



VSM-1 Series

Vacuum measurement

0.1 to 1333 mbar / 0.1 to 1000 Torr

Stainless-steel diaphragm sensor

Advantages

- Chemical resistant
Stainless-steel 316L diaphragm
- High accuracy 0.75% of reading
- 4-20 mA programmable current output
- 0-10 VDC programmable voltage output
- Temperature drift compensated
- Compact, robust 316 stainless-steel design
- IP67 enclosure for harsh environments
- Optional solid-state setpoint relay for process control
- Cost attractive alternative to traditional capacitance manometers

Applications

- PVD coating
- Mass spectrometer
- Electron microscope
- Fore-line vacuum
- Freeze drying
- Sterilization
- Load lock
- Furnace

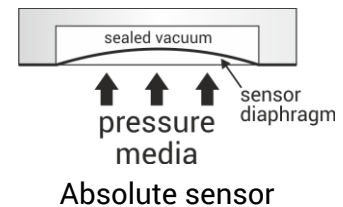


The VSM-1 series vacuum transmitter is designed for vacuum measurement in a variety of industrial vacuum applications. Its ultra-compact design offers a unique combination of high measurement performance, flexible configuration and a robust industrial grade stainless-steel design.

The attractive price-performance ratio makes the VSM-1 a cost optimized alternative to more expensive conventional industry standard ceramic or Inconel diaphragm capacitance manometers and transducers.

Sensor technology

The VSM-1 is based on a stainless-steel sensor diaphragm that converts the applied gas pressure to an electrical signal. The sensor measures absolute pressure independent of gas type and concentration.



The stainless-steel 316L diaphragm offers excellent chemical resistance and compatibility with a wide range of aggressive gases, solvents and acids.

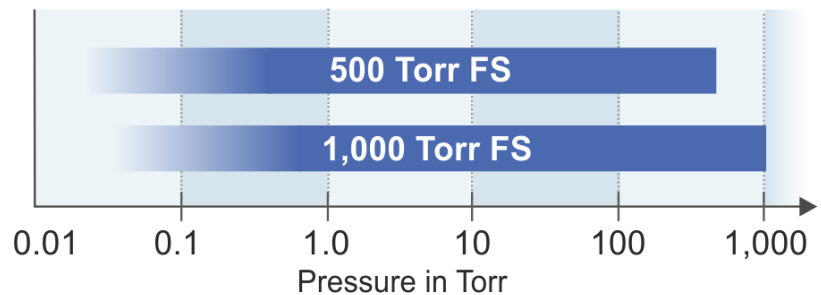


Figure 1: Measurement range for 500 and 1000 Torr full-scale versions.

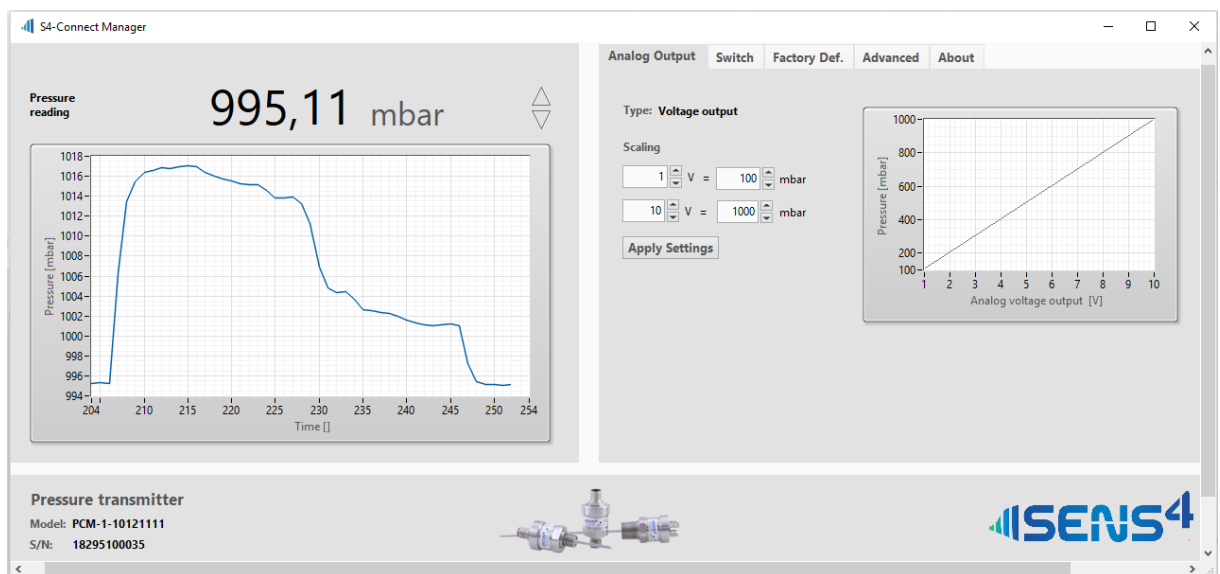
Measurement performance

Every VSM-1 transmitter is individually calibrated and actively compensated for drift due to changes in ambient temperature. The multi-point calibration provides high basic accuracy throughout the measurement range.

