HPM18V Capacitance Diaphragm Gauge

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Overview

HPM18V is a capacitive vacuum gauge, also called a capacitive thin film vacuum gauge (CDG). This product uses a ceramic capacitive sensor as a sensitive element and directly measures pressure using a vacuum connection. Its analog output signals such as 0-5 or 0-10 VDC are proportional to the measured pressure and are not affected by the type and composition of the process gas. Ceramic has the characteristics of high elasticity, wear resistance, corrosion resistance, and fast heat dissipation, which makes the vacuum gauge have very good thermal stability and low temperature drift.

HPM18V capacitive vacuum gauge has high measurement accuracy, excellent overpressure resistance and excellent long-term stability. Its corrosion-resistant ceramic sensor is temperature compensated, has a wide operating temperature range, and has good zero-point stability. The vacuum gauge is compact in overall size, easy to use and reliable, and is suitable for accurate measurement of medium and low vacuum with complex gas composition.

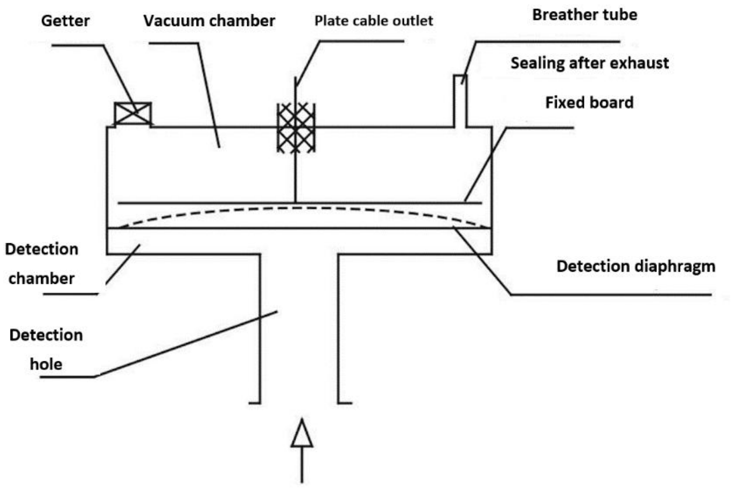
Application

- Vacuum application
- Laboratory and research and development
- Semiconductor industry
- Vacuum packaging
- Plasma etching process equipment

Features

- Capacitor film principle
- High precision and good stability
- Has excellent anti-overload capability
- Detection is not affected by gas type and composition
- Fast response and small hysteresis
- Direct pressure measurement, the analog output signal is proportional to the measured pressure
- Support various pressure interfaces KF, CF, VCR, etc. in the vacuum industry

Measuring Principle



Capacitive vacuum gauge, also called capacitive film vacuum gauge, works based on the principle of capacitance change and consists of a detection part and a conversion circuit.

The picture above is a schematic diagram of the detection part. The detection part has two chambers, the vacuum chamber and the detection chamber. The vacuum chamber is a fully sealed structure. After passing the leak detection by the helium mass spectrometer leak detector, it is exhausted for a long time, and finally the exhaust pipe is sealed to maintain a long-term high vacuum. The fixed electrode plate is in the vacuum chamber and is led out of the vacuum chamber by the electrode lead wire. The detection diaphragm is placed between the high vacuum chamber and the detection chamber of the low vacuum system to be tested. The detection diaphragm is a movable plate, which forms a flat capacitor with the fixed plate. The measured low vacuum pressure enters the detection chamber through the detection hole, and the detection diaphragm deflects, changing its distance from the fixed plate, and the capacitance value also changes accordingly. Different low vacuum pressures determine different capacitance values.

The capacitance signal formed by the detection part is sent to the circuit conversion part. The circuit conversion part converts the capacitance signal through transformation, sorting, amplification and conversion, and finally outputs a standard voltage or current signal. This standard electrical signal is derived from the capacitive signal and is proportional to the vacuum pressure.

