

HPM18LV Capacitance Vacuum Gauge



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Overview

HPM18LV is a capacitive vacuum gauge, also known as a capacitive thin-film vacuum gauge (CDG). This product uses a ceramic capacitive sensor as its sensing element and directly measures pressure via a vacuum connection. Its 0-10 VDC analog output signal is proportional to the measured pressure and is unaffected by the type and composition of the process gas. Ceramic materials possess high elasticity, wear resistance, corrosion resistance, and rapid heat dissipation, giving this vacuum gauge excellent thermal stability and low temperature drift.

HPM18LV capacitive vacuum gauge offers high measurement accuracy, excellent overpressure resistance, and superior long-term stability. Its corrosion-resistant ceramic sensor is temperature-compensated, providing a wide operating temperature range and good zero-point stability. This vacuum gauge is easy and reliable to use, suitable for accurate measurement of medium and low vacuum conditions in complex gas compositions. Its electrical interface and signals are compatible with imported brands.

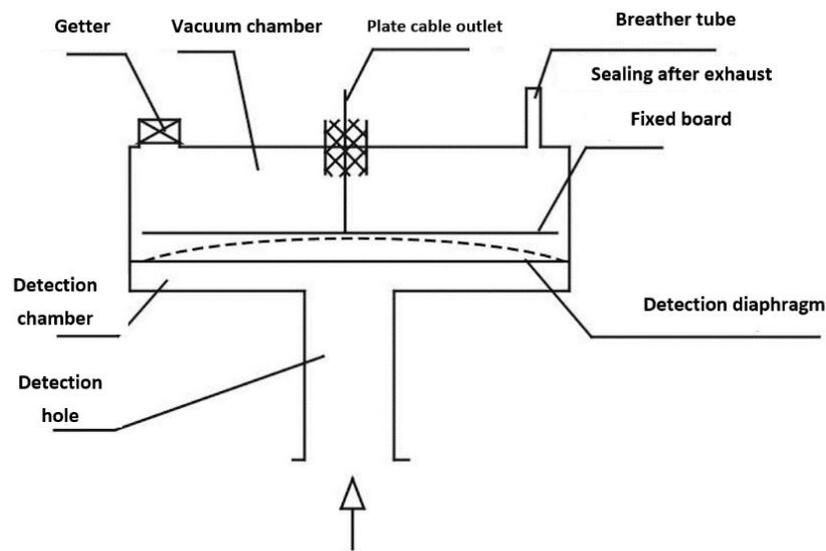
Application

- ◆ 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
- ◆ Fast response and low hysteresis
- ◆ 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.

