



## Measuring Instruments for RPM, Analysis, Current/Voltage



pH

°C

mV

mS/cm

µS/cm

mg/l NaCl

%TPM

rpm

rpm

V

mA

**Overview**

pH electrodes / conductivity measurement sensors and their applications

(Part no. 0650 2063)

(Part no. 0650 1623)

(Part no. 0650 0245)

(Part no. 0650 2064)

**Applications**

Part-aqueous sol. >10% H <sub>2</sub> O		+		–
Part-aqueous sol. <10% H <sub>2</sub> O		0		–
pH measurements at temperatures up to 100 °C	–	–		–
TRIS buffer solutions	0	+		+
Effluent samples	+	+		+
General aqueous solutions	+	+		+
Aquariums	+	+		+
Beer, fruit juice, wine	0	+		0
Yoghurt, cheese		–	+	–
Substances containing protein	–	0	+	–
Emulsions, aqueous		+		0
Emulsions, part aqueous		+		–
Earth (suspension)	0	+		–
Extreme pH values (pH<1, pH>13)	0	0		–
Penetration meas. in meat	–	–	+	–
Penetration meas. in fruit,veg	–	–	+	–
Substances with hydrofluoric acid	–	–		–
Galvanic sewage		+		–
Hot electrolyte	–	0		–
Highly viscous solutions		0		–
Infusion solutions		+		0
Solutions low in ions	–	0		0
Jams		–	+	–
Cosmetic products		0		
Leather, paper	0	–		–
Milk		+	+	+
Pure and rain water	–	+		0
Cream, whipped yoghurt		0	+	–
Brine	0	+		+
Swimming pools	+	+		+
Soaps, detergents		+		–
Aqueous suspensions		+		–
Part-aqueous suspensions		+		–
Pastry, bread		–	+	–

+ suitable

0 suitable in certain cases

– not suitable

**Order no. 0650 2063**

pH universal plastic electrode without temperature sensor

**Order no. 0650 2064**

pH universal plastic electrode with temperature sensor

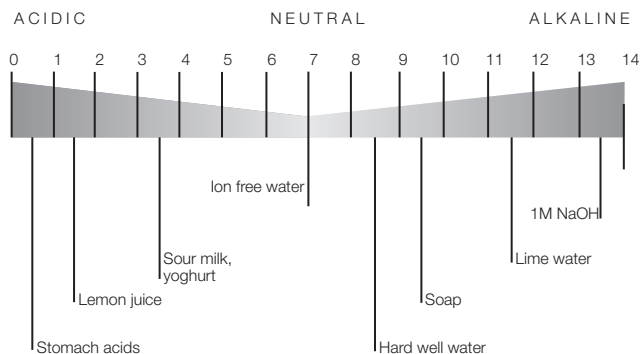
**Order no. 0650 1623**

pH glass electrode with temperature sensor

**Order no. 0650 0245**

pH food electrode without temperature sensor

Analytical instruments are only as accurate as the sensor used. When measuring pH only those probes suited to the particular substance can guarantee an accurate reading.

**Why You Should Choose Analysis Instruments from Testo**
**Examples of the pH values of everyday substances**

**Definition of the pH value**

pH is the abbreviation of the Latin expression „pondus hydrogenii“ (pondus = pressure, hydrogenium = hydrogen).

It is therefore a measure for the activity of the hydrogen ions in a substance. The activity is connected directly to its acidic, neutral or alkaline character.

## Measuring Instruments

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## testo 205

## One-hand pH/°C measuring instrument – Robust and maintenance-free

A robust food penetration pH/°C measuring instrument with automatic temperature compensation. The robust penetration measuring tip is interchangeable and not affected by dirt and dust thanks to the hole diaphragm.

- pH tip embedded in unbreakable plastic
- Combined penetration tip with temperature probe
- Measurement tip can be replaced by user
- Maintenance-free gel electrolyte
- Backlit display
- Audible key feedback
- 2 line display
- Automatic full-scale value recognition
- 1, 2 or 3 point calibration possible



**testo 205 instrument set: One-hand pH/°C measuring instrument with penetration probe, storage cap, gel and calibration bottles 250 ml pH 4+7, belt/wall holder**

Part no.

**0563 2051**

Set	Part no.
testo 205 Starter set: One-hand pH/°C measuring instrument with penetration probe, storage cap, gel and calibration bottles 250 ml pH 4+7, belt/wall holder and aluminium case	0563 2052

Accessories	Part no.
<b>Additional accessories and spare parts</b>	
Spare pH probe for testo 205 with gel storage cap	0650 2051
Storage cap for testo 205 with KCl gel filling	0554 2051
Storage cap for testo 205 with KCl gel filling (pack of 3)	0554 2052
Button cell batteries, Type LR 44, 1.5 Volt (4 off)	0515 0032
pH buffer solution 4.01 in dosing bottle (250 ml) with DAkKS calibration certificate*	0554 2061
pH buffer solution 7.00 in dosing bottle (250 ml) with DAkKS calibration certificate*	0554 2063
pH buffer solution 10.01 in dosing bottle (250 ml) with DAkKS calibration certificate*	0554 2065

\* Successor organization of the DKD

Technical data	
Probe type	pH electrode / NTC
Meas. range	0 to 14 pH 0 to 60 °C (Short-term to +80 °C max. 5 min)
Accuracy	±0.02 pH ±1 digit
Resolution	0.01 pH 0.1 °C
Oper. temp.	0 to +50 °C
Storage temp.	-20 to +70 °C
Battery type	4 x Button cell LR44
Battery life	80 h (Auto Off 10 Min)
Dimensions	145 x 38 x 167 mm
Weight	135 g
Display	LCD, 2 lines

**testo 205, Starter set  
(Part no. 0563 2052)**



One-hand pH/°C measuring instrument with penetration probe, storage cap, gel and calibration bottles 250 ml 4+7, belt/wall holder and aluminium case

## testo 206 pH1

The pH measuring instrument for fast checks on liquids. The combination of pH immersion tip and temperature probe for fast and efficient temperature compensation is unique.

