

MDM6000-GP/AP

Smart Gauge/Absolute Pressure Transmitter



Introduction

MDM6000-GP/AP smart gauge/absolute pressure transmitter adopts advanced monocrystalline silicon piezoresistive technology. The product is used to measure the level, density, and pressure of liquid, gas or steam, and then converts the pressure signal into 4mA~20mA DC analog current signal output, and can realize supports setting, monitoring and other functions through communication equipment. It is suitable for the demanding process chemical industry.

Feature

- Monocrystalline silicon piezoresistive sensor technology with stable performance, and high accuracy up to 0.075%FS.
- High overload protection diaphragm to achieve high pressure overload protection function.
- Adopts high performance EMC protection circuit module with strong anti-interference ability.
- Excellent long-term stability: $\pm 0.2\%$ SPAN/5 years.

Application

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

Specification

GP accuracy	$\pm 0.075\%$, $\pm 0.1\%$, $\pm 0.2\%$ URL See the specifications for details
AP accuracy	$\pm 0.1\%$, $\pm 0.2\%$ URL See the specifications for details
GP range	0.4bar~400bar, see the ordering table
AP range	0.4bar~100bar, see the ordering table
Long-tem stability	$\pm 0.2\%$ SPAN/5 years
Ambient temperature effects	See the specifications for details
Power supply effect	When the supply voltage varies from 10.5V/16.5V to 55V DC, the zero and span change should be less than $\pm 0.005\%$ URL/V.
Mounting position effects	less than 4mbar at any position, which can be corrected by PV=0 reset.
Vibration effect	$< 0.1\%$ URL as per GB/T18271.3/IEC61298-3
Output signal	4mA~20mA DC+HART Modbus-RTU/RS485
Protection rating	IP67
Weight	About 1.56kg (without mounting bracket and process connection parts)

Accuracy

Stated reference accuracy include linearity (BFSL) , hysteresis, and repeatability as per the standard and reference test conditions. Calibration Temperature: 20°C ±5°C , based on Zero value.

Linear output accuracy	GP	TD≤5	±0.1%	0.4bar
			±0.075%	2.5bar,10bar,30bar,100bar,400bar
		TD>5	± (0.025+0.015TD) %	0.4bar
			± (0.0025+0.0145TD) %	2.5bar,10bar,30bar,100bar,400bar
	AP	TD≤5	±0.2%	0.4bar
			±0.1%	2.5bar,10bar,100bar
		TD>5	± (0.025+0.035TD) %	0.4bar
			± (0.025+0.015TD) %	2.5bar,10bar,100bar

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|)].

Ambient temperature effects

Product type	Influence quantity	Range
GP	± (0.075+0.035TD) % 10°C of SPAN	40kPa、250kPa 1 MPa、3MPa、10MPa、40MPa
AP	± (0.125+0.075TD) % 10°C of SPAN	40kPa
	± (0.115+0.065TD) % 10°C of SPAN	250kPa、1 MPa、10MPa

Range

Model	Nominal Range	Min. Range	Lower (LRL)	Upper (URL)	Overload
GP	0.4bar	20mbar	-0.4bar	0.4bar	10bar
	2.5bar	125mbar	-1bar	2.5bar	40bar
	10bar	0.5bar	-1bar	10bar	60bar
	30bar	1.5bar	-1bar	30bar	150bar
	100bar	5bar	-1bar	100bar	200bar
	400bar	50bar	-1bar	400bar	800bar
AP	0.4bar	0.2bar	0bar	0.4bar	10bar
	2.5bar	0.5bar	0bar	2.5bar	40bar
	10bar	2bar	0bar	10bar	60bar
	100bar	10bar	0bar	100bar	200bar

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

Overload value: Depending on the pressure value of the weakest pressure bearing capacity, this overload pressure is the maximum pressure that the sensor can withstand, not the maximum pressure that the product itself can withstand.

