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## Measuring Instruments for Pressure and Refrigeration



hPa

mbar

Pa

mm H<sub>2</sub>O

inch H<sub>2</sub>O

inch Hg

mm Hg

psi

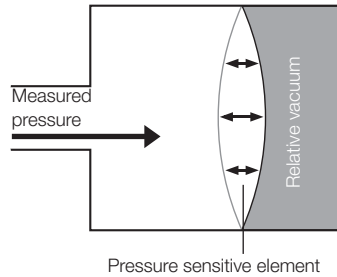
m/s



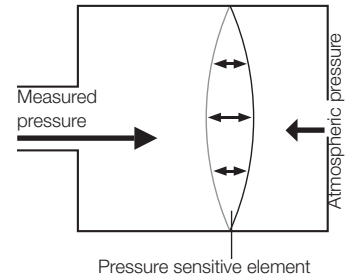
fpm

**Different pressure types**
**Absolute pressure ( $P_{abs}$ )**

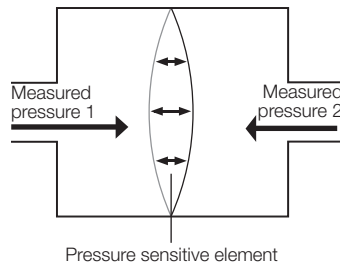
The pressure which applies to the vacuum in the universe (zero pressure) is known as absolute pressure. Absolute pressure has "abs" as its index.


**Atmospheric pressure difference, positive pressure**

Atmospheric pressure difference ( $p_g$ ) is the difference between an absolute pressure ( $p_{abs}$ ) and the respective atmospheric pressure ( $p_a = p_{abs} - p_{amb}$ ). This is generally referred to as positive pressure.


**Differential pressure, pressure difference ( $\Delta p$ )**

The difference between two pressures  $p_1$  and  $p_2$  is known as pressure difference ( $\Delta p = p_1 - p_2$ ). If the difference between two pressures is a variable, this is referred to as differential pressure ( $p_{1,2}$ ).


**Atmospheric air pressure ( $P_{amb}$ )**

This is the most important pressure for life on earth. Atmospheric pressure is created by the weight of the atmosphere surrounding the earth. The atmosphere reaches a height of up to approx. 500 km. Pressure decreases constantly up to this height (absolute pressure  $P_{abs} = \text{zero}$ ). Atmospheric air pressure is also influenced by fluctuations in the weather. The average  $P_{amb}$  at sea level is 1013.25 Hectopascal (hPa) or millibar (mbar/ normal pressure in accordance with DIN 1343). Typically this value can fluctuate by  $\pm 5\%$  if there are low or high pressure weather areas.

**Measuring principle**

When designing pressure meters, the principle of the effect of pressure on a defined area is almost always used. This is then retraced to a measurement of force.

The following formula applies:

$$\text{Pressure (p)} = \frac{\text{Force (F)}}{\text{Area (A)}}$$

**Pressure meters**
**Advantages: Electrical pressure meters**

There is a displacement of 1-3 mm in elastic pressure meters. The deformation in electrical pressure sensors is only a few  $\mu\text{m}$ . Due to this very low mechanical deformation, electrical pressure meters / sensors have an excellent dynamic performance and low material stress resulting in high endurance levels and long-term stability. Electrical pressure meters can also be manufactured in very small sizes.

An additional advantage is the easy-to-read display. Considering today's technology standards, accurate pressure measurement is becoming more and more important. Precision measuring

meters have an accuracy of  $\pm 0.05\%$  of the full-scale value. In the case of mechanical manometers, such accuracies cannot be read on account of the parallax error and mechanical performance of the springs. Electrical precision meters with LCD display often have a resolution in the thousandth range of 0.001.

**Types of pressure meters**
**Liquid pressure meters**

- U-tube manometer
- Inclined tube manometer
- Multi-liquid manometer
- Float manometer

**Pressure balances with sealing liquid**
**Piston pressure meters**

- Piston pressure meters with spring-loaded piston
- Piston pressure scales

**Elastic pressure meters**
**Electric pressure sensors and pressure meters**

- Sensor principles with strain meters
- Sensor principles with path measurement
- Compression meter
- Ionisation pressure meter
- Friction meter

**Conversion table for the most important pressure units**

	Pa	hPa/mbar	kPa	MPa	bar	psi	mmH <sub>2</sub> O	inH <sub>2</sub> O	mmHg	inHg
<b>Pa</b>	1	100	1.000	1.000.000	100.000	6.895	9.807	249.1	133.3	3.386
<b>hPa/mbar</b>	0.01	1	10	10.000	1.000	68.948	0.09807	2.491	1.333	33.864
<b>kPa</b>	0.001	0.1	1	1.000	100	6.895	0.009807	0.2491	0.1333	3.386
<b>MPa</b>	0.000001	0.0001	0.001	1	0.1	0.006895	0.00009807	0.0002491	0.0001333	0.003386
<b>bar</b>	0.00001	0.001	0.01	10	1	0.0689	0.00009807	0.002491	0.001333	0.0339
<b>psi</b>	0.0001451	0.0145	0.14505	145.05	14.505	1	0.001422	0.0361	0.0193	0.4912
<b>mmH<sub>2</sub>O</b>	0.102	10.2	102	102.000	10.200	704.3	1	25.4	13.62	345.9
<b>inH<sub>2</sub>O</b>	0.004016	0.4016	4.016	4.016	401.6	27.73	0.0394	1	0.5362	13.62
<b>mmHg</b>	0.007501	0.7501	7.501	7.501	750.1	51.71	0.0734	1.865	1	25.4
<b>inHg</b>	0.002953	0.0295	0.2953	295.3	29.53	2.036	0.002891	0.0734	0.0394	1

## Pressure meters

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**testo 510**
**Pocket size differential pressure and flow meter**

The differential pressure meter is ideally suitable for pressure measurements in the range 0 to 100 hPa.

testo 510's differential pressure measurement is temperature-compensated for accurate readings. Readings can be displayed in Pascal over the whole measurement range.

Magnets at the back of the instrument enable hands-free operation, for instance, while adjusting gas heaters.

- Display in Pascal possible over entire measurement range
- Accuracy:  $\pm 0.03$  hPa (0 to 0.30 hPa) /  $\pm 0.05$  hPa (0.31 to 1.00 hPa)
- Temperature compensation
- Magnetic rear permits free-hand work
- Flow velocity measurement with Pitot tube (Pitot tube not included in delivery)
- Air density compensation
- Protective cap for safe storage
- Including wrist strap and belt holder
- Backlit display
- Switchable units: hPa, mbar, Pa, mmH<sub>2</sub>O, mmHg, inH<sub>2</sub>O, inHg, psi, m/s, fpm



**testo 510; differential pressure meter incl. protective cap, batteries and calibration protocol**

Part no.  
**0560 0510**

Technical data			
Meas. range	0 to 100 hPa	Protection class	IP40
Accuracy	$\pm 0.03$ hPa (0 to 0.30 hPa)	Battery type	2 batteries Type AAA
$\pm 1$ digit	$\pm 0.05$ hPa (0.31 to 1.00 hPa) $\pm (0.1 \text{ hPa} + 1.5 \% \text{ of mv})$ (1.01 to 100 hPa)	Battery life	50 h (average, without display illumination)
Positive pressure	500 mbar	Measurement rate	0.5 s
max. static pressure	1.5 bar	Dimensions	119 x 46 x 25 mm (incl. protective cap)
Resolution	0.01 hPa	Weight	90 g (with batteries and protective cap)
Oper. temp.	0 to +50 °C	Warranty	2 years
Storage temp.	-40 to +70 °C		
Selectable units	hPa, mbar, Pa, mmH <sub>2</sub> O, inH <sub>2</sub> O, inHg, mmHg, psi, m/s, fpm		

Accessories	Part no.
Hose set: Connection hose, silicone, 2 m long, max. load 700 hPa (mbar)	0554 0448
ISO calibration certificate relative pressure, 3 measurement points distributed over the measurement range	0520 0085
ISO calibration certificate/pressure, differential pressure, accuracy 0.1 to 0.6 (% of fsv)	0520 0025

**testo 511**
**Pocket-size absolute pressure meter**

testo 511 measures absolute pressure with an accuracy of  $\pm 3$  hPa.

It is converted to barometric air pressure by entering on-site height above sea level.

In addition, barometric elevation measurement between two points is also possible.

Measures absolute pressure, e.g. for absolute pressure compensation in flow velocity measurements with a Pitot tube

Calculation of barometric air pressure

Barometric altitude measurement

Accuracy  $\pm 3$  hPa

Protective cap for safe storage

Including wrist strap and belt holder

Backlit display

8 switchable pressure units: hPa, mbar, Pa, mmH<sub>2</sub>O, mmHg, inH<sub>2</sub>O, inHg, psi



testo 511; absolute pressure meter incl. protective cap, batteries and calibration certificate

Part no.  
**0560 0511**

**Technical data**

Meas. range	300 to 1200 hPa
Accuracy	$\pm 3.0$ hPa
$\pm 1$ digit	
Resolution	0.1 hPa
Oper. temp.	0 to +50 °C
Storage temp.	-40 to +70 °C
Selectable units	hPa, mbar, Pa, mmH <sub>2</sub> O, mmHg, inH <sub>2</sub> O, inHg, psi, m, ft

Protection class	IP40
Battery type	2 batteries Type AAA
Battery life	200 h (average, without display illumination)
Dimensions	119 x 46 x 25 mm (incl. protective cap)
Measurement rate	0.5 s
Weight	90 g (with batteries and protective cap)
Warranty	2 years

**Accessories**

	Part no.
Hose set: Connection hose, silicone, 2 m long, max. load 700 hPa (mbar)	0554 0448
ISO calibration certificate/absolute pressure, 3 meas. points distributed over meas. range	0520 0185
ISO calibration certificate/absolute pressure, 5 measurement points distributed over meas. range	0520 0125

**testo 512**

**Pressure and flow velocity measuring instrument**

testo 512 shows pressure and flow velocity simultaneously in an easy-to-read, large, backlit display. Measurement data is printed on site with date and time as well as minimum and maximum values. testo 512 has two switchable units for flow: m/s and fpm. Eight units can be set for pressure: kPa, hPa, Pa, mmH<sub>2</sub>O, mmHg, psi, inch H<sub>2</sub>O, inch Hg.