The Testo pH probe is leak-proof, maintenance-free, robust and not affected by dirt thanks to the large volume of gel electrolyte and the dual wall diaphragm.

**testo 206-pH1 instrument set:**  
One-hand pH/°C measuring instrument, pH1 probe head for liquids, storage cap with gel, TopSafe and belt/wall holder

Part no.  
**0563 2061**

## Compact pH tester – For liquids

- TopSafe: Robust, water-tight, hygienic and dishwasher-proof protection case (IP68)
- Maintenance-free gel electrolyte
- Automatic full-scale recognition
- Built-in temperature probe
- 1, 2 or 3 point calibration possible



Easy exchange of probes with testo 205, testo 206-pH1/-pH2/-pH3



pH1 probe head for liquids

Set	Part no.
testo 206-pH1 Starter Set: One-hand pH/°C measuring instrument, pH1 probe head for liquids, storage cap with gel, calibration dosing bottles 250 ml pH 4+7, TopSafe, belt/wall holder and aluminium case	0563 2065
Accessories	Part no.
<b>Additional accessories and spare parts</b>	
Spare pH probe for testo 206 incl. gel storage cap	0650 2061
Storage cap for testo 206 with KCl gel filling	0554 2067
Storage cap for testo 206 with KCl gel filling (pack of 3)	0554 2068
Replacement Li-battery button cell type CR 2032	0515 0028
pH buffer solution 4.01 in dosing bottle (250 ml) with DAKkS calibration certificate*	0554 2061
pH buffer solution 7.00 in dosing bottle (250 ml) with DAKkS calibration certificate*	0554 2063
pH buffer solution 10.01 in dosing bottle (250 ml) with DAKkS calibration certificate*	0554 2065

\* Successor organization of the DKD

Technical data	
<b>Probe type</b>	pH electrode / NTC
<b>Meas. range</b>	0 to 14 pH 0 to 60 °C (Short-term to +80 °C max. 5 min)
<b>Accuracy</b> ±1 digit	±0.02 pH ±0.4 °C
<b>Resolution</b>	0.01 pH 0.1 °C
<b>Oper. temp.</b>	0 to +60 °C
<b>Storage temp.</b>	-20 to +70 °C
<b>No. meas. channels</b>	2 channel
<b>Temperature compensation</b>	Automatic
<b>Meas. rate</b>	2 measurements per second
<b>Battery type</b>	1x CR2032
<b>Material/Housing</b>	ABS with TopSafe, Protection type IP 68
<b>Battery life</b>	80 h (Auto Off 10 min)
<b>Dimensions</b>	197 x 33 x 20 mm
<b>Weight</b>	69 g
<b>Display</b>	LCD, 2 lines

### testo 206-pH1 instrument set (Part no. 0563 2061)



One-hand pH/°C measuring instrument, pH1 probe head for liquids, storage cap with gel, TopSafe and belt/wall holder

### testo 206-pH1 Starter Set (Part no. 0563 2065)



One-hand pH/°C measuring instrument, pH1 probe head for liquids, storage cap with gel, calibration dosing bottles 250 ml pH 4+7, TopSafe, belt/wall holder and aluminium case

## testo 206-pH2

The pH measuring instrument for spot checks on semi-solid food, e.g. jelly, cream, cheese, fruit...

The protection case included "TopSafe" (IP 68) is waterproof, hygienic and dishwasher-safe.

**testo 206-pH2 instrument set:**  
One-hand pH/°C measuring instrument, pH2 probe head for semi-solid substances, storage cap with gel, TopSafe and belt/wall holder

Part no.  
**0563 2062**

## Compact pH tester – For semi-solid food

- pH2 probe head for semi-solid food
- Leak-proof storage gel
- Used for food containing protein
- Combination: pH penetration tip with temperature measurement probe
- Automatic full-scale recognition



Easy exchange of probes with testo 205, testo 206-pH1/-pH2/-pH3



pH2 probe head for semi-solid food

Set	Part no.
testo 206-pH2 Starter Set: One-hand pH/°C measuring instrument, pH2 probe head for semi-solid substances, storage cap with gel, calibration dosing bottles 250 ml pH 4+7, TopSafe, belt/wall holder and aluminium case	0563 2066

Accessories	Part no.
<b>Additional accessories and spare parts</b>	
Spare pH probe pH2 for testo 206 incl. gel storage cap	0650 2062
Storage cap for testo 206 with KCl gel filling	0554 2067
Storage cap for testo 206 with KCl gel filling (pack of 3)	0554 2068
Replacement Li-battery button cell type CR 2032	0515 0028

pH buffer solution 4.01 in dosing bottle (250 ml) with DAKKs calibration certificate*	0554 2061
pH buffer solution 7.00 in dosing bottle (250 ml) with DAKKs calibration certificate*	0554 2063
pH buffer solution 10.01 in dosing bottle (250 ml) with DAKKs calibration certificate*	0554 2065

