

# 02

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## Golden Rules CO.,Ltd

Air & Gas  
Thermal Mass Flow Meter  
Specialty Manufacture

**KC-2600GF**

### Thermal Mass Flow Meter



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



## 02. THERMAL MASS FLOW METER (Air & Gas)

### 2-2 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  $\pm 0.1\%$ ,  $\pm 2.5\ \mu\text{A}$  (4~20 mA)
- Field validation of flowmeter calibration settings  
Smart program interface (RS-485 standard)
- Direct mass flow monitoring eliminates need for  
Temperature and pressure compensation
- Simple signal Processing & calibration
- Excellent reproducibility
- Excellent long-term stability
- Best price-performance ratio
- Easy adaptable for different application or into housings
- No mechanical moved components
- Greatly reduces upstream piping requirements (7-5D)
- Outstanding range ability (Turn down ratio 1000:1)
- 0.1-second response to changes in flow rate
- Ex(IP66), KC

#### Description

Golden Rules' KC-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 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-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.

The information contained herein is subject to change without notice.

**Performance Specification**

◆ **Accuracy of Point Velocity**

±0.5% of F.S

**Repeatability**

±0.2 % of Full Scale

◆ **Temperature Coefficient**

±0.03 % Reading / ±(10 ~ 38) °C내에서 °C  
±0.06 % Reading / ±(25 ~ 50) °C내에서 °C

◆ **Pressure Drop**

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

◆ **Response Time**

1 second 63% of final velocity value

◆ **Measuring Range**

0.01 ~ 66.2 m/sec

◆ **Function**

Air, O2, N2, LNG, LPG .... Other Gas

**Mass Flow Rates**

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

Notes: Air or N2 Flow Standard Condition :21°C(70°F) & 21°C(70°F) scfm:0°C, Nm<sup>3</sup>/h 1atm

**Operating Specification**

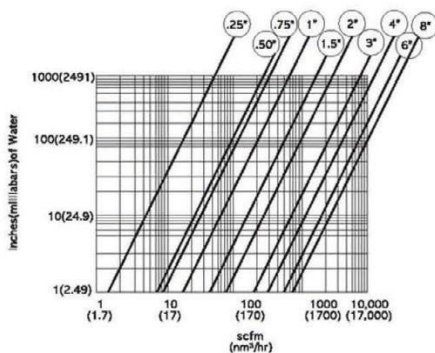
◆ **Fluid**

Air & Gas

◆ **Pressure (limitation)**

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

◆ **Pressure Drop**



### ◆ Fluid & Ambient temp'

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

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

### ◆ Input Power (selection)

DC24 V ±10 %, 200 mA

(100 ~ 240) V AC ±10 %, 10 watts

### ◆ Output Signal

Linear (4 ~ 20) mA & Pulse

### ◆ Display

Adjustable variables via remote control switch or Smart interface software

Adjustable : Full scale : (0 ~100) %

Flow: m<sup>3</sup>/h(m<sup>3</sup>), L/h(L), mL/h(mL), kg/h(kg)

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

Zero & Span

### Totalizer

8-digits (99,999,999 Count) in engineering units Reset table by

Software or remote control switch

### ◆ Software

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

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

## Physical Specification

### ◆ Wetted Part Mat'l

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

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

### Enclosure

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

General-Area CASE (IP67)

### ◆ Electrical Connection

2 X ½"NPT or Exp Cable Gland(SS) 22C

### ◆ Mounting (selection)

¾" Compression Fitting과 ¾" Male NPT (Standard)

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

¾" Compression Fitting과 1" Male NPT (Option)

Ball Valve System (Option)

### ◆ Certification

Ex (Ex d[ib] IIC T4)

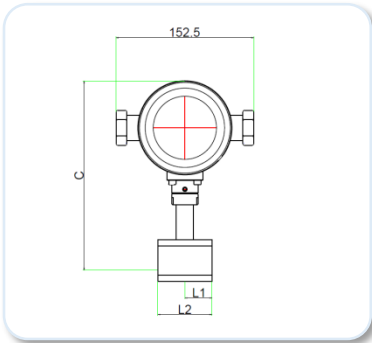
CE (CASE 전체)

