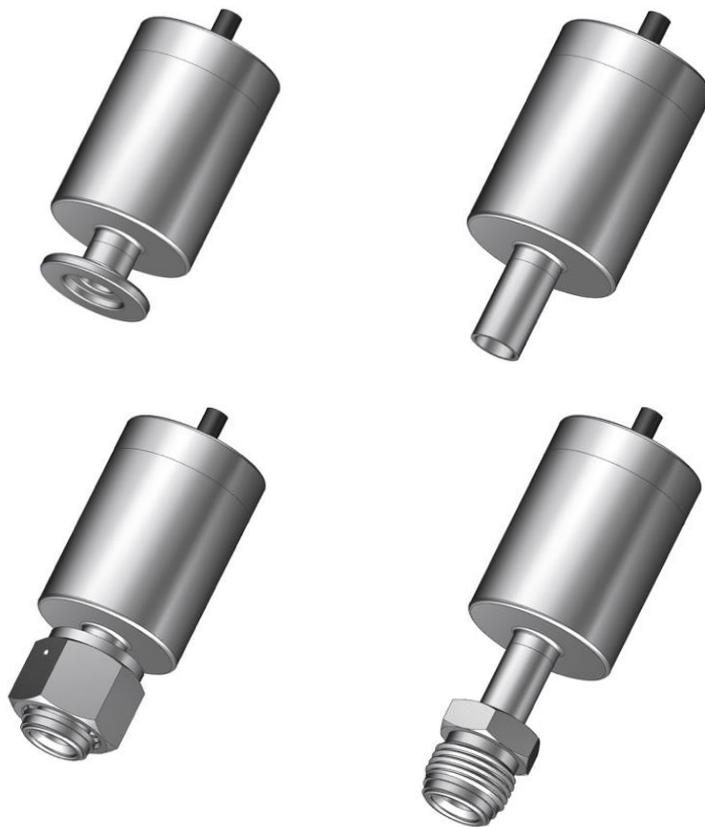


HPM18V Capacitance Vacuum Gauge



Nanjing Hangjia Electronic Technology Co., Ltd.

Overview

HPM18V is a capacitive vacuum gauge, also called a capacitive diaphragm 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.

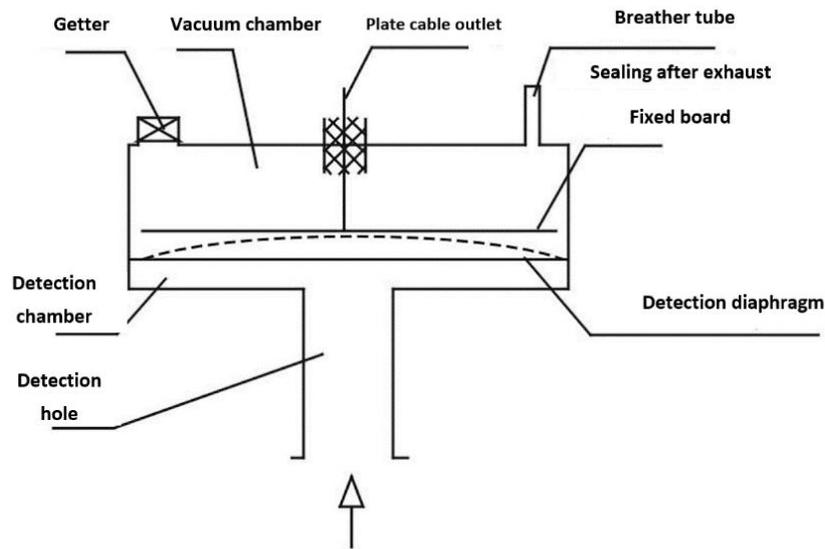
Application

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

Features

- ◆ Capacitive thin-film principle
- ◆ High precision and good stability
- ◆ Excellent overload resistance
- ◆ Detection is unaffected by gas type and composition
- ◆ Zero adjustment function
- ◆ Direct pressure measurement, analog output signal is proportional to the measured pressure
- ◆ Supports various pressure interfaces in the vacuum industry, such as KF, CF, and VCR

Measuring Principle



The capacitive vacuum gauge, also called capacitive diaphragm 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