The VSM-1 is as standard delivered with a factory calibration certificate and can be delivered with optional DAkKS calibration certificate

Programmable parameters with S4-Connect™

The innovative S4-Connect™ USB digital communication interface provides access to the powerful digital core. It enables digital communication over the power supply line, thus eliminating the need for additional connector pins while offering pin compatibility with industry standards.



The interface can be used for diagnostics, maintenance, service, calibration, unit selection, setpoint configuration and setting of other customized parameters.

The S4-Connect™ interface can also be used for display of real time pressure measurements with a read-out resolution of 0.01 mbar or 0.01 Torr.

The graphical user interface and real-time readout can be useful tools for visualization of pump-down pressure profiles and rate of rise leak testing.

Customized settings

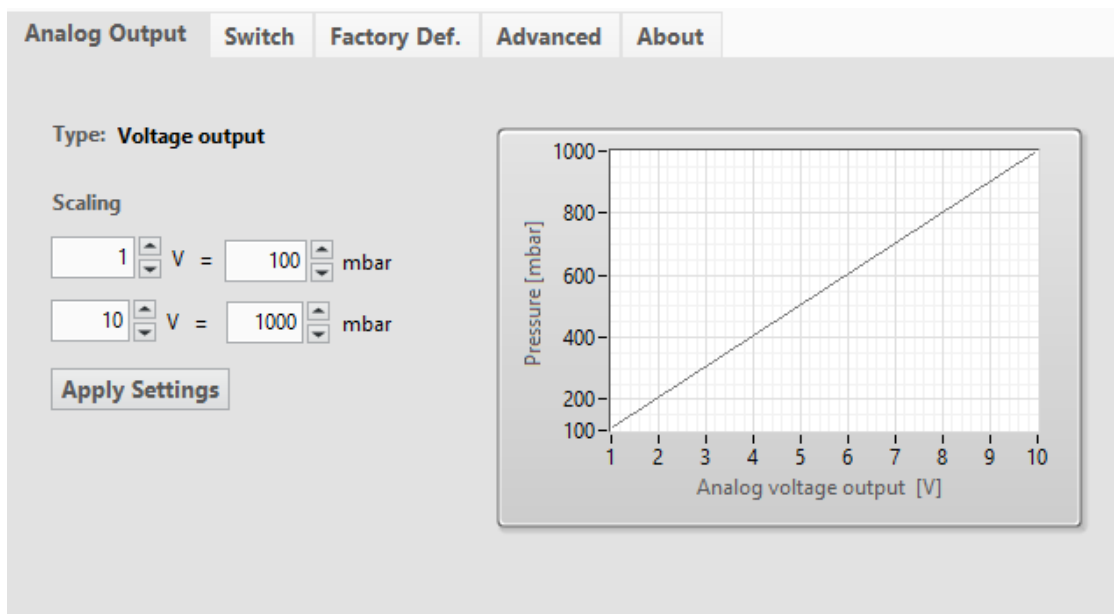
The transmitter can be delivered with a custom configuration to match specific application requirements. Examples of pre-configured options include measurement range, pressure unit, setpoint configuration and output signal scaling. Customized products will be assigned a unique part number for easy and simple future re-ordering.

Vacuum switch functionality

The optional setpoint solid-state relay can be either used for control or surveillance of the measured vacuum pressure. The basic control uses on/off switch regulation with a programmable setpoint and hysteresis switch value.

Analog and digital options

The VSM-1 is available with industry standard analog 4-20 mA current output or 0-10 VDC voltage output. The analog output can be scaled and configured using the S4-Connect™ interface.



Multivariable transmitter

The VSM-1 has a built-in precision temperature sensor that can be monitored using the S4-Connect™ interface and software. The temperature sensor can also be used to control the solid-state relay when the transmitter temperature exceeds a user-programmed setpoint temperature value.

Application examples

Fore-line vacuum measurement

In high-vacuum applications the vacuum fore-line between the roughing- or backing-pump and the turbo molecular pump requires monitoring or surveillance of vacuum pressure to ensure that the fore-line pressure is low enough to start the turbo-pump and to protect the turbo-pump. The VSM-1 transducer with programmed setpoint can be used as a stand-alone solution to provide a reliable surveillance of fore-line vacuum pressure.