Environment Condition

Items	Condition	
Working temperature	-40°C ~85°C ,LCD display:-20°C ~70°C	
Storage temperature	-40 °C ~100°C ,LCD display:-40°C ~85°C	
Media temperature	Silicone oil filled:-40°C~105°C	
	Inert oil filled:-45°C ~85°C	
Working humidity	5%RH~100%RH@40°C	
Hazardous area *	NEPSI	Ex db IIC T6 Gb Ex ia IIC T4 Ga
	ATEX	Ex db IIC T6 Gb,Ex tb IIIC T80°C Db Ex ia IIC T4 Ga
	IECEX	Ex db IIC T6 Gb,Ex tb IIIC T80°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 T80°C Class III
* Please consult engineers for details		

Power Supply & Load Requirements

Items	Condition
Power supply	HART communication protocol: 16.5V~55V DC
	Intrinsically safe HART communication protocol: 18.5V~28V DC
	Modbus-RTU/RS485:12V~32V DC
Load resistance	0Ω~2119Ω (working state) 250Ω~600Ω(Hart communication)
Transmission Distance	< 1000m
Power consumption	
4mA~20mA	≤500mW@24V DC, 20.8mA
Modbus-RTU/RS485	≤240mW@24V DC, 10mA

Note: The power supply voltage can be selected as 10.5V, please consult the engineer for details.

Time Index

Damping time constant: equals to the combined damping time of electronic components and sensor module.
Electronic components damping time: 0s~100s configurable
Sensor module damping time(sensor isolated diaphragm and filled silicone oil): ≤ 0.2s
Turn-on time: ≤ 6s
Factory reset time: ≤ 31s

EMC Environment

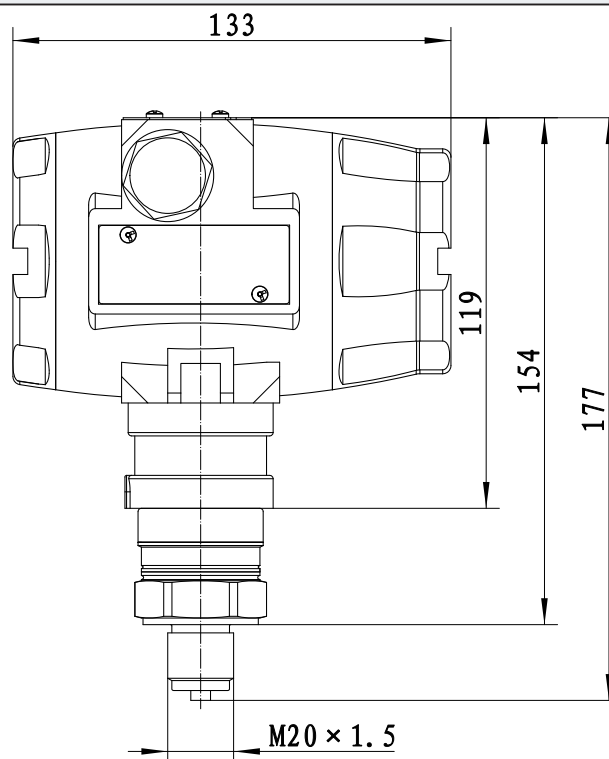
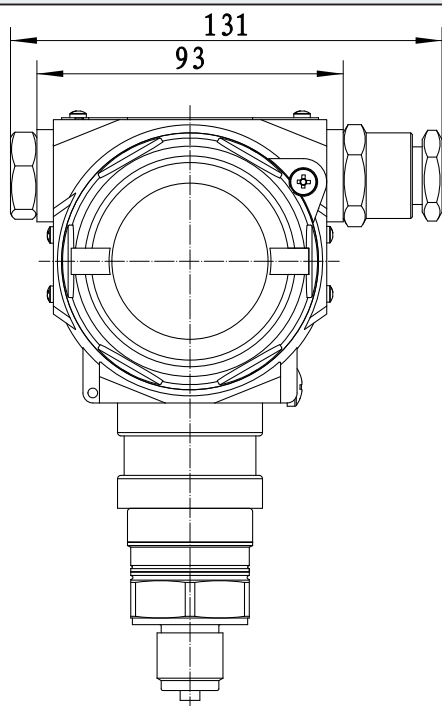
SN	Test items	Basic Standards	Test Conditions	Performance Level
1	Radiated interference (Casing)	GB/T 9254.1/CISPR 32	30MHz~1000MHz	Qualified
2	Conducted interference (DC power port)	GB/T 9254.1/CISPR 32	0.15MHz~30MHz	Qualified
3	Electrostatic discharge immunity test (ESD)	GB/T 17626.2/IEC61000-4-2	8kV (Contact), 8kV (Air)	A
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)	A
7	Surge immunity requirements	GB/T 17626.5/IEC61000-4-5	1kV (line to line) 2kV (line to ground (1.2/50 μ s)	A
8	Immunity to conducted disturbances induced by radio frequency fields	GB/T 17626.6/IEC61000-4-6	3V (150kHz~80MHz)	A

