

MDM7000-LT

Smart Level Transmitter



Introduction

MDM7000-LT smart level transmitter adopts advanced monocrystalline silicon piezoresistive sensing technology. The product is used to measure the level, density, pressure and flow of liquids and gases, convert the measurement pressure into 4mA~20mA DC analog current signal output, and supports remote setting, monitoring and other functions through communication equipment. It is suitable for the demanding process chemical industry.

Features

- Monocrystalline silicon piezoresistive sensor technology with stable performance, and high accuracy up to 0.075%FS.+Diaphragm seal effects
- Use high overload protection diaphragm to achieve high overload protection
- Adopts high performance EMC protection circuit module with strong anti-interference ability

Application

- Oil and gas industry
- Food Processing
- Pulp and Paper
- Power and Energy
- Chemical Industry
- Marine Equipment

Specifications

Accuracy	±0.075% URL(Diaphragm seal effects)
Measuring range	0.4bar ~ 30bar (see the order guide for more details)
Ambient temperature effect	-10°C ~80°C : ±(0.375+0.125TD)%/10°C of SPAN
Power supply effect	When power supply voltage is within 10.5V/16.5V~55V DC, zero and span change should not more than ±0.005%URL/V
Mounting position effects	Transmitter installation may produce a zero-point error that can be corrected by zero adjustment without span effect.
Vibration effect	According to GB/T18271.3/IEC61298-3, <0.1% SPAN
Output signal	4mA~20mA DC+HART
Protection class	IP67
Weight	The flange DN50: Net weight approx 12.5kg (excluding capillary) The flange DN80: Net weight approx 15.5kg (excluding capillary)

Accuracy

① Based on the standard and test reference conditions, including linearity (BFSL), hysteresis, and repeatability. Calibration temperature: 20°C ±5°C, based on zero value calibration.

② The total performance of the product includes the reference accuracy and the ambient temperature effect. Calculation formula: Total performance = $\pm \sqrt{(E1)^2 + (E2)^2 + (E3)^2}$

E1= reference accuracy, E2=Ambient temperature effect, E3=Static pressure effect

Linear output accuracy	TD≤5	±0.075%SPAN+Diaphragm seal effects	0.4bar, 2.5bar
		±0.05%SPAN+Diaphragm seal effects	10bar, 30bar
	TD>5	±0.075×TD%SPAN+Diaphragm seal effects	0.4bar, 2.5bar
		±0.05×TD%SPAN+Diaphragm seal effects	10bar, 30bar

Square root output accuracy is 1.5 times of the linear output accuracy

Note: TD represents the turn down ratio, TD= Maximum range / Current range, [Maximum range = URL (range starts with 0, same as factory calibration range); Current range = SPAN (equivalent to |URV-LRV|)].

Range

Nominal Range	Lowest Range	Lower Range Limit (LRL)	Upper Range Limit (URL)
0.4bar	0.1bar	-0.4bar	0.4bar
2.5bar	0.25bar	-2.5bar	2.5bar
10bar	1bar	-10bar	10bar
30bar	3bar	-30bar	30bar

LRV/URV setting: the lower limit value (LRV) and upper limit value (URV) are achieved between the upper and lower limits. If IURV I ≥ ILRV I, IURVI must be larger than the minimum pressure; if IURVI ≤ ILRV I, ILRV I must be larger than the minimum pressure.

Electromagnetic Compatibility

No	Test Items	Basic Standards	Test Conditions	Performance Level
1	Radiated interference	GB/T 9254.1/CISPR 32	30MHz ~ 1000MHz	Qualified
2	Conducted interference (DC power port)	GB/T 9254.1/CISPR 32	0.15MHz ~ 30MHz	Qualified
3	Electrostatic discharge immunity test (ESD)	GB/T 17626.2/IEC61000-4-2	8kV (Contact), 8kV (Air)	B
4	Immunity to radio frequency EM-fields	GB/T 17626.3/IEC61000-4-3	10V/m (80MHz ~ 1GHz)	A
5	Power frequency magnetic field Immunity test	GB/T 17626.8/IEC61000-4-8	30A/m	A
6	Electrical fast transient / Burst Immunity test	GB/T 17626.4/IEC61000-4-4	4kV(5/50ns,100kHz)	B
7	Surge immunity requirements	GB/T 17626.5/IEC61000-4-5	1kV (Line to line) 2kV (Line to ground) (1.2/50μs)	B
8	Immunity to conducted disturbances induced by radio frequency fields	GB/T 17626.6/IEC61000-4-6	3V(150kHz ~ 80MHz)	A

Note: Performance level A: The performance within the limits of normal technical specifications.

