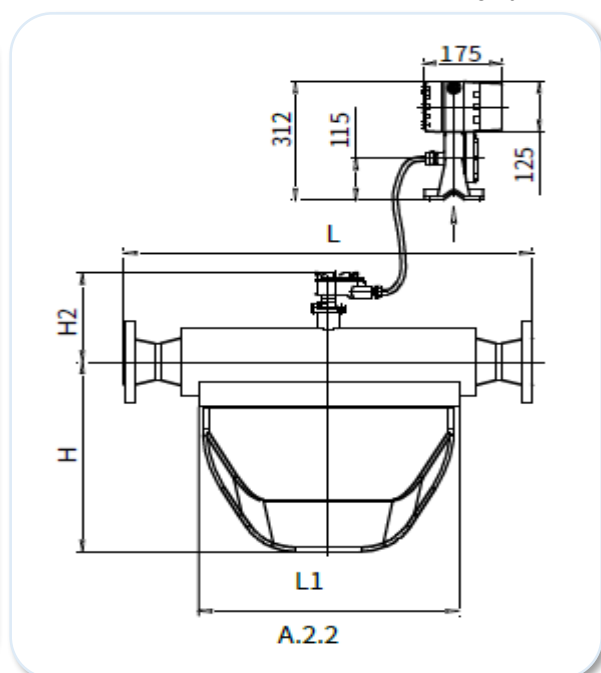
CE (All CASE)

Dimensional Spec' & Chart KC-7740

Unit : mm



Compact type(KC-7740)



Remote type(KC-7740-R)

※ The shape of the sensor and Housing manufacturers are subject to change

Outline dimensions and weight

Process connection size	Figure	L(mm)		L1 (mm)	H (mm)	H1 (mm)	H2 (mm)	Cmax (mm)*	Weight(kg)	
		1.6 ... 4.0 MPa	6.3 MPa						A.2.1	A.2.2
DN10, 3/8 inch	A.2	360	374	240	180	290	220	95	10	13
DN15, 1/2 inch	A.2	400	414	280	184	290	220	115	11	14
DN25, 1 inch	A.2	500	536	360	250	300	230	150	15	18
DN40, 1 1/2 inch	A.2	600	634	460	300	310	240	165	30	33
DN50, 2 inch	A.2	800	828	640	410	320	250	205	35	38
DN80, 3 inch	A.2	900	928	700	490	350	280	416	75	78
DN100, 4 inch	A.2	1130	1156	860	660	370	290	440	132	135

*Overall height of the body, excluding transmitter

The Coriolis mass flow meter realizes the following control with the current output signal.

- | | |
|--|--|
| 01 – Mass flow(kg/h) Control | 02 – Density (g/cm ²) Measuring |
| 03 – Volume flow(m ³ /h) Control | 04 – Temperature(kPa) Measuring |

Applications :

Batch control / Blending / Process control / Filling and dosing / Loading and unloading / Custody transfer / Process gas measurement



It responds to customers' needs with a fast response speed and can realize energy savings due to $\pm 0.1\%$ F.S precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7740 inline type)

Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7740 Smart- IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows (in same plane)	10D	5D	62D

- Note :
- (1) Number of diameters (D) of straight pipe required between upstream disturbance and the flowmeter.
 - (2) Number of diameters (D) of straight pipe required downstream of the flowmeter.
 - (3) For comparison purposes only. Table shows number of diameter(D) of upstream straight pipe length required for an ISO Standard 5167 Orifice plate with a beta ration of 0.7
 - (4) Consult factory for pressure effects.

Order Code KC-7740GF Series (inline type)

KC-77 - - E - P - V - - - - - -

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Type	Code 1
Water	40WF
Oil	40OF
Corrosive or Gas	40GF
Agency approved, customer specified	W

Input power	Code 8
DC 18 ~ 36V	2
AC 85 ~ 265V, 60Hz	3

Calibration 2 ⁹ (Air)	Code 13
70 °F(21 °C) 14.7 psig (1.103 barg)	A
32 °F(0 °C) 14.7 psig (1.103 barg)	B
Agency approved, customer specified	W

Output Signal	Code 2
4-20mA & Impulse	1
RS-485+Impulse+4-20mA	2
HART+Impulse+4-20mA	3
Agency approved, customer specified	W

Calibration 2 ⁹ (Water)	Code 13
64.4 °F(18 °C) 14.7 psig (1.103 barg)	A
32 °F(0 °C) 14.7 psig (1.103 barg)	B
Agency approved, customer specified	W

Connection form	Code 2
DIN Flange	D
ANSI Flange	A
JIS Flange	J
Agency approved, customer specified	W

Display	Code 10
No Readout	NR
Digital Display	DD
Agency approved, customer specified	W

Pressure Limit	Code 14
230 psi (16 bar)	1
360 psi (25 bar)	2
580 psi (40 bar)	3
915 psi (63 bar)	4

Connection Spec ^{1,3}	Code 3,4,5		
Size	DIN	150 lb	JIS 10k
0.1" (DN3)	D1	F1	J1
1/2" (DN15)	D2	F2	J2
3/4" (DN20)	D3	F3	J3
1" (DN25)	D4	F4	J4
1-1/4" (DN32)	D5	F5	J5
1-1/2" (DN40)	D6	F6	J6
2" (DN50)	D7	F7	J7
2-1/2" (DN65)	D8	F8	J8
3" (DN80)	D9	F9	J9
4" (DN100)	D11	F11	J11

Flow Direction	Code 11
Horizontal Left to Right or Vertical UP	1
Horizontal Right to Left or Vertical Down	2
Agency approved, customer specified	W

Option	Code 15
Agency approved, customer specified	W

Calibration 1 ⁹ (Air)	Code 12
Standard Calibration	A
Air, only for 3" and large pipe Size	
Compressed Air, only for 3" and large pipe size	D
Customer Calibration	B
Agency approved, customer specified	W

Enclosure ⁵	Code 6,7
IP65 (Option: IP67)	N2
Remote IP67 with Junction Box	N4(Ft)
Agency approved, customer specified	W

Calibration 1 ⁹ (Water)	Code 12
Standard Calibration	A
Water, only for 2" and small pipe Size	
Water, only for 2" and large pipe size	D
Customer Calibration	B
Water	
Agency approved, customer specified	W

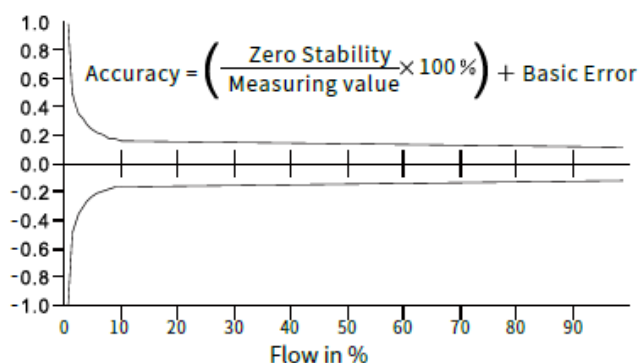
Flow Measurement Principle

Coriolis Mass Flow Sensing

Golden Rule's unique Coriolis Mass Flow meter guarantees the outstanding accuracy of industrial flow meters, and robustness and reliability in the case of high pressure/high pressure.

Coriolis Mass Flow Meter uses two parallel arranged pipes which are rotated at their resonant frequency by coils. Any mass flow passing through the tubes will generate Coriolis forces which appear whenever a mass moves radially in a rotating system. The forces have opposed effects on the inlet and outlet sides, they slightly deform the pipes. The excursion of the pipes is detected by sensors on the inlet and outlet side. The phase shift between the rotation frequencies of both pipes are proportional to the mass flow rate. The resonant frequency of both pipes changes in accordance with the density of the medium. This effect determines the density. Using one sensor density and temperature can also be measured for compensation purposes.

Accuracy



The diagram shows typical values. Individual values may be taken from the calibration records supplied with each meter.

Additional Option (ILAC/TAF) Test Report I



Additional option: (ILAC / TAF) Test report - Standard calibration laboratory (TAF accreditation: 3032, complying with ISO / IEC 17025)
TAF has mutual recognition arrangement with ILAC MRA

Project	Measurand level or range
Flow meters	Flow rate: 2.4 ... 30 m ³ /h (40.0 ... 500.0 L/min)
	Flow velocity: 0.2 ... 3 m/s
	8 basic points (8 basic points on average or specified by customer)

APPLICATION

◆ Simply select to suit the application

Application	Type		Mass Flowmeter	
			Coriolis Mass	
Object of Measurement	Liquid		O	
	Gas		O	
	Vaper		O	
	steam		X	
Application	control		O	
	Monitor		O	
	Supply		O	
Operating condition	Temperature		Gas	– 50 to 250°C
			Liquid	–50 to 250°C
			Oil	–50 to 250°C
	Pressure		Max 63 barg	
	Pressure loss		Negligible	
	Range ability		Large	
Installing condition	Bore		Ø4 to Ø100	
	Straight	upstream	10D	
	Pipe length	downstream	5D	
	Piping work		Required	
	Explosion-proofing		O	
Performance	Accuracy		Gas	±0.5% F.S (Option: 0.1%)
			Liquid	±0.5% F.S (Option: 0.1%)
			Oil	±0.5% F.S (Option: 0.1%)
	Velocity		Gas	0.5~200,000 kg/h
			Liquid	5~200,000 kg/h
			Oil	5~200,000 kg/h

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Golden Rules Co.,Ltd

Liquid
Inline, Insertion, Sanitary type

KC-8850 Series **MAGNETICS FLOWMETER**



The nation's development item, 100% domestic goods, Patent **NO. 10-1660226**



07. ELECTROMAGNETIC FLOWMETER

7-1. Magnetic Flowmeter KC-8850 Series



Compact Type
KC-8850-M Series



Remote Type
KC-8850-I Series



Sanitary Type
KC-8850-S Series

Features

- Measuring Range : 0.14 ~ 96,000.0 m³/h
- Enclosure : IP67 (standard), IP68 (option : immerse type)
- Accuracy : $\pm 0.5\%$ R.D (0.3~10 m/s), $\pm 1.0\%$ R.D (0.01~0.3 m/s)
- Housing & Flange Mat'l : Carbon or Stainless Steel (option)
- Control output : Forward & Reverse Flow, High & Low Alarm
- Control input : Zero adjustment, Initialization of integration, Integration stop
- Pulse output : Active or Passive, Pulse
- Diagnostic function : Malfunction record, Instantaneous flow output test, Control input and output test, Emulation test mode

Other features

Parameter Protection
Indicator of Sensor Parameter
Span Adjustment & Zero Adjustment
Small Signal Cutting, Smoothing
Access to External Memorizer

Flow meter Size	10 ~ 2000 mm (3/8" ~ 80")
Flange spec'	0.6 ~ 1.6 MPa (Option: Ordering Code)
Liner mat'l	Hardrubber, PTFE, PFA
Electrode type	Standard type
Electrode mat'l	STS316L(STD), Hastelloy-C, Titanium, Tantalum
Ambient temp'&Humidity	-25 ~ 60°C Remote type -25 ~ 70°C / (5 ~ 95)%RH (Relative Humidity)
Fluid Temperature	Rubber -10 ~ +70°C / FEP -10 ~ +160°C / PTFE -10°C ~ +180°C
Measuring Velocity	100 : 1 (Velocity 10 m/s bellow)
Converter Structure	Integral, Remote, immerse type
Input power	85~250 VAC, 24 VDC(Option), Battery(Option); Life 2 year
Communication	RS-485
Output signal	Analog 4-20mA DC, Pulse Output(DC 8~30V Open collector pulse)

The information contained herein is subject to change without notice.

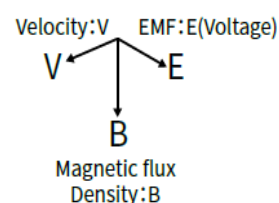
Description

The KC-8850 series intelligent electromagnetic flowmeter measures the flow rate based on the principles of Faraday's law. KC-8850 Electromagnetic Flow Meter is a flange type electromagnetic flow meter ideal for conductive liquids. It comes in sizes from 10 ~ 2200mm flow tubes.

Electromagnetic Flow Meter is widely used for tap-water, waste water, food & beverage pulp & paper and many other applications. Can be a stand alone magmeter that could also be used with various configurations, such as integral or remote and DC power requirement. RS-485 communication is available.

Measuring Principle

The Electromagnetic Flow Meter uses Faraday's Law of electromagnetic induction to measure the process flow. When an electrically conductive fluid flows in the pipe, an electrode placed at right angles to the direction of the magnetic field. The electrode voltage E is directly proportional to the average fluid velocity V .



$$E = K \times B \times V \times D$$

K : measuring instrument constant

B : magnetic flux density

D : diameter of measurement duct

V : Average fluid velocity across the duct

Performance Spec'

- Accuracy: $\pm 0.5\%$ R.D (10~600mm), $\pm 1\%$ R.D (700~2200mm)
- Repeatability: $\pm 0.15\%$, $\pm 0.25\%$
- Vibration frequency: 50/60Hz
- Storage of surrounding environment: $\leq 400A / m$
- Liquid electrical conductivity: $5\mu s$
- Electronic case: IP67(Integral type), IP68 (synthetic rubber liner material separation type)
- Alarm output: activated
- Flange material: carbon steel, stainless steel(Optional)
- Measurement tube material: stainless steel
- Flange standard, any standard flange available according to buyer's requirements

Body Spec'

Electrode Mat'l	Non-corrosive performance
STS316L	For water, waste water, inorganic or organic acid, nitric acid, lower than 5% vitrol in room temperature, boiling phosphoric acid, gormic acid, aqueous alkali, and sulfurous acid, acetic acid in a certain amount of pressure
Hastelloy	seawater and brine
Titanium	seawater, various chloride and hypochlorine, gasified acid (including fuming nitric acid) and alkali
Tantalium	chemical liquid, including boiling muriatic acid, and 175 °C-down vitrol

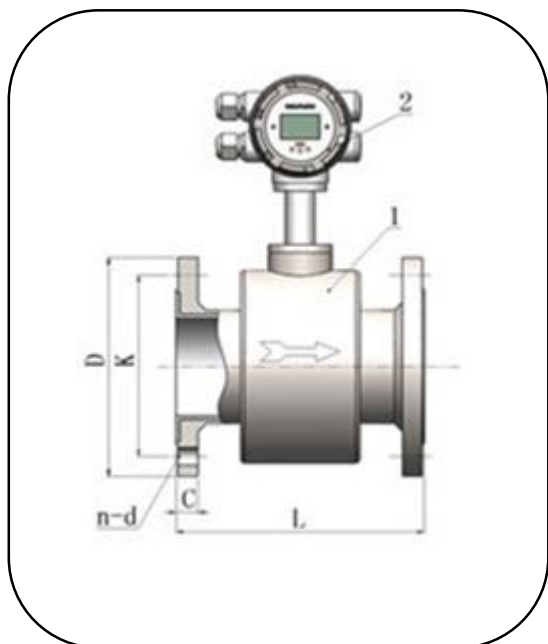
Lining Material Selection

Lining Material	Main Performance	Temp' Range
PTFE	1) Resistant muriatic acid, vitrol, nitric acid, aqua regia concentrated alkali, and organic solvent II)good wearability and bad cohesion. (I) -40 ~ + 150 °C (I) Quite good resistance , wearability, and breaking tenacity	- 10° C ~ +160° C
Hardrubber	(II) Anticorrosive to normal week acid and alkali (I) ≤70 °C (II) Water and sewage	≤ + 70° C

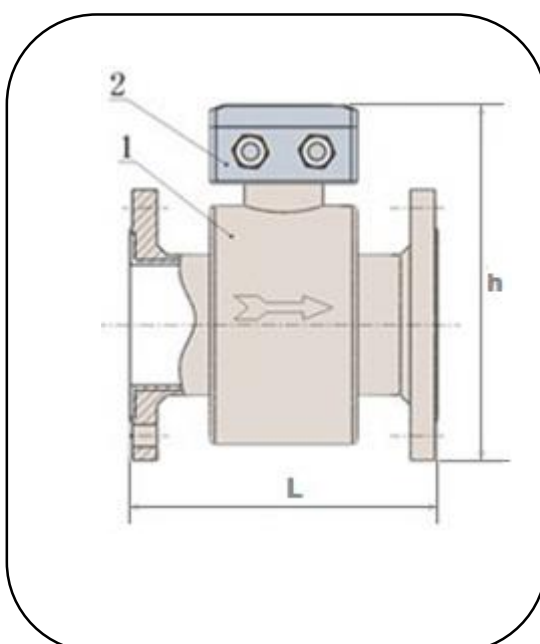
Flow Range and Spec' Diameter Selection Table

Size (mm)	25Flow Range (m³/h)		Size (mm)	Flow Range (m³/h)	
	Min. Range	Max. Range		Min. Range	Max. Range
	0.3 m/s	10 m/s		0.3 m/s	10 m/s
10	0.14	2.8	400	160	3200
15	0.3	6	450	200	4000
20	0.5	10	500	250	5000
25	0.8	16	550	300	6000
32	1.4	28	600	350	7000
40	2	40	700	500	10000
50	3	60	800	600	12000
65	5	100	900	800	16000
80	7	140	1000	1000	19600
100	10	200	1100	1200	24000
125	15	300	1200	1400	28000
150	25	500	1400	2000	40000
200	45	900	1600	2500	50000
250	70	1400	1800	3200	64000
300	100	2000	2000	4000	80000
350	120	2400	2200	4800	96000