Adjustable damping for sliding mean calculation, density compensation is built-in. The displayed actual value can be frozen in the display by pressing the HOLD button. The measured minimum and maximum value can be displayed and stored in the meter.

TopSafe protects the measuring instrument in the field from impact, dirt and splash water.

- 8 units for pressure: kPa, hPa, Pa, mm H<sub>2</sub>O, mmHg, psi, inch H<sub>2</sub>O, inch Hg
- 2 units for flow: m/s, fpm
- Built-in density compensation
- Display light
- Hold/Max/Min function
- Readings printout with date/time and min./max. values



Simultaneous display of flow and pressure value

<b>1</b>	<b>0 to 2 hPa/mbar</b> testo 512 differential pressure meter, 0 to 2 hPa, incl. battery and calibration protocol
Part no. <b>0560 5126</b>	

<b>3</b>	<b>0 to 200 hPa/mbar</b> testo 512 differential pressure meter, 0 to 200 hPa, incl. battery and calibration protocol
Part no. <b>0560 5128</b>	

<b>2</b>	<b>0 to 20 hPa/mbar</b> testo 512 differential pressure meter, 0 to 20 hPa, incl. battery and calibration protocol
Part no. <b>0560 5127</b>	

<b>4</b>	<b>0 to 2000 hPa/mbar w/o flow velocity and Pascal measurement</b> testo 512 differential pressure meter, 0 to 2000 hPa, incl. battery and calibration protocol
Part no. <b>0560 5129</b>	

Technical data	1	2	3	4
Meas. range	0 to +2 hPa +2 to +17.5 m/s 395 to 3445 fpm	0 to +20 hPa +5 to +55 m/s 985 to 10830 fpm	0 to +200 hPa +10 to +100 m/s 1970 to 19690 fpm	0 to +2000 hPa
Resolution	0.001 hPa 0.1 m/s 0.1 fpm	0.01 hPa 0.1 m/s 0.1 fpm	0.1 hPa 0.1 m/s 0.1 fpm	1 hPa
Overload	±10 hPa	±200 hPa	±2000 hPa	±4000 hPa

Common data			
Accuracy	0.5% of fsv ±1 digit	Auto Off	10 min
Measuring medium	All non-corrosive gases	Battery type	9V block battery, 6F22
		Battery life	120 h
Display	LCD, 2 lines	Dimensions	202 x 57 x 42 mm
Oper. temp.	0 to +60 °C	Weight	300 g
Storage temp.	-10 to +70 °C	Warranty	2 years

Accessories	Part no.
<b>Accessories for measuring instrument</b>	
9V rech. battery for instrument instead of battery	0515 0025
Recharger for 9V rechargeable battery for external recharging of 0515 0025 battery	0554 0025
<b>Printer and accessories</b>	
Testo fast printer with wireless infrared interface, 1 roll thermal paper and 4 AA batteries	0554 0549
Spare thermal paper for printer (6 rolls), permanent ink measurement data documentation legible for up to 10 years	0554 0568
<b>Transport and Protection</b>	
TopSafe, protects from impact and dirt	0516 0221
Case for measuring instrument and probes	0516 0210
Transport case for meas. instr. and probes (405 x 170 x 85 mm)	0516 0201

Accessories	Part no.
<b>Additional accessories and spare parts</b>	
Pitot tube, 350 mm long, Ø 7 mm, stainless steel, measures flow speed	0635 2145
Pitot tube, 500 mm long, Ø 7 mm, stainless steel, measures flow speed	0635 2045
Pitot tube, 1000 mm long, stainless steel, measures flow speed	0635 2345
Connection hose, silicone, 5m long max. load 700 hPa (mbar)	0554 0440
Hose connection set for gas pressure measurement on heating systems, incl. silicone hoses and T-pieces	0554 0315
<b>Calibration certificates</b>	
DKD calibration certificate/pressure diff. and pos. pressure; 11 measuring points distributed over the instr. meas. range	0520 0215
ISO calibration certificate/pressure, differential pressure, accuracy 0.1 to 0.6 (% of fsv)	0520 0025

**testo 312-2**

testo 312-2, DVGW approval according to TRGI, measures pressure from 0 to 200 hPa. Even the finest of pressures with a resolution of 0.01 mbar can be measured in the measuring range from 0 to 40 mbar.

testo 312-2, precision manometer up to 40/200 hPa, DVGW approval, incl. alarm display, battery and calibration protocol

Part no.  
**0632 0313**

**testo 312-3**

testo 312-3, the versatile manometer for the pre-test and main test on gas and water pipelines up to 6 bar. Pressure changes caused by changes in temperature during the measurement are balanced out by the temperature compensation function.

testo 312-3, robust manometer up to 300/6000 hPa, DVGW approval, incl. alarm display, battery and calibration protocol

Part no.  
**0632 0314**

**Pressure meters for gas and water fitters**

- Switchable precision range with a high resolution
- Alarm when user-defined limit values are exceeded
- Printout of data incl. software, instrument number, date/time on Testo printer
- Clear display with time
- DVGW approval

**Technical data**

	testo 312-2		testo 312-3	
Meas. range	-40 to +40 hPa	-200 to +200 hPa	-300 to +300 hPa	-6000 to +6000 hPa
Accuracy ±1 digit	±1.5% of mv. (+3 to +40 hPa) ±0.03 hPa (0 to +3 hPa)	±0.5 hPa (0 to +50 hPa) ±2 hPa (+50 to +200 hPa)	±0.5 hPa (0 to +50 hPa) ±1.5 hPa (+50 to +300 hPa)	±2% of mv. (+400 to +2000 hPa) ±4% of mv. (+2000 to +6000 hPa) ±4 hPa (0 to +400 hPa)
Resolution	0.01 hPa (-40 to +40 hPa)	0.1 hPa (-200 to +200 hPa)	0.1 hPa (-300 to +300 hPa)	1 hPa (-6000 to +6000 hPa)
Overload	±1000 hPa (-40 to +40 hPa)	±1000 hPa (-200 to +200 hPa)	±8000 hPa (-300 to +300 hPa)	±8000 hPa (-6000 to +6000 hPa)

**Common data**

Display	LCD, 2 lines	Measurement range can be switched from ±40 hPa to ±200 hPa Setting step: 0.01 hPa or 5 hPa Alarm threshold: -0.04 hPa or 100 hPa Alarm display: Audible and visual if limit values are reached
Oper. temp.	+5 to +45 °C	
Storage temp.	-20 to +70 °C	
Material/Housing	ABS	
Battery type	9V block battery	
Dimensions	215 x 68 x 47 mm	
Weight	300 g	
Warranty	2 years	

**Recommended set****The complete maintenance set with documentation**

- Pressure measuring instrument up to 40/200 hPa (Part no. 0632 0313)
- TopSafe (protection case), with bench stand (Part no. 0516 0443)
- Pressure set (Part no. 0554 3150)
- testo 316-1, gas leak detector (Part no. 0632 0316)
- TopSafe for testo 316, protection case incl. stand, protects from dirt and impact (Part no. 0516 0189)
- Testo report printer (Part no. 0554 0549)
- Case (plastic) (Part no. 0516 3120)

**Probes**

Pressure set with flue draught probe, consisting of: 2 x silicone hoses Ø 4 mm and Ø 6 mm respectively, 4 mm and 6 mm T-piece, connection piece

215 mm  
Ø 5 mm

**Part no.**

0554 3150

**Accessories****Part no.****Printer and accessories**

Testo fast printer with wireless infrared interface, 1 roll thermal paper and 4 AA batteries

0554 0549

External fast charger for 1-4 AA rech. batteries, incl. 4 Ni-MH rech. batteries with individual cell charging and charge control display, incl. impulse trickle charging, integrated discharge function, with built-in international mains plug, 100-240 V, 300 mA, 50/60 Hz

0554 0610

Spare thermal paper for printer (6 rolls)

0554 0569

Spare thermal paper for printer (6 rolls), permanent ink, measurement data documentation legible for up to 10 years

0554 0568

**Additional accessories and spare parts**

9V rech. battery for instrument, instead of battery

0515 0025

Recharger for 9V rechargeable battery, for external recharging of 0515 0025 battery

0554 0025

**Transport and Protection**

TopSafe (protection case), with bench stand, protects instrument from dirt and impact

0516 0443

Case, for secure storage of measuring instrument

0516 0191

Transport case (plastic), for transport and secure storage of measuring instrument and accessories

0516 3120

**Calibration certificates**

ISO calibration certificate/pressure, differential pressure; 5 points distributed over meas. range

0520 0005

See next page for test system for gas and water fitters

See next page for high pressure set

**testo 312**

**Complete test system for gas/water fitters**

Everything you need to inspect gas and water pipeline installations: Check pressure drop using the testo 312-3 electronic pressure meter. The measurement results are output on the printer. Using slide rule, you can quickly determine the amount of gas leaking and thus the serviceability of the gas pipelines. A gas leak is quickly detected by testo 316-1.