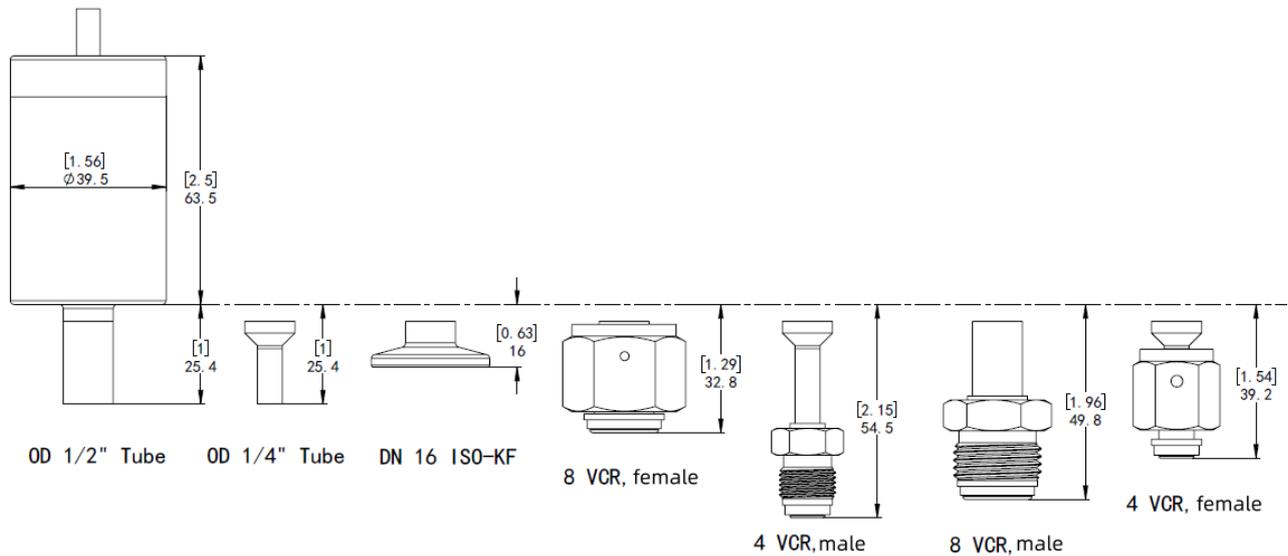
Measuring Range									
Absolute (kPa)	Rated pressure	0.2	0.5	1	2	5	10	20	100
	Overload	350	350	350	350	400	400	600	1000
Absolute (Torr)	Rated pressure	2	5	10	20	50	100	200	1000
	Overload	2600	2600	2600	2600	3000	3000	4500	7500
Absolute (mbar)	Rated pressure	2	5	10	20	50	100	200	1000
	Overload	3500	3500	3500	3500	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} (If has a display, Vs = 13~30 V _{DC})								
Standard	0~5VDC /Vs=10~30 V _{DC}								
Standard	0~10VDC /Vs=12~30 V _{DC}								
Standard	RS485 /Vs=8~30 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°C (max 120min on +125°C) Ambient temperature: -30~85°C Storage temperature: -30~85°C								
Protection grade	IP65, DIN43650/Hirschmann (C1) IP66, Cable outlet (C2), M12×1 (C5), M12×1 with cable (C5X) IP68, Cable outlet (C2P)								
Temperature Drift									
Compensation temperature	-20~80°C								
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
S6	Pressure Interface	SS316L
PE		PEEK
M6	Sensor	Ceramic Al ₂ O ₃ 99.9%
FK	Sealing	FKM Fluoro rubber
FF		FFKM perfluoroether rubber

Structure Drawings (Unit:mm)

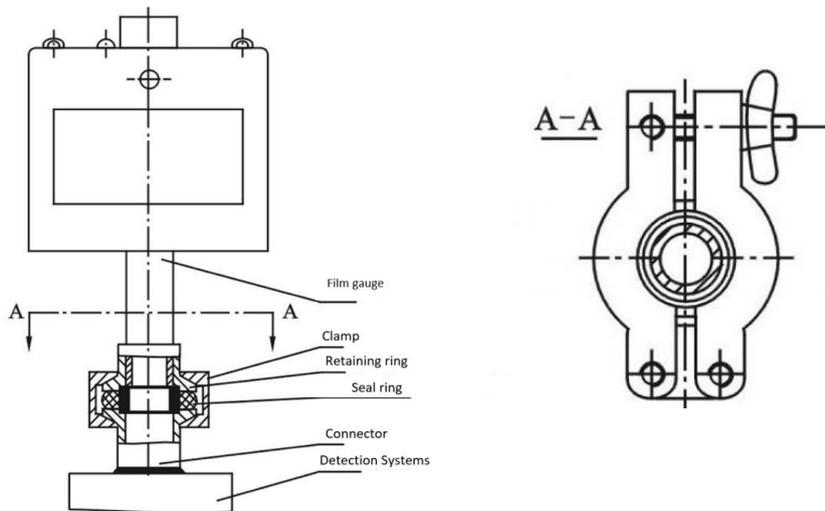


1. The dimensions listed in the figure may change as the manufacturing process is updated.
2. Please consult our sales engineer for other specifications and dimensions.

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.