도면 치수 사양 I

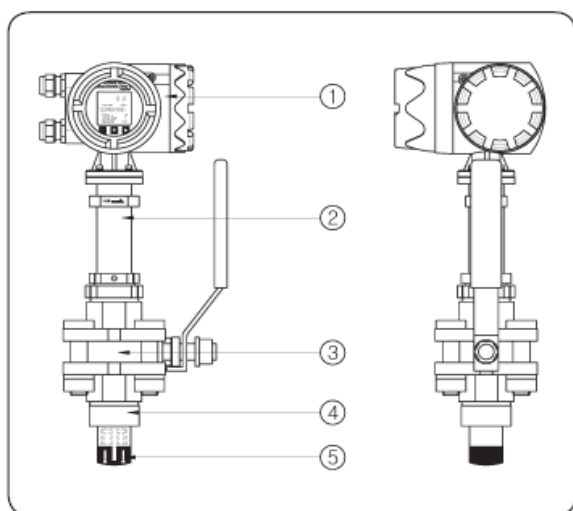


Integral type KC-8851

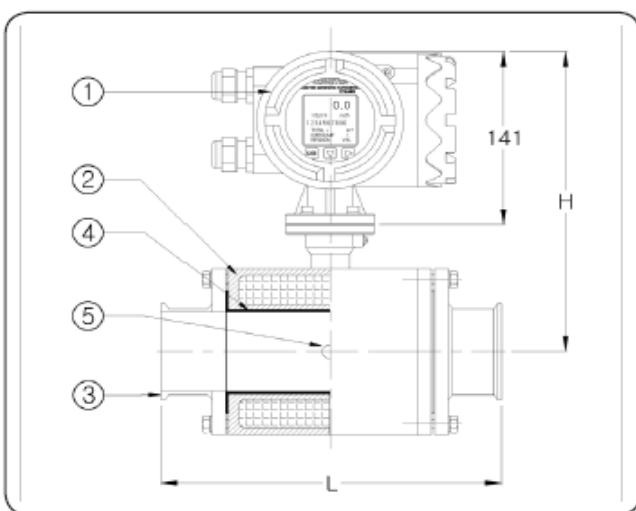


Converter Remote type KC-8852

도면 치수 사양 II



Integral type KC-8853

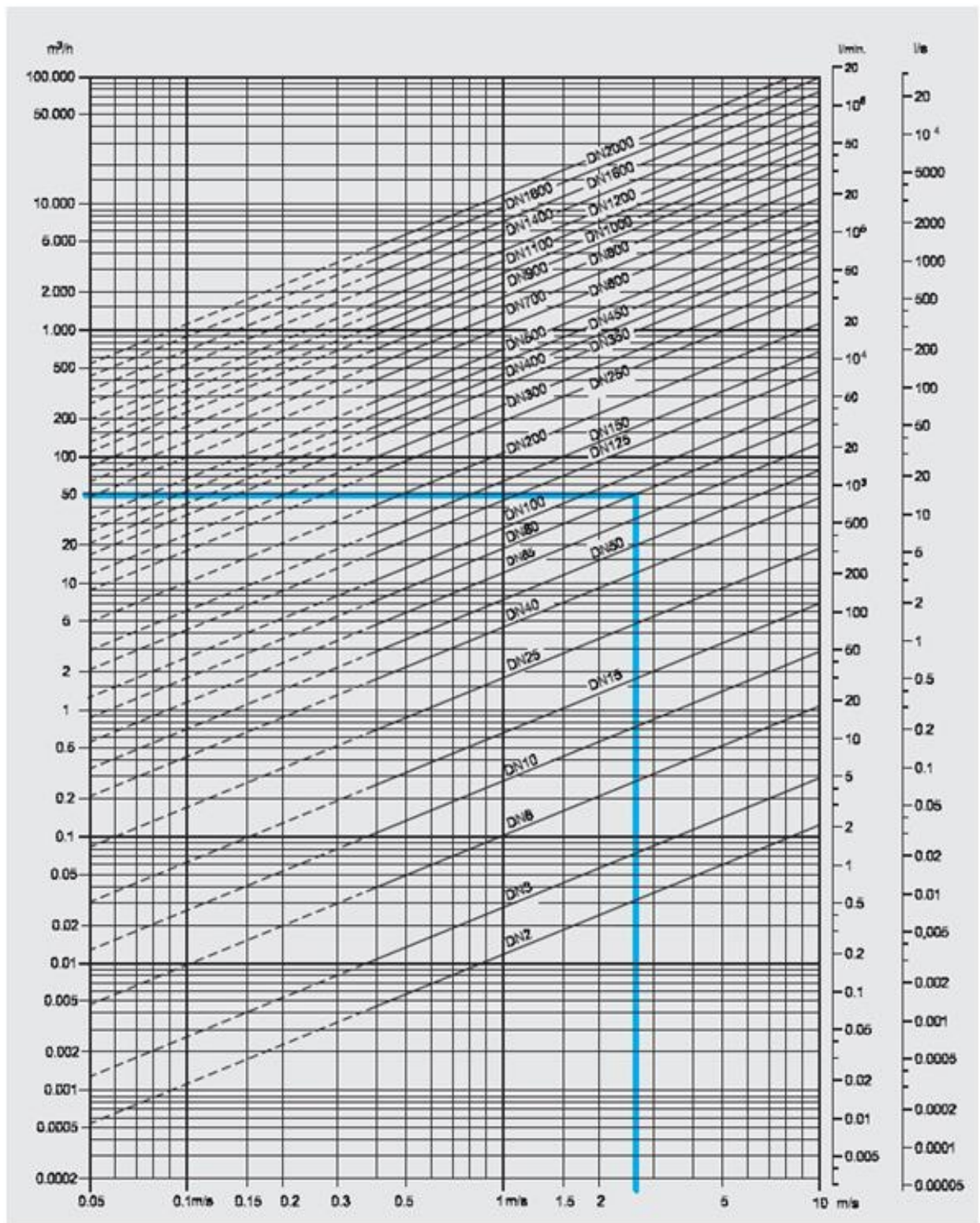


Converter Remote type KC-8851-S

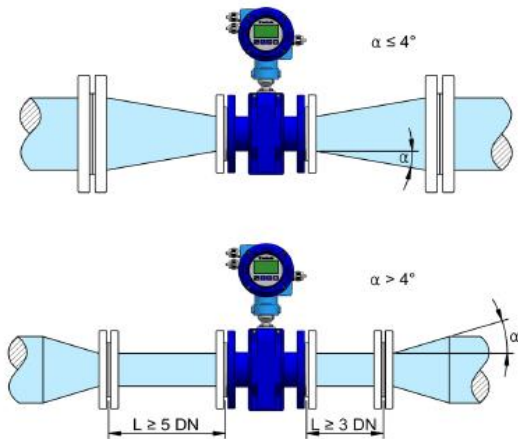
Drawing Dimension Chart III

Pipe Size (mm)	Pressure (Mpa)	Outward Dimension (mm)			Dimension (mm)					Weight (kg)
DN	PN	L	R1	R2	B	K	C	a	d	
10	4.0	160	306	191	95	65	14	4	14	8
15	4.0	160	306	191	95	65	14	4	14	8.5
20	4.0	200	312	197	115	85	14	4	16	9
25	4.0	200	312	197	115	85	26	4	16	10
32	4.0	200	334	219	140	100	18	4	18	11
40	4.0	200	339	224	150	110	18	4	18	13
50	4.0	200	347	232	165	125	18	4	20	14
65	1.6	200	365	250	185	145	18	4	20	16
80	1.6	250	382	267	200	160	18	8	20	18
100	1.6	250	405	290	220	160	18	6	22	22
125	1.6	250	432	317	250	210		8	18	29
150	1.6	300	463	348	285	240	22	8	24	35
200	1.0	350	520	405	340	295	22	8	24	48
250	1.0	400	550	445	395	350	22	12	26	66
300	1.0	400	632	517	445	400	22	12	26	77
350	1.0	400	692	577	505	460	22	15	26	115
400	1.0	450	742	627	565	515	26	15	26	165
450	1.0	450	798	683	615	565	26	20	28	175
500	1.0	450	860	745	670	620	26	20	28	187
600	0.6	600	950	835	780	725	30	20	28	303
700	0.6	700	1045	900	895	840	30	24	30	430
800	0.6	800	1150	1035	1010	950	30	24	32	500
900	0.6	900	1250	1135	1110	1050	34	23	34	600
1000	0.6	1000	1365	1260	1230	1100	36	23	34	921
1200	0.6	1200	1480	1365	1405	1340	33	32	28	1100
1400	0.6	1400	1690	1565	1630	1560	34	23	32	1295
1600	0.6	1600	1820	1705	1830	1760	36	35	34	1675
1800	0.6	1800	1970	1855	2045	1970	36	40	36	2050
2000	0.6	2000	2135	2020	2265	2180	39	41	38	2670
2200	0.6	2200	2345	2230	2475	2390	42	43	52	3250

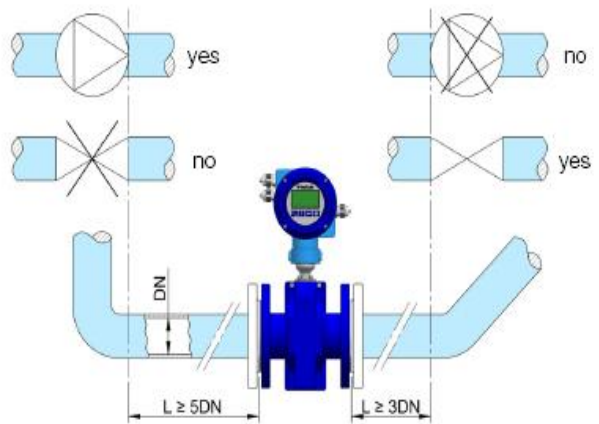
Drawing Dimension Chart IV



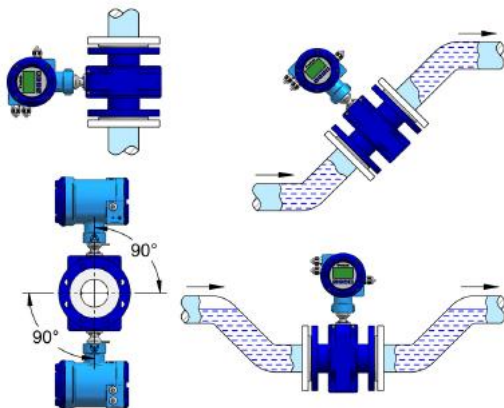
Flowmeter Installation Method II



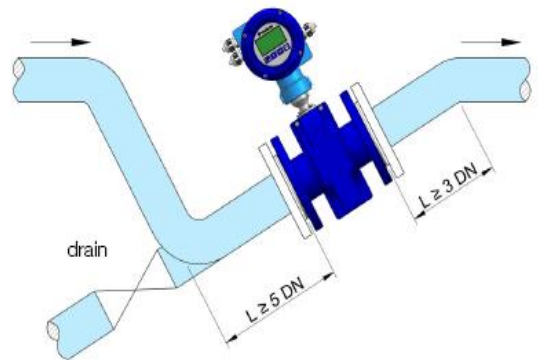
Shaft pipe & expansion pipe installation method



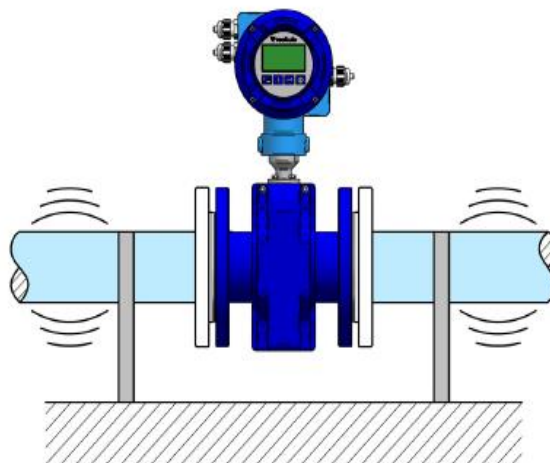
Curved pipe downward horizontal piping installation method



Flow rate installation method by pipe type



Curved pipe downward slope upward piping installation method



Horizontal pipe vibration damping installation method

Order Code KC-8850 Series (Magnetic Flowmeter)

Type Conn' mode Conn' spec' Power Output Display Direction E-Mat'l L-Mat'l Flang Option
 KC-88 5 - - - P - V - - - - - -
 1 2 3 4 5 6 7 8 9 10 11 12 13

structure type	Code 1
Integral(IP67)	1
Remote(IP68)	2
Insertion(High Pressure:4.0MPa)	3
SUS304/316L(High Pressure:4.0MPa)	4
Agency approved, customer specified	W

Connection Mode	Code 2
DIN Flange	D
ANSI Flange	A
JIS Flange	J
Clamp connection	C
Sanitary connection	S
Agency approved, customer specified	W

접속구 사양	Code 3,4,5		
Size	DIN	150 lb	JIS 10k
3/8" (DN10)	D1	F1	J1
1/2" (DN15)	D2	F2	J2
3/4" (DN20)	D3	F3	J3
1" (DN25)	D4	F4	J4
1-1/4" (DN32)	D5	F5	J5
1-1/2" (DN40)	D6	F6	J6
2" (DN50)	D7	F7	J7
2-1/2" (DN65)	D8	F8	J8
3" (DN80)	D9	F9	J9
4" (DN100)	D11	F11	J11
5" (DN125)	D12	F12	J12
6" (DN150)	D13	F13	J13
8" (DN200)	D15	F15	J15
12" (DN250)	D16	F16	J16
Agency approved, customer specified	W		

Input Power	Code 6
DC 24 V ±10%(Option)	2
85~250 VAC	3

Output Signal	Code 7
4~20 mA DC & Pulse	1
RS-485 & 4~20 mA DC & Pulse	2
Agency approved, customer specified	W

Display	Code 8
No Readout	NR
Digital Display (Flow & Total)	DD
Agency approved, customer specified	W

Direction	Code 9
Horizontal -> Forward & Vertical up	1
Horizontal -> Reverse & Vertical down	2
Agency approved, customer specified	W

Electrode Material	Code 10
SUS 316L	1
Hastelloy C	2
Titanium	3
Tantalum	4
Agency approved, customer specified	W

Liner Material	Code 11
Hard Rubber	1
PTFE	2
FFA	3
FEP	4
Agency approved, customer specified	W

Flange Mode	Code 12
0.6 Mpa: max pressure(Integral type)	1
1.6 Mpa: max. pressure(Remote type)	2
4.0 Mpa: max pressure(Insertion&SUS)	3
Others	4
Agency approved, customer specified	W

Option Spec'	Code 13
Agency approved, customer specified	W



08

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Liquid, Oil

KC-7750 Series
TURBINE FLOWMETER



The nation's development item, 100% domestic goods, Patent **NO. 10-1660226**

8. TURBINE FLOWMETER

8-1. 터빈유량계 KC-7750 Series

Inline type Turbine Flowmeter

제품특징



High Accuracy type
KC-7753-J



integral type
KC-7751-J



Sanitary type
KC-7751-S

- Enclosure : NEMA 4X
- Accuracy : $\pm 0.5\%$ or $\pm 0.2\%$ R.D (Option)
 $\pm 0.5\%$ or $\pm 1.0\%$ F.S
- Turndown Ratio : Standard 10:1, (Option 20:1)
- Measure : Flow, Volume
- Diameter : DN4 ~ DN200
- Output : 4~20 mA DC, or (1~5) V
Open Collector Pulse
- Linearity : $\pm 0.5\%$ of Flow rate
- Repeatability : $\pm 1.0\%$
- Power : 2wire or 4-wire Loof Type, AC 110/220V, 60 Hz
- Display : Total – 9 Digit LCD & Rate – 9 Digit
- Connection : NPT, PT & Flange (ANSI, JIS, DIN etc.)
- Flow direction : Forward, -> arrow direction indication
- Staraight pipe length : Upstream – 10 D / Downstream – 5D
- Caution when installation : The flow sensor must be completely closed.
- Screw type : Outdia DN4 ~ DN50 / india DN15 ~ DN50

Product Matl (std.)

Part No.	Part List	Material
1	Transmitter	Cast Aluminium
2	Pick-Up Coil	SUS 304
3	Body	SUS 304, 316
4	Flange	SUS 304, 316

* Except for standard specifications, please consult with the head office

제품성능

◆ Accuracy

±0.5 % R.D or R.D의 ±0.2% (Option)
±0.5% or ±1.0 % F.S (General type)

◆ Repeatability

±0.5 % of Full Scale

◆ Response Time

0.8 ~ 1 Sec

◆ Measuring Range

0 ~ max. 800 m3/h (200A Standardt)

◆ Function

Flow & Total

Flow Rates

Flow Ranges							
Line Size (mm)		STD. Flow Range (m3/h)		Extended Flow Range (m3/h)		External Thread	
A	B	Min.	Max.	Min.	Max.	Ex.ternal thread	kg
4	0.15"	0.04	0.25	0.04	0.4	G1/2	3
6	0.25"	0.1	0.6	0.06	0.6	G1/2	3
10	0.4"	0.2	1.2	0.15	1.5	G1/2	3
15	0.5"	0.6	6	0.4	8	G1	4
20	0.75"	0.8	8	0.45	9	G1	5.2
25	1"	1	10	0.5	10	G11/4	6.6
32	1.25"	1.5	15	0.8	15	G11/2	9
40	1.5"	2	20	1	30	G2	14.2
50	2"	4	40	2	40	G21/2	
65	2.5"	7	70	4	70		
80	3"	10	100	5	100		
100	4"	20	200	10	200		
125	5"	25	250	13	250		
150	6"	30	300	15	300		
200	8"	80	800	40	800		

Note. : Refer to the chart and look for the meter for a range of 6.62 to the Specified full scale (upper limit range). Select a full scale speed of 1 to 3 m/s.
Ensure that the overall flow rate used during the final design phase is maintained.
Within a 6.62 radius of the current flow

운전사양

◆ Fluid

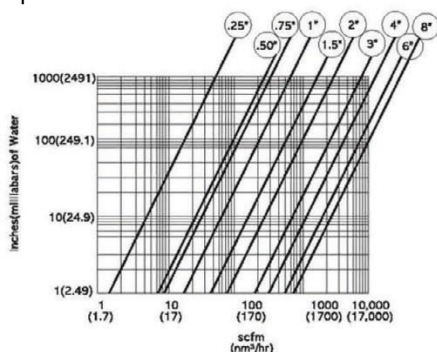
Liquid (Water, Diesel, Others : Clean water, low Viscosity)

◆ Pressure Limit

Thread: 63 bar(DN4... DN25) / 25 Bar(DN20... DN50)

◆ Pressure Loss

0.15 Kpa



◆ Fluid & Ambient Temp'

Liquid : -4 ~ 176 °F , -20 ~ 80 °C

Option : -4 ~ 302 °F , -20 ~ +150 °C

Ambient : -4 ~ 185 °F , -20 ~ 85 °C

◆ Power Supply

DC24 V ±10 %

◆ Output (STD.)

