

DR3051S-GP

Pressure Transmitter

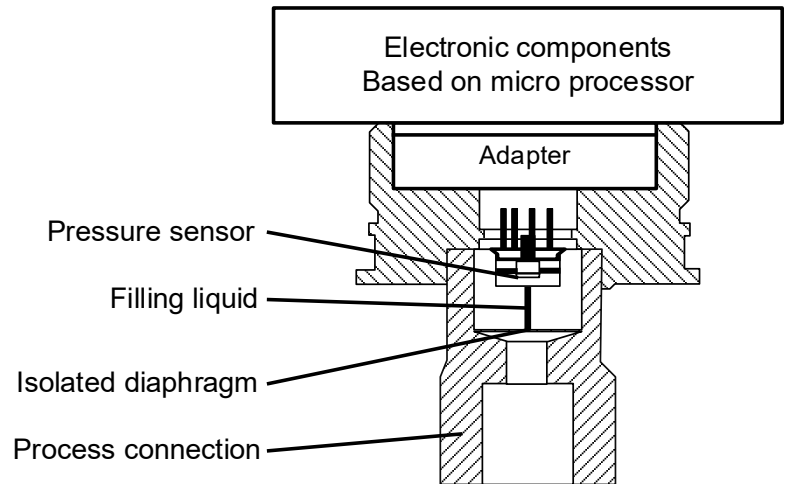


Brief Introduction

Gauge Pressure Transmitter (GP)

- Measured media: gas, steam, liquid
- Measured range (with no shift):
0mbar~6mbar...600bar
- Basic error: $\pm 0.075\%$
- Diaphragm contacting with liquid:
Stainless Steel 316L, Hast-alloy

Working Principle



Pressure transmitter includes two functional units:

1. Main unit
2. Auxiliary unit

Main unit includes sensor and process connection, working principle as followed:

Through corrugated, isolated diaphragm and filling oil, process media is pressurized to diaphragm of pressure sensor. The other end of pressure sensor diaphragm is connected to the air (for gauge measurement) or vacuum (for absolute measurement). In such way, it makes the resistor of sensor die change so that the detection system outputs different voltage. The output voltage is in proportion to the pressure variation, and then it is transmitted to standard output by adapter and amplifier.

DR3051S-GP Pressure Transmitter

MDM3051S series gauge pressure transmitter is used for level, density, pressure and flow measurement of liquid, gas and steam. Then it will output 4mA~20mA DC HART signal and also it could be connected to MS-HART375 handing communicator or RSM295 Modem to do the specification setting and process control.

Standard Specification

(Standard zero as the reference calibration range, Stainless steel 316L diaphragm, filling liquid is silicone oil).

Performance Specification

Reference Basic error for range calibration(including linearity, hysteresis and repeatability from zero): $\pm 0.075\%$. If $TD > 10$ ($TD = \text{Max. Pressure range/calibration range}$), the Basic error is $\pm(0.0075 \times TD)\%$. The Basic error of square root output is 1.5 times of above reference Basic error.

Environmental Temperature Effect

Range code	-20°C ~65°C total effect value
B	$\pm(0.30 \times TD + 0.20)\% \times \text{Span}$
others	$\pm(0.20 \times TD + 0.10)\% \times \text{Span}$
Range code	-40°C ~-20°C and 65°C ~85°C total effect value
B	$\pm(0.30 \times TD + 0.20)\% \times \text{Span}$
others	$\pm(0.20 \times TD + 0.10)\% \times \text{Span}$

Over pressure effect: $\pm 0.075\% \times \text{Span}$

Long-term stability

Range code	Effect value
B	$\pm 0.2\% \times \text{Span} / 1 \text{ year}$
others	$\pm 0.1\% \times \text{Span} / 1 \text{ year}$

Power effect

$\pm 0.001\% / 10V$ (12V~42V DC), negligible.

Functional Specification

Pressure range and limits

range/limits		mbar/bar
B	range	(6~60)mbar
	limits	(-60~60)mbar
C	range	(0.02~0.4)bar
	limits	(-0.4~0.4)bar
D	range	(0.025~2.5)bar
	limits	(-1~2.5)bar
F	range	(0.3~30)bar
	limits	(-1~30)bar
G	range	(1~100)bar
	limits	(-1~100)bar
H	range	(2.1~210)bar
	limits	(-1~210)bar
I	range	(4~400)bar
	limits	(-1~400)bar
J	range	(6~600)bar
	limits	(-1~600)bar

Pressure range limit

The pressure is adjustable within the upper and lower limit.

