

# Differential pressure measuring instrument

## testo 521 – Precise Pitot tube measurement

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Temperature-compensated differential pressure sensor in instrument

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Additional 2 probe inputs for the connection of further probes for the measurement of pressure and temperature

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Direct calculation of flow velocity and volume flow

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Direct zeroing of display value from pressure probes

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Display of Hold-, max. and min. values

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Easy data storage by measurement site as well as analysis, archiving and documentation via optional PC software

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Point and timed mean value calculation

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hPa

°C

testo 521-1/-2/-3 are highly accurate differential pressure measuring instruments with an internal sensor. The versionstesto 521-1 and testo 521-2 both have a measuring range from 0 to 100 hPa, however they are available in two accuracy classes:

- testo 521-1: accuracy 0.2 % of final value
- testo 521-2: accuracy 0.1 % of final value

testo 521-1 and testo 521-2 are optimally suited to checks on extraction systems and ventilators and for the monitoring of pressure drop at filters. In combination with a Pitot tube, the internal sensor measures flow velocities from 5 to 100 m/s. The instrument additionally has two probe inputs for the connection of further probes for the measurement of

pressure and temperature. A large selection of probes is available for this purpose.

testo 521-3 has a measuring range of 0 to 2.5 hPa and records even the smallest pressure differences without difficulty. Its high accuracy and a resolution of 0.1 Pa make it ideal for differential pressure measurements in cleanrooms. In combination with the Pitot tube, the internal sensor measures flow velocities from 1 to 20 m/s. The testo 521-3 is also equipped with two probe inputs for the connection of further probes for the measurement of pressure and temperature.

## Differential pressure measuring instrument

### testo 521-1

testo 521, differential pressure measuring instrument with measuring range 0 to 100 hPa and 0.2 hPa accuracy, incl. calibration protocol and batteries

Part no. 0560 5210



### testo 521-2

testo 521, differential pressure measuring instrument with measuring range 0 to 100 hPa and 0.1 hPa accuracy, incl. calibration protocol and batteries

Part no. 0560 5211

### testo 521-3

testo 521, differential pressure measuring instrument with measuring range 0 to 2.5 hPa, incl. calibration protocol and batteries

Part no. 0560 5213

testo 521-1/-2 with internal sensor 0 to 100 hPa / 0.1 %  
 testo 521-1/-2 is equipped for accurate differential pressure measurements in the VAC sector, for example pressure drops in filters, inspections on ventilators and suction systems. Use testo 521-1/-2 for Pitot tube measurements in the range 5 to 100 m/s.

testo 521-3 with internal sensor 0 to 2.5 hPa  
 Even the smallest differential pressures up to 2.5 hPa are measured using testo 521-3. A high accuracy level and a resolution of 0.1 Pa make the instrument ideal for measurements in cleanrooms or for flue draught inspections. Use testo 521-3 for accurate measurements during Pitot tube measurements in the range 1 to 20 m/s.

## Advantages testo 521

- Built-in differential pressure probe
- 2 user defined probe sockets for pressure and temperature
- Wide selection of probes
- Documentation on site
- Easy data management via PC
- 2 line display with text menu guide
- Mains socket/fast battery recharging
- Fast-action coupling connections M8x0.5



Easy data management via PC



Inspection of transmitters with 4 to 20 mA interface



2 user defined probe sockets for pressure and temperature

## Further advantages testo 521

### Wide selection of probes

The differential pressure sensor is integrated into testo 521. Up to two additional probes can be connected through user-defined probe sockets.

- Differential pressure probes to 2000 hPa
- Absolute pressure probes to 2000 hPa
- Relative pressure probes to 400 bar
- Temperature probes from -200 to +1250 °C
- Probes for measuring current/voltage

### Advantages while measuring

- The short-text menu facilitates the handling vastly.
- Two measurement channels are displayed in the large two-lined LED-display; switching between the calculated measurement parameters is done by way of the arrow buttons.
- Zeroing of the relative and differential pressure is done by pressing the P=O button.
- When measuring pressure, the following units can be selected: mbar, hPa, bar, Pa, kPa, inH<sub>2</sub>O, mmH<sub>2</sub>O, torr and psi.
- Button for Hold, max, min and mean values.
- Hands-free: TopSafe (impact protection) including carrier strap and magnet disc as useful accessories.

