Intelligent Vacuum Metrology
Intelligent Vacuum Transducers For 1000 To 1 x 10^{-9} mbar

THYRACONTs tradition is research and innovation and providing optimal solutions for our customer’s requirements. The latest family of THYRACONT Smartline gauges was developed to meet the increasing demands for functionality, precision and reliability in a wide variety of vacuum applications.

Durability That Pays Off

The patented THYRACONT impulse Pirani with extended measuring range activates ionization sensors below a very low pressure threshold. This protects the sensors and improves gauge life.

Green Gauges

Both, sensors and electronics are designed for high performance with minimum energy consumption.

Time Is Money

Smartline’s intelligent microcontrollers can manage sensor control automatically. This ensures optimal interaction between the Pirani sensor and ionization sensors without operator intervention.

Further Smartline Advantages:

- Compact, metal sealed sensors
- Low thermal and electric disturbance of the vacuum process
- Insensitive to shock venting
- Replaceable sensor heads
- Correct pressure readings due to separate gas correction factors for each sensor
**Application Example**

Freeze drying is a method to carefully extract moisture from products like food or serums. These products are sensitive to temperature so that their internal structure must be protected. Freezing is followed by an accurately controlled pressure decrease, which results in sublimation of the microscopic ice crystals.

**Challenge**

To avoid costly damage to products and maintain a cost effective process vacuum gauges with high repeatability and reliability are required.

**Solution**

The VSP62 Pirani is protected against vapor condensation by a stainless steel shield. Its metal sealed sensor has a long life helix filament and the stainless steel flange makes the gauge very durable resulting in improved process reliability and a reduction in maintenance costs.

**Applications**

- Analysis instruments
- Vacuum furnaces
- Coating processes
- Test of roughing pumps
- Devices with confined space for installation
- Safety switching in vacuum systems
- Process engineering
- Vacuum centrifuges

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**Application Example**

During the optical coating of mirrors for laser resonators the typical process pressure lies above 2 x 10⁻³ mbar.

**Challenge**

A suitable vacuum transducer must be able to monitor both, process pressure during the coating as well as the available minimum pressure of 10⁻⁶ mbar in the vacuum chamber. One of our customers used to work with a Pirani/cold cathode combination gauge, the cold cathode monitoring minimum and process vacuum. However, the continuous operation above 10⁻³ mbar resulted in rapid deterioration of the sensor.

**Solution**

In the VSM72 transducer a patented impulse Pirani with extended range operates the cold cathode only below very low pressures. Further the transition between the two sensors can be configured to meet applications requirements. The entire coating process is now monitored by the Pirani. The cold cathode is saved because it is active only when the system pumps down to minimum pressure. The availability of the coating plant has improved significantly.

**Applications**

- Analysis instruments
- Coating plants
- Process engineering
- Controlling fine to high vacuum applications
- Sputtering appliances
- Vacuum furnaces

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**Application Example**

Brazing, sintering or annealing requires an oxygen free atmosphere which means that processes are carried out under vacuum partially using inert gas.

**Challenge**

The vacuum level must be monitored and kept constantly low during the process to avoid oxidation of the products. One of our clients needed to measure the pressure in their high vacuum tube furnace near the gas inlet as well as at the vacuum port with high accuracy.

**Solution**

Two VSH82 transducers that have the required wide measuring range and are used to measure the pressure at the furnaces gas inlet and vacuum port with high precision. The transducers are linked to the system PLC by their serial RS485 interfaces, so that both pressure levels can be directly visualized graphically which allows easy monitoring of the pressure gradient inside the furnace tube.

**Applications**

- Analysis instruments
- Coating processes
- Controlling fine to ultrahigh vacuum applications
- Sputtering appliances
- Process engineering

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**Technical Features**

- All types of Smartline vacuum transducers can be connected to the VD9 and VD10 range of display and control units. The gauges are designed for industrial use. Their shielded metal cases offer a high degree of protection against electromagnetic interference.

**Advantages**

- Display and front plate are protected against water splashes
- 2 relay set points per measurement channel
- Remote control via serial interface
- Large and bright LCD display with background illumination
The VSP62 is based on a new, patented measurement principle.

This enhancement of the well proven Pirani sensor results in a larger measuring range with higher resolution.

The temperature compensated transducer provides an analog, logarithmic output signal 0 - 10 V.

