Main_catalog

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Golden Rules Co.,Ltd

AIR, GAS, STEAM, LIQUID

Mass Flow Meters

Specialized manufacturer

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

Products

A. MASS FLOWMETER

Delivery performance ~ 345 EA

Client	Enduser	Model
The Yoon Synergy	The Yoon Synergy	FN-MASS KC-7730A, Compressed Air
ILJIN AIR TECH	ILJIN AIR TECH	FN-MASS KC-7730A, Compressed Air
COMP KOREA	COMP KOREA	FN-MASS KC-7730A,Compressed Air ~ **17EA**
Daejeon Urban Railway Corporation	Yuseong Hot Spring Pumping Station	FN-MASS KC-7730L, Water
BELTECH CO.,LTD	BELTECH LAP	FN-MASS KC-7730L, Water
Korea Institute of Machinery and Materials	Korea Institute of Machinery and Materials	KC-7730G-FM153BEx, 25A, LPG
Sepratech Co., Ltd.	Hanwha Ulsan Plant	FN-MASS KC-7730A, Compressed Air ~ **4EA**
GTC CO., LTD.	GTC CO., LTD.	FN-MASS KC-7730A, Compressed Air ~ 1**2EA**
Bugang Tech	Icheon (Remnant Corpse Disposal System)	KC-7730G-FM153BEx, 25A, LPG
BELTECH CO.,LTD	Beltech test league	FN-MASS KC-7730A, Compressed Air ~ **4EA**
Sambu General Machinery	Sambu General Machinery	FN-MASS KC-7730A, Compressed Air
Gyeongsan Paper	Gyeongsan Paper	KC-7730S-FM153BEx, 250A, Steam
Act Co., Ltd.	Act Co., Ltd.	FN-MASS KC-7730A, Compressed Air ~ **10EA**
SEON BO INDUSTRY	Busan (Gupyeong 2nd Factory)	FN-MASS KC-7730A, Compressed Air
Korea Institute of Machinery and Materials	Cheonan, Chungcheongnam-do (Puritech)	KC-7730G-FM153BEx,40A,O2 Gas ~ **4EA**
Korea Institute of Machinery and Materials	Cheonan, Chungcheongnam-do (Puritech)	FN-MASS KC-7730A, Compressed Air ~ **4EA**
TURBO MAN	Iksan, Jeollabuk-do (Hite Jujeong)	KC-7730L-FM153BEx, 25A, Ethanol
Pukyong National University	YONDANG CAMPUS	FN-MASS KC-7730A, Compressed Air
DONGIL CNE	Hanwha Onsan Plant	FN-MASS KC-7730A, Compressed Air
Kunyoung Machinery	Kunyoung Machinery	FN-MASS KC-7730A, Air ~ **10EA**
SUNHWAN ENG	Kunyoung Machinery	KC-7730OP-FM153BEx, 50A, NG
SEA ANTLE	SEA ANTLE	FN-MASS KC-7730A, Compressed Air ~ **2EA**
COMP KOREA	COMPRESSURED AIR	FN-MASS KC-7730A, Compressed Air ~ **3EA**
FINETECH	FINETECH	FN-MASS KC-7730A, Compressed Air ~ 1**5EA**
ILJIN MATERIAL	IKSAN PLANT	FN-MASS KC-7730A, Compressed Air ~ **2EA**
PURITECH	PURITECH	FN-MASS KC-7730A, Compressed Air ~ **4EA**
J KEISIS CO.,LTD,	J KEISIS CO.,LTD.	FN-MASS KC-7730A, Compressed Air ~ **22EA**
JUNG WOO FLOW	JUNG WOO FLOW	FN-MASS KC-7730A, Compressed Air ~ **3EA**
Kunyoung Machinery	Kunyoung Machinery	FN-MASS KC-7730A, Compressed Air ~ **10EA**
Wonkwang valve	STX ENGINE	KC-7730H-FM153B-G050-H2 Mixture
Kunyoung Machinery	Kunyoung Machinery	FN-MASS KC-7730GF, Compressed Air ~ **10EA**
VPE KOREA	VPE KOREA	FN-MASS KC-7730GF, Compressed Air
Kunyoung Machinery	Kunyoung Machinery	FN-MASS KC-7730GF, Compressed Air ~ **20EA**
Kunyoung Machinery	Kunyoung Machinery	FN-MASS KC-7730GF, Compressed Air ~ **30EA**
Kunyoung Machinery	Kunyoung Machinery	FN-MASS KC-7730GF, Compressed Air ~ **30EA**
BOYN E&M CO.,LTD.	Urban Railroad Corporation	FN-MASS KC-7730GF, Compressed Air
Kukdong Jeyeon	Kukdong Jeyeon	FN-MASS KC-7730WF, Water
Kukdong Jeyeon	Kukdong Jeyeon	KC-7730L-FM153B-G080-Ethylene Glycol
Korea Aerospace Research Institute	Korea Aerospace Research Institute	FN-MASS KC-7730G-FM153B, H2 Mixture ~ **3EA**
LG ELECTRONICS	Cheongju Factory	FN-MASS KC-7730S,스팀,100A,125A,200A ~ **3EA**
LG ELECTRONICS	Cheongju Factory	FN-MASS KC-7730G-FM153BEx,LNG,50A(2),65A(2),80A(1),100A,125A,150A ~ **8EA**
Kunyoung Machinery	Kunyoung Machinery	FN-MASS KC-7730GF, Compressed Air
SAMSUNG ELECTRONICS	For precise measurement of gas accumulation	KC-7730GF O2-65A, N2-32A ~ **2EA**
Korea Water Resources Corporation	Korea Water Resources Corporation	FN-MASS KC-7730SF 25A Steam, Water ~ **2EA**
Chungbuk Sewage Treatment Plant	For testing of water and wastewater facilities	KC-7730B-FM153BEx, 300A, 350A, Bio gas~ **2EA**
Innowill Co.,Ltd.	Korea Energy Research Institute	FN-MASS KC-7730GF,100A,50A,Blower Air ~ **2EA**

Client	Enduser	Model
INFORAD CO.,LTD.	Korea Energy Research Institute For vacuum pump precision flow test	FN-MASS KC-7730OP 공기 25A, 40A
Korea Energy Research Institute	Hydrogen charging station 1st and 2nd plants	KC-7730G-FM153B, H2 Mixture, 50A, 8.2barg 25.2-252 kg/h, 200'C
INNO WILL CO.,LTD.	Korea Energy Research Institute	FN-MASS KC-7730OP 50A, 65A, AIR ~ **2EA**
Toray Advanced Materials.	For precise measurement of gas accumulation	FN-MASS KC-7730OP-FM153B ~ **2EA** O2-65A, N2-32A
Energy Technology Evaluation Institute	Ammonia decomposition hydrogen production purification system	FN MASS KC-7730OP-FM153B ~ **2EA** 20A,NH3 Mix, 7.43barg, 20A-H2 Mix, 6.93barg
Korea Aerospace Industries' Sacheon site	Korean fighter KF-21 fuel system integrated rig test equipment	FN MASS KC-7730OP-FM153B ~ **12EA** JP-5,100A(2),15A(3), Liquid, 20A(6),32A(1)
Energy Technology Evaluation Institute	Alkaline water electrolysis for BOP hydrogen measurement	FN-MASS KC-7730OP-FM153B, ½:",5Nm3/h
KEPCO Electric Power Research Institute (Daejeon)	For precision measurement of hydrogen generators	FN-MASS KC-7730OP-FM153B 3/8", 200 LPM, 3-5 Barg
POSCO KWANG YANG	Nitrogen gas purification system	FN-MASS KC-7730OP, 150A, 5,000Nm3/h
POSCO Pohang Stainless Steel 3	For precise measurement of gas cutters	KC-7730OP-FM153B, 25A, LNG, O2 ~ 2EA
SK Innovation	For precise measurement of hydrogen gas	KC-7730H-FM153BEx, ½", 55-1520LPM, Nor17 Max 30Barg
Guri Sewage Treatment Plant	For precise measurement of biogas consumption	KC-7730G-FM153BEx, Bio gas, 80A ~ **3EA**
INNO WILL CO.,LTD.	Korea Energy Research Institute	FN-MASS KC-7730OP 150A, AIR
Haesung DS Co., Ltd. Changwon Headquarters	For precision measurement of semiconductor plasma process and hydrogen generator	KC-7730H-FM153BEx, 3/8",15-150LPM,3-5Barg
Uljin Livestock Manure Treatment Plant	For precision measurement of biogas for supply to generators	KC-7730B, Bio Gas, 50~500mmH20,,40~60'C 100A-800Nm3/h, 80A-500Nm3/h ~ **3EA**
LS Cable & System / POSCO R&D Center	For precise measurement of LNG consumption	LNG,80A,160Nm3/h,31'C,30Kpa,24V.RS-485~**6EA**
POSCO R&D Center	1For sintering steam research project	KC-7730S,Steam,250A,8-80Ton/h,193'C,8BAR
POSCO KWANG YANG	For precise steam measurement	KC-7730S,Steam,100A,7000kg/h,190'C,7Bar
Lithium Plus Geumsan Plant	Sodium hydroxide crystallization facility pjt for semiconductor fuel cell	KC-7730S,Steam,200A,150A,100A ~ **6EA** KC-7730L,Liquid,80A,40A,25A ~ **10EA**
Hyundai Motor	For precision testing of hydrogen generator	KC-7730H-FM153BEx, H2,3/8",2-40m3/h,8.2Barg ~ **2EA**
LG Energy Solution	Danil Gaschem Co., Ltd., for precise measurement of nitrogen gas	KC-7730G,N2 Gas,7.5Bar,70-1200Nm3/h,25'C
ECO PRO CO.,LTD.	For air precision measurement in laboratory test facilities	KC-7730G,Air,300A,130m3/min,95-101Kpa,25'C
Eumseong Livestock Manure Treatment Plant	For precision measurement of biogas for supply to generators	KC-7730B, Bio Gas, 50~300mmH20,,40~60'C 125A-125Nm3/h, 208Nm3/h ~ **3EA**
Posco Pohang	For precision measurement of air lines	KC-7730G,50A,800Kpa,25'C,63-630Nm3/h
Water Resources Corporation	Membrane filter for precise measurement of air	KC-7730G,300A,25'C,0.8Bar,800-8000Nm3/h
Daejeon Techno Park Hydrogen Electric Vehicle	For precise measurement of hydrogen gas at hydrogen charging stations	KC-7730H-FM153BEx, H2 GAS, ½", 1~10Nm3/min, 20'C, 250Bar
Ulsan Sewage Treatment Plant	For precise steam line measurement	KC-7730S-FM153BEx, Steam, 50A, 1~10Ton/h, 205'C, 17Bar
Korea Land & Housing CorporationHwaseong Dongtan 2 Clean Energy C	For precision measurement of biogas trade	KC-7730B-FM153BEx, Bio gas, 250mmAq, 30~40'C, 50A, 20-200Nm3/h ~ **2EA** 100A, 28~280Nm3/h ~ **1EA**
Hyundai Motor	Hydrogen equipment, for precise measurement of hydrogen gas	KC-7730H-FM153BEx, 10A, H2 GAS, 5000SLPM -50~95'C, 40BAR ~ **3EA**
Posco Pohang	For precision measurement of air lines	KC-7730G,50A,800Kpa,25'C,63-630Nm3/h ~**3EA**
Maeil Dairies Gochang Cheese Factory	For Steam EMS System Project	KC-7730S,80A,125A179'C,7.9BAR ~ **2EA**
ECO PRO CO., LTD.	For O2 Gas trading	KC-7730-FM153B, 80A, O2 Gas, 30-1,500Nm3/h 25'C, 8.8 Bar
Hyundai Rotem Tongyeong Hydrogen Refueling Station	For hydrogen gas trading	KC-7730H-FM153B,20A,2-70kg/h,40'C,200Bar~ **3EA**
Gunpo Biomass Plant	for biogas trade	KC-7730B-FM153B,200A,120-4,200Nm3/h
Environmental Facility Management Co., Ltd.	For biogas trade	KC-7730B-FM153BEx, Bio gas, 250mmAq, 20~30'C, 100A, 10-300Nm3/h ~ **3EA**
KEPCO Research Institute	For hydrogen generator measurement	KC-7730H-FM153B,20A-20Nm3/h,100Nm3/h,40- 90'C,9.7Bar, 15A-140Nm3/h, 100'C, 200Bar ~ **3EA**

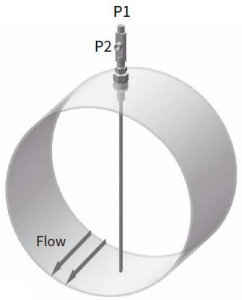
FLOW MEASUREMENT PRINCIPLE

■D/P type

FN mass flow sensor (orifice, flow nozzle, venturi nozzle, pitot)
Orifice piping pipe standard: D-0.5D / Corner / Flange
Absolute pressure and differential pressure sensor:
H2 Gas : STS316L+Plated Gold Special Gas : STS316, STS316L
Temperature sensor : RTD Pt100 (3-wire)

Flow Nozzle type

Venturi Cone 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, Venturi, V-Cone, Pitot tube 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[m^3/s]
ρ_1 = upstream density[kg/m^3]
Δp = differential pressure[Pa]

01

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Golden Rules Co.,Ltd

Compressed Air

FN-Mass Flow Meter

KC-7730A Series

The nation's development item, 100% domestic goods,Patent **NO.** 10-1606497

APPLICATION

◆ Simply select to suit the application

Application	Type		Mass Flowmeter	
			D/P-type FN-MASS FLOWMETER	
Object of Measurement	Liquid		O	
	Gas		O	
	Vaper		O	
	steam		O	
Application	control		O	
	Monitor		O	
	Supply		O	
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		Max 10 barg	
	Pressure loss		Negligible	
	Range ability		Large	
Installing condition	Bore		Ø10 to Ø500	
	Straight	upstream	10 ~ 7D	
	Pipe length	downstream	5 ~ 2D	
	Piping work		Required	
	Explosion-proofing		O	
Performance	Accuracy		Gas	±0.5% F.S(Option: 0.1%)
			Liquid & Oil	±0.5% F.S(Option: 0.1%)
			Steam	±0.5% F.S(Option: 0.1%)
	Velocity		Gas	0.1~100 m/s
			Liquid & Oil	0.1~100 m/s
			Steam	0.1~100 m/s

01 FN-MASS FLOWMETER (Air)

1 FN-Mass type KC-7730A Series

Air type
FN-Mass Flowmeter
KC-7730A Series

Features

5-for multi-measurement

- **Rate, integrated, volume, mass flow, temp', pressure, density indication**
- Input Power DC 24 V, < 100mA
- Output accuracy ±0.1 %, ±2.5 μA
- Field validation of flowmeter calibration settings
  Smart program interface (RS-485 standard)
- Direct mass measurement of the flow function eliminates the need for additional temperature and pressure compensation
- Simple signal Processing & calibration
- Built-in flow function of compression coefficient, expansion coefficient, viscosity coefficient, direct calculation formula
- 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 35:1, Option 50:1)
- 0.1-second response to changes in flow rate
- Measurement for compressed air only (max. 10 Barg)
- High temperature fluid measurement up to 400'C(Option)
- CE, Ex(IP67)

Description

Golden Rules' KC-7730A Series FN-Mass flowmeter accommodates the change measurement Requirements and instrument-validation demands of fluid flow monitoring installations.
It is a LOK Fitting, Flange type, and it is a microprocessor commercially capable of measuring flow rate, adjusting flow rate, and diagnosing at the same time.
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 Rule's KC-7730A series is a product designed based on differential pressure mass flow measurement technology.

Golden Rule's KC-7730A series is a product designed based on FN-mass flow measurement technology, and is a built-in flow function that takes into account the compression coefficient, expansion coefficient, and viscosity coefficient. Enthalpy, etc. can be provided to the user.

Performance Specifications

◆ Accuracy of Point Velocity
±0.5% of F.S / ±1.0% of R.D
(Option : ±0.75% of R.D)

◆ Repeatability
±0.5% of Full Scale

◆ Sensor Accuracy
< 0.2% of span

◆ Turndown Ratio
35:1 (Option 50:1)

◆ Pressure Loss
0.1 ~ Below 0.3 Bar

◆ Response Time
0.1 second

◆ Measuring Range
0.1 ~ 100 m/sec

◆ Function
5-for multi-measurement : rate, total, volume, mass, density, temp', pressure, energy indication

Mass Flow Rates (Air)

Air Flow Ranges							
Pipe Size (배관경)		Minimum (최소)		Maximum (최대)		Weight (줄량)	
A	B	Nm3/m	N㎥/h	Nm3/m	N㎥/h	방폭	일반
15A	½-inch	0.13	8.0	1.33	80	5kg	3kg
20A	¾-inch	0.27	16	2.7	160	5kg	3kg
25A	1-inch	0.4	24	120	240	6kg	4kg
40A	1½-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 N㎥/h 1Atm

Operating Specifications

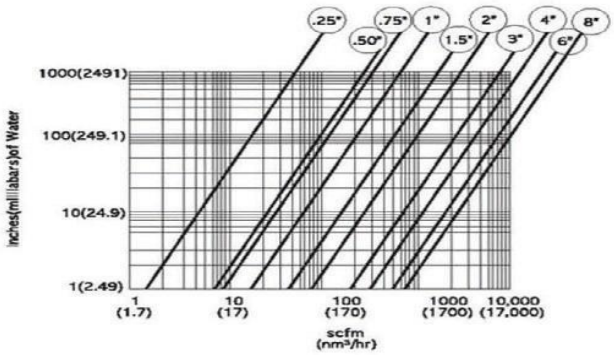
◆ Fluid
Air & Gas

◆ Input Power
DC 24 V ±10 %, < 100 Ma

100~240VAC ±10 %, < 10 Watts

◆ Output Signal
Linear 4 ~ 20 mA, 4Wire
RS-485S
Pulse (Option)

◆ Pressure Drop
15.5 kpa



◆ Fluid & Ambient temperature

Air : -40 ~ 100 ℃ (-40 ~ 212 ℉) Option : 110 ~ 400℃ (230 ~ 732 ℉)
Pipe Temp' : Over 300 ℃ 이상 (572 ℉)
Ambient : -4 ~ 185 ℉ (-20 ~ 85 ℃) Option : -70 ~ 100 ℃ (-94 ~ 212 ℉)

◆ Pressure (limitations)

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

◆ Displays

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

◆ Totalizer

Flow rate and total oxygen point (0000. / 000.0/ 00.00 / 0.000)
Seven digits (9,999,999,99.9 Count) in engineering units Reset table by Software

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, prefereed 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 – STS316 (Option : STS316L)
Flow inline Body – STS304 (Option : STS316, STS316L)

◆ Enclosure

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

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

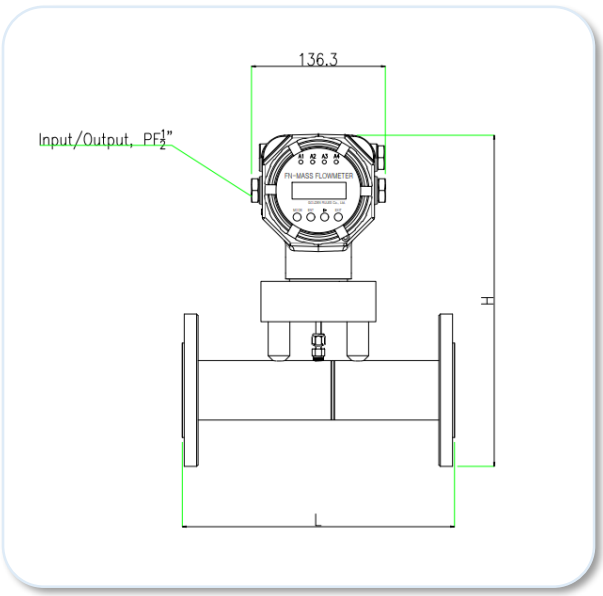
◆ Mounting (Selection)

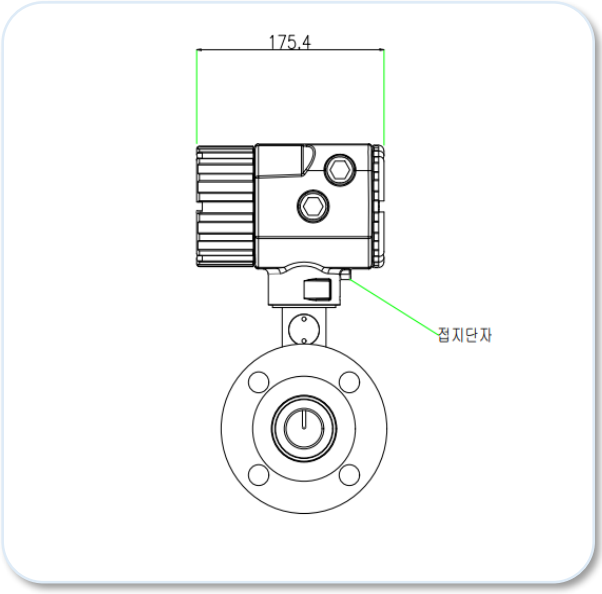
ANSI 150lb Flange, JIS 10k RF Flange, other

◆ Certification

CE (CASE)
KCS Certificate
Atex Certificate
Ex (Ex d IIC T6)

Dimensional Spec'& Chart KC-7730A





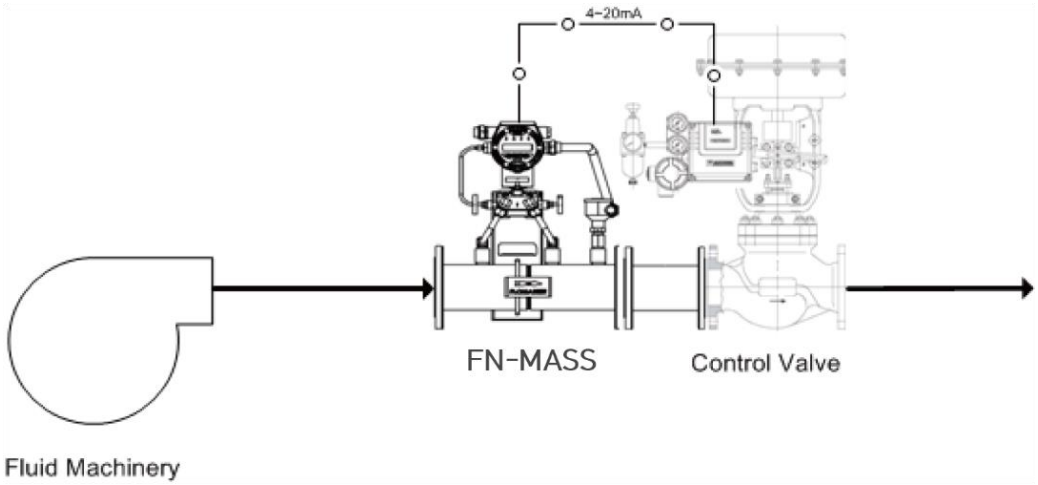
※ The shape of the sensor and housing manufacturers are subject to change

Unit : mm

Size	H	L
15A	375	300
20A	380	300
25A	390	300
32A	402	300
40A	406	300
50A	420	300
65A	442	300
80A	442	350
100A	451	400
125A	508	409
150A	540	451
200A	575	522
250A	626	602
300A	684	672

The 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 ± 0.5% precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7730A FN-Mass Flowmeter)

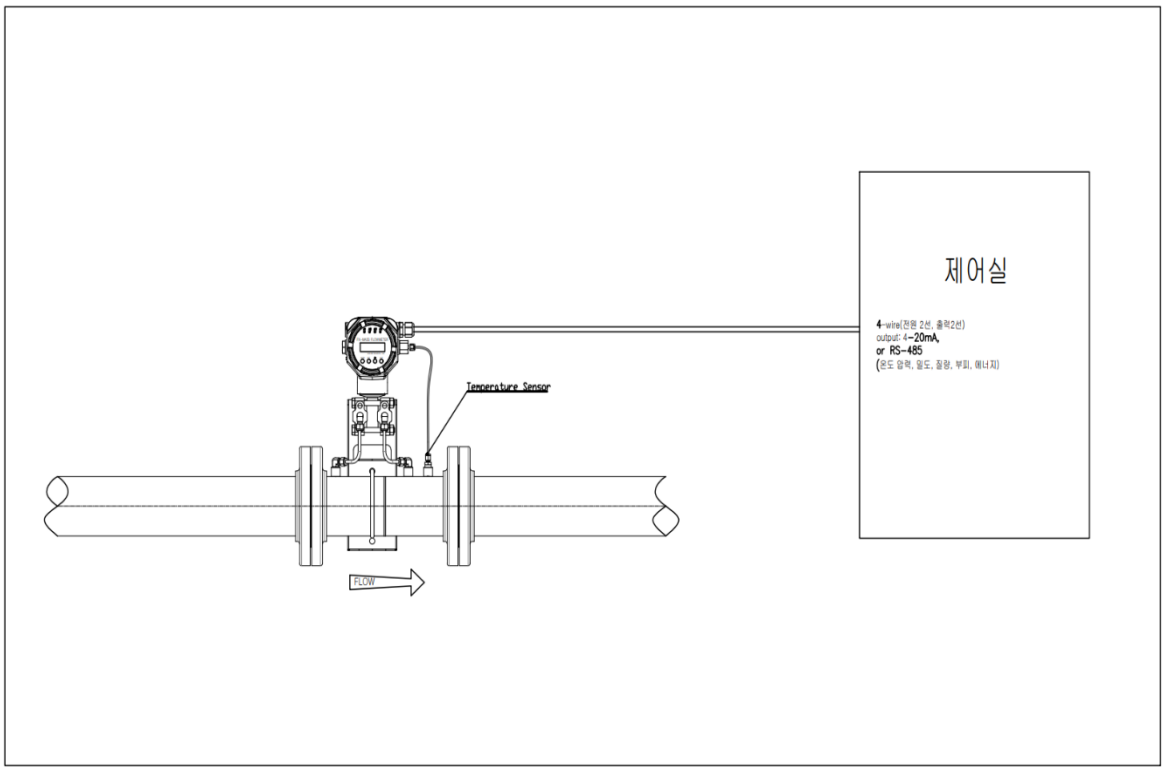
Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730A Smart- IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows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

APPLICATION

◆ Overview and Advantages of All-In-One FN Mass

1. Significantly reduced installation construction cost.
2. Since it is a direct type FN mass flow meter, the accuracy is much higher than the existing differential pressure type (±0.1% F.S)
3. Wide range of flow rate when measuring high temperature, high pressure and large flow rate (turndown ratio 50:1)
4. Simultaneous monitoring of 5 data (flow rate, temperature, pressure, density, heat amount) by the central cancer monitoring panel with communication output
5. Easy to install as it is a temperature/pressure sensor/flow computer all-in-one mass flow meter



Order Code KC-7730A Series (FN-Mass Flowmeter)

	Type		Flange	Conn` Spec			Enclosure		Power		Output		Display		Direction	Cal 1	Cal 2		Pressure		Option
KC-77							E		P		V							-		-	
	1		2	3	4	5	6	7	8		9		10		11	12	13		14		15

Type	Code 1
Compressed Air	30A
Blower Air	30BA
Fuel Gas	30FG
Hazardous-Area Location Endosure	FM153B
Agency approved, customer specified	W

Connection form	Code 2
LOK : 3/8", ½", ¾", 1"	L / V
Thread : 3/8", ½", ¾", 1"	T
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
AC 100-240 V ±10 %, 10 watts	3
Agency approved, customer specified	W

Output (Selection)	Code 9
DC 4-20mA, 4Wire (Std.)	1
RS-485S (Std.)	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 U P	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 Below 145 psig (10 barg)	L
Agency approved, customer specified	W

Option	Code 15
Material : STS316, STS316LSS	H
Agency approved, customer specified	W

02

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ALL Gas

FN-Mass Flow Meter

KC-7730G Series

The nation's development item, 100% domestic goods,Patent **NO.** 10-1606497

APPLICATION

◆ Simply select to suit the application

Application	Type		Mass Flowmeter	
			D/P-type FN-MASS FLOWMETER	
Object of Measurement	Liquid		O	
	Gas		O	
	Vaper		O	
	steam		O	
Application	control		O	
	Monitor		O	
	Supply		O	
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 / 30 barg / Max 450 barg	
	Pressure loss		Negligible	
	Range ability		Large	
Installing condition	Bore		Ø10 to Ø500	
	Straight	upstream	10 ~ 7D	
	Pipe length	downstream	5 ~ 2D	
	Piping work		Required	
	Explosion-proofing		O	
Performance	Accuracy		Gas	±0.5% F.S(Option: 0.1%)
			Liquid & Oil	±0.5% F.S(Option: 0.1%)
			Steam	±0.5% F.S(Option: 0.1%)
	Velocity		Gas	0.1~100 m/s
			Liquid & Oil	0.1~100 m/s
			Steam	0.1~100 m/s

02 FN-MASS FLOWMETER (Gas)

2. FN-MASS KC-7730G Series

All Gas
KC-7730G

Features

- Mixed gas Automatic Calculator (4~20mA input : 8-Channel)
- **5-for multi-: Rate, integrated, volume, mass flow, temp', pressure, density**
- Input Power DC 24 V, < 100mA
- Output accuracy ±0.1 %, ±2.5 μA (4~20 mA, 4-Wire)
- Field validation of flowmeter calibration settings
  Smart program interface (RS-485 standard)
- Direct mass measurement of the flow function eliminates the need for additional temperature and pressure compensation
- Simple signal Processing & calibration
- Built-in flow function of compression coefficient, expansion coefficient, viscosity coefficient, direct calculation formula
- 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 (Turndown ratio 35:1, Option 50:1)
- 0.1-second response to changes in flow rate
- High pressure fluid can be measured (up to 400 Barg)
- High temperature fluid measurement up to 400'C
- CE, Ex(IP67)

Description

Golden Rules' KC-7730G Series FN-Mass flowmeter accommodates the change measurement requirements and instrument-validation demands of fluid flow monitoring installations.
It is a LOK Fitting, Flange type, and it is a microprocessor commercially capable of measuring flow rate, adjusting flow rate, and diagnosing at the same time.
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 Rule's KC-7730G series is a product designed based on differential pressure mass flow measurement technology.

