



# VPM-17 TriCAP™ ATM

Multi sensor vacuum transducer

1×10<sup>-6</sup> to 1333 mbar / 7.5×10<sup>-7</sup> to 1000 Torr

Ultra-wide range Pirani / capacitance / piezo transducer with atmospheric switch function

## Advantages

- Ultra-wide measuring range of 9 decades
- 6 decades gas independent measurement from 5E-3 to 1333 mbar
- AutoZeroCAP™ provides automatic zeroing of capacitance manometer
- Reliable solid-state relays for control
- Barometric pressure measurement
- 0-10 VDC programmable voltage output
- Digital interface
- Vacuum temperature sensor for diagnostics
- RGB LED color pressure indicator

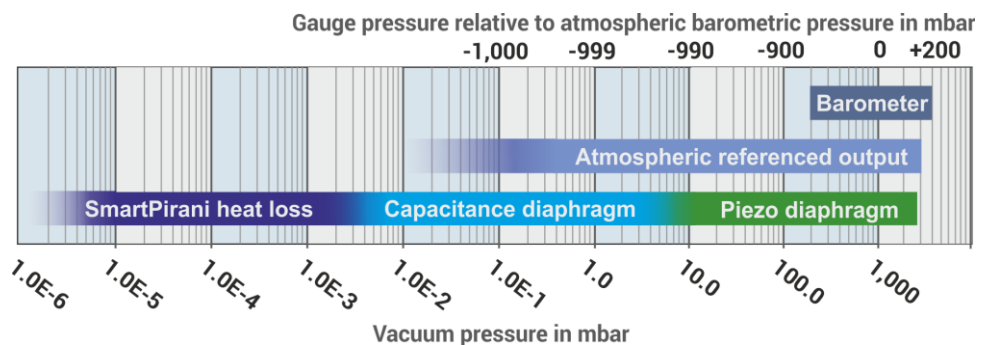
## Applications

- PVD coating
- Freeze-drying end point detection
- Load-lock control
- Furnace heat treatment
- Pirani calibration
- Mass spectrometers
- Scanning electron microscopes



The VPM-17 TriCAP™ ATM transducer establishes new standards with an all-in-one measurement solution for a wide selection of vacuum applications. It differentiates from any other vacuum gauges by offering an overall cost-effective gas independent measurement from 5.0E-3 to 1333 mbar in combination with Pirani heat-loss measurement down to 1E-6 mbar.

In vacuum applications where the gas composition or type can change, traditional gas dependent Pirani gauges will result in measurement deviation from the actual pressure. The TriCAP™ ATM transducer uses a precision capacitance diaphragm gauge (CDG) sensor that eliminates the gas dependency and provides accurate measurements also when the gas properties change.



The integrated heat-loss MEMS Pirani sensor extends the measuring range down to 1E-6 mbar and provides a novel automatic zero adjustment of the capacitance manometer that eliminates the common needs for manual zero adjustment of traditional capacitance diaphragm gauges.

## Rethink vacuum gauging

The TriCAP™ ATM is a novel true multi-sensor vacuum gauge and is the choice for superior performance upgrade of traditional Pirani gauge applications or a cost optimized all-in-one solution for applications where separate capacitance manometers and Pirani gauges are used.

## Contamination containment

Particulate contamination can occur in applications like vacuum furnaces and physical vapor deposition systems. The optional baffle accessory can prevent such particles from reaching the sensor element and thereby extend the time between maintenance and overall lifetime of the product.

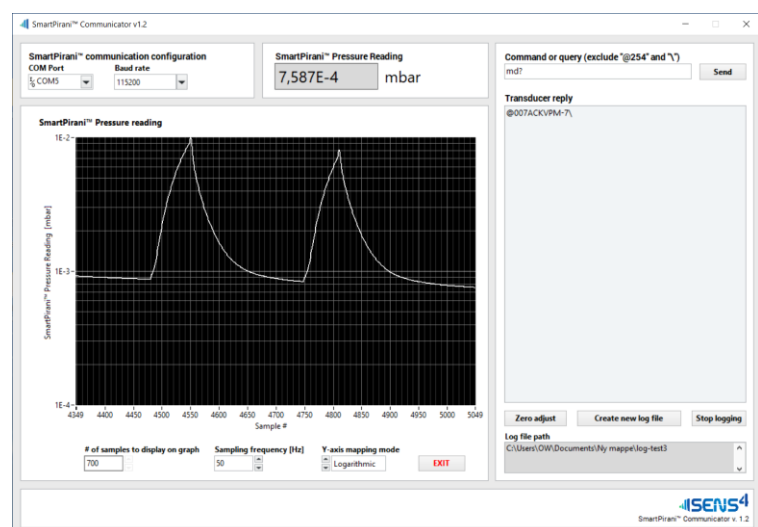


The baffle can be removed for contamination inspection, cleaning, or replacement.