Technical Parameters

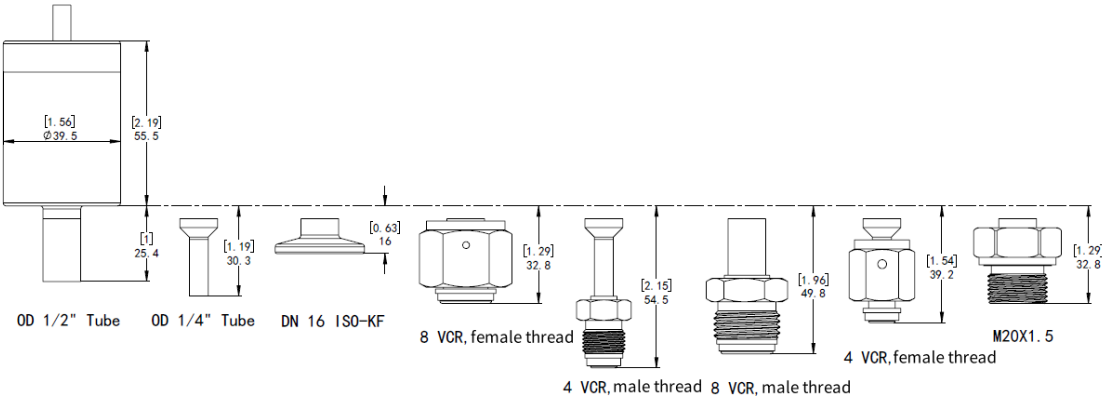
Measuring Range									
Absolute (kPa)	Rated pressure	0.2	0.5	1	2	5	10	20	100
	Overload	200	200	200	200	400	400	600	1000
Absolute (Torr)	Rated pressure	2	5	10	20	50	100	200	1000
	Overload	2000	2000	2000	2000	4000	4000	6000	10000
Absolute (mbar)	Rated pressure	2	5	10	20	50	100	200	1000
	Overload	2000	2000	2000	2000	4000	4000	6000	10000
Note: For other measuring ranges, please contact us.									

Measuring Medium	
Type	Various gases compatible with contact materials
Output Signal/Power Supply	
Standard	4~20mA / Vs=10~30 V_{DC}
Standard	0~5VDC /Vs=8.5~30 V_{DC}
Standard	0~10VDC /Vs=12~30 V_{DC}
Standard	RS485 /Vs=10~30 V_{DC}
Performance	
Accuracy	±0.1%FS (20kPa,100kPa) ±0.25%FS (5kPa,10kPa) ±0.5%FS (500Pa,1kPa,2KPa) ±1.5%FS (200Pa)
Long-term stability	±0.50%FS/year, ≤1kPa ±0.25%FS/year, >1kPa
*Accuracy complies with IEC 60770 (non-linearity, hysteresis, repeatability)	
Environmental Conditions	
Temperature range	Working temperature: -40~125℃ (max 120min on +125°C) Ambient temperature: -30~85℃ Storage temperature: -30~85℃
Protection grade	IP65
Temperature Drift	
Compensation temperature	-20~80℃
Temperature drift of zero point	±1.5%FS (Within compensation temperature)
Temperature drift of full scale	±1.5%FS (Within compensation temperature)
Electrical Protection	
Short circuit protection	Support
Reverse polarity protection	No damage, the circuit does not work
Mechanical stability	
Vibration	20g(20~5000Hz)
Impact resistance	50g(11ms)
Insulation	
Insulation resistance	>200MΩ @500VDC
Dielectric strength	<2mA @500VAC 1min

Structure Material

Ordering Code	Part	Materials
S4	Pressure Interface	SS304
S6		SS316L
PE		PEEK
M6	Sensor	Ceramic Al_2O_3 99.9%
FK	O-Ring	FKM Fluoro rubber
NB		NBR Nitrile