Golden Rule's KC-7730G series is a product designed based on differential pressure mass flow measurement technology. It is a built-in flow function that takes into account the compression coefficient, expansion coefficient, and viscosity coefficient rather than the conventional temperature and pressure correction method. Enthalpy, etc. can be provided to the user.

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

◆ Turndown Ratio

35:1 (Option 50:1)

◆ Pressure Loss

0.1 ~ Below 0.3 Bar

◆ Response Time

0.1 second

◆ Measuring Range

0.1 ~ 100 m/sec

◆ Function

5-for multi-measurement : rate, total, volume, mass, density, temp', pressure, energy indication

Mass Flow Rates (Air)

Air Flow Ranges							
Pipe Size		Minimum		Maximum		Weight	
A	B	Nm3/m	N㎥/h	Nm3/m	N㎥/h	방폭	일반
15A	½-inch	0.13	8.0	1.33	80	5kg	3kg
20A	¾-inch	0.27	16	2.7	160	5kg	3kg
25A	1-inch	0.4	24	120	240	6kg	4kg
40A	1½-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 N㎥/h 1Atm

Operating Specifications

◆ Fluid

All Gas, Mixed Gas, Air

◆ Input Power

DC 24 V ±10 %, < 100 mA

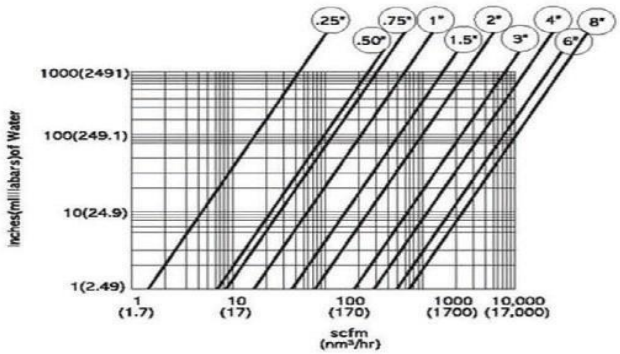
100~240VAC ±10 %, < 10 Watts

◆ Output Signal

Linear 4 ~ 20 mA, 4Wire
RS-485
Pulse (Option)

◆ Pressure Drop

15.5 kpa



Mass Flow Range 2

Air Flow Ranges							
Pipe Size		Nm3//min, SL/min		Nm3/h, kg/h		Spec'	
A	B	Min.	Max.	Min.	Max.	Fluid	Press'/Temp'
25A	1-inch	14.3 SL/min	500 SL/min				105-110KPa/ 40-60'
32A	2 ½"-inch			6.7 Nm3/h	74 Nm3/h		
40A	1 ½-inch	142.9 SL/min	5,000 SL/min				105-110KPa/ 40-60'
50A	2-inch			14.3 Nm3/h 63 Nm3/h	500 Nm3/h 630 Nm3/h		105-110KPa/ 40-60 800 Kpa / 25'C
65A	2 ½-inch			34.3 kg/h	1,200 kg/h		105-110KPa/ 40-60
80A	3-inch						
100A	4-inch			85.7 kg/h	3,000 kg/h		105-110KPa/ 40-60
150A	6-inch			217 kg/h	7,600 kg/h		105-110KPa/ 40-60
200A	8-inch						
250A	10-inch						
300A	12-inch	3.7 Nm3/min	135 Nm3/min	800 Nm3/h	8,000 Nm3/h		95-101 Kpa / 0.8 Bar 25'C

N2, O2 Gas Flow Ranges							
Pipe Size		Nm3//min / kg/min		Nm3/h / kg/h		Spec'	
A	B	Min.	Max.	Min.	Max.	Fluid	Press'/Temp'
25A	1-inch	1.7 8.6	60 300	145	5,100	N2 Gas O2 Gas	7-8 Bar / 20-25'C 20 Bar / 20-25'C
32A	2 ¼"-inch			10 kg/h 14.3 kg/h	100 kg/h 500 kg/h	N2 Gas O2 Gas	6.5-7 Bar / 20'C 6.5-7 Bar / 20'C
40A	1 ½-inch			18.6 kg/h	650 kg/h	O2 Gas	7 Bar / 20'C
50A	2-inch						
65A	2 ½-inch			2.9 kg/h 50 kg/h	100 kg/h 500 kg/h	N2 Gas O2 Gas	6.5-7 Bar / 20'C 6.5-7 Bar / 20'C
80A	3-inch			4.6 30	160 1,500	O2 Gas	10KPa / 40'C 8.8 Bar / 25'C
100A	4-inch			70	1,200	N2	7.5 Bar / 25'C

LNG, LPG Flow Ranges							
Pipe Size		Nm3//min		Nm3/h		Spec'	
A	B	Min.	Max.	Min.	Max.	Fluid	Press'/Temp'
25A	1-inch	1.7	60	3.4	120	LNG LPG	6 Bar / 20-25'C 9 Bar / 25'C
40A	1 ½-inch						
50A	2-inch			4.3	150	LNG	5 Bar / 20'C
80A	3-inch			4.6	160	LNG	10KPa / 40'C
100A	4-inch						

◆ Fluid & Ambient temperature

Air : -40 ~ 100 ℃ (-40 ~ 212 ℉) Option : 110 ~ 400℃ (230 ~ 732 ℉)
Pipe Temp' : Over 300 ℃ 이상 (572 ℉)
Ambient : -4 ~ 185 ℉ (-20 ~ 85 ℃) Option : -70 ~ 100 ℃ (-94 ~ 212 ℉)

◆ Pressure (limitations)

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

◆ Displays

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

◆ Totalizer

Flow rate and total oxygen point (0000. / 000.0/ 00.00 / 0.000)
Seven digits (9,999,999,99.9 Count) in engineering units Reset table by Software

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, prefereed 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 – STS316 (Option : STS316L)
Flow inline Body – STS304 (Option : STS316, STS316LS)

◆ Enclosure

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

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

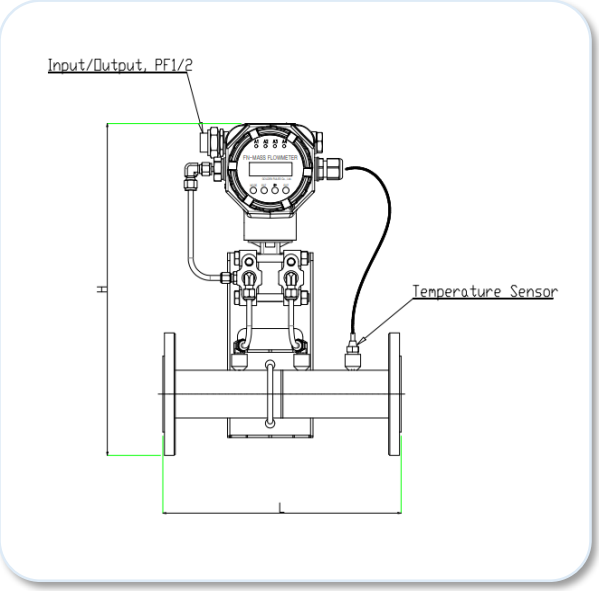
◆ Mounting (Selection)

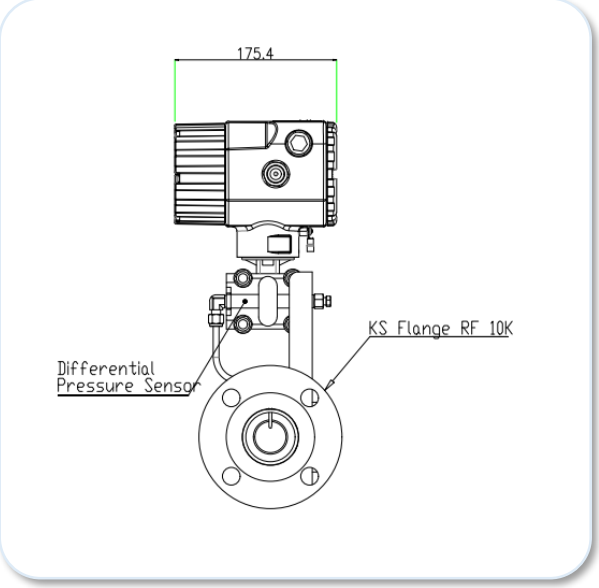
ANSI 150lb Flange, JIS 10k RF Flange, other

◆ Certification

CE (CASE)
KCS Certificate
Atex Certificate
Ex (Ex d IIC T6)

Dimensional Spec & Chart KC-7730G(B)





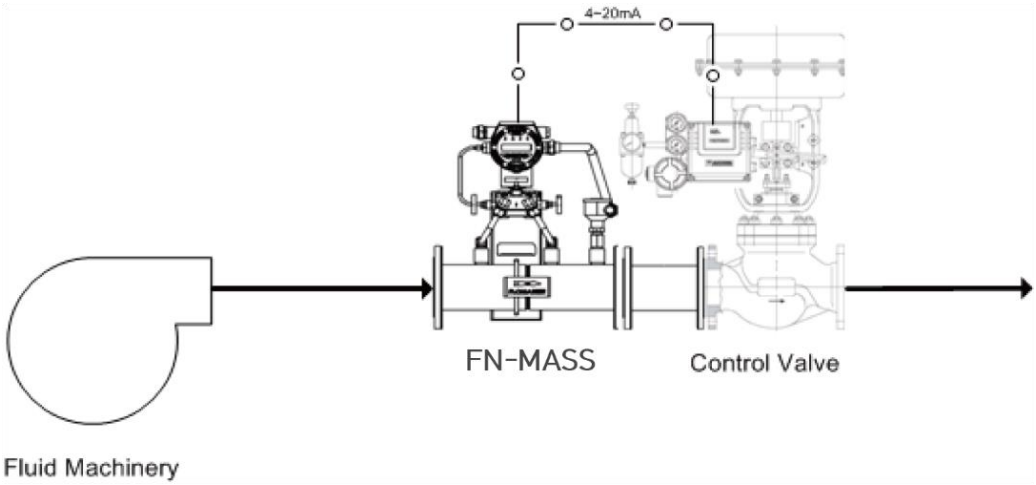
※ The shape of the sensor and housing manufacturers are subject to change

Unit : mm

Size	H	L
15A	375	300
20A	380	300
25A	390	300
32A	402	300
40A	406	300
50A	420	300
65A	442	300
80A	442	350
100A	451	400
125A	508	409
150A	540	451
200A	575	522
250A	626	602
300A	684	672

The 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 ± 0.5% precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7730G D/P-Mass Flow meter)

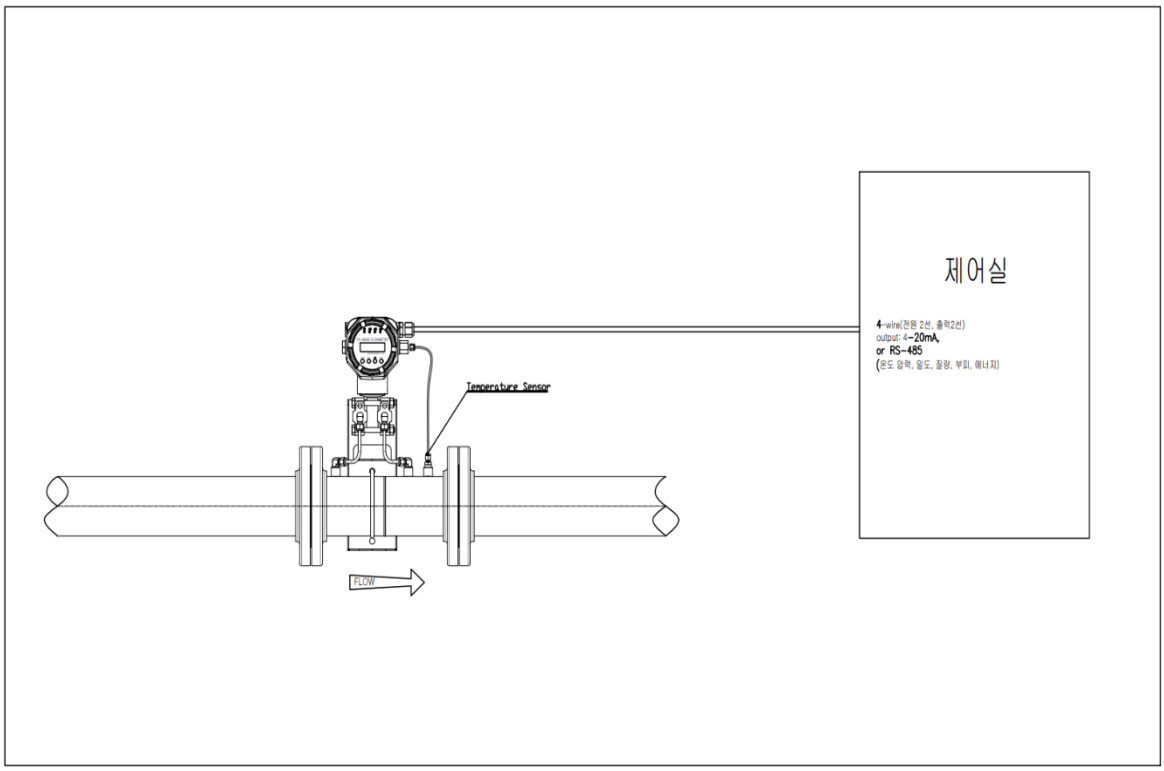
Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730G Smart– IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows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

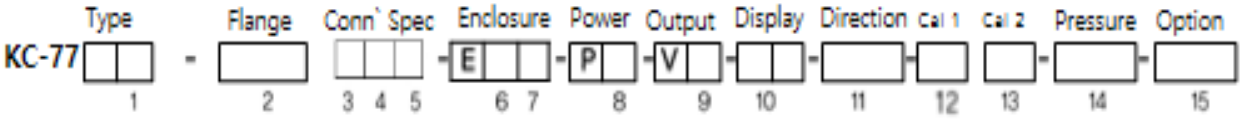
APPLICATION

◆ Overview and Advantages of All-In-One FN Mass

1. Significantly reduced installation construction cost.
2. Since it is a direct type FN mass flow meter, the accuracy is much higher than the existing differential pressure type (±0.1% F.S)
3. Wide range of flow rate when measuring high temperature, high pressure and large flow rate (turndown ratio 50:1)
4. Simultaneous monitoring of 5 data (flow rate, temperature, pressure, density, heat amount) by the central cancer monitoring panel with communication output
5. Easy to install as it is a temperature/pressure sensor/flow computer all-in-one mass flow meter



Order Code KC-7730G Series (FN-MASS FLOWMETER)



Type	Code 1
Gas	30G
Mixed gas	30MX
Blower air	30BA
Hazardous-Area Location Endosure	**FM153B**
Agency approved, customer specified	W

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

Connecion 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 %, 60 ㎃	2
AC 100-240 V ±10 %, 10 watts (옵션)	3
Agency approved, customer specified	W

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

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

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

Calbration1[9] (Gas)	Code 12
Standard Calibration (Small Size)	A
Air, only for 1/2" and large pipe Size	
Compressed Air, only for 2" and large pipe size	D
Customer Calibration	B
Agency approved, customer specified	W

Calbration2[9] (Gas)	Code 13
70 ℉(21 ℃) 14.7 psig (1.103 barg)	A
32 ℉(0 ℃) 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)
Agency approved, customer specified	W

Option	Code 15
Oerating temp': max 400'C	Option
Pulse	Option
Agency approved, customer specified	W

03

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Bio Gas

FN-Mass Flow Meter

KC-7730B Series

The nation's development item, 100% domestic goods,Patent **NO.** 10-1606497

APPLICATION

◆ Simply select to suit the application

Application	Type		Mass Flowmeter	
			D/P-type FN-MASS FLOWMETER	
Object of Measurement	Liquid		O	
	Gas		O	
	Vaper		O	
	steam		O	
Application	control		O	
	Monitor		O	
	Supply		O	
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		Min. 20mmAq / Nor. 300mmAq/ Max 1Bar	
	Pressure loss		Negligible	
	Range ability		Large	
Installing condition	Bore		Ø10 to Ø500	
	Straight Pipe length	upstream	10 ~ 7D	
		downstream	5 ~ 2D	
	Piping work		Required	
	Explosion-proofing		O	
Performance	Accuracy		Gas	±0.5% F.S(Option: 0.1%)
			Liquid & Oil	±0.5% F.S(Option: 0.1%)
			Steam	±0.5% F.S(Option: 0.1%)
	Velocity		Gas	0.1~100 m/s
			Liquid & Oil	0.1~100 m/s
			Steam	0.1~100 m/s

03 FN-MASS FLOWMETER (Bio Gas)

3. FN-MASS KC-7730B Series

Bio Gas
KC-7730B

Features

- Mixed gas Automatic Calculator (4~20mA input : 8-Channel)
- **5-for multi-: Rate, integrated, volume, mass flow, temp', pressure, density**
- Input Power DC 24 V, < 100mA
- Output accuracy ±0.1 %, ±2.5 μA (4~20 mA, 4-Wire)
- Field validation of flowmeter calibration settings
  Smart program interface (RS-485 standard)
- Direct mass measurement of the flow function eliminates the need for additional temperature and pressure compensation
- Simple signal Processing & calibration
- Built-in flow function of compression coefficient, expansion coefficient, viscosity coefficient, direct calculation formula
- 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 (Turndown ratio 35:1, Option 50:1)
- 0.1-second response to changes in flow rate
- High pressure fluid can be measured (up to 400 Barg)
- High temperature fluid measurement up to 400'C
- CE, Ex(IP67)

Description

Golden Rules' KC-7730B Series D/P type FN-Mass flowmeter accommodates the change measurement requirements and instrument-validation demands of fluid flow monitoring installations.
It is a LOK Fitting, Flange type, and it is a microprocessor commercially capable of measuring flow rate, adjusting flow rate, and diagnosing at the same time.
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 communicaion port and Golden Rule's KC-7730B series is a product designed based on differential pressure mass flow measurement technology.

Golden Rule's KC-7730B series is a product designed based on differential pressure mass flow measurement technology. It is a built-in flow function that takes into account the compression coefficient, expansion coefficient, and viscosity coefficient rather than the conventional temperature and pressure correction method. Enthalpy, etc. can be provided to the user.

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

◆ Turndown Ratio

35:1 (Option 50:1)

◆ Pressure Loss

0.1 ~ Below 0.3 Bar

◆ Response Time

0.1 second

◆ Measuring Range

0.1 ~ 100 m/sec

◆ Function

5-for multi-measurement : rate, total, volume, mass, density, temp', pressure, energy indication

Mass Flow Rates (Bio gas)

Bio gas Flow Ranges				
Pipe Size		Minimum	Maximum	Pressure / Temp'
A	B	Nm³/h	Nm³/h	Pressure / Temp'
50A	2-inch	4.8	160 (digester)	250mmAq / 30-40'C
80A	3-inch	20	700 (generator)	1,250mmAq 1,350mmAq 1,500mmAq / 25-30'C
100A	4-inch	10	350 (digester) 300 (digester)	250/300mmAq / 25-30'C
125A	5-inch	8.6	300 (generator)	1,500mmAq/ 20-35'C
150A	6-inch	14.3	500 (digester)	200mmAq / 35-40'C
200A	8-inch	28.6	1,000 (digester)	250mmAq / 30'C

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

Operating Specifications

◆ Fluid

Bio Gas, Mixed Gas

◆ Input Power

DC 24 V ±10 %, < 100 mA

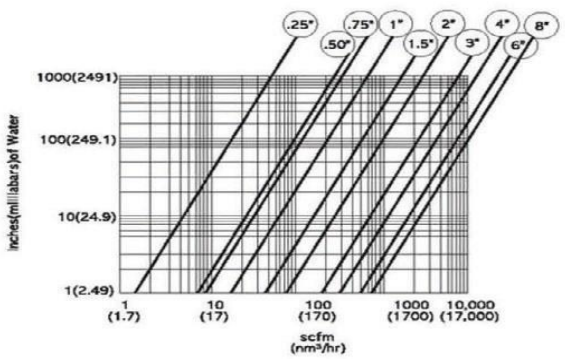
100~240VAC ±10 %, < 10 Watts (Option)

◆ Output Signal

Linear 4 ~ 20 mA, 4Wire
RS-485S

◆ Pressure Drop

15.5 kpa



◆ Fluid & Ambient temperature

Gas : -40 ~ 100 ℃ (-40 ~ 212 ℉) Option : 110 ~ 400℃ (230 ~ 732 ℉)
Pipe Temp' : Over 300 ℃ 이상 (572 ℉)
Ambient : -4 ~ 185 ℉ (-20 ~ 85 ℃) Option : -70 ~ 100 ℃ (-94 ~ 212 ℉)

◆ Pressure (limitations)

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

◆ Displays

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

◆ Totalizer

Flow rate and total oxygen point (0000. / 000.0/ 00.00 / 0.000)
Seven digits (9,999,999,99.9 Count) in engineering units Reset table by Software

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, prefereed 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 – STS304 (Option : STS316, STS316L)
Flow inline Body – STS304 (Option : STS316, STS316L)

◆ Enclosure

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

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

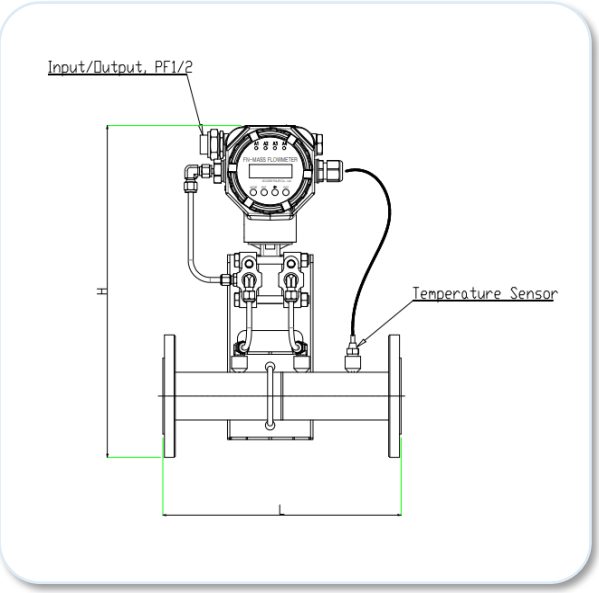
◆ Mounting (Selection)

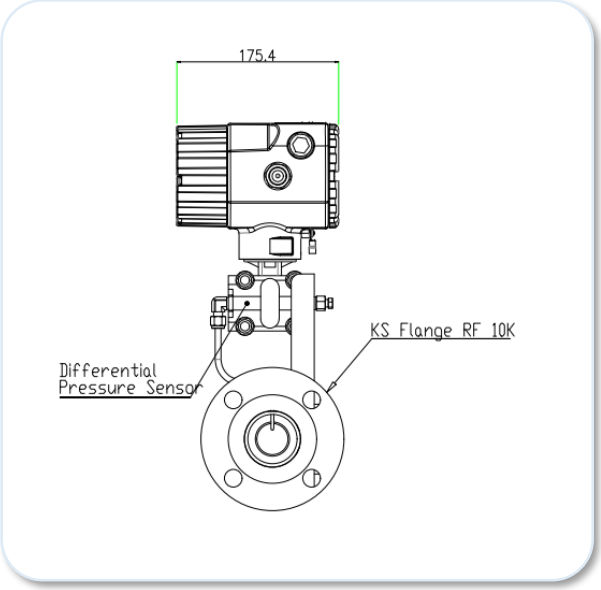
ANSI 150lb Flange, JIS 10k RF Flange, other

◆ Certification

CE (CASE)
KCS Certificate
Atex Certificate
Ex (Ex d IIC T6)

Dimensional Spec & Chart KC-7730B





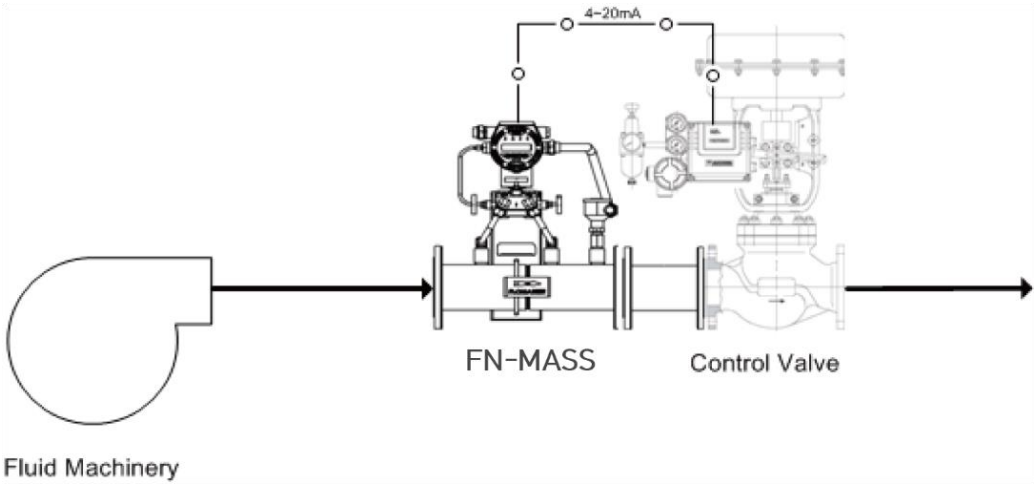
※ The shape of the sensor and housing manufacturers are subject to change

Unit : mm

Size	H	L
15A	375	300
20A	380	300
25A	390	300
32A	402	300
40A	406	300
50A	420	300
65A	442	300
80A	442	350
100A	451	400
125A	508	409
150A	540	451
200A	575	522
250A	626	602
300A	684	672

The 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 ± 0.5% precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7730B FN-Mass Flow meter)

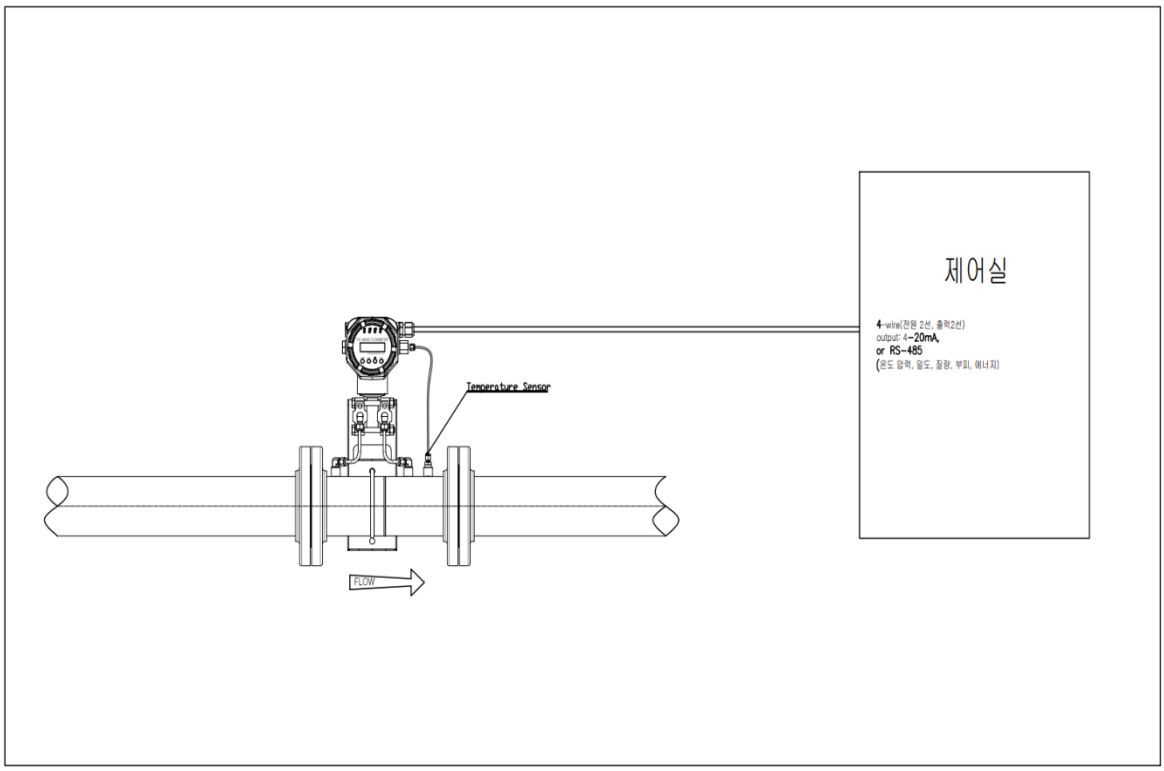
Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730B Smart– IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows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

APPLICATION

◆ Overview and Advantages of All-In-One FN Mass

1. Significantly reduced installation construction cost.
2. Since it is a direct type FN mass flow meter, the accuracy is much higher than the existing differential pressure type (±0.1% F.S)
3. Wide range of flow rate when measuring high temperature, high pressure and large flow rate (turndown ratio 50:1)
4. Simultaneous monitoring of 5 data (flow rate, temperature, pressure, density, heat amount) by the central cancer monitoring panel with communication output
5. Easy to install as it is a temperature/pressure sensor/flow computer all-in-one mass flow meter



APPLICATION : Digester bio gas

Sewage treatment plant, livestock manure, landfill, food wastewater biogas
Currently, we are experiencing many difficulties due to the problem of biogas flowmeters installed across the country. As a replacement for imported ultrasonic flowmeters, our differential pressure mass flowmeter is becoming an alternative. There is no hunting and high accuracy when measuring biogas containing contaminants such as moisture, particles, and dust. Currently, 21 sets are under approval at 8 sites including 4 major sewage treatment plants, landfill sites in the metropolitan area, Miryang, and Uljin livestock manure treatment plants.

