



Committing to the future

2010

## Measurement Solutions for Climate Applications in Industry





# Measurement Solutions for Climate Applications in Industry

Measuring tasks in industry place a variety of complex demands on the measuring technology used. It is in light of this challenging task that Testo places a great deal of importance on quality, operating reliability and security of results. A large selection of standard probes and measuring accessories already offers immense flexibility in providing the required measurement solutions. We offer customer-specific probes tailored to special measuring tasks.

Many years of experience gained from industrial applications are incorporated into Testo's in-house research activities, thus ensuring a practical approach to new developments and, in turn, a technological advantage. As such, Testo has assumed a pacesetter role in the market. Real innovations in sensor systems as well as advances made in microelectronics, measurement data storage or communication with other media such as a PC benefit all Testo customers.

This combination of longtime practical experience and close customer proximity as well as theoretical examination – including the area of basic research – increases the utility of Testo measurement solutions for all users and underscores future development.

Testo provides sophisticated measuring instrument variants and services to meet a wide application spectrum. With 1800 employees and 27 subsidiaries, Testo has representation on all continents.

## **Certified reliability**

Quality assurance is serious business. This is why Testo industrial services offers certified calibrations in accordance with all applicable standards (e.g. ISO 9000ff, QS 9000, DKD, ÖKD, Cofrac, NIST, GMP, HACCP, FDA etc.) as well as various services. Calibration takes place in accredited, in-house high-tech laboratories.

## **Qualified service**

Testo offers professional, fair consultation for all questions pertaining to measuring technology. We provide users quick assistance also after the purchase is made – worldwide. Our products have a 10-year service warranty, translating into a long-term and safe investment for our customers.

We are the market leader because we also take all product-related services very seriously: service, support and availability. We set the standard, both before and after the purchase as well as in all application phases.

### Continuing education and qualification

Being a market leader requires not only top-class products, but also the ability to react quickly to changes. In this context, continuing education and qualification play a prominent role at Testo - both internally and externally.

Staying at the cutting edge of knowledge: that is one of the most critical conditions that must be satisfied if complex measuring tasks and increasing quality requirements are to be met.

To this end, our own employees are promoted and advanced in their capacity as much as possible, while users are offered practically-oriented knowledge. Testo imparts knowledge to customers in the areas of measuring technology and application know-how in the form of training courses, seminars and field guides.

## Highly recommended

Renowned companies from many different industry sectors utilize decisive productivity and quality advantages by choosing Testo right from the beginning. Take advantage of a successful partnership as well! More than 100,000 users have already done so.

**PHILIPS**

**ciba**

**Audi**

**RENAULT**

**KRAFT**

**Bayer**

**VIESSMANN**

**Intel Inside**

**IBM**

**Kodak**

**Hoechst**

**Ford**

**MANNESMANN  
Mannesmann & Braun**

**ABB**

**CH**

**Ballson**

**DU PONT**

**SIEMENS**

**Ballson**

**Vaillant**

**ARLING**

**MITSUBISHI  
MITSUBISHI**

**AT&T**

**BASF**

**FERRERO**

**McDonald's**

**Toyota**

**Mercedes**

**Honeywell**

**ratiopharm**

**BOSCH**







## www.testo.com

The international Testo portal provides quick access to our products and services in 86 countries around the world.

Up-to-date information is at your fingertips. Our Internet Website has many features:

- Convenient product search
- Configuration of your individual measuring system
- Many application examples
- Online ordering

- Querying a Testo dealer in your neighbourhood
- Service advice for Testo measuring instruments
- Current trade fair and seminar dates
- Download centre
- Specialised library
- Press releases
- Job offers

Our Internet presence gives visitors of the Testo sites access to comprehensive product information. Online queries and orders are possible same as downloading user and press release information all about measuring technology.

A concise navigation and a list of current topics on the homepage ensure fast entry.



Global entry point: [www.testo.com](http://www.testo.com)



Country-specific Web sites incl. all product catalogues



Detailed product information incl. direct ordering option



A multitude of additional information such as trade fair dates

## Product overview according to instrument classes, with specifications

### Measuring system

testo 454 (from page 48)

testo 400 reference multi-function measuring instrument  
(from page 54)

testo 650 reference humidity measuring instrument  
(from page 54)

### MEasurement data monitoring system

testo Saveris (from page 6)

### Data loggers

testostor 171, testo 175, testo 177 for temperature (from page 18) and humidity (from page 36)

testo 521-3 reference pressure measuring instrument  
(page 72)

### Calibrators

huminator, mini wind tunnel (pages 74, 75)