Performance level B: Temporary reduction or loss of functionality or performance, it can restore itself. The actual operating conditions, storage, and data will not be changed.

Environmental Conditions

Items	Conditions	
Working temperature	-10°C ~85°C , -10°C ~70°C (with LCD display)	
Storage temperature	-40°C ~100°C , -40°C ~85°C (with LCD display)	
Media temperature	Silicone oil: -40°C ~205°C	
	High-temperature silicon oil: 0°C ~315°C	
	Hygienic filler: -10°C ~180°C	
Working humidity	5%RH~100%RH@40°C	
Dangerous condition*	PCEC	Ex db IIC T6 Gb Ex ia IIC T4 Ga
	ATEX	Ex db IIC T6 Gb, Ex tb IIIC T70°C Db Ex ia IIC T4 Ga
	IECEX	Ex db IIC T6 Gb, Ex tb IIIC T70°C Db Ex ia IIC T4 Ga
	CSA	Class I, Division 1, Group A, B, C and D T6 Class II, Division 1 Group E, F and G T70°C Class III
* Please consult engineers for details		

Time Index

Total damping time constant (related to capillary length): equal to the sum of damping time of the amplifier and sensor capsule.
Damping time of amplifier: 0s~100s adjustable.
Damping time of sensor capsule (isolation sensor diaphragm and silicon filling) ≤ 0.2s
Startup after power off: ≤6s
Restore the factory settings ≤31s

Power Supply and Load Requirements

Item	Condition
Power supply	HART communication protocol: 16.5V~55V DC
	Intrinsically safe HART communication protocol: 18.5V~28V DC
Load resistance	0Ω~2119Ω(working) 250Ω~600Ω(HART communication)
Transmission distance	< 1000m
Power consumption	
4mA~20mA	≤500mW@24V DC, 20.8mA
Modbus-RTU/RS485	≤240mW@24VDC, 10mA

$R = \frac{U - 10.5}{0.021}$

R (Ω) External load resistance

2119

600

250

0

10.5 16.5 23.8 55

Power supply voltage U(V)