◆ **Client : Cheongju Environment Office ~ 1 Set**

Fluid : Bio gas
Size : 350A (for digester main)
Fluid temperature : 25~40 ' C
Flow range : 50 ~ 1,000Nm3/h
Operating pressure : 50~300mmAq
Design pressure : 500mmAq

For measuring the rear end of digester tank

◆ **Environmental Management Corporation project**

* Fluid : Bio gas
* Line size : 100A (for gas holder main)
* Flow range : 50 ~ 500 Nm3/hr
* Flow pressure : 50 ~ 250 mmH20
* Fluid temperature : 40 ~ 60'C
* Delivery quantity : 1 Set

Based on the know-how accumulated in the anaerobic biogas field for the past 11 years, this is a differential pressure mass flow meter exclusively developed for biogas.

The biogas coming out of the digester tank by the natural pressure (25~250mmH20) is not only very low pressure due to its characteristics, but it is also full of moisture, dust, and particles, so it is impossible to measure it with an existing flowmeter.

◆**The reason why it cannot be used with an existing flow meter is briefly listed.** The thermal mass flow meter is a measurement method using a temperature difference, and there is hunting and errors in the flow rate due to moisture. The turbine flowmeter does not rotate the blades due to the corrosion of the rolling holding the turbine blades. The vortex flowmeter is a product used in high-pressure lines and cannot measure low pressure. Existing differential pressure flowmeters cannot measure the low pressure line and cause errors due to moisture.

APPLICATION : Digester Bio Gas

◆Client : Guri Sewage Treatment Plant

◆ Project name : Digester bio gas Boiler 1, 2, 3

◆ Delivery model : KC-7730B-FM153BEx

* Fluid : Bio Gas (for boiler supply)
* Line size : 80A
* Flow range : 70 ~ 700 Nm3/h
* Fluid pressure : 1350, 1500, 1250 mmAq
* Fluid temperature : 25~40'C
* Delivery quantity : 3 Set

APPLICATION : Digester Bio Gas

◆Client : Uljin Livestock Manure Treatment Plant

◆ Project name : Digester bio gas

◆ Delivery model : KC-7730B-FM153BEx

* Fluid : Bio gas
* Line size : 80A (for generator supply)
* Flow range : 15 ~ 150 Nm3/h
* Fluid pressure : 20 ~ 250 mmH20
* Fluid temperature : 60'C
* Delivery quantity : 1 Set

* Line size : 100A (for main digester)
* Flow range : 30 ~ 300 Nm3/h
* Fluid pressure : 0.1 ~ 0.15 Bar
* Fluid temperature : 40'C
* Delivery quantity : 1 Set

APPLICATION : Digester Bio Gas

◆Client : Eumseong Livestock Manure Treatment Plant

◆ Project name : Digester bio gas

◆ Delivery model : KC-7730B-FM153BEx

* Fluid : Bio gas
*** Line size : 125A (for Digester)**
* Flow range : 6 ~ 210 Nm3/h
* Fluid pressure : 20 ~ 250 mmH20
* Fluid temperature : 30'C
* Delivery quantity : 1 Set

*** Line size : 125A (for generator supply)**
* Flow range : 3.7 ~ 130 Nm3/h
* Fluid pressure : 43 ~ 1,500 mmH20
* Delivery quantity : 2 Set

Order Code KC-7730B Series (FN-Mass Flowmeter)

	Type		Flange	Conn` Spec			Enclosure		Power	Output		Display		Direction	Cal 1	Cal 2		Pressure		Option
KC-77							E		P		V									
	1		2	3	4	5	6	7	8	9		10		11	12	13		14		15

Type	Code 1
Orifice Plate	30B1
Flow Nozzle	30B2
Venturi Tube or Venturi Cone	30B3
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
AC 100-240 V ±10 %, 10 watts (옵션)	3
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 U P	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 Below (20mmAq~ 300mmAq)	L
Medium pressure Below (300mmAq ~ 0.2 Bar)	M
High pressure Below (Max. 1 barg)	H
Agency approved, customer specified	W

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

04

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Golden Rules Co.,Ltd

Air, Flue gas, Exhaust gas

FN-Mass Flow Meter

KC-7730I Series

The nation's development item, 100% domestic goods,Patent **NO.** 10-1606497

APPLICATION

◆ Simply select to suit the application

Application	Type		Mass Flowmeter	
			D/P-type FN-MASS FLOWMETER	
Object of Measurement	Liquid		O	
	Gas		O	
	Vaper		O	
	steam		O	
Application	control		O	
	Monitor		O	
	Supply		O	
Operating condition	Temperature		Gas	– 40 to 100℃ (Option:400℃)
			Liquid & Oil	–40 to 100℃(Option:400℃)
			Steam	–20 to 200℃(Option:400℃)
	Pressure		10 barg / 30 barg / Max 450 barg	
	Pressure loss		Negligible	
	Range ability		Large	
Installing condition	Bore		Ø10 to Ø500	
	Straight Pipe length	upstream	10 ~ 7D	
		downstream	5 ~ 2D	
	Piping work		Required	
	Explosion-proofing		O	
Performance	Accuracy		Gas	±0.5% F.S(Option: 0.1%)
			Liquid & Oil	±0.5% F.S(Option: 0.1%)
			Steam	±0.5% F.S(Option: 0.1%)
	Velocity		Gas	0.1~100 m/s
			Liquid & Oil	0.1~100 m/s
			Steam	0.1~100 m/s

4. Pitot Tube-MASS FLOWMETER (Air, Flue, Exhaust Gas)

4. KC-7730I D/P-Mass Series

Pitot tue – Mass flowemter
Model : KC-7730I

Feature

- Mixed gas Automatic Calculator (4~20mA input : 8-Channel)
- **5-for multi-: Rate, integrated, volume, mass flow, temp', press', density**
- Input Power DC 24 V, < 100mA
- Output accuracy ±0.1 %, ±2.5 μA
- Field validation of flowmeter calibration settings
  Smart program interface (RS-485 standard)
- Direct mass measurement of the flow function eliminates the need for additional temperature and pressure compensation
- Simple signal Processing & calibration
- Built-in flow function of compression coefficient, expansion coefficient, viscosity coefficient, direct calculation formula
- 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 (Turndown ratio 35:1, Option 50:1)
- 0.1-second response to changes in flow rate
- High pressure fluid can be measured (up to 400 Barg)
- High temperature fluid measurement up to 400'C
- CE, Ex(IP67)

Description

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

It is a Flange type, and it is a microprocessor commercially capable of measuring flow rate, adjusting flow rate, and diagnosing at the same time.
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 Rule's KC-7730I series is a product designed based on differential pressure mass flow measurement technology.

Golden Rule's KC-7730I series is a product designed based on differential pressure mass flow measurement technology, and is a built-in flow function that takes into account the compression coefficient, expansion coefficient, and viscosity coefficient. Enthalpy, etc. can be provided to the user.

Performance Specifications

◆ Accuracy of Point Velocity

±0.5% of F.S
(Option : ±0.1% of F.S)

◆ Repeatability

±0.5% of Full Scale

◆ Sensor Accuracy

< 0.2% of span

◆ Turndown Ratio

35:1 (Option 50:1)

◆ Pressure Loss

0.1 ~ Below 0.3 Bar

◆ Response Time

0.1 second

◆ Measuring Range

0.1 ~ 100 m/sec

◆ Function

5-for multi-measurement :
rate, total, volume, mass, density, temp', pressure, energy indication

Operating Specifications

◆ Fluid

Air, Flue, Bio, Exhaust Gas

◆ Input Power

DC 24 V ±10 %, < 100 mA

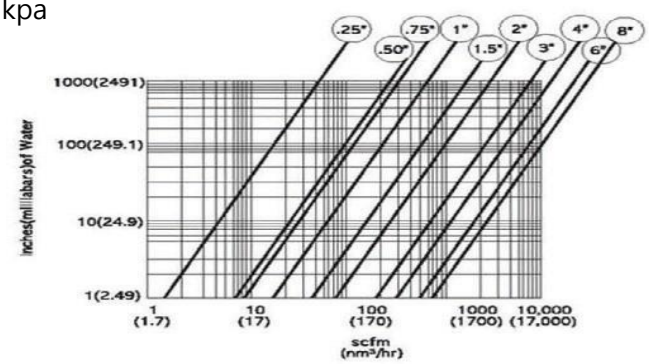
100~240VAC ±10 %, < 10 Watts

◆ Output Signal

Linear 4 ~ 20 mA, 4Wire
RS-485S
Pulse (Option)

◆ Pressure Drop

15.5 kpa



Mass Flow Rates (Air)

Air Flow Ranges							
Pipe Size		Minimum		Maximum		Weight	
A	B	Nm3/m	N㎥/h	Nm3/m	N㎥/h		일반
15A	½-inch	0.13	8.0	1.33	80	5kg	3kg
20A	¾-inch	0.27	16	2.7	160	5kg	3kg
25A	1-inch	0.4	24	120	240	6kg	4kg
40A	1½-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		

Mass Flow Rates (Bio gas)

Pipe Size (배관경)		Minimum (최소)	Maximum (최대)	Weight (중량)
Pipe Size		Minimum	Maximum	Pressure / Temp'
A	B	N㎥/h	N㎥/h	Pressure / Temp'
50A	2-inch	4.8	160 (digester)	250mmAq / 30-40'C
80A	3-inch	20	700 (generator)	1,250mmAq 1,350mmAq 1,500mmAq / 25-30'C
100A	4-inch	10	350 (digester) 300 (digester)	250/300mmAq / 25-30'C
125A	5-inch	8.6	300 (generator)	1,500mmAq/ 20-35'C
150A	6-inch	14.3	500 (digester)	200mmAq / 35-40'C

◆ Fluid & Ambient temperature

Gas : -40 ~ 100 ℃ (-40 ~ 212 ℉) Option : -70 ~ 400 ℃ (-94 ~ 752 ℉)
Pipe Temp' : Over 300 ℃ 이상 (572 ℉)
Ambient : -4 ~ 185 ℉ (-20 ~ 85 ℃) Option : -70 ~ 100 ℃ (-94 ~ 212 ℉)

◆ Pressure (limitations)

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

◆ Displays

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

◆ Totalizer

Flow rate and total oxygen point (0000. / 000.0/ 00.00 / 0.000)
Seven digits (9,999,999,99.9 Count) in engineering units Reset table by Software

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, prefereed 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 – STS316L+Plated gold(H2 Gas), 316LSS(Special Gas)
Flow inline Body – 304SS (Option : STS316, STS316L)

◆ Enclosure

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

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

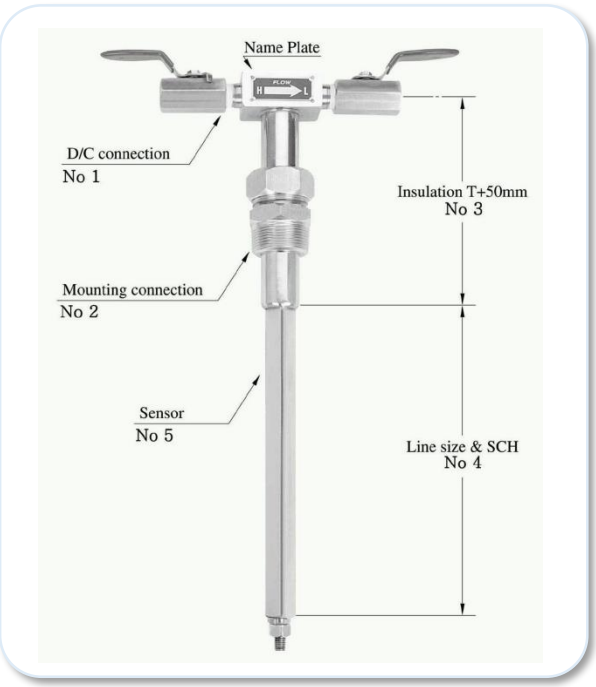
◆ Mounting (Selection)

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

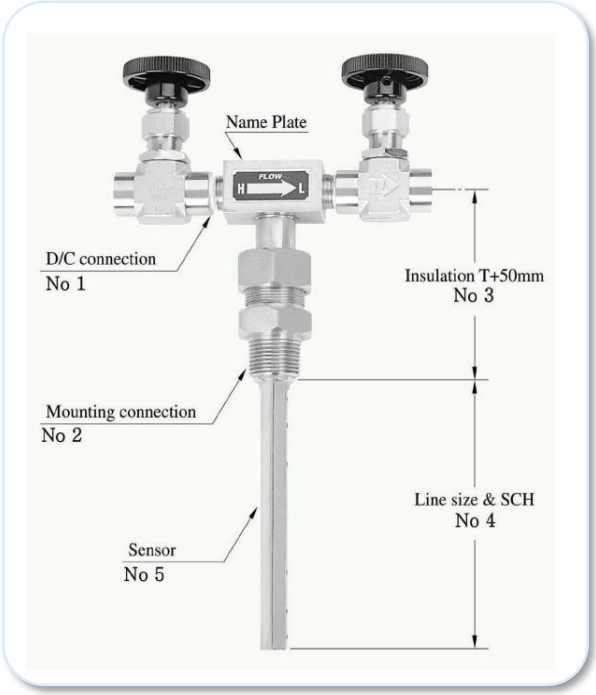
◆ Certification

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

Sensor name & installation drawing KC-7730I _ Pitot tube type

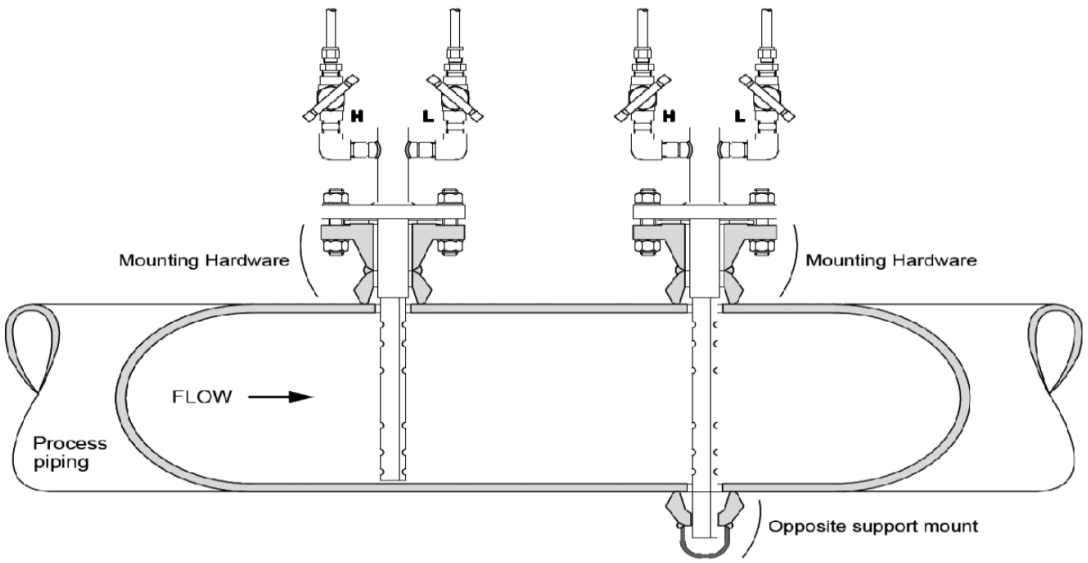


Hig pressure or Large diameter(18″~118″)



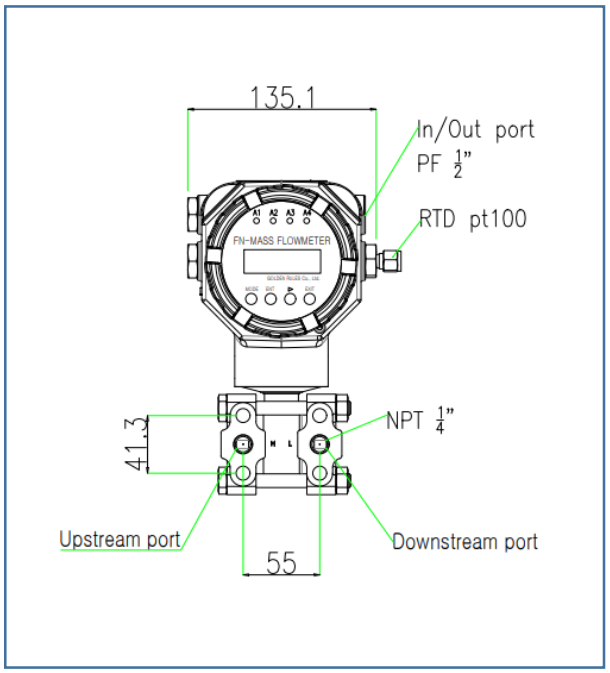
Low pressure or Small ~ Large diameter(3″~80″)

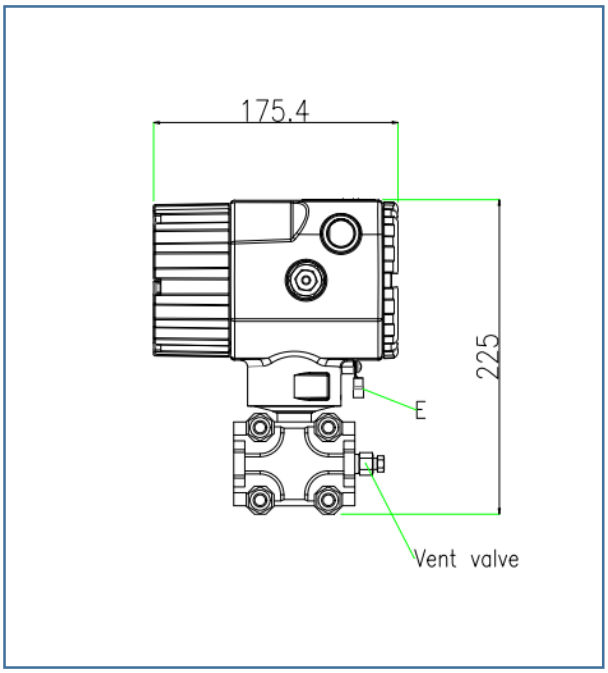
※ The shape of the sensor may be changed according to the circumstances of the manufacturer. -> Refer to detail approval drawing

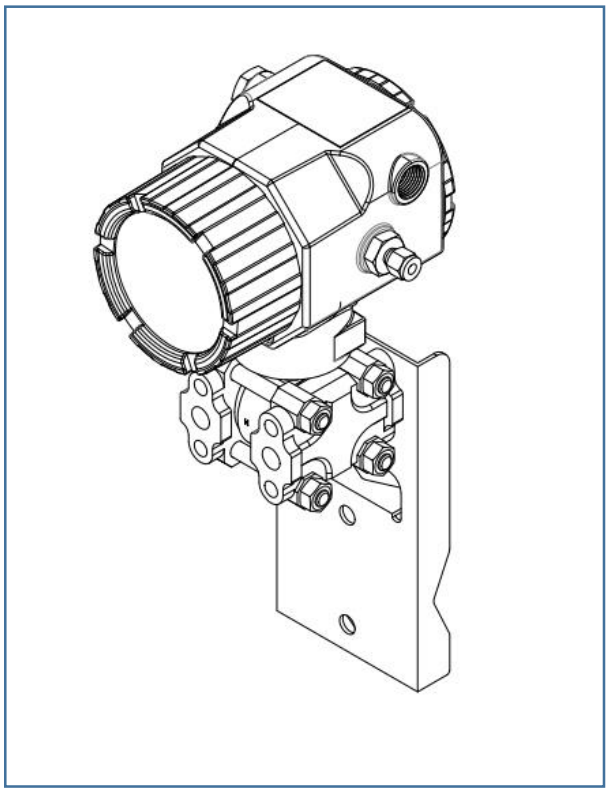


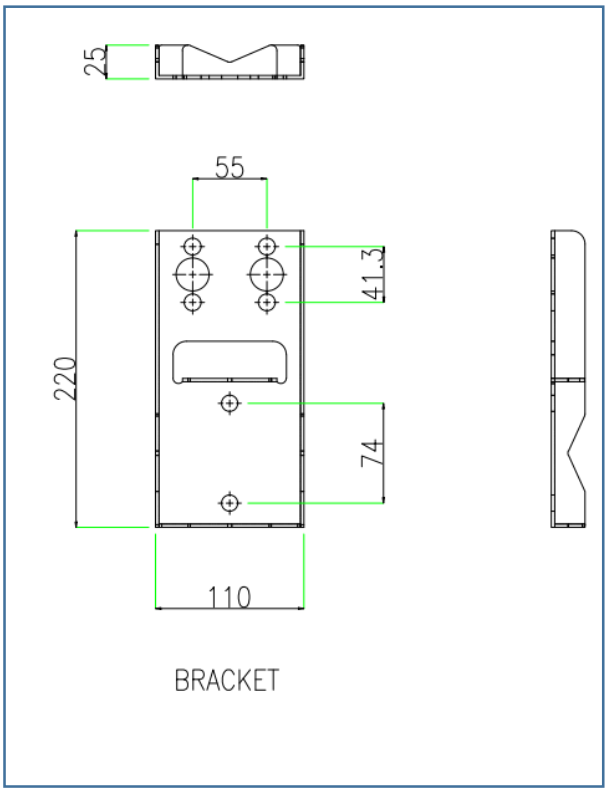
How to install small diameter and large diameter

Mass flow transmitter dimensions KC-6000 Series



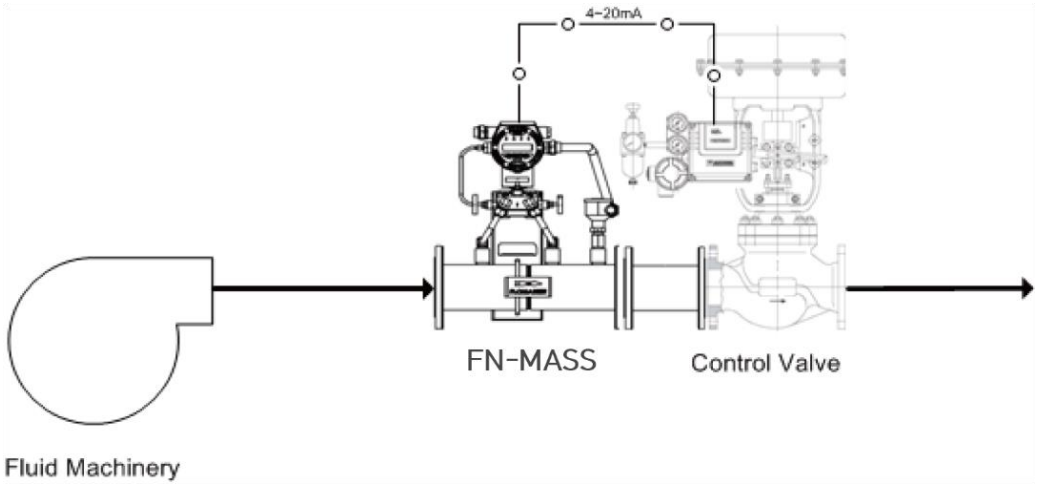






The FN-Mass flow meter realizes the following control with the current output signal.