- Printout with date
- Load and gas-tightness test on gas pipelines
- Pressure check on water pipelines
- Efficient leak detection



DVGW-TRGI approved



Testing system set
testo 312-3 pressure meter TopSafe for testo 312 Printer testo 316-1 gas leak detector TopSafe for testo 316-1 Accessories: Pressure drop test set 200 mbar, testing pump, single-pipe counter cap, two valve T-fitting, single valve barrier, connection hose LW 6, conical test plugs 1/2", 3/4", high pressure stage stops 3/8", 3/4", 1/2", 1", leak detection spray, slide rule, system case
Part no. <b>0563 0314</b>

High pressure set with case (without instrument)
Pressure drop test set, 200 mbar Testing pump, greater than 500 mbar Single-pipe counter cap Two-valve T-fitting Single-valve barrier Connection hose LW Conical test plugs 1/2" and 3/4" High pressure stage stop 3/8", 1/2", 3/4", and 1" Leak detection spray System case
Part no. <b>0554 3160</b>

Accessories	Part no.
Pressure drop test set 200 mbar, incl. manual bulb pump, hoses, T-fitting w/ valve, conical test stopper 1/2"	0554 3153
Test pump to produce test pressure	0554 3157
Single-pipe counter cap, connects test fittings to pipe, Simply dismantle gas counter, attach single-pipe counter cap and connect hose	0554 3156
Two-valve branch (brass) to connect 2 or more pipes, can be blocked off separately	0554 3161
Single-valve stop to block off pipe, e.g. when changing hoses during a test	0554 3162
LW 6 connection hose, To connect T-fitting/single-pipe counter cap or for extension purposes	0554 3158
Conical test stop 1/2" for connecting test set to the gas pipe 19–32 mm, Connects test fittings to pipe	0554 3151
Conical test stop 3/4" for connecting the test set to the gas pipe 24-44 mm, Connects test fittings to pipe	0554 3155
Conical test stop 1" to connect test fittings to gas pipe 35–65 mm, Connects test fittings to pipe	0554 3152
High pressure stage stop 3/8" and 3/4", To connect test fittings to gas pipe	0554 3163
High pressure stage stop 1/2" and 1", To connect test set to gas pipe	0554 3164
Leak detection spray for spraying on the gas pipe, shows leaking points where bubbles form, To detect leaks (bubbles appear) in gas pipes	0554 3166
System case for the complete test system, Ensures orderly storage of case contents	0554 3165
Slide rule to quickly determine serviceability	0554 3169
DKD calibration certificate/pressure, diff. and pos. pressure; 6 meas. points distributed over meas. range (>0.6% of fsv)	0520 0225

Please order the testo 312-3 or testo 312-2 instrument suitable for your requirements

testo 312-2, precision manometer up to 40/200 hPa, DVGW approval, incl. alarm display, battery and calibration protocol
Part no. <b>0632 0313</b>

testo 312-3, robust manometer up to 300/6000 hPa, DVGW approval, incl. alarm display, battery and calibration protocol
Part no. <b>0632 0314</b>





## testo 314

### Unique

Efficient measurement due to absolute pressure compensation

testo 314 independently compensates fluctuations in absolute pressure during volume flow measurement via absolute pressure compensation.

### Fast

Zeroing phase for connected pipe

To determine  $\Delta P$  efficiently and quickly, zeroing to ambient air pressure takes place while the measurement is in progress. This eliminates interruptions and removal of pipes.

### Efficient

Measuring using standard test pressure compensation with feeding unit

The flow test which is independent of gas mains, has the advantage that pressure fluctuations in pipes can be compensated. The built-in flow pressure controller (gas bubble with gas feeding unit) compensates for fluctuations. The finely adjusted value is displayed in testo 314 along with the leakage amount.

## The complete testing system for gas and water pipes

- Load and gas-tightness test on gas pipes
- Fast measurement of amount of gas leaking according to DVGW-TRGI 2008 VP 952
- Efficient detection of gas leaks using testo 316-1
- Analysis software to show course of measurement
- Serviceability test on gas pipes
- Data recording for testing pressure regulator
- Analysis with PC software
- Pressure test on waste water pipes according to DIN EN 1610 using the high pressure probe (available as an option)

### The complete testing system set for gas/water pipes

testo 314, pressure meter with built-in printer, from -1000 mbar to +1000 mbar

Mains unit 230 V/8 V/1 A for separate use of control unit

System case incl. hose set for connection to the gas pipe

testo 316-1, electronic gas leak detector with flexible measurement probe

TopSafe for testo 316, indestructible protection case incl. stand, protects from dirt and impact

Leak detection spray for spraying on gas pipe, bubbles indicate leaking points

Conical test stop 1/2" for connecting test set to the gas pipe 19–32 mm

Conical test stop 3/4" for connecting test set to the gas pipe 24–44 mm

High pressure step plug 3/8" and 3/4" for connecting test set to the gas pipe

High pressure step plug 1/2" and 1" for connecting test set to the gas pipe

Pressure release plug

Single-valve block for blocking off the pipe

Double valve branch (brass) for connecting 2 or more pipes, can be blocked off separately

Test pump for generating test pressure

Part no.

**0563 3140 70**



Tested according to DVGW-TRGI 2008 / VP 952

### Accessories

testo 316-1, Electronic gas leak detector with flexible measurement probe and battery 0632 0316

TopSafe for testo 316, protection case incl. stand, protects from dirt and impact 0516 0189

Gas feeding unit for testo 314, for battery-operated measurement 0554 3142

Mains unit 230 V/ 8 V/ 1 A, for instrument (European plug), for mains operation and battery recharging 0554 1084

Hose set for connection to gas pipe with test pump and conical test plug 1/2" 0554 3141

Single-pipe counter cap, connects test fittings to pipe 0554 3156

Two-valve branch (brass) to connect 2 or more pipes, can be blocked off separately 0554 3161

Single-valve stop to block off pipe 0554 3162

LW 6 connection hose, To connect T-fitting/single-pipe counter cap or for extension purposes 0554 3158

Conical test stop 1/2" for connecting test set to the gas pipe 19–32 mm 0554 3151

Conical test stop 3/4" for connecting the test set to the gas pipe 24-44 mm 0554 3155

Conical test stop 1" to connect test fittings to gas pipe 35–65 mm 0554 3152

High pressure stage stop 3/8" and 3/4", To connect test fittings to gas pipe 0554 3163

High pressure stage stop 1/2" and 1", To connect test set to gas pipe 0554 3164

Leak detection spray for spraying on the gas pipe, shows leaking points where bubbles form 0554 3166

Spare thermal paper for printer (6 rolls) 0554 0569

Pressure set for gas pressure measurement on heating systems 0554 0449

Test pump to produce test pressure 0554 3157

Pressure release plug 0554 3171

ISO calibration certificate/flow in gases, 5 measurement points 0520 0084

System case with hose set, test pump and conical test plug 1/2" 0516 3140

Analysis software, shows measurement in form of diagrams, tables and manages customer data 0554 3332

RS232 cable, connects instrument to PC (1.8 m) for data transfer 0409 0178

High-pressure probe up to 25 bar 0638 1743

Pipe wrap probe for pipes with diameter of up to 2", for flow/return temp. meas. in hydronic systems 0600 4593

Quick-action surface probe with sprung thermocouple strip, measuring range short-term to +500°C 0604 0194

Cable, 1.5 m long, connects probe with plug-in head to meas. instrument 0430 0143

### testo 314

Pressure meter with built-in printer, from 0 mbar to +1000 mbar

Part no.

**0560 3140**

### Technical data testo 314

Pressure meas. range	0 to 1000 mbar
Resolution	0.1 mbar
Accuracy	±0.5 mbar; ±3% of mv
Volume flow meas. range	0 to 8 l/h
Resolution	0.1 l/h
Accuracy	±0.1 l/h; ±5% of mv
Battery life	> 5 h
Dimensions	252 x 115 x 58 mm
Weight	Approx. 728 g



## testo 525

Temperature fluctuations do not have any influence on measurements taken using testo 525 on account of temperature compensation. It facilitates measurements in the ranges of positive/negative overpressure and absolute pressure making testo 525 the ideal reference measuring instrument for calibration.

testo 525, pressure meters incl. battery and calibration protocol. See below for the different instrument versions available for every application.