**Typical Applications**

- Analysis instruments
- Freeze drying
- Vacuum ovens
- Coating plants
- Operational control of roughing pumps and vacuum plants
- Applications requiring cost savings and inaccessible installations
- Safety circuits in vacuum systems
- Monitoring of fore vacuum
- Process engineering
- Vacuum centrifuges

**Benefits**

- High reliability
- Extremely compact, designed for industrial applications
- Wide measuring range, high resolution in the rough vacuum range
- Excellent reproducibility
- Suitable for UHV applications due to the robust metal sealed stainless steel sensor
- Durable Pirani helix filament
- Highly cost effective
- Filament protected by a metal screen provides good resistance against oil and solvent vapors
- Rugged, EMI-proof metal housing
- Low power consumption
- Stable measuring values due to optimized temperature compensation

Precise push button digital adjustment on zero pressure and atmosphere

Easy system integration and connection with PLCs due to logarithmic 0 - 10 V standard output

Vacuum connection using stainless steel small flange DN 16 ISO-KF, conflat flange DN 16 CF or hose nozzle 9.5 mm
## Technical Data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring Principle</td>
<td>Heat conduction (Impulse Pirani), depending on gas type</td>
</tr>
<tr>
<td>Materials In Contact With Vacuum</td>
<td>Stainless steel 1.4307, nickel, tungsten, glass</td>
</tr>
<tr>
<td>Measurement Range</td>
<td>1000 - 1 x 10⁻⁶ mbar (750 - 1 x 10⁻⁴ Torr), max. overpressure 4 bar absolute</td>
</tr>
</tbody>
</table>
| Accuracy                               | 1000 - 20 mbar: < 30% from reading  
                                           20 - 2 x 10⁻³ mbar: < 10% from reading  
                                           < 2 x 10⁻³ mbar: < factor 2 |
| Repeatability                          | 2%                                                 |
| Reaction Time                          | Max. 200 ms                                        |
| Voltage Supply                         | 15 - 30 VDC                                        |
| Electrical Connection                  | Hirschmann, 6 pole, male, screwable                |
| Power Consumption                      | Approx. 10 mA                                      |
| Operating Temperature                  | +5...+50°C                                         |
| Storage Temperature                    | -20...+70°C                                        |
| Max. Bake Out Temperature              | 80°C at the flange                                 |
| Output Signal                          | 0 - 10 VDC, measuring range 1.5 - 8.5 VDC, logarithmic, 1V / decade load resistance > 10 kΩ |
| Vacuum Connection                      | Stainless steel small flange DN 16 ISO-KF (VSP62MV), additional hose nozzle 9.5 mm (VSP62MVSW) stainless steel conflat flange DN 16 CF (VSP62MVCF) |
| Protection Class                       | IP40                                               |
| Weight                                 | Approx. 120 g                                      |

### Product Codes

- **VSP62MV**
  Pirani transducer, 1000 to 1 x 10⁻⁶ mbar, with DN 16 ISO-KF connection; Output 0 - 10 V logarithmic
- **VSP62MVSW**
  As above, with DN 16 ISO-KF connection and hose nozzle 9.5 mm
- **VSP62MVCF**
  As above, with DN 16 CF connection

**Accessories:**

- **XB0600002**
  Counter plug, 6-pole
- **Wo606002**
  Measuring cable, shielded, 2 m (for VD9 / VD10)
- **Wo606006**
  Measuring cable, shielded, 6 m (for VD9 / VD10)

### Output Signal Equation

\[
V_{out} (V) = \log (p(hPa)) + 5.5
\]

\[
p (hPa) = 10^{(V_{out}(V) - 5.5)}
\]
Smartline Vacuum Transducer
Absolute Pressure 1000 to 5 x 10^{-9} mbar

The combination transducer VSM72 (Pirani/cold cathode) measures absolute pressure from atmospheric to ultrahigh vacuum.

The intelligent, micro processor controlled Smartline transducers automatically manage the appropriate interaction of both vacuum sensors regarding measurement ranges and switching points.

Smartline uses a high tech design and provides safe, easy to use and cost effective process control.