Linera DC 4 ~ 20mA, Pulse (Option: RS-485)

◆ Displays

Alphanumeric 2 X 16 backlight LCD

Adjustable variables via remote control switch or Smart interface software

Adjustable : Full scale : (0 ~100) %

Flow: m³/h(m³), L/h(L), mL/h(mL), kg/h(kg)

Time response 1 ~ 7 sec / Correction factor setting 0.5 ~ 5 /

Zero & Span

Physcial Spec'

◆ Wetted Materials

Bearings & sharts – Tungsten carbide

Rotor – 2Cr13 (Optional: Duplex impeller)

Flange – 304SS (Optional : 316SS, 316LSS)

Housing – 304SS (Optional : 316SS)

◆ Enclosure

General-Area IP65

◆ Electrical Connection

½" PF

◆ Mounting (Selection)

ANSI 150lb Flange

JIS 10k RF Flange

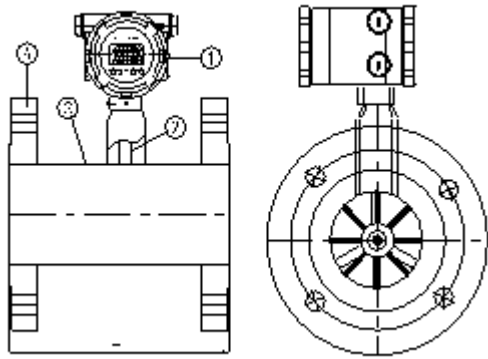
◆ Certification

CE (CASE) Certificate

Dimension Spec' KC-7760 I

[Unit : mm]

Nominal Diameter	C to C (L)	Nominal Diameter	C to C (L)
4	120	1S	90
6	120	1.5S	115
10	120	2S	160
15	150		
25	100		
40	140		
50	150		
80	200		
100	220		
125	220		
150	300		
200	360		



※ The shape of the sensor can be changed depending on the circumstances of the manufacturer.

Installation Spec' II

Before installing the KC-7760 series turbine flowmeter, make sure that there are no foreign substances inside the pipe and that the rotor is free to rotate. When installing the flowmeter, the flow direction of the fluid and the direction of the arrow on the body of the flowmeter must be installed, and it is highly recommended to install a strainer in front of the flowmeter.

Standar Strainer		
Turbine Size	Strainer Mesh	Clearance
3/8	60 x 60	0.0092
1/2	60 x 60	0.0092
3/4	60 x 60	0.0092
7/8	60 x 60	0.0092
1	60 x 60	0.0092
1-1/2	20 x 20	0.0340
2	10 x 10	0.0652
3	8 x 8	0.0900
4	10 x 10	0.6500
6	4 x 4	0.1875
8	8 x 8	0.0900
10	4 x 4	0.1875

Caution: When the fluid flows after the initial installation, it must be changed at a high speed after a certain period of operation at low speed. In addition, severe vibration or shock may shorten the performance or life of the instrument.

Order Code KC-7760 Series (Turbine Flowmeter)

Thpe Conn. Mode Flange spec' Power Output Display Direction Mat'l Pressure Option

KC-77 5 - - - P - V - - - - -

1 2 3 4 5 6 7 8 9 10 11 12

Structure type	Code 1
Integral	1
Remote	2
High Accuracy	3
Agency approved, customer specified	W

Connection Mode	Code 2
DIN Flange	D
ANSI Flange	A
JIS Flange	J
Screw	N
Sanitary	S
Agency approved, customer specified	W

Flange spec'	Code 3,4,5		
Size	DIN	150 lb	JIS 10k
1/2" (DN15)	D2	F2	J2
3/4" (DN20)	D3	F3	J3
1" (DN25)	D4	F4	J4
1-1/4" (DN32)	D5	F5	J5
1-1/2" (DN40)	D6	F6	J6
2" (DN50)	D7	F7	J7
2-1/2" (DN65)	D8	F8	J8
3" (DN80)	D9	F9	J9
4" (DN100)	D11	F11	J11
5" (DN150)	D12	F12	J12
6" (DN150)	D13	F13	J13
8" (DN200)	D15	F15	J15
10" (DN250)	D16	F16	J16
12" (DN300)	D17	F17	J17
Agency approved, customer specified	W		

Input power	Code 6
DC 24V ±10%, 100 mA	2
Agency approved, customer specified	W

Output	Code 7
Pulse, 4-20mA DC	1
Local display + 4-20 mA DC	2
Agency approved, customer specified	W

Display	Code 8
No Readout	NR
Digital Display (Flow & Total)	DD
Agency approved, customer specified	W

Direction	Code 9
Horizontal Left to Right or Vertical UP	1
Horizontal Right to Left or Vertical Down	2
Agency approved, customer specified	W

Material	Code 10
304SS (STD.)	1
316SS or 316LSS	2
PVC	3
PTFE	4
Others	5

Pressure Limit	Code 11
6.3 Mpa (6A~25A)	1
2.5 Mpa (40A~80A)	2
1.6/2.5 Mpa (100A~200A)	3
1.6 Mpa (250A~300A)	4
Agency approved, customer specified	W

Option	Code 12
RS-485	RS
Flow Controller (Remote)	FC
Batch Controller (Remote)	BC
Counter (General, Ex)	C

Additional option : (ILAC / TAF) Test report - Standard calibration laboratory (TAF accreditation: 3032, complying with ISO / IEC 17025)
TAF has mutual recognition arrangement with ILAC MRA

Project	Measurand level or range
Flow meters	Flow rate: 2.4 ... 30 m³/h (40.0 ... 500.0 L/min)
	Flow velocity: 0.2 ... 3 m/s
	8 basic points (8 basic points on average or specified by customer)

09

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Liquid, Oil, Gas, Steam
Inline type Magnetics Flow Meter

KC-7760 Series VORTEX FLOWMETER



The nation's development item, 100% domestic goods, Patent **NO. 10-1660226**

9. VORTEX FLOWMETER

9-1. Inline & Wafer & Sanitary type KC-7760 Series

Vortex Flowmeter

Features

- Accuracy : $\pm 1.0\%$
- Pressure Loss : Resistance Coefficient (C_d) ≤ 2.4
- Measurable fluid temperature : $(-40 \sim 350)^\circ\text{C}$
- Power : $(12 \sim 24)\text{ V DC}$
- Enclosure : Ex ia IIC T6
- Connection Pressure : 1.6 Mpa, 2.5 Mpa, 4.0 Mpa etc.
- Output Signal :
Voltage Pulse Low Level $\leq 1\text{ V}$
High Voltage $\geq 6\text{ V}$
 $(4 \sim 20)\text{ mA}$ Current output
- Communication :
RS-485 Modbus



Compact Type
KC-7761-J



Sanitary Type
KC-7761-S



Wafer Type
KC-7761-WF



Temp'-Pressure Compensation Type
KC-7764-J

Mountings

KC-7760 series vortex flowmeter can be installed on horizontal and vertical (vertical direction flowing from the bottom to the top). The intuition should be placed at the front and rear ends as shown below.

same core contraction and fully open valve		Two 90° elbows in the same plane	
same core pipe expanding		Two 90° elbows in the different plane	
One 90° elbow		Adjustable valve and half-open valve	

The information contained herein is subject to change without notice.

Dimension KC-7760 Series

[unit : mm]

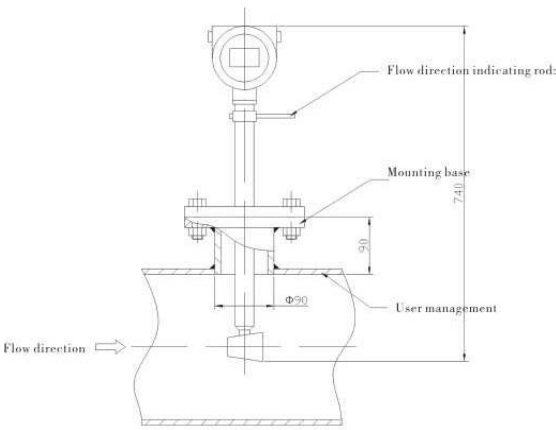
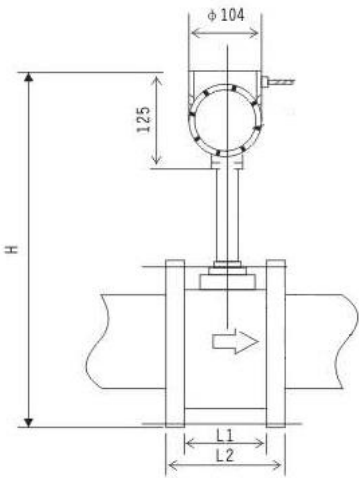
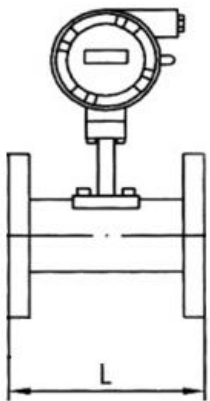
Flange type	
Nominal Diameter	C to C (L)
25	170
32	170
40	190
50	190
65	220
80	220
100	240
125	260
150	280
200	300
250	360
300	400

WAFFER TYPE		
Nominal Diameter	L1	L2
25	65	95
32	65	95
40	75	109
50	75	109
65	75	117
80	75	109
100	90	132
125	100	146
150	120	170
200	150	200
250	160	214
300	170	224

Insertion type

Total Length : 740 mm

Mounting : $\Phi 90 \times 90$ L



※ The shape of the sensor and Housing manufacturers are Subject to Change.

Flow Range

1. Liquid and the flow range of working condition gas

Size (mm)	Water	Normal Pressure and Temperature Air (NPT Air)
	Standard Measuring Range (m³/h)	Standard Measuring Range (m³/h)
25	1.3 ~ 13	8 ~ 60
32	1.5 ~ 15	14 ~ 100
40	3 ~ 30	18 ~ 180
50	4 ~ 40	30 ~ 300
65	6 ~ 60	50 ~ 500
80	13 ~ 130	70 ~ 700
100	20 ~ 200	100 ~ 1000
125	36 ~ 360	150 ~ 1500
150	50 ~ 500	200 ~ 2000
200	100 ~ 1000	400 ~ 4000
250	150 ~ 1500	600 ~ 6000
300	200 ~ 2000	1000 ~ 10000

2. The quality flow range of saturated steam

unit [kg/h]

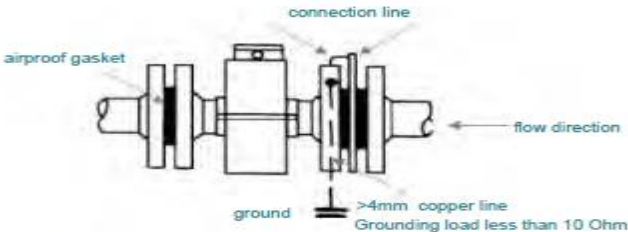
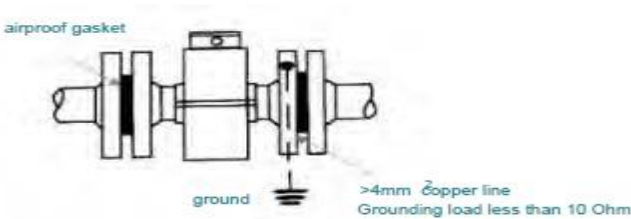
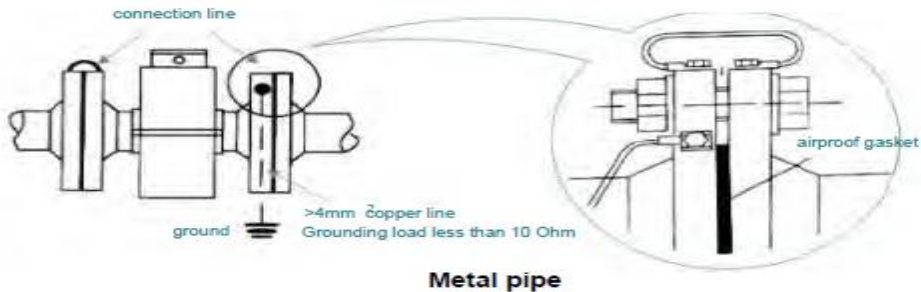
Size (mm)		0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.5	2.0
Temperature(°C)		120.23	133.54	143.62	151.84	158.94	164.96	170.41	175.36	179.88	187.96	198.40	212.37
Density(kg/m³)		1.129	1.651	2.163	2.66	3.170	3.667	4.162	4.655	5.147	6.127	7.602	10.005
DN 25	Standard Low Limit	14	17	19	22	23	25	27	28	30	33	36	42
	Standard High Limit	140	170	190	220	230	250	270	280	300	330	360	420
DN 32	Standard Low Limit	26	30	34	38	41	44	47	50	52	57	63	73
	Standard High Limit	260	300	340	380	410	440	470	500	520	570	630	730
DN 40	Standard Low Limit	31	38	44	48	53	57	60	64	67	73	82	94
	Standard High Limit	310	380	440	480	530	570	600	640	670	730	820	940
DN 50	Standard Low Limit	52	63	73	81	88	95	101	107	112	122	136	157
	Standard High Limit	520	630	730	810	880	950	1010	1070	1120	1220	1360	1570
DN 65	Standard Low Limit	90	106	121	134	146	158	168	178	187	204	227	261
	Standard High Limit	900	1060	1210	1340	1460	1580	1680	1780	1870	2040	2270	2610
DN 80	Standard Low Limit	122	148	170	188	205	221	235	249	261	285	318	365
	Standard High Limit	1220	1480	1700	1880	2050	2210	2350	2490	2610	2850	3180	3650
DN 100	Standard Low Limit	175	212	242	269	293	315	336	355	374	408	454	522
	Standard High Limit	1750	2120	2420	2690	2930	3150	3360	3550	3740	4080	4540	5220
DN 125	Standard Low Limit	262	318	363	404	440	473	504	533	561	612	681	783
	Standard High Limit	2620	3180	3630	4040	4400	4730	5040	5330	5610	6120	6810	7830
DN 150	Standard Low Limit	300	423	484	538	596	631	672	711	747	815	908	1044
	Standard High Limit	3000	4230	4840	5380	5960	6310	6720	7110	7470	8150	9080	10440
DN 200	Standard Low Limit	700	846	969	1076	1173	1261	1344	1421	1494	1630	1815	2088
	Standard High Limit	7000	8460	9690	10760	11730	12610	13440	14210	14940	16300	18150	20880
DN 250	Standard Low Limit	1050	1269	1453	1641	1759	1892	2016	2132	2241	2245	2722	3132
	Standard High Limit	10500	12690	14530	16410	17590	18920	20160	21320	22410	24450	27220	31320
DN 300	Standard Low Limit	1750	2116	2422	2690	2932	3153	3369	3553	3736	4076	4536	5220
	Standard High Limit	17500	21160	24220	26900	29320	31530	33590	35530	37360	40760	45360	52200

3. The quality flow range of superheated steam

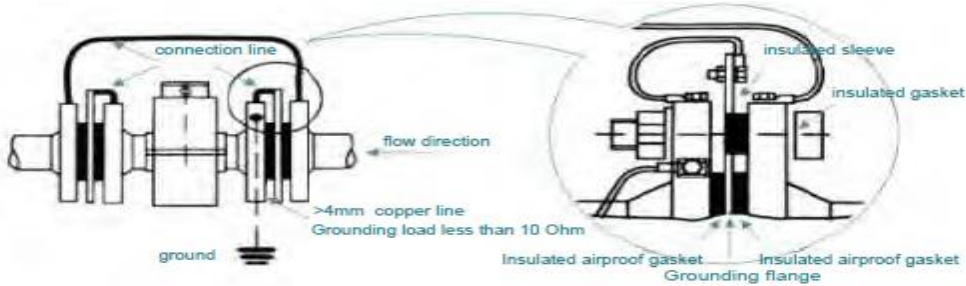
	Low Limit Flow (kg/h)	High Limit Flow (kg/h)
25	$13.1\sqrt{P}$	$131\sqrt{P}$
32	$23\sqrt{P}$	$184\sqrt{P}$
40	$26.5\sqrt{P}$	$265\sqrt{P}$
50	$49.4\sqrt{P}$	$494\sqrt{P}$
65	$82.3\sqrt{P}$	$823\sqrt{P}$
80	$115.3\sqrt{P}$	$1153\sqrt{P}$
100	$164.7\sqrt{P}$	$1647\sqrt{P}$
125	$247.1\sqrt{P}$	$2471\sqrt{P}$
150	$329.4\sqrt{P}$	$3294\sqrt{P}$
200	$658.8\sqrt{P}$	$6588\sqrt{P}$
250	$988.2\sqrt{P}$	$9882\sqrt{P}$
300	$1647\sqrt{P}$	$16470\sqrt{P}$

Grounding method

CONNECTION AND GROUNDING BETWEEN THE SENSOR AND PIPE



Nonmetal pipe,sensor with grounding electrode



Pipe with cathode protection

Order Code KC-7760 Series (Vortex Flowmeter)

KC-77 6 – – – – P – – V – – –

1 2 3 4 5 6 7 8 9 10 11 12

structure type	Code 1
Integral	1
Remote	2
High Temp.	3
Temp' & Press' Compensation type	4
Ex-proof (Ex is IIC T6)	5
Agency approved, customer specified	W

Measured Medium)	Code 6
Liquid	1
Common Gas	2
Saturated Steam	3
Superheated Steam	4
Others	5
Agency approved, customer specified	W

Pressure limit	Code 11
1.6 Mpa	1
2.5 Mpa	2
4.0 Mpa	3

Option	Code 12
Agency approved, customer specified	W

(Connection Mode	Code 2
DIN Flange	D
ANSI Flange	A
JIS Flange	J
Sanitary Clamp	S
Wafer	WF
Agency approved, customer specified	W

Input power	Code 7
DC 24 V ±10 %, 100 mA	2
Agency approved, customer specified	W

Output	Code 8
Pulse	1
(4–20) mA DC	2
Agency approved, customer specified	W

Connection spec'	Code 3,4,5		
Size	DIN	150 lb	JIS 10k
1/2" (DN15)	D2	F2	J2
3/4" (DN20)	D3	F3	J3
1" (DN25)	D4	F4	J4
1-1/4" (DN32)	D5	F5	J5
1-1/2" (DN40)	D6	F6	J6
2" (DN50)	D7	F7	J7
2-1/2" (DN65)	D8	F8	J8
3" (DN80)	D9	F9	J9
4" (DN100)	D11	F11	J11
5" (DN150)	D12	F12	J12
6" (DN150)	D13	F13	J13
8" (DN200)	D15	F15	J15
10" (DN250)	D16	F16	J16
12" (DN300)	D17	F17	J17
Agency approved, customer specified	W		

Display	Code 9
No Readout	NR
Digital Display (Flow & Total)	DD
Agency approved, customer specified	W

Flow direction	Code 10
Horizontal Left to Right or Vertical UP	1
Horizontal Right to Left or Vertical Down	2
Agency approved, customer specified	W



www.goldenrules.co.kr

Golden Rules Co., Ltd

Orifice Plate & Flange type
Liquid, Gas, Vapor

Orifice Flange Assembly KC-2100 Series



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

10. Orifice Flange Assembly KC-2100 Series

10-1. Orifice Plate & Flange Assembly KC-2100 Series

Features & Specification

- **ORIFICE FLANGE TYPE**

[Butt Welding Type]

Welding Neck

Ring Type Joint Welding-Neck

[Insertion Welding Type]

Slip-on

Socket Welding

Threaded-Screwed Joint Type

- **FLANGES RATING**

ANSI(JPI) 150#, 300#, 600#, 900#, 1500#

JIS 10K, 20K, 30K, 63K



KC-2100
Orifice Flange Assembly

Application

Semiconductor Industry / Steel Industry / Chemical Industry / Environmental engineering / Food / Pharmaceutical / Water Plant / Power Plant / R&D Testing

Description

ORIFICE FLANGES are widely used in conjunction with orifice meters for measuring the rate of flow of liquids and gases. An orifice flange assembly is the combination of an orifice plate, flanges with taps, bolts and nut, and gaskets.