KGS Certificate

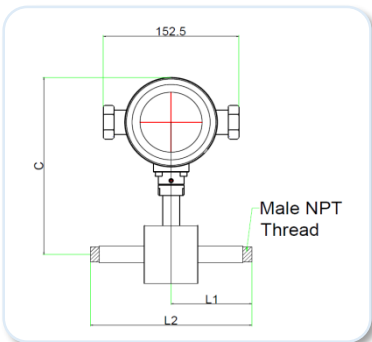
KC Certificate

**Dimensional Specification & Chart | General type KC-2610GF (IP67)**

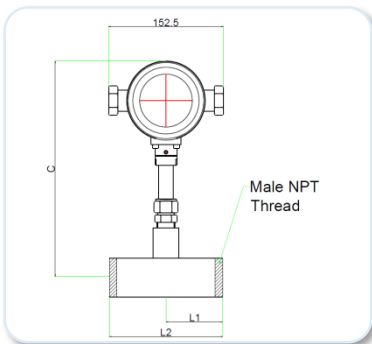
●1/4," 3/8" NPT – Front View (EN2)



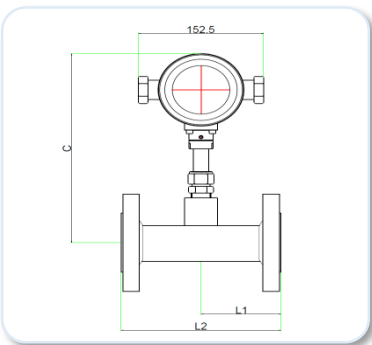
●1/2," 3/4" NPT – Front View (EN2)



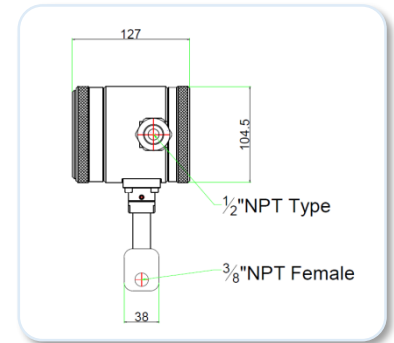
●1/4," 3/8" NPT – Front View (EN2)



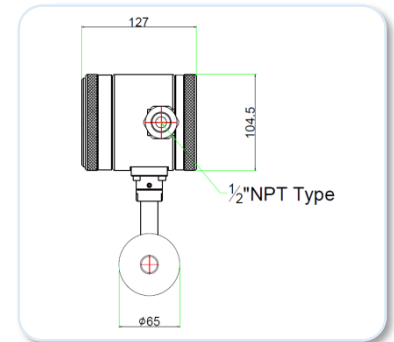
●1/2," 3/4" Flange – Front View (EN2)



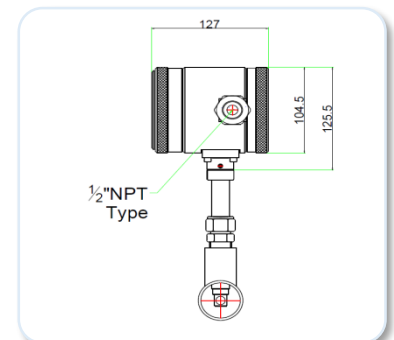
●Compression Fitting – Side View (EN2)



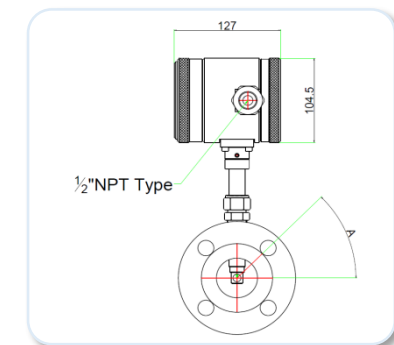
●1/2," 3/4" NPT – Side View (EN2)



●Compression Fitting – Side View (EN2)



●1/2," 3/4" Flange – Side View (EN2)



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

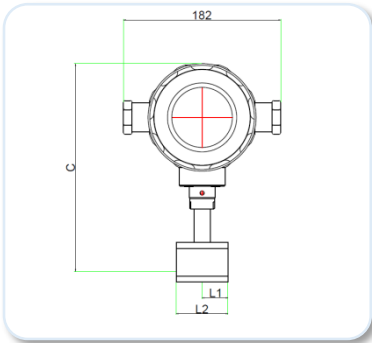
| SIZE for ANSI 150# FLANGE |       |       |     |     |
|---------------------------|-------|-------|-----|-----|
| Size                      | C     | L1    | L2  | A   |
| 1/2"                      | 210.5 | 101.5 | 203 | 45° |
| 3/4"                      | 210.5 | 101.5 | 203 | 45° |