### Long-term monitoring also during dynamic measurement

- Measurement data can be saved separately or as a measurement series. The measurement rate (0.04 seconds, 1 second to 24 hours) and the number of values to be saved are freely selectable. The maximum memory size is 100 KB (25000 readings).
- Dynamic measurements can be saved in the instrument at a measurement rate of 0.04 seconds. Here you have the option of displaying the values every second. For large quantities of data, activate the online measurement via a PC.

### Documentation on site

- Measurement protocols can be printed on site. No awkward cables required on account of the infrared interface.
- Long-term legible thermal paper ensures that measurement data documentation can be stored for up to 10 years.

### Easy data management via PC

- The saved measurement data can be easily analysed and processed using the software available.
- Readings are taken by the instrument and can be depicted online by the software.

### Pitot tube measurement, Pitot tube factor 1.00

With the built-in pressure sensor with an accuracy of 0.1 % of the full-scale value, the testo 521-2 enables precise measurement results in the range of 5 to 100 m/s:

|                     |          |
|---------------------|----------|
| Accuracy at 5 m/s:  | 0.32 m/s |
| Accuracy at 10 m/s: | 0.09 m/s |
| Accuracy at 50 m/s: | 0.05 m/s |

In the lower flow range of 1 to 12 m/s, high accuracy can be reached by connecting the 100 Pa-probe. The double membrane technology completely eliminates positional dependences. Changes in position do not influence the measurement result:

|                    |         |
|--------------------|---------|
| Accuracy at 2 m/s: | 0.1 m/s |
|--------------------|---------|

# Technical data

## General technical data testo 521-1/-2/-3

|                       |   |
|-----------------------|---|
| Storage temperature   | -20 to +70 °C   |
| Operating temperature | 0 to +50 °C   |
| Power supply          | Battery/Rechargeable battery, Mains unit 12 V   |
| Battery type          | 9 V (6LR61)   |
| Battery life          | Continuous operation w/ internal pressure sensor: 30 h<br>With rech. battery: 10 h<br>With carbon battery: 18 h |
| Weight                | 300 g   |
| Dimensions            | 219 x 68 x 50 mm  |
| Housing material      | ABS   |
| Memory                | 100 kB (corresponds to approx. 25000 readings)  |

|                          |  |
|--------------------------|--|
| Connection               | Hose: inner Ø 4 mm<br>outer Ø 6 mm   |
| Display                  | LCD display with symbol,<br>7 segment display and point matrix   |
| Updating rate in display | 2x per second, in fast measurement 4x per second   |
| Measuring rate           | from 0.04 seconds  |
| PC                       | RS232 interface  |
| Other features           | Mains connection and battery recharging in instrument<br>Automatic recognition of all connected probes<br>9 measurement units selectable: mbar, hPa, bar, Pa, kPa, inH <sub>2</sub> O, mmH <sub>2</sub> O, torr, psi |

## Sensor types

|                    | <b>Piezoresistive pressure sensor</b>   | <b>Piezoresistive pressure sensor For external pressure probes</b>  | <b>Ceramic sensor for external pressure probes</b> | <b>NTC</b>   | <b>Type K (NiCr-Ni)</b>                              |
|--------------------|---|---|--|--|--|
| Measuring range    | 0 ... 100 hPa (testo 521-1/-2)<br>0 to 2.5 hPa (testo 521-3**)  | 0 to 2000 hPa   | -1 to 400 bar                                      | -40 to +150 °C                                       | -200 to +1370 °C                                     |
| Accuracy ±1 digit* | ±0.2 % of fsv (testo 521-1)<br>±0.1 % of fsv (testo 521-2)<br>±0.5 Pa (0 to 20 Pa)<br>±(0.5 Pa ±0.5% of m.v.)<br>(20.1 to 250 Pa) (testo 521-3**) | ±0.1 % of m.v.  | ±0.2 % of fsv                                      | ±0.2 °C (-10 to +50 °C)<br>±0.4 °C (remaining range) | ±0.4 °C (-100 to +200 °C)<br>±1 °C (remaining range) |
| Resolution         | 0.01 hPa (testo 521-1/-2)<br>0.1 Pa (testo 521-3**)   | 0.1 Pa (0638 1347)<br>0.001 hPa (0638 1447)<br>0.01 hPa (0638 1547) | 0.01 bar   | 0.1 °C   | 0.1 °C   |
| Static pressure    | 1000 hPa (abs) (testo 521-1/-2)<br>1000 hPa (abs) (testo 521-3**)   |   |  |  |  |
| Overload           | 300 hPa (testo 521-1/-2)<br>50 hPa (testo 521-3**)  |   |  |  |  |
| Zeroing            | to 2.5 hPa (testo 521-1/-2)<br>to 0.5 hPa (testo 521-3**)   |   |  |  |  |