\* Successor organization of the DKD

Technical data	
Probe type	pH electrode / NTC
Meas. range	0 to 14 pH 0 to 60 °C (Short-term to +80 °C max. 5 min)
Accuracy ±1 digit	±0.02 pH ±0.4 °C
Resolution	0.01 pH 0.1 °C
Oper. temp.	0 to +60 °C
Storage temp.	-20 to +70 °C
No. meas. channels	2 channel
Temperature compensation	Automatic
Meas. rate	2 measurements per second
Battery type	1x CR2032
Material/Housing	ABS with TopSafe, Protection type IP 68
Battery life	80 h (Auto Off 10 min)
Dimensions	197 x 33 x 20 mm
Weight	69 g
Display	LCD, 2 lines

### testo 206-pH2 instrument set (Part no. 0563 2062)



One-hand pH/°C measuring instrument, pH2 probe head for semi-solid substances, storage cap with gel, TopSafe and belt/wall holder

### testo 206-pH2 Starter Set (Part no. 0563 2066)



One-hand pH/°C measuring instrument, pH2 probe head for semi-solid substances, storage cap with gel, calibration dosing bottles 250 ml pH 4+7, TopSafe, belt/wall holder and aluminium case



## testo 206-pH3

testo 206-pH3 is equipped with a BNC socket which makes it possible to connect all pH probes to the instrument. The temperature value supplied is automatically analysed if Testo pH probes are used with a built-in temperature sensor. The temperature can be adjusted manually in probes without a temperature sensor. Automatic recognition of a stable reading facilitates the measurement process. The instrument is ideal for outdoor use or use in tough industrial conditions thanks to the "TopSafe" protection case supplied.

**testo 206-pH3 instrument set:**  
One-hand pH/°C measuring instrument, pH3 probe head with BNC interface, TopSafe and belt/wall holder

Part no.  
**0563 2063**

## Compact pH tester – To connect external probes

- External pH probes can be connected
- Not affected by dirt particles thanks to the TopSafe protective case
- 2 line display
- Automatic full-scale recognition
- 1, 2 or 3 point calibration possible
- All probes on the market can be connected to the BNC adapter
- Testo probes with temperature measurement facilitate temperature compensation



External pH probe attachable



Easy exchange of probes with testo 205, testo 206-pH1/-pH2/-pH3



pH3 probe head with BNC interface

Set	Part no.
testo 206 pH3 – Affordable Set : One-hand pH/°C measuring instrument, pH3 probe head with BNC interface, pH universal plastic electrode without temperature sensor, storage cap with gel, calibration dosing bottles 250 ml pH 4+7, TopSafe, belt/wall holder and aluminium case	0563 2067
testo 206-pH3 Versatile Set: One-hand pH/°C measuring instrument, pH3 probe head with BNC interface, pH universal plastic electrode with temperature sensor, storage cap with gel, calibration dosing bottles 250 ml pH 4+7, TopSafe, belt/wall holder and aluminium case	0563 2068

Accessories	Part no.
<b>Additional accessories and spare parts</b>	
pH universal plastic electrode without temperature sensor*	0650 2063
pH universal plastic electrode with temperature sensor*	0650 2064
Glass pH electrode with temperature sensor*	0650 1623
pH food electrode without temperature sensor*	0650 0245
Replacement Li-battery button cell type CR 2032	0515 0028
Storage solution; 50ml, for electrode type 03 pH and type 13 pH	0554 2318
Electrolyte solutions (50 ml) for storing pH electrodes (in watering cap), KCl 3M for pH electrode 0650 2063, 0650 1623, 0650 2064	0554 2332
Gel storage cap for standard electrodes	0554 2053
pH buffer solution 4.01 in dosing bottle (250 ml) with DAKS calibration certificate**	0554 2061
pH buffer solution 7.00 in dosing bottle (250 ml) with DAKS calibration certificate**	0554 2063
pH buffer solution 10.01 in dosing bottle (250 ml) with DAKS calibration certificate**	0554 2065

\* See pH probes testo 230

\*\* Successor organization of the DKD

Technical data	
<b>Probe type</b>	pH electrode / NTC
<b>Meas. range</b>	0 to 14 pH 0 to 80 °C (depending on the pH probe used)
<b>Oper. temp.</b>	0 to +60 °C
<b>Storage temp.</b>	-20 to +70 °C
<b>Battery life</b>	80 h (Auto Off 10 min)
<b>Dimensions</b>	197 x 33 x 20 mm
<b>Weight</b>	69 g
<b>Display</b>	LCD, 2 lines

### testo 206-pH3 instrument set (Part no. 0563 2063)



One-hand pH/°C measuring instrument, pH3 probe head with BNC interface, TopSafe and belt/wall holder

### testo 206 pH3 – Affordable Set (Part no. 0563 2067)



One-hand pH/°C measuring instrument, pH3 probe head with BNC interface, pH universal plastic electrode without temperature sensor, storage cap with gel, calibration dosing bottles 250 ml pH 4+7, TopSafe, belt/wall holder and aluminium case

### testo 206-pH3 Versatile Set (Part no. 0563 2068)



One-hand pH/°C measuring instrument, pH3 probe head with BNC interface, pH universal plastic electrode with temperature sensor, storage cap with gel, calibration dosing bottles 250 ml pH 4+7, TopSafe, belt/wall holder and aluminium case

## testo 230

## Compact pH/°C measuring instrument

testo 230 combines a complete pH measuring instrument and a high standard thermometer in a compact, waterproof housing.

The instrument has automatic temperature compensation and can be calibrated in the pH range with standard and also with DIN buffers.