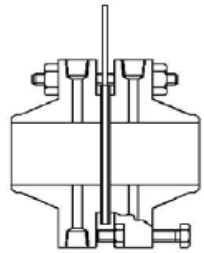
The flange are subject to ANSI(JPI) or JIS other regulating standards, and are joined to pipings. The flanges are divided into a few types, Flat Face (FF), Raised Face (RF) and Ring Joint (RTJ), depending on their contact surface formation with the gasket. They have taps for taking out differential pressures.

Construction & Type

- **WELDING NECK FLANGE**

The welding neck flange is normally referred to as the "high hub" flange. It is designed to transfer stresses to the pipe, thereby reducing high stress concentrations at the base of the flange. The welding neck flange is the best designed butt-welded flange of those currently available because of its inherent structural value. It is expensive because of the design.

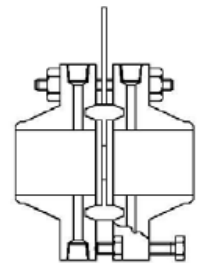
KC-2100-1



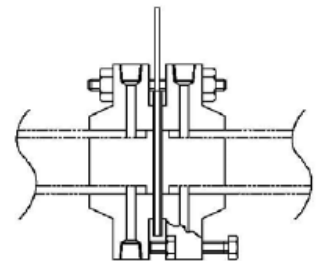
- **SLIP-ON FLANGE**

The slip-on flange has a low hub because the pipe slips into the flange prior to welding. It is welded both inside and out to provide sufficient strength and prevent leakage. Slip-on flanges are all bored slightly larger than the O.D. of the matching pipe. They are preferred over welding neck flanges by many users due to their lower initial cost, but final installation cost is probably not much less than that of the welding neck flange because of the additional welding involved.

KC-2100-2



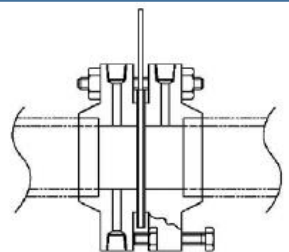
KC-2100-3



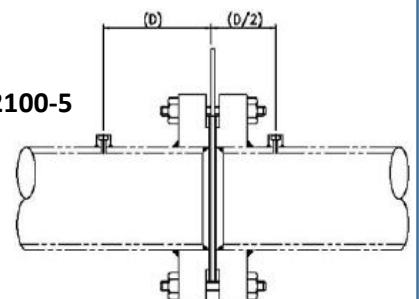
- **SOCKET-WELDING FLANGE**

The socket welding flange is similar to a slip-on flange except it has a bore and a counterbore dimension. The counterbore is slightly larger than the O.D. of the matching pipe, allowing the pipe to be inserted into the flange similar to a slip-on flange. The diameter of the smaller bore is the same as the I.D. of the matching pipe. A restriction is built into the bottom of the bore which sets as a shoulder for the pipe to rest on. This eliminates any restriction in flow when using a socket welding flange.

KC-2100-4



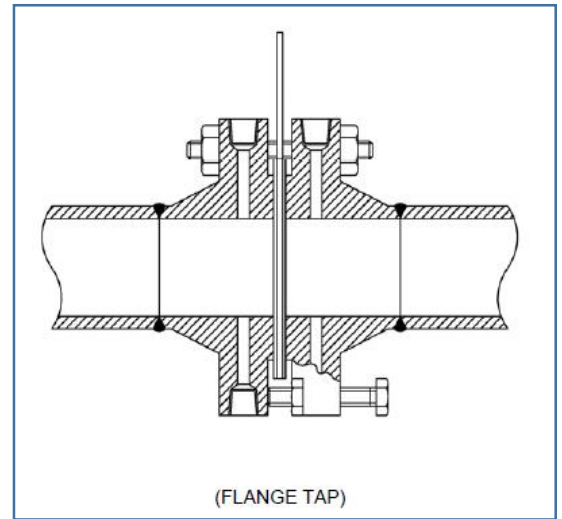
KC-2100-5



CHOICE OF TAP LOCATION FOR ORIFICE

1. FLANGE TAP

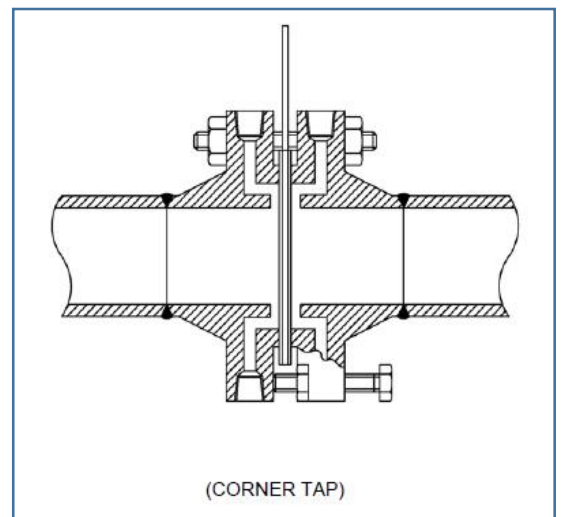
The most commonly used tap locations on pipe sizes of 2 inches or larger are in the orifice flange. Orifice tapping is at 1 inch upstream and 1 inch downstream from the faces of the orifice plate. These taps are located by the flange manufacturer, thereby eliminating some of the personal element from the installation. The flanges are equipped with spreader screws which facilitate removing the plate and separating the faces for inspection of the tap holes, which, being near the opening, are readily accessible. Flange taps, because they are symmetrically located, are readily adapted to



Reversing flows on which measurement is desired in both directions. If the proper limitations to their use are followed, they give an accuracy of measurement adequate for all commercial requirements. They are the predominant standard in the gas, oil, and chemical industries. Flange taps lose much of their advantage when the orifice may be installed in an existing flange union. However, holding rings equipped with pressure holes having flange tap spacing can be obtained for raised-face flanges, ring-joint flange, Van Stone flanges, and other types of flange construction. The use of flange taps should be limited to pipe size of 2 inches or larger. In the smaller sizes, the downstream tap location is at an unstable region of the pressure recovery curve on high diameter ratios (d/D).

2. CORNER TAP

On pipe sizes of less than 2 inches, corner taps located directly at the faces of the orifice plate should be used. Otherwise, on high d/D ratios the low pressure tap will be downstream from the vena contracta in a highly turbulent region for which standard coefficients will not apply. For ultimate accuracy, individually calibrated meter runs should be used, if the pipe size is less than 2 inches.

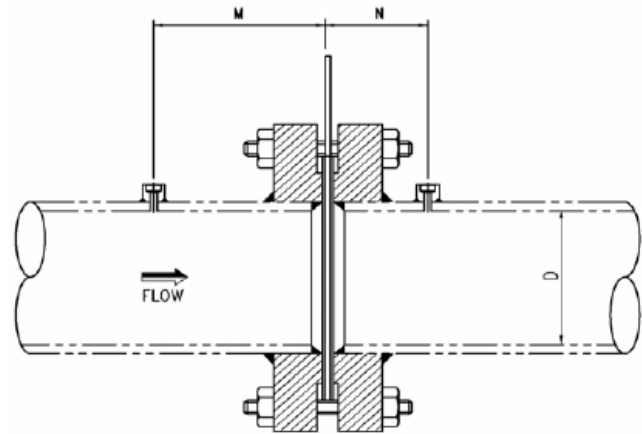


3. VENA CONTRACTA TAP

Vena contracta taps, located at 1 pipe Diameter upstream (Dimension M) and at The point of minimum pressure downstream (Dimension N) are most widely used in the Measurement of steam.

With laboratory care in installation, they are Capable of accuracy slightly better than that Of flange taps.

For pipe sizes above the limits of existing Test data, it is probable that extrapolated Coefficients for vena acontracta taps are more Accurate than for flange taps, because of The geometric similarity of the installation. Pipe sizes smaller than 6 inches usually Require special drilling through the flange.

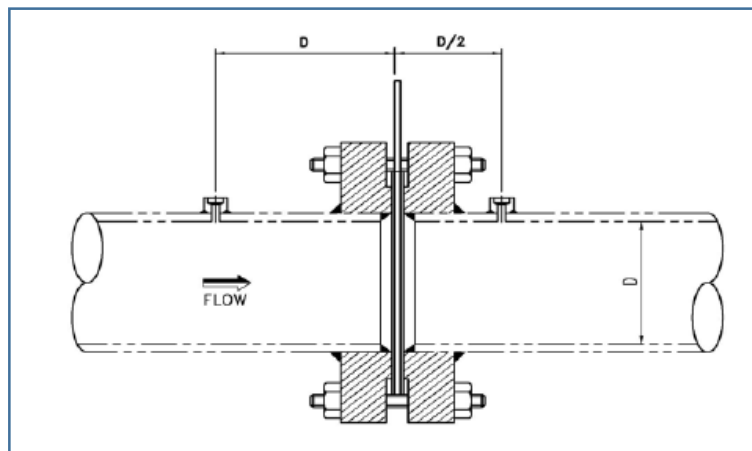


(VENA CONTRACTA TAP)

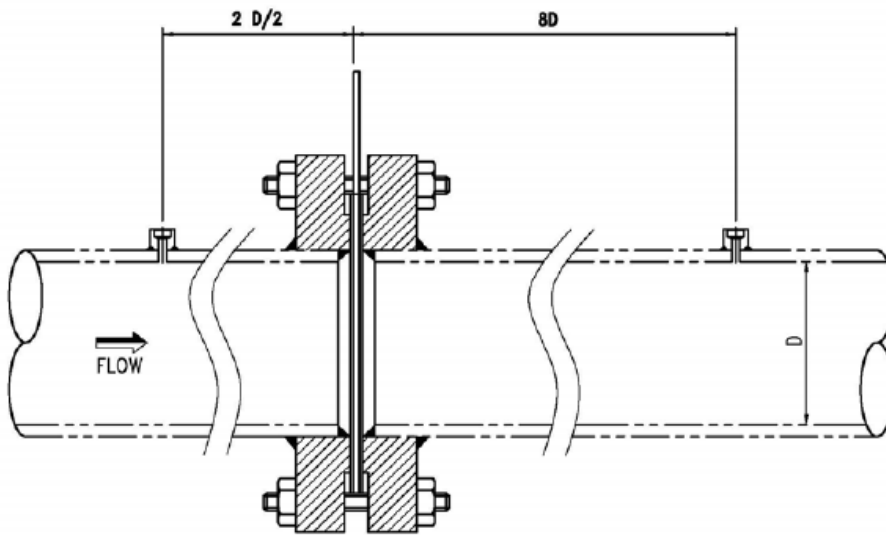
Orifice to Pipe Diameter Ratio	Location of Downstream Pressure Tap (N)		
	(Pipe-Diameters)		
	Minimum	Mean	Maximum
0.2	.37	.85	1.30
0.3	.44	.80	1.15
0.4	.47	.73	1.00
0.5	.47	.66	.84
0.6	.42	.57	.70
0.7	.35	.45	.55
0.8	.25	.33	.41

4. RADIUS TAP (1D & 1/2D TAP)

This type of connection is a modification of, and has largely replaced, the Vena Contracta taps. It yields equally accurate results and has the advantage that the downstream connection is easier To locate The upstream connection should be at 1D above the upstream face of the orifice plate, But location of the upstream connection any where between 1/2D and 2D introduces only Negligible Error. The downstream connection is located 1/2D downstream form the upstream face of the Orifice plate.



5. FULL-FLOW PIPE TAP (2-1/2D & 8D TAP)



(PIPE TAP)

Full-flow taps at 2-1/2 pipe diameters upstream and 8 pipe diameters downstream, attained their popularity (largely in the western and middlewestern parts of the United States) before the development of the A.G.A.-A.S.M.E. coefficient data in 1935.

Using the old coefficient data, these taps gave more consistent results when comparing the measurement of one orifice with that of one or more orifices of different d/D ratio. Since the development of the new coefficient data there has been a trend toward replacement by flange taps. Because the locations are geometrically similar for all pipe sizes, full-flow taps, like vena contracta taps, have an advantage for use on line sizes outside the range covered by the test data, without the limitation, however, as to minimum pipe size.

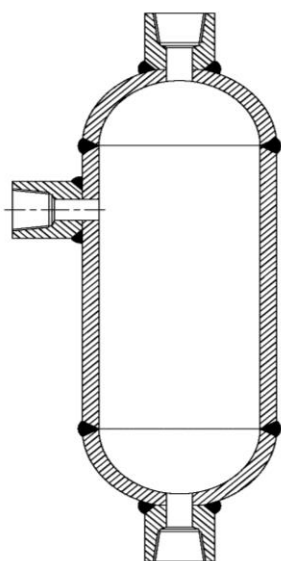
Full-flow taps at 2-1/2 and 8 pipe diameters have the same advantage as vena contracta or radius taps in that they permit installation of the orifice in an existing flange. However, the wide spacing of the 2-1/2 and 8 pipe diameter taps necessitates a considerably greater length of straight pipe for a satisfactory installation.

The probable error of measurement with these tap locations is about 50% greater than with flange or vena contracta taps. Although their flow capacity with the same orifice at the same differential is somewhat greater, in order to attain the same accuracy the d/D ratio limitation should be reduced to such an extent that the maximum d/D will pass no more than is allowable with any of the other taps.

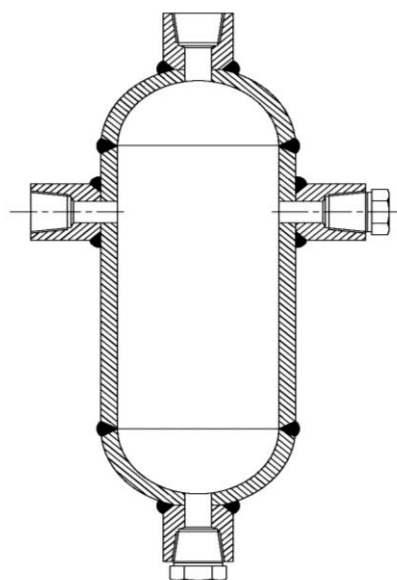
Pressure tap holes should be smooth and slightly rounded at the edges and cylindrical for a distance from the entrance of 2 to 2-1/2 times the diameter of the tap hole.

ACCESSORY

Condensate and Seal Chambers



MODEL : KCS-10



MODEL : KCS-20

Straightening Vanes

STRAIGHTENING VANES are recommended to eliminate swirls and crosscurrents set up by pipe fittings and valves preceding the meter tube.

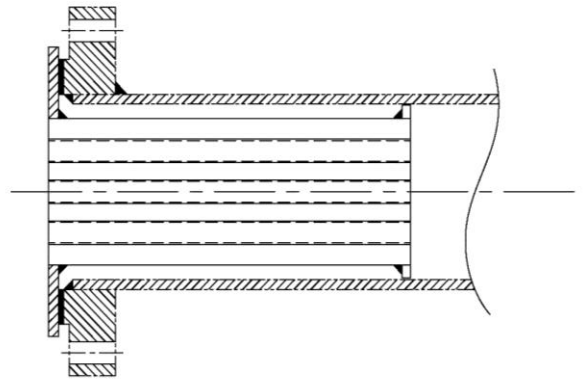
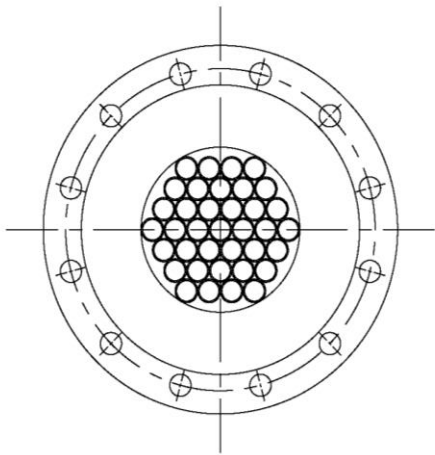
The use of these vanes in meter tubes can reduce considerably the length of straight tube required preceding the orifice plate.

Straightening vanes are constructed from thin wall steel tubing.

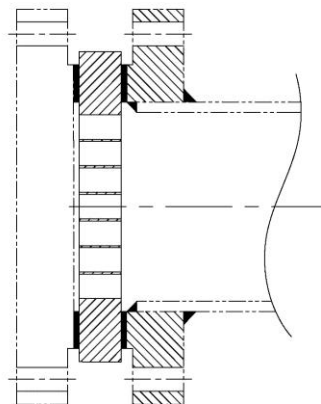
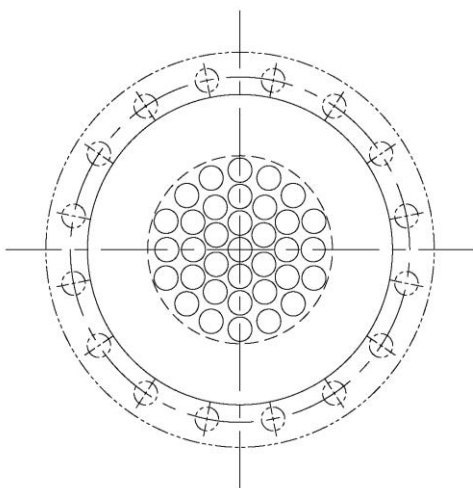
The nest of tubes is symmetrical and each tube is beveled on both ends.

Tangent points on both ends are welded for maximum strength.

