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Golden Rules Co.,Ltd

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

Differential Pressure Transmitter KC-9100 Series



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

13. Differential Pressure Transmitter

13-1. Pressure Transmitter KC-9100 Series

Features & Specification

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



KC-9100
Diff. Pressure Transmitter

Application

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

Description

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

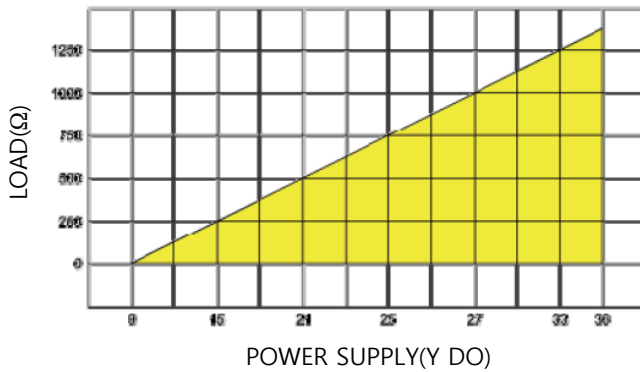
Performance Specification

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

Performance Specification

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

Supply Voltage vs Loop Load I



Principle Description II

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

This measurement method is based on the Continuity equation (Law of conservation of mass) and the Bernoulli's principle (Conservation of energy) to achieve the purpose of accurate measurement. As shown in the figure, the red part is the orifice plate installed in the pipeline, which is perpendicular to the flow direction.

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

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

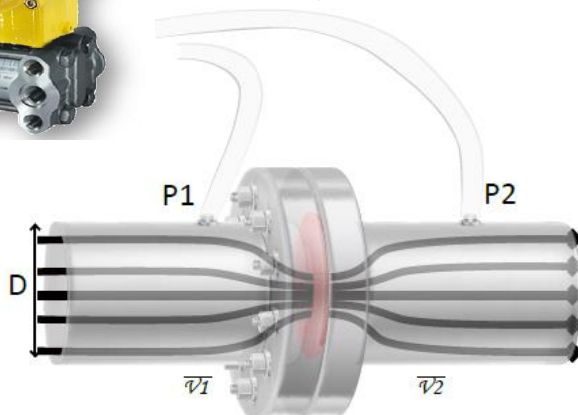
$$\rho_1 v_1^2 F_1 = \rho_2 v_2^2 F_2 \dots \dots \text{formula (2)}$$

v: Average flow velocity (m/s) P: Average flow rate (Pas abs)
 ρ1: Fluid density (kg/m³) F: Fluid cross-sectional area (m²)