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

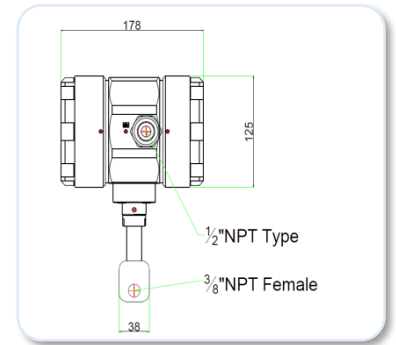
All dimensions are inches. Millimeters are in parentheses.

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

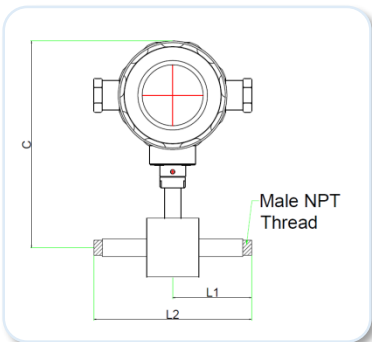
●1/4," 3/8" NPT – Front View (E2)



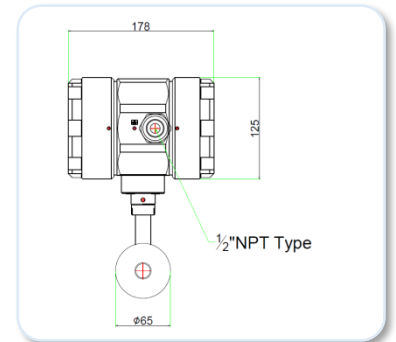
●Compression Fitting – Side View (E2)



●1/2," 3/4" NPT – Front View (E2)

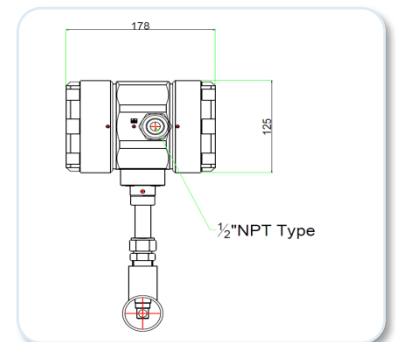


●1/2," 3/4" NPT – Side View (E2)

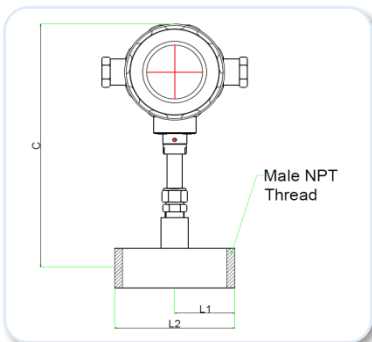


| SIZE for NPT & Flange |       |       |       |
|-----------------------|-------|-------|-------|
| Size                  | C     | L1    | L2    |
| 1/4" & 3/8"           | 241.5 | 30    | 60    |
| 1/2"                  | 241.5 | 90.7  | 181.4 |
| 3/4"                  | 241.5 | 90.7  | 181.4 |
|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

●Compression Fitting – Side View (E2)



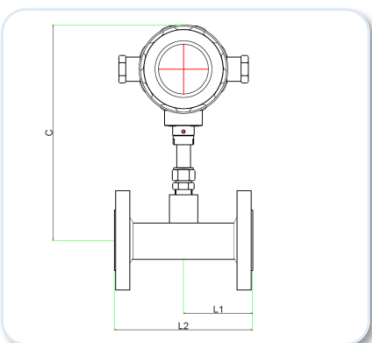
●1/4," 3/8" NPT – Front View (E2)



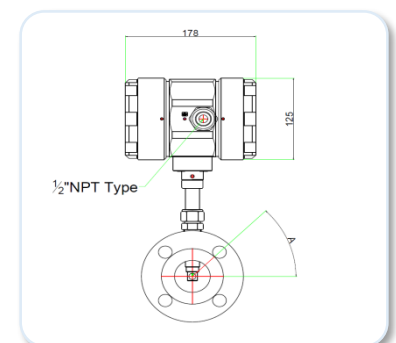
| SIZE for ANSI 150# FLANGE |       |       |     |     |
|---------------------------|-------|-------|-----|-----|
| Size                      | C     | L1    | L2  | A   |
| 1/2"                      | 241.5 | 101.5 | 203 | 45° |
| 3/4"                      | 241.5 | 101.5 | 203 | 45° |