## Highly Accurate Pressure Meters for Industrial Applications

- Temperature-compensated (temperature fluctuations do not have any influence on the measurement result)
- 11 different meas. units to select from
- Measures leak rate (pressure drop over time)
- Min/Max value
- Hold button
- Data memory for single values or series of measurements
- Auto-Off/Low Bat display
- With precision certificate

One touch zero  
Hold button  
Configuration modes



### testo 525 Positive pressure meters

Accuracy  $\pm 0.2\%$  of fsv

Meas. range	Resolution	Overload	Part no.
0 to 30 bar	0.01 bar	70 bar	0560 5258

### testo 525 Absolute pressure meters

Accuracy  $\pm 0.2\%$  of fsv

Meas. range	Resolution	Overload	Part no.
0 to 1100 hPa	0.1 hPa	$\pm 3000$ hPa	0560 5256
0 to 2000 hPa	0.1 hPa	$\pm 3000$ hPa	0560 5257

Accuracy  $\pm 0.1\%$  of fsv

Meas. range	Resolution	Overload	Part no.
0 to 1100 hPa	0.1 hPa	$\pm 2000$ hPa	0560 5266
0 to +2000 hPa	0.1 hPa	$\pm 3000$ hPa	0560 5267

Accuracy  $\pm 0.05\%$  of fsv

Meas. range	Resolution	Overload	Part no.
0 to +2000 hPa	0.1 hPa	$\pm 3000$ hPa	0560 5273

**Technical data**

See opposite page for information on accuracies, measurement ranges, resolution and overload.

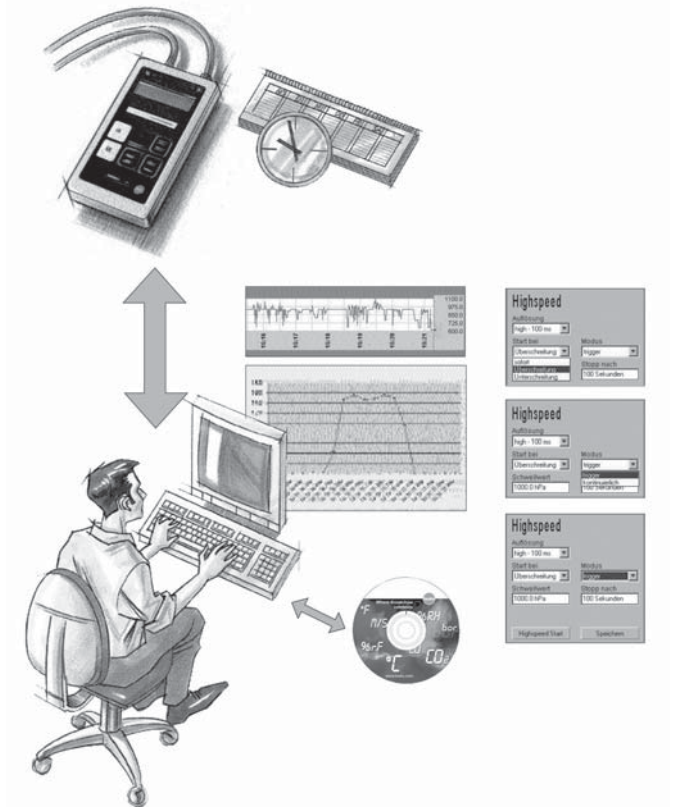
**Common data**

Sensor	Piezoresistive pressure sensor
Measuring medium	All non-corrosive gases
Conn.	Hose 4 mm (to 7 bar) NPT 1/8" (from 10 bar)
PC	RS232 interface
Display	LCD, 1 line

Saving interval	Manually, 1 second...60 min selectable
Memory	984
Oper. humidity	30 to 95 %RH
Oper. temp.	-5 to +50 °C
Storage temp.	-30 to +85 °C
Protection class	IP54
Battery type	9V block battery
Battery life	50 h
Dimensions	152 x 83 x 34 mm
Weight	270 g
Warranty	2 years
Other features	11 different measuring units can be set: bar, mbar, kPa, hPa, MPa, mmH2O, mH2O, mmHg, psi, inchH2O, inchHg

**Accessories**

	Part no.
<b>Transport and Protection</b>	
Case made of leather with shoulder strap, For secure storage of measuring instrument	0554 5251
Transport case (plastic) for measuring instrument and accessories, For safe transport	0516 5200
<b>Software and accessories</b>	
Software set incl. RS232 data transfer cable, Software for instrument control and data management	0554 5256
Software, for instrument control and data management	0554 5255
Data transfer cable RS 232, Connects measuring instrument to PC for data transfer	0554 5250
<b>Additional accessories and spare parts</b>	
9V rech. battery for instrument, instead of battery	0515 0025
Recharger for 9V rechargeable battery, for external recharging of 0515 0025 battery	0554 0025
Connection hose, silicone, 5m long, max. load 700 hPa (mbar)	0554 0440
Connection hose set, 2 x 1 m, coiled, incl. 1/8" screw connection, pressure-tight up to 20 bar, outer diameter 6.3 mm, inner diameter 4.8 mm	0554 0441
Adapter 1/8", for connection hoses	0554 5200
Calibration pump, positive pressure, Max. 5 bar	0554 5252
Pressure transmitter 0 to 10 bar, to measure pressure in liquid substances	0554 5254
Connection hose for pressure transmitter to system (1 off)	0554 3170
<b>Calibration certificates</b>	
ISO calibration certificate/Pressure, Differential pressure, accuracy ± 0.1 (% of full scale value)	0520 0035
DKD calibration certificate/pressure, diff. and pos. pressure; 11 measuring points distributed over the instr. meas. range	0520 0215
DKD calibration certificate/Pressure, Absolute pressure 11 points distributed over the whole measuring range (less than 0.1% of fsv)	0520 0222

**Software for instrument control and data management**


**Configuration settings in instrument**  
All of the important parameters in the instrument can be easily adapted on your PC using the PC software for testo 525; regardless of whether you wish to change a unit or measuring rate or wish to activate smoothing. No problem. Simply select the required value using the pull-down menu and it is transmitted to your instrument straightaway.

**Readout memory**  
Data is transferred to a file on your hard disk, where it is permanently filed, when the "Readout memory" button is pressed. The data can also be shown in a table. Important information such maximum/minimum and mean value appear in the top lines. The data can also be printed or transferred to Excel.

**Online Measurement**  
All of the measurement data can be read straightaway from the graphic appearing in the initial screen. The data is automatically saved during online measurement.

**High speed**  
testo 525 carries out 10/20 measurements per second. Fast measurement is necessary so that pressure drops can be recognised and recorded. In the case of high speed measurements, the user can select when the measurement is to be started.

The following can be selected:  
**immediately**  
Measurement starts running *ad hoc*  
**Overshooting**  
Measurement starts once a specific limit value is overshoot  
**Undershooting**  
Measurement starts once a specific limit value is undershot.

A trigger mode can also be set up. If a limit value is exceeded, you can determine how long afterwards measurements can continue. Recording stops once the specified time has been reached. If the limit value is again exceeded, recording begins again. This mode is ideal for troubleshooting systems.

## testo 521

**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.

**1** 0 ... 100 hPa /  $\pm 0.2$  % of fsv  
 testo 521-1, differential pressure meter 0 to 100 hPa incl. battery and calibration protocol

Part no.  
**0560 5210**

**2** 0 to 100 hPa /  $\pm 0.1$  % of fsv  
 testo 521-2, differential pressure meter 0 to 100 hPa incl. battery and calibration protocol

Part no.  
**0560 5211**

**3** 0 to 2.5 hPa  
 testo 521-3, differential pressure meter 0 to 2.5 hPa, battery and calibration protocol included

Part no.  
**0560 5213**

## testo 526

**testo 526-1 with internal sensor 0 to 2000 hPa / 0.1 %**  
 testo 526 is the ideal differential pressure meter for industrial applications. Processes can be accurately measured and monitored with an accuracy of 0.1% of the full-scale value.

### testo 526-2 with highly accurate internal sensor 0 to 2000 hPa, 0.05%

testo 526 is the ideal differential pressure meter for sensitive industrial applications. Critical processes can be efficiently measured and monitored at an accuracy of up to 0.05% of the full-scale value.

#### Pressure test

Specially for leak tests on containers, uninterrupted recording is possible via the built-in test menu in testo 526-1 and testo 526-2. Subsequent processing of measurement data via software or printouts ensure that the pressure test is documented.

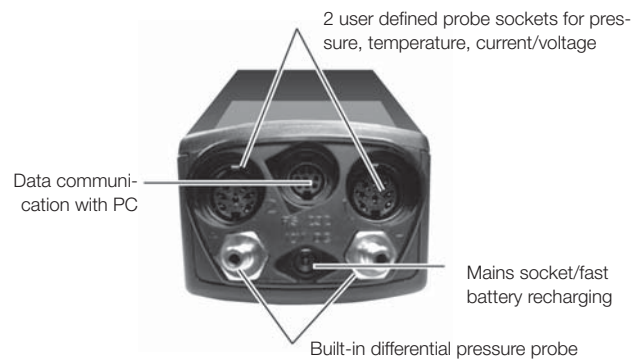
**4** 0 to 2000 hPa /  $\pm 0.1$  % of fsv  
 testo 526-1, differential pressure meter 0 to 2000 hPa incl. fast coupling connections, battery and calibration protocol

Part no.  
**0560 5280**

**5** 0 to 2000 hPa /  $\pm 0.05$  % of fsv  
 testo 526-2, differential pressure meter 0 to 2000 hPa incl. fast coupling connections, battery and calibration protocol

Part no.  
**0560 5281**

## Reference pressure meters for all measurement ranges



### Wide selection of probes

The differential pressure sensor is built into testo 521 and testo 526. Up to two additional probes can be connected via 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

### Long-term monitoring made easy

- 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 25,000 readings.
- The readings are saved under separate names for the sites (max. 99 sites) - with retracing guarantee.
- Online measurement for large quantities of data can be activated via 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.