It is recommended to choose the range code with the lowest pressure range proportion to optimize the performance specification.

Zero setting

The zero and pressure range could be adjust to any value within the measured rang in the table, only the calibrated range $\geq \text{Min. Range}$ is valid.

Mounting position effect

The change of mounting position parallel to diaphragm could not influence the zero drift. If the angle between mounting position and diaphragm is over 90° , the zero drift is $< 2.5\text{mbar}$ for range C and $< 1.5\text{mbar}$ for other ranges which could be calibrated by zero setting. No other effect on pressure range.

Output

2- wire, 4mA~20mA DC, HART communication protocol, linearity or square root output optional. Output signal limit: $I_{\min} = 3.9\text{mA}$, $I_{\max} = 20.5\text{mA}$.

Response time

The damping constant of amplifier parts is 0.1s, time constant of sensor is 0.1s~1.6s, which is depended on the pressure range and pressure range proportion. The additional adjustable time constant is 0.1s~60s.

Warm-up time

$< 15\text{s}$

Environmental temperature

-40°C ~85°C

With LCD display and viton sealing ring, the temperature is -20°C ~65°C .

Storage temperature/ transportation temperature

-50°C ~85°C ; with LCD display: -40°C ~85°C .

Pressure limit

It is from vacuum to Max. Pressure range.

Overpressure Limit

Pressure range	60mbar (B)	0.4bar (C)	2.5bar (D)	30bar (F)
Overpressure limit	3bar	10bar	40bar	160bar
Pressure range	100bar (G)	210bar (H)	400bar (I)	600bar (J)
Overpressure limit	200bar	500bar	500bar	700bar

EMC

Please refer to next page "EMC table".

Installation

Power and load condition

Power supply: 24V DC, $R \leq (U_s - 12V) / I_{max}(k\Omega)$
 $I_{max} = 23mA$
 Max. Voltage supply: 42V DC
 Min. Voltage supply: 12V DC, 15V DC (Backlit LCD display)
 Digital communication load resistance range:
 230 Ω ~600 Ω

Electrical Connection

M20×1.5 cable sealing buckle, terminals are suitable for (0.5~2.5)mm² wire.

Process connection

Standard process connection: NPT 1/2 female, which can be transferred to NPT 1/2 male, G1/2 male, M20×1.5 male and KF16 vacuum port etc.

Physical Specification

Material

Diaphragm: Stainless Steel 316L, Hast-alloy C
 Process Connection: Stainless steel 304
 Filling liquid: silicone oil
 Transmitter housing: Aluminum alloy material, epoxy resin glue spraying on the surface
 Housing sealing ring: NBR
 Nameplate: Stainless steel 304

Weight

1.6kg (not including LCD display, mounting support and process connection)