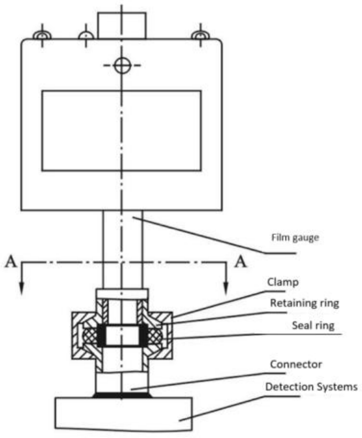
Structure Drawings

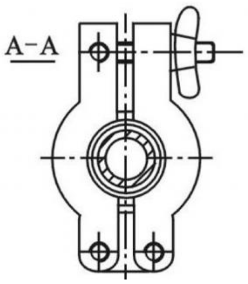


Installation Notes

ISO-KF interface installation diagram

When installing the capacitive film vacuum gauge, it is recommended to use the national standard GB4982-85 (equivalent to ISO 2861/1-74 or DIN 28403) KF vacuum quick connector. The user only needs to weld the joint to the system to be tested, and after confirming the seal through leak detection, install the retaining ring, O-ring and film gauge in sequence, then clamp it firmly with the clamp of the connector, and finally tighten the nut, and it is complete. Installation work. The installation is very convenient, and the sealing is reliable.





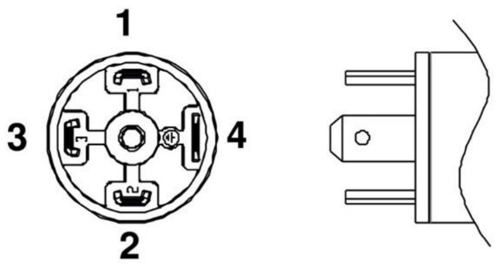
Note:

1. The film gauge must be installed vertically upward as shown in the figure.

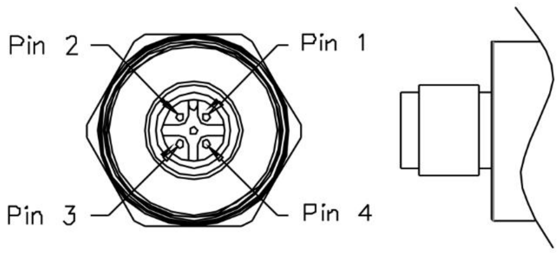
2. During the disassembly and assembly process, care should be taken to handle it with care and avoid collisions to avoid instrument errors. Otherwise, it needs to be recalibrated before it can be used.
3. The diaphragm gauge cannot be installed in a vibrating position. If it must be installed in a vibrating position, please use a vacuum hose to connect it to avoid vibration.
4. The film gauge can also be installed using CF type vacuum flange, VCR, etc. Please consult the sales engineer for details.