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

●1/2," 3/4" Flange – Front View (E2)

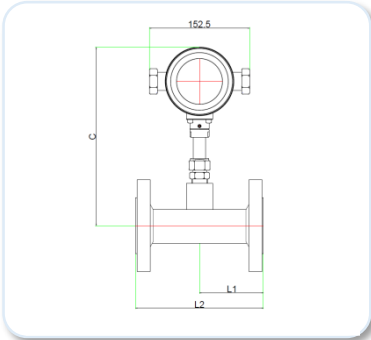


●1/2," 3/4" Flange – Side View (E2)

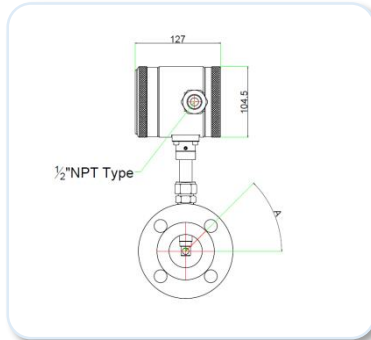


**Dimensional Specification & Chart III KC-2610GF( (IP67)**

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

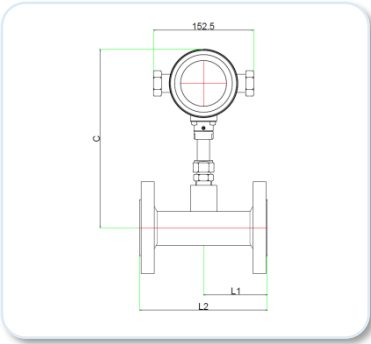


●1-1/2" ~ 8" – Side View (EN2)  
150# Flange, JIS 10k RF Flange

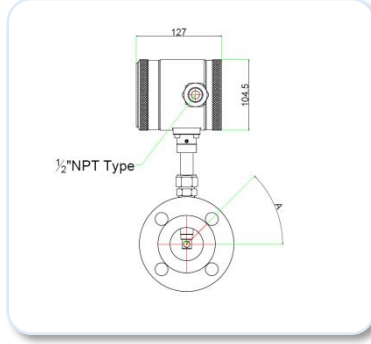


| Size for ANSI 150# Flange |       |       |     |       |
|---------------------------|-------|-------|-----|-------|
| Size                      | C     | L1    | L2  | A     |
| 1-1/2"                    | 283.5 | 101.5 | 203 | 45°   |
| 2"                        | 283.5 | 101.5 | 203 | 45°   |
| 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)



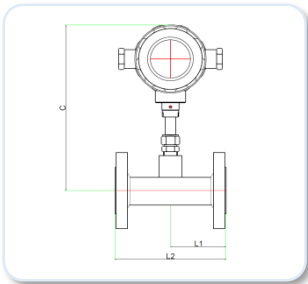
●DIN Flange – Side View (EN2)



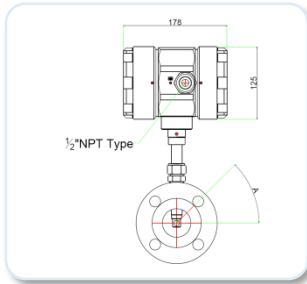
| Size for PN16 DN Flange |       |       |     |
|-------------------------|-------|-------|-----|
| Size                    | C     | L1    | L2  |
| DN40                    | 283.5 | 101.5 | 203 |
| DN50                    | 283.5 | 101.5 | 203 |
| DN80                    | 344.6 | 127   | 254 |
|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