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 ± 0.5% precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7730I FN –Mass Flowmeter)

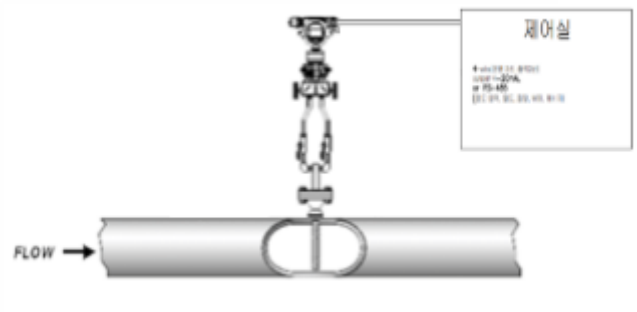
Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730I Smart– IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows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

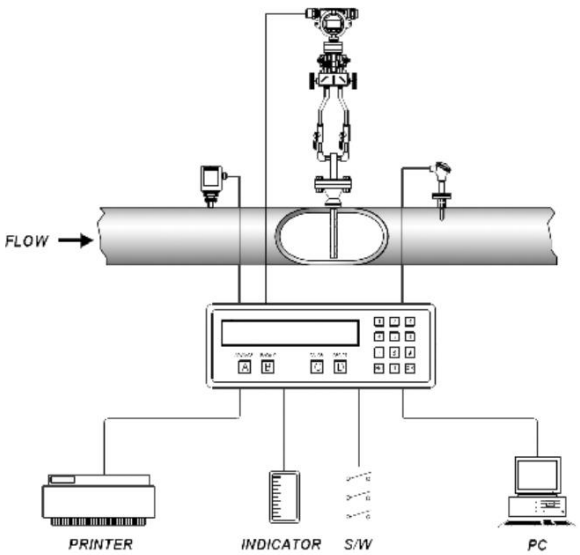
APPLICATION

Schematic diagram and advantages of all-in-one differential pressure

1. The installation cost is greatly reduced.
2. Since it is a direct-type mass flow meter, the accuracy is much higher than that of the existing differential pressure type (±0.1% F.S).
3. Simultaneous monitoring of 5 data (flow, temperature, pressure, density, heat quantity) by communication output in heavy-duty monitoring panel
4. Since it is a mass flow meter equipped with temperature and pressure sensors, there is no need to separately install it on the pipe.



New concept mass flow method ~ all-in-one flow sensor, temperature, pressure sensor and flow computer



Existing differential pressure method- Flow, temperature, pressure sensor, flow computer separate configuration

Order Code KC-7730I Series (Pitot tube-MASS FLOWMETER)

	Type		L-length		Conn` Spec			Enclosure		Power		Output		Display		Direction	Cal 1	Cal 2		Pressure		Option
KC-7730I								E		P		V							-		-	
	1		2		3	4	5	6	7	8		9		10		11	12	13		14		15

Type	Code 1
Gas	30G
Mixed gas	30MX
Air	30BA
Hazardous-Area Location Endosure	**FM153B**
Agency approved, customer specified	W

Insert length[4]	Code 2
6″ (15 cm)	06
9″	09
12″	12
18″	18
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

Mounting	Code 3,4,5
None	0
Compression Fitting2 (3/4″ tube X ¾″ Male NPT)	10
Threadlet (3/4″ Female NPT) Specify pipe O.D. in parentheses	2( )
Compression Fittings (IP67) (1/2″ tube X ¾″ Male NPT)	3
Curved Duct Bracket (3/4″ tube Compression Fitting) Specify duct O.D. in Parentheses	4( )
Low Pressure Retract Valve Specify duct O.D. in parentheses	8( )
Compression Fittings (3/4″ tube X 1″ Male NPT)	15( )
Agency approved, customer spec'	W

Enclosure[5]	Code 6,7
Hazardous-Area Location Enclosure	2
IP67 Integral or Remote	N2
Agency approved, customer specified	W

Input Power	Code 8
DC 24 V ±10 %, 60 ㎃	2
AC 100-240 V ±10 %, 10 watts (옵션)	3
Agency approved, customer specified	W

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

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

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

Calbration1[9] (Gas)	Code 12
Standard Calibration (Small Size)	A
Air, only for 1/2″ and large pipe Size	
Compressed Air, only for 2″ and large pipe size	D
Customer Calibration	B
Agency approved, customer specified	W

Calbration2[9] (Gas)	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)
Agency approved, customer specified	W

Option	Code 15
Air Purging System	Option
Pulse	Option
Agency approved, customer specified	W

05

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Golden Rules Co.,Ltd

H2, Special Gas

FN-Mass Flow Meter

KC-7730H-FM153BEx Series

The nation's development item, 100% domestic goods,Patent **NO.** 10-1606497

APPLICATION

◆ Simply select to suit the application

Application	Type		Mass Flowmeter	
			D/P-type FN-MASS FLOWMETER	
Object of Measurement	Liquid		O	
	Gas		O	
	Vaper		O	
	steam		O	
Application	control		O	
	Monitor		O	
	Supply		O	
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		20 barg / 250 barg / Max 450 barg	
	Pressure loss		Negligible	
	Range ability		Large	
Installing condition	Bore		Ø10 to Ø500	
	Straight Pipe length	upstream downstream	10 ~ 7D	
			5 ~ 2D	
	Piping work		Required	
	Explosion-proofing		O	
Performance	Accuracy		Gas	±0.5% F.S(Option: 0.1%)
			Liquid & Oil	±0.5% F.S(Option: 0.1%)
			Steam	±0.5% F.S(Option: 0.1%)
	Velocity		Gas	0.1~100 m/s
			Liquid & Oil	0.1~100 m/s
			Steam	0.1~100 m/s

5 FN-MASS FLOWMETER (H2 & Special Gas)

5. FN-Mass KC-7730H-FM153BEx

H2,Special, Gas type
KC-7730H-FM153BEx

Features

- Mixed gas Automatic Calculator (4~20mA input : Basic Mode)
- **5-for multi-: Rate, integrated, volume, mass flow, temp', pressure, density**
- Input Power DC 24 V, < 100mA
- Output accuracy ±0.1 %, ±2.5 μA (4~20 mA, 4-Wire)
- Field validation of flowmeter calibration settings
  Smart program interface (RS-485 standard)
- Direct mass measurement of the flow function eliminates the need for additional temperature and pressure compensation
- Simple signal Processing & calibration
- **Built-in flow function of compression coefficient, expansion coefficient, viscosity coefficient, direct calculation formula**
- 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 40:1)
- 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-7730H-FM153BEx Series 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-7730H-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

◆ Turndown Ratio

35:1 (Option 50:1)

◆ Pressure Loss

0.1 ~ Below 0.3 Bar

◆ Response Time

0.1 second

◆ Measuring Range

0.1 ~ 100 m/sec

◆ Function

5-for multi-measurement :
rate, total, volume, mass, density, temp', pressure, energy indication

Operating Specifications

◆ Fluid

H2, Special, Special Gas

◆ Input Power

DC 24 V ±10 %, < 100 mA

100~240VAC ±10 %,<10 Watts

◆ Output Signal

Linear 4 ~ 20 mA, 4Wire
RS-485S
Pulse (Option)

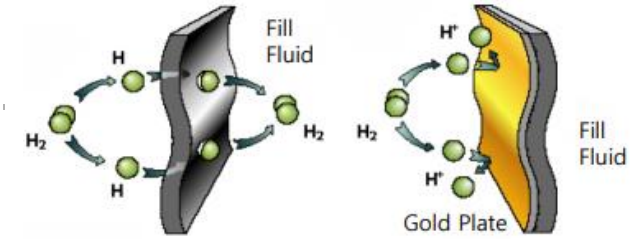
◆ Pressure Drop

15.5 kpa

Mass Flow Rates (H2 Gas)

H2 Gas Flow Ranges							
Pipe Size		NL/min Kg/min		NM³/h Kg/h		Fluid	Pressure/ Temp'
A	B	최소	최대	최소	최대	Fluid	Press'/Temp'
10A	⅜-inch	5.7	200	0.34	12.00	H_2	3-5Barg/20'C
10A	⅜-inch	4.3	150	0.28	9.00	H_2	3-5Barg/20'C
10A	⅜-inch	33.0	666.7	2.0	40.00	H_2	8.2Barg/25'C
10A	⅜-inch	50.0	416.6	3.0	25.00	H_2	7Barg/20'C
15A	½-inch	300	5,000	18.0	300.0	H_2	40Barg/95'C
15A	½-inch	55.0	1,520	3.30	91.20	H_2	17-30Barg/ 20'C
15A	½-inch	285.7	10,000	17.14	600.0	H_2	250Barg/20'C
15A	½-inch	23.83	833.3	1.43	50.00	H_2	7Barg/25'C
15A	½-inch	2.38	83.33	0.14	5.00	H_2	1-5Barg/20'C
15A	½-inch	66.66	2,333	4.0	140.00	H_2	200Barg/ 100'C
20A	¾-inch	23.83	833.3	1.43	50.00	H_2+ Mix	7.3Barg/20'C
20A	¾-inch	23.83	833.3	1.43	50.00	H_2+ Mix	6.9Barg/20'C
20A	¾-inch	9.52	333.3	0.60	20.00	H_2	9.7Barg/ 40-90'C
20A	¾-inch	47.61	1,666	2.90	100	H_2	9.7Barg/ 40-90'C
20A	¾-inch	0.05	1.16	2.00	70.00	H_2	200Barg/40'C
25A	1-inch	23.83	833.3	1.43	50.00	H_2	7Barg/25'C
50A	2-inch	0.12	4.20	7.20	252.0	H_2	8.2Barg/200'C
50A	2-inch	100.0	3,500	6.00	210.5	H_2	7.9Barg/150'C

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



◆ Fluid & Ambient temperature

H2 Gas : -40 ~ 100 ℃ (-40 ~ 212 ℉) Option : -70 ~ 400 ℃ (-94 ~ 752 ℉)
Pipe Temp' : Over 300 ℃ 이상 (572 ℉)
Ambient : -4 ~ 185 ℉ (-20 ~ 85 ℃) Option : -70 ~ 100 ℃ (-94 ~ 212 ℉)

◆ Pressure (limitations)

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

◆ Displays

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

◆ Totalizer

Flow rate and total oxygen point (0000. / 000.0/ 00.00 / 0.000)
Seven digits (9,999,999,99.9 Count) in engineering units Reset table by Software

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, prefereed 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 – STS316L+Plated gold(H2 Gas), STS316L(Special Gas)
Flow inline Body – 304SS (Option : STS316, STS316L)

◆ Enclosure

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

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

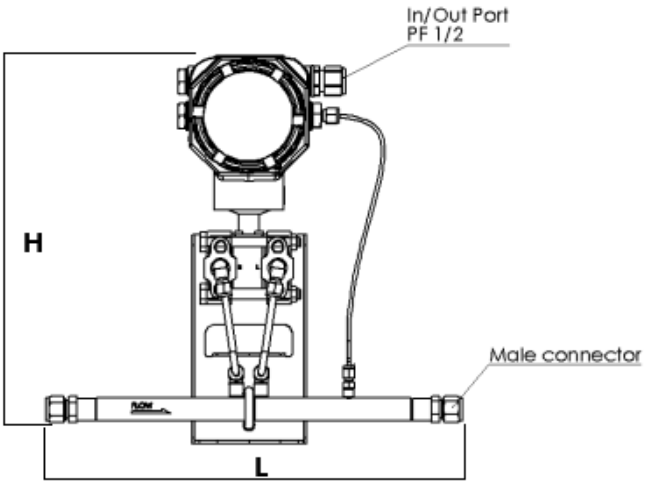
◆ Mounting (Selection)

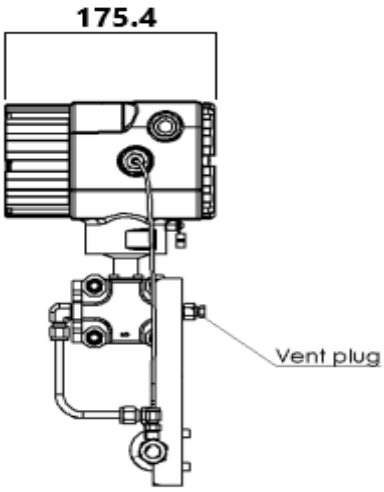
ANSI 150lb Flange, JIS 10k RF Flange, other

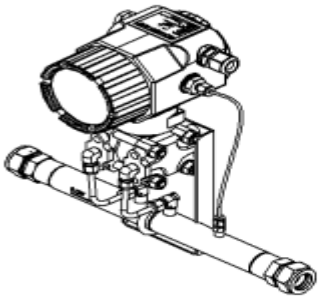
◆ Certification

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

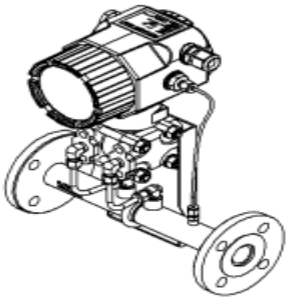
Dimensional Spec' & Chart KC-7730H-FM153BEx



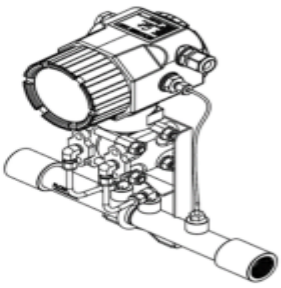




LOK fitting



Flange



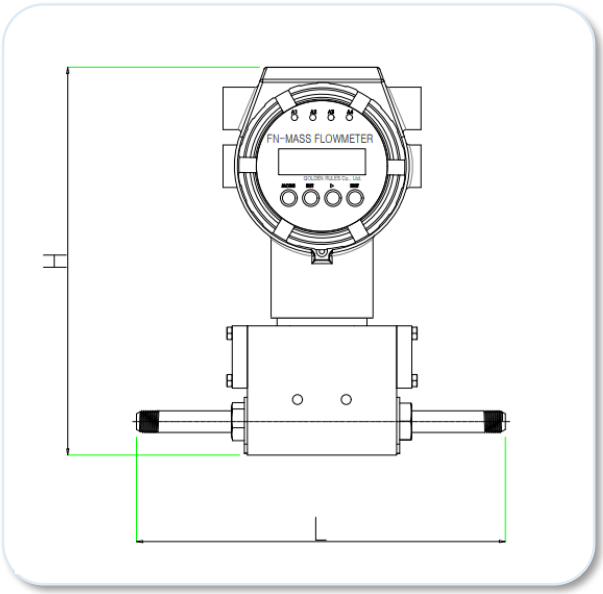
PT Female(Socket)

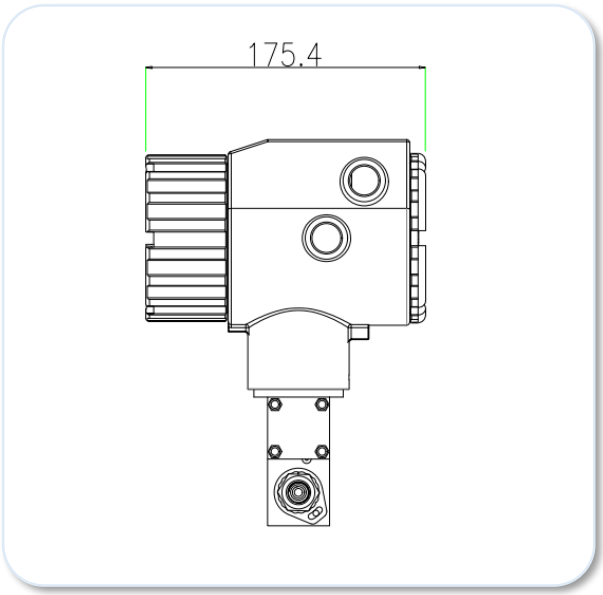
※ The shape of the sensor depends on the circumstances of the manufacturer. subject to change. -> Refer to the detailed approval drawing

단위 : mm

Size	H	L
3/8" Thread / Lok	255.1	300
1/2" Lok / Flnage	256.1 / 375	300
3/4" Lok / Flange	257.6	300
1" Flange	358.5	300
32A	402	300
40A	406	300
50A	420	300
65A	442	350
80A	442	400
100A	451	409
125A	508	451
150A	540	522
200A	575	602
250A	626	672

Dimensional Spec' & Chart For high pressure hydrogen filling station Max 400 Bar





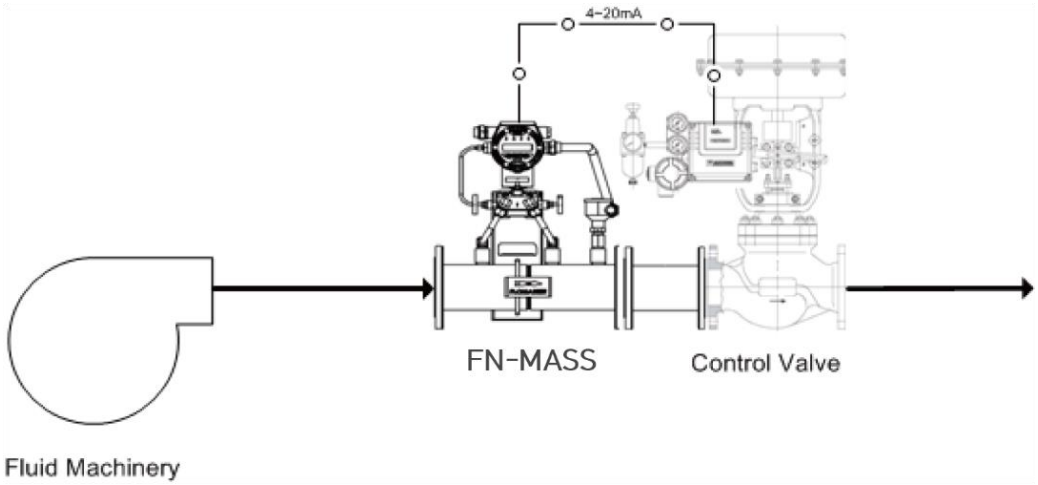
※ The shape of the sensor depends on the circumstances of the manufacturer.
subject to change. -> Refer to the detailed approval drawing

단위 : mm

Size	H	L
3/8" Cone&Thread tubing	255.1	300
1/2" Cone&Thread tubing	256.1 / 375	300
3/4" Cone&Thread tubing	257.6	300
1" Cone&Thread tubing	358.5	300

The D/P-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 ± 0.5% precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7730H-FM153BEx)

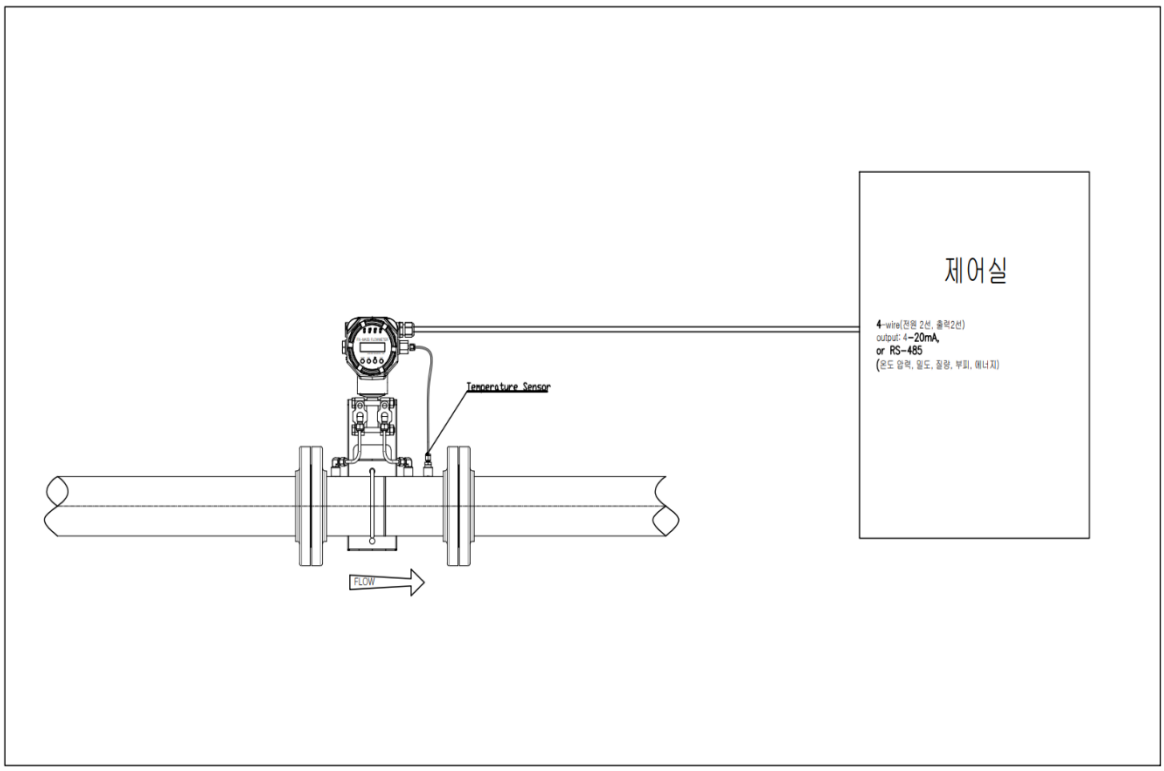
Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730H-FM153BEx Smart– IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two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

APPLICATION

◆ Overview and Advantages of All-In-One FN Mass Flow Meter

1. Significantly reduced installation construction cost.
2. Since it is a direct type FN mass flow meter, the accuracy is much higher than the existing differential pressure type (±0.5% F.S)
3. Wide range of flow rate when measuring high temperature, high pressure and large flow rate (turndown ratio 35:1, Option 50:1)
4. Simultaneous monitoring of 5 data (flow rate, temperature, pressure, density, heat amount) by the central cancer monitoring panel with communication output
5. Easy to install as it is a temperature/pressure sensor/flow computer all-in-one mass flow meter



hydrogen definition

Mass flow meter for hydrogen gas measurement at hydrogen refueling stations

Hydrogen is colorless, odorless and non-toxic, and its unit energy is more than 5 times that of fossil fuels. However, because hydrogen is the lightest, it rarely exists alone on the surface of the earth, and exists mostly in the atmosphere. Hydrogen is a clean energy, but it has the disadvantage of being difficult to manage. In other words, to use hydrogen, it is necessary to use very high pressure gas or liquid hydrogen in a cryogenic state. Currently, the most economical method is to use gaseous hydrogen in an ultra-high pressure state as energy.

The mileage of a hydrogen car is proportional to the amount of fuel charged, and this is accomplished by charging high-pressure hydrogen into the vehicle storage tank. The existing hydrogen filling pressure was 350 bar (35 MPa) or less, but it is a global trend to fill the tank above 700 bar (70 MPa) for a high mileage. For hydrogen charging of 700 bar, the charging pressure of the hydrogen dispenser is higher than 840 bar to supply the hydrogen car.

The hydrogen mass flowmeter of Golden Rule includes two pressure sensors and a temperature sensor, and the pressure sensor is full scale as the pressure rises (because the error is reduced, it measures the flow rate more accurately than any other sensor in the ultra-high pressure state of 70 MPa or more) The two pressure sensors have an automatic zero adjustment function, so they can maintain high accuracy in any installation environment.

The design of a hydrogen flow meter for a hydrogen filling station is designed through Golden Rule's DPP G1 program. The tightening mechanism is a venturi nozzle, the filling pressure is 84 MPa, the filling temperature 15℃, the flow rate is 260 kg/h, and the filling density is 45.287 kg/m3. It's possible. Pressure piping is 20,000 psi, tube size 9/16", and stainless 316 cold material cone and thread type nipple is used, so it has no leakage and is very durable. Golden Rule is a pressure-explosion-proof certified (Ex d ⅡC T6) product from the Korea Gas Safety Corporation for this hydrogen mass flow meter.

APPLICATION : hydrogen generator

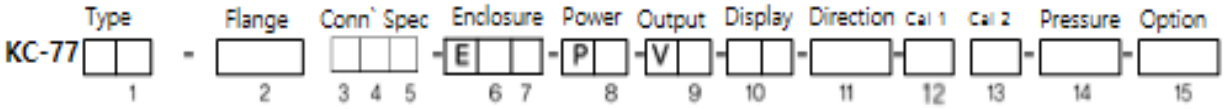
◆Client : KEPCO Electric Power Research Institute

◆ **Project name :** PG2-based 10Nm3/H2/h class water electrolysis system

◆ **Delivery model : KC-7730H-FM153BEx**

* Fluid : H2 GAS
* Line size : 10A (3/8")
* Flow range : 6 ~ 200 NL/min
* Fluid pressure : 3 ~ 5 Barg
* Fluid temperature : 24'C
* Delivery quantity : 1 Set

Order Code KC-7730H-FM153BEx (FN-Mass Flowmeter)



Type	Code 1
H2 Gas 100%, or H2 Mixture	30H
Special Gas	30S
High Pressure Gas	30HP
Hazardous-Area Location Endosure	FM153B
Agency approved, customer specified	W

Connection form	Code 2
LOK : 3/8", ½", ¾", 1"	L
VCR : 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
AC 100-240 V ±10 %, 10 watts (옵션)	3
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 U P	1
Horizontal Right to Left or Vertical Down	2
Agency approved, customer specified	W

Calibration 1[9] (Air)	Code 12
Standard Calibration Air, only for 3/8" and large pipe Size	A
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 290 psig (20 barg)	L
Medium pressure Max. 3,626 psig (250 barg)	M (Option)
High pressure Max.. 6,527 psig (450 barg)	H (Option)
Agency approved, customer specified	W

Option	Code 15
High temp' : 400'C	H
Agency approved, customer specified	W

06

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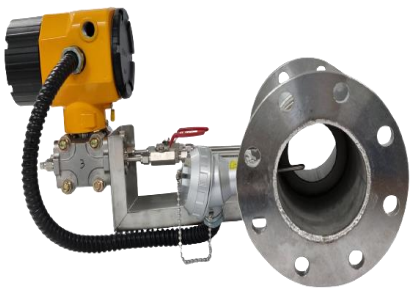
Golden Rules Co.,Ltd

Steam
FN-Mass Flow Meter
KC-7730S Series



The nation's development item, 100% domestic goods,Patent **NO.** 10-1606497

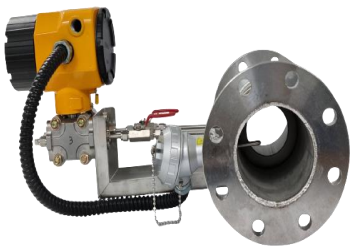
APPLICATION

◆ Simply select to suit the application

Application	Type		Mass Flowmeter	
			D/P-type FN-MASS FLOWMETER	
Object of Measurement	Liquid		O	
	Gas		O	
	Vaper		O	
	steam		O	
Application	control		O	
	Monitor		O	
	Supply		O	
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 / 30 barg / Max 450 barg	
	Pressure loss		Negligible	
	Range ability		Large	
Installing condition	Bore		Ø10 to Ø500	
	Straight	upstream	10 ~ 7D	
	Pipe length	downstream	5 ~ 2D	
	Piping work		Required	
	Explosion-proofing		O	
Performance	Accuracy		Gas	±0.5% F.S(Option: 0.1%)
			Liquid & Oil	±0.5% F.S(Option: 0.1%)
			Steam	±0.5% F.S(Option: 0.1%)
	Velocity		Gas	0.1~100 m/s
			Liquid & Oil	0.1~100 m/s
			Steam	0.1~100 m/s

6 FN-MASS FLOWMETER (Steam)

6. FN-MASS KC-7730S Series



Steam
KC-7730S

Features

- **5-for multi-: Rate, integrated, volume, mass flow, temp', pressure, density**
- **Input Power DC 24 V, < 100mA**
- **Output accuracy ±0.1 %, ±2.5 μA (4~20 mA, 4-Wire)**
- **Field validation of flowmeter calibration settings**
  Smart program interface (RS-485 standard)
- **Direct mass measurement of the flow function eliminates the need for additional temperature and pressure compensation**
- **Simple signal Processing & calibration**
- **Built-in flow function of compression coefficient, expansion coefficient, viscosity coefficient, direct calculation formula**
- **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 (Turndown ratio 35:1, Option 50:1)**
- **0.1-second response to changes in flow rate**
- **High pressure fluid can be measured (up to 400 Barg)**
- **High temperature fluid measurement up to 400'C**
- **CE, Ex(IP67)**

Description

Golden Rules' KC-7730S Series D/P type FN-Mass flowmeter accommodates the change measurement requirements and instrument-validation demands of fluid flow monitoring installations.
It is a LOK Fitting, Flange type, and it is a microprocessor commercially capable of measuring flow rate, adjusting flow rate, and diagnosing at the same time.
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 Rule's KC-7730S series is a product designed based on differential pressure mass flow measurement technology.