Housing protection

IP67

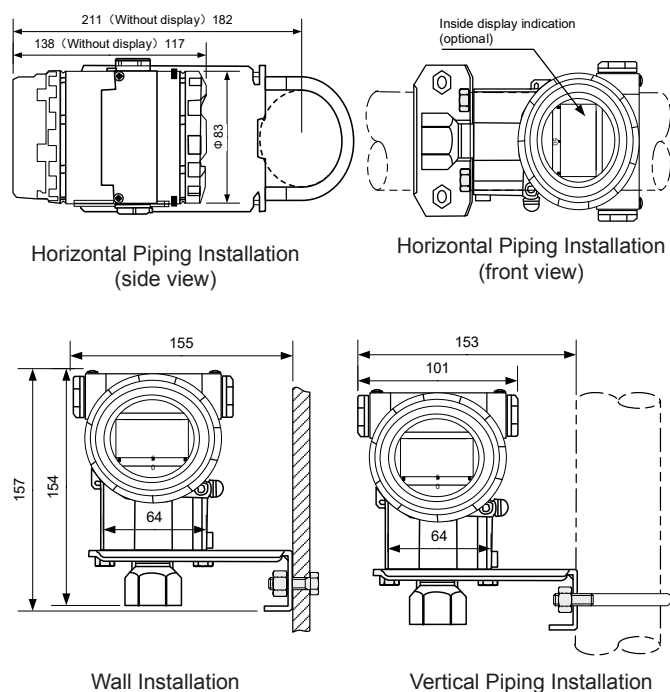
EMC Table

Code	Test terms	Standard	Test condition	Performance degree
1	Radiated interference(housing)	GB/T 9254-2008 table5	30MHz~1000MHz	Qualified
2	Transmission interference (DC power port)	GB/T 9254-2008 table1	0.15MHz~30MHz	Qualified
3	ESD immunity	GB/T 17626.2-2006	4kV(contact) 8kV(air)	B
4	Radio frequency electromagnetic field immunity	GB/T 17626.3-2006	10V/m (80MHz~1GHz)	A
5	Power frequency magnetic field immunity	GB/T 17626.8-2006	30A/m	A
6	EFT immunity	GB/T 17626.4-2008	2kV(5/50ns,5kHz)	B

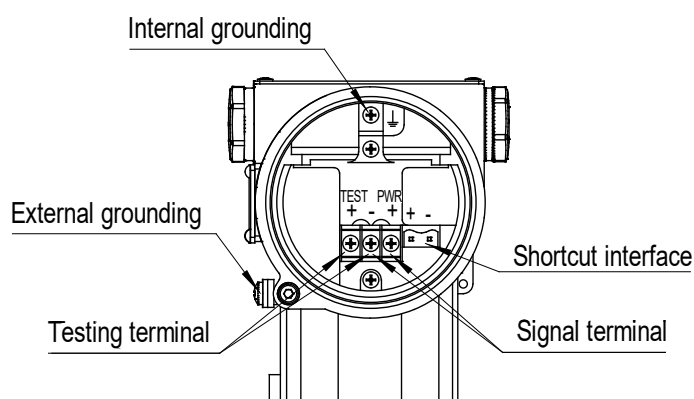
Notes

1. A degree: performance is normal within the technical standard range during testing;
2. B degree: During testing, the function or performance is lowered or lost temporarily, but it could be recovered by itself. Actual operation state, storage and data will keep the same.

Outline Dimension(Unit:mm)