Medical & industrial central vacuum systems

In large factories and hospitals where vacuum is used in many different locations, central vacuum systems are often used.

Vacuum pressure monitoring and surveillance of central systems is required to balance load and ensure no interruption of system pressure. The required pressure level can vary between different load stations, requiring vacuum pressure measurement and regulation at the point of load.

The VSM-1 transducer can be interfaced to pressure regulation equipment and central controlling system for vacuum pressure surveillance and regulation.

Vacuum packaging

In the food and pharma industries the quality and consistency of vacuum packaging process is critical. Adequate vacuum levels must be consistently achieved and controlled to ensure food quality and adequate shelf life. The VSM-1 transducer offers high measurement accuracy and reproducibility that fulfills the typical requirements of vacuum packing applications.

Vacuum drying process

Drying processes can be accelerated significantly by use of vacuum drying chambers. The process vacuum pressure and temperature is determined by the exposed materials and vapors that need to be removed. The high operation temperature tolerance and active temperature drift compensation makes the VSM-1 transducer an ideal choice for vacuum drying processes with process pressure in the rough to medium vacuum range.

Specifications

Measuring range	0.1 to 1333 mbar
Accuracy of reading (1 to 1333 mbar)	+/- 0.75% of reading ⁽¹⁾
Repeatability	0.1% of reading
Thermal drift (offset, base: 22 °C)	+/- 0.01%/°C of full-scale (from +10 to +50°C)
Output signal (voltage version)	0-10 VDC (programmable scaling)
Output resolution (voltage version)	16 bit / 150 µV
Output signal (current version)	4-20 mA ⁽²⁾ (programmable scaling)
Output resolution (current version)	16 bit / 244 nA
Solid-state relay contact rating (optional)	250 mA, 50 VDC / VAC peak

Environment conditions

Operating ambient temperature	-40 to +100 °C
Media temperature at flange	-40 to +125 °C
Storage ambient temperature	-40 to +125 °C
Maximum media pressure	2500 mbar / 3300 Torr
Burst media pressure	4000 mbar / 5300 Torr
Mounting position	Any
Protection rating, EN 60529/A2:2013	IP67 ⁽³⁾ , IP65 ⁽⁴⁾
Humidity, IEC 68-2-38	98%, non-condensing

Power supply

Supply voltage	12-30 VDC
Power consumption (voltage version)	240 mW (max)
Power consumption (current version)	600 mW (max)
Reverse polarity protection	Yes
Overvoltage protection	Yes
Internal fuse	100 mA (thermal recoverable)

Materials

Enclosure	SS 1.4404 / AISI 316L
Electrical connector DIN 175301-803A	PA Nylon
Electrical connector M12 IEC 61076-2-101	PA Nylon, Nickel plated Zinc alloy
Process connection (media wetted)	SS 1.4404 / AISI 316L
Sensor diaphragm (media wetted)	SS 1.4404 / AISI 316L
Process leak tightness (ISO 27895:2009)	<1·10 ⁻⁹ mbar·l/sec.

Approvals

CE	EMC directive 2014/30/EU
RoHS compliance	Directive EU 2015/863

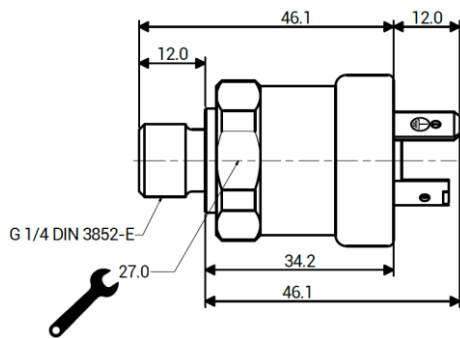
Contact sales@sens4.com for other approvals and certifications.

- (1) Typical accuracy specification.
- (2) 4-20 mA NAMUR NE43 compliant signal.
- (3) IP67 for product versions with IEC 61076-2-101 M12 connector
- (4) IP65 for product versions with DIN EN 175301-803 A connector

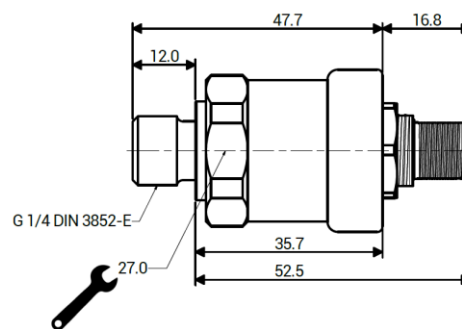
Specifications are subject to change without further notice

Dimensions

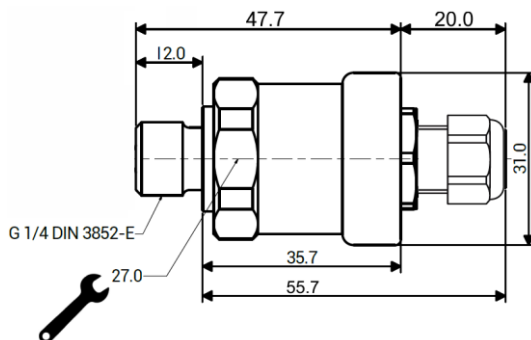
All dimensions in mm.