Golden Rule's KC-7730S series is a product designed based on differential pressure mass flow measurement technology. It is a built-in flow function that takes into account the compression coefficient, expansion coefficient, and viscosity coefficient rather than the conventional temperature and pressure correction method. Enthalpy, etc. can be provided to the user.

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

◆ Turndown Ratio

35:1 (Option 50:1)

◆ Pressure Loss

0.1 ~ Below 0.3 Bar

◆ Response Time

0.1 second

◆ Measuring Range

0.1 ~ 100 m/sec

◆ Function

5-for multi-measurement :
rate, total, volume, mass, density, temp', pressure, energy indication

Operating Specifications

◆ Fluid

Steam (Saturated, Super Heated)

◆ Input Power

DC 24 V ±10 %, < 100 mA

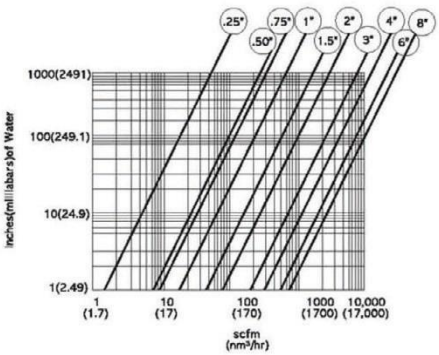
100~240VAC ±10 %, < 10 Watts (Option)

Output Signal

Linear 4 ~ 20 mA, 4Wire
RS-485S
Pulse (Option)

◆ Process Drop

15.5 kpa



Steam Flow Range

Pipe Size		Pressure / Temp'		Flow Range (kg/h)		Flow Range (Ton/h)	
A	B	Barg	'C	Minimum	Maximum	Minimum	Maximum
25A	1-inch						
32A	11/4-inch						
40A	11/2-inch						
50A	2-inch	16-17	200-205	1,000	10,000		
65A	21/2-inch						
80A	3-inch	7.9	179.5	300	3,000		
100A	4-inch	7.9 7.0 2	179.5 190 133.2	200 700 75	2,000 7,000 750		
125A	5-inch	7.9	179.5	250	2,500		
150A	6-inch	2	133.2	300	3,000		
200A	8-inch	7.9 38	179.5 400	1,500	15,000	10	100
250A	10-inch	8 8	193 210	8,000	80,000	1.1	11
300A	12-inch	8	210	1,100	11,000	1.1	11
400A	16-inch	8	176	2,000	65,000		

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(℃)		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/m^3)		1.129	1.651	2.163	2.66	3.170	3.667	4.162	4.655	5.147	6.127	7.602	10.005
25A	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
32A	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
40A	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
50A	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
65A	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
80A	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
100A	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
125A	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
150A	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
200A	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
250A	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
300A	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	33530	37360	40760	45360	52200

◆ Fluid & Ambient temperature

Steam : -20 ~ 200 ℃ (-4 ~ 392 ℉) Option : 210 ~ 400 ℃ (410 ~ 752 ℉)
Pipe Temp' : Over 300 ℃ 이상 (572 ℉)
Ambient : -4 ~ 185 ℉ (-20 ~ 85 ℃) Option : -70 ~ 100 ℃ (-94 ~ 212 ℉)

◆ Pressure (limitations)

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

◆ Displays

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

◆ Totalizer

Flow rate and total oxygen point (0000. / 000.0/ 00.00 / 0.000)
Seven digits (9,999,999,99.9 Count) in engineering units Reset table by Software

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, prefereed 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 – STS316 (Option : STS316L)
Flow inline Body – STS304 (Option : STS316, STS316L)

◆ Enclosure

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

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

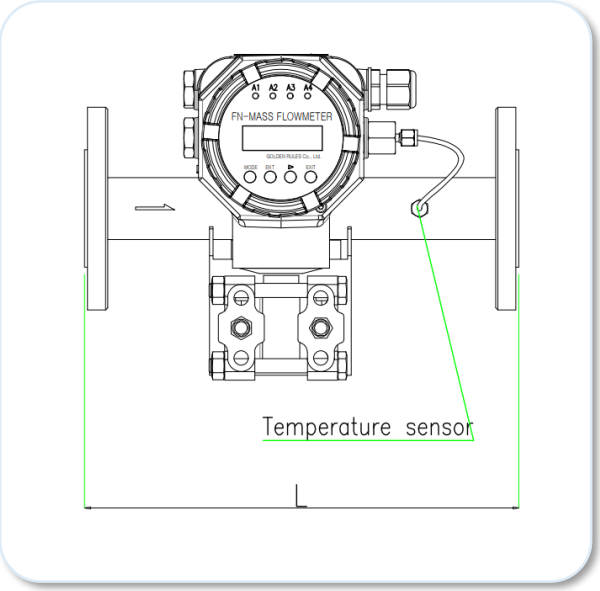
◆ Mounting (Selection)

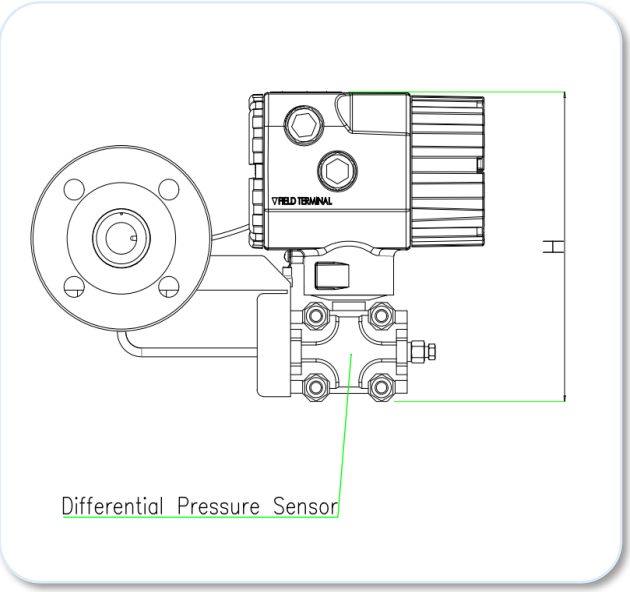
ANSI 150lb Flange, JIS 10k RF Flange, other

◆ Certification

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

Dimensional Spec'& Chart KC-7730S_Steam





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

unit : mm

Size	D	L
15A	309	300
20A	309	300
25A	319	300
32A	319	300
40A	329	300
50A	339	300
65A	349	300
80A	369	350
100A	389	400
125A	409	409
150A	429	451
200A	449	522
250A	469	602
300A	499	672

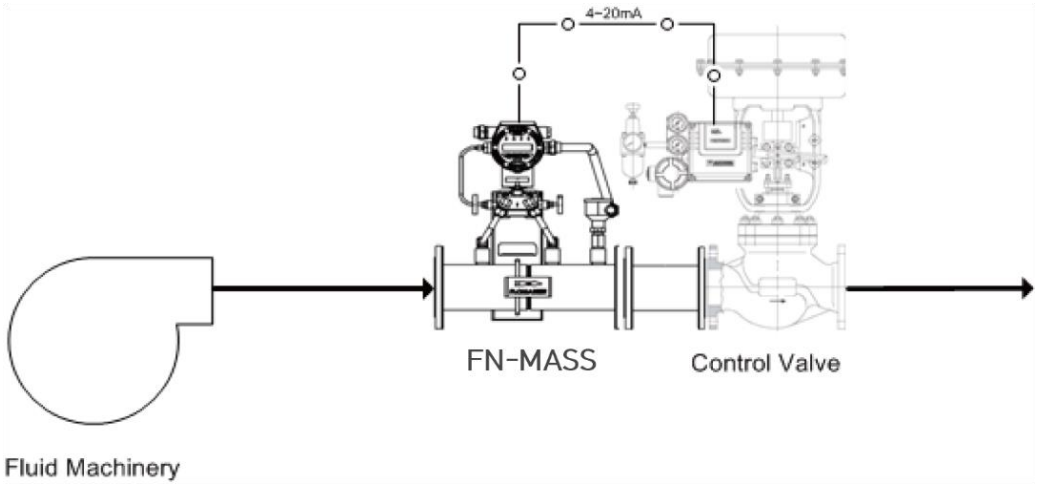
The FN-Mass flow meter realizes the following control with the current output signal.

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 ± 0.5% precision control, minimizing losses in industrial sites.

Piping Requirement (KC-7730S FN-Mass Flowmeter)

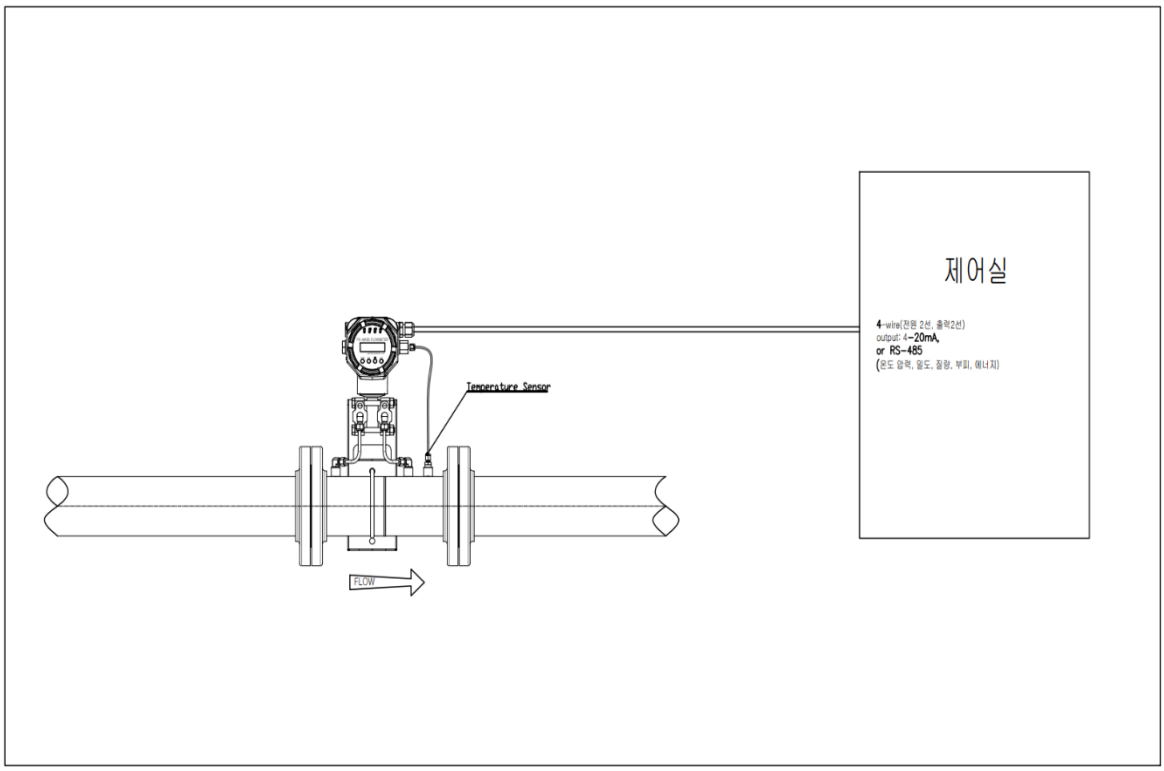
Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730S Smart– IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows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

APPLICATION

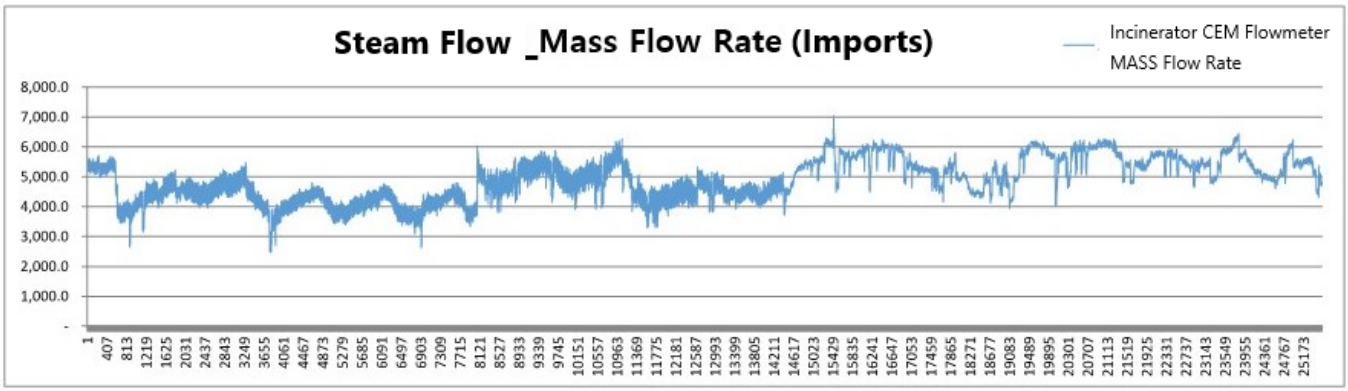
◆ Overview and Advantages of All-In-One FN Mass Flow Meter

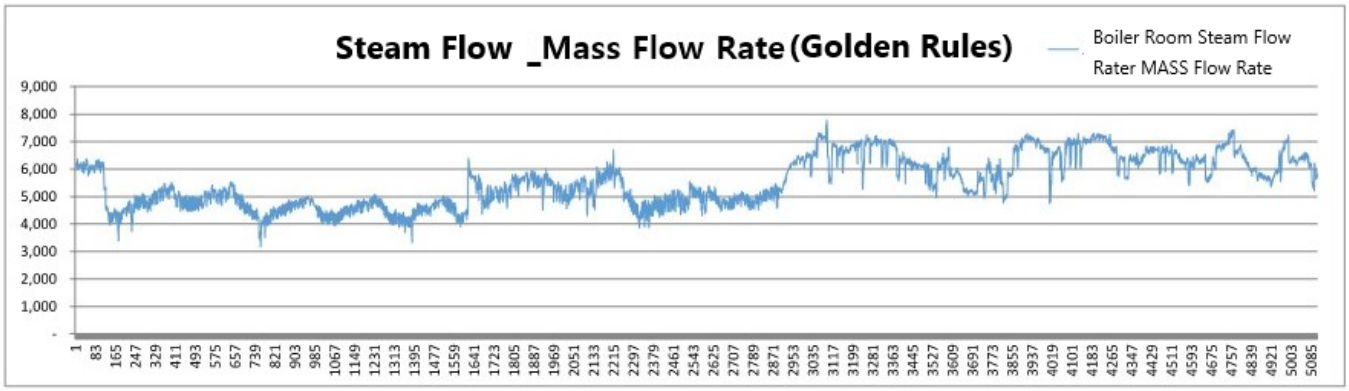
1. Significantly reduced installation construction cost.
2. Since it is a direct type FN mass flow meter, the accuracy is much higher than the existing differential pressure type (±0.5% F.S)
3. Wide range of flow rate when measuring high temperature, high pressure and large flow rate (turndown ratio 35:1, Option 50:1)
4. Simultaneous monitoring of 5 data (flow rate, temperature, pressure, density, heat amount) by the central cancer monitoring panel with communication output
5. Easy to install as it is a temperature/pressure sensor/flow computer all-in-one mass flow meter



◆ Steam Flowmeter Comparison Date

Steam Flowmeter Comparison Date (23.03.01 00:00~23.03.20 10:00) 173℃/7.5bar/200A





Order Code KC-7730S Series (FN-Mass Flow meter)

	Type		Flange	Conn` Spec			Enclosure		Power		Output		Display		Direction	Cal 1	Cal 2		Pressure		Option
KC-77							E		P		V										
	1		2	3	4	5	6	7	8		9		10		11	12	13		14		15

Type	Code 1
Steam	30S
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
8" DIN PN40 RF (Option)			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
AC 100-240 V ±10 %, 10 watts	3
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 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)
Agency approved, customer specified	W

Option	Code 15
High temperature : max. 400'C	HT
Material : STS316SS, STS316L	B
Agency approved, customer specified	W

07

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Golden Rules Co.,Ltd

Liquid, Oil

FN-Mass Flow Meter

KC-7730L Series

The nation's development item, 100% domestic goods,Patent **NO.** 10-1606497

APPLICATION

◆ Simply select to suit the application

Application	Type		Mass Flowmeter	
			D/P-type FN-MASS FLOWMETER	
Object of Measurement	Liquid		O	
	Gas		O	
	Vaper		O	
	steam		O	
Application	control		O	
	Monitor		O	
	Supply		O	
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 / 30 barg / Max 400 barg	
	Pressure loss		Negligible	
	Range ability		Large	
Installing condition	Bore		Ø10 to Ø500	
	Straight	upstream	10 ~ 7D	
	Pipe length	downstream	5 ~ 2D	
	Piping work		Required	
	Explosion-proofing		O	
Performance	Accuracy		Gas	±0.5% F.S(Option: 0.1%)
			Liquid & Oil	±0.5% F.S(Option: 0.1%)
			Steam	±0.5% F.S(Option: 0.1%)
	Velocity		Gas	0.1~100 m/s
			Liquid & Oil	0.1~100 m/s
			Steam	0.1~100 m/s

7 FN-MASS FLOWMETER (Liquid, Oil)

7. FN-Mass type KC-7730L Series

Features

Liquid, Oil type
KC-7730L

- **5-for Multi-Measurement**
- 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 ±0.1 %, ±2.5 μA (4~20 mA, 4-Wire)
- Field validation of flowmeter calibration settings
  Smart program interface (RS-485 standard)
- Direct mass measurement of the flow function eliminates the need for additional temperature and pressure compensation
- Simple signal Processing & calibration
- Built-in flow function of compression coefficient, expansion coefficient, viscosity coefficient, direct calculation formula
- 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 (Turndown ratio 35:1, Option 50:1)
- 0.1-second response to changes in flow rate
- High pressure fluid can be measured (up to 400 Barg)
- High temperature fluid measurement up to 400'C
- CE, Ex(IP67)

Description

Golden Rules' KC-7730L Series D/P type FN-Mass flowmeter accommodates the change measurement requirements and instrument-validation demands of fluid flow monitoring installations.
It is a LOK Fitting, Flange type, and it is a microprocessor commercially capable of measuring flow rate, adjusting flow rate, and diagnosing at the same time.
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 & Golden Rule's KC-7730L series is a product designed based on differential pressure mass flow measurement technology.

Golden Rule's KC-7730L series is a product designed based on differential pressure mass flow measurement technology. It is a built-in flow function that takes into account the compression coefficient, expansion coefficient, and viscosity coefficient rather than the conventional temperature and pressure correction method. Enthalpy, etc. can be provided to the user.

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

◆ Turndown Ratio

35:1 (Option 50:1)

◆ Pressure Loss

0.1 ~ Below 0.3 Bar

◆ Response Time

0.1 second

◆ Measuring Range

0.1 ~ 100 m/sec

◆ Function

5-for multi-measurement :
rate, total, volume, mass, density, temp', pressure, energy indication

Operating Specifications

◆ Fluid

Liquid, Oil

◆ Input Power

DC 24 V ±10 %, < 100 mA

100~240VAC ±10 %

◆ Output Signal

Linear 4 ~ 20 mA, 4Wire
RS-485S
Pulse (Option)

◆ Pressure Drop

15.5 kpa

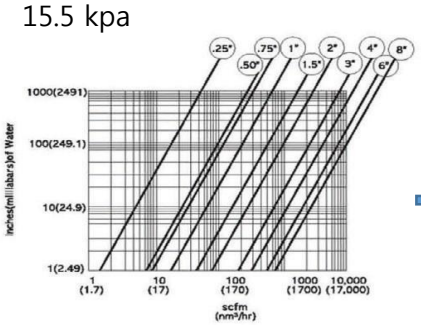


Table Flow Velocity vs. Flow Volume Unit : m³/h, L/min, L/h

Pipe Size		L/min (L/h)		m³/h		Fluid	Pressure /Temp'
A	B	최소	최대	최소	최대	Oil/Liquid	Press'/Temp'
15A	½-inch	0.83	8.83	0.05	0.53	JP-8	5.2Bar/110'C
15A	½-inch	1.00	10.00	0.06	0.60	Mixed Liquid	1Bar/60'C
15A	½-inch	0.71 (42.85)	25.00 (1,500)	0.04	1.50	Diesel	0.1Bar/20'C
20A	¾-inch	1.42 (85.71)	50.00 (3,000)	0.08	3.00	Diesel	0.1Bar/20'C
20A	¾-inch	4.33	41.70	0.26	2.50	JP-8	2Bar/150'C
20A	¾-inch	8.66	83.30	0.52	5.00	JP-8	2.5Bar/150'C
25A	1-inch	4.66	166.7	0.28	10.00	Liquid	1Bar/60'C
25A	1-inch	0.83	33.30	0.05	2.00	Ethanol	3Bar/30'C
25A	1-inch	3.33	33.30	0.20	2.00	Liquid	0.9Bar/50'C
32A	11/4-inch	2.57	90.00	0.15	5.40	Kerosene	4~10Bar/ -15~20'C
40A	1½-inch	10.00	100.0	0.60	6.00	Liquid	2Bar/60'C
40A	1½-inch	1.33	50.00	0.08	3.00	Water	3Bar/60'C
40A	1½-inch	4.00	140.0	0.24	8.40	Kerosene	4~10Bar/ -15~20'C
50A	2-inch	2.33	83.30	0.14	5.00	Water	2Bar/ 60'C
50A	2-inch	9.42	330.0	0.56	19.80	Kerosene	4~10Bar/ -15~20'C
65A	2½-inch	19.00	666.7	1.14	40.00	JP-8	5.2Bar/ 110'C
80A	2-inch	22.85	800.0	1.37	48.00	Kerosene	4~10Bar/ -15~20'C
80A	3-inch	23.83	833.3	0.8	8.00	Liquid	0.83Bar/60'C
80A	3-inch	28.50	1,000	1.71	60.00	Ethylene Glycol	4Bar/20'C
80A	3-inch	28.50	1,000	1.71	60.00	JP-8	2Bar/150'C
80A	3-inch	56.66	2,000	3.40	120.0	Water	3Bar/20'C
100A	4-inch	4.74	1,600	2.74	96.00	Kerosene	4~10Bar/ -15~20'C
100A	4-inch	4.74	1,600	2.74	104.0	JP-8	5.2Bar/110'C
125A	5-inch	85.66	3,000	5.14	180.0	JP-8	5.2Bar/ 110'C

Refer to the chart and look for the meter for a range of 10m/s 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 10m/s radius of the current flow

◆ Fluid & Ambient temperature

Liquid : -40 ~ 100 ℃ (-40 ~ 212 ℉) Option : 110 ~ 400℃ (230 ~ 732 ℉)
Pipe Temp' : Over 300 ℃ 이상 (572 ℉)
Ambient : -4 ~ 185 ℉ (-20 ~ 85 ℃) Option : -70 ~ 100 ℃ (-94 ~ 212 ℉)

◆ Pressure (limitations)

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

◆ Displays

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

◆ Totalizer

Flow rate and total oxygen point (0000. / 000.0/ 00.00 / 0.000)
Seven digits (9,999,999,99.9 Count) in engineering units Reset table by Software

◆ Software (Option)

Smart interface Windows® -based Software 8MB RAM of RAM, prefereed 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 – STS316 (Option : STS316L)
Flow inline Body – STS304 (Option : STS316, STS316LS)

◆ Enclosure

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

◆ Electrical Connections

2 X ½" PF or Exp Cable Gland(SS) 22C

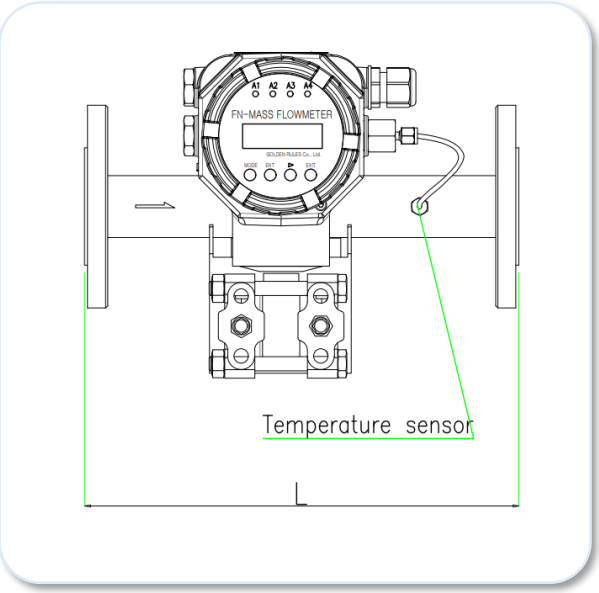
◆ Mounting (Selection)

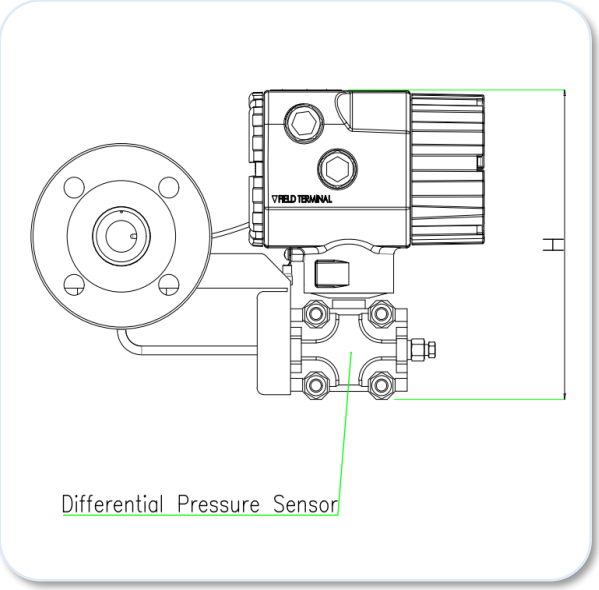
ANSI 150lb Flange, JIS 10k RF Flange, other

◆ Certification

CE (CASE)
KCS Certificate
Atex Certificate
Ex (Ex d IIC T6)

Dimensional Spec'& Chart KC-7730L_ Liquid, Oil





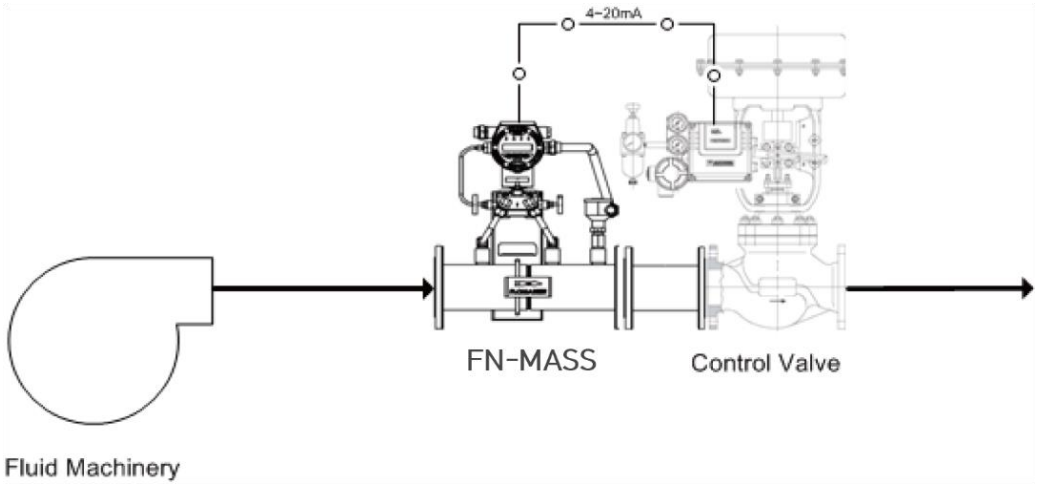
※ The shape of the sensor and Housing manufacturers are subject to change

Unit : mm

Size	H	L
15A	309	300
20A	309	300
25A	319	300
32A	319	300
40A	329	300
50A	339	300
65A	349	300
80A	369	350
100A	389	400
125A	409	409
150A	429	451
200A	449	522
250A	469	602
300A	499	672

The 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 ± 0.5% precision control, minimizing losses in industrial sites.