- Easy, user-friendly operation
- pH/°C electrodes are connected via a single plug-in connection
- Robust and splashwater-proof (IP 54)
- Easy-to-read large 2 line display
- Latest probe technology for almost every application
- Displays calibration data and error messages
- pH and temperature measuring instrument in one



2 line display

Plug-in connection for pH/°C/redox electrodes

testo 230, analysis instrument, with 2 electrode clips and battery

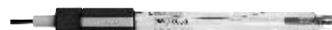
Part no.

**0560 2304**

### pH / °C/ redox electrodes

pH universal plastic electrode without temperature sensor

### Illustration



Meas. range  
0 to +14 pH

Oper. temp.  
0 to +60 °C  
Short-term to +80 °C

Part no.  
0650 2063

pH universal plastic electrode with temperature sensor



0 to +14 pH

0 to +60 °C  
Short-term to +60 °C

0650 2064

Glass pH electrode with temperature sensor

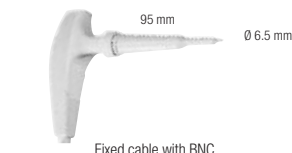


0 to +14 pH

-10 to +80 °C

0650 1623

pH food electrode without temperature sensor



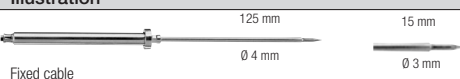
+2 to +14 pH

0 to +40 °C

0650 0245

### Temperature probes

Stainless steel NTC food probe (IP65) with PUR cable



Meas. range  
-50 to +150 °C

Accuracy  
±0.5% of mv (+100 to +150 °C)  
±0.2 °C (-25 to +74.9 °C)  
±0.4 °C (remaining range)

t99  
8 s

Part no.  
0613 2211

Robust NTC food penetration probe with special handle, reinforced PUR cable



-25 to +150 °C <sup>1)</sup>

±0.5% of mv (+100 to +150 °C)  
±0.2 °C (-25 to +74.9 °C)  
±0.4 °C (remaining range)

7 s

0613 2411

<sup>1)</sup> Long-term measurement range +125 °C, short-term +150 °C (2 minutes)



Sets	Part no.
testo 230, Universal set: testo 230 analysis instrument with 2 electrode clips and battery, Testo buffer set pH 4 and 7, 50ml each, universal plastic electrode with temperature sensor and set case (plastic)	0563 2305
testo 230, Food set: testo 230 analysis instrument with 2 electrode clips and battery, Testo buffer set pH 4 and 7, 50ml each, pH food electrode without temperature sensor, storage solution (50ml), robust food penetration probe with special handle (IP 65) and plastic transport case	0563 2308

Accessories	Part no.
<b>Transport and Protection</b>	
Set case (plastic) for measuring instrument, probes and accessories user-friendly arrangement of measuring instrument and accessories	0516 0230
<b>Additional accessories and spare parts</b>	
Gel storage cap for standard electrodes	0554 2053
Testo buffer set pH 4, 7; 50 ml each for calibration in acidic range	0554 2321
Testo buffer set pH 4, 7, 10; 50ml each for calibration in acidic and alkaline range	0554 2320
Electrolyte solutions (50 ml) for storing pH electrodes (in watering cap) KCl 3M for pH electrode 0650 2063, 0650 1623, 0650 2064	0554 2332
Storage solution; 50ml for electrode type 03 pH and type 13 pH	0554 2318
<b>Calibration Certificates</b>	
ISO calibration certificate/water analysis for pH buffer solutions; calibration points 4 pH; 7 pH; 10 pH	0520 0007
ISO calibration certificate/water analysis at 3 pH values over the measuring range	0520 0037

Technical data			
Probe type	pH	NTC	
Meas. range	0 to +14 pH	-50 to +150 °C	
Accuracy ±1 digit	±0.01 pH (0 to +14 pH)	±0.5% of mv (+100 to +150 °C) ±0.2 °C (-25 to +74.9 °C) ±0.4 °C (-50 to -25.1 °C) ±0.4 °C (+75 to +99.9 °C)	
Resolution	0.01 pH	0.1 °C	

Oper. temp.	0 to +40 °C	Temperature compensation: man. -10 to +150°C; auto -50 to +150°C
Storage temp.	-20 to +70 °C	
Display	LCD, 2 lines	
Battery type	9V block battery	
Battery life	100 h	
Dimensions	168 x 72 x 27 mm	
Weight	170 g	
Material/Housing	ABS	
Warranty	2 years	



## testo 270

The cooking oil has been frequently used. Longer use is bad for the quality of the product and can lead to complaints from the customer.

The most important part of the testo 270 cooking oil tester is Testo's new capacitive oil sensor. Using this sensor, measurements are carried out directly in the hot cooking oil which means that control measurements can be quickly carried out while work in the kitchen is in progress. Several deep-fat fryers can be tested back-to-back without the sensor having to cool down.

Maximum use of the cooking oil is made possible. The oil is only changed if the limit value is reached.