**Typical Applications**
- Analysis technology
- Coating plants and vapor deposition
- Process engineering
- Measuring and controlling in fine and ultrahigh vacuum
- Sputtering plants
- Vacuum furnaces

**Benefits**
- Combination sensor with wide measuring range
- The cold cathode sensor is automatically switched on and off by the Pirani
- Patented pulsed Pirani sensor with extended range allows operation of cold cathode at lower pressure and increase of lifetime
- Robust cold cathode sensor
- Low thermal and electrical interference with the vacuum process
- Excellent ignition behavior
- Insensitive against inrush of air
- Two independent, dry relay switch points
- Logarithmic signal output 0 - 10 V provides easy interpretation
- RS485 serial interface
- The digital output signals can be transmitted error-free over long distances (up to 500 m)
- Replaceable sensor heads
- Low power consumption
- Correct pressure readings by means of separate gas type correction factors for Pirani and cold cathode sensors
- Precise pushbutton digital adjustment of zero pressure and atmospheric
- Rugged, EMI-proof metal housing
### Technical Data

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<tr>
<td><strong>Measuring Principle</strong></td>
<td>Heat conduction (Impulse Pirani), cold cathode: inverted magnetron, both depending on gas type</td>
</tr>
<tr>
<td><strong>Material In Contact With Vacuum</strong></td>
<td>Stainless steel 1.4307, nickel, tungsten, molybdenum, glass</td>
</tr>
<tr>
<td><strong>Measurement Range</strong></td>
<td>1000 - 5 x 10^{-9} mbar (750 - 5 x 10^{-9} Torr), max. overpressure 4 bar abs.</td>
</tr>
</tbody>
</table>
| **Accuracy**                     | 1000 - 20 mbar: < 30 % from reading  
20 - 5 x 10^{-3} mbar: < 10 % from reading  
5 x 10^{-3} mbar - 1 x 10^{-7} mbar: < 25% from reading |
| **Repeatability**                | 5%                                                                             |
| **Response Time**                | 200 ms, 500 ms for activating the cold cathode                                |
| **Cathode Voltage**              | Max. 2.5 kV                                                                     |
| **Voltage Supply**               | 19 - 30 VDC                                                                    |
| **Electrical Connection**        | Sub-D, 15-pole, male                                                           |
| **Power Consumption**            | Approx. 2.5 W (without switch points)                                           |
| **Operating Temperature**        | +5...+50°C                                                                      |
| **Storage Temperature**          | -20...+70°C                                                                     |
| **Maximum Bake Out Temperature** | 150°C at flange (electronic detached)                                          |
| **Output Signal**                | 0 - 10 VDC, measuring range 1.8 - 8.6 VDC, logarithmic, 1 V/decade            |
| **Serial Interface**             | RS485: 9600 baud, address switch                                               |
| **Switch Points**                | 2 switch-over relays, 60 V, 0.5 A                                              |
| **Vacuum Connection**            | Stainless steel flange DN 25-KF (VSM72MV)                                      
Stainless steel conflat flange DN 40 CF (VSM72MVCF) |
| **Protection Class**             | IP40                                                                            |
| **Weight**                       | Approx. 570 g                                                                   |

### Product Codes

- **VSM72MV**  
  Combination transducer Pirani/inverted magnetron 1000 - 5 x 10^{-9} mbar, with DN 25 ISO-KF connection; output 0 - 10 V logarithmic, RS485  
- **VSM72MVCF**  
  As above, with DN 40 CF connection

### Accessories:

- **W1506002**  
  Measuring cable, shielded, 2 m (for VD9)  
- **W1506006**  
  Measuring cable, shielded, 6 m (for VD9)  
- **W1515002**  
  Measuring cable, shielded, 2 m (for VD10)  
- **W1515006**  
  Measuring cable, shielded, 6 m (for VD10)  
- **BVSM72KF25**  
  Sensor head DN 25 ISO-KF for replacement  
- **BVSM72CF**  
  Sensor head DN 40 CF for replacement

### Formula

\[
\text{Vout} / \text{V} = 0.6 \log (\text{p/mbar}) + 6.8 \\
\text{p/mbar} = 10^{(\text{Vout} / \text{V} - 6.8) / 0.6}
\]
VSH82

The combination transducer VSH82 (Pirani/hot cathode) measures absolute pressure from atmospheric to ultrahigh vacuum.

The intelligent, micro processor controlled Smartline transducers automatically manage the appropriate interaction of both vacuum sensors regarding measurement ranges and switching points.