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

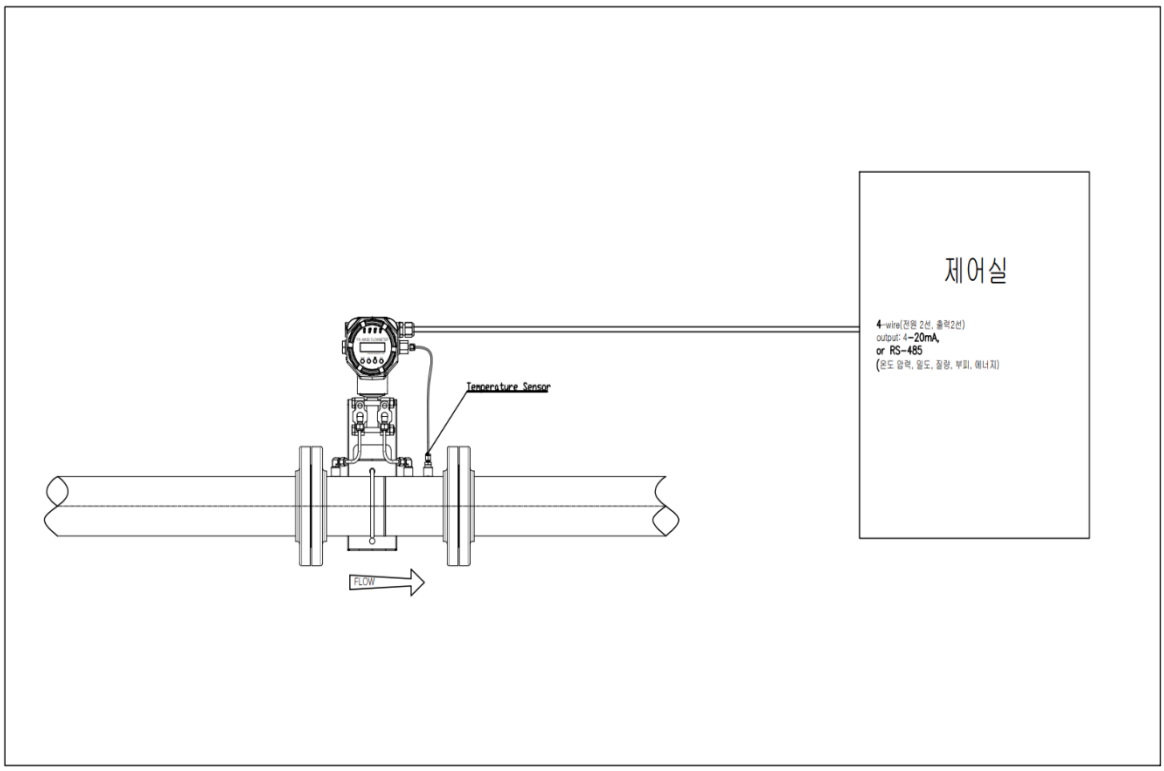
Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-7730L Smart– IN™		Orifice Plate(3)
	Upstream(1)	Downstream(2)	
90° Elbow or T-Piece	10D	5D	28D
Reduction (4:1)	10D	5D	14D
Expansion (4:1)	10D	5D	30D
After Control Valve	10D	5D	32D
Two 90° Elbows (in same plane)	10D	5D	36D
Two 90° Elbows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

APPLICATION

◆ Overview and Advantages of All-In-One FN Mass

1. Significantly reduced installation construction cost.
2. Since it is a direct type FN mass flow meter, the accuracy is much higher than the existing differential pressure type (±0.1% F.S)
3. Wide range of flow rate when measuring high temperature, high pressure and large flow rate (turndown ratio 50:1)
4. Simultaneous monitoring of 5 data (flow rate, temperature, pressure, density, heat amount) by the central cancer monitoring panel with communication output
5. Easy to install as it is a temperature/pressure sensor/flow computer all-in-one mass flow meter



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

	Type		Flange	Conn` Spec			Enclosure		Power		Output		Display		Direction	Cal 1	Cal 2		Pressure		Option
KC-77							E		P		V							-		-	
	1		2	3	4	5	6	7	8		9		10		11	12	13		14		15

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 ±10 %, < 100 mA	2
AC 100-240 V ±10 %, 10 watts	3
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 U P	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 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)
Agency approved, customer specified	W

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

www.goldenrules.co.kr

Golden Rules Co.,Ltd

Thermal Mass Flowmeter

The nation's development item, 100% domestic goods,Patent **NO.** 10-1606497

Flow Sensing Principle

Thermal Mass Flow Sensing

KC-2600 Series
Thermal Mass Sensor

Golden Rule Co., Ltd.'s unique Mass Flow probe guarantees excellent accuracy, robustness and reliability of industrial flowmeters.The mass flow sensor consists of two sensing parts, one is a flow sensor and the other is a temperature sensor that automatically compensates for changes in gas temperature. The new device consists of two temperature platinum resistors on a single chip. A high ohm resistor is used to measure the reference temperature, while a low ohm resistor is used as a heater. By using the bridge circuit, the different resistance values of the two elements generate different self-heating. Self-heating depends on the supply voltage, mass flow and the medium in which the sensor is placed. A higher voltage increases self-heating, and a higher flow rate increases cooling. If self-heating is continuously maintained by a suitable controller, the voltage will be increased with a high flow rate so that the mass flow can be measured.

◆ **Simply select to suit the application**

Application	Type		Mass Flowmeter Thermal	
Object of Measurement	Liquid		X	
	Gas		O	
	Vaper		X	
	steam		X	
Application	control		X	
	Monitor		O	
	Supply		X	
Operating condition	Temperature		Gas	– 40 to 150˚C
	Pressure		Max 100bar	
	Pressure loss		Negligible	
	Range ability		Large	
Installing condition	Bore		Ø8 to Ø6,000	
	Straight Pipe length	upstream	7D	
		downstream	3D	
	Piping work		Required	
	Explosion-proofing		O	
Performance	Accuracy		Gas	±0.5% F.S
	Velocity		Gas	0.1~100 m/s

Delivery performance

Taekyung Chemical, Kumho Petrochemical, LG Chemical Daesan Plant, LG Chemical Cheongju Plant, SK Chemicals Ulsan Plant, Hanmi Fine Chemicals Sihwa Plant, Kolon Glotech Gumi Plant, Hanwha Chemical Yeosu Plant, Shinchang Yeosu Plant, POSCO Chemical, KCC Yeosu Plant, KCC Daejuk Plant

Korea Gas Corporation -> 4 EA

Samcheok base, Tongyeong base headquarters, Gwangju nursery DME pilot project

Resource recovery facility -> 6 EA

Gyeongnam Yangsan, Mokdong Yangcheon

Medicine -> 4 EA

Samsung Biologics Songdo, Hanmi Pharmaceutical Pyeongtaek Plant

Bridge -> 22 EA

Busan Gwangan Bridge, Yeongjong Bridge, Mokpo New Millennium Bridge

Car -> 110 EA

Hyundai Powertech Dangjin Plant, Hyundai Motors Ulsan/Asan Plant, Kia Motors Hwaseong Plant

Semiconductor & Electronics -> 53 EA

Samsung Electronics Suwon/Hwaseong Plant, LG Siltron Gumi Plant, LG Electronics Cheongju Plant, LG Innotek, Cheongju Plant, Dongjin Semichem Hwaseong Plant, Korea Molex Gwangju Plant

Construction -> 109 EA

POSCO E&C, Samsung C&T, Lotte E&C, Hyundai E&C, Hanwha, Halla OMS, Doosan E&C, Taeyoung E&C

Food -> 13 EA

Dongseo Food Bupyeong/Changwon Plant, Namyang Dairy, Haitai Beverage, OB Beer Cheongju Plant

Cement -> 5 EA

Halla Cement Bucheon Plant, Hanil Cement (Gongju, Mokpo, Haman, Gaya Plant)

Delivery performance

Communication -> 2 EA

KT Busan

Machine -> 31 EA

Korea NSK Cheonan Factory, Bearing Art Yeongju Factory

Energy Saving System Project (for compressed air) -> 162 EA

1. Gyeongbuk region (Daegu Dalseong Industrial Complex & Gyeongbuk Gumi Industrial Complex)-300 units for compressed air, **129 units** currently being delivered after receiving an order in August 2016

2. In the process of being delivered to other factories for the basic unit check of compressed air usage -> **11 EA**

POSCO Gwangyang 65A-1ea(2005.12),
Bogwang Phoenix Park 250A-2ea(2006.5),
Samsung Biologics 100A-2ea(2012.7),
POSCO Gwangyang 50A-1ea(2012.8),
SamyangMillmax Asan Plant 80A-1ea(2015.8),
LG Electronics Cheongju Plant 80A-1ea (2015.8),
Kia Motors Hwaseong Plant 250A-1ea (2017.1),
Kolon Glotech Gumi Plant 100A-1ea (2017.7),
SK Technopack Cheonan Plant 150A-1ea (2017.8),

3. Gyeongnam &Busan industrial complex energy management system PJT energy saving compressed air -> **22 EA**

Castech Korea Co., Ltd. Busan Factory 80A-1ea (2016.7),
Dongeun Forging Co., Ltd. Busan Factory
65A-1ea, 80A-1ea, 100A-2ea, 150A-2ea (2016.7)
Samshin Precision Co., Ltd. Gyeongnam Haman Factory 200A-3ea(2018.8),
Boyoung Metal Goryeong(2018.9)-3ea,
HM Metal Haman Plant-3ea,
etc.-6ea

01

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Golden Rules Co.,Ltd

Thermal Mass Flow Meter
Speicalty Manufacture

KC-2600GI Series

Air & Gas insertion type




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

01. THERMAL MASS FLOW METER (Air & Gas)

01. Insertion type KC-2600GI Series

Insertion Type Thermal Mass Flowmeter

Gerneral insertion type
KC-2610GI
(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 ±0.1 %, ±2.5 μA (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

Description

Golden Rules' KC-2600GI 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-2600GI 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 F.S

Repeatability

±0.2 % of Full Scale

◆ Temperature Coefficient

±0.03 % Reading / ±(10 ~ 38) ℃
±0.06 % Reading / ±(25 ~ 50) ℃

◆ 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	Nm³/h	Scfm	Nm³/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, Nm³/h 1기압

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) ℉ ((-40 ~ 65) ℃)
: 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) ℉ ((-40 ~ 150) ℃)
Ambient : (-4 ~ 185) ℉ ((-20 ~ 85) ℃)

Gas accumulation range

Up to 5×10^{-4} with helium gas

◆ Input Power (selection)

DC24 V ±10 %, 200 ㎃
100 ~ 240 V AC ±10 %, 10 watts

◆ Output Signal (Standard)

Linear (4 ~ 20) ㎃ & Pulse

◆ Display

Alphanumeric 2 X 16 backlight LCD
Adjustable variables via remote control switch or Smart interface software
Adjustable : Full scale : (0 ~100) %
Flow: ㎥/h(㎥), 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)

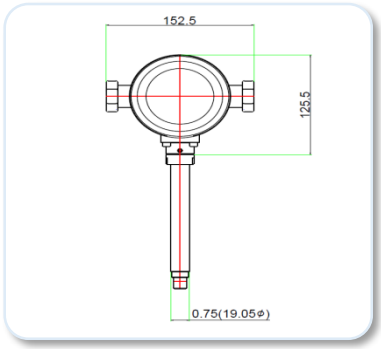
◆ Certification

Ex (Ex d[ib] ⅡC T4)
CE (CASE)
KGS Certificate
KC Certificate

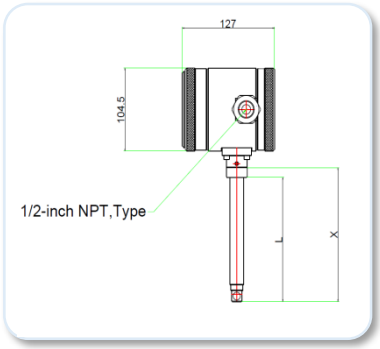
Dimensional Specification & Chart I

♣ General KC-2610GI (IP67)

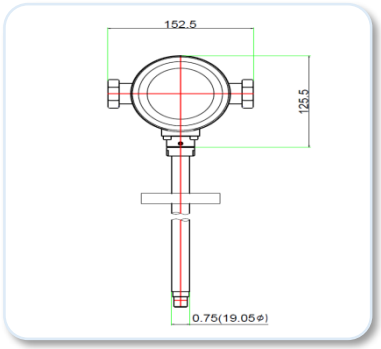
●Compression Fitting – Front View (EN2)



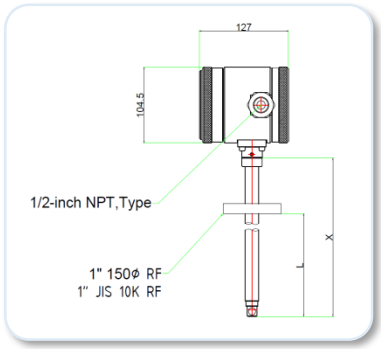
●Compression Fitting – Side View (EN2)



●Flange Mounting – Front View (EN2)

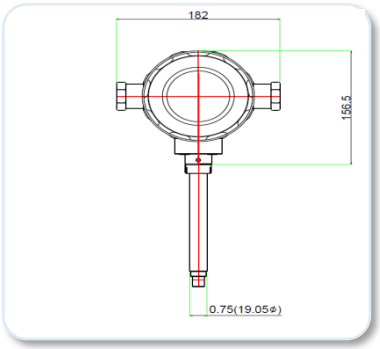


●Flange Mounting – Side View (EN2)

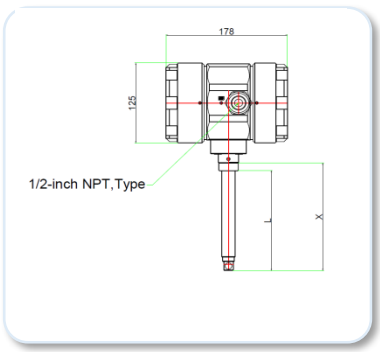


♣ Ex-proof KC-2620Ex (IP66)

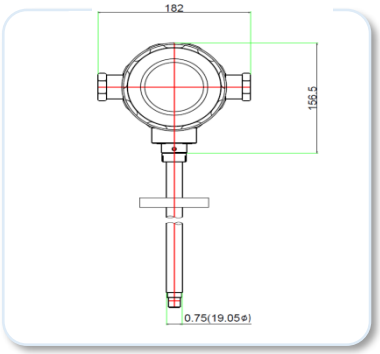
●Compression Fitting – Front View (E2)



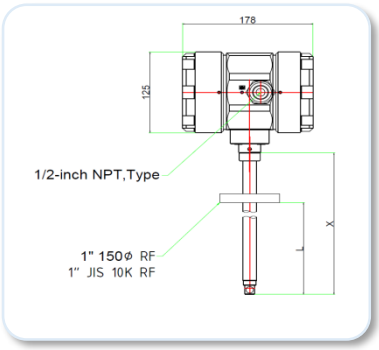
●Compression Fitting – Side View (E2)



●Flange Mounting – Front View (E2)



●Flange Mounting – Side View (E2)

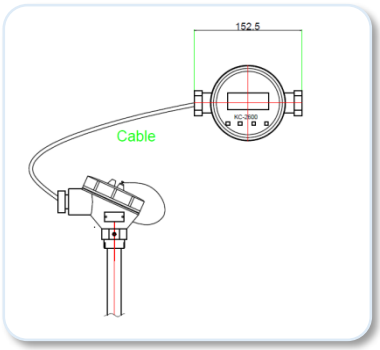


The shape of the sensor and Housing manufacturers are Subject to Change.

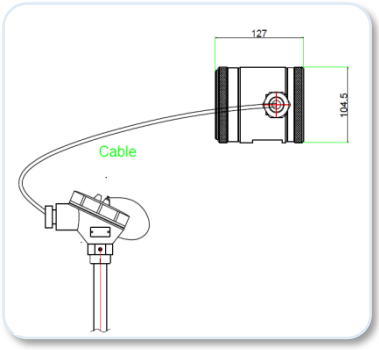
Dimensional Specification & Chant Ⅱ

♣ General Insertion type KC-2610GI-R

- Remote Mount Junction Box – Front View (EN4)

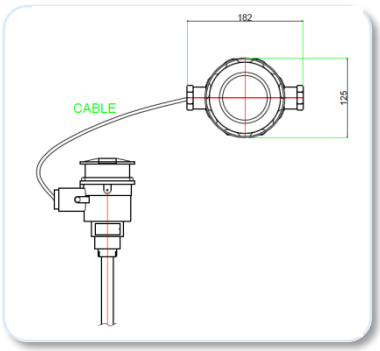


Remote Mount Junction Box – Side View (EN4)

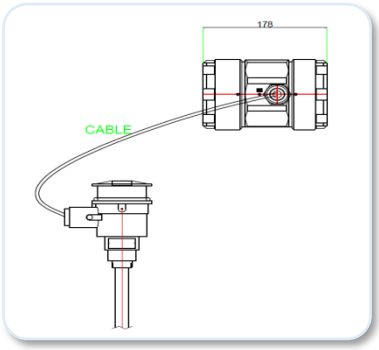


♣ Ex-proof Insertion type KC-2620Ex-R

- Remote Mount Junction Box – Front View (E4)



• Remote Mount Junction Box – Side View (E4)



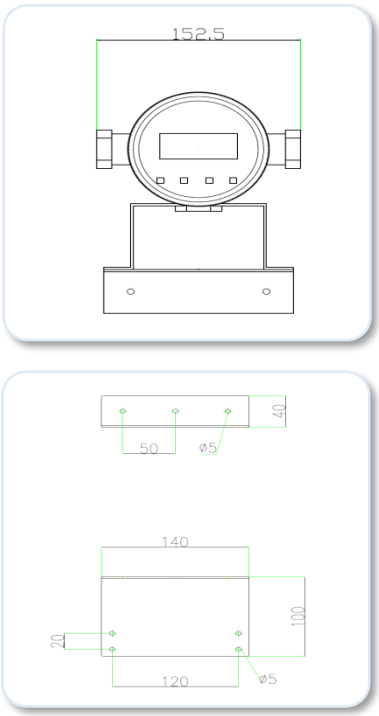
Length Chart		
Code	**L**	**X**
L06	**6.0 (152.4)**	**7.5 (190.5)**
L09	**9.0 (228.6)**	**10.5 (266.7)**
L13	**13.0 (330.2)**	**14.5 (368.3)**
L18	**18.0 (457.2)**	**19.5 (495.3)**
L24	**24.0 (609.6)**	**25.5 (647.7)**
L36	**36.0 (914.4)**	**37.5 (952.5)**

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

Dimensional Specification & Chart Ⅲ

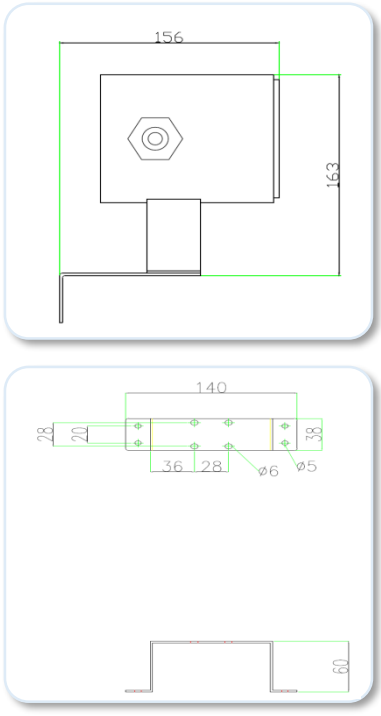
♣ General Insertion type KC-2610GI-R

●Remote Rear Bracket Electronics (EN4)



Panel mounting bracket 1

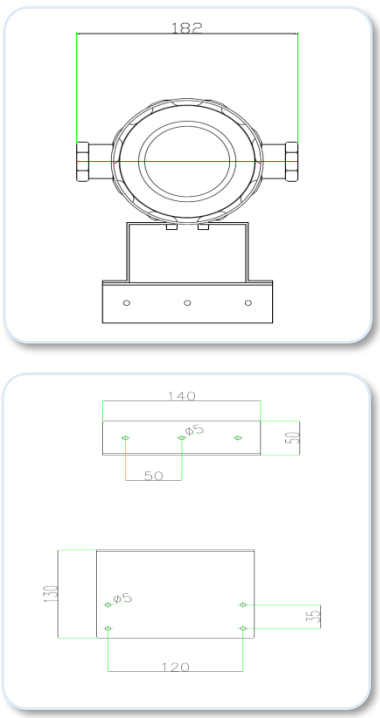
●Remote Side Bracket Mounted Electronics (EN4)



Panel mounting bracket 2

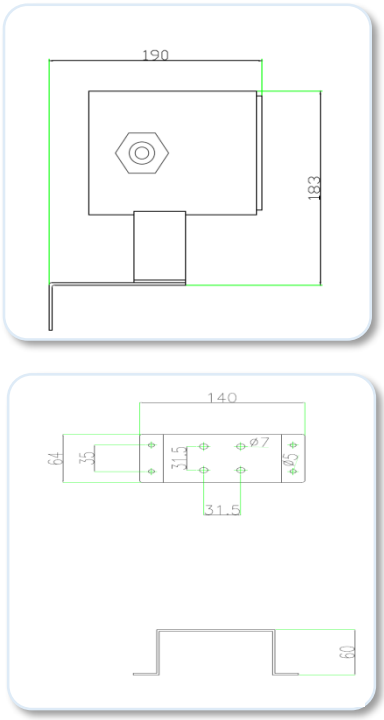
♣ Ex-proof Insertion type KC-2620Ex-R

●Remote Rear Bracket Electronics (E4)



Panel mounting bracket 1

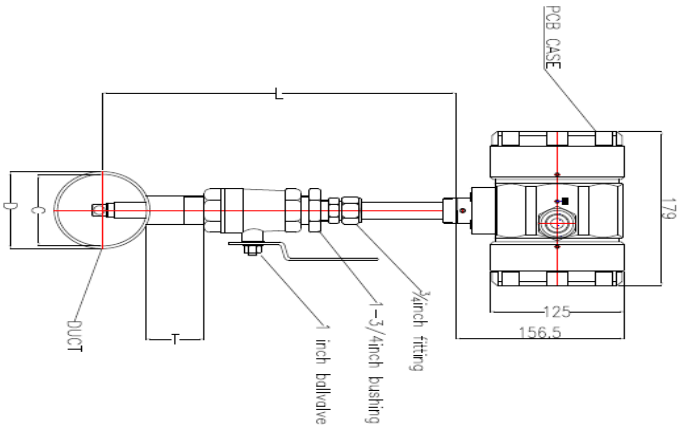
●Remote Side Bracket Mounted Electronics (E4)



Panel mounting bracket 2

Low Pressure Ball Valve Diemensional

●Side view

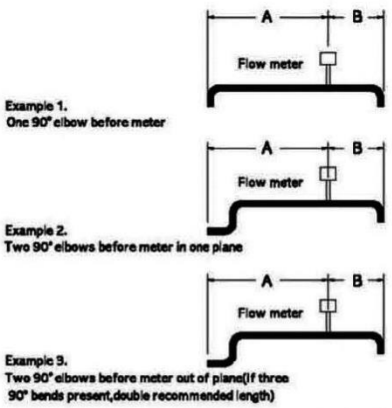


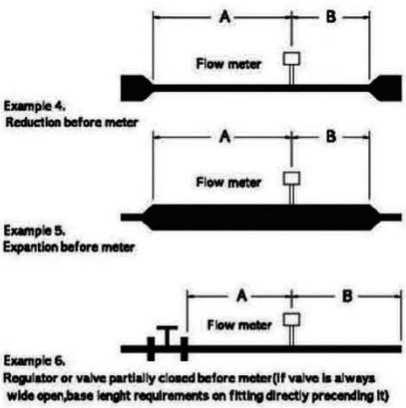
VARIABLE
L = Normal Probe Length
D = Duct O.D
C = Duct I.D
T = Height of "Threadolet" or
Customer provided weldolet

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 & Downsream 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 tje 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
IP67 or IP65	10 GI
Hazardous-Area Location Enclosure	20 Ex
Agency approved, customer specified	30

Length[4]	Code 2,3
6" (15 ㎝)	06
9" (23 ㎝)	09
12" (30 ㎝)	12
18" (46 ㎝)	18
24" (61 ㎝)	24
36" (92 ㎝)	36
Special Length	(in)
Probe with 2" JIS 10k RF Flange	(in)-M5
High pressure with Retractor Valve	(in)-M9
Agency approved, customer specified	WW

Connection Specification	Code 4,5
None	0
Compression Fitting2 (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 Retract 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

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

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

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

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 larg e pipe size	D
Customer Calibration	B
Air	
Air equivalency (Digester Gas, Flue, Gas etc.)	C
Nitrogen, Helium, Argon, Carbon Dio xide Compressed Air or Digester Gas	E
Hydrocarbon (Natural Gas, Methane, Ethane, Propane etc.)	F
Hydrogen or Hydrogen Mixture	G
Agency approved, customer specified	W

Calibration 2[9]	Code 13
70 °F(21 ℃) 14.7 psig (1.103 barg)	A
32 °F(0 ℃) 14.7 psig (1.103 barg)	B
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)

Option	Code 15
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.Flnage 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 exeed temperature & pressure limitations of the 2610GI, 2620Ex Series products specifications

02

www.goldenrules.co.kr

Golden Rules Co.,Ltd

Thermal Mass Flow Meter

KC-2600GF Series

Air & Gas Inline type

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

02. THERMAL MASS FLOW METER (Air & Gas)

2 Inline type KC-2600GF 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 ±0.1 %, ±2.5 μA (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-2600GF 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 optional2X16 LCD panel. The programmable transmitter is easily configured via an RS-485 communication port andGolden Rules Smart interface software, or via the display and magnetic switches in the instrument panel.
The Golden Rules KC-2600GF 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

±0.5% of F.S

Repeatability

±0.2 % of Full Scale

◆ Temperature Coefficient

±0.03 % Reading / ±(10 ~ 38) ℃내에서 ℃

±0.06 % Reading / ±(25 ~ 50) ℃내에서 ℃

◆ 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	Nm³/h	Scfm	Nm³/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
100 A	4-inch	90	130	1800	2700	16.2	14.2
150 A	6-inch	200	300	4000	5900		
200 A	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

Air & Gas

◆ Pressure (limitation)

Compression Fittings : 508 psig (35 barg) option

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

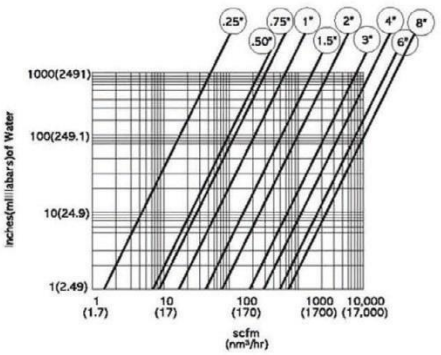
150 lb Flange, JIS 10k RF PN16 DIN 121 ℃ (250 ℉) : 185 psig (12.8 barg)

150 lb Flange, JIS 10k RF PN16 DIN 400 ℃ (752 ℉) : 155 psig (10.7 barg)

NPT -40 ~ 150 ℃ ((-40 ~ 302) ℉) : 508 psig (35 barg)

High Pressure Retract Valve : 1000 psig (70 barg)

◆ Pressure Drop



◆ Fluid & Ambient temp'