Cooking oil tester testo 270 incl. aluminium case, TopSafe, hand strap, reference oil, batteries, adjustment protocol, instruction manual and short instruction manual

Part no.  
**0563 2700**

## Cooking oil tester

- Measurement directly in the deep-fryer
- Sensor is embedded in metal and breakage-proof, can be easily wiped clean thanks to sensor protection layer
- Fast measurement value display in % TPM
- Automatic recognition of measurement end (Auto-Hold %TPM)
- With 2 freely selectable limit values  
Alarm function audible and visual:
  - Lettering "ALARM"
  - 3-colour LED bar (green, yellow, red)
- Configuration menu and limit values can be locked to protect them from external manipulation
- Removable protective case and optional hand strap (dishwasher-proof)
- Conforms to: VO (EG) 1935/2004, EC guideline 2004/108/EC



Washable protective case TopSafe included in delivery



testo 270, set in aluminium case incl. reference oil for monitoring accuracy



Technical data			
Measurement parameters	Total Polar Materials (%TPM) Temperature (°C/°F)	Battery type	2 x AA
Measurement value sensor	Capacitive Testo sensor (%TPM) PTC (°C/°F)	Battery life	approx. 25 h continuous use approx. 500 measurements
Meas. range	0,5 to 40,0 %TPM +40 to +200 °C	Material/Housing	ABS (white) TopSafe as accessory (included)
Accuracy	±2 %TPM (+40 to +190 °C) (at ambient temperature of +25 °C) ±1,5 °C	Alarm function (can be switched off)	2 limit values freely adjustable, 3-colour LED (green, yellow, red), audible alarm when temperature and limit values are violated or at end of measurement (Auto-Hold)
Resolution	0,5 %TPM 0,5 °C/°F	Further displays	Maximum measuring temperature exceeded Minimum measuring temperature exceeded
Cooking oil temperature	+40 to +200 °C	Miscellaneous	Response time TPM < 30 sec. (Prerequisite: measurement value is within accuracy limits) Protection class (with TopSafe) IP 65 Warranty 24 months
Storage temp.	-20 to +70 °C		
Oper. temp.	0 to +50 °C		
Dimensions	Approx. 354 x 50 x 30 mm (incl. TopSafe)		
Weight	Approx. 164 g (incl. batteries, TopSafe, hand strap)		
Display	LCD, 2-line, display illumination		

Accessories	Part no.
<b>Additional accessories and spare parts</b>	
ISO calibration certificate/analysis	0520 0028
calibration points approx. 3 % TPM and approx. 24 %TPM at 50 °C	
Reference oil for calibrating and adjusting the cooking oil tester testo 270 (1 x 100 ml)	0554 2650
Reference oil for calibrating and adjusting the cooking oil tester testo 270 (3 x 100ml)	0554 2651

## Testo buffer solutions with pH 4.01/7.00/10.01

pH buffer solution 4.01 in dosing bottle (250 ml), with DAkkS calibration certificate

Part no. 0554 2061

pH buffer solution 7.00 in dosing bottle (250 ml), with DAkkS calibration certificate

Part no. 0554 2063

pH buffer solution 10.01 in dosing bottle (250 ml), with DAkkS calibration certificate

Part no. 0554 2065



### 1 Filling the dosing chamber

- To attain the right buffer quantity



### 2 Adjusting

- Instrument adjustment in fresh pH buffer solution, no measurement errors caused by used buffer solution



### 3 Emptying the dosing chamber

- Empty dosing chamber following adjustment, i.e. no contamination caused by left over buffer solution



## Gel storage caps

Storage cap for testo 205 with KCl gel filling

Part no. 0554 2051

Storage cap for testo 205 with KCl gel filling (pack of 3)

Part no. 0554 2052

Storage cap for testo 206 with KCl gel filling

Part no. 0554 2067

Storage cap for testo 206 with KCl gel filling (pack of 3)

Part no. 0554 2068

Gel storage cap for standard electrodes

Part no. 0554 2053



The potassium chloride is bonded with the gel and cannot leak out

## Measuring methods for rpm

The measuring methods in rpm measurement can be divided into three main groups:

### 1. Mechanical rpm measurement

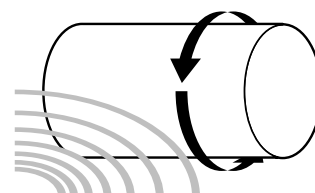
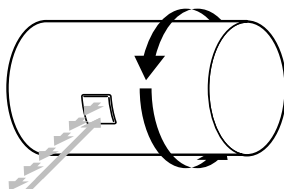
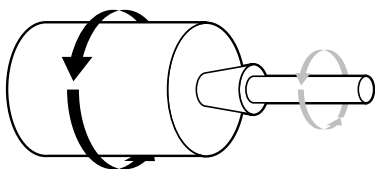
Data acquisition via mechanical measuring sensors is the oldest way to measure rpm. Revolutions in the sensor are electronically analysed in the instrument. This method is still used frequently but mostly for low revolutions between 20 and 20,000 rpm. The disadvantages of this measuring method are the non-constant load movements during measurement which depend largely on the contact pressure. In addition, mechanical rpm measurement cannot be used for small objects. If the revolutions are too high slip may occur.

### 2. Electric method using reflections (optical rpm measurement)

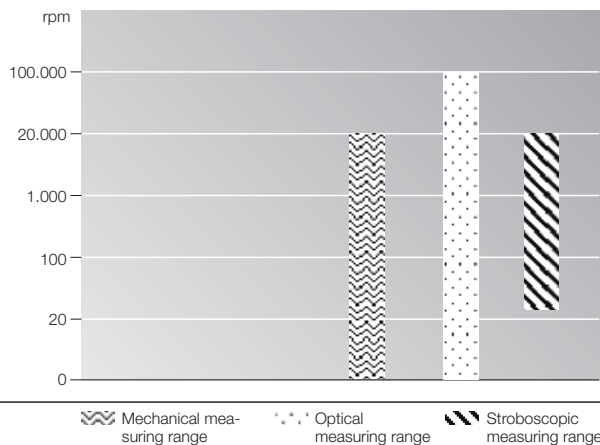
Rotation is transmitted to the measuring instrument via an infrared light beam coming from the instrument which is then reflected by a reflective tape on the object. Please note that the maximum distance between reflective tape and instrument should not be exceeded (distance max. = 600 mm). This method is superior to mechanical rpm measurement. However, it is not always possible to attach reflective tapes.