### Inspection of transmitters with 4 to 20 mA interface

All transmitters or non-Testo probes (in 2 or 4 wire systems, 18 V) can be connected to the 4 to 20 mA interface. Scaling is carried out on the hand-held measuring instrument.

Major benefit: The transmitter connected does not need its own power; it is supplied by the testo 521 or testo 526 pressure meter.

### 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.
- Pressure drops can be protocolled online in cycles of 0.05 seconds in the

Fast Measurement menu. Since, in most cases, pressure drops cannot be predicted, a rule can be defined via the trigger function; the pressure drops are then filtered out and stored separately for the user in indexed pages.



## testo 521 / testo 526

## Accessories / Technical data

Accessories	Part no.
<b>Additional accessories and spare parts</b>	
Desk-top power supply with international connection options	0554 1143
9V rech. battery for instrument, instead of battery	0515 0025
Recharger for 9V rechargeable battery, for external recharging of 0515 0025 battery	0554 0025
<b>Transport and Protection</b>	
TopSafe (protection case), incl. carrier strap, bench stand and magnet. Protects instrument from dust, impact, scratches	0516 0446
Transport case, for measuring instrument, probes, Prandtl Pitot tube, accessories	0516 0527
System case, For measuring instrument, probes, straight or Prandtl Pitot tube, accessories	0516 0526
<b>Printer and accessories</b>	
Testo fast printer with wireless infrared interface, 1 roll thermal paper and 4 AA batteries, for printing out measurements on site	0554 0549
External fast charger for 1-4 AA rech. batteries, incl. 4 Ni-MH rech. batteries with individual cell charging and charge control display, incl. impulse trickle charging, integrated discharge function, with built-in international mains plug, 100-240 V, 300 mA, 50/60 Hz	0554 0610
Spare thermal paper for printer (6 rolls)	0554 0569
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 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve	0554 0830
RS232 cable, connects instrument to PC (1.8 m) for data transfer	0409 0178
Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit, facilitates data communication in network	0554 1711








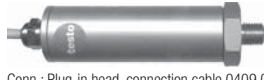



Accessories	Part no.
<b>Calibration certificates</b>	
DKD calibration certificate/Pressure, Differential pressure, accuracy $\pm$ 0.1 (% of full scale value)	0520 0205
DKD calibration certificate/pressure, differential pressure, accuracy 0.1 to 0.6 (% of full-scale value)	0520 0215
DKD calibration certificate/pressure, differential pressure, accuracy > 0.6 (% of full-scale value)	0520 0225
DKD calibration certificate/pressure, absolute pressure, accuracy 0.1 to 0.6 (% of full-scale value)	0520 0212
ISO calibration certificate/Pressure, Differential pressure, accuracy $\pm$ 0.1 (% of full scale value)	0520 0035
ISO calibration certificate/pressure, differential pressure, accuracy 0.1 to 0.6 (% of fsv)	0520 0025
ISO calibration certificate/pressure, Differential pressure, accuracy > 0.6 (% of fsv), for testo 521-3	0520 0005
ISO calibration certificate/Pressure, Differential pressure, accuracy > 0.1 (% of fsv), for testo 521-2	0520 0405
ISO calibration certificate/absolute pressure, 5 measurement points distributed over meas. range, absolute pressure, accuracy 0.1 to 0.6 (% of fsv)	0520 0125
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
DKD calibration certificate/temperature, meas. instr. with air/immersion probe; calibration points -20°C; 0°C; +60°C	0520 0211
DKD calibration certificate/temperature, contact surface temperature probes; calibration points +100°C; +200°C; +300°C	0520 0271
ISO calibration certificate/electrical	0520 1000

Technical data					
	testo 521-1	testo 521-2	testo 521-3	testo 526-1	testo 526-2
Probe type	Piezoresistive pressure sensor	Piezoresistive pressure sensor	Piezoresistive pressure sensor	Piezoresistive pressure sensor	Piezoresistive pressure sensor
Meas. range	0 ... 100 hPa	0 to 100 hPa	0 to 2.5 hPa	0 to 2000 hPa	0 to 2000 hPa
Accuracy $\pm$ 1 digit	$\pm$ 0.2 % of fsv	$\pm$ 0.1 % of fsv	$\pm$ 0.5 Pa (0 to 20 Pa) $\pm$ (0.5 Pa $\pm$ 0.5% of mv) (20.1 to 250 Pa)	$\pm$ 0.1 % of fsv	$\pm$ 0.05 % of fsv
Resolution	0.01 hPa	0.01 hPa	0.1 Pa	0.1 hPa	0.1 hPa
Static pressure	2000 hPa	2000 hPa	100 hPa	2000 hPa	2000 hPa
Overload	300 hPa	300 hPa	50 hPa	3000 hPa	3000 hPa
Zeroing	to 2,5 hPa	to 2,5 hPa	to 0,5 hPa	to 50 hPa	to 50 hPa

Common data testo 521 / testo 526						
	Ceramic sensor for external pressure probes	Piezoresistive pressure sensor For external pressure probes	NTC	Type K (NiCr-Ni)	Voltage measurement	Current measurement
Meas. range	-1 to 400 bar	0 to 2000 hPa	-40 to +150 °C	-200 to +1370 °C	0 ... 10 V	0 to 20 mA
Accuracy* $\pm$ 1 digit	$\pm$ 0.2 % of fsv	$\pm$ 0.1 % of mv	$\pm$ 0.2 °C (-10 to +50 °C) $\pm$ 0.4 °C (remaining range)	$\pm$ 0.4 °C (-100 to +200 °C) $\pm$ 1 °C (remaining range)	$\pm$ 0.01 V	$\pm$ 0.04 mA
Resolution	0.01 bar	0.1 Pa (0638 1347) 0.001 hPa (0638 1447) 0.01 hPa (0638 1547) 0.1 hPa (0638 1647; 0638 1747; 0638 1847)	0.1 °C	0.1 °C	0.01 V	0.01 mA

\*Accuracy information applies only to instrument without probes connected

Oper. temp.	0 to +50 °C	Conn.	Hose: inner $\varnothing$ 4 mm outer $\varnothing$ 6 mm	Measuring rate	from 0.04 seconds	Other features	Mains connection and battery recharging in instrument Automatic recognition of all connected probes 9 measurement units selectable: mbar, hPa, bar, Pa, kPa, inH <sub>2</sub> O, mmH <sub>2</sub> O, torr, psi
Storage temp.	-20 to +70 °C		Display	LCD display with symbol, 7 segment display and point matrix	Dimensions		
Power supply	Battery/Rechargeable battery, Mains unit 12 V	Weight			300 g		
Battery type	9 V (6LR61)	Warranty			2 years		
Battery life	Continuous operation w/ internal pressure sensor: 30 h With rech. battery: 10 h With carbon battery: 18 h	Updating rate in display	2x per second, in fast measurement 4x per second	Material/Housing	ABS		
				PC	RS232 interface		
				Memory	100 kB (corresponds to approx. 25,000 readings)		

Differential pressure probe	Illustration	Meas. range	Accuracy	Overload	Static pressure	Zeroing	Part no.
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	$\pm(0.3 \text{ Pa} \pm 0.5\% \text{ of mv})$	50 hPa	100 hPa	to 20 Pa	0638 1347
			Oper. temp. 0 to +50 °C (compensated)			Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	
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	$\pm 0.03 \text{ hPa}$	50 hPa	1000 hPa	to 0,4 hPa	0638 1447
			Oper. temp. 0 to +50 °C (compensated)			Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	
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	$\pm 0.5\% \text{ of mv (+20 to +100 hPa)}$ $\pm 0.1 \text{ hPa (0 to +20 hPa)}$	300 hPa	1000 hPa	to 4 hPa	0638 1547
			Oper. temp. 0 to +50 °C (compensated)			Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	
Pressure probe, 1000 hPa, measures differential pressure, in robust metal housing with impact protection, incl. quick-closing coupling (M8 x 0.5), magnet for fast attachment		0 to +1000 hPa	$\pm 1 \text{ hPa (0 to 200 hPa)}$ $\pm 0.5\% \text{ of mv (200 to 1000 hPa)}$	2000 hPa	1000 hPa	to 20 hPa	0638 1647
			Oper. temp. 0 to +50 °C (compensated)			Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	
Pressure probe, 2000 hPa, measures differential pressure, in robust metal housing with impact protection, incl. quick-closing coupling (M8 x 0.5), magnet for fast attachment		0 to +2000 hPa	$\pm 2 \text{ hPa (0 to 400 hPa)}$ $\pm 0.5\% \text{ of mv (400 to 2000 hPa)}$	3000 hPa	1000 hPa	to 40 hPa	0638 1747
			Oper. temp. 0 to +50 °C (compensated)			Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	
Absolute pressure probe	Illustration	Meas. range	Accuracy	Overload	Static pressure	Zeroing	Part no.
Pressure probe, 2000 hPa, measures absolute pressure, in robust metal housing with impact protection, incl. quick-closing coupling (M8 x 0.5), magnet for fast attachment		0 to +2000 hPa	$\pm 5 \text{ hPa (0 to +2000 hPa)}$	4000 hPa	—	—	0638 1847
			Oper. temp. 0 to +50 °C			Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	
Relative pressure probe (media compatible)	Illustration	Meas. range	Accuracy	Overload	Zeroing	Part no.	
Low pressure probe, refrigerant-proof stainless steel, up to 10 bar		-1 to +10 bar	$\pm 1\% \text{ of fsv}$	25 bar	to 0,1 bar	0638 1741	
			Oper. temp. -40 to +100 °C 0 to +70 °C (compensated)			Conn.: Plug-in head, connection cable 0409 0202 required	
High pressure probe, refrigerant-proof stainless steel, up to 30 bar		-1 to +30 bar	$\pm 1\% \text{ of fsv}$	120 bar	to 0,3 bar	0638 1841	
			Oper. temp. -40 to +100 °C 0 to +70 °C (compensated)			Conn.: Plug-in head, connection cable 0409 0202 required	
High pressure probe, refrigerant-proof stainless steel, up to 40 bar		-1 to +40 bar	$\pm 1\% \text{ of fsv}$	120 bar	to 0,4 bar	0638 1941	
			Oper. temp. -40 to +100 °C 0 to +70 °C (compensated)			Conn.: Plug-in head, connection cable 0409 0202 required	
High pressure probe, refrigerant-proof stainless steel, up to 100 bar		-1 to +100 bar	$\pm 1\% \text{ of fsv}$	250 bar	to 1 bar	0638 2041	
			Oper. temp. -40 to +100 °C 0 to +70 °C (compensated)			Conn.: Plug-in head, connection cable 0409 0202 required	
High pressure probe, refrigerant-proof stainless steel, up to 400 bar		-1 to +400 bar	$\pm 1\% \text{ of fsv}$	600 bar	to 4 bar	0638 2141	
			Oper. temp. -40 to +100 °C 0 to +70 °C (compensated)			Conn.: Plug-in head, connection cable 0409 0202 required	