Note: At performance level A, the performance is normal within the limits of the technical specifications.

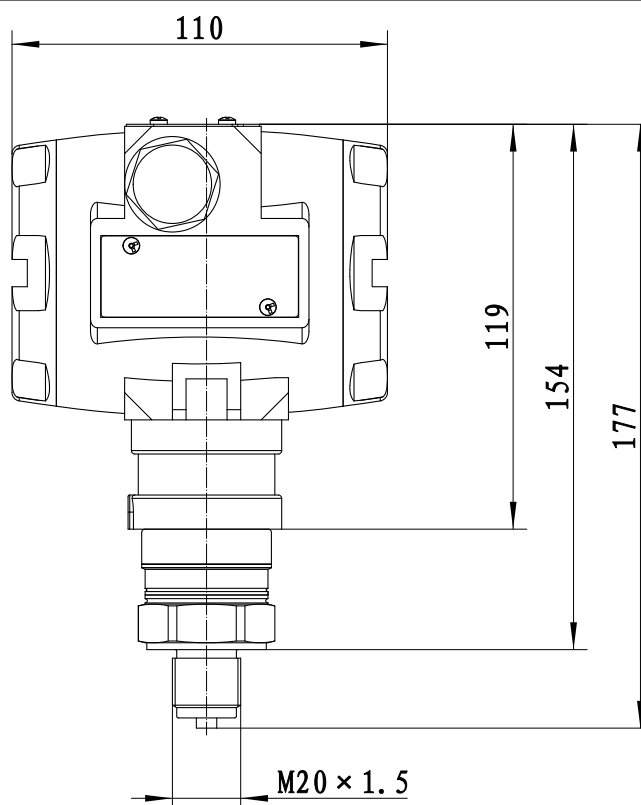
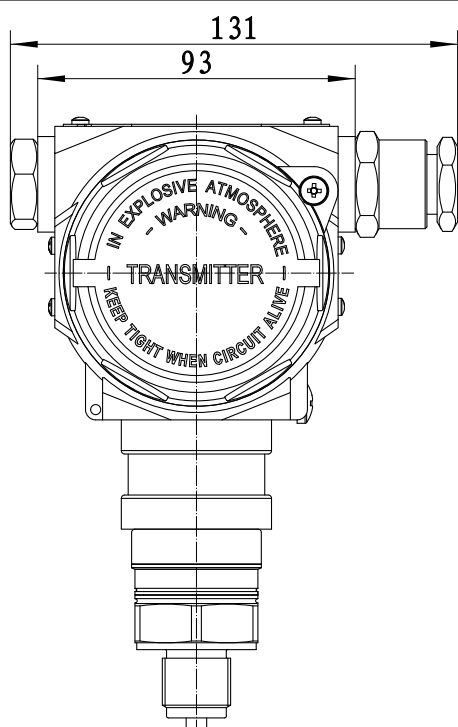
Dimension