### 3. rpm measurement using the stroboscopic method

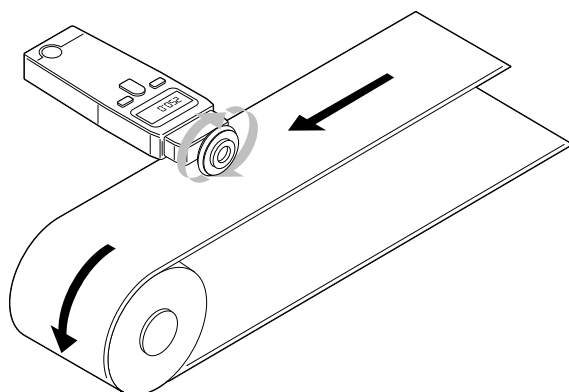
According to the stroboscopic principle, objects are stationary in the eyes of the observer when the frequency of the high-speed flashes is in synchronisation with the rpm (movement) of the object. The stroboscope principle has clear advantages over other measuring methods using mechanical or optical sensors: Using this method it is possible to measure the rpm of very small objects or in inaccessible places. It is not necessary to attach reflective tapes to the objects being measured. For example, production processes do not need to be interrupted. Measuring range: 30 to 20,000 rpm. In addition to rpm measurement the stroboscopic measuring method can also analyse oscillations and monitor motion e.g. in moving diaphragms, loudspeakers etc.



Measuring ranges of the different measuring methods



<b>Note:</b>	
<b>testo 460</b>	measures optically
<b>testo 465</b>	measures optically
<b>testo 470/471</b>	uses mechanical and optical measuring methods
<b>testo 475</b>	uses mechanical and stroboscopic measuring methods
<b>testo 476</b>	uses stroboscopic measuring methods



### Measuring speed and length

Speed and length can be measured using a surface speed disc and a suitable measuring instrument. The running wheel is simply placed on the moving object (e.g. conveyor belt etc.) and the reading can be taken. (Note: do not put too much pressure on the surface speed disc, press lightly).

## testo 460

## Pocket-sized measuring instrument for non-contact rpm measurement

testo 460 optically measures rpm, e.g. of ventilators and shafts. The measurement spot is displayed on the measurement object with an LED marking. Max./min. values are displayed directly at the press of a button. The backlit display allows the measurement values to be easily read out, even in unfavourable light conditions. testo 460 is very handy, small and easy to operate.

- Optical rpm measurement with LED measurement spot marking
- Max./min. values
- Display light
- Protective cap for safe storage
- Incl. calibration protocol
- Reflective markers



testo 460; rpm measuring instrument incl. protective cap, batteries and calibration protocol

Part no.  
**0560 0460**

### Technical data

Meas. range	100 to 29999 rpm
Accuracy	±(0.02 % of mv + 1 digit)
Resolution	0.1 rpm (100 to 999.9 rpm) 1 rpm (1000 to 29.999 rpm)
Selectable units	rpm, rps
Measuring rate	0.5 s
Protection class	IP40

Oper. temp.	0 to +50 °C
Storage temp.	-40 to +70 °C
Battery type	2 batteries Type AAA
Weight	85 g (incl. battery and protective cap)
Warranty	2 years
Dimensions	119 x 46 x 25 mm (incl. protective cap)
Battery life	20 h (average, without display illumination)

### Accessories

Reflectors, self-adhesive (1 pack = 5 off, each 150 mm long)

### Part no.

0554 0493

### Calibration Certificates

### Part no.

#### Accessories and Technical data

ISO calibration certificate/rpm  
Calibration points freely selectable from 10 to 99500 rpm

0520 0114

## testo 465

## Measuring instrument for non-contact rpm measurement

Using testo 465, rpm can be easily measured without contact. Simply attach a reflector to the object to be measured and then point the visible, red light beam at the reflector and measure.

- Easy one-hand operation
- Storage of mean/max/min value, last reading
- Measurement distance up to 600 mm
- Robust design on account of SoftCase (protective case)

testo 465, rpm measuring instrument set: Measuring instrument with SoftCase (protective case) in transport case (plastic), incl. reflectors, batteries and calibration protocol

Part no.  
**0563 0465**

### Technical data

Probe type	Optically with mod. light beam
Meas. range	+1 to +99999 rpm
Accuracy	±0.02% of mv ±1 digit
Resolution	0.01 rpm (+1 to +99.99 rpm) 0.1 rpm (+100 to +999.9 rpm) 1 rpm (+1000 to +99999 rpm)

Oper. temp.	0 to +50 °C
Storage temp.	-20 to +70 °C
Battery type	2 AA batteries or rechargeable battery
Display	5-figure LCD display, 1-line
Weight	145 g
Warranty	2 years
Dimensions	144 x 58 x 20 mm
Battery life	40 h

### Accessories

Reflectors, self-adhesive (1 pack = 5 off, each 150 mm long)

### Part no.

0554 0493

### Calibration Certificates

### Part no.

#### Accessories and Technical data

ISO calibration certificate/rpm  
optical and mechanical rpm measuring instruments; cal. points 500; 1000; 3000 rpm

0520 0012

ISO calibration certificate/rpm  
optical rpm measuring instruments; calibration points 10; 100; 1000; 10000; 99500 rpm

0520 0022

ISO calibration certificate/rpm  
Calibration points freely selectable from 10 to 99500 rpm

0520 0114

DAkS calibration certificate/rpm\*  
Optical rpm probes, 3 points in instrument measurement range (1 to 99,999 rpm)