Current/voltage probes	Illustration	Meas. range	Accuracy	Conn.	Part no.
Current/voltage cable ( $\pm 1$ V, $\pm 10$ V, 20 mA)		0 to +1000 mV 0 to +10 V 0 to +20 mA	$\pm 1$ mV (0 to +1000 mV) $\pm 0.01$ V (0 to +10 V) $\pm 0.04$ mA (0 to +20 mA)		0554 0007
4 to 20 mA interface for connection and intermittent power supply to transmitters (scaling via hand-held instrument), in robust metal housing with impact protection, incl. magnet for fast attachment		0/4 to 20 mA Channels Auxiliary energy output max. connection load	$\pm 0.04$ mA 1 channel, transmitter connection via terminal board 18V DC $\pm 20\%$ 30 mA	Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	0554 0528
Pitot tubes	Illustration	Meas. range	Accuracy	Oper. temp.	Part no.
Pitot tube, 350 mm long, $\emptyset$ 7 mm, stainless steel, measures flow speed in conjunction with 0638 1347 / 0638 1447 / 0638 1547 pressure probes or testo 521, with internal sensor		350 mm $\emptyset$ 7 mm		0 to +600 °C	0635 2145
Pitot tube, 500 mm long, $\emptyset$ 7 mm, stainless steel, measures flow speed in conjunction with 0638 1347 / 0638 1447 / 0638 1547 pressure probes or testo 521, with internal sensor		500 mm $\emptyset$ 7 mm		0 to +600 °C	0635 2045
Temperature probes	Illustration	Meas. range	Accuracy	t99	Part no.
Quick-action surface probe with sprung thermocouple strip, measuring range short-term to +500 °C		150 mm $\emptyset$ 10 mm	-200 to +300 °C Class 2*	3 s	0604 0194
Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required					
Pipe wrap probe for pipes with diameter of up to 2", for flow/return temp. meas. in hydronic systems		150 mm	-60 to +130 °C Class 2*	5 s	0600 4593
Conn.: Fixed cable					
Super quick-action immersion/penetration probe for measurements in liquids		150 mm $\emptyset$ 1.5 mm	-200 to +600 °C Class 1*	1 s	0604 0493
Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required					
Highly accurate air probe for air and gas temperature measurements with bare, mechanically protected sensor		150 mm $\emptyset$ 9 mm	-40 to +130 °C To UNI curve	60 s	0610 9714
Conn.: Fixed cable					
Accessories	Part no.	Accessories	Part no.		
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument, PUR coating material	0430 0143	Connection hose set, 2 x 1 m, coiled, incl. 1/8" screw connection, pressure-tight up to 20 bar, outer diameter 6.3 mm, inner diameter 4.8 mm	0554 0441		
Cable, 5 m long, connects probe with plug-in head to measuring instrument, PUR coating material	0430 0145	Connection cable, 2.5 m long, for pressure probes 0638 1741/1841/1941/2041/2141	0409 0202		
Connection hose, silicone, 5m long, max. load 700 hPa (mbar)	0554 0440	Adapter for pressure probes, 1/2" outer thread, 1/4" inner thread, for pressure probes 0638 1741/1841/1941/2041/2141	0699 3127		

\*According to standard EN 60584-2, the accuracy of Class 1/2 refers to -40 to +1000/+1200 °C

## testo 316-4

**testo 316-4 Set 1 the fast and reliable leakage detector for all common refrigerants**

**testo 316-4 Set 2 specially for ammonia.**

The sensor is permanently monitored and shows malfunctions or contamination in the display. The use of test leaks is thus no longer necessary. If dirty, the sensor can be easily cleaned and is immediately ready for use again.

When leaks are detected, the display changes from green to red. An audible signal additionally informs of leakages detected. Using the earplug, the testo 316 can also be used in loud surroundings. The maximum indicator function shows maximum leakages and so facilitates the identification of leakage locations. The flexible gooseneck allows the optimum positioning of the sensor close to the piping or the leakage location.

A simple change of sensor by the user turns the 316-4 into an ammonia detector.

## Leakage Detector for Refrigerants

- Very long sensor life
- Optical and audible alarm
- Permanent sensor check
- Easy sensor change by the user
- Earplug socket for secure localization of leakages in loud surroundings
- Maximum indicator shows maximum leakages



### Leakage detector for refrigerants

**Set 1 consisting of testo 316-4, sensor head refr. (CFC, HCFC, HFC, H<sub>2</sub>), case, mains charging unit, earplug)**

Part no.

**0563 3164**

### testo 316-4 Set 2

**Set 2 consisting of testo 316-4, sensor head NH<sub>3</sub>, case, mains charger unit, earplug**

Part no.

**0563 3165**

### Technical data

Meas. parameter	g/a
Detectable	R134a, R22, R404a, H <sub>2</sub> and all common refrigerants such as CFC, HCFC, HFC NH <sub>3</sub> (separate sensor head)
lower reaction threshold	3 g/a
Reaction time	<math>\leq 1</math> s
Leakage alarm	optical and audible alarm
Complies with:	1g/year sensitivity acc. to EN 14624 and E 35-422

Length of gooseneck	370 mm
Start-up time	<math>\leq 50</math> s (0 to +50 °C) <math>\leq 80</math> s (-20 to 0 °C)
Oper. temp.	-20 to +50 °C
Oper. humidity	20 to 80 %RH
Storage temp.	-25 to +70 °C
Power supply	1 battery block (6 cells NiMH)
Battery life	6 h (Continuous operation)
Dimensions	190 x 57 x 42 mm
Weight	348 g
Warranty	24 months (instrument and sensor)

### Accessories

Spare head for refrigerants (CFC, HCFC, HFC, H<sub>2</sub>)

### Part no.

0554 3180

Spare head for ammonia (NH<sub>3</sub>)

0554 3181

### Detectable refrigerants

Refrigerants Refrigerants group	Reference refrigerant (lower response threshold specified)	Refrigerant detectable	Refrigerant selection in instrument
CFC		x	R22
H-CFC		x	R22
H-HFC		x	R404a
R12		x	R22
R22	x	x	R22
R123		x	R22
R134a	x	x	R134a
R404	x	x	R404a
R407a, b, c, d, e		x	R134a
R408		x	R22
R409		x	R22
R410a		x	R134a
R505		x	R22
R507		x	R134a
R600/R600a		x	R22
Hydrogen	x	x	H <sub>2</sub>
Ammonia	x	x	NH <sub>3</sub>
R410a		x	R134a
R124		x	R22
R227		x	R134a
R422d		x	R134a
R11		x	R22
R290		x	H <sub>2</sub>
R508		x	R134a
R427a		x	R404a
R1270		x	R22
R1150		x	R22
R170		x	R134a

## testo 523

The electronic manifold is used to calculate superheating and sub-cooling in a refrigeration system. The pressures measured with the two pressure sensors are immediately converted into temperature values, depending on the refrigerant selected, and displayed on a large, backlit display.

testo 523, electronic refrigeration system analyser, brass connections, calibration protocol and batteries included

Part no.  
**0560 5231**

### testo 523 Set 1

testo 523 refrigeration system analyser, Velcro surface probe

Part no.  
**0563 5234**

### testo 523 Set 3

Refrigeration system analyzer testo 523, pipe clamp probe for pipe diameters 5 to 65, transport case for instrument and accessories

Part no.  
**0563 5236**

### Technical data

Low pressure/High pressure	
Meas. range	25 bar / 50 bar
Overload	50 bar / 100 bar
Accuracy	±0.5% fs (Class 0.5)
±1 digit	
Resolution	0.1 bar
Conn.	3 x 7/16" UNF
Temperature	
Meas. range	-100 to +200 °C
Accuracy	Class B ±(0,3 +0,005 t)
Resolution	0.1 °C
Probe connections	1 x plug-in