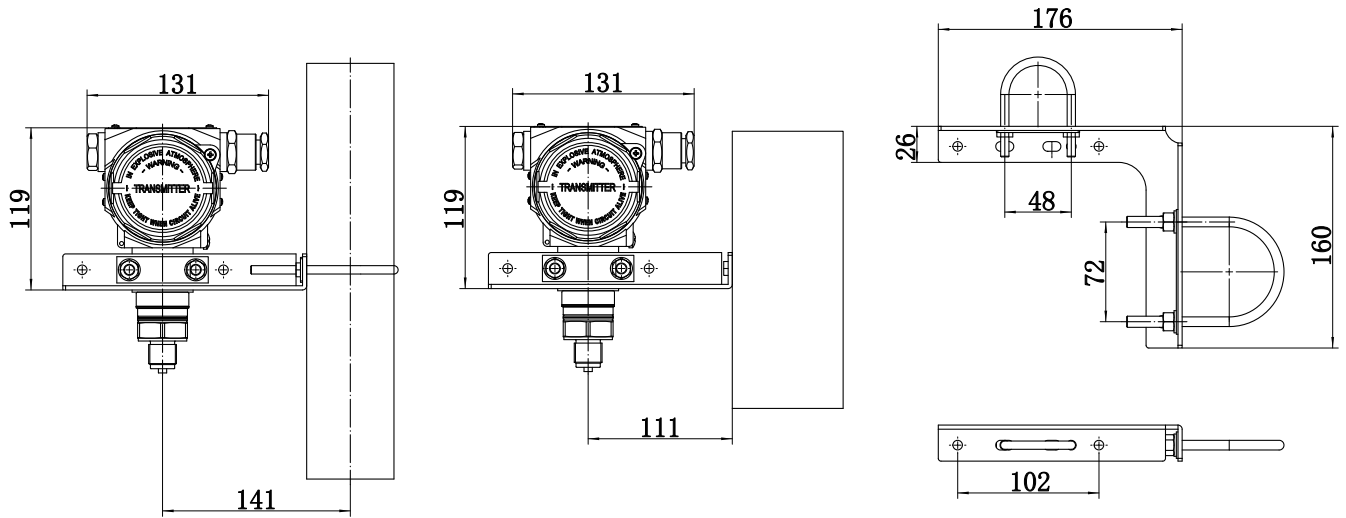
unit: mm

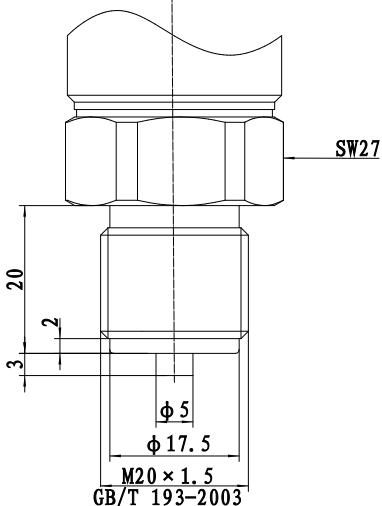
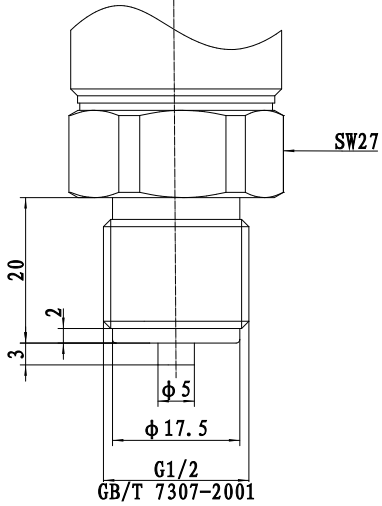
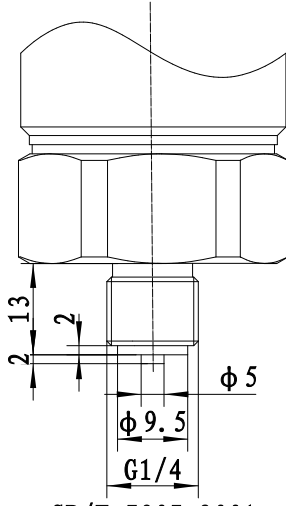