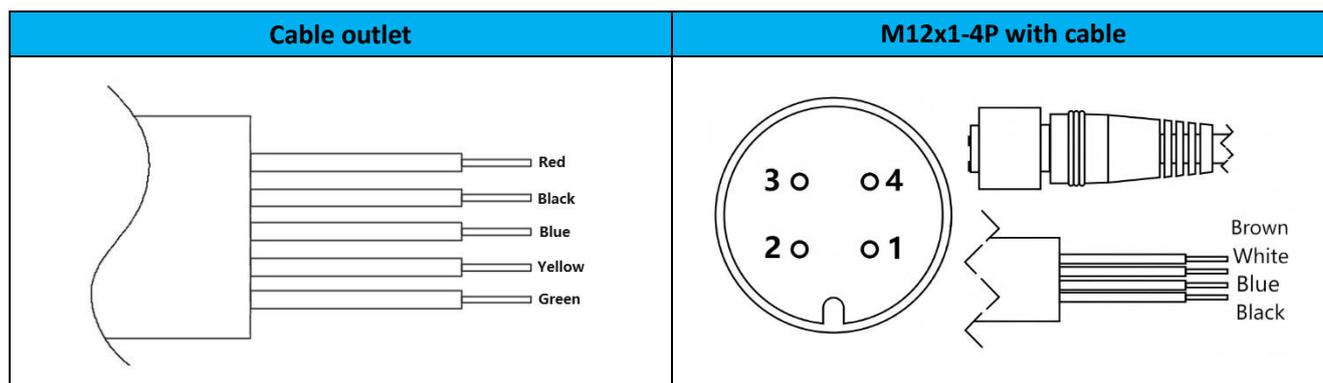


Note:

- 1 The 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 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 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



2-wire 4~20mA current output

	Power supply+(+V)	Power supply-(0V/+OUT)	Grounding	Functions*
Hirschmann/DIN43650	1	2	⊥	3
Cable outlet	Red	Black	Cable shielding	Blue
M12×1	1	3	Connector housing	2
M12×1 (with cable)	Brown	Blue	Cable shielding	White

*Functions include:

1. Remote zero-point adjustment: Refer to the zero-point adjustment operation.
2. Factory reset: For this operation, please consult a sales engineer.

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

	Power supply+(+V)	Power supply-(GND)	Signal+(+OUT)	Grounding
Hirschmann/DIN43650	1	2	3	⊥
Cable outlet	Red	Black	Blue	Cable shielding
M12×1	1	3	2	Connector housing
M12×1(with cable)	Brown	Blue	White	Cable shielding

4-wire Modbus-RTU/RS485

	Power supply+(+V)	Power supply-(-V)	RS485A	RS485B	Grounding
Hirschmann/DIN43650	1	2	3	⊥	Product housing
Cable outlet	Red	Black	Yellow	Green	Cable shielding
M12×1,4P	1	3	2	4	Connector housing
M12×1(with cable)	Brown	Blue	White	Black	Cable shielding

Zeroing Functions

1. When using the vacuum gauge for the first time, it is recommended to perform zero-point adjustment. Due to long-term operation or contamination, zero-point drift may occur, requiring zero-point adjustment.
2. Adjustment Methods
 - External Magnetic Zeroing: For analog signal output products, place a magnetic rod firmly

against the area marked **(Z)** on the casing and wait for at least 8 seconds.

- Remote Zeroing: For 4-20mA output products, short-circuit the function line to the negative power supply and wait for at least 8 seconds to perform the zeroing operation.
- Command Zeroing: For RS485 output products, zeroing can be performed by sending the zero-offset value.

3. Adjustment Steps

- Evacuate the pressure to below 10^{-5} of the full range. For example, for a 1kPa range product, the zero-point pressure should be less than 0.01Pa; for a 100Torr range product, the zero-point pressure should be less than 0.001Torr.
- Run the vacuum gauge for at least 15 minutes.
- Select the appropriate adjustment method.
- Wait for the output to return to zero, indicating successful zero.
- If zeroing fails, you can try the zeroing operation again or perform a factory reset to recover the data.

Ordering Guide

Item	Type									
HPM18V	Capacitance Vacuum 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	M20x1.5 male							
		Item	Electrical Interface							
		C1	DIN43650							
		C2	Cable outlet							
		C2P	Cable outlet(IP68)							
		C5	M12*1							
		CSX	M12*1 with cable							
		Item	Sensor							
		M6	Ceramic Al2O3							
		Item	Wetted part Material							
		S6	SS316L							
		PE	PEEK							
		Item	Others							
		A	Absolute(By default)							
		FK	FKM sealing							
		FF	FFKM sealing							
		D	With display(DIN43650 model)							
		ZM	Magnetic zeroing							
		QF	Factory 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