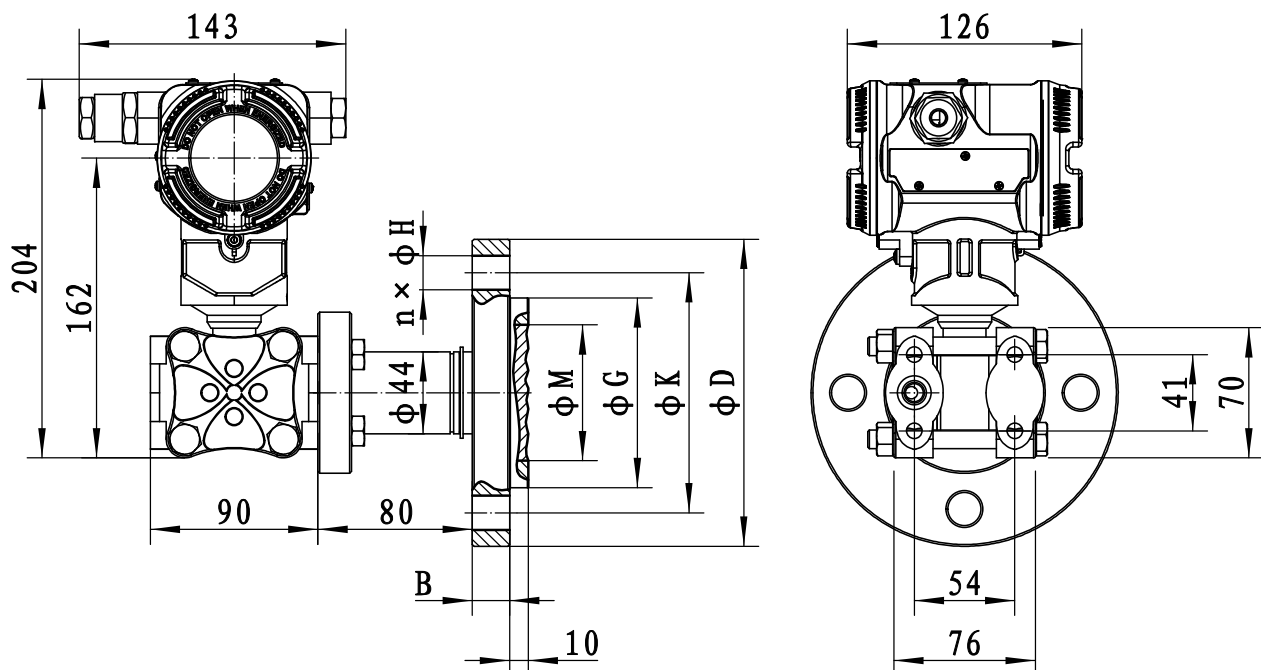
Digital communication range HART

Note: The supply voltage is selectable to 10.5V, please consult engineers for details.