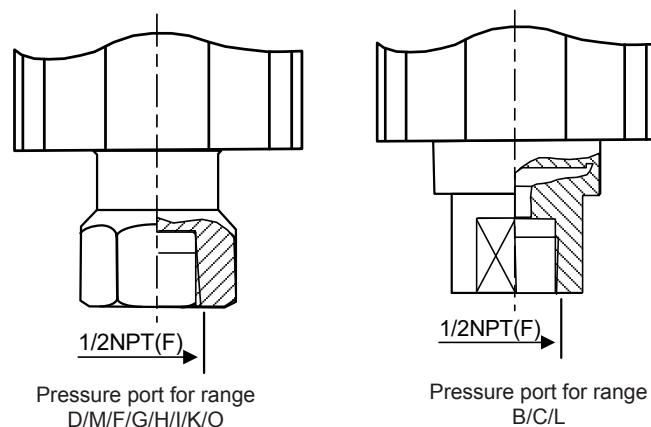
Electrical connection chart



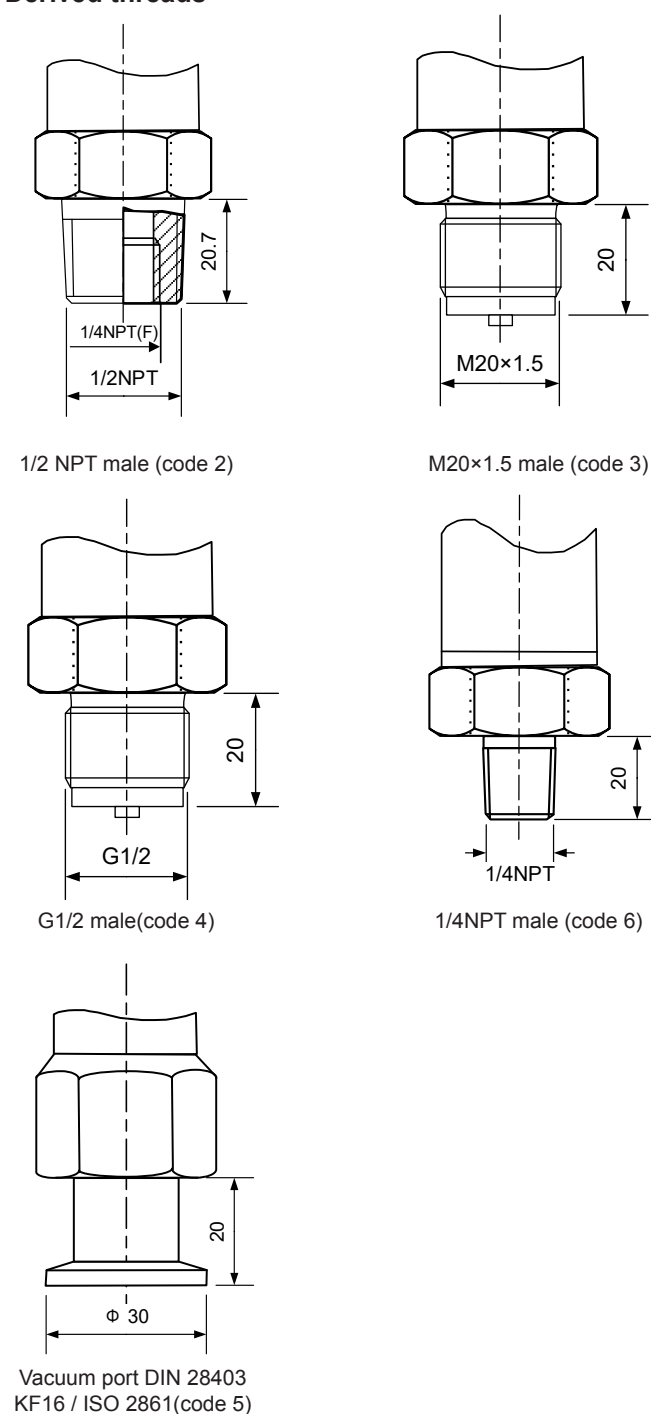
the function of shortcut interface is equal to signal terminal.

Process connection instruction

Standard version(code 1)



Derived threads



Order Guide

DR3051S-GP		Pressure Transmitter															
		Code	Output														
		H	4mA~20mA DC with HART														
			Code	Pressure Range													
			B	0mmH ₂ O~60mmH ₂ O...600 mmH ₂ O/(0mbar~6mbar...60mbar)													
			C	0mmH ₂ O~200mmH ₂ O...4000 mmH ₂ O/(0mbar~20mbar...400mbar)													
			D	0mH ₂ O~0.25mH ₂ O...25 mH ₂ O/(0mbar~25mbar...2500mbar)													
			F	0mH ₂ O~3mH ₂ O...300 mH ₂ O/(0bar~0.3bar...30bar)													
			G	0bar~1bar...100bar													
			H	0bar~2.1bar...210 bar													
			I	0bar~4bar...400 bar													
			J	0bar~6bar...600 bar													
					Code	Diaphragm material	Filling										
	A	Stainless steel316L			silicone oil												
	C	Hastelloy C			silicone oil												
					Code	Process connection											
					1	1/2 NPT female											
					2	1/2 NPT male(with 1/4 NPT inside)											
					3	M20x1.5 male											
					4	G1/2 male											
					5	Vacuum connector DIN 28403 KF16 / ISO 2861[2]											
					6	1/4 NPT male											
							Code	Additional function									
			N	None													
			O	No oil processing(For oxygen measurement: fluorocarbon oil filling, viton sealing ring ,<60bar,<60℃)													
							Code	Mounting bracket									
							N	None									
							1	Stainless steel									
							2	Galvanized Carbon Steel									
									Code	Display							
									N	None							
									1	LCD with back-light							
													Code	Others			
N													None				
A	Intrinsic safe																
D	Exd version with Explosion-proof cable joint																
T	Ship-use																

DR3051S-GP	H	[0~0.2]bar	A	1	N	2	1	N	The whole spec.	
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Notes

- 1.The min range of GP is 60mbar;
- 2.Vacuum port DIN 28403 KF16 / ISO 2861 is only suitable for pressure range within 2.5bar.