Available in C.S or S.S



MODEL : KCV-PB



MODEL : KCV-SP

Order Code KC-2100 Series (Orifice Plate & Flange)

KC-2100 – – – – – P – – V

Type Size F-Rating T-type F-Mat'l P-Mat'l Option

1 2 3 4 5 6 7

Orifice Plate & Flange type	Code 1	D/P Tap type	Code 4	Option	Code7
Weld-Neck	1	Flange Tap	1	Tap valve & Nipple	TN
Weld-Neck (RTJ)	2	Corner Tap	2	Agency approved specified	W
Slip-On	3	Radius Tap (D-D1/2 Tap)	3		
Socket-Weld	4	Vena Tap	4		
Slip-On (D-D1/2 Tap)	5	Pipe Tap	5		
Agency approved specified	W	Agency approved sepcified	W		

Line Size	Code 2	Flange Material	Code 5
Ex) 300A	12"	Carbon Steel	C
Agency approved specified	W	Stainless Steel 304	S1
		Stainless Steel 316	S2
		Etc (Piping spec)	e

Flange Rating	Code 3	Plate Material	Code 6
JIS 10K	1	Stainless Steel 304	S1
JIS 20K	2	Stainless Steel 316	S2
JIS 30K	3	Monel	M
ANSI 150#	4	Hastelloy-C	H
ANSI 300#	5	etc	e
ANSI 600#	6		
ANSI 900#	7		
etc (Piping spec)	e		

1

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Golden Rules Co.,Ltd

Liquid
Clamp-on type

KC-7780C Series
Ultrasonic Flowmeter



The nation's development item, 100% domestic goods, Patent **NO.** 10-1660226

11. ULTRASONIC FLOWMETER

11-1. Ultrasonic Flowmeter KC-7780C Series

Golden Rule KC-7780C series Clamp-on Ultrasonic Flow Transmitter measures the velocity of a fluid with ultrasound to calculate volume flow. Using ultrasonic transducers, the flow transmitter can measure the average velocity along the path of an emitted beam of ultrasound, by averaging the difference in measured transit time between the pulses of ultrasound propagating into & against the direction of the flow or by measuring the frequency shift from the Doppler effect. It is affected by the acoustic properties of the fluid & can be impacted by temperature, density, viscosity & suspended particulates depending on the exact flow transmitter.

Features

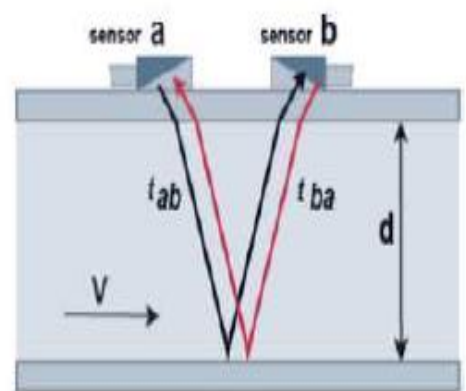
- Small and lightweight
- Economical price
- Parameter setting and checking by 4 keys
- Power Supply DC 24V
- Low power consumption less than 1.5W
- Accuracy $\pm 2.0\%$ F.S
- Wide measuring range DN15 ~ DN50
- High reliability, low voltage application, 4-20mA technology, long life and reliability
- Double balance for noise reduction of converter for strong external interference rejection
- Signal difference receiver and driving circuit
- Automatic data saving function in case of power failure (64 times)

Flow measurement principle

When ultrasonic waves are irradiated into the pipe through which the fluid is flowing, the ultrasonic wave that propagates (t_{ab} up-stream → down-stream) reaches quickly in proportion to the sum of the flow rates, the ultrasonic wave (t_{ba} down-stream → up-stream) reaches slowly in proportion to the difference in flow rate. The time difference (t_{ab}-t_{ba}) Δt is reached due to the slow arrival in proportion to the difference in flow rate.

Will occur. Since the propagation Δt generated here is a correlation function of the fluid velocity, the average flow velocity (V) in the sound wave path is calculated based on this, and the flow rate (Q) is calculated again taking into account the cross-sectional area of the pipe bore (d). In this case, ultrasonic waves have the characteristics of sound waves and pass through with a unique flow velocity depending on the fluid.

$$Q = A \times Vb$$



Performance specifications

- Measurement Principle: Correlation of ultrasonic time difference
- Accuracy: $\pm 2.0\%$ F.S (± 0.5 m/s ... 5.0 m/s)
- Repeatability: $\pm 0.8\%$
- Response time: within 2 second
- Flow rate range: 0.01 ~ 5 m/s bi-directional
- Function: Instantaneous & Accumulated
- Resolution: 0.5 mm/s
- Sensitivity: 0.03 m/s
- The clamp-on design is not necessary to shut down flow or cut the pipe when installing the Ultrasonic Flow Transmitter.

Operating specifications

- Measurement Liquid: Clean fluid or slightly turbid fluid (turbidity <10,000ppm)
- Enclosure type: Clamp-on type
- Display: OLED 128x64 display screen
- Totalizer: 6-digit bit
- Enclosure Protection class: IP54
- Enclosure material: Aluminum alloy
- Fluid temperature: 0 ~ 50°C standard
- Ambient temperature: 0 ~ 50°C standard
- Ambient Humid: 0 ~ 95% RH (Non-condensing)
- Operation: 4 – light touch buttons
- Units: Metric & imperial units are available
m3/h, L/h, GAL/h, m3/min, L/min, GAL/min, Default unit setting : m3/h
- Output: 4 – 20mA DC, Maximun load : 6 ohm
- Communication protocol: Modbus RS – 485
- Auxiliary output: OCT, high & low flow alarm function (Optional)
- Power supply: DC 24V
- Automatic data storage function (64 times in case of power failure)
- Communication: RS-485, GPRS module connection support
- Double balanced signal receiver for noise reduction of the converter for strong external interference rejection
- Line Size: DN15 ~ DN50
- Pipe Mat'l: Carbon Steel, Stainless Steel, PVC

Application

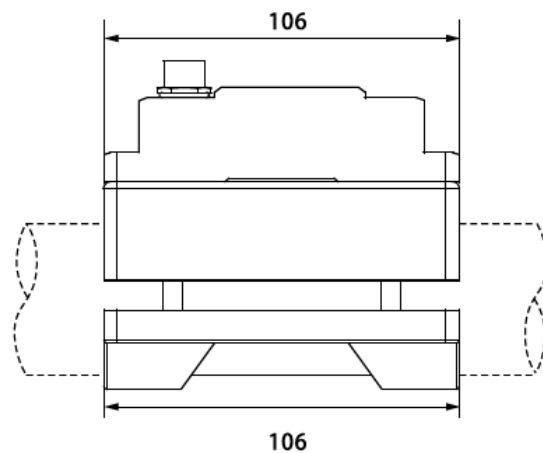
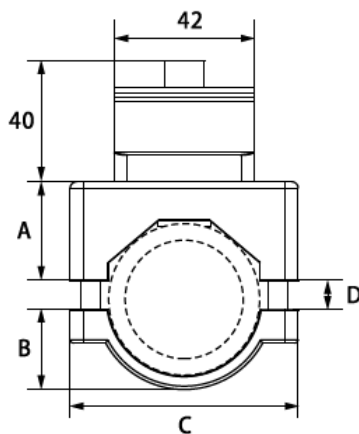
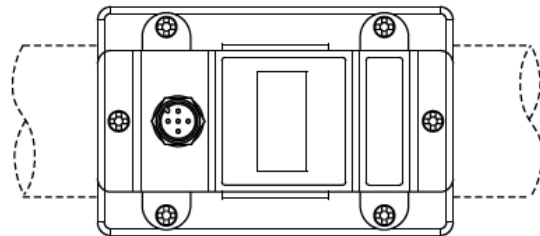
- Water and wastewater treatment
- Food, pharmaceutical and paper
- industry, Petrochemical industry
- Refrigeration and air conditioning industry
- Energy plant

Dimension I

Clamp-on Ultrasonic Flow Transmitter

Dimension

A (mm)	B (mm)	C (mm)	D(mm)	
			min.	Max.
25	8	58	1.5/Φ 20	8/Φ 23
25	15	58	1.5/Φ 25	4.5/Φ 28
28.5	18.5	58	1.5/Φ 32	4.5/Φ 35
29.5	24	68	1.5/Φ 38	8.5/Φ 45
36	27	78	1.5/Φ 48	8.5/Φ 54
41	32	91	1.5/Φ 58	7.5/Φ 64



Dimensions (mm)	Electric unit	106x42x51		
	Base bracket	106x58x40	106x58x47	106x68x53.5
Weight (Kg)	Electric unit	0.19		
	Base bracket	0.35	0.33	0.41

Pipe outside diameter	Φ 20	Φ 25	Φ 32	Φ 40	Φ 50	Φ 63
Pipe inside diameter	15 mm	20 mm	25 mm	32mm	40 mm	50 mm
Nominal name	DN15	DN20	DN25	DN32	DN40	DN50
Popular name	1/2"	3/4"	1"	1.2"	1.5"	2"

Order Code KC-7780C Series (Ultrasonic Flowmeter)

KC-77

Type	Diameter	Material	Power	Output	Display	Pressure	Temp'	Humidity	Liquid	Option
80			P	V						
1	2	3	4	5	6	7	8	9	10	11

Type	Code 1
Clamp-on	C

Pipe outside diameter	Code 2
DN20	1
DN25	2
DN32	3
DN40	4
DN50	5
DN63	6

Pipe Material	Code 3
Carbon Steel	CS
Stainless Steel	SS
Cast Iron	CI
Glass Fiber Reinforced	GF
PVC	PVC
Cement	CM
Others	W

Input power	Code 4
DC 24V	2

Output	Code 5
Modbus RS-485	1
4~20 mA DC	2
Alarm: High & Low (Optional)	3

Display	Code 6
No Readout	NR
Digital Display (Flow & Total)	DD
Agency approved, customer specified	W

Pressure	Code 7
0.6 Mpa Standard	1
1.6 Mpa (Option)	2
Agency approved, customer specified	W

Temperature	Code 8
Liquid: 0 ~ 50°C	1
Ambient: 0 ~ 50°C	2
Agency approved, customer specified	W

Humidity	Code 9
0 ~ 95% RH (Non-condensing)	1
Agency approved, customer specified	W

Liquid	Code 10
Water	1
Chemical	2
Oil	3
Others	4
Agency approved, customer specified	w

Option	Code 11
Agency approved, customer specified	W

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Golden Rules Co., Ltd

Liquid
Handheld type

KC-7780H Series Ultrasonic Flowmeter

Standard type clip box



Bracket type box



The nation's development item, 100% domestic goods, Patent NO. 10-1660226

11. ULTRASONIC FLOWMETER

11-2. Ultrasonic Flowmeter KC-7780H Series

Golden Rule's KC-7780H Handheld ultrasonic flowmeter is designed to work with clamp-on sensors to measure the liquid flow within a closed pipe without any insertion mechanical parts. Mainly be used for routing inspection or pipe monitoring, very convenience for use. It is controlled by a micro-processor system which contains a wide range of data that enables it to be used with pipes with an outside diameter ranging from 15mm up to 6000mm (Depending on mode) and constructed of almost any material.

- Applications : Piping systems, Energy-saving monitoring, Water-saving management, Industrial use, Semiconductor manufacturing, Food manufacturing industry, Cooling tower, Power plant



Std. Clamp-on Type



KC-7780H



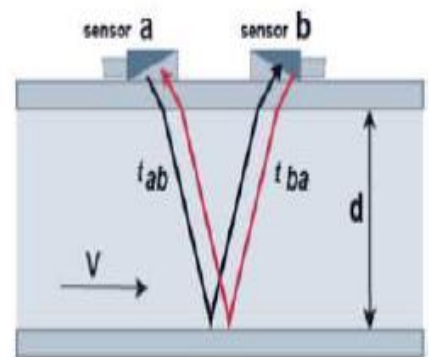
Bracket type Transducers

Measurement Principle

When ultrasonic waves are irradiated into the pipe through which the fluid is flowing, the ultrasonic wave that propagates (t_{ab} up-stream → down-stream) reaches quickly in proportion to the sum of the flow rates, the ultrasonic wave (t_{ba} down-stream → up-stream) reaches slowly in proportion to the difference in flow rate. The time difference (t_{ab}-t_{ba}) Δt is reached due to the slow arrival in proportion to the difference in flow rate.

Will occur. Since the propagation Δt generated here is a correlation function of the fluid velocity, the average flow velocity (V) in the sound wave path is calculated based on this, and the flow rate (Q) is calculated again taking into account the cross-sectional area of the pipe bore (d). In this case, ultrasonic waves have the characteristics of sound waves and pass through with a unique flow velocity depending on the fluid.

$$Q = A \times Vb$$



Handheld type Measuring Diagram-Clamp

Clamp-on transducer



Easy to install and no need to cut off the flow,
No pressure loss.
Different transducer from DN15...DN6000.
Different transducer for temperature -30...160°C.

Bracket mounting



Reduces installation, improve installation accuracy.
Easy installation no need cut the flow,
No pressure loss.
Different transducer from DN15...DN700.
Different transducer for temperature -30...160°C.

Features

- No need to cut off water, no pressure loss
- Connect clamp-on temperature, transducer, can finish the heat / energy measurement
- Easy for installation
- Power Supply: AC 100 ~ 240V
- High Accuracy: $\pm 1.0\%$ F.S
- Wide measuring range: DN15 ~ DN6000
- High reliability, low voltage application, 4-20mA technology, long life and reliability
- Single liquid can transmitter sound wave

Performance Spec'

- Measurement Principle: Transit-time Ultrasonic Flowmeter
- Repeatability: $\pm 0.5\%$
- Response time: within 1 second
- Flow rate range: $0 \sim \pm 10 \text{ m/s}$
- Function: Instantaneous & Accumulated
- Resolution: 0.5 mm/s
- Sensitivity: 0.03 m/s
- The clamp-on design is not necessary to shut down flow or cut the pipe when installing the Ultrasonic Flow Transmitter.

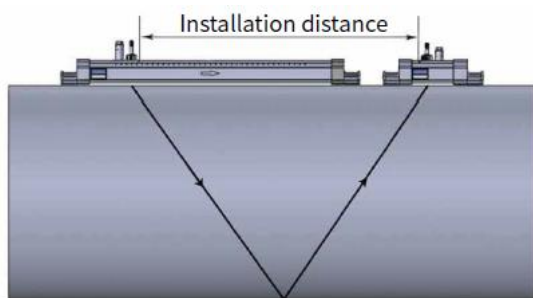
Operating Spec'

- Measurement Liquid: Clean fluid or slightly turbid fluid (turbidity $< 10,000\text{ppm}$: less bubble)
- Enclosure type: Wall mount or Handheld type
- Display: 2 x 20 character LCD with backlight
- Enclosure Protection class: IP65
- Measuring medium : Water, Sea water, Waste water, Alcohol, Beer, Various kinds of oil etc
which can conduct ultrasound single uniform liquid
- Fluid temperature : $-30 \sim +160^\circ\text{C}$ standard
- Ambient temperature: Converter: $-20 \sim 60^\circ\text{C}$ standard / Flow Transducer: $-30 \sim +160^\circ\text{C}$
- Ambient Humidity: Converter 85% RH / Flow Transducer: Water depth $< 2\text{m}$
- Units: Metric & imperial units are available
 m^3/h , L/h , GAL/h , m^3/min , L/min , GAL/min , Default unit setting : m^3/h
- Output: 1 channel OCT pulse output, pulse width $6 \sim 1000 \text{ ms}$ (Default is 200 ms)
- Connect the temperature transducer PT100
- Communication protocol: Isolation of 232 communication interface, can upgrade flow meter through PC
- Auxiliary output: OCT, Relay output (Pulse width 1000 ms , default is 200ms)
- Power Supply : Three internal 1.2V , 2000 mAH rechargeable Ni-MH battery Can work 12 hours fully charged
. Can achieve continuous measurement with AC $100 \sim 240\text{V}$ power adapter
- Power consumption : 1.5 W
- Line Size: $15 \sim 6000 \text{ mm}$
- Velocity range: $0 \sim \pm 10 \text{ m/s}$
- Pipe Mat'l: Carbon Steel, Stainless Steel, Cast Iron, Copper, Cement, PVC, Aluminum, FRP, etc.
- Straight pipe : Transducer installation should be satisfied : upstream 10D, downstream 5D, 30D away from the pump outlet (D for diameter)
- Special cable : 10 m (Standard set, 2 cable)
- Data storage : 32 K BIT built-in data storage, can store two thousand rows of data

How to use the Extension Bracket

V-method Installation

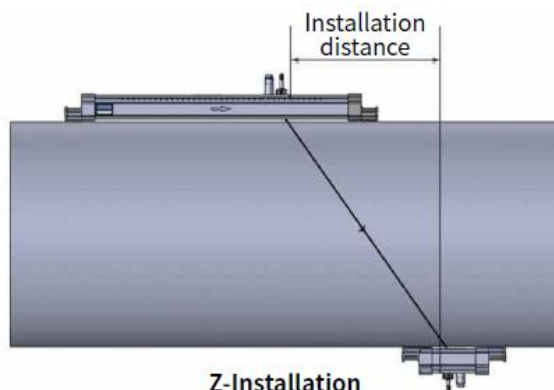
V-method installation is the most widely used mode for daily measurement with pipe inner diameters ranging from 15mm to 200mm. It is also called reflective mode or method.



V-Installation

Z-method Installation

Z-method is commonly used when the pipe diameter is between 300mm and 500mm.



Z-Installation

Optional Transducers

Type	Picture	Size	Model	Measuring range	Temp.	Dimension (mm)
Standard clamp on type		Small	CS	DN15 ... DN100	-30 ... 90°C	45x25x32
		Medium	CM	DN50 ... DN700	-30 ... 90°C	64x39x44
		Large	CL	DN300 ... DN6000	-30 ... 90°C	97x54x53
Standard bracket type		Small	BS	DN15 ... DN100	-30 ... 90°C	318x59x85
		Medium	BM	DN50 ... DN300	-30 ... 90°C	568x59x85
		Large(without sensor)	BE	DN300 ... DN700	-30 ... 90°C	188x59x49

Order Code KC-7780H Series (Ultrasonic Flowmeter)

KC-77 8 H - - P - V - - - - -

1 2 3 4 5 6 7 8 9 10 11

Type	Code 1
Handheld	H

Pipe outside diameter	Code 2
DN15 ~ 100	1
DN50 ~ 700	2
DN300 ~ 6000	3
Agency approved, customer specified	W

Output	Code 5
RS-232C	1
1 channel OCT pulse output	2
Agency approved, customer specified	W

Display	Code 6
No Readout	NR
Digital Display (Flow & Total)	DD
Agency approved, customer specified	W

Liquid	Code 9
Water	1
Sea water	2
Waste water	3
Alcohol	4
Agency approved, customer specified	w

Remote Cable	Code 10
10 m (std.)	1

Flow transducer (Clamp-on type)	Code 3
CS (Small) : DN15 ~ 100	1
CM (Medium) : DN50 ~ 700	2
CL (Large) : DN300 ~ 6000	3
Flow transducer (Bracket type)	HT
BS (Small) : DN15 ~ 100	4
BM (Medium) : DN50 ~ 300	5
BE (Large) : DN300 ~ 700	6

Converter Temp'	Code 7
Main unit : -20 ~ 60°C	1
Sensor : -30 ~ 160°C	2
Agency approved, customer specified	W

Option	Code 11
Calorimeter	1
SD card memory	2
Agency approved, customer specified	w

Pipe Material	Code 8
Carbon Steel	CS
Stainless Steel	SS
Cast Iron	CI
Agency approved, customer specified	W

Input power	Code 4
Battery	2
AC 100 ~ 240V, 60Hz	3

Golden Rules Co., Ltd

Liquid
Wall mount type

KC-7780W Series Ultrasonic Flowmeter



11. ULTRASONIC FLOWMETER

11-3. Ultrasonic Flowmeter KC-7780W Series

Golden Ruled The KC-7780W series flowmeter can be virtually applied to a wide range of long-term online measurement. Converter protection class IP67, transducer protection class IP68.