Gases : (-40 ~ 302) ℉ ((-40 ~ 150) ℃)
Ambient : (-4 ~ 185) ℉ ((-20 ~ 85) ℃)

◆ Input Power (selection)

DC24 V ±10 %, 200 ㎃
(100 ~ 240) V AC ±10 %, 10 watts

◆ Output Signal

Linear (4 ~ 20) ㎃ & Pulse

◆ Dispaly

Adjustable variables via remote control switch or Smart interface software
Adjustable : Full scale : (0 ~100) %
Flow: ㎥/h(㎥), 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, prefereed 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

Hazadous-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)

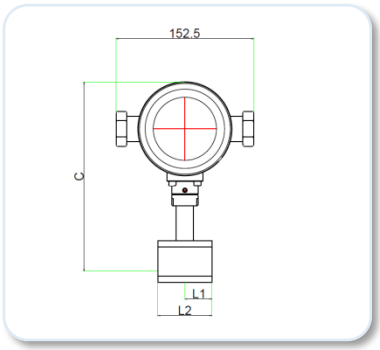
¾" Compression Fitting과 ¾" Male NPT (Standard)
ANSI 150lb Flange, JIS 10k RF Flange (Option)
¾" Compression Fitting과 1" Male NPT (Option)
Ball Valve System (Option)

◆ Certification

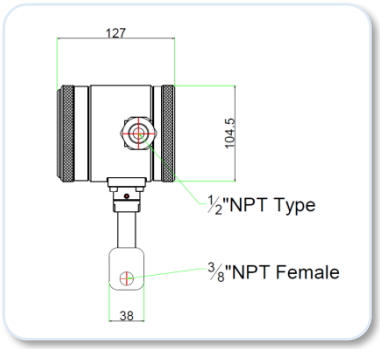
Ex (Ex d[ib] ⅡC T4)
CE (CASE 전체)
KGS Certificate
KC Certificate

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

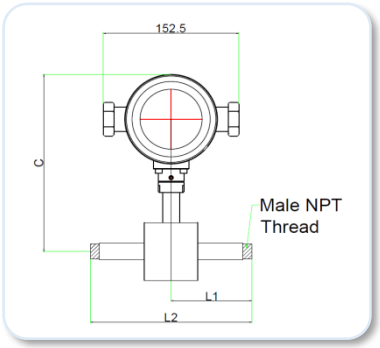
●1/4," 3/8" NPT – Front View (EN2)



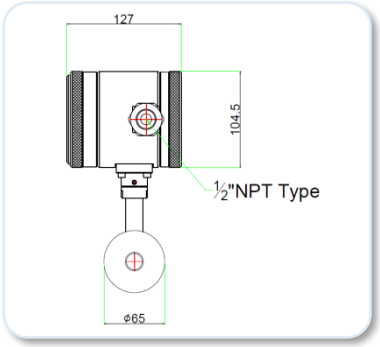
●Compression Fitting – Side View (EN2)



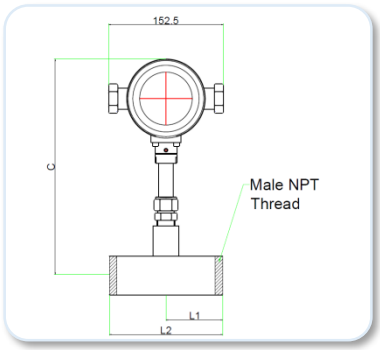
●1/2," 3/4" NPT – Front View (EN2)



●1/2," 3/4" NPT – Side View (EN2)



●1/4," 3/8" NPT – Front View (EN2)

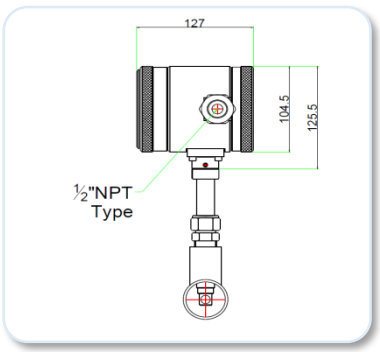


SIZE for NPT			
Size	C	L1	L2
1/4" & 3/8"	210.5	30	60
1/2"	210.5	90.7	181.4
3/4"	210.5	90.7	181.4
1"	272.5	101.5	203
1-1/2"	272.5	101.5	203
2"	272.5	101.5	203
3"	334.6	127	254
4"	334.6	127	254
6"	334.6	127	254
8"	404.6	127	254

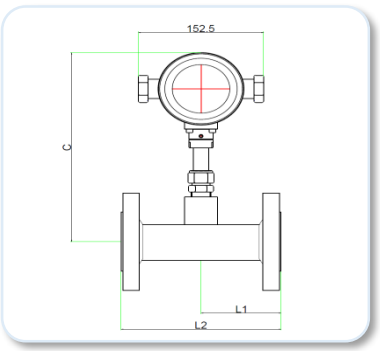
SIZE for ANSI 150# FLANGE				
Size	C	L1	L2	A
1/2"	210.5	101.5	203	45°
3/4"	210.5	101.5	203	45°

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

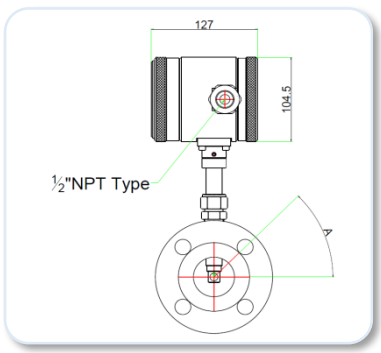
●Compression Fitting – Side View (EN2)



●1/2," 3/4" Flange – Front View (EN2)



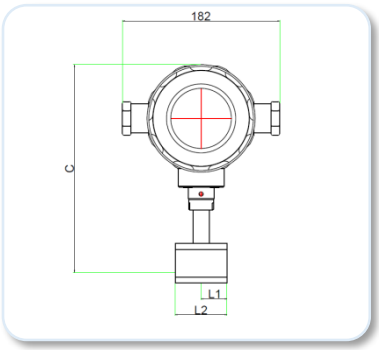
●1/2," 3/4" Flange – Side View (EN2)



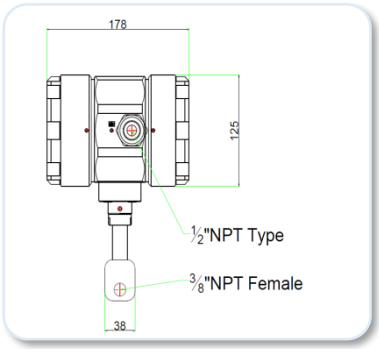
All dimensions are inches. Millimeters are in parentheses.

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

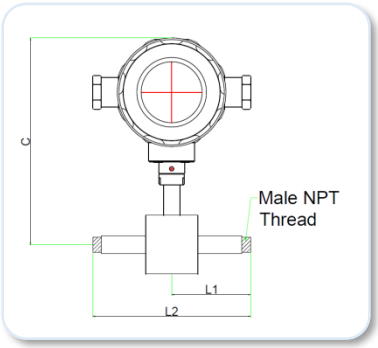
●1/4," 3/8" NPT – Front View (E2)



●Compression Fitting – Side View (E2)

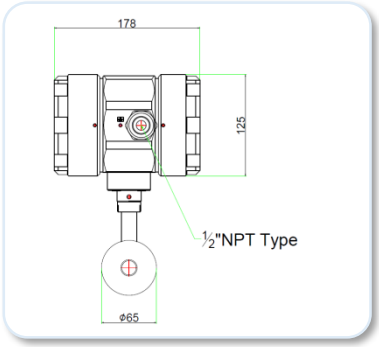


●1/2," 3/4" NPT – Front View (E2)

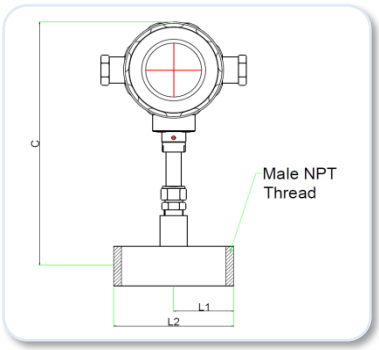


SIZE for NPT			
Size	C	L1	L2
1/4" & 3/8"	241.5	30	60
1/2"	241.5	90.7	181.4
3/4"	241.5	90.7	181.4
1"	283.5	101.5	203
1-1/2"	283.5	101.5	203
2"	283.5	101.5	203
3"	344.6	127	254
4"	344.6	127	254
6"	344.6	127	254
8"	404.6	127	254

●1/2," 3/4" NPT – Side View (E2)



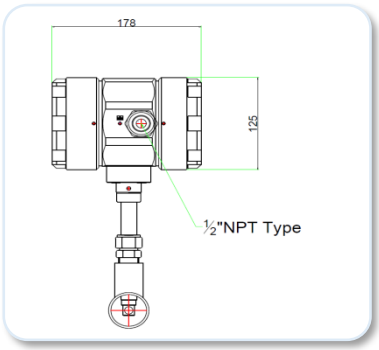
●1/4," 3/8" NPT – Front View (E2)



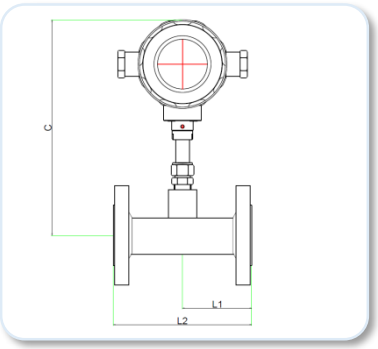
SIZE for ANSI 150# FLANGE				
Size	C	L1	L2	A
1/2"	241.5	101.5	203	45°
3/4"	241.5	101.5	203	45°

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

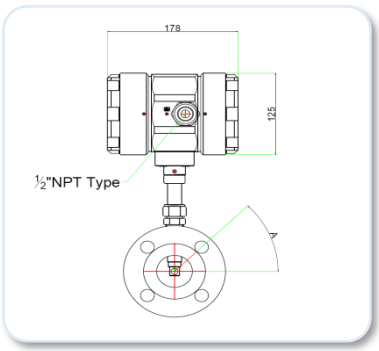
●Compression Fitting – Side View (E2)



●1/2," 3/4" Flange – Front View (E2)

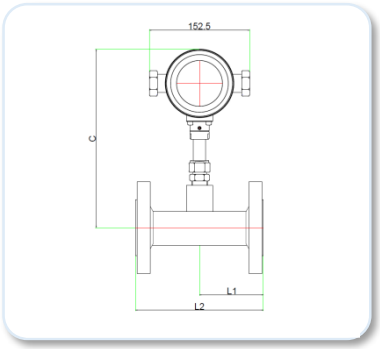


●1/2," 3/4" Flange – Side View (E2)

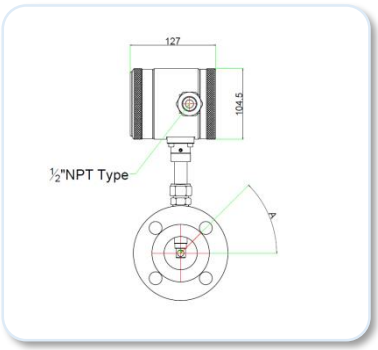


Dimensional Specification &Chart Ⅲ KC-2610GF (IP67)

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

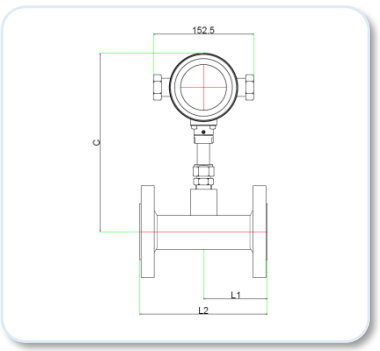


●1-1/2" ~ 8"– Side View (EN2)
150# Flange, JIS 10k RF Flange

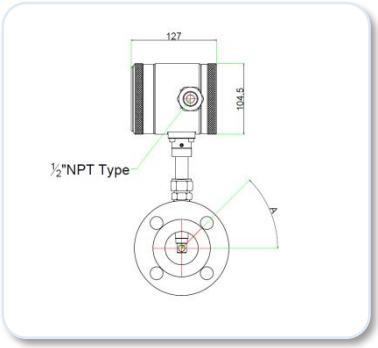


Size for ANSI 150# Flange				
Size	C	L1	L2	A
1-1/2"	283.5	101.5	203	45°
2"	283.5	101.5	203	45°
3"	344.6	127	254	45°
4"	344.6	127	254	22.5°
6"	344.6	127	254	22.5°
8"	404.6	127	254	22.5°

●DIN Flange – Front View (EN2)



●DIN Flange – Side View (EN2)

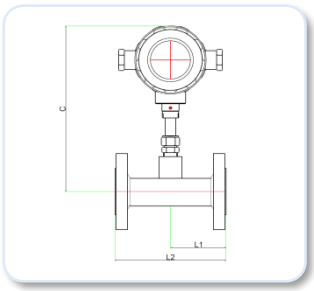


Size for PN16 DN Flange			
Size	C	L1	L2
DN40	283.5	101.5	203
DN50	283.5	101.5	203
DN80	344.6	127	254
DN100	344.6	127	254
DN150	344.6	127	254
DN200	404.6	127	254

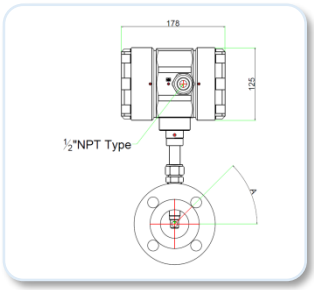
Dimensional Specification & Chart Ⅲ KC-2620Ex (Ex-proof)

♣ General Remot type KC-2610GF-R

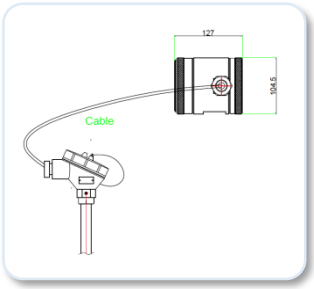
●1-1/2" ~ 8" – Front View(E2)
150# Flange, JIS 10k RF Flange



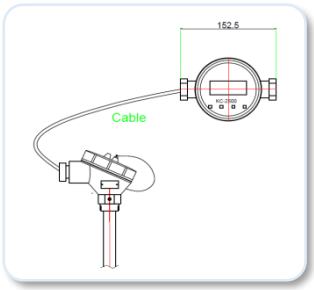
●1-1/2" ~ 8" – Side View(E2)
150# Flange, JIS 10k RF Flange



●Remote Mount Junction Box
– Front View(EN4)

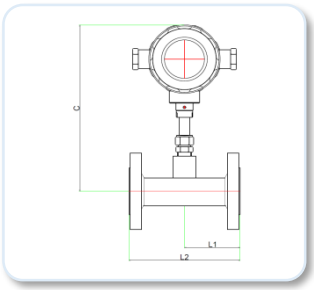


●Remote Mount Junction Box
– Side View(EN4)

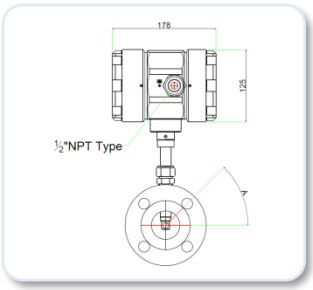


♣ Ex-proof Remote type KC-2620Ex-R

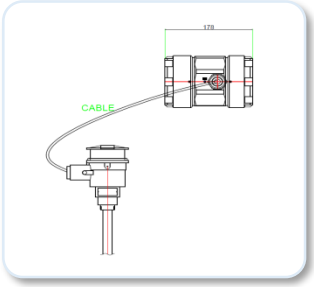
●DIN Flange – Front View(E2)



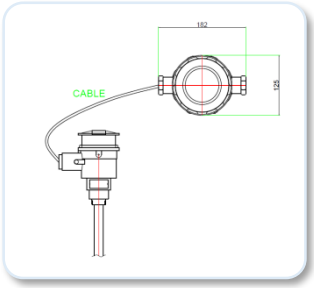
●DIN Flange – Side View(E2)



●Remote Mount Junction Box
– Front View(E4)



●Remote Mount Junction Box
– Side View(E4)

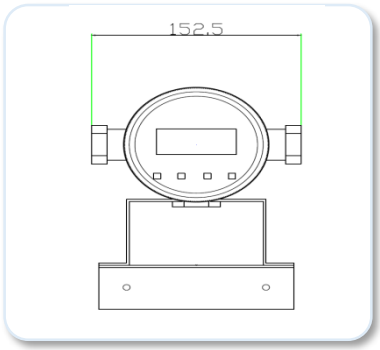


※ The shape of the sensor and Housing manufacturers are Subject to Change.

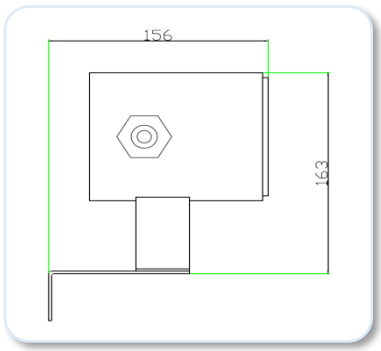
Dimensional Specification &Chart V

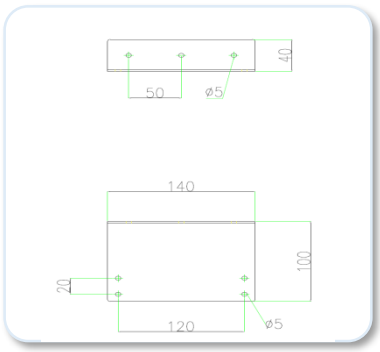
♣ General Remote type KC-2610GF-R

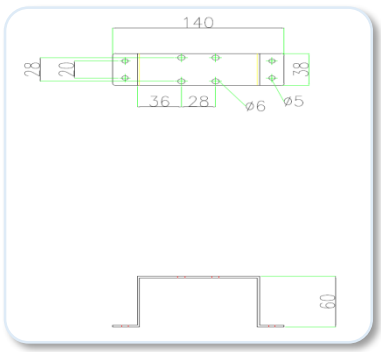
●Remote Rear Bracket Electronics (EN4)



●Remote Side Bracket Mounted Electronics (EN4)





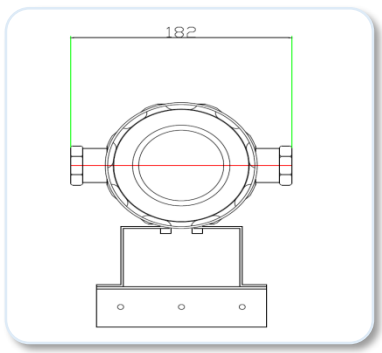


●panel mounting bracket 1

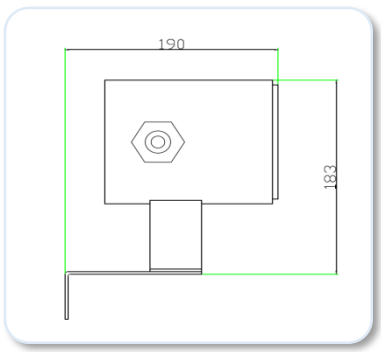
●panel mounting bracket 2

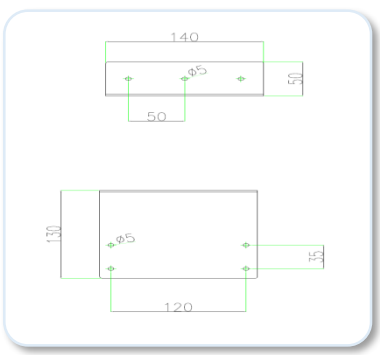
♣ Ex-proof Remote type KC-2620Ex-R

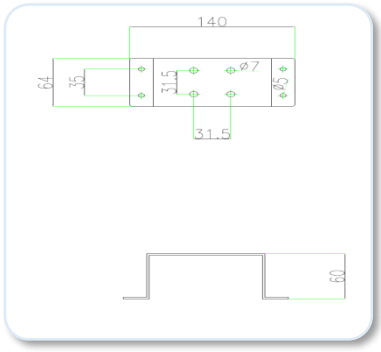
●Remote Rear Bracket Electronics (E4)



●Remote Side Bracket Mounted Electronics (E4)





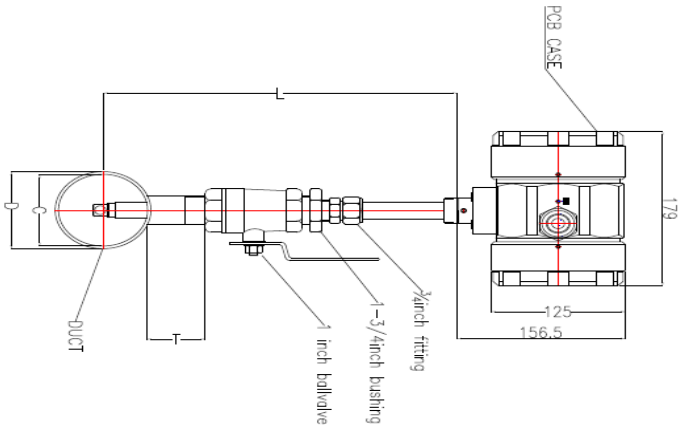


●panel mounting bracket 1

Low Pressure Ball Valve Dimenional & Specification

●Side View

VARIABLE
L = Normal Probe Length
D = Duct O.D
C = Duct I.D
T = Height of "Threadolet" or
Customer provided weldolet



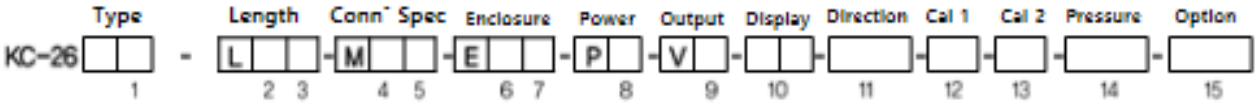
±0.25 All dimensions are inches. Millimeters are in parentheses.
All drawings save a ±0.25 inch(6.4 mm) tolerance.
Certified and available be on request.

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)



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

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

Calibration 2[9]	Code 13
70 °F(21 ℃) 14.7 psig (1.103 barg)	A
32 °F(0 ℃) 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 ㎃,	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

Flow Direction	Code 11
Horizontal Free or Vertical UP	1
Horizontal Free or Vertical Down	2
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

Calibration 1[9]	Code 12
Standard Calibration	A
Air, only for 3" and large pipe size	
Compressed Air, only for 3" and larg e pipe size	D
Customer Calibration	B
Air	
Air equivalency (Digester Gas, Flue, Gas etc.)	C
Nitrogen, Helium, Argon, Carbon Dio xide 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.Flnage 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 exeed temperature & pressure limitations of the 2610GF, 2620Ex Series products specifications

03

www.goldenrules.co.kr

Golden Rules Co.,Ltd

Thermal Mass Flow Meter

KC-2600BI Series

Bio Gas Insertion type




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

03. THERMAL MASS FLOW METER (Bio Gas)

3 Insertion type KC-2600BI Series

Insertion Type Thermal Mass Flowmeter

Gerneral 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 ±0.1 %, ±2.5 μA (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

Description

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**
±0.5% of F.S

Repeatability
±0.2 % of Full Scale

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

◆ **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	N㎥/h	Scfm	N㎥/h
25A	1-inch	6	8.9	120	180
40A	1 1/2-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: Air or N2 Flow Standard Condition :21˚C(70˚F) & 21˚C(70˚F) scfm:0˚C, N㎥/h 1atm

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) ℉ ((-40 ~ 65) ℃)
: 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) ℉ ((-40 ~ 150) ℃)
Ambient : (-4 ~ 185) ℉ ((-20 ~ 85) ℃)

Gas accumulation range
Up to 5×10^{-4} with helium gas

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

◆ **Output Signal (Standard)**

Linear (4 ~ 20) ㎃ & Pulse

◆ **Display**

Alphanumeric 2 X 16 backlight LCD
Adjustable variables via remote control switch or Smart interface software
Adjustable : Full scale : (0 ~100) %
Flow: ㎥/h(㎥), 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

Physcial 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)

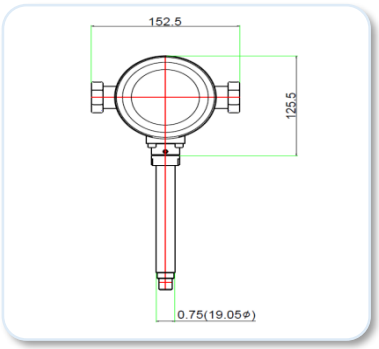
◆ **Certification**

Ex (Ex d[ib] ⅡC T4)
CE (CASE)
KGS Certificate
KC Certificate

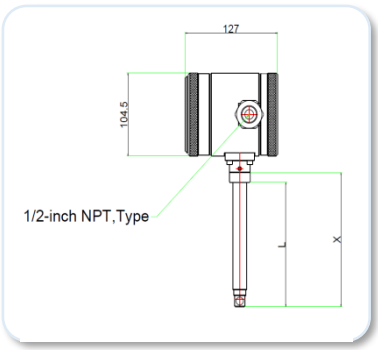
Dimensional Spec'& Chart I

♣ General type KC-2610BI (IP67)

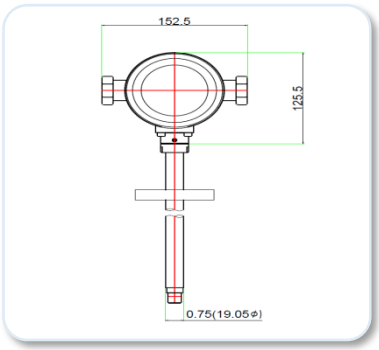
●Compression Fitting – Front View (EN2)



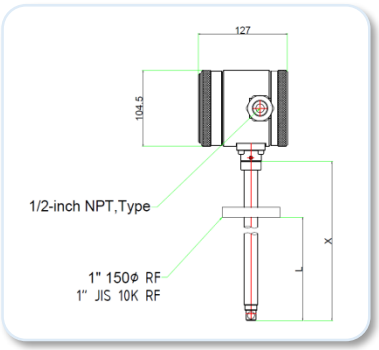
●Compression Fitting – Side View (EN2)



●Flange Mounting – Front View (EN2)

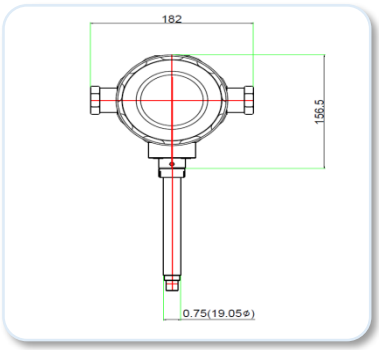


●Flange Mounting – Side View (EN2)

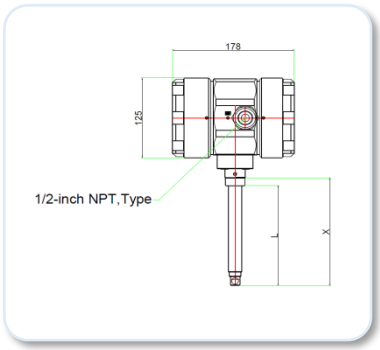


♣ Ex-proof type KC-2620Ex (IP66)

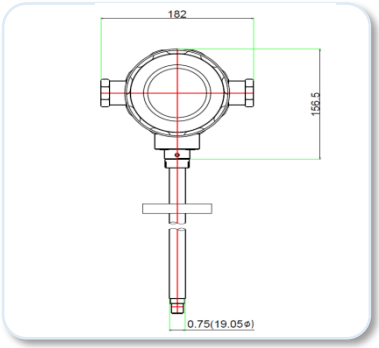
●Compression Fitting – Front View (E2)



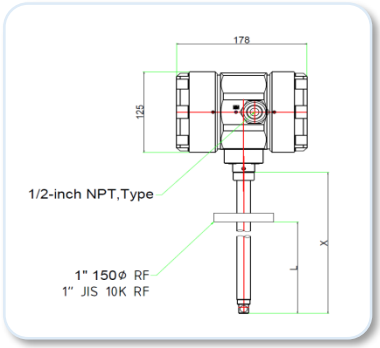
●Compression Fitting – Side View (E2)



●Flange Mounting – Front View (E2)



●Flange Mounting – Side View (E2)

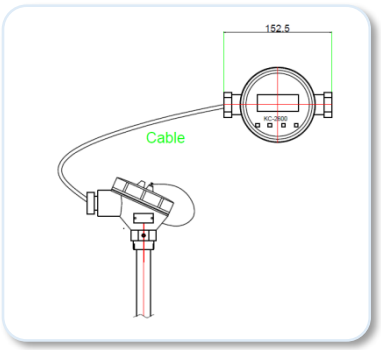


The shape of the sensor and Housing manufacturers are Subject to Change.