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

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

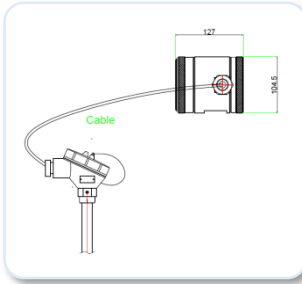


●1-1/2" ~ 8" – Side View(E2)  
150# Flange, JIS 10k RF Flange

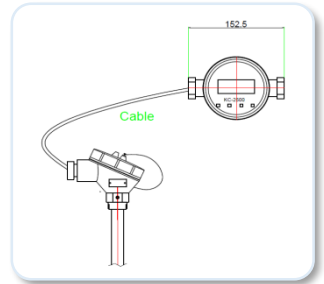


**General Remot type KC-2610GF-R**

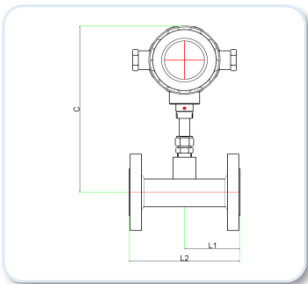
●Remote Mount Junction Box – Front View(EN4)



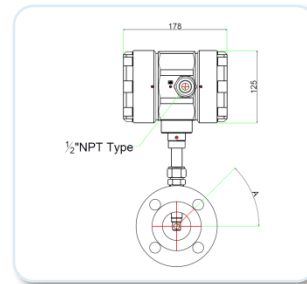
●Remote Mount Junction Box – Side View(EN4)



●DIN Flange – Front View(E2)

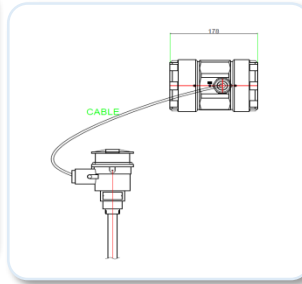


●DIN Flange – Side View(E2)

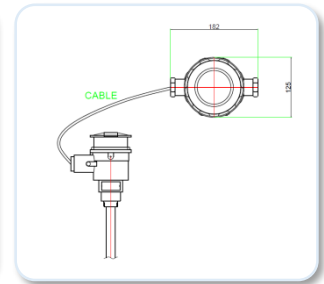


**Ex-proof Remote type KC-2620Ex-R**

●Remote Mount Junction Box – Front View(E4)



●Remote Mount Junction Box – Side View(E4)



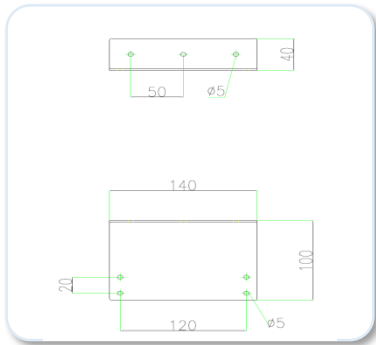
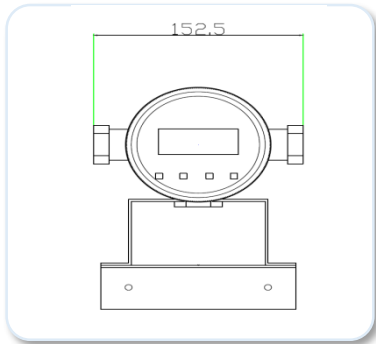
※ The shape of the sensor and Housing manufacturers are Subject to Change.



## Dimensional Specification & Chart V

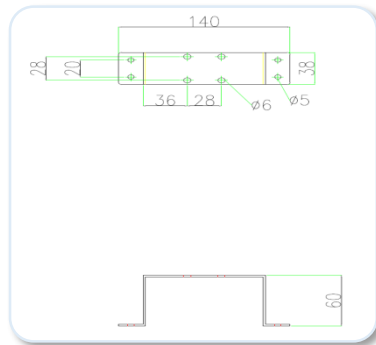
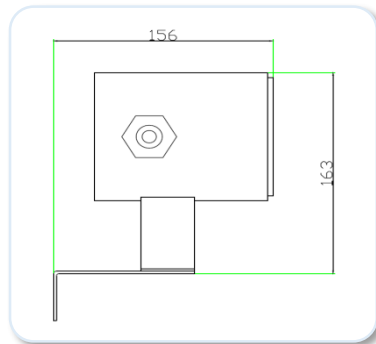
### General Remote type KC-2610GF-R

● Remote Rear Bracket Electronics (EN4)