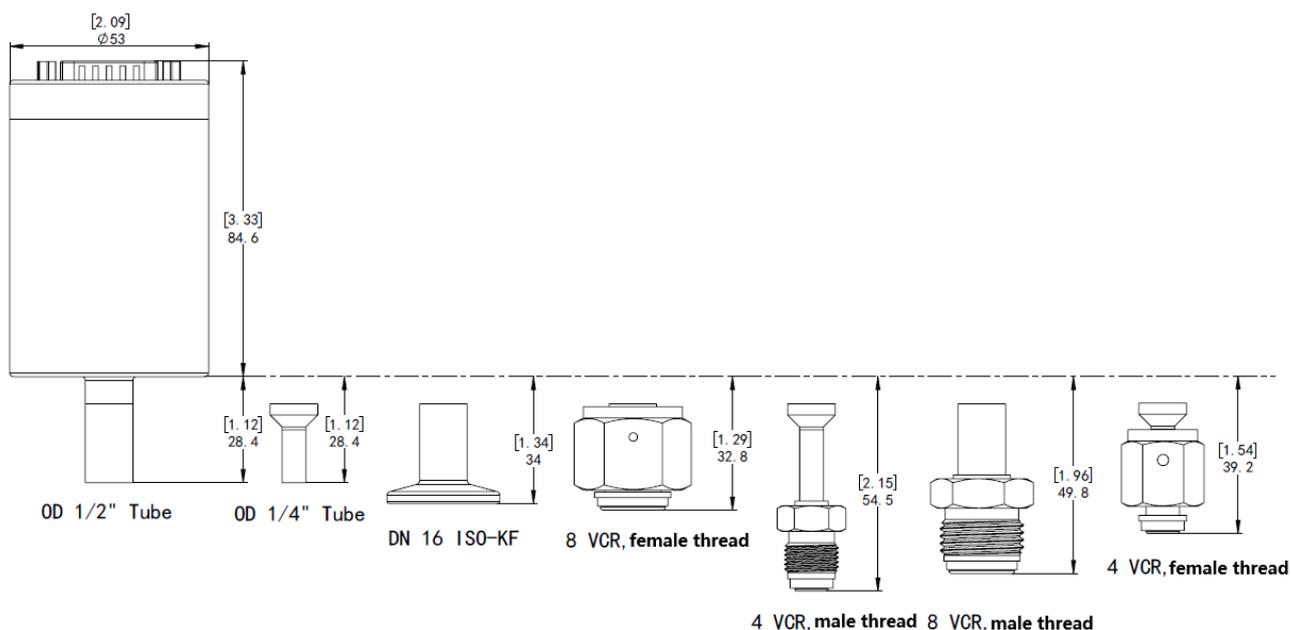
Technical Parameters

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		0~10VDC /Vs=12~30 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		IP40							
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)

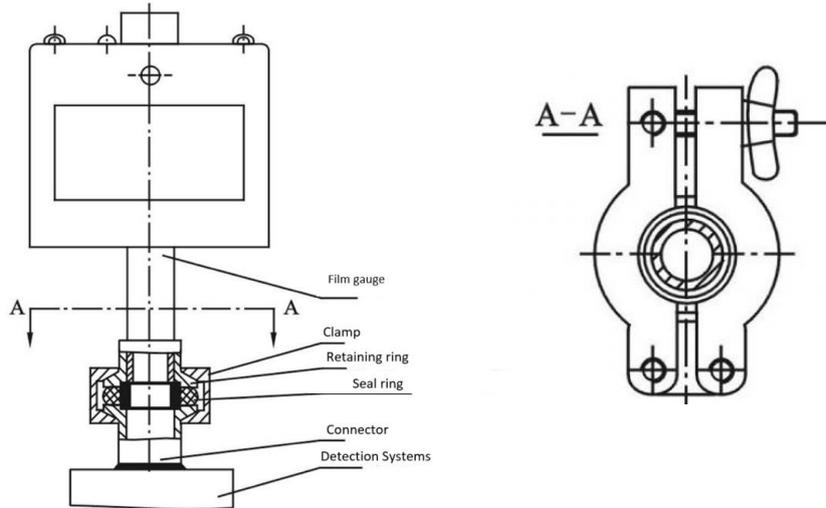


1. The dimensions listed in the figure may change as the manufacturing process is updated.
2. Please consult our sales engineer for other specifications and dimensions.

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

15-pin male D-sub (C11)	9-pin male D-sub (C12)
8-pin FCC68/RJ45 (C13)	8-pin male M12x1 (CM8)

0~5V/10V voltage output						
Signal definition	Power supply+ (+V)	Power Common GND	Signal +OUT	Signal Common -OUT	Function* FUN	Grounding EARTH
15 pin male D-sub	7,11	5	2	12	6,10	15, Connector housing
9 pin male D-sub	4	9	1	8	6,7	Connector housing
8 pin FCC68/RJ45	1	2	3	5	4,6	Connector housing
8 pin male M12×1	1	2	3	5	4,6	Connector housing

*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.

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
 - Button Zeroing: Press the button on the top of the product with the needle bar and hold for at least 8 seconds.
 - Remote Zeroing: Short-circuit the function lines together and wait at least 8 seconds to perform the zeroing operation.
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						
HPM18LV	Capacitance Vacuum Gauge	Measuring Range					
		Range	Fill X directly Also support Torr or mbar				
		(0 ~ X)kPa					
			Item	Output			
			B3	0-10V			
			B4	0-5V			
			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			
			Item	Electrical Interface			
			C11	15-pin male D-sub			
			C12	9-pin male D-sub			
			C13	8-pin FCC68/RJ45			
			CM8	8-pin male M12x1			
		Item	Sensor				
		M6	Ceramic Al2O3				
		Item	Wetted part Material				
		S6	SS316L				
		PE	PEEK				
		Item	Others				
		A	Absolute pressure (default)				
		FK	FKM fluororubber seal				
		FF	FFKM perfluoroether seal				
		ZP	Push-button zeroing function				
		QF	Factory inspection report				
			Other customization requirements				
eg.HPM18LV	(0 ~ 1)kPa	B3	VKF16	C2	C11	S6	A FK ZP

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.	00223Q21711R15

CE	
Certification Organization	ECM
Certification Scope	Pressure Transmitter
Mark	CE
Electromagnetic Compatibility Directive	2014/30/EU
Registration No.	6G241223.NHEWC83