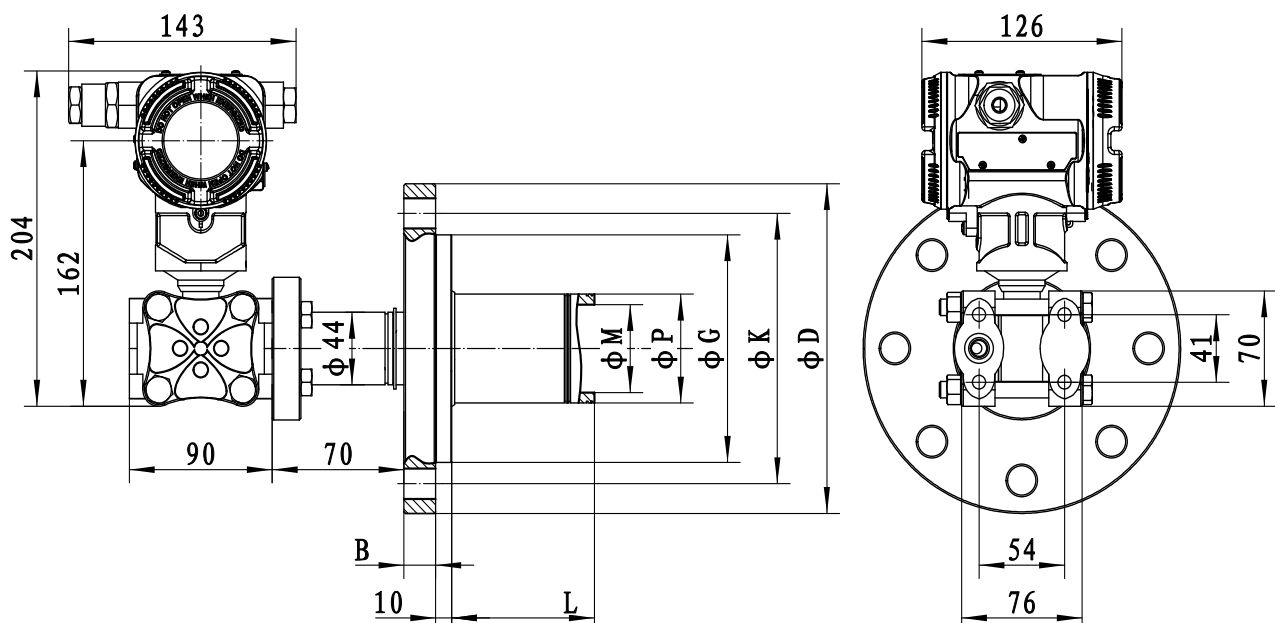
Dimensions

unit: mm

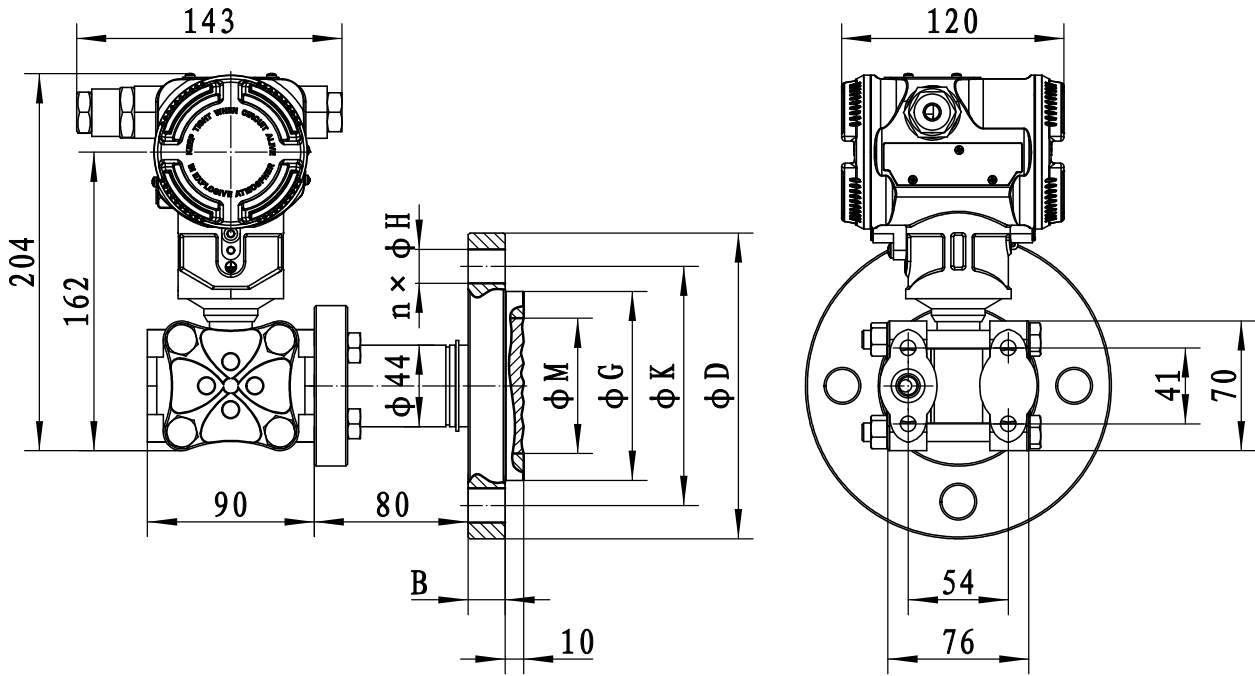
Flange Configuration of MDM7000 with Display (flush mount only)



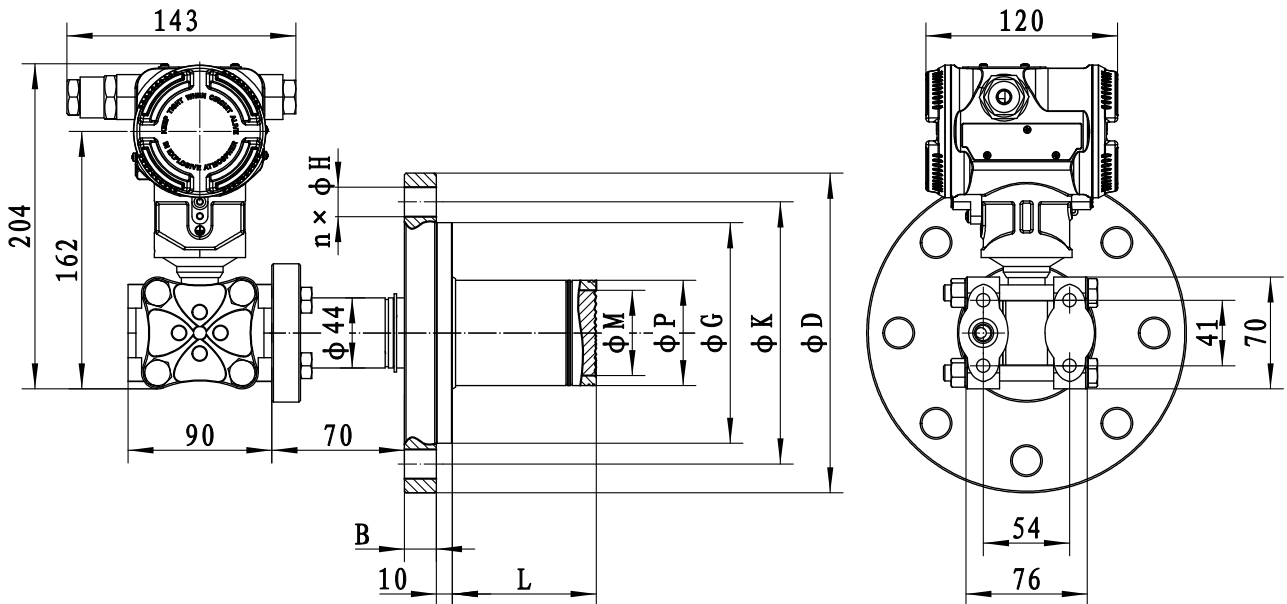
Flange Configuration of MDM7000 with Display (with Extension)