● panel mounting bracket 1

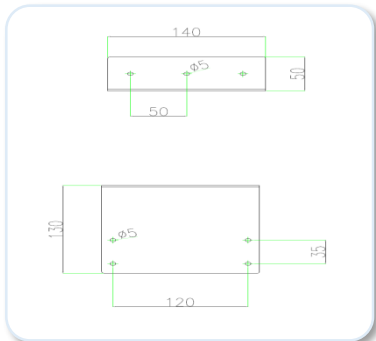
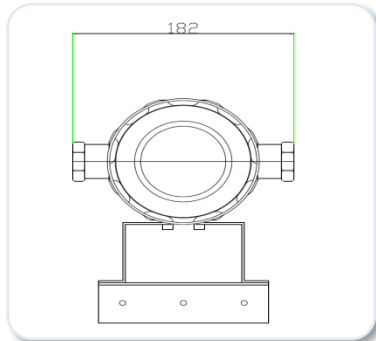
● Remote Side Bracket Mounted Electronics (EN4)



● panel mounting bracket 2

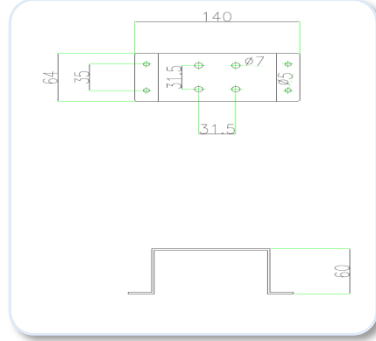
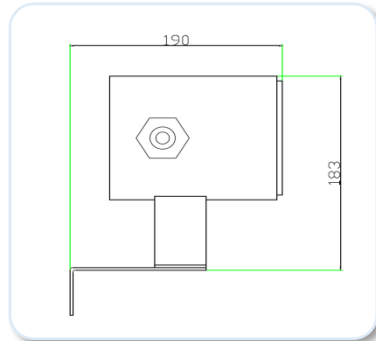
### Ex-proof Remote type KC-2620Ex-R

● Remote Rear Bracket Electronics (E4)



● panel mounting bracket 1

● Remote Side Bracket Mounted Electronics (E4)



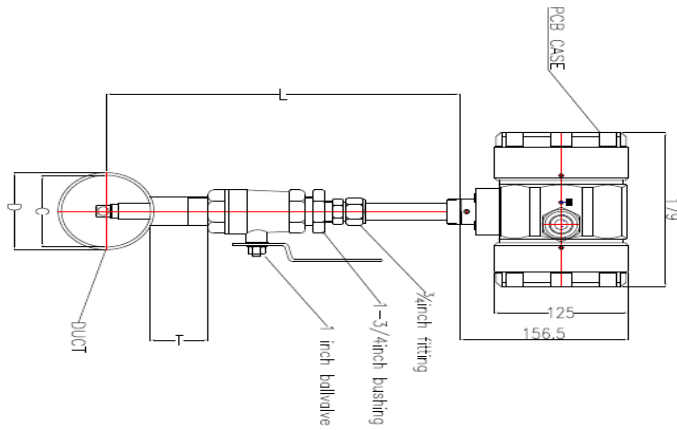
● panel mounting bracket 2

## Low Pressure Ball Valve Dimensional & Specification

●Side View

**VARIABLE**

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



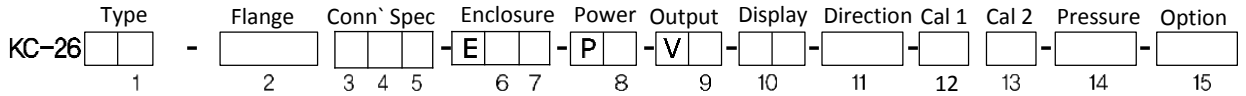
±0.25 All dimensions are inches. Millimeters are in parentheses.  
 All drawings save a ±0.25 inch(6.4 mm) tolerance.  
 Certified and available be on request.

## Piping Requirement (KC-2600GF inline type)

| Straight Pipe Length Requirements at 1 atm |                      |               |                  |
|--|----------------------|---------------|------------------|
| Piping condition                           | KC-2600GF 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 mA               | 2      |
| AC 100 ~ 240 V ±10 % (옵션)           | 3      |
| Agency approved, customer specified | W      |

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

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

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

| Pressure limit                              | Code 14       |
|---|---------------|
| Low pressure<br>Below 43 psig (3 barg)      | L             |
| Medium pressure<br>Below 145 psig (10 barg) | M             |
| High pressure<br>Below 725 psig (50 barg)   | H<br>(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       |

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

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

**Note**

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







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