A variety of liquid applications can be accommodated: ultra-pure liquids, potable water, chemicals, raw sewage, reclaimed water, cooling water, river water, plant, effluent. Etd

- Applications : Oil & Gas Industries / Chemical / Pharmaceutical / Food & Beverage / Metal / Mining / Pulp & Paper / Wastewater Industries.



Wall Mount Type
KC-7780W



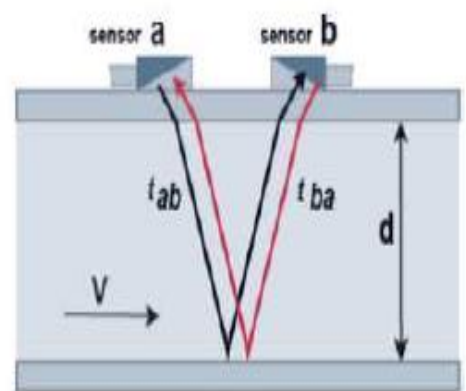
Transducers

Measurement Principle

When ultrasonic waves are irradiated into the pipe through which the fluid is flowing, The ultrasonic wave that propagates (t_{ab} up-stream $\rightarrow$ down-stream) It reaches quickly in proportion to the sum of the flow rates, The ultrasonic wave (t_{ba} down-stream $\rightarrow$ up-stream) The time difference ($t_{ab}-t_{ba}$) Δt is reached due to the slow arrival in proportion to the difference in flow rate.

Will occur. Since the propagation Δt generated here is a correlation function of the fluid velocity, the average flow velocity (V) in the sound wave path is calculated based on this, and the flow rate (Q) is calculated again taking into account the cross-sectional area of the pipe bore (d). In this case, ultrasonic waves have the characteristics of sound waves and pass through with a unique flow velocity depending on the fluid.

$$Q = A \times Vb$$



Wall Mount type Measuring Diagram-Clamp

Flow Measurement



Heat Measurement



Optional Temperature Transducer

Connect the temperature transducer can finish the heat / energy measurement

Picture	Specification	Model	Measurement Range	Temperature	Cut of water	Accuracy
	Pt100 Patch Type Surface Thermometer	PT.3M	< DN50	-40 ... +60 °C	No	100 °C ± 0.8 °C Exact match temperature difference ≤ 0.1 °C

Features

- No need to cut off water, no pressure loss
- Connect clamp-on temperature, transducer, can finish the heat / energy measurement
- Easy for installation
- Power Supply DC 8 ~ 36V or AC 85 ~ 264V
- Accuracy ± 1.0% F.S
- Wide measuring range DN15 ~ DN6000
- High reliability, low voltage application, 4-20mA technology, long life and reliability
- Single liquid can transmitter sound wave

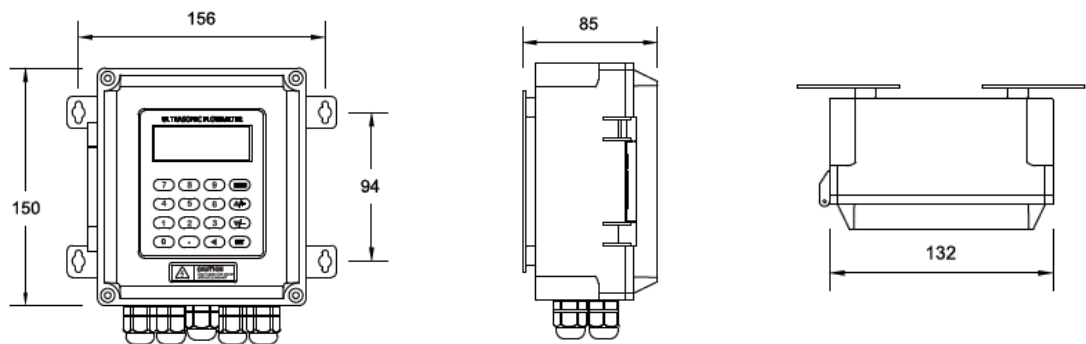
Performance Spec'

- Measurement Principle: Transit-time Ultrasonic Flowmeter
- Repeatability: $\pm 0.5\%$
- Response time: within 1 second
- Flow rate range: $0 \sim \pm 10 \text{ m/s}$
- Function: Instantaneous & Accumulated
- Resolution: 0.5 mm/s
- Sensitivity: 0.03 m/s
- The clamp-on design is not necessary to shut down flow or cut the pipe when installing the Ultrasonic Flow Transmitter.

Operating Spec'

- Measurement Liquid: Clean fluid or slightly turbid fluid (turbidity $< 10,000\text{ppm}$: less bubble)
- Enclosure type: Wall mount or Handheld type
- Display: 2 x 20 character LCD with backlight
- Enclosure Protection class: IP67 or IP68
- Enclosure material: Aluminum alloy
- Measuring medium : Water, Oil, Alcohol, Beverage, Ultra-pure liquid, etc.
- Fluid temperature: $-30 \sim +160^\circ\text{C}$ standard
- Ambient temperature: Converter: $-20 \sim 60^\circ\text{C}$ standard / Flow Transducer: $-30 \sim +160^\circ\text{C}$
- Ambient Humidity: Converter 85% RH / Flow Transducer: Water depth $< 2\text{m}$
- Units: Metric & imperial units are available
m³/h, L/h, GAL/h, m³/min, L/min, GAL/min, Default unit setting : m³/h
- Output: 4 – 20mA DC, electric resistance $0 \sim 1 \text{ K}$, accuracy 0.1%
- Connect the temperature transducer PT100
- Communication protocol: Modbus RS – 485
- Auxiliary output: OCT, Relay output (Pulse width 1000 ms, default is 200ms)
- Power Supply DC $8 \sim 36\text{V}$ or AC $85 \sim 264\text{V}$
- Power consumption : 1.5 W
- Line Size: $15 \sim 6000 \text{ mm}$
- Pipe Mat'l: Carbon Steel, Stainless Steel, Cast Iron, Copper, Cement, Pipe, PVC, Aluminum, Glass steel product, liner is allowed
- Straight pipe : Transducer installation should be satisfied : upstream 10D, downstream 5D, 30D from pump
- Special cable : Twisted-pair cable, generally, the length under 50 meters ; Select the RS-485, transmission distance can over 1000m
- Converter Dimension : $132 \times 150 \times 85 \text{ mm}$

제품치수 I



옵션 트랜스듀서 II

Please choose the suitable transducer, according to different liquid pipe condition and installation method, (please refer to the measuring diagram P2).

Types	Picture	Model	Measurement Range	Temperature	Dimension
Clamp on		TS-2 (Small)	DN25 ... 100	-30 ... +90 °C	45 x 25 x 32 mm
		TM-1 (Medium)	DN50 ... 700		64 x 39 x 44 mm
		TL-1 (Large)	DN300 ... 6000		97 x 54 x 53 mm
High temp clamp on		TS-2-HT (Small)	DN25 ... 100	-30 ... +160 °C	45 x 25 x 32 mm
		TM-1-HT (Medium)	DN50 ... 700		64 x 39 x 44 mm
		TL-1-HT (Large)	DN300 ... 6000		97 x 54 x 53 mm

Optional SD card memory

Convenience for long-term and large data storage. Available to do the data processing like tabulation, statistical, data analysis, printing reports and production flow curve by using data analysis software.



Order Code KC-7780W Series (Ultrasonic Flowmeter)

KC-77 8 W - - P - V - - - - - -

1 2 3 4 5 6 7 8 9 10 11

Type	Code 1
Wall mount	W

Input power	Code 4
DC 24V	2
AC 85 ~ 264V, 60Hz	3

Liquid	Code 9
Water	1
Chemical	2
Oil	3
Alcohol	4
Agency approved, customer specified	w

Pipe outside diameter	Code 2
DN25 ~ 100	1
DN50 ~ 700	2
DN300 ~ 6000	3
Agency approved, customer specified	W

Output	Code 5
Modbus RS-485	1
4~20 mA DC	2
Alarm: High & Low (Optional)	3

Flow transducer (-30 ~ +90°C)	Code 3
TS-2 (Small)	1
TM-1 (Medium)	2
TL-1 (Large)	3
Flow transducer (-30 ~ +160°C)	HT
TS-2-HT (Small)	4
TM-1-HT (Medium)	5
TL-1-HT (Large)	6

Display	Code 6
No Readout	NR
Digital Display (Flow & Total)	DD
Agency approved, customer specified	W

Remote Cable	Code 10
10 m (std.)	1

Converter Ambient Temp'/Humidity	Code 7
-20 ~ 60°C	1
85% RH	2
Agency approved, customer specified	W

Option	Code 11
Calorimeter	1
SD card memory	2
Agency approved, customer specified	w

Pipe Material	Code 8
Carbon Steel	CS
Stainless Steel	SS
Cast Iron	CI
Agency approved, customer specified	W

1

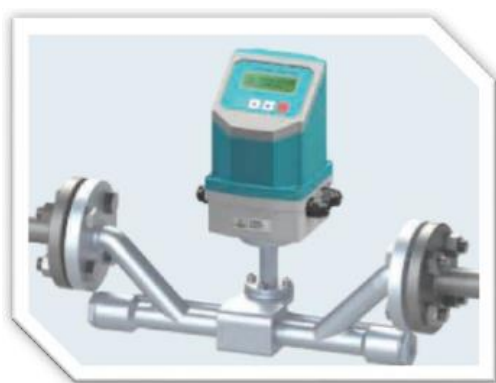
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Golden Rules Co.,Ltd

Liquid
Flange & Sanitary type

Ultrasonic Flowmeter

KC-7780F/S Series



◆ National development item, 100% domestic product, patent number 10-1660226

11.INLINE TYPE ULTRASONIC FLOWMETER

11-4. Flange type KC-7780F / Sanitary type KC-7780S Series

The KC-7780F/S series is an advanced flow meter with high-performance ultrasonic time difference transmission/reception method, and is a flow meter installed by flange connection method.

It measures the flow rate of the liquid in the flow rate range (0.1 to 10 m/s).

The module of the ultrasonic flow meter is designed for long-term measurements in-line.

Feature

- Low flow rate, low flow rate fluid measurement possible
- Economical price
- Parameter setting and confirmation by 4 keys
- There is no driving part, so the failure rate is small and there is no pressure loss.
- Flange fastening method
- High Accuracy $\pm 1.0\%$ F.S (Option: $\pm 0.5\%$ F.S)
- Wide measuring range (DN15~DN1,000)
- A wide range of measuring media: water, oil, chemicals, etc.
- High reliability, low voltage application, multi-pulse technology, long life and reliability
- Double balance to eliminate noise from the converter to eliminate strong external interference
- Signal difference receiver and driving circuit
- Automatic data saving function in case of power failure (64 times)

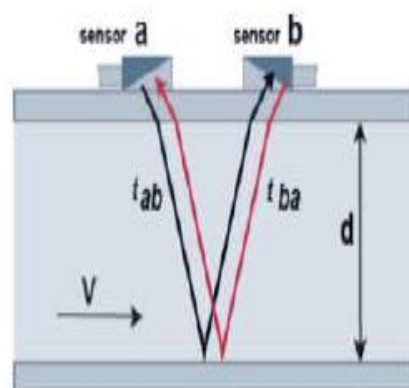


Measurement principle

When an ultrasonic wave is irradiated into the tube through which the fluid is flowing, the ultrasonic wave propagating along (tab Up-stream → Down-stream) It reaches quickly in proportion to the sum of the flow rates, The ultrasonic wave (tba Down-stream → Up-stream)

It arrives slowly in proportion to the difference in flow velocity, so that the time difference (tab-tba) Δt is Will occur.

Since the propagation Δt generated here is a correlation function of the fluid velocity, the average flow velocity (V) in the sound wave path is calculated based on this, and the flow rate (Q) is calculated again by considering the cross-sectional area of the pipe inner diameter (d). In this case, ultrasonic waves have the characteristics of sound waves and pass through with their own flow velocity depending on the fluid.



$$Q = A \times Vb$$

Performance Specifications

- Measurement principle: Ultrasonic parallax correlation
- Accuracy: $\pm 1.0\%$ F.S (Option: ± 0.5 F.S)
- Repeatability: $\pm 0.8\%$
- Response time: within 1 second
- Flow range: $0.1 \sim 10$ m / s bidirectional
- Function: instantaneous and cumulative
- Resolution: 0.5 mm / s
- Sensitivity: 0.03 m/s
- General flange type: DN15 $\sim$ DN1000
- Hygienic type: DN15 $\sim$ DN80 ($0.5 \sim 3$ S)

Operating Specifications

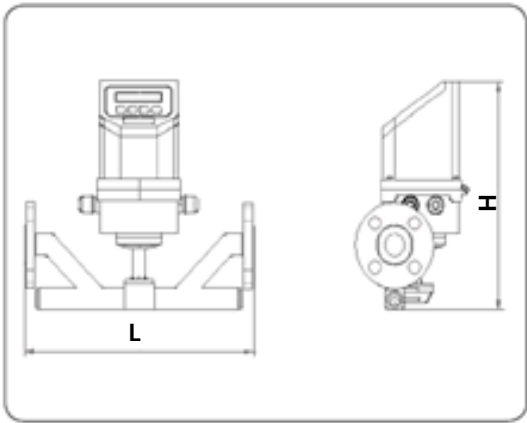
- Measuring fluid: any liquid
- Enclosure type: Insertion inline type
- Display: LCD display screen (instantaneous & accumulated & remaining battery level)
- Totalizer: 6 digit bit
- Enclosure protection class: IP65
- Enclosure material: ABS
- Ambient temperature: $-40 \sim 80^{\circ}\text{C}$ standard
- Fluid temperature: $-40 \sim 160^{\circ}\text{C}$
- Material: Sensor-ceramic
Indicator-ABS
Body/Flange/Bolt, Nut – 304SS
- Ambient Humidity: 0 to 95% RH (non-condensing) Operation: 4-Light touch button
- Unit: Metric and imperial units are available
m³/h, L/h, GAL/h, m³/min, L/min, GAL/min, basic unit
Setting: m³ / h
- Output: 4 – 20mA DC, Maximum load: 6 ohm
- Communication protocol: Modbus RS-485
- Auxiliary output: OCT, high flow and low flow alarm function (optional)
- Power supply: DC 24V
- Automatic data storage function (64 times during power failure)
- Communication: RS-485, GPRS module connection support Dual balance signal receiver for noise reduction of converter for strong external interference cancellation
- Line size: DN15 $\sim$ DN1000
- Maximum pressure: 10 Bar

Application

- Food, pharmaceutical and paper: drugs, acids, caustic soda, protein, antibiotics, etc.
- Power plants and nuclear power plants: cooling water, condensate and boiler supply water
- Water resource industry: desalination facilities, leak detection, extraction and inflow of extracted water, hot water and district heating
- Industrial process, petrochemical industry: adhesive, fibrous products, latex, emulsions of emulsified paints, etc.
- Beverage industry: Beverages containing cereals, pure water, milk, and other dairy products, including mixing, administration, and quantitative distribution (soft drinks, beer, fruit juice, wine, etc.)
- Refrigeration and air conditioning industry
- Energy plant
- State-of-the-art sanitation facilities

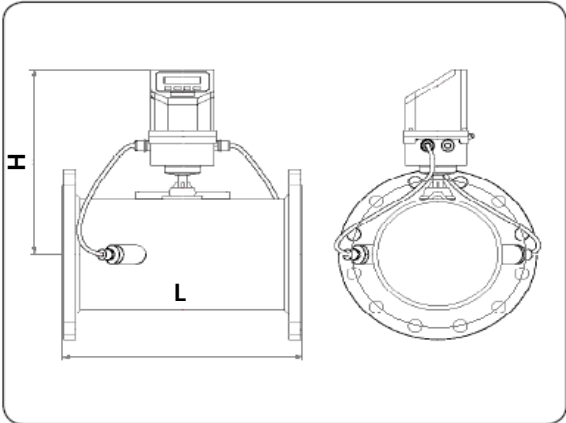
General type range & dimensions I

CONNECTION SIZE (15 ~ 32A)



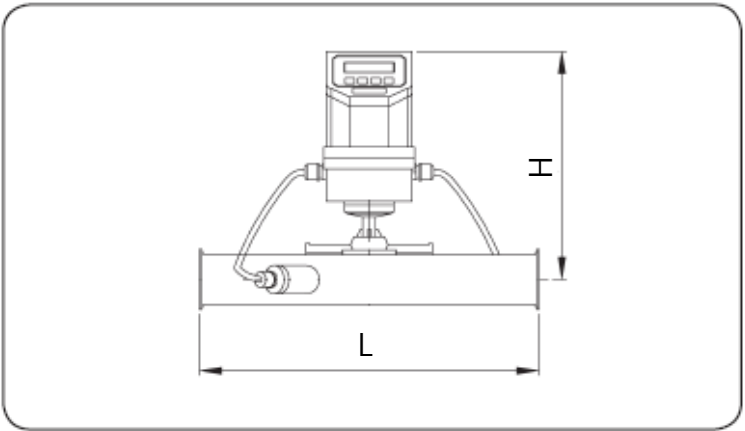
KC-7780F

CONNECTION SIZE (40 ~ 300A)



SIZE		FLOW RANGE		DIMENSIONS(mm)	
		Flow rate (m^3/h)	Flow rate (m^3/h)	L	H
15A	1/2B	0.063	6.358	320	285
20A	3/4B	0.113	11.304	360	285
25A	1B	0.176	17.662	440	292
32A	1-1/4B	0.289	28.938	450	292
40A	1-1/2B	0.452	45.216	300	275
50A	2B	0.706	70.650	320	281
65A	2-1/2B	1.194	119.398	360	289
80A	3B	1.808	180.864	250	295
100A	4B	2.820	282.600	280	308
125A	5B	4.410	441.560	300	320
150A	6B	6.350	635.850	320	333
200A	8B	11.300	1130.400	380	359
250A	10B	17.660	1766.250	420	384
300A	12B	25.430	2543.400	460	410