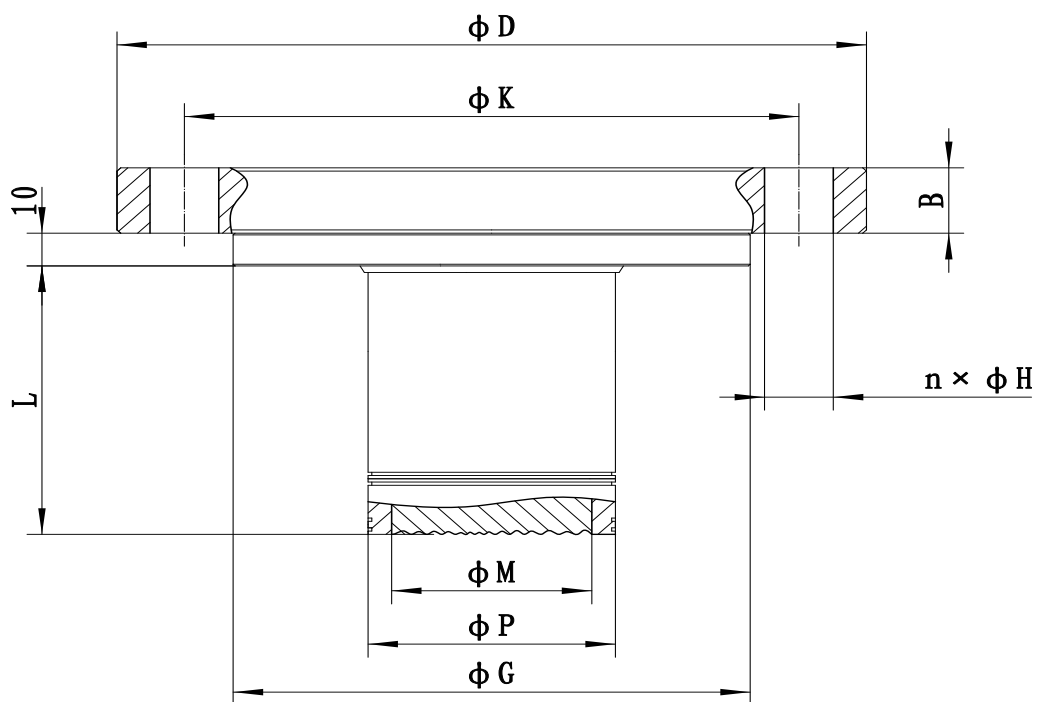
Flange Configuration of MDM7000 without Display (flush mount only)



Flange Configuration of MDM7000 without Display (With Extension)

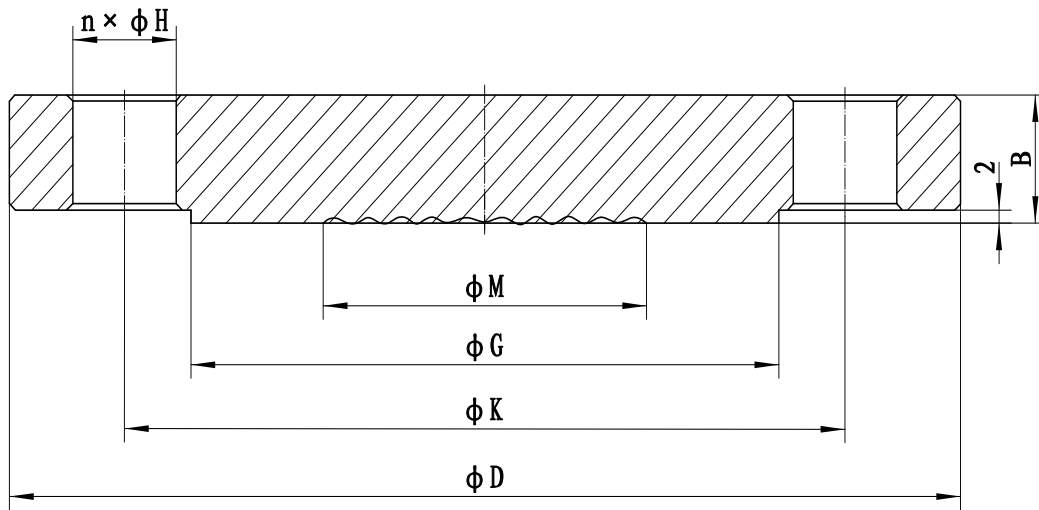


Process Connection(D01~D05、D09)