0520 0422

\* Successor organization of the DKD





## testo 470

testo 470, the ideal combination of optical and mechanical rpm measurement. An optical measurement becomes a mechanical measurement by simply attaching an adapter for probe tip or surface speed disc.

testo 470, rpm measuring instrument set: Instrument with SoftCase (protective case) in transport case, incl. adapter, probe tip, surface speed disc, reflectors, batteries and calibration protocol

Part no.  
**0563 0470**

## Measuring instrument for non-contact and mechanical rpm measurement

- Easy one-hand operation
- Measurement of rpm, speeds and lengths
- Storage of mean/max./min. values, last reading
- Measurement distance up to 600 mm (optical measurement)
- "Low Batt" warning
- Robust design with SoftCase (protective case)



### testo 470 with adapters for versatile measurement applications



Mechanical with probe tip



Mechanical with surface speed disc




Non-contact (optical)

### Technical data

Probe type	Optically with mod. light beam	Mechanical
Meas. range	+1 to +99999 rpm	+1 to +19.999 rpm
Accuracy	±0.02% of mv	±0.02% of mv
±1 digit		
Resolution	0.01 rpm (+1 to +99.99 rpm) 0.1 rpm (+100 to +999.9 rpm) 1 rpm (+1000 to +99999 rpm)	

Oper. temp.	0 to +50 °C
Storage temp.	-20 to +70 °C
Battery type	2 AA batteries
Battery life	40 h
Display	5-figure LCD display, 1-line
Dimensions	175 x 60 x 28 mm
Weight	190 g
Warranty	2 years

	0.1 m	6"	12"
m/min	0.10-1999	0.10-1524	0.40-609.6
ft/min	0.40-6550	0.40-5000	0.40-2000
in/min	4.00-78700	4.00-6000	4.00-24000
m/sec	0.10-33.30	0.10-25.40	0.10-10.16
ft/sec	0.10-109	0.10-83.33	0.10-33.33
m	0.00-99999	0.00-99999	0.00-99999
ft	0.00-99999	0.00-99999	0.00-99999
in	0.00-99999	0.00-99999	0.00-99999
Units	rpm, m/min, ft/min, in/min, m, ft, in		
Accuracy: (±1 digit/0.02 m/1.00 inch depending on resolution)			
Measuring wheels: 0.1m, 6" (included)			

### Accessories

Accessories	Part no.
Reflectors, self-adhesive (1 pack = 5 off, each 150 mm long)	0554 0493
Measuring wheel 12"	0554 4755
Measuring wheel 6"	0554 4754

### Calibration Certificates

Accessories and Technical data	Part no.
ISO calibration certificate/rpm optical and mechanical rpm measuring instruments; cal. points 500; 1000; 3000 rpm	0520 0012
ISO calibration certificate/rpm optical rpm measuring instruments; calibration points 10; 100; 1000; 10000; 99500 rpm	0520 0022
ISO calibration certificate/rpm Calibration points freely selectable from 10 to 99500 rpm	0520 0114
DAkkS calibration certificate/rpm*, Optical rpm probes, 3 points in instrument measurement range (1 to 99,999 rpm)	0520 0422

\* Successor organization of the DKD

## testo 471

With the testo 471, the lengths and speeds of threads, wires or (glass) fibres can be measured. The plug-in thread measurement adapter has a very lightly running, specially coated measuring wheel and a deflection pulley, in order to be able to measure with as little tension as possible.

Optical measurement with reflective tape and mechanical measurement with a surface speed disc or measurement tip are also possible.

testo 471, Measurement of the speeds and lengths of threads

rpm-measurement set:

Measuring instrument in protective SoftCase in transport case, incl. thread measurement adapter, adapter, probe tip, surface speed disc, reflectors, batteries and calibration protocol

Part no.

**0563 4710**

## Measuring instrument for non-contact and mechanical rpm measurement with additional thread measurement adapter

- Measurement of rpm, speeds and lengths (as testo 470)
- Thread measurement adapter for measuring the speed and length of threads, wires and fibres
- Measurement distance up to 600 mm (optical measurement)
- Battery check "Low Bat"
- Robust design



Mechanical with thread counter



Non-contact (optical)



Mechanical with probe tip



Mechanical with surface speed disc



Technical data		
Probe type	Optically with mod. light beam	Mechanical
Meas. range	+1 to +99999 rpm	+1 to +19.999 rpm
Accuracy ±1 digit	±0.02% of mv	±0.02% of mv
Resolution	0.01 rpm (+1 to +99.99 rpm) 0.1 rpm (+100 to +999.9 rpm) 1 rpm (+1000 to +99999 rpm)	

Oper. temp.	0 to +50 °C
Storage temp.	-20 to +70 °C
Battery type	2 AA batteries
Dimensions	175 x 60 x 28 mm
Battery life	40 h
Display	5-figure LCD display, 1-line
Weight	190 g
Warranty	2 years

	0.1 m	6"	12"
m/min	0.10-1999	0.10-1524	0.40-609.6
ft/min	0.40-6550	0.40-5000	0.40-2000
in/min	4.00-78700	4.00-6000	4.00-24000
m/sec	0.10-33.30	0.10-25.40	0.10-10.16
ft/sec	0.10-109	0.10-83.33	0.10-33.33
m	0.00-99999	0.00-99999	0.00-99999
ft	0.00-99999	0.00-99999	0.00-99999
in	0.00-99999	0.00-99999	0.00-99999
Units	rpm, m/min, ft/min, in/min, m, ft, in		
Accuracy: (±1 digit/0.02 m/1.00 inch depending on resolution)			
Measuring wheels: 0.1m, 6" (included)			