Sanitary type range & Dimension II



KC-7780S

SIZE		FLOW RANGE		DIMENSIONS(mm)	
		Flow rate (m^3/h)	Flow rate (m^3/h)	L	H
15A	1S 1-1/2S	0.063	6.358	200	275
20A		0.113	11.304	200	278
25A		0.176	17.662	250	281
32A	1S 1-1/2S	0.289	28.938	250	284
40A		0.452	45.216	300	287
50A	2S	0.706	70.650	300	290
65A	3S	1.194	119.398	350	300
80A		1.808	180.864	400	310

Order Code KC-7780 Series (Inline type Ultrasonic flowmeter)

KC-77 - - - P - V - - - -

type size pipe mat'l power output display press' temp/humidity converter option

1 2 3 4 5 6 7 8 9 10

Type	Code 1
Flange	80F
Sanitary	80S
Others	W

Line Size	Code 1
DN15	1
DN20	2
DN25	3
DN32	4
DN40	5
DN50	1
DN65	2
DN80	3
DN100	4
DN125	5
Others	6

Pipe Material	Code 3
Stainless Steel(304SS)	D
Stainless Steel(316SS)	1
Others	W

Input power	Code 4
DC 24V	2
Other	W

Output	Code 5
Modbus RS-485 RTU	1
4~20 mA DC	2
OCT : Relay output	3

Display	Code 6
No Readout	NR
Digital Display (Flow & Total)	DD
Agency approved, customer specified	W

Pressure	Code 7
5 Bar (Std.)	1
10 Bar (Std.)	2
Agency approved, customer specified	W

Temp' & Humidity	Code 8
Fluid : -40 ~ 160°C	1
Ambient : -40 ~ 80°C	2
Humidity : 0 ~ 95% RH	W

Fluid	Code 9
Water	1
Chemical	2
Oil	3
Others	4
Agency approved, customer specified	W

Option	Code 10
Agency approved, customer specified	W

Golden Rules Co.,Ltd

Gauge Pressure, Absolut pressure, Diff. pressure
(Liquid, Gas, Vapor)

Smart Diff. Pressure Transmitter KC-9100 Series



12. Smart Differential Pressure Transmitter

12-1. Diff. Pressure Transmitter KC-9100 Series

Features & Specification

- Updating time of output current in 200ms
- Accuracy : $\pm 0.075\%$ of span
- Display : 360° rotation LCD display
- 4-20mA output with direct digital HART communication
- Two years stability of 0.2%
- Parameter setting by keypad directly
- Automatic zero calibration by press-button
- Weather proof housing
- Improved performance, increased accuracy greater stability



KC-9100
Diff. Pressure Transmitter

Application

Semiconductor Industry / Steel Industry / Chemical Industry / Environmental engineering / Food / Pharmaceutical / Water Plant / Power Plant / R&D Testing

Description

The KC-9100 Series digital differential pressure / pressure transmitter is a well-developed high-performance pressure transmitter adopting advanced monocrystalline silicon pressure sensor technology. The product uses a diaphragm with double overpressure protection design and internal circuit with anti-surge protection design. It can accurately measure differential pressure, absolute pressure, gauge pressure.

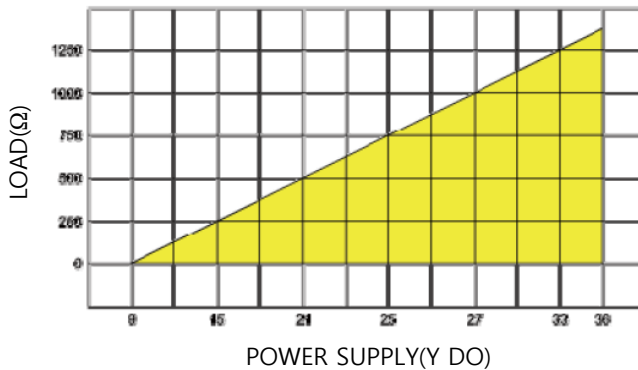
Performance Specification

- Display range : 5-digits programmable & 0-100% Bargraph
- Display Unit : Standard 22 different engineering unit
: 5-digits programmable for special unit
- Keyboard : 3 internal keys for programming and output setting
- Protection Class : IP67(STD.)
- Power Supply : 9 ~ 36V DC
- Current Output : 4~20mA 2-wires with HART Signal(Compatible)
- Digital Communication : HART Protocol
- Damping : 0 – 32 seconds
- Response time : 200mS
- Humidity : 0 – 100% Relative Humidity
- Mounting : Bracket on 2" pipe
- Turn on Time : 2 Seconds with minimum damping
- Cable Entry : M20X1.5P Conduit threads(Female)
- Zero Calibration : Automatic zero calibration by push-button
- Ambient Temperature : -20 °C ~ +60 °C
- Dimensions : 102(W) X 188(H) X 130(D)mm

Operating Specification

- Process Fluid : Liquid, Gas or Vapor
- Application : Differential Pressure, Absolute pressure, Gauge pressure
- Measuring Range : 0 – 10kPa ~ 0 – 30kPa(Min.) / 0 – 32MPa ~ 0 – 70MPa(Max.)
- Turndown Ratio : 100:1
- Accuracy : $\pm 0.075\%$ of span
- Stability : $\pm 0.15\%$ of URL for 2 years
- Working Temperature : -40 °C ~ +120 °C
- Max. Pressure : 5801 psi
- Temperature Effect : $\pm 0.18\% \sim 0.5\%$ of span per 20 °C
- Process Connection : $\frac{1}{4}$ " – 18 NPT
 $\frac{1}{2}$ " – 14 NPT(with adapter)
- Material : Flange / Adapter : SUS304 / SUS316
Drain / Vent : SUS304 / SUS316
Diaphragm : SUS316L / Hastelloy C / Tantalum
Housing –ALDC 12, yellow(HW) paint
Process O-Ring : Buna N / Viton / PTFE
- Fill Fluid : Silicon / Fluorine Oil

Supply Voltage vs Loop Load I



Principle Description II

The airflow forms a local contraction at the orifice plate, so the flow velocity increases and the static pressure decreases, so a pressure difference is generated in front or at the back of the orifice plate. When the fluid flow getting bigger, the pressure difference getting bigger at the same time, so the flow rate can be measured based on the pressure difference.

This measurement method is based on the Continuity equation (Law of conservation of mass) and the Bernoulli's principle (Conservation of energy) to achieve the purpose of accurate measurement.

As shown in the figure, the red part is the orifice plate installed in the pipeline, which is perpendicular to the flow direction.

Assuming that the fluid fills the pipeline, between the two-point cross section of side P1 and side P2 in the figure, it is according to the Continuity equation (Law of conservation of mass) and the Bernoulli's principle (Conservation of energy), we can get formula (1) and formula (2)

$$\rho_1 v_1^2/2 + P_1 = \rho_2 v_2^2/2 + P_2 \dots \dots \text{formula (1)}$$

$$\rho_1 v_1^2 F_1 = \rho_2 v_2^2 F_2 \dots \dots \text{formula (2)}$$

v : Average flow velocity (m/s)

P : Average flow rate (Pas abs)

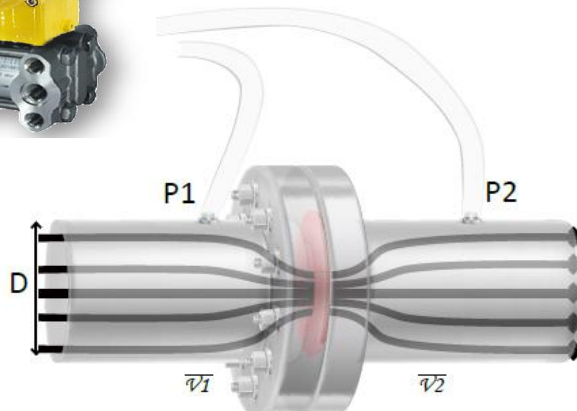
ρ_1 : Fluid density (kg/m³)

F : Fluid cross-sectional area (m²)

From formula (1)(2), the volume flow rate Q (m³/s) through the orifice plate is:

$$Q = v_2 F_2 = F_2 \frac{1}{\sqrt{1 - (F_2/F_1)^2}} \sqrt{\frac{2}{\rho_1} (P_1 - P_2)}$$

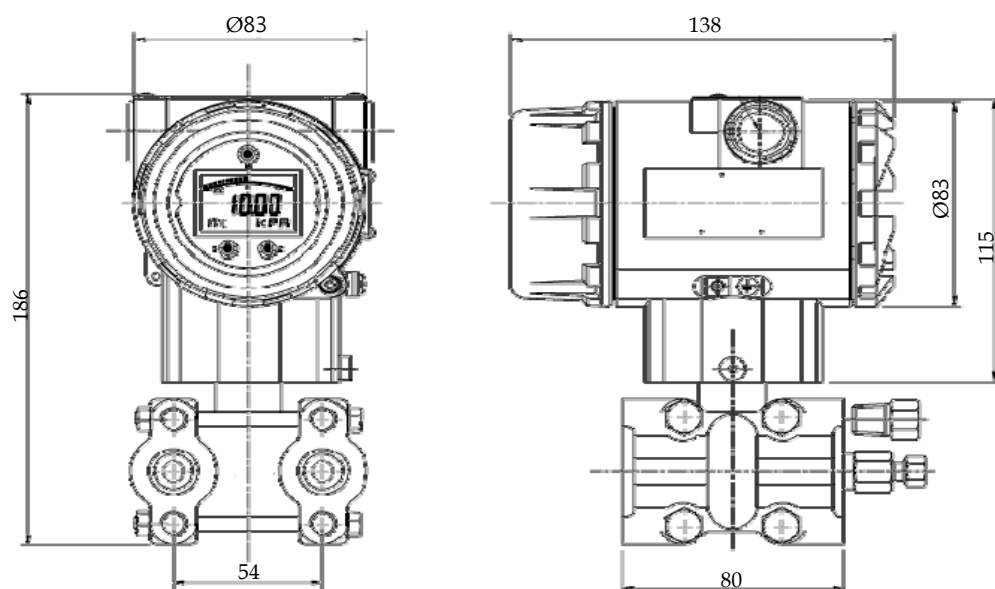
$$Q = k \sqrt{\Delta P}$$



Measuring Range III

Range Code	Pressure Range				Transmitter		
	Low Range	High Range	Low Range	High Range	Diff. Pressure	Gauge Pressure	Absolute Pressure
2	0 ~ 0.125 kPa	0 ~ 1.5 kPa	0 ~ 0.938 mmHg	0 ~ 11.251 mmHg	◆	◆	
	0 ~ 1.250 mbar	0 ~ 15 mbar	0 ~ 0.5018 inH ₂ O	0 ~ 6.022 inH ₂ O			
	0 ~ 0.018 psi	0 ~ 0.218 psi	0 ~ 0.001 kg/cm ²	0 ~ 0.015 kg/cm ²			
3	0 ~ 1.3 kPa	0 ~ 7.5 kPa	0 ~ 9.75 mmHg	0 ~ 56.25 mmHg	◆	◆	
	0 ~ 13 mbar	0 ~ 75 mbar	0 ~ 5.219 inH ₂ O	0 ~ 30.11 inH ₂ O			
	0 ~ 0.189 psi	0 ~ 1.088 psi	0 ~ 0.013 kg/cm ²	0 ~ 0.076 kg/cm ²			
4	0 ~ 6.2 kPa	0 ~ 37 kPa	0 ~ 46.5 mmHg	0 ~ 277.5 mmHg	◆	◆	◆
	0 ~ 62 mbar	0 ~ 370 mbar	0 ~ 24.89 inH ₂ O	0 ~ 148.5 inH ₂ O			
	0 ~ 0.899 psi	0 ~ 5.366 psi	0 ~ 0.063 kg/cm ²	0 ~ 0.377 kg/cm ²			
5	0 ~ 30 kPa	0 ~ 180 kPa	0 ~ 225 mmHg	0 ~ 1350 mmHg	◆	◆	◆
	0 ~ 300 mbar	0 ~ 1800 mbar	0 ~ 120.4 inH ₂ O	0 ~ 722.6 inH ₂ O			
	0 ~ 4.351 psi	0 ~ 26.11 psi	0 ~ 0.306 kg/cm ²	0 ~ 1.835 kg/cm ²			
6	0 ~ 117 kPa	0 ~ 690 kPa	0 ~ 34.5 inHg	0 ~ 203.8 inHg	◆	◆	◆
	0 ~ 1.170 bar	0 ~ 6.900 bar	0 ~ 469.7 inH ₂ O	0 ~ 2770 inH ₂ O			
	0 ~ 16.97 psi	0 ~ 100.1 psi	0 ~ 1.193 kg/cm ²	0 ~ 7.036 kg/cm ²			
7	0 ~ 350 kPa	0 ~ 2000 kPa	0 ~ 103.4 inHg	0 ~ 590.5 inHg	◆	◆	◆
	0 ~ 3.5 bar	0 ~ 20 bar	0 ~ 1405 inH ₂ O	0 ~ 8029 inH ₂ O			
	0 ~ 50.76 psi	0 ~ 290.1 psi	0 ~ 3.569 kg/cm ²	0 ~ 20.39 kg/cm ²			
8	0 ~ 1.17 MPa	0 ~ 6.8 MPa	0 ~ 345.5 inHg	0 ~ 2008.0 inHg	◆	◆	◆
	0 ~ 11.70 bar	0 ~ 68 bar	0 ~ 4697.1 inH ₂ O	0 ~ 27299 inH ₂ O			
	0 ~ 169.7 psi	0 ~ 986.3 psi	0 ~ 11.93 kg/cm ²	0 ~ 69.34 kg/cm ²			
9	0 ~ 4.0 MPa	0 ~ 25 MPa	0 ~ 1181.2 inHg	0 ~ 7381.6 inHg	◆	◆	◆
	0 ~ 40.0 bar	0 ~ 250 bar	0 ~ 16059 inH ₂ O	0 ~ 100366 inH ₂ O			
	0 ~ 169.7 psi	0 ~ 986.3 psi	0 ~ 11.93 kg/cm ²	0 ~ 69.34 kg/cm ²			

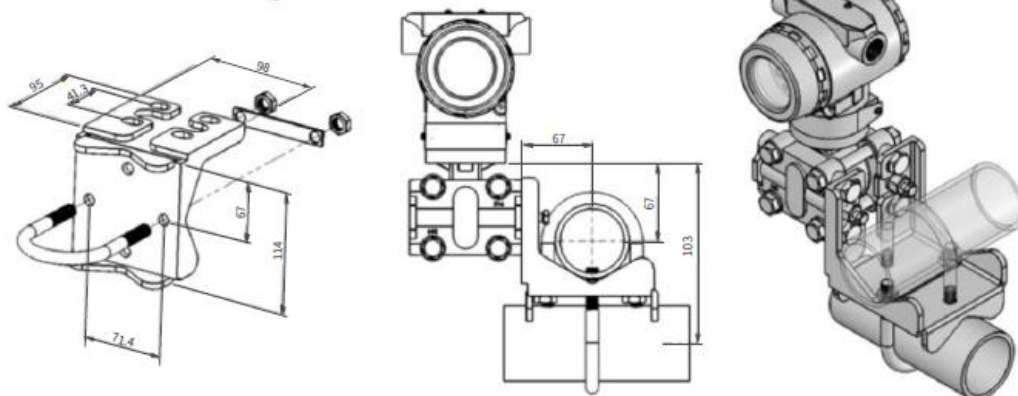
Dimension IV



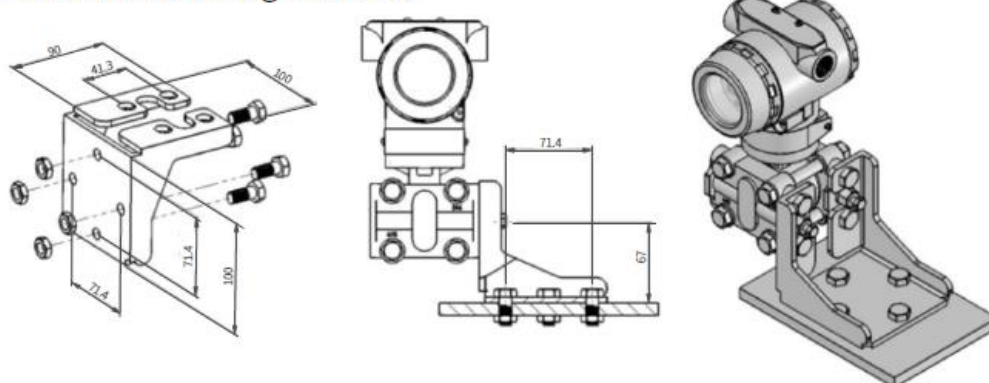
Optional Accessories V

UNIT : mm

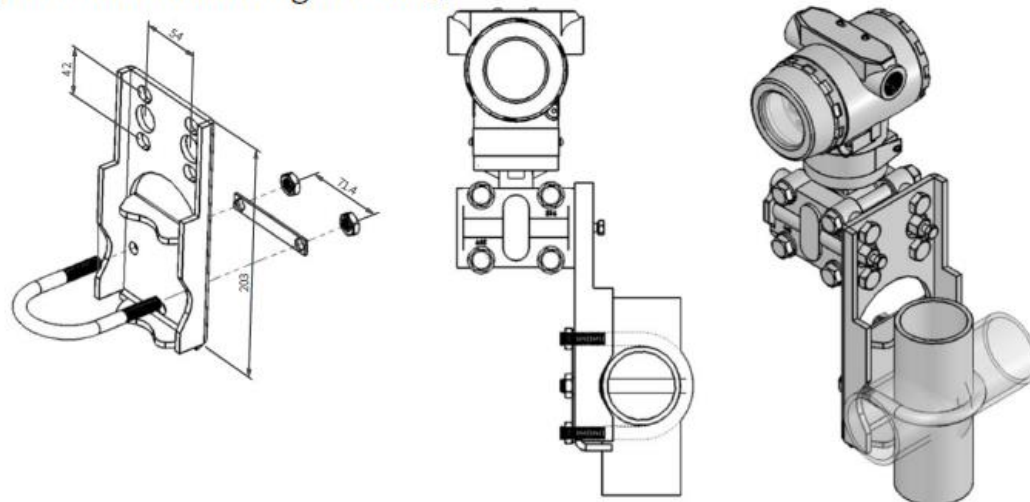
【1.B1 Tube bending bracket】



【2.B2 Plate bending bracket】



【3.B3 Tube mounting bracket】



Order Code KC-9100 Series (Diff. Pressure Transmitter)