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

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

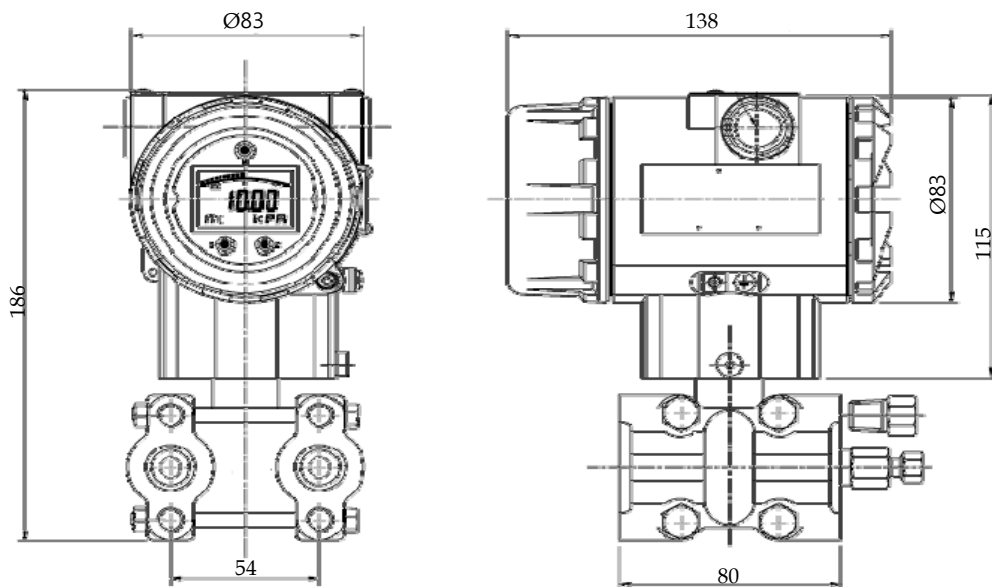
$$Q = k \sqrt{\Delta P}$$



Measuring Range III

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

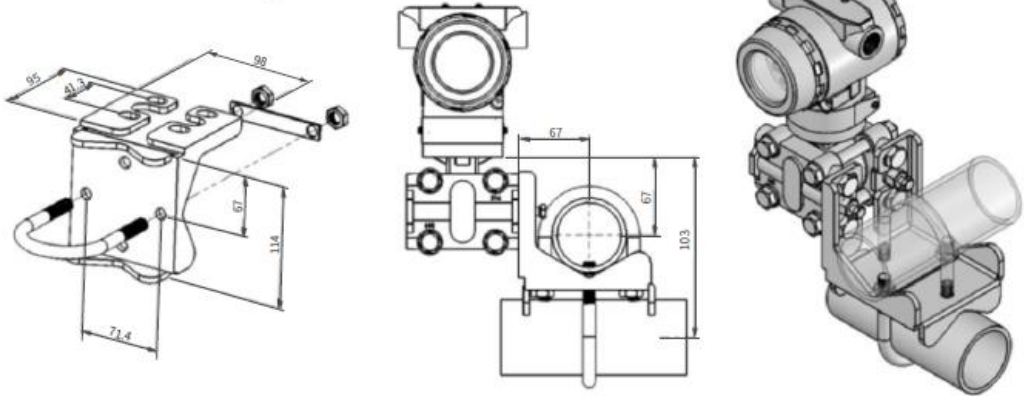
Dimension IV



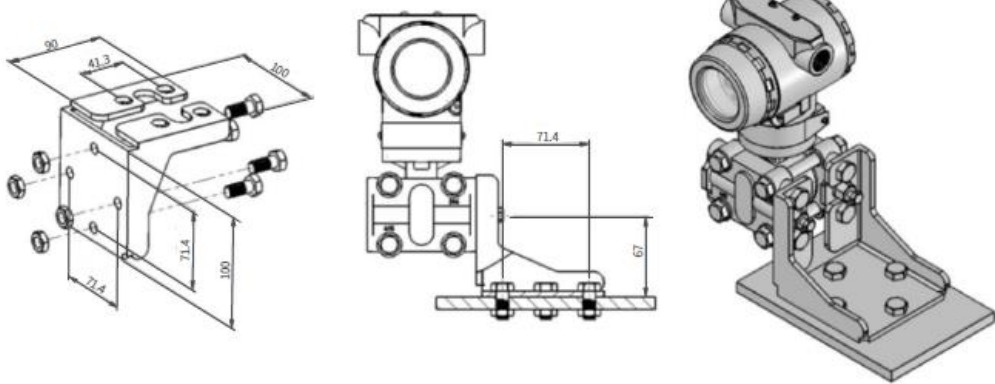
Optional Accessories V

UNIT : mm

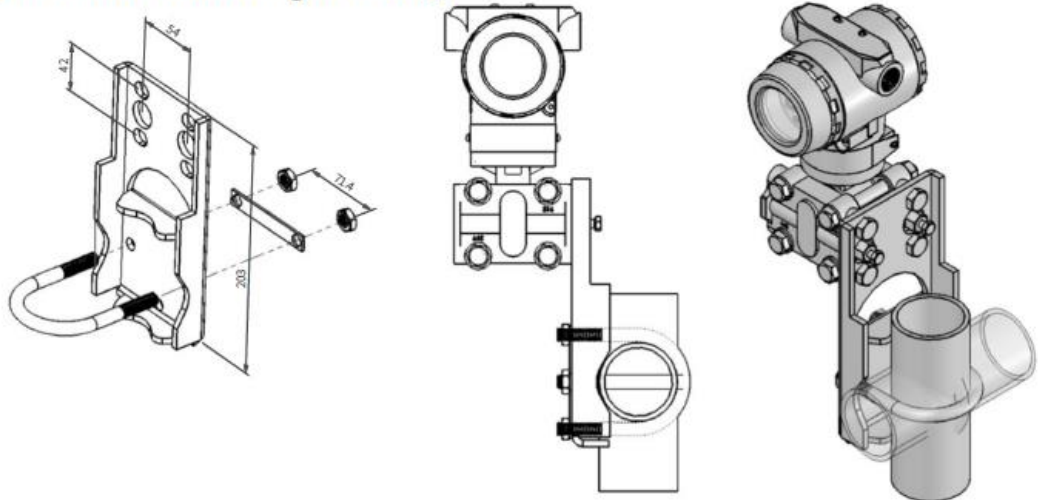
[1.B1 Tube bending bracket]



[2.B2 Plate bending bracket]



[3.B3 Tube mounting bracket]



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

KC-9100 – – – – – – – – – – –

1 2 3 4 5 6 7 8 9 10

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

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

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

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

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

Fill Fluid	Code 6
Silicon	N
Fluorine	F

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

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

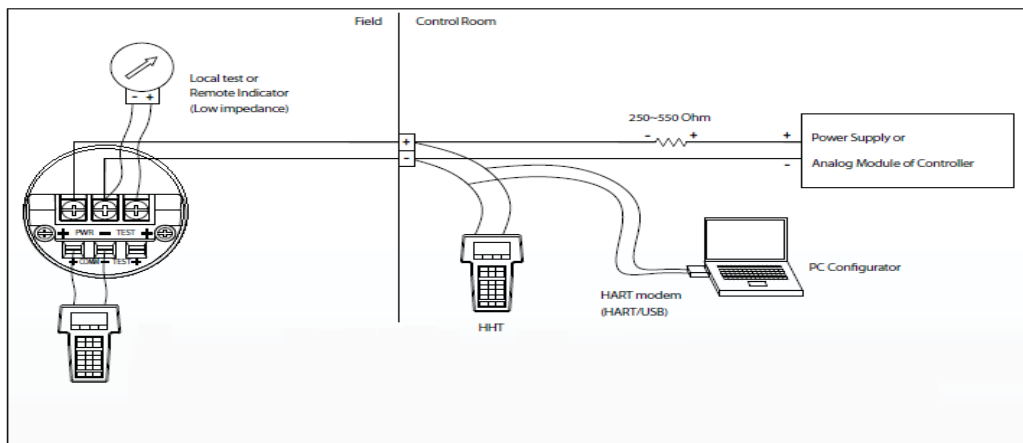
Process Connection	Code 9
NPT 1/4" – 18 NPT	N
NPT 1/2"- 14 NPT(with Adapter)	A
Other	Z
Agency approved specified	W

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

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

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

HART Communication Wiring Diagram





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Gas & Liquid & Steam

Mass & Magnetic & Total Flowmeter

Specialized manufacturer

Distributor

Certified in accordance with

KC Q ISO 9001 : 2015

KC Q ISO 14001 : 2015

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