\*Accuracy information applies only to instrument without probes connected

\*\*Sensor is not suitable for long-term measurements



# Accessories

| <b>Additional accessories and spare parts</b>   | <b>Part no.</b> |  |
|---|-----------------|--|
| Desk-top power supply with international connection options   | 0554 1143       |  |
| 9V rech. battery for instrument, instead of battery   | 0515 0025       |  |
| <b>Printer and Accessories</b>  |                 |  |
| Testo fast printer IrDA with wireless infrared interface; 1 roll thermal paper; 4 AA batteries, for printing out measurements on site | 0554 0549       |  |
| Spare thermal paper for printer (6 rolls), permanent ink, measurement data documentation legible for up to 10 years                   | 0554 0568       |  |
| <b>Software and Accessories</b>   |                 |  |
| ComSoft Professional, Pro software incl. data archiving   | 0554 1704       |  |
| RS232 cable, connects instrument to PC (1.8 m) for data transfer  | 0409 0178       |  |
| <b>Calibration Certificates</b>   |                 |  |
| DAkkS calibration certificate/Pressure, Differential pressure, accuracy < 0.1 (% of full scale value)                                 | 0520 0205       |  |
| DAkkS calibration certificate/pressure, differential pressure, accuracy 0.1 to 0.6 (% of full-scale value)                            | 0520 0215       |  |
| DAkkS calibration certificate/pressure, differential pressure, accuracy > 0.6 (% of full-scale value)                                 | 0520 0225       |  |
| ISO calibration certificate/Pressure, Differential pressure, accuracy < 0.1 (% of full scale value)                                   | 0520 0035       |  |
| ISO calibration certificate pressure, accuracy 0.1 to 0.6 (% of fsv), 5 points distributed over meas. range                           | 0520 0025       |  |
| ISO calibration certificate pressure, accuracy > 0.6 (% of fsv)   | 0520 0005       |  |
| ISO calibration certificate/Pressure, Differential pressure, accuracy > 0.1 (% of fsv), for testo 521-2                               | 0520 0405       |  |
| ISO calibration certificate/temperature, for air/immersion probes, calibration points -18°C; 0°C; +60°C                               | 0520 0001       |  |
| ISO calibration certificate/temperature, meas. instr. with air/immersion probe; cal. points 0°C; +150°C; +300°C                       | 0520 0021       |  |
| ISO calibration certificate/temperature, meas. instr. with surface probe; calibration points +60°C; +120°C; +180°C                    | 0520 0071       |  |
| DAkkS calibration certificate/temperature, meas. instr. with air/immersion probe; calibration points -20 °C; 0 °C; +60 °C             | 0520 0211       |  |
| DAkkS calibration certificate/temperature, contact surface temperature probes; calibration points +100°C; +200°C; +300°C              | 0520 0271       |  |
| ISO calibration certificate/electrical  | 0520 1000       |  |
| <b>Probe accessories</b>  |                 |  |
| Connection hose; silicone; length 5 m; max. load 700 hPa (mbar)   | 0554 0440       |  |
| Connection cable, 2.5 m long, for pressure probes 0638 1741/1841/1941/2041/2141   | 0409 0202       |  |