Standard	Specification	Diameter(ϕD)	Thickness(B)	Convexity diameter(ϕG)	Hole Circumference(ϕK)
HG/T20592-2009	DN80PN10	200	20	138	160
HG/T20592-2009	DN80PN10	200	20	138	160
HG/T20592-2009	DN80PN10	200	20	138	160
HG/T20592-2009	DN50PN10	165	20	102	125
HG/T20592-2009	DN50PN10	165	20	102	125
HG/T20592-2009	DN50PN10	165	20	102	125
Number (n)	Hole diameter (ϕH)	Inserted tube diameter (ϕP)	Inserted tube length (L)	Corrugation diameter (ϕM)	
8	18	66	50	42	
8	18	66	100	42	
8	18	66	150	42	
4	18	46	150	42	
4	18	46	50	42	
4	18	46	100	42	

Process Connection (H01,H05,H06)



Standard	Specification	Diameter(ϕD)	Thickness(B)	Hole circumference(ϕK)
HG/T20592-2009	DN50PN10	165	20	125
HG/T20592-2009	DN80PN10	200	20	160
HG/T20592-2009	DN100PN10	220	20	180
Convexity diameter(ϕG)	Hole diameter (ϕH)	Quantity(n)	Corrugation diameter(ϕM)	
102	18	4	56	
138	18	8	56	
158	18	8	56	

Order Guide

Item	Parameters	Code	Instruction
	Model	MDM7000-LT	Smart Level Transmitter
Sensor	Separator	-	Detailed specifications as following
	Range	S403D	Nominal value (URL): 0.4bar
		S254D	Nominal value (URL): 2.5bar
		S105D	Nominal value (URL): 10bar
		S305D	Nominal value (URL): 30bar
	Sensor seal	F	Stainless steel welding seal
Electrical connection	Separator	-	Detailed specifications as following
	Cable entry protector	R1	A waterproof connector M20×1.5 at one side and a gland at the opposite side, PVC material, applicable for 6mm~8mm diameter cable, IP67
		R2	Flame proof, 1/2 NPT(F) at one side, gland at the opposite side, stainless steel material, applicable for 6mm~8mm diameter cable, IP67
		R3	Flame proof, M20×1.5 (F) at one side, gland at the opposite side, stainless steel material, applicable for 6mm~8mm diameter cable, IP67
		R7	Flame proof, G1/2 (F) at one side, gland at the opposite side, stainless steel material, applicable for 6mm~8mm diameter cable, IP67
Output	Separator	-	material, applicable for 6mm~8mm diameter cable, IP67
	Output signal	H	4mA~20mA DC+HART two wire, power supply: 16.5V~55V DC
		B	4mA~20mA DC+HART two wire, Intrinsically safe, power supply: 18.5V~28V DC
	Display	A	Without LCD display
		C	LCD display
Process connection	Separator	-	Detailed specifications as following
Process connection (High pressure side)	Connection position	HL	High-pressure side fixed connection, low-pressure side 1/4NPT(F) GB/T 12716-2011
		/H	High-pressure side and low-pressure side both are diaphragm connection
	Connection type	G	Fixed mounting
	Isolation fluid filling	S	Silicone oil
		H	High-temperature silicone oil
		F	Hygienic filler, Neobee M-20, pass the FDA sanitary permit
	Wetted parts material	4	SUS304
		6	SUS316
	Diaphragm material	S	SUS316L
		T	Tantalum (process connection material can only be SS316)
		H	Hastelloy C (process connection material can only be SS316)
		L	SUS316L + gold plated
		P	SUS316L + PTFE (Diaphragm diameter≥31.1mm, Range≥1bar)