Accessories	Part no.
Reflectors, self-adhesive (1 pack = 5 off, each 150 mm long)	0554 0493
Measuring wheel 12"	0554 4755

Calibration Certificates	Part no.
ISO calibration certificate/rpm	0520 0022
optical rpm measuring instruments; calibration points 10; 100; 1000; 10000; 99500 rpm	
ISO calibration certificate/rpm	0520 0012
optical and mechanical rpm measuring instruments; cal. points 500; 1000; 3000 rpm	
ISO calibration certificate/rpm	0520 0114
Calibration points freely selectable from 10 to 99500 rpm	
DAkkS calibration certificate/rpm*, Optical rpm probes, 3 points in instrument measurement range (1 to 99,999 rpm)	0520 0422

\* Successor organization of the DKD

## testo 477

## LED hand-held stroboscope for high revolutions

The testo 477 LED hand-held stroboscope measures rotations and vibrations and facilitates measurements during operation. The stationary image enables the inspection and quality assessment of high-frequency moving parts.

- Extremely wide measurement range: Up to 300,000 flashes per minute (fpm)
- Very high light intensity of up to 1500 Lux
- Long operating time due to long battery life of up to 5 h
- Ideal also for robust applications on account of impact protection and protection class IP65
- Trigger input and output enable connection to external systems and control by an external sensor

testo 477, LED hand-held stroboscope, with case, trigger signal plug, batteries and calibration protocol

Part no.

**0563 4770**



Accessories	Part no.
ISO calibration certificate/rpm, optical and mechanical rpm measuring instruments; cal. points 500; 1000; 3000 rpm	0520 0012
ISO calibration certificate/rpm, optical rpm measuring instruments; calibration points 10; 100; 1000; 10000; 99500 rpm	0520 0022
DAkKS calibration certificate/rpm*, Optical rpm probes, 3 points in instrument measurement range (1 to 99,999 rpm)	0520 0422

\* Successor organization of the DKD

Technical data			
Protection class	IP65	<b>Trigger input</b>	
Meas. range	30 to 300.000 fpm	Principle	Optocoupler
Display	LCD, multiline	Low level	< 1 V
Accuracy	0.02 % ( $\pm 1$ digit)	Level	3 to 32 V (square wave voltage), NPN + PNP
Resolution	$\pm 0.1$ (30 to 999 fpm) / $\pm 1$ (1000 to 300.000 fpm)	Pulse duration	50 $\mu$ s
Flash duration	Can be adjusted	Reverse battery protection	Yes
Flash intensity	1500 Lux at 6000 fpm / 20 cm	<b>Trigger output</b>	
Flash colour	Approx. 6500 K	Principle	Short-circuit and surge-proof transistor output
Service life	NiMH rechargeable battery: Approx. 11 h at 6000 fpm Batteries: approx. 5 h at 6000 fpm	Level	NPN, max. 32 V
Dimensions	191 x 82 x 60 mm	Pulse duration	Can be adjusted
Weight	Approx. 400 g (with battery)	Maximum current	50 mA
Oper. temp.	0 to +45 °C	Reverse battery protection	Yes
Warranty	2 years		

## testo 476

## Light-intensive hand-held stroboscope

The testo 476 Pocket Strobe™ hand-held stroboscope measures and checks rotation and vibration movements. It facilitates the measurement of very small objects or in hard-to-access places. And all without interrupting the production process.

testo 476 is therefore ideal for measuring rpm and inspecting high-frequency moving parts.

The energy optimised switching electronics and light-intensive xenon flash lamp facilitate a high light intensity (approx. 800 lux).

testo 476, Pocket Strobe™ hand-held stroboscope incl. transport case, recharger with 4 country adapters and trigger signal connector

Part no.

**0563 4760**

- High setting accuracy and stability thanks to dynamic setting dial
- High light intensity due to energy optimised switching electronics and powerful xenon flashlamp
- Memory function (last reading is stored when switched off)
- Powerful rechargeable battery pack for min. 2 hours' continuous operation without mains connection over the whole frequency range
- Trigger input for synchronizing flash sequence (long-term observation)
- Tripod connection in housing



Light-intensive xenon flashlamp



### Accessories

### Part no.

Spare xenon flashlamps (2 off) for hand-held stroboscope  
High light intensity

0554 4760

### Calibration Certificates

### Part no.

ISO calibration certificate/rpm  
optical and mechanical rpm measuring instruments; cal. points 500; 1000; 3000 rpm

0520 0012

### Technical data

Meas. range	+30 to +12500 rpm	Display: 5 digit LCD display
Accuracy	±0.01% of mv	Illumination: 800 Lux at distance of approx. 20 cm
±1 digit		Flash energy: max. 150 mJ
Resolution	1 rpm	Flash duration: <20 µs
Oper. temp.	0 to +40 °C	Light colour: 6000 to 6500 K
Dimensions	240 x 65 x 50 mm	Type of operation: Rechargeable battery
Weight	415 g	Mains voltage rech. battery: 100 to 240 V, 50/60 Hz
Display	LCD, 1 line	Battery type: NiMH rech battery pack
Warranty	2 years	Battery charging time: max. 3.5 h
		Total discharge protection: Yes
		Overload protection: Yes
		Trickle charging: Yes
		Connection external trigger: 0 to 5 V DTL/TTL compatible; 3.5 mm / 1/8
		Standard plug: Uout=7.2 V unregulated
		Housing material: ABS
		Operating time: 1h at 30 to 12,500 rpm and 23°C (typically)
		Flash lamp life: 100 mio. flashes

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