Smartline uses a high tech design and provides safe, easy to use and cost effective process control.

Typical Applications
- Analysis technology
- Coating plants and vapor deposition
- Sputtering plants
- Vacuum furnaces
- Process engineering
- Measuring and controlling in the fine and ultrahigh vacuum range

Benefits
- Combination sensor with wide measuring range
- The hot cathode sensor is automatically switched on and off by the Pirani
- Patented pulsed Pirani sensor with extended range allows operation of hot cathode at lower pressure and increase of lifetime
- Excellent repeatability and high accuracy
- Low thermal and electrical interference with the vacuum process
- Bayard-Alpert with double filament, in the event of filament failure the gauge automatically switches to the backup
- Insensitive against inrush of air
- Two independent, dry relay switch points
- Logarithmic signal output 0 - 10 V provides easy interpretation
- RS485 interface
- The digital output signals can be transmitted error free over long distances (up to 500 m)
- Replaceable sensor heads
- Low power consumption
- Correct pressure readings by means of separate gas type correction factors for Pirani and hot cathode sensors
- Metal sealed stainless steel sensor cell with detachable protective screen
- Resistant, EMC compatible metal housing
- Precise pushbutton digital adjustment of zero pressure and atmospheric

Smartline Vacuum Transducer
Absolute Pressure 1000 to 1 x 10^{-9} mbar
Technical Data

Measuring Principle  Heat conduction (Impulse Pirani), Bayard Alpert, dep. on gas type

Materials In Contact With Vacuum  Stainl. steel 1.4307, Ni, W, Pt, yttrium coated iridium, glass, ceramic

Measurement Range  1000 - 1 x 10⁻⁹ mbar (750 - 1 x 10⁻⁹ Torr), max. overpressure 4 bar abs.

Accuracy  
- 1000 - 20 mbar: < 30 % from reading
- 20 - 5 x 10⁻³ mbar: < 10 % from reading
- < 5 x 10⁻³ mbar: < 15 % from reading

Response Time  200 ms, 500 ms for switching BA emission currents

Repeatability  5%

Emission Current  10 µA, 100 µA, 1 mA

Degas  Ohmic heating of the anode

Voltage Supply  19 - 30 VDC

Electrical Connection  Sub-D, 15-pole, male

Power Consumption  Approx. 6.5 W (without switch points)

Operating Temperature  +5...+50°C

Storage Temperature  -20...+70°C

Maximum Bake Out Temperature  180°C at the flange (electronic detached)

Output Signal  0 - 10 VDC, measuring range 2.0 - 8.6 VDC, logarithmic, 1 V / decade

Serial Interface  RS485: 9600 baud, address switch 1 - 15

Switch Points  2 switch-over relays, 60 V, 0.5 A

Vacuum Connection  Stainless steel flange DN 40 ISO-KF (VSH82MV)
- Stainless steel conflat flange DN 40 CF (VSH82MVCF)

Protection Class  IP40

Weight  Approx. 665 g

Product Codes
- **VSH82MV**
  Combination transducer Pirani/Bayard Alpert, 1000 to 1 x 10⁻⁹ mbar, with DN 40 ISO-KF connection; output 0 - 10 V, logarithmic, RS485

- **VSH82MVCF**
  As above, with DN 40 CF connection

Accessories:
- **W506002**
  Measuring cable, shielded, 2 m (for VD0)

- **W506006**
  Measuring cable, shielded, 6 m (for VD0)

- **W515002**
  Measuring cable, shielded, 2 m (for VD10)

- **W515006**
  Measuring cable, shielded, 6 m (for VD10)

- **BVSH82KF40**
  Sensor head DN 40 ISO-KF for replacement

- **BVSH82CF**
  Sensor head DN 40 CF for replacement
VD9 is an intelligent control unit for applications in apparatus and plant engineering or special equipment construction.

It offers two relay switches, one joint or two independent set points.

Compact metal EMC compatible 19 inch cassette 14 HP x 3 RE.

A front foil protects the instrument from water splashing and can be easily cleaned.