## Programmable settings and parameters

The transducer settings and parameters can be user-programmed to control vacuum system and application process parameters. The digital RS-232 or RS-485 serial interface can be used for diagnostics, predictive maintenance, service, calibration, setpoint configuration, analog output scaling and acquisition of real-time vacuum pressure measurements for on-screen visualization.

The serial USB programmer in combination with the free, intuitive configuration software is a plug-and-play solution for transducer programming, real-time



## Reliable and robust pressure control

Several vacuum pressure parameters need to be accurately and reliably controlled in many vacuum applications. The TriCAP™ ATM transducer has three independent solid-state switch relays that can be configured to control venting, the transfer chamber gate-valve, and the load-lock door.

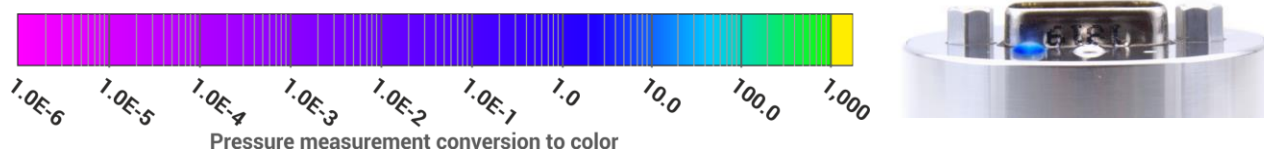
Compared to traditional electro-mechanical relays, the solid-state relays offer superior reliability and faster switching time while providing arc free contacts and generates no EMI (electromagnetic interference) when switching contacts. The TriCAP™ ATM control relays are designed to last and are UL listed, CSA recognized, and EN/IEC 60950-1 certified for maximum confidence when used to control critical vacuum processes and high-cycle applications.

## Analog voltage output

A wide selection of analog output scaling options to emulate other vendors' vacuum gauges and transducers is available. An optional secondary analog output enables external monitoring of both the full-range vacuum pressure and the pressure signal relative to atmospheric pressure.

## RGB LED for pressure indication

The TriCAP™ ATM introduces a new approach for visually determining the measured pressure by a multi-color LED that smoothly changes color throughout the pressure range. This selectable visual function is a low-cost alternative to integrated displays and provides a rough indication of the measured pressure. It also provides a clear visual warning if the vacuum system is pressurized above ambient pressure.



## Customized settings

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

## Applications

The TriCAP™ ATM transducer is designed for pressure measurement and control in vacuum applications that requires wide-range measurement from atmosphere to high vacuum in combination with accurate control of gas backfill of the vacuum system to atmospheric pressure.

The multi-sensor design eliminates the need for separate atmospheric switches to ensure safe venting of the vacuum chamber to atmospheric



### **PVD Coating equipment**

Physical vapor deposition (PVD) coating processes are used in many applications like decorative, corrosion resistance and hard coating.

During a common PVD process different gas types are used to form different coating properties and gas independent measurement are in general required to control or verify process pressure.

### **Vacuum drying end point detection**

The unique combination of the gas dependent Pirani and gas independent Capacitance manometer enables detection of the water vapor level in vacuum drying applications by monitoring the difference between the two measurements.

The water vapor level detection function can be used to monitor drying process and determine the end point.