### Refrigerants permanently stored in instrument

R12	R290	R402B	R407B	R410A	R500
R1270	R401A	R403B	R407C	R413A	R502
R134a	R401B	R404A	R407D	R414B	R507
R22	R401C	R406A	R408A	R417A	R744
R23	R402A	R407A	R409A	R422D	R718

## Electronic manifold

- Calculation of superheating and sub-cooling in real time
- Display and sightglass illumination
- 2-way valve block
- 1 temperature probe socket
- 30 refrigerants stored in instrument
- Interface to the wireless report printer (optionally available)
- Stowable carabiner hook for easy suspension of the instrument

### testo 523 Set 2

testo 523 refrigeration system analyser, Velcro surface probe, incl. transport case

Part no.  
**0563 5235**

### testo 523 Set 4

Refrigeration system analyzer testo 523, pipe clamp probe for pipe diameters 5 to 65, Testo report printer, spare thermal paper (6 rolls), transport case for instrument and accessories

Part no.  
**0563 5237**

### General technical data

Pressure media	CFC, HFC, N, H2O, CO2
Oper. temp.	-20to +60 °C
Storage temp.	-20to +60 °C
Battery type	4 AA batteries
Battery life	40 h (no light)
Dimensions	260 x 130 x 70 mm
Protection class	IP54
Weight	1250 g



Probes and Accessories on page22

## testo 556

## Electronic refrigeration system analyser with data management

The refrigeration system analyser, with 4-way valve block and 2 pressure sensors included, calculates superheating and subcooling in a refrigeration system or heat pump using externally attachable probes. The flow paths of a system can be temporarily changed with the 4-way valve block.

Convenient data management on a PC with "EasyKool" software.

- On-site printout on Testo printer (optional)
- High-quality sensors measure high/low pressure and temperature
- Calculation of superheating and subcooling in real time
- 4-way valve block with sight glass
- 4 temperature probe sockets (2 x wireless, 2 x wire connection)
- Wireless temperature measurement up to 20 m distance (without obstruction)
- 30 refrigerants are stored in the instrument, more refrigerants can be downloaded free of charge from the Testo website using "EasyKool" software
- 60,000 readings can be stored
- Additional functions (not included in delivery):
  - Current measurement
  - Stock management of refrigerants when filling and evacuating refrigeration systems
  - Connection of refrigerant scales
  - Oil pressure measurement



**testo 556-1, electronic refrigeration system analyser, brass connections, calibration protocol and batteries included**

Part no.  
**0560 5563**

**testo 556-2, electronic refrigeration system analyser, stainless steel connections, calibration protocol and batteries included**

Part no.  
**0560 5564**

### testo 556-1 Set

testo 556-1 refrigeration system analyzer, Velcro surface probe, software with USB data cable, mains unit, lock to secure analyzer, system case for extensive accessories included

Part no.  
**0563 5561**

### testo 556-2 Set

testo 556-2 refrigeration system analyzer, Velcro surface probe, software with USB data cable, mains unit, lock to secure analyzer, NH3 adapter, system case for extensive accessories included

Part no.  
**0563 5562**

### Technical data testo 556 / testo 560

#### Low pressure/High pressure

Meas. range	25 bar / 50 bar
Overload	50 bar / 100 bar
Accuracy	±0.5% fs (Class 0.5)
±1 digit	
Resolution	0,1 bar
Conn.	3 x 7/16" UNF 1 x 5/8" UNF

#### Vacuum

Meas. range	0 to 200 hPa
Overload	3 bar*
Resolution	0,1 mbar

#### Temperature

Meas. range	-100 to +200 °C
Accuracy	Class B ±(0,3 +0,005 t)
Resolution	0.1 °C
Probe connections	2 x plug-in (Pt100) 2 x wireless (TC)

\*Sensor protected from high pressures

#### General technical data

Pressure media	CFC, HFC, N, H2O, CO2
Oper. temp.	-20to +60 °C
Storage temp.	-20to +60 °C
Battery type	4 AA batteries
Battery life	40 h (no light)
Dimensions	260 x 130 x 70 mm
Data store in instrument	60,000 readings
Protection class	IP54
Weight	1400 g

### Refrigerants permanently stored in instruments

R-12	R401A	R404A	R408A	R422a*	R723**
R1270	R401B	R406a*	R409A	R500	R744
R134a	R401C	R407A	R410A	R502	R718
R22	R402A	R407B	R413A	R507	
R23	R402B	R407C	R414b*	R508**	
R290	R403B	R407D	R417A	R717**	

In the case of testo 556 and testo 560, additional refrigerants can be downloaded free of charge using the Testo website and "EasyKool software".

\* only testo 556-1 / 560-1 (brass)

\*\* only testo 556-2 / 560-2 (stainless steel)

## testo 560

The refrigeration system analyser for all applications on refrigeration systems and heat pumps. The measuring instrument with high-quality sensors for measuring pressure, vacuum and temperature. Valve block for temporarily changing the flow paths in the system is included.

A convenient PC software supports data management: data overviews of all measurements, displays in table and graph form, automatic transfer of company, fitter, customer and system data.

testo 560-1, electronic refrigeration system analyser with vacuum sensor, brass connections, calibration protocol and batteries included

Part no.  
**0560 5603**

### testo 560-1 Set

testo 560-1 refrigeration system analyser, Velcro surface probe, software with USB data cable, mains unit, lock to secure analyser, system case for extensive accessories included

Part no.  
**0563 5602**

## Electronic refrigeration system analyser with data management and vacuum sensor

- Vacuum sensor/Evacuation
- The sensor measures absolute pressure and displays the corresponding evaporation temperature of water.
- The vacuum cell is protected from high pressures by a special valve.
- On-site printout on Testo printer (optional)
- High-quality sensors measure high/low pressure and temperature
- Calculation of superheating and subcooling in real time
- 4-way valve block with sight glass
- 4 temperature probe sockets  
(2 x wireless, 2 x wire connection)
- Wireless temperature measurement up to 20 m distance (without obstruction)
- 30 refrigerants are stored in the instrument, more refrigerants can be downloaded free of charge from the Testo website using "EasyKool" software
- 60,000 readings can be stored
- Additional functions (not included in delivery):
  - Current measurement
  - Stock management of refrigerants when filling and evacuating refrigeration systems
  - Connection of refrigerant scales
  - Oil pressure measurement

testo 560-2, electronic refrigeration system analyser with vacuum sensor, stainless steel connections, calibration protocol and batteries included

Part no.  
**0560 5604**

### testo 560-2 Set

testo 560-2 refrigeration system analyser, Velcro surface probe, software with USB data cable, mains unit, lock to secure analyzer, NH3 adapter, system case for extensive accessories included

Part no.  
**0563 5603**



Technical data see page 20

## testo 556 / 560

Save time and money when analysing errors

If the performance of a refrigeration unit slacks off or a system registers "Error", it could be for any number of reasons: air in the refrigerant circuit, leaks in pipes and therefore loss of refrigerant, dirt in evaporators or condensers etc.

By recording the pressures and temperatures measured over a longer period of time, it is not necessary to monitor the system for several hours at a time. The recorded data is analysed in the fastest time on your PC.

testo 556 and testo 560 save all the readings quickly and reliably. Electronic refrigeration system analysers can store over 60,000 readings. In this way, large-scale measurement series lasting several days can be logged without any problem.

Measurement data stored in the analysers is transmitted to your PC using the interface cable. The data is shown in graph or table form.

Issuing logs for customers

"EasyKool" software manages all customer addresses, systems and individual customer and system information. The data recorded relating to repairs, leak tests or evacuations in refrigeration systems can therefore be easily allocated to customers.

The most important data such as customer address, system, refrigerants and date are automatically fed into tables or graphs.

Managing refrigerants and downloading new refrigerants!  
PC software lists all of the available refrigerants. Additional refrigerants can be downloaded at any time to the analysers using the Testo website and software.

Up to 40 refrigerants can be managed on testo 556 and testo 560 at any one time. All – or the refrigerants identified in the list by a mouse click – can be added. In this way each refrigeration system analyser can be individually equipped with refrigerants.