**Typical Applications**
- Industrial plant engineering
- Process automation
- Apparatus engineering, e.g. process control and documentation for quality assurance
- Mechanical engineering
- Packaging technology
- Chemical process engineering (vacuum mixers)

**Benefits**
- High contrast LCD display with background illumination
- Pressure display in mbar, Torr, hPa
- Universal switched mode power supply 95 - 265 VAC
- Easy to use
- 2 relay switches
- On-off or three-position control
- Control optionally with PI characteristic, continuous PI control output configurable
- Shielded 19" metal cassette with foil-protected front panel
- 1 channel controller, can be combined with 2 transducers to cover a wider range (e.g. 1400 - 1 x 10^-9 mbar) providing a continuous pressure display
- Supports programming of set points via serial interface
- VacuGraph software: Documentation and evaluation of vacuum processes, programming set points and time based pressure profiles, remote control
- The controller is configured at the factory to customer’s specification
- Versions made to customer’s specification on request (e.g. analog set point adjustment)
**Technical Data**

**Display**
Alphanumeric LCD display, background illumination, 4 digits, 45 x 20 mm, floating point: 2 - 4 digits exponential, 2 digits mantissa, 1st. exponent

**Display Refresh Rate**
2 Hz (0.5 s)

**Sample Rate**
20 Hz (50 ms)

**Power Supply**
95 - 265 VAC, 50/60 Hz

**Power Consumption**
Max. 15 W incl. transducer

**Fuse**
0.8 A/T

**Operating Temperature**
+5...+50°C

**Storage Temperature**
-20...+60°C

**Measuring Inputs**
2 x 4 - 20 mA, SubD, 9-pole, female, for VSC42MA4, VSP52MA4
1 x 0 - 10 V Amphenol C91E, 6-pole, female, for VSP62, VSM72, VSH82

**Control Outputs**
2 x relay contact, potential free change over switches, Phoenix strip terminal 6-pole:
4 A / 250 VAC, 2 A / 45 VDC

**Analog Output**
0 - 10 V, 10 kΩ, jack plug, 2-pole

**Serial Interface**
RS232, SubD, 9-pole, female; from fall 2009 on Mini-USB, type B, 5-pole, female, Virtual Com Port protocol

**Protection Class**
IP20

**Weight**
750 g

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**Product Codes**

- **VD9S2**
  - 19inch cassette 14 HP x 3 RU, RS232, analog output, 95 - 265 VAC

- **Complete Sets**
  - **VD92P** (1400 - 1 mbar)
    - VD9S2 + VSC42MA4 + cable 2 m
  - **VD95P** (1400 - 1 x 10⁻³ mbar)
    - VD9S2 + VSC42MA4 + VSP52MA4 + 2 cables á 2 m
  - **VD96P** (1000 - 1 x 10⁻⁴ mbar)
    - VD9S2 + VSP62MV + cable 2 m
  - **VD96CFP** (1000 - 1 x 10⁻⁴ mbar)
    - VD9S2 + VSP62MVCF + cable 2 m
  - **VD97P** (1000 - 5 x 10⁻⁵ mbar)
    - VD9S2 + VSM72MV + cable 2 m
  - **VD97CFP** (1000 - 5 x 10⁻⁵ mbar)
    - VD9S2 + VSM72MVCF + cable 2 m
  - **VD98P** (1000 - 1 x 10⁻⁶ mbar)
    - VD9S2 + VSH82MV + cable 2 m
  - **VD98CFP** (1000 - 1 x 10⁻⁶ mbar)
    - VD9S2 + VSH82MVCF + cable 2 m

- **VacuGraph software for windows**
- **WUSB0002**
  - Interface cable USB, shielded, 2 m
VD10 is an intelligent control unit for application in apparatus and plant engineering or special equipment construction.

Eight potential free switches can be mapped to the measuring channels.

Compact metal 19inch cassette 21 HP x 3 RU.

**Typical Applications**
- Industrial plant engineering
- Process automation
- Coating plants
- Vacuum furnaces
- Apparatus engineering, e.g. process control and documentation for quality assurance
- Special equipment construction

**Benefits**
- Simultaneous control of up to 4 measuring channels
- Can be combined with all Smartline transducers
- 8 potential-free switching points
- 2 programmable function keys
- Universal switched mode power supply 95 - 265 VAC
- Pressure display in mbar, Torr, hPa
- Fail safe operation due to the EMC compatible metal housing
- Foil-protected front panel
- Large graphic LCD display with background illumination
- Easy to use, menu-driven operator instructions
- USB interface for process documentation
- Interfaces CAN, Ethernet, Profinbus on request
- VacuGraph software: Documentation and evaluation of vacuum processes, programming set points and time based pressure profiles, remote control
- The controller is configured at the factory to customer’s specification
### Technical Data