### **Analytical applications**

In mass spectrometers and scanning electron microscopes different types of gasses can be used to assist the analyzing process. The TriCAP™ ATM can eliminate the use of separate capacitance manometer for gas pressure control and the low range measurement capability can be used to provide a control signal for the analyzer ion

# Technical data

## Specifications

Measuring range	1×10 <sup>-6</sup> to 1333 mbar (7.5×10 <sup>-7</sup> to 1000 Torr)
Measuring principle 1×10 <sup>-6</sup> to 1×10 <sup>-3</sup> mbar	MEMS Pirani thermal conductivity
Measuring principle 1×10 <sup>-3</sup> to 4.99×10 <sup>-3</sup> mbar	Blended MEMS Pirani / CDG reading <sup>(1)</sup>
Measuring principle 5.0×10 <sup>-3</sup> to 3.99 mbar	Capacitance diaphragm gauge (CDG)
Measuring principle 4 to 6 mbar	Blended MEMS Piezo / CDG <sup>(1)</sup>
Measuring principle 6 to 1333 mbar	MEMS piezo resistive diaphragm
Accuracy 1×10 <sup>-5</sup> to 9.99×10 <sup>-5</sup> mbar	25% of reading
Accuracy 1×10 <sup>-4</sup> to 9.99×10 <sup>-3</sup> mbar	5% of reading
Accuracy 1E-2 to 800 mbar	0.5% of reading
Accuracy 800 to 1099 mbar	0.25% of reading
Accuracy 1100 to 1200 mbar	0.5% reading
Barometric measurement range	300 to 1200 mbar
Barometric accuracy	+/- 0.5 mbar
Atmospheric referenced pressure output range	-1333 to + 1333 mbar
Vacuum temperature sensor range	-20 to + 85°C
Vacuum temperature sensor accuracy	+/- 1.5 °C
Transducer temperature sensor range	-20 to + 85°C
Transducer temperature sensor accuracy	+/- 1.5 °C
Analog output resolution	16 bit (150 µV)
Analog output update rate	124 Hz
Response time	<20 ms
Temperature compensation	+10 to +50 °C
Solid state relay set point range (absolute)	5×10 <sup>-6</sup> to 1333 mbar (3.75×10 <sup>-6</sup> to 1000 Torr)
Solid state relay set point range (atm. relative)	-1,100 to + 500 mbar (-770 to +375 Torr)
Solid state relay contact rating	50 V, 100 mA <sub>rms</sub> / mA <sub>DC</sub>
Solid state relay contact endurance	Unlimited (no mechanical wear)
Solid state relay approvals	UL Recognized: File E76270 CSA Certified: Certificate 1175739 EN/IEC 60950-1 Certified

## Environment conditions

Operating ambient temperature	-20 to +50 °C
Media temperature	-20 to +50 °C
Storage ambient temperature	-20 to +80 °C
Bake-out temperature (non-operating)	+80 °C
Maximum media pressure	4 bar absolute
Mounting position	Arbitrary
Protection rating, EN 60529/A2:2013	IP40
Humidity, IEC 68-2-38	98%, non-condensing

## Power supply

Supply voltage	12-30 VDC
Power consumption	350 mW (max)
Reverse polarity protection	Yes
Overvoltage protection	Yes
Internal fuse	100 mA (thermal recoverable)

(1) Blending range can be changed and application adapted via the digital interface.

Specifications are subject to change without further notice

# Technical data

## Materials

Enclosure	SS 1.4307 / AISI 304L / Aluminum 6061
Vacuum Process flange (media wetted)	SS 1.4307 / AISI 304L
Vacuum exposed materials (media wetted)	304 Stainless steel, Kovar, glass, silicon, nickel, aluminum, SiO <sub>2</sub> , Si <sub>3</sub> N <sub>4</sub> , Al <sub>2</sub> O <sub>3</sub> , gold, Viton®, low out-gassing epoxy resin, solder, RO4305, vitreous silica
Process leak tightness	<1·10 <sup>-9</sup> mbar·l/s

## Approvals

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

Specifications are subject to change without further notice

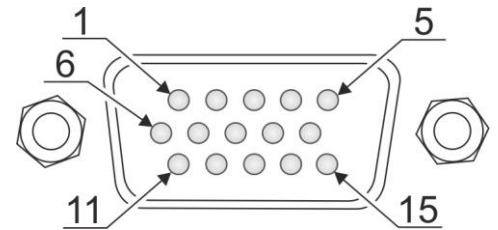
Viton® is a trademark of THE CHEMOURS COMPANY FC, LLC