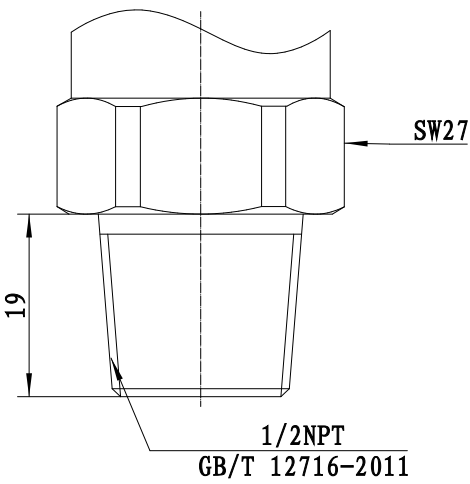
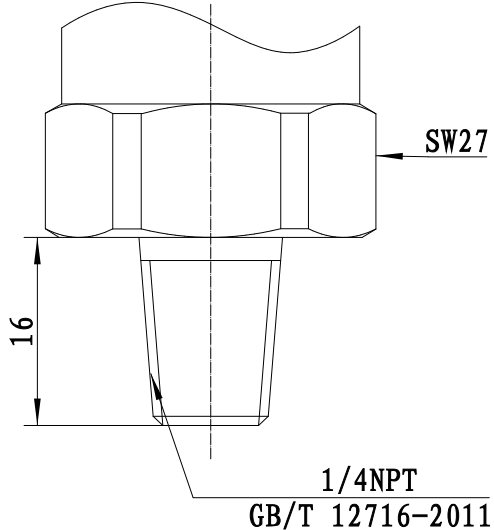
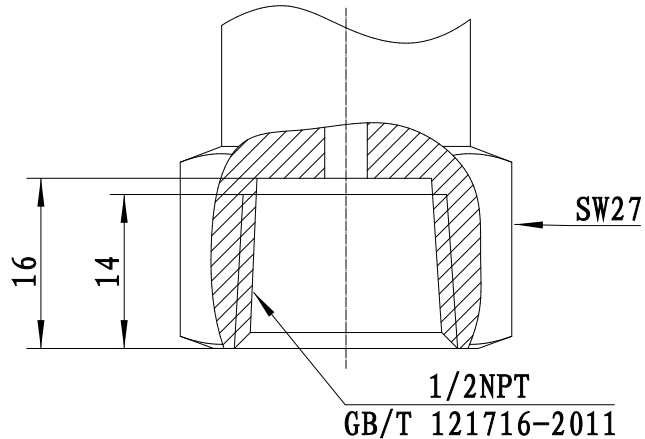
MDM6000 With Display