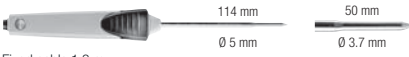




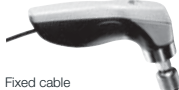

"EasyKool" software can do even more...  
- Reads out and deletes memory con-



- tents of analyzer
- Online measurement
- Refrigerant management
- Import of system data e.g. from Excel

## testo 523, 556, 560

## Probes

Probes testo 523 / testo 556 / testo 560	Illustration	Meas. range	Accuracy	t99	Part no.
Pipe wrap probe with Velcro for pipes from Ø 6 mm to Ø 120 mm, Pt 100, 2.9 m cable length		-100 to +400 °C	Class A	90 s	0609 5602
Robust, waterproof Pt100 immersion/penetration probe	 Fixed cable 1.2 m	-50 to +400 °C	Class A (-50 to +300 °C), Class B (remaining range)	12 s	0609 1273
Robust, waterproof surface temperature probe, Pt100	 Fixed cable 1.2 m	-50 to +400 °C	Class B	40 s	0609 1973
Efficient, robust air probe, Pt100	 Fixed cable 1.2 m	-50 to +400 °C	Class A (-50 to +300 °C), Class B (remaining range)	70 s	0609 1773
Pipe wrap probe for pipe diameter 5 to 65 mm		-50 to +120 °C	Class B	5 s	0609 5605
Probes testo 556 / testo 560	Illustration	Meas. range	Accuracy	t99	Part no.
Current probe for measuring current consumption of compressors, with switchable measuring range		0 to 20/200 A	0 to 9.9 A 4% 10 to 49.9 A 3% 50 to 200 A 2%		0554 5607
Oil pressure probe for checking oil level in the compressor		0 to 25 bar rel	1,5 % of fsv Overload 50 bar		0638 1742
Scales incl. transport case and batteries (0 to 80 kg), incl. data cable, directly connectable to testo 556/560, overload 120 kg, resolution: 0.01 kg					0554 5606


## testo 523, 556, 560

## Accessories


Accessories testo 523 / testo 556 / testo 560	Part no.	Calibration Certificates	Part no.
Testo fast printer with wireless infrared interface, 1 roll thermal paper and 4 AA batteries	0554 0549	ISO calibration certificate relative pressure, 3 measurement points distributed over the measurement range	0520 0085
Spare thermal paper for printer (6 rolls), permanent ink	0554 0568	ISO calibration certificate/absolute pressure, 3 meas. points distributed over meas. range	0520 0185
Lock for wall holder	0554 1747	ISO calibration certificate/temperature, meas. instr. with surface probe; calibration points +60°C; +120°C; +180°C (no wireless probes)	0520 0071
External fast charger for 1-4 AA rech. batteries, incl. 4 Ni-MH rech. batteries with individual cell charging and charge control display, incl. impulse trickle charging, integrated discharge function, with built-in international mains plug, 100-240 V, 300 mA, 50/60 Hz	0554 0610	Calibration for wireless probes: ISO calibration certificate/temperature, single point calibration for surface thermometer; calibration point +60°C	0520 0072
Scales incl. transport case and batteries (0 to 80 kg), incl. data cable, directly connectable to testo 556/560, overload 120 kg, resolution: 0.01 kg	0554 5606	ISO calibration certificate/temperature, for air/immersion probes, calibration points -18°C; 0°C; +60°C	0520 0001
Transport case for measuring instrument and accessories	0516 5013	ISO calibration certificate current probe, 3.5-figure	0520 3105
System case for measuring instrument and extensive accessories	0516 5602	ISO calibration certificate/scales	0520 2620
Accessories testo 556 / testo 560	Part no.		
Plug-in mains adapter, 5 VDC 500 mA with European adapter, 100-250 VAC, 50-60 Hz	0554 0447		
USB connection cable, instrument to PC	0449 0047		
"EasyKool" software with measurement data management, USB data cable included	0554 5604		
Stainless steel adapter for NH3 (ammonia), 3 connection hoses with 7/16" to 1/2" and 1 connection hose 5/8" to 1/2", hose length 24 cm	0554 5561		


**Radio module for upgrading measuring instrument with radio option**

Country versions	Radio freq.	Part no.
Radio module for measuring instrument, 869.85 MHz, approval for the countries: DE, FR, UK, BE, NL, ES, IT, SE, AT, DK, FI, HU, CZ, PL, GR, CH, PT, SI, MT, CY, SK, LU, EE, LT, IE, LV, NO	869.85 MHz FSK	0554 0188
Radio module for measuring instrument, 915.00 MHz FSK, approval for USA, CA, CL	915.00 MHz FSK	0554 0190


Radio probes incl. humidity probe head	Meas. range	Accuracy	Resolution
Radio handle for attachable probe heads with humidity probe head 	0 to +100 %RH -20 to +70 °C	±2 %RH (+2 to +98 %RH) ±0.3 °C	0.1 %RH 0.1 °C
Country versions	Radio freq.	Part no.	
Radio handle for plug-in probe heads, incl. T/C adapter, approval for the countries: DE, FR, UK, BE, NL, ES, IT, SE, AT, DK, FI, HU, CZ, PL, GR, CH, PT, SI, MT, CY, SK, LU, EE, LT, IE, LV, NO	869.85 MHz FSK	0554 0189	
Humidity probe head, attachable to radio handle			0636 9736
Radio handle for plug-in probe heads, incl. T/C adapter, approval for USA, CA, CL	915.00 MHz FSK	0554 0191	
Humidity probe head, attachable to radio handle			0636 9736

**Assembled for you: Radio handles with probe head**

Radio handles with probe head for air-/ immersion-penetration-meas.	Meas. range	Accuracy	Resolution	t <sub>99</sub>
Radio handle for attachable probe heads with T/C probe head for air and immersion/penetration measurement 	-50 to +350 °C Short-term to +500 °C	: ±(0.5 °C + 0.3% of mv) (-40 to +500 °C) ±(0.7 °C + 0.5% of mv) (remaining range) : Class 2	0.1 °C (-50 to +199.9 °C) 1.0 °C (remaining range)	99 t <sub>99</sub> (in water) 10 s
Country versions	Radio freq.	Part no.		
Radio handle for plug-in probe heads, incl. T/C adapter, approval for the countries: DE, FR, UK, BE, NL, ES, IT, SE, AT, DK, FI, HU, CZ, PL, GR, CH, PT, SI, MT, CY, SK, LU, EE, LT, IE, LV, NO	869.85 MHz FSK	0554 0189		
T/C probe head for air/immersion/penetration measurement, attachable to radio handle, T/C Type K				0602 0293
Radio handle for plug-in probe heads, incl. T/C adapter, approval for USA, CA, CL	915.00 MHz FSK	0554 0191		
T/C probe head for air/immersion/penetration measurement, attachable to radio handle, T/C Type K				0602 0293

Radio handles with probe head for surface measurement	Meas. range	Accuracy	Resolution	t <sub>99</sub>
Radio handle for attachable probe heads with T/C probe head for surface measurement 	-50 to +350 °C Short-term to +500 °C	: ±(0.5 °C + 0.3% of mv) (-40 to +500 °C) ±(0.7 °C + 0.5% of mv) (remaining range) : Class 2	0.1 °C (-50 to +199.9 °C) 1.0 °C (remaining range)	99 5 s
Country versions	Radio freq.	Part no.		
Radio handle for plug-in probe heads, incl. T/C adapter, approval for the countries: DE, FR, UK, BE, NL, ES, IT, SE, AT, DK, FI, HU, CZ, PL, GR, CH, PT, SI, MT, CY, SK, LU, EE, LT, IE, LV, NO	869.85 MHz FSK	0554 0189		
T/C probe head for surface measurement, attachable to radio handle, T/C Type K				0602 0394
Radio handle for plug-in probe heads, incl. T/C adapter, approval for USA, CA, CL	915.00 MHz FSK	0554 0191		
T/C probe head for surface measurement, attachable to radio handle, T/C Type K				0602 0394


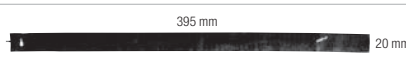



**Radio handles, separate**

Radio handles for attachable T/C probes	Meas. range	Accuracy	Resolution
Radio handle for attachable probe heads incl. adapter for attaching T/C probes (Type K) 	-50 to +1000 °C	±(0.7 °C + 0.3% of mv) (-40 to +900 °C) ±(0.9 °C + 0.5% of mv) (remaining range)	0.1 °C (-50 to +199.9 °C) 1.0 °C (remaining range)
Country versions	Radio freq.	Part no.	
Radio handle for plug-in probe heads, incl. T/C adapter, approval for the countries: DE, FR, UK, BE, NL, ES, IT, SE, AT, DK, FI, HU, CZ, PL, GR, CH, PT, SI, MT, CY, SK, LU, EE, LT, IE, LV, NO	869.85 MHz FSK	0554 0189	
Radio handle for plug-in probe heads, incl. T/C adapter, approval for USA, CA, CL	915.00 MHz FSK	0554 0191	

**Radio probes: General technical data**

Radio immersion/penetration probe, NTC			Measuring rate	0.5 s or 10 s, adjustable on handle	Radio transmission	Unidirectional
Battery type	2 x 3V button cell (CR 2032)	2 AAA micro batteries	Radio coverage	Up to 20 m (without obstructions)	Oper. temp.	-20 to +50 °C
Battery life	150 h (meas. rate 0.5 s) 2 months (meas. rate 10 s)	215 h (meas. rate 0.5 s) 6 months (meas. rate 10 s)			Storage temp.	-40 to +70 °C

**Probes for radio handle**

Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
Fast-action surface probe with sprung thermocouple strip, also for uneven surfaces, measurement range short-term to +500°C, TC Type K 	-60 to +300 °C	Class 2	3 s	0602 0393
Pipe wrap probe with Velcro strip, for temperature measurement on pipes with diameter up to max. 120 mm, T <sub>max</sub> +120°C, TC Type K 	-50 to +120 °C	Class 1	90 s	0628 0020
Pipe wrap probe for pipe diameter 5 to 65 mm, with exchangeable measuring head. Meas. range short-term to +280°C, TC Type K 	-60 to +130 °C	Class 2	5 s	0602 4592
Spare meas. head for pipe wrap probe, TC Type K 	-60 to +130 °C	Class 2	5 s	0602 0092
Clamp probe for measurements on pipes, pipe diameter 15 to 25 mm (max. 1"), meas. range short-term up to +130°C, TC Type K 	-50 to +100 °C	Class 2	5 s	0602 4692



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Measuring Instruments for RPM, Analysis, Current/Voltage

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