	Flange connection	H01	HG/T 20592-2009 DN50PN10~PN40 RF raised face flange
		H05	HG/T 20592-2009 DN80PN10 RF raised face flange
		H06	HG/T 20592-2009 DN100PN10 RF raised face flange
	Extension diameter and length	D00	None
		D01	Diameter: 66mm, length: 50mm
		D02	Diameter: 66mm, length: 100mm
		D03	Diameter: 66mm, length: 150mm
		D04	Diameter: 46mm, length: 150mm
		D05	Diameter: 46mm, length: 50mm
		D09	Diameter: 46mm, length: 100mm
Process connection (For Low-pressure side, only available when the parameters are not same at High pressure and Low pressure sides)	Connection position	/L	Low pressure side connection(High and low pressure parameters are inconsistent)
	Connection type	C	Capillary transmission
	Capillary type	M1	Armoublue SUS304, with PVC cover
		M2	Armoublue SUS304, outer diameter 3.5mm
	Capillary length	XX	XX value range: 0~10, samples: 2=2 meters; 10=10meters
	Isolation fluid filling	S	Silicone oil, process
		H	High-temperature silicone oil
		F	Hygienic filler, Neobee M-20, pass the FDA sanitary permit
	Wetted parts material	4	SUS304
		6	SUS316L
	Diaphragm material	S	SUS316L
		T	Tantalum (process connection material can only be SS316)
		H	Hastelloy C (process connection material can only be SS316)
		L	SUS316L + gold plated
		P	SUS316L + PTFE (Diaphragm diameter≥31.1mm, Range≥1bar)
Flange connection	H01	HG/T 20592-2009 DN50PN10~PN40 RF raised face flange	
	H05	HG/T 20592-2009 DN80PN10 RF raised face flange	
	H06	HG/T 20592-2009 DN100PN10 RF raised face flange	

	Extension diameter and length	D00	None	
		D01	Diameter: 66mm, length: 50mm	
		D02	Diameter: 66mm, length: 100mm	
		D03	Diameter: 66mm, length: 150mm	
		D04	Diameter: 46mm, length: 150mm	
		D05	Diameter: 46mm, length: 50mm	
		D09	Diameter: 46mm, length: 100mm	
Accessories	Separator	-	Detailed specifications as following	
	Process connection accessories	/A1	Adaptor, M20×1.5 (M) with pressure-guided pipe φ14×2×30, SS304, spherical hard seal	
		/A2	Adapter, 1/2-14NPT female, SS304	
		0	None	
	Calibration report	/Q1	Calibration report provide by our company	
		/Q2	Calibration report provide by Chinese authorized third party	
		0	None	
	Flameproof certification	/E1/AT	Flameproof certification, ATEX certification	
		/E1/IE	Flameproof certification, IECEx certification	
		/E1/PC	Flameproof certification, PCEC certification	
		/E2	Flameproof certification, CSA certification	
		0	None	
	Intrinsically safe certification	/I1/AT	Intrinsically safe certification, ATEX certification	
		/I1/IE	Intrinsically safe certification, IECEx certification	
		/I1/PC	Intrinsically safe certification, PCEC certification	
		0	None	
	CCS certification	/CCS	CCS certification	
		0	None	
	Wetted parts treatment	/G1	Ungrease treatment	
		0	None	
	Note: Please consult the engineer for product certification details.			

Certifications

RoHS		CE
The name of the certification organization		TÜV SÜD
License scope	MDM7000 Series smart Pressure Transmitters	
mark	RoHS	CE
directives	2015/863/EU	2014/30/EU
Verification criteria	IEC62321-1:2013 IEC62321-5:2014 IEC62321-2:2013 IEC62321-6:2015 IEC62321-4:2014 IEC62321-7-1:2015	EN IEC 61326-1:2021

Flameproof certification		
The name of the certification organization	PCEC	CSA
License scope	MDM7000 Series smart Pressure Transmitters	
Explosion-proof signs	Ex db IIC T6 Gb	Class I, Division 1, Group A, B, C and D T6 Class II, Division 1 Group E, F and G T70°C Class III
Use ambient temperature	-40°C ~70°C	-40°C ~70°C

Intrinsically safe certification	
The name of the certification organization	PCEC
License scope	MDM7000 Series smart Pressure Transmitters
Explosion-proof signs	Ex ia IIC T4 Ga
Use ambient temperature	-40°C ~70°C
Description of intrinsically safe parameters	Maximum input voltage U_i (V): 28
	Maximum input current I_i (mA): 100
	Maximum input power P_i (W): 0.7
	Highest internal equivalent parameter C_i (nF): 20
	Highest internal equivalent parameter L_i (μH): 20