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display</strong></td>
<td>LCD graphic display, background illuminated, 57 x 35 mm, floating point: 2 - 4 digits, exponential, 2 digits mantissa, 1 digit exponent</td>
</tr>
<tr>
<td><strong>Display Refresh Rate</strong></td>
<td>2 Hz (0.5 s)</td>
</tr>
<tr>
<td><strong>Sample Rate</strong></td>
<td>5 Hz (200 ms) per channel (RS485-serial interface, digital)</td>
</tr>
<tr>
<td></td>
<td>30 Hz (33 ms) per channel (0 - 10 V input, analog)</td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td>95 - 265 VAC, 50/60 Hz</td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>Max. 45 W incl. transducer</td>
</tr>
<tr>
<td><strong>Fuse</strong></td>
<td>2.0 A / T</td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>+5...+40°C</td>
</tr>
<tr>
<td><strong>Storage Temperature</strong></td>
<td>-20...+60°C</td>
</tr>
<tr>
<td><strong>Measuring Inputs</strong></td>
<td>1 x RS485, SubD, 15-pole, male, for VSM72, VSH82</td>
</tr>
<tr>
<td></td>
<td>2 x 0 - 10 V Amphenol C91E, 6-pole, female, for VSP62</td>
</tr>
<tr>
<td><strong>Control Outputs</strong></td>
<td>8 x relay, normally open contact, SP free assignable, Phoenix strip terminal 16-pole, lifetime &gt; 1.000.000 cycles, 3 A, 250 VAC, 2 A 40 VD</td>
</tr>
<tr>
<td><strong>Serial Interface</strong></td>
<td>Mini-USB, type B, 5-pole, female, Virtual Com Port protocol</td>
</tr>
<tr>
<td><strong>Protection Class</strong></td>
<td>IP20</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>1100 g</td>
</tr>
</tbody>
</table>

### Product Codes

- **VD10S8**: 4-channel display and control unit, 19” cassette 21 HP x 3 RU, 95 - 265 VAC
- **W0606002**: Measuring cable for VSP62MV, shielded, 2 m
- **W0606006**: Measuring cable for VSP62, shielded, 6 m
- **W1515002**: Measuring cable RS485 for VSM72, VSH82, shielded, 2 m
- **W1515006**: Measuring cable RS485 for VSM72, VSH82, shielded, 6 m
- **VGR**: VacuGraph software for windows
- **WUSB0002**: USB interface cable, shielded, 2 m
VacuGraph software can save measurements, plot pressure diagrams for graphical evaluation and control your application in combination with our vacuum control units.

VacuGraph is easy to use, is self explanatory and is suitable for all Thyracont instruments with either an USB or RS 232 interface.

Operating Systems:
Windows 98/ME/2000/XP/Vista

Typical Applications
- Documentation of measurements and pump down curves
- Analysis of vacuum processes
- Visualization of pressure increase
- Set point setting and regulation of time based pressure profiles

Benefits
- Saving of Measurements
- Graphical display and evaluation of measurements
- Online measurement on a PC
- Comparison of multiple plots
- Read out data of Thyracont data loggers
- Easy operation
- Export data as ASCII text file e. g. for Microsoft Excel
- Printing diagramms
- Logarithmic or linear pressure scales
- PC based control by programming time triggered setpoints and process profiles in combination with Thyracont control units like VD9
- Remote control of vacuum controllers (keyboard lock, Start/Stop,...)
- Comfortable setting of instrument parameters in the configuration board
### Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>VD8</th>
<th>VD6</th>
<th>VD9</th>
<th>VD10</th>
<th>DC1</th>
<th>DC1S</th>
<th>VSM</th>
<th>VSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read measurements</td>
<td>x</td>
<td>x</td>
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<td>Define set points</td>
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<td>Program set point profiles</td>
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<td>Set hystereses</td>
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<td>Read out data logger</td>
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<td>Set data logger rate</td>
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<td>Start / Stop Control</td>
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<td>Keyboard lock</td>
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<td>Gas correction factors</td>
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### Product Codes
- **VGR**
  - VacuGraph Windows software

### Accessories:
- **WUSB0002**
  - Interface cable 2m, for instruments with USB interface
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