KC-9100 – – – – – P – – V – – – –

1 2 3 4 5 6 7 8 9 10

Pressure type	Code 1
Very Low differential pressure	V
Differential pressure	D
DP of high system Pressure	H
Absolute pressure	A
Gauge pressure	G
Agency approved specified	W

Pressure Range	Code 2
0 ~ 15 mbar (D or G)	2
0 ~ 75 mbar (D or G)	3
0 ~ 370 mbar (D, G or A)	4
0 ~ 1800 mbar (D, G or A)	5
0 ~ 6.9 bar (D, G or A)	6
0 ~ 20 bar (D, G or A)	7
0 ~ 68 bar (D, G or A)	8
0 ~ 250 bar (D, G or A)	9

Diaphragm Material	Code 3
Stainless Steel 316L	N
Hastelloy – B	B
Hastelloy – C	C
Monel	M
Tantalum	T
Agency approved specified	W

Process Flanges, Drain/Vent Material	Code 4
Stainless Steel 304	N
Stainless Steel 316	S

Bolt / Nuts Material	Code 5
Carbon Steel	N
Stainless Steel 316	S

Fill Fluid	Code 6
Silicon	N
Fluorine	F

Wetted O-ring Material	Code 7
Buna-N	N
Viton	V
PTFE	P
Agency approved sepcified	W

Mounting Bracket Material	Code 8
Stainless Steel 304	N
Stainless Steel 316	S
Other	Z
Agency approved sepcified	W

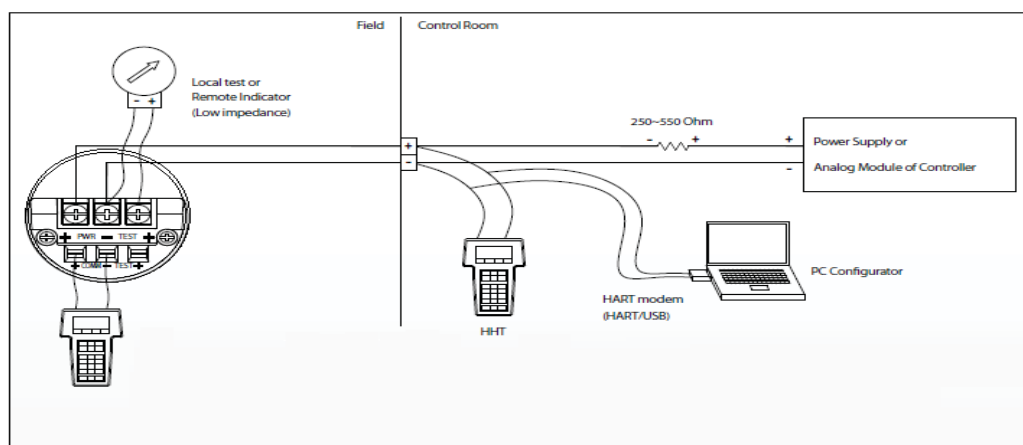
Process Connection	Code 9
NPT 1/4" – 18 NPT	N
NPT 1/2"- 14 NPT(with Adapter)	A
Other	Z
Agency approved specified	W

Cable Entry	Code10
M20 X 1.5P Conduit Threads	1
1/2" NPT(Female)	2

Maximum Pressure Limit	Code11
580 psi	N
928 psi	1
2320 psi	2
5801 psi	3

Option	Code12
None	N
Explosion proof(Ex d IIC T6)	E
HART Signal(Compatible)	H
Others	Z

HART Communication Wiring Diagram



Golden Rules Co.,Ltd

Gauge Pressure, Absolut pressure
(Liquid, Gas, Vapor)

Smart Pressure Transmitter KC-9200 Series



12. Smart Differential Pressure Transmitter

12-2. Smart Pressure Transmitter KC-9200 Series

Features & Specification

- Updating time of output current in 200ms
- Accuracy : $\pm 0.075\%$ of span
- Display : 360° rotation LCD display
- 4-20mA output with direct digital HART communication
- Two years stability of 0.2%
- Parameter setting by keypad directly
- Automatic zero calibration by press-button
- Weather proof housing
- Improved performance, increased accuracy greater stability



KC-9200
Pressure Trnsmitter

Application

Semiconductor Industry / Steel Industry / Chemical Industry / Environmental engineering / Food / Pharmaceutical / Water Plant / Power Plant / R&D Testing

Description

The KC-9200 Series digital pressure transmitter is a well-developed high-performance pressure transmitter adopting advanced monocrystalline silicon pressure sensor technology. The product uses a diaphragm with double overpressure protection design and internal circuit with anti-surge protection design. It can accurately measure absolut pressure, gauge pressure.

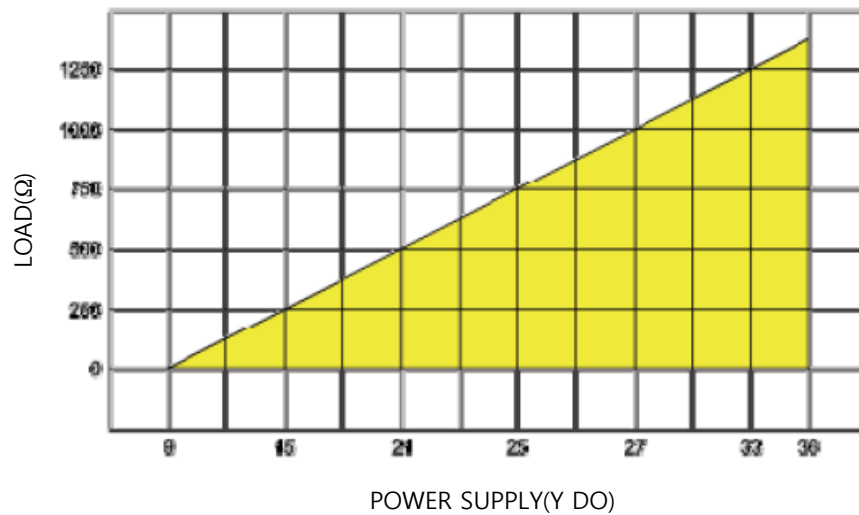
Performance Specification

- Display range : 5-digits programmable & 0-100% Bargraph
- Display Unit : Standard 22 different engineering unit
: 5-digits programmable for special unit
- Keyboard : 3 internal keys for programming and output setting
- Protection Class : IP67(STD.)
- Power Supply : 9 ~ 36V DC
- Current Output : 4~20mA 2-wires with HART Signal(Compatible)
- Digital Communiation : HART Protocol
- Damping : 0 – 32 seconds
- Response time : 200mS
- Humidity : 0 – 100% Relative Humidity
- Mounting : Bracket on 2" pipe
- Turn on Time : 2 Seconds with minimum damping
- Cable Entry : M20X1.5P Conduit threads(Female)
- Zero Calibration : Automatic zero calibration by push-button
- Ambient Temperature : -20 °C ~ +60 °C
- Dimensions : 102(W) X 188(H) X 130(D)mm

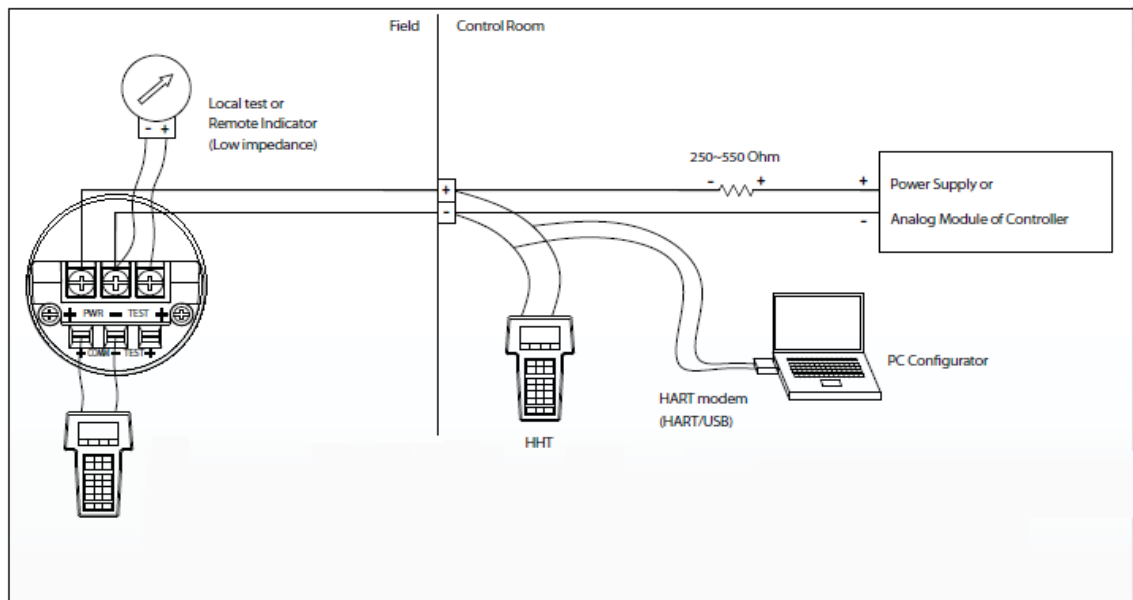
Performance Specification

- Process Fluid : Liquid, Gas or Vapor
- Application : Absolute pressure, Gauge pressure
- Measuring Range : 0 – 10kPa ~ 0 – 30kPa(Min.), 0 – 32MPa ~ 0 – 70MPa(Max.)
- Turndown Ratio : 100:1
- Accuracy : $\pm 0.075\%$ of span
- Stability : $\pm 0.15\%$ of URL for 2 years
- Working Temperature : -40 °C ~ +120 °C
- Max. Pressure : 5801 psi
- Temperature Effect : $\pm 0.18\% \sim 0.5\%$ of span per 20 °C
- Process Connection : $\frac{1}{4}"$ – 18 NPT
 $\frac{1}{2}"$ – 14 NPT(with adapter)
- Material : Flange / Adapter : SUS304 / SUS316
Drain / Vent : SUS304 / SUS316
Diaphragm : SUS316L / Hastelloy C / Tantalum
Housing –ALDC 12, yellow(HW) paint
Process O-Ring : Buna N / Viton / PTFE
- Fill Fluid : Silicon / Fluorine Oil

Supply Voltage vs Loop Load I



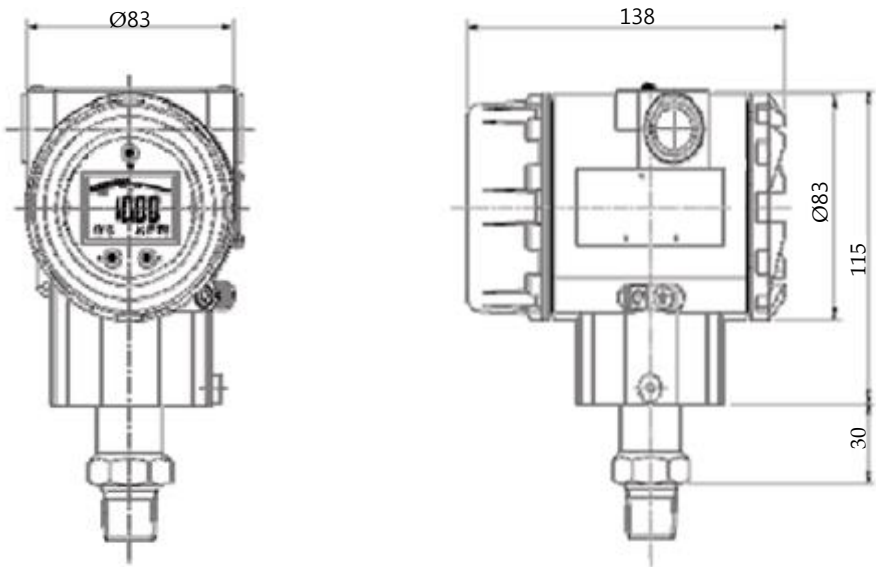
HART Protocol Wiring Diagram II



Measuring Range III

Range Code	Pressure Range				Transmitter	
	Low Range	High Range	Low Range	High Range	Gauge Pressure	Absolute Pressure
2	0 ~ 10 kPa	0 ~ 30 kPa	0 ~ 1020 mmH ₂ O	0 ~ 3059 mmH ₂ O	◆	◆
	0 ~ 100 mbar	0 ~ 300 mbar	0 ~ 40.15 inH ₂ O	0 ~ 120.4 inH ₂ O		
	0 ~ 1.450 psi	0 ~ 4.351 psi	0 ~ 0.102 kg/cm ²	0 ~ 0.306 kg/cm ²		
3	0 ~ 30 kPa	0 ~ 100 kPa	0 ~ 3059 mmH ₂ O	0 ~ 10197 mmH ₂ O	◆	◆
	0 ~ 300 mbar	0 ~ 1000 mbar	0 ~ 120.4 inH ₂ O	0 ~ 401.5 inH ₂ O		
	0 ~ 4.351 psi	0 ~ 14.50 psi	0 ~ 0.306 kg/cm ²	0 ~ 1.020 kg/cm ²		
4	0 ~ 100 kPa	0 ~ 200 kPa	0 ~ 10.20 MH ₂ O	0 ~ 20.39 MH ₂ O	◆	◆
	0 ~ 1000 mbar	0 ~ 2000 mbar	0 ~ 40.15 inH ₂ O	0 ~ 802.9 inH ₂ O		
	0 ~ 14.50 psi	0 ~ 29 psi	0 ~ 1.020 kg/cm ²	0 ~ 2.039 kg/cm ²		
5	0 ~ 200 kPa	0 ~ 700 kPa	0 ~ 20.39 MH ₂ O	0 ~ 71.38 MH ₂ O	◆	◆
	0 ~ 2.0 bar	0 ~ 7.0 bar	0 ~ 802.9 inH ₂ O	0 ~ 2810 inH ₂ O		
	0 ~ 29 psi	0 ~ 101.5 psi	0 ~ 2.039 kg/cm ²	0 ~ 7.138 kg/cm ²		
6	0 ~ 700 kPa	0 ~ 1.7 MPa	0 ~ 71.38 MH ₂ O	0 ~ 173.4 MH ₂ O	◆	◆
	0 ~ 7.0 bar	0 ~ 17.0 bar	0 ~ 2810 inH ₂ O	0 ~ 6825 inH ₂ O		
	0 ~ 101.5 psi	0 ~ 246.6 psi	0 ~ 7.138 kg/cm ²	0 ~ 17.34 kg/cm ²		
7	0 ~ 1.7 MPa	0 ~ 3.5 MPa	0 ~ 173.4 MH ₂ O	0 ~ 356.9 MH ₂ O	◆	◆
	0 ~ 17.0 bar	0 ~ 35.0 bar	0 ~ 6825 inH ₂ O	0 ~ 14051 inH ₂ O		
	0 ~ 246.6 psi	0 ~ 507.6 psi	0 ~ 17.34 kg/cm ²	0 ~ 35.69 kg/cm ²		
8	0 ~ 3.5 MPa	0 ~ 7.0 MPa	0 ~ 356.9 MH ₂ O	0 ~ 713.8 MH ₂ O	◆	◆
	0 ~ 35.0 bar	0 ~ 70.0 bar	0 ~ 14051 inH ₂ O	0 ~ 28102 inH ₂ O		
	0 ~ 507.6 psi	0 ~ 1015 psi	0 ~ 35.69 kg/cm ²	0 ~ 71.38 kg/cm ²		
9	0 ~ 7.0 MPa	0 ~ 32.0 MPa	0 ~ 713.8 MH ₂ O	0 ~ 3263 MH ₂ O	◆	◆
	0 ~ 70.0 bar	0 ~ 320.0 bar	0 ~ 28102 inH ₂ O	0 ~ 128468 inH ₂ O		
	0 ~ 1015 psi	0 ~ 4641.2 psi	0 ~ 71.38 kg/cm ²	0 ~ 326.3 kg/cm ²		
A	0 ~ 32 MPa	0 ~ 70 MPa	0 ~ 3263 MH ₂ O	0 ~ 7137.9 MH ₂ O	◆	◆
	0 ~ 320 bar	0 ~ 700.0 bar	0 ~ 128468 inH ₂ O	0 ~ 281024 inH ₂ O		
	0 ~ 4641.2 psi	0 ~ 10152.6 psi	0 ~ 326.3 kg/cm ²	0 ~ 713.8 kg/cm ²		
Z	Others range available.				◆	◆

Dimension IV



Order Code KC-9200 Series (Pressure Transmitter)

KC-9200 – – – – – P – – V –

Type Range D-Mat'l P-Conn' N-Mat'l C-Entry B-Mat'l Option

1 2 3 4 5 6 7 8

Pressure Type	Code 1
Stainless Steel 304	N
Stainless Steel 316	S

Pressure Range	Code 2
0 ~ 10 to 30 kPa	2
0 ~ 30 to 100 kPa	3
0 ~ 100 to 200 kPa	4
0 ~ 200 to 700 kPa	5
0 ~ 700 to 1.7 Mpa	6
0 ~ 30 to 100 kPa	7
0 ~ 1.7 to 3.5 Mpa	8
0 ~ 7.0 to 32 Mpa	9
0 ~ 32 to 70 Mpa	A
Other	Z

Diaphragm Material	Code 3
Stainless Steel 316L	N
Tantalum	T
Other	Z

Process Connection	Code 4
1/2" NPT	N
1/2" PT	P
Other	Z
Agency approved specified	W

Name Plate Material	Code 5
Carbon Steel	N
Stainless Steel 316	S

Cable Entry	Code 6
M20 X 1.5P Conduit Threads	1
1/2" NPT (Female)	2

Mounting Bracket Material	Code 7
None	N
Stainless Steel 304	4
Stainless Steel 316	6
Agency approved sepcified	W

Option	Code 8
None	NN
Explosion proof(Ex d IIC T6)	Ex
HART Signal(Compatible)	HT
Others	ZZ

* When placing an order, selected ordering number should be indicated on the purchase order sheet.

* Specifications are subject to change without notice.

Golden Rules Co.,Ltd





Golden Rules

• GOLDEN RULES

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GAS & LIQUID & STEAM
Mass & Total flowmeter
Specialized manufacturer

Distributor

Certified in accordance with

KC Q ISO 9001 : 2015

KC Q ISO 14001 : 2015

 (주)골든룰