## Connector Pin outs

### 15 Pin HD D-sub RS-232 / RS-485

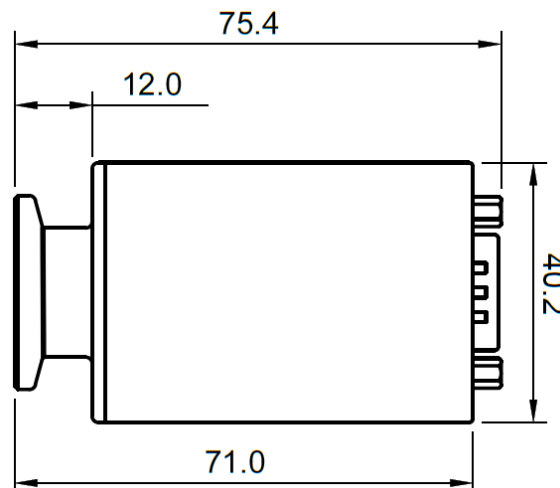
Pin	Description
1	RS-232 Transmit / RS-485 (-)
2	RS-232 Receive / RS-485 (+)
3	Supply voltage 12-30 VDC
4	Supply voltage – (return)
5	Analog voltage signal +
6	Analog voltage signal – (return)
7	Relay 1 NO (normally open contact) <sup>(1)</sup>
8	Relay 1 Common <sup>(1)</sup>
9	Relay 1 NC (normally closed contact) <sup>(1)</sup>
10	Relay 2 NC (normally closed contact) <sup>(1)</sup>
11	Relay 2 Common <sup>(1)</sup>
12	Relay 2 NO (normally open contact) <sup>(1)</sup>
13	Relay 3 NC (normally closed contact) <sup>(1)</sup>
14	Relay 3 Common <sup>(1)</sup>
15	Relay 3 NO (normally open contact) <sup>(1)</sup>

(1) Optional relay



## Dimensions (DN16KF flange)

All dimensions in mm.



# Order guide

VPM-17-	1	0	1	0	1	2	3	2	
<b>Vacuum flange</b>									
DN16KF	1	0							<b>Connection</b>
DN25KF	2	0							2 15 pin HD D-sub male
NPT 1/8"	3	0							3 15 pin HD D-Sub male / dual analog out
VCR4	4	0							<b>Setpoints</b>
DN16KF Extended	8	0							0 None
DN16KF with light baffle	1	1							1 1x Solid State Relay
DN16KF with heavy duty baffle	1	2							2 2x Solid State Relays
									3 3x Solid State Relays
<b>Digital interface</b>									<b>Unit</b>
RS-232 / S4-Connect™			1						1 torr
RS-485 / S4-Connect™			2						2 mbar
									3 Pascal
<b>Analog Output</b>									
0.5 - 9.6 (1 V/dec)			0		1				
1.0-9 VDC 1 VDC/Dec (MKS 901P/925/910)			0		2				
0.375 to 5.659 VDC (MKS GP275)			0		3				
0.5VDC/dec (MKS 523)			0		4				
1.9-10 VDC (Inficon PSG55x, Leybold TTR91)			0		5				
1.5-8.5 VDC (Pfeiffer TPR260/27x/28x)			0		6				
1.9-9.1VDC Edwards APG100XLC			0		7				
1.9-9.1VDC (Edwards APG100XM)			0		8				
0-10 VDC 0.1Torr FS Capacitance manometer	1		0						
0-10 VDC 1 Torr FS Capacitance manometer	1		1						
0-10 VDC 10 Torr FS Capacitance manometer	1		2						
0-10 VDC 100 Torr Capacitance manometer	1		3						
0-10 VDC 1000 Torr Capacitance manometer	1		4						

Other analog outputs are available on request

## Accessories

Programming device	
RS-232 to USB, 15 pin HD D-sub, Power supply (90-230VAC)	PRG-WPRS2-15DS-01
RS-485 to USB, 15 pin HD D-sub, Power supply (90-230VAC)	PRG-WPRS4-15DS-01
RS-232 USB programmer, 1.5 m cable	PRG-RS232-DS15 RS-232
RS-485 USB programmer, 1.5 m cable	PRG-RS485-DS15 RS-485
Calibration certificate	
Accredited calibration certificate from DAKKS lab.	CAL-VPM17-DAKSS
Cables	
15 pin HD D-sub female to 15 pin D-sub male with 3 m cable	CAB-F15DSM15DS-003
15 pin HD D-sub female to 15 pin D-sub male with 5 m cable	CAB-F15DSM15DS-005
15 pin HD D-sub female to 15 pin D-sub male with 10 m cable	CAB-F15DSM15DS-0105

## About

Sens4 develops, manufactures, markets, and distributes vacuum, pressure and temperature measuring equipment for industrial 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™