# Probes



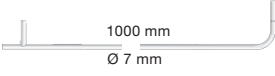
| Probe type  | Illustration  | Measuring range | Accuracy   | Overload | Static pressure | Zeroing    | Part no.  |
|---|---|-----------------|--|----------|-----------------|------------|-----------|
| <b>Differential pressure probe</b>  |   |                 |  |          |                 |            |           |
| Precision pressure probe, 100 Pa, in robust metal housing with impact protection, incl. magnet for fast attachment, to measure differential pressure and flow speeds (in combination with Pitot tube) |  | 0 to +100 Pa    | ±(0.3 Pa ±0.5% of m.v.)                                    | 50 hPa   | 100 hPa         | to 20 Pa   | 0638 1347 |
| Pressure probe, 10 hPa, in robust metal housing with impact protection incl. magnet for fast attachment, to measure differential pressure and flow speeds (in combination with Pitot tube)            |  | 0 to +10 hPa    | ±0.03 hPa  | 50 hPa   | 1000 hPa        | to 0.4 hPa | 0638 1447 |
| Pressure probe, 100 hPa, in robust metal housing with impact protection, incl. magnet for fast attachment, to measure differential pressure and flow speeds (in combination with Pitot tube)          |  | 0 to +100 hPa   | ±0.5% of m.v. (+20 to +100 hPa)<br>±0.1 hPa (0 to +20 hPa) | 300 hPa  | 1000 hPa        | to 4 hPa   | 0638 1547 |

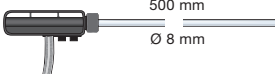
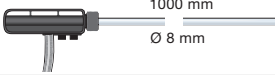
Operating temperature: 0 to +50 °C (compensated)  
 Connection: Plug-in head, connection cable 0430 0143 or 0430 0145 required


| Probe type   | Illustration  | Measuring range | Accuracy   | Overload | Zeroing    | Part no.  |
|--|---|-----------------|------------|----------|------------|-----------|
| <b>Relative pressure probe (media compatible)</b>                    |   |                 |            |          |            |           |
| Low pressure probe, refrigerant-proof stainless steel, up to 10 bar  |  | -1 to +10 bar   | ±1% of fsv | 25 bar   | to 0.1 bar | 0638 1741 |
| High pressure probe, refrigerant-proof stainless steel, up to 30 bar |  | -1 to +30 bar   | ±1% of fsv | 120 bar  | to 0.3 bar | 0638 1841 |

Operating temperature: -40 to +100 °C; 0 to +70 °C (compensated)      Connection: Plug-in head, connection cable 0409 0202 required  
 screw-in thread 7/16" UNF

# Probes

| Probe type  | Illustration   | Operating temperature | Part no.  |
|---|--|-----------------------|-----------|
| <b>Pitot tubes</b>  |  |                       |           |
| Pitot tube, 500 mm long, Ø 7 mm, stainless steel, for measuring flow velocity In conjunction with 0638 1347 / 0638 1447 / 0638 1547 pressure probes or testo 521, testo 435-3, testo 435-4 and testo 480 with internal sensor |  | 0 to +600 °C          | 0635 2045 |
| Pitot tube, 350 mm long, Ø 7 mm, stainless steel, for measuring flow velocity in conjunction with 0638 1347 / 0638 1447 / 0638 1547 pressure probes or testo 521, testo 435-3, testo 435-4 and testo 480 with internal sensor |  | 0 to +600 °C          | 0635 2145 |
| Pitot tube, 1000 mm long, stainless steel, for measuring flow velocity  |  | 0 to +600 °C          | 0635 2345 |

| Probe type   | Illustration   | Measuring range | Probe type       | Part no.  |
|--|--|-----------------|------------------|-----------|
| <b>Straight Pitot tubes</b>  |  |                 |                  |           |
| Pitot tube, stainless steel, 500 mm long, measures velocity with temperature, for pressure probes 0638 1345/..1445/..1545  |  | -40 to +600 °C  | Type K (NiCr-Ni) | 0635 2140 |
| Pitot tube, stainless steel, 1000 mm long, measures velocity with temperature, for pressure probes 0638 1345/..1445/..1545 |  | -40 to +600 °C  | Type K (NiCr-Ni) | 0635 2240 |

| Probe type                   | Dimensions<br>Probe shaft/probe shaft tip   | Measuring range | Accuracy | t <sub>99</sub> | Part no.  |
|------------------------------|---|-----------------|----------|-----------------|-----------|
| <b>Temperature probes</b>    |   |                 |          |                 |           |
| Quick-action surface probe** |  | -200 to +300 °C | Class 2* | 3 s             | 0604 0194 |

\*According to standard EN 60584-1, the accuracy of Class 1/2 refers to -40 to +1000/+1200 °C  
 \*\*Connection: Plug-in head. connection cable 0430 0143 or 0430 0145 required