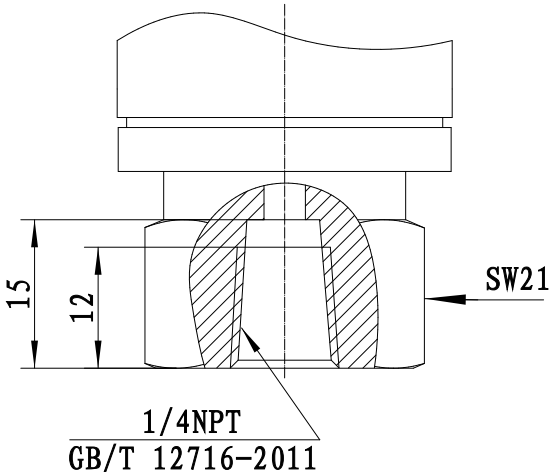
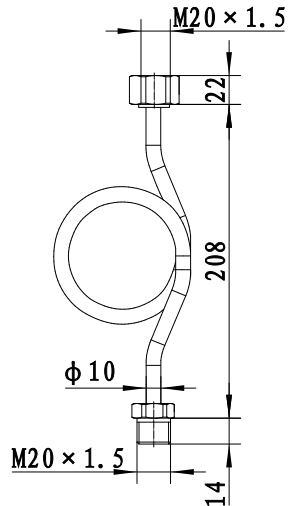
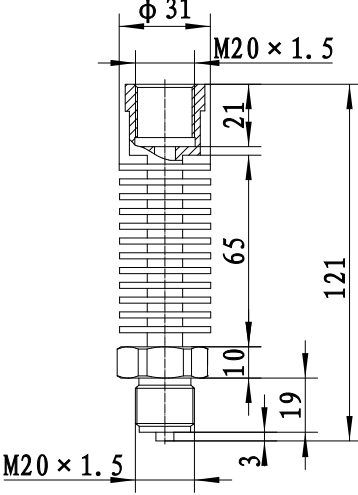
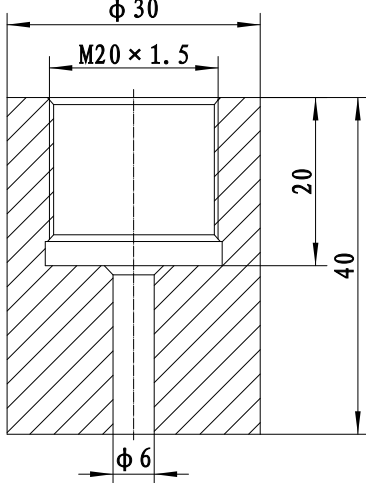
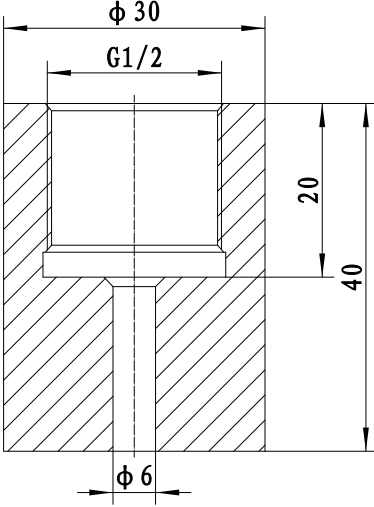


MDM6000 Without Display



MDM6000 U-shaped Mounting Bracket (B4) for 2" Pipe Mounting

Process connection (M01)	Process connection (G01)
 <p>SW27</p> <p>20</p> <p>2</p> <p>3</p> <p>$\phi 5$</p> <p>$\phi 17.5$</p> <p>M20 x 1.5</p> <p>GB/T 193-2003</p>	 <p>SW27</p> <p>20</p> <p>2</p> <p>3</p> <p>$\phi 5$</p> <p>$\phi 17.5$</p> <p>G1/2</p> <p>GB/T 7307-2001</p>
Process connection (G02)	Process connection (R01)
 <p>SW27</p> <p>13</p> <p>2</p> <p>$\phi 5$</p> <p>$\phi 9.5$</p> <p>G1/4</p> <p>GB/T 7307-2001</p>	 <p>SW27</p> <p>19</p> <p>1/2NPT</p> <p>GB/T 12716-2011</p>
Process connection (R02)	Process connection (R03)
 <p>SW27</p> <p>16</p> <p>1/4NPT</p> <p>GB/T 12716-2011</p>	 <p>SW27</p> <p>16</p> <p>14</p> <p>1/2NPT</p> <p>GB/T 12716-2011</p>

Process connection (R04)	Heat exchange link (N1)
 <p>15 12</p> <p>SW21</p> <p>1/4NPT GB/T 12716-2011</p>	 <p>M20 x 1.5 22 208 phi 10 M20 x 1.5 14</p>
Heat exchange link (N2)	Welded connector (Z1)
 <p>phi 31 M20 x 1.5 21 65 121 10 19 3 M20 x 1.5</p>	 <p>phi 30 M20 x 1.5 20 40 phi 6</p>
Welded connector (Z2)	
 <p>phi 30 G1/2 20 40 phi 6</p>	