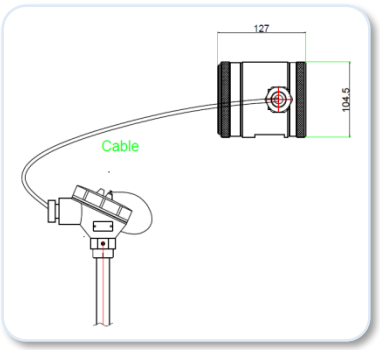
Dimenstional Spec'& Chart Ⅱ

♣ Genreal Remote KC-2610BI-R

●Remote Mount Junction Box – Front View (EN4)

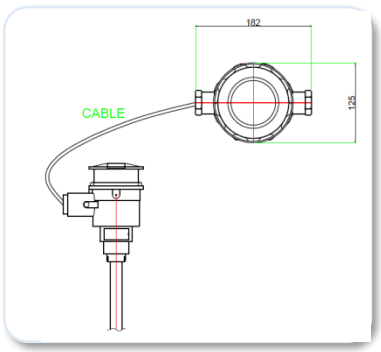


●Remote Mount Junction Box – Side View (EN4)

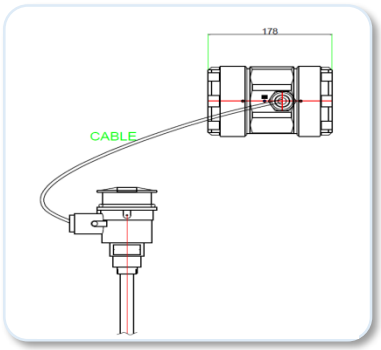


♣ Ex-proof Remote type KC-2610Ex-R

●Remote Mount Junction Box – Front View (E4)



●Remote Mount Junction Box – Side View (E4)



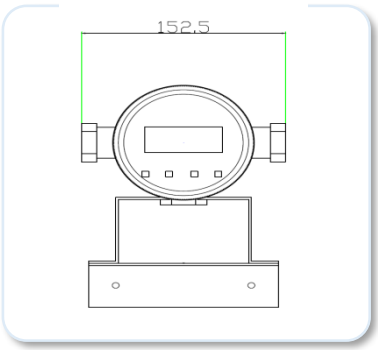
Length Chart		
Code	**L**	**X**
L06	**6.0 (152.4)**	**7.5 (190.5)**
L09	**9.0 (228.6)**	**10.5 (266.7)**
L13	**13.0 (330.2)**	**14.5 (368.3)**
L18	**18.0 (457.2)**	**19.5 (495.3)**
L24	**24.0 (609.6)**	**25.5 (647.7)**
L36	**36.0 (914.4)**	**37.5 (952.5)**

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

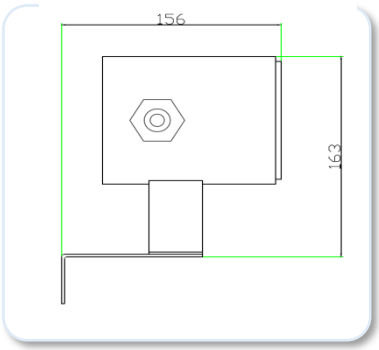
Dimensional Spec& Chart Ⅲ

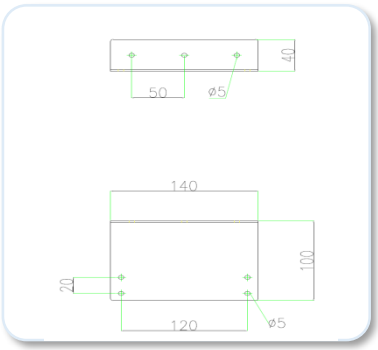
♣ General Remote type KC-2610BI-R

●Remote Rear Bracket Electronics (EN4)

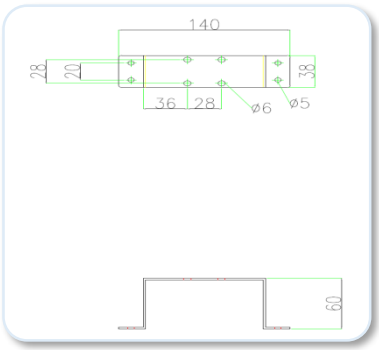


●Remote Side Bracket Mounted Electronics (EN4)





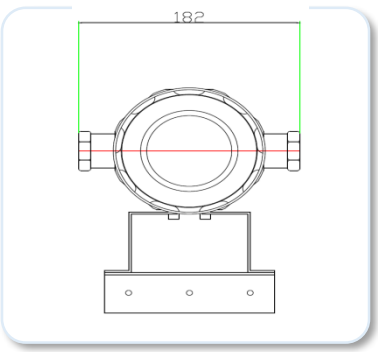
Panel mounting bracket 1



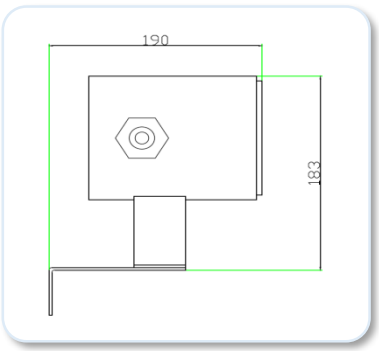
Panel mounting bracket 2

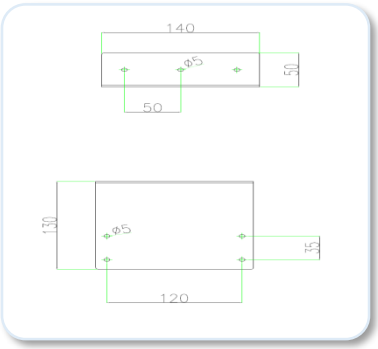
♣ Ex-proof Remote type KC-2610Ex-R

●Remote Rear Bracket Electronics (E4)

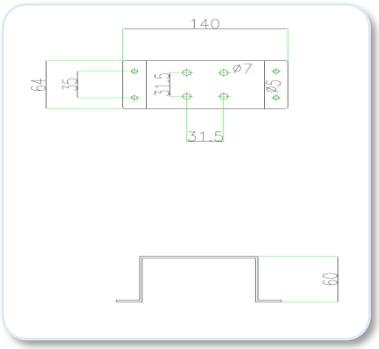


●Remote Side Bracket Mounted Electronics (E4)





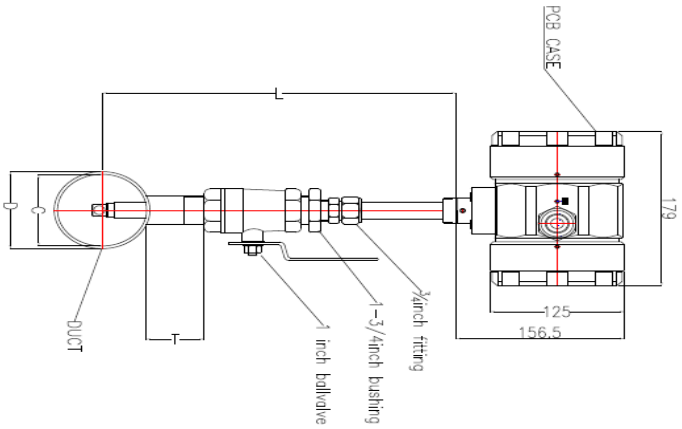
Panel mounting bracket 1



Panel mounting bracket 2

Low Pressure Ball Valve Diemensional

●side view

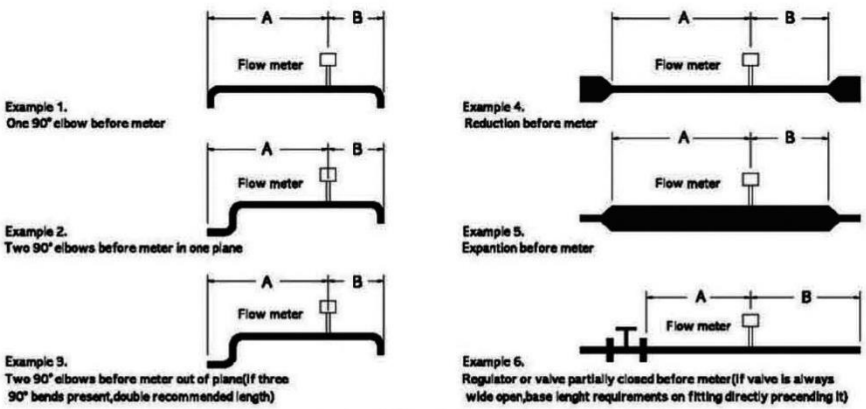


VARIABLE
L = Normal Probe Length
D = Duct O.D
C = Duct I.D
T = Height of "Threadolet" or
Customer provided weldolet

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&Downsream dimension(KC-2600BI insertion)

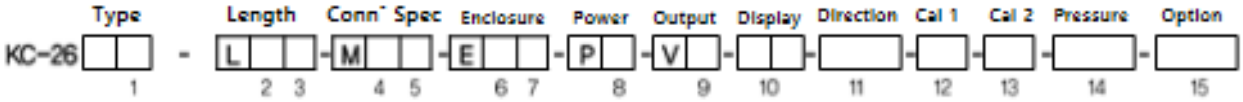
Select an installation that minimize possible distortion in the flow profile, Valves, elbows, control valves and other piping components may cause flow disturbances. Check your specific piping condition against the examples shown below.
In order to achieve accurateness and repeatable performance install 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 tje flow meter.

Order Code KC-2600BI Series (Bio Gas Insertion type)



Type	Code 1
IP67 or IP65	10 BI
Hazardous-Area Location Enclosure	20 Ex
Agency approved, customer specified	30

Length[4]	Code 2,3
6″ (15 ㎝)	06
9″ (23 ㎝)	09
12″ (30 ㎝)	12
18″ (46 ㎝)	18
24″ (61 ㎝)	24
36″ (92 ㎝)	36
Special Length	(in)
Probe with 2″ JIS 10k RF Flange	(in)-M5
High pressure with Retractor Valve	(in)-M9
Agency approved, customer specified	WW

Connection Specification	Code 4,5
None	0
Compression Fitting2 (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 Retract 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

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

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

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

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 larg e pipe size	D
Customer Calibration	B
Air	
Air equivalency (Digester Gas, Flue, Gas etc.)	C
Nitrogen, Helium, Argon, Carbon Dio xide Compressed Air or Digester Gas	E
Hydrocarbon (Natural Gas, Methane, Ethane, Propane etc.)	F
Hydrogen or Hydrogen Mixture	G
Agency approved, customer specified	W

Calibration 2[9]	Code 13
70 ℉(21 ℃) 14.7 psig (1.103 barg)	A
32 ℉(0 ℃) 14.7 psig (1.103 barg)	B
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)

Option	Code 15
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.Flnage 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 exeed temperature & pressure limitations of the 2610BI, 2620Ex Series products specifications

04

www.goldenrules.co.kr

Golden Rules Co.,Ltd

Thermal Mass Flow Meter

KC-2600BF Series

Bio Gas Inline type

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

04. THERMAL MASS FLOW METER (Bio Gas)

4 Inline type KC-2600BF 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 ±0.1 %, ±2.5 μA (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-2600BF 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-2600BF 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

±0.5% of F.S

Repeatability

±0.2 % of Full Scale

◆ Temperature Coefficient

±0.03 % Reading / ±(10 ~ 38) ℃내에서 ℃
±0.06 % Reading / ±(25 ~ 50) ℃내에서 ℃

◆ 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

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

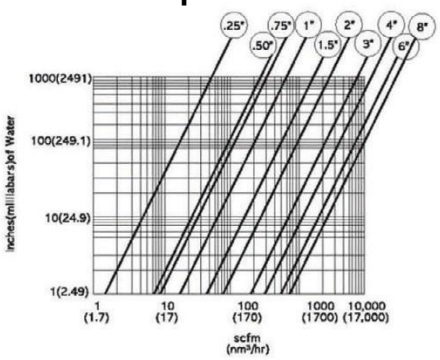
◆ Fluid

Bio gas & Mixed gas

◆ Pressure (limitation)

Compression Fittings : 508 psig (35 barg) option
150 lb Flange, JIS 10k RF PN16 DIN (-40 ~ 150) ℃ (-40 ~ 302) ℉ : 230 psig (15.9 barg)
150 lb Flange, JIS 10k RF PN16 DIN 121 ℃ (250 ℉) : 185 psig (12.8 barg)
150 lb Flange, JIS 10k RF PN16 DIN 400 ℃ (752 ℉) : 155 psig (10.7 barg)
NPT -40 ~ 150 ℃ ((-40 ~ 302) ℉) : 508 psig (35 barg)
High Pressure Retract Valve : 1000 psig (70 barg)

◆ Pressure Drop



◆ **Fluid & Ambient temp'**

Gases : (-40 ~ 302) ℉ ((-40 ~ 150) ℃)
Ambient : (-4 ~ 185) ℉ ((-20 ~ 85) ℃)

◆ **Input Power (selection)**

DC24 V ±10 %, 200 ㎃
(100 ~ 240) V AC ±10 %, 10 watts

◆ **Output Signal**

Linear (4 ~ 20) ㎃ & Pulse

◆ **Dispaly**

Adjustable variables via remote control switch or Smart interface software
Adjustable : Full scale : (0 ~100) %
Flow: ㎥/h(㎥), 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, prefereed 16MB of RS-485 communication
Additional features: Zero cut-off adjustment / Linearization adjustment / Save / Load configuration / For meter validation

Physcial Specification

◆ **Wetted Part Mat'l**

Sensor Probe – Ceramic + 303SS (Platinum) Option : 316SS, 316LSS
Flow Body – 304SS (Option 316SS, 316LSS)

◆ **Enclosure**

Hazadous-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)**

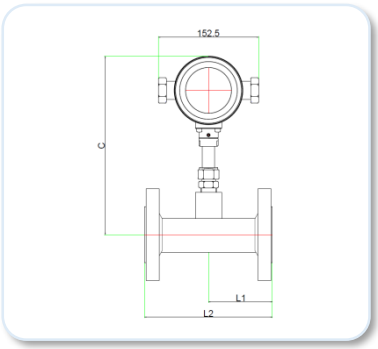
¾" Compression Fitting과 ¾" Male NPT (Standard)
ANSI 150lb Flange, JIS 10k RF Flange (Option)
¾" Compression Fitting과 1" Male NPT (Option)
Ball Valve System (Option)

◆ **Certification**

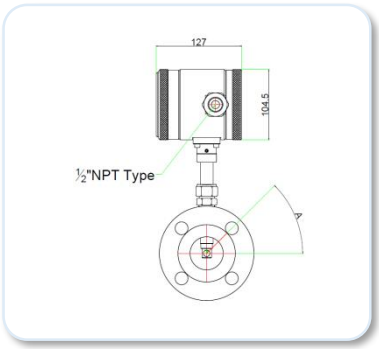
Ex (Ex d[ib] ⅡC T4)
CE (Proceeding)
KGS Certificate
KC Certificate

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

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

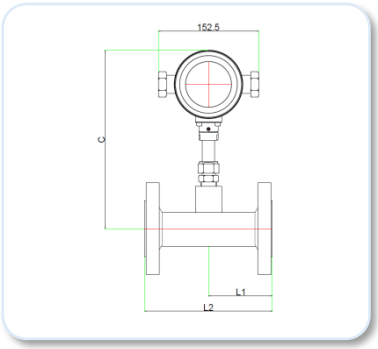


●1 1/2,"부터 8" 150lb & JIS 10k RF Flange – Side View (EN2)

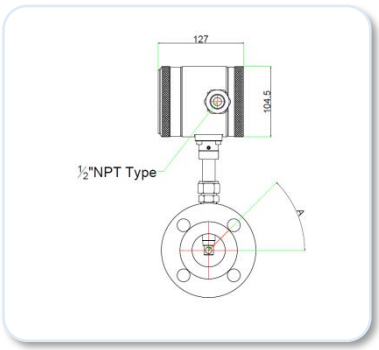


Size for ANSI 150lb Flange				
Size	C	L1	L2	A
1.5 inch	283.5	101.5	203	45°
2 inch	283.5	101.5	203	45°
3 inch	344.6	127	254	45°
4 inch	344.6	127	254	22.5°
6 inch	344.6	127	254	22.5°
8 inch	404.6	127	254	22.5°

●DIN Flange – Front View (EN2)



●DIN Flange – Side View (EN2)

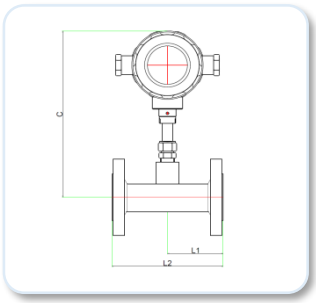


Size for DIN PN16 Flange			
Size	C	L1	L2
DN40	283.5	101.5	203
DN50	283.5	101.5	203
DN80	344.6	127	254
DN100	344.6	127	254
DN150	344.6	127	254
DN200	404.6	127	254

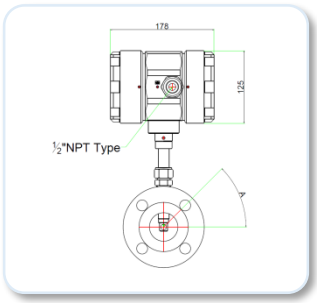
Dimension Spec&Chart II Ex-proof KC-2620Ex

♣ General Remote type KC-2610BF-R

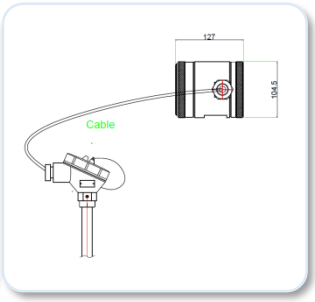
●1 1/2,"부터 8" 150lb & JIS 10k RF Flange – Front View (EN2)



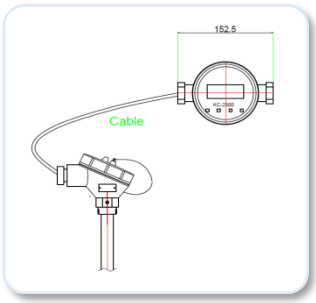
●1 1/2,"부터 8" 150lb & JIS 10k RF Flange – Side View (EN2)



●Remote Mount Junction Box – Front View (EN4)

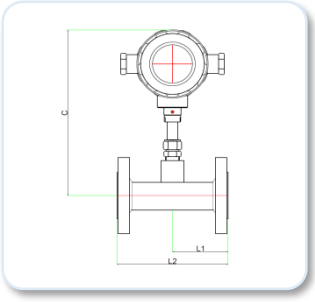


●Remote Mount Junction Box – Front View (EN4)

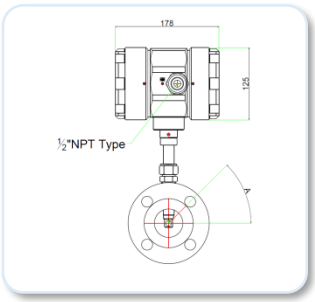


♣ Ex-proof Remote type KC-2620Ex-R

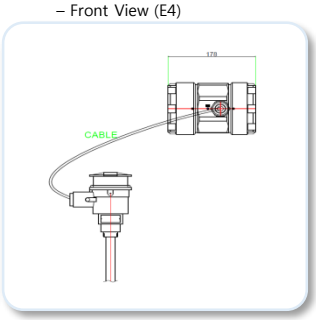
●DIN Flange – Front View (E2)



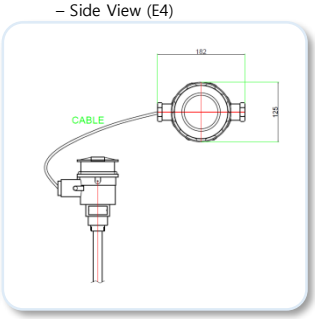
●DIN Flange – Side View (E2)



●Remote Mount Junction Box – Front View (E4)



●Remote Mount Junction Box – Side View (E4)

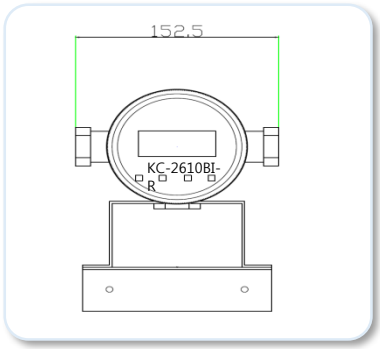


※ The shape of the sensor and Housing manufacturers are Subject to Change.

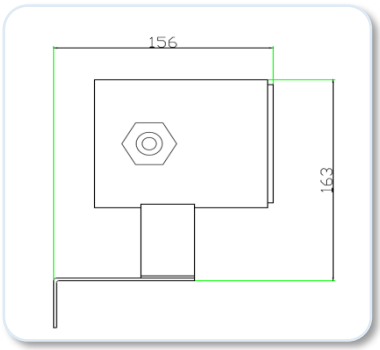
Dimensional Specification &Chart Ⅱ (IP67)

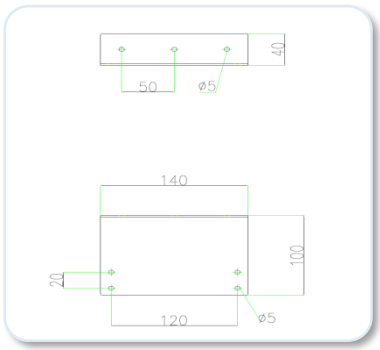
♣ General Remote type KC-2610BF-R

●Remote Rear Bracket Electronics (EN4)

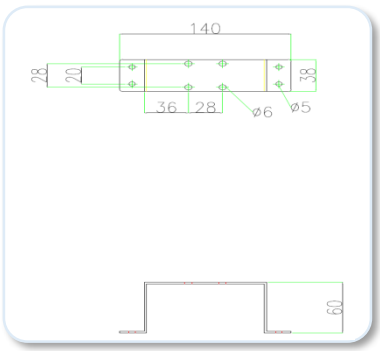


●Remote Side Bracket Mounted Electronics (EN4)





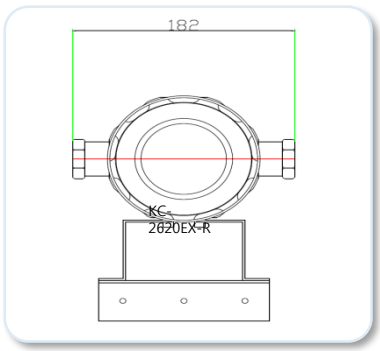
●panel mounting bracket 1



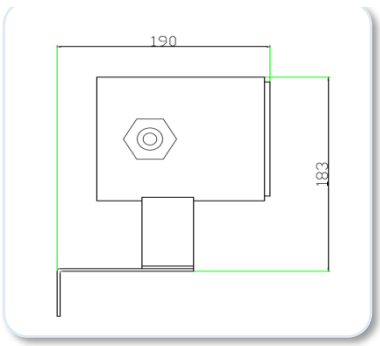
●panel mounting bracket 2

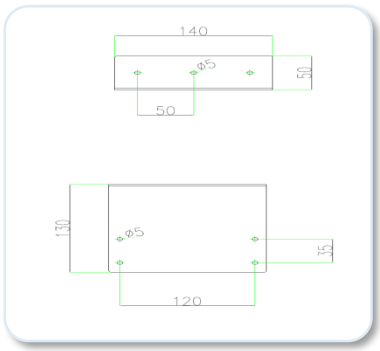
♣ Ex-proof Remote type KC-2620Ex-R

●Remote Rear Bracket Electronics (EN4)

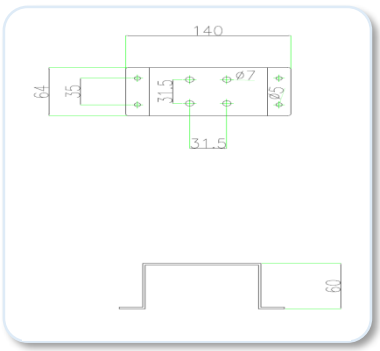


●Remote Side Bracket Mounted Electronics (EN4)





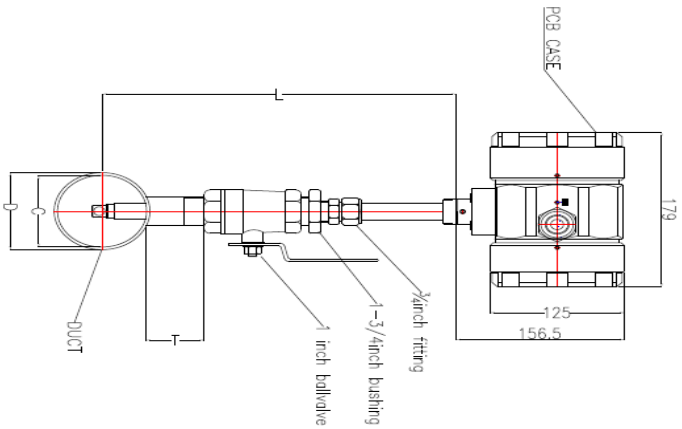
●panel mounting bracket 1



●panel mounting bracket 2

Ball Valve Low Pressure Ball Valve Dimenional & Chart Ⅲ Specification 사양

●side view



VARIABLE
L = Normal Probe Length
D = Duct O.D
C = Duct I.D
T = Height of "Threadolet" or
Customer provided weldolet

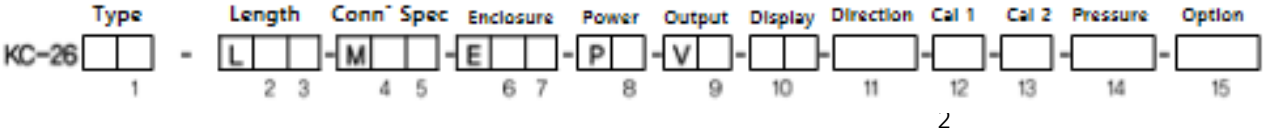
±0.25 inch(6.4 mm)의±0.25 All dimensions are inches. Millimeters are in parentheses.
All drawings save a ±0.25 inch(6.4 mm) tolerance.
Certified and available be on request.

Piping Requirement (KC-2600BF inline type)

Straight Pipe Length Requirements at 1 atm			
Piping condition	KC-2600BF 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)



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

Connection type	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" (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

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

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

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

Display	Code 10
No Readout	NR
Digital Display	DD
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 larg e pipe size	D
Customer Calibration	B
Air	
Air equivalency (Digester Gas, Flue, Gas etc.)	C
Nitrogen, Helium, Argon, Carbon Dio xide Compressed Air or Digester Gas	E
Hydrocarbon (Natural Gas, Methane, Ethane, Propane etc.)	F
Hydrogen or Hydrogen Mixture	G
Agency approved, customer specified	W

Calibration 2[9]	Code 13
70 °F(21 ℃) 14.7 psig (1.103 barg)	A
32 °F(0 ℃) 1 atm (76 mmHg)	B
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)

Option	Code 15
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.Flnage 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 exeed temperature & pressure limitations of the 2610BF, 2620Ex Series products specifications

Golden Rules

• GOLDEN RULES

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Air, Gas, Steam, Liquid

Mass Flowmeter

Specialty Manufacture

Distributer

Certified in accordance with

KC Q ISO 9001 : 2015

KC Q ISO 14001 : 2015

(주)골든룰