3 pin + PE DIN EN 175301-803 A



4 pin M12 connector IEC 61076-2-101



With fixed cable and flying leads

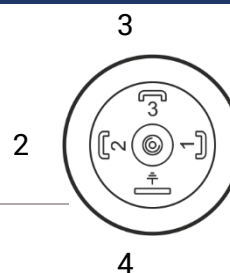
All dimensions are in mm unless otherwise stated – General tolerance ISO 2768-1 M

Connector pinout

4 pin DIN EN 175301-803 A, angular connector

1	Positive supply voltage (V+)
2	Supply voltage return (GND)
3	Signal output (S+) or not connected ⁽⁵⁾
4	Shield
Chassis	Shield

(5) 3 wire version voltage output / 2 wire version not connected

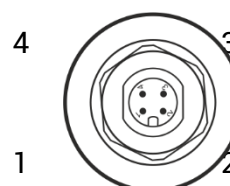


4 pin M12, IEC 61076-2-101

1	Positive supply voltage (V+)
2	Solid-state relay out or not connected ⁽⁶⁾
3	Supply voltage return (GND)
4	Signal output (S+) or not connected ⁽⁷⁾
Chassis	Shield

(6) Optional solid-state relay

(7) 3 wire version voltage output / 2 wire version not connected



Order guide:

VSM-1-		1	0	1	0	1	1	1	1
Process connection		1							
DIN 3852-E, G¼" A		1							
ANSI B1.20.1, ¼" NPT		3							
DN16KF		8							
Range			0	1					
0 2000 mbar			0	1					
0 1000 mbar			0	2					
0 500 mbar			0	3					
0 1000 Torr			1	1					
0 500 Torr			1	2					
Connection									
		1							M12 x 1, 4 pin
		2							DIN175301-803 Form A
		3							Cable 1 meter (3.3 feet)
		4							Cable 3 meter (9.9 feet)
		5							Cable 5 meter (16.4 feet)
Setpoints									
		0							None
		1							On/Off solid-state relay
Digital interface									
		1							S4-Connect™
Analog Output									
		0	1						0-10 VDC linear
		0	2						0-5 VDC linear
		0	3						1-10 VDC linear
		0	4						4-20 mA linear
		0	5						1-5 VDC linear
		0	6						1-6 VDC linear
		0	7						0.5-4.5 VDC linear
		0	6						1-6 VDC linear
		0	7						0.5-4.5 VDC linear
		1	0						2-10 VDC LOG10
		1	1						1-5 VDC LOG5
		1	2						1 - 9.8 VDC linear

Other configurations

Please contact Sens4 for inquiries on configurations not listed above:

Email: sales@sens4.com or phone: +45 88447044

Accessories

Connectors	Part number
M12 x 1, 4 pin female metal connector	CON-FM12-001
3 + PE DIN EN 175301-803 A female	CON-FDN8-001
Cables	Part number
M12 x 1, 4 pin Connector with 3 m cable	CAB-M12-003
M12 x 1, 4 pin Connector with 5 m cable	CAB-M12-005
M12 x 1, 4 pin Connector with 10 m cable	CAB-M12-010
DIN Connector with 3 m cable	CAB-DIN1-003
DIN Connector with 5 m cable	CAB-DIN1-005
DIN Connector with 10 m cable	CAB-DIN1-010
Programming device	
S4-Connect™ programmer USB with M12 connector	PRG-S4-M12-01
S4-Connect™ programmer USB with DIN connector	PRG-S4-DIN-01
DAkKS Calibration certificate	
DAkKS certified calibration certificate	CAL-DAKKS1



We offer more than standard products

Sens4 offers customization of measurement products and solutions. We have invented a modular product concept that enables us to customize the product functions, features and appearance.

Through our private branding program, we also offer supply of transmitters with logo and product name according to customer specifications.

Contact the Sens4 team to inquire on customized pressure, vacuum and temperature measurement solutions: Email: sales@sens4.com or phone: +45 88447044.

About Sens4

Sens4 develops, manufactures, markets and distributes temperature, vacuum and pressure measuring equipment for industrial and scientific applications worldwide.

Our products are designed, engineered and manufactured in Denmark to the highest quality standards.

Our mission is to continuously endeavor to provide customer centric state-of-the-art measurement solutions.

Our passion | Your value™