Order Guide

Items	Parameter	Code	Description	
	Model	MDM6000-GP/AP	smart Gauge/Absolute Pressure Transmitter	
Sensor	Separator	-	Detailed specifications as following	
	GP range	S403G	Nominal value(URL): 0.4bar	
		S254G	Nominal value(URL): 2.5bar	
		S105G	Nominal value(URL): 10bar	
		S305G	Nominal value(URL): 30bar	
		S106G	Nominal value(URL): 100bar	
		S406S	Nominal value(URL): 400bar	
	AP range	S403A	Nominal value(URL): 0.4bar	
		S254A	Nominal value(URL): 2.5bar	
		S105A	Nominal value(URL): 10bar	
		S106A	Nominal value(URL): 100bar	
	Isolated diaphragm material	S	SS316L	
		H	Hastelloy C	
	Fill oil	S	silicone oil	
		D	Inert filler	
	Sensor seal	F	Stainless steel welded seal	
		S	Viton o-ring	
	Electrical Connection	Separator	-	Detailed specifications as following
		Cable outlet protection	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	-	Detailed specifications as following	
	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	
		R	Modbus-RTU/RS485, Applicable power supply voltage:12V~32V DC	
	Display	A	Without LCD display	
		C	LCD display	
Process connection	Separator	-	Detailed specifications as following	

	Specification	M01	M20×1.5 Male, φ3 pressure lead hole, GB/T 193-2003	
		G01	G1/2 Male, φ3 pressure lead hole, GB/T 7307-2001	
		G02	G1/4 Male, φ3 pressure lead hole, GB/T 7307-2001	
		R01	1/2-14NPT Male, φ6 pressure lead hole, GB/T 12716-2011	
		R02	1/4-18NPT Male, φ3 pressure lead hole, GB/T 12716-2011	
		R03	1/2-14NPT Female, φ6 pressure lead hole, GB/T 12716-2011	
		R04	1/4-18NPT Female, φ3 pressure lead hole, GB/T 12716-2011	
options	Separator	-	Detailed specifications as following	
	Process connection mounting fittings	/N1	Heat exchange link, M20×1.5 female to M20×1.5 male thread, SUS304 stainless steel (condenser)	
		/N2	Heat exchange link, M20×1.5 female thread to M20×1.5 male thread, SUS304 stainless steel (heat sink)	
		/Z1	Welded connector, internal thread M20×1.5, SUS304 stainless steel	
		/Z2	Welded connector, internal thread G1/2, SUS304 stainless steel	
		0	None	
	Fixed mounting accessories	/B4	U-bracket, 2-inch pipe, carbon steel	
		0	None	
	Validation report	/Q1	Calibration report provided by MicroSensor	
		0	None	
	Flameproof certification	/E1/AT	Flameproof certification, ATEX certification	
		/E1/IE	Flameproof certification, IECEx certification	
		/E1/NE	Flameproof certification, NEPSI 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/NE	Intrinsically safe certification, NEPSI 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	MDM6000 Series smart Pressure Transmitters	
Sign	RoHS	CE
Directives	2015/863/EU	2014/30/EU
Verification criteria	IEC 62321-5:2013 IEC 62321-4:2013+AMD1:2017 CSV IEC 62321-5:2013 IEC 62321-7-2:2017 IEC 62321-6:2015 IEC 62321-8:2017	EN IEC 61000-6-4:2019 EN IEC 61000-6-2:2019

Flameproof certification		
The name of the certification organization	NEPSI	CSA
License scope	MDM6000 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 T80°C Class III
Use ambient temperature	-20°C~55°C	-40°C~60°C
Use the maximum temperature of the medium	80°C	

Intrinsically safe certification	
The name of the certification organization	NEPSI
License scope	MDM6000 Series smart Pressure Transmitters
Explosion-proof signs	Ex ia IIC T4 Ga
Use ambient temperature	-40°C~60°C
Maximum process medium temperature	120°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 (μ F): 0
	Highest internal equivalent parameter L_i (mH): 0.01