Electrical Connection

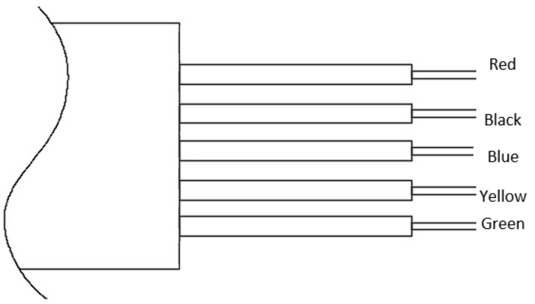
Hirschmann/DIN43650



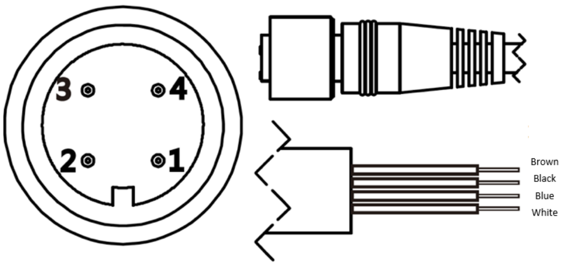
M12×1-4P



Cable outlet



M12x1-4P with cable



Two-wire 4~20mA current output

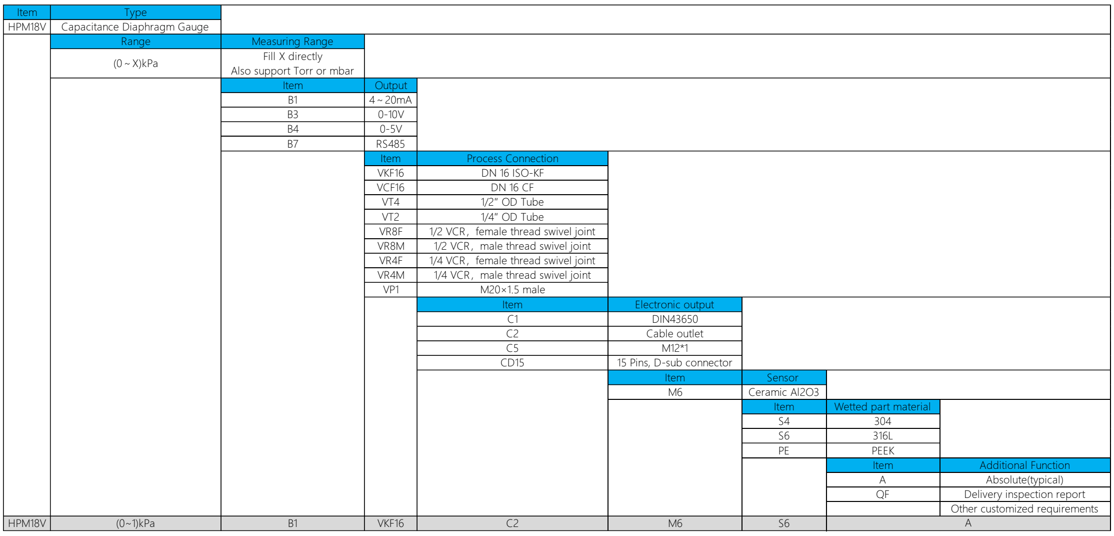
	Power supply+ (+V)	Power supply- (0V/+OUT)	Empty
Hirschmann/DIN43650	1	2	3, 4
Cable outlet	Red	Black	-
M12×1	1	2	3,4
M12×1 (with cable)	Brown	Black	Blue, white

Three- wire 0~5V/10V voltage output

	Power supply+(+V)	Common Ground (GND)	Output(+OUT)	Empty
Hirschmann/DIN43650	1	2	3	4
Cable outlet	Red	Black	Blue	-
M12×1	1	2	3	4
M12×1(with cable)	Brown	Black	Blue	White

Four-wire Modbus-RTU/RS485				
	Power supply+(+V)	Power supply-(-V)	RS485A	RS485B
Hirschmann/DIN43650	1	2	3	4
Cable outlet	Red	Black	Yellow	Green
M12×1,4P	1	2	3	4
M12×1(with cable)	Brown	Black	Blue	White

Ordering Guide



Item	Type
HPM18V	Capacitance Diaphragm Gauge

Range	Measuring Range
(0 ~ X)kPa	Fill X directly Also support Torr or mbar

Item	Output
B1	4 ~ 20mA
B3	0-10V
B4	0-5V
B7	RS485

Item	Process Connection
VKF16	DN 16 ISO-KF
VCF16	DN 16 CF
VT4	1/2" OD Tube
VT2	1/4" OD Tube
VR8F	1/2 VCR，female thread swivel joint
VR8M	1/2 VCR，male thread swivel joint
VR4F	1/4 VCR，female thread swivel joint
VR4M	1/4 VCR，male thread swivel joint
VP1	M20×1.5 male

Item	Electronic output
C1	DIN43650
C2	Cable outlet
C5	M12*1
CD15	15 Pins, D-sub connector

Item	Sensor
M6	Ceramic Al2O3

Item	Wetted part material
S4	304
S6	316L
PE	PEEK

Item	Additional Function
A	Absolute(typical)
QF	Delivery inspection report
	Other customized requirements

HPM18V	(0~1)kPa	B1	VKF16	C2	M6	S6	A

Certification Information

Factory certification	
Certification organization	CQM
Quality management system	ISO 9001:2015
Certification scope	Research, development and manufacture of pressure transmitter and temperature transmitter
Certificate No.	00223Q21711R1S

CE	
Certification organization	ECM
Certification scope	Pressure Transmitter (Differential Pressure Transmitter)
Standard	EN IEC 61000-3-2:2019+A1:2021
	EN IEC 61000-3-3:2013+A1:2019+A2:2021
	EN IEC 61000-6-4:2019, EN IEC 61000-6-2:2019
Certificate No.	6G241223.NHEWC83