## Profiles

Air temperature		X	X	X	X	X	X
Surface temperature		X	X	X	X	X	X
Differential temperature				X	X	X	X
Air humidity	X		X	X	X	X	X
Precision humidity				X	X	X	X
Vane	X					X	X
Thermal probe	X					X	X
Pitot tube						X	X
VAC module						X	
Differential pressure		X			X	X	X
External differential pressure probe		X			X	X	X
Absolute pressure		X			X	X	X
CO2					X	X	X
rpm/voltage/current (0 to 20 mA, 0 to 1/10 V)					X	X	X
Number of probe inputs		3	4 max.	4 max.	2	2	81 max.
Data bus							X
Analog output							X
Printout of readings (infrared printer)		X	X		X	X	X
Processing of measurement data on PC		X	X	X	X	X	X
Reading memory		X	X	X	500,000	500,000	from 250,000
Wireless probes				X			
Ethernet probes				X			
Central measurement data monitoring				X			

## testo Saveris™ – Measurement data monitoring for climate applications in industry

In climate applications in industry, exact temperature and humidity values are crucial.

In a number of applications, testo Saveris helps to collect these values wirelessly by Ethernet, to store them securely and to present them. A selection of alarms which can be used flexibly, support those responsible for the system in keeping the values in the required range.

### Typical applications:

- Monitoring of storage and production climate
- Monitoring of humidity values, e.g. in climate cabinets
- Monitoring of temperatures, e.g. in heat treatment or in climat cabinets



The Saveris wireless and Ethernet probes stand out thanks to their reliable transfer of measurement data by wireless and LAN structure.



The testo Saveris base saves all measurement values in its long-term memory, and sends optical and audible alarm reports, e.g. by SMS.

**Now new!**



The testo analog coupler enables the integration of all transmitters with standardized current/voltage interfaces, e.g. 4 to 20 mA

### Note on the radio frequencies

868 MHz: EU countries and certain other countries (e.g. CH, NOR)

2.4 GHz: non-EU countries (country list can be called up under [www.testo.com/saveris](http://www.testo.com/saveris))



The network-capable testo Saveris software offers a central overview of the measurement data, and uninterrupted documentation.





### Saveris set 1

Set 1: 868 MHz, consisting of base 0572 0120, 3 NTC radio probes without display 0572 1110, mains unit for base 0554 1096 and SBE software 0572 0180 incl. USB cable

### Set 1, 868 MHz

Part no. 0572 0110

Set 1: 2.4 GHz, consisting of base 0572 0160, 3 NTC radio probes without display 0572 1150, mains unit for base 0554 1096 and SBE software 0572 0180 incl. USB cable

### Set 1, 2.4 GHz

Part no. 0572 0150

### Saveris set 2

Set 2: 868 MHz, consisting of base 0572 0120, 5 NTC radio probes with display 0572 1120, router 0572 0119, 2 mains units for base and router 0554 1096 and SBE software 0572 0180 incl. USB cable

### Set 2, 868 MHz

Part no. 0572 0111

Set 2: 2.4 GHz, consisting of base 0572 0160, 5 NTC radio probes with display 0572 1160, router 0572 0159, 2 mains units for base and router 0554 1096 and SBE software 0572 0180 incl. USB cable

### Set 2, 2.4 GHz

Part no. 0572 0151

### Saveris set 3

Set 3: 868 MHz, consisting of base 0572 0121 incl. GSM module for SMS alarm, aerial with magnetic base 0554 0525, 5 NTC radio probes with display 0572 1120, router 0572 0119, 2 mains units for base and router 0554 1096 and SBE software 0572 0180 incl. USB cable

### Set 3, 868 MHz

Part no. 0572 0112

Set 3: 2.4 GHz, consisting of base 0572 0161 incl. GSM module for SMS alarm, aerial with magnetic base 0554 0525, 5 NTC radio probes with display 0572 1160, router 0572 0159, 2 mains units for base and router 0554 1096 and SBE software 0572 0180 incl. USB cable

### Set 3, 2.4 GHz

Part no. 0572 0152

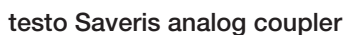




### testo Saveris radio probe

## testo Saveris router

Through the connection of a converter to an Ethernet jack, the signal of a radio probe can be converted into an Ethernet signal. This combines the flexible connection of the radio probe with the use of the existing Ethernet even over long transmission paths.



## Humidity transmitter testo 6651/6681

## testo Saveris Ethernet probe

By connecting a converter to an Ethernet socket, the signal from a wireless probe can be converted to an Ethernet signal. This combines the flexible positioning of a wireless probe with the use of the existing Ethernet even over long transfer distances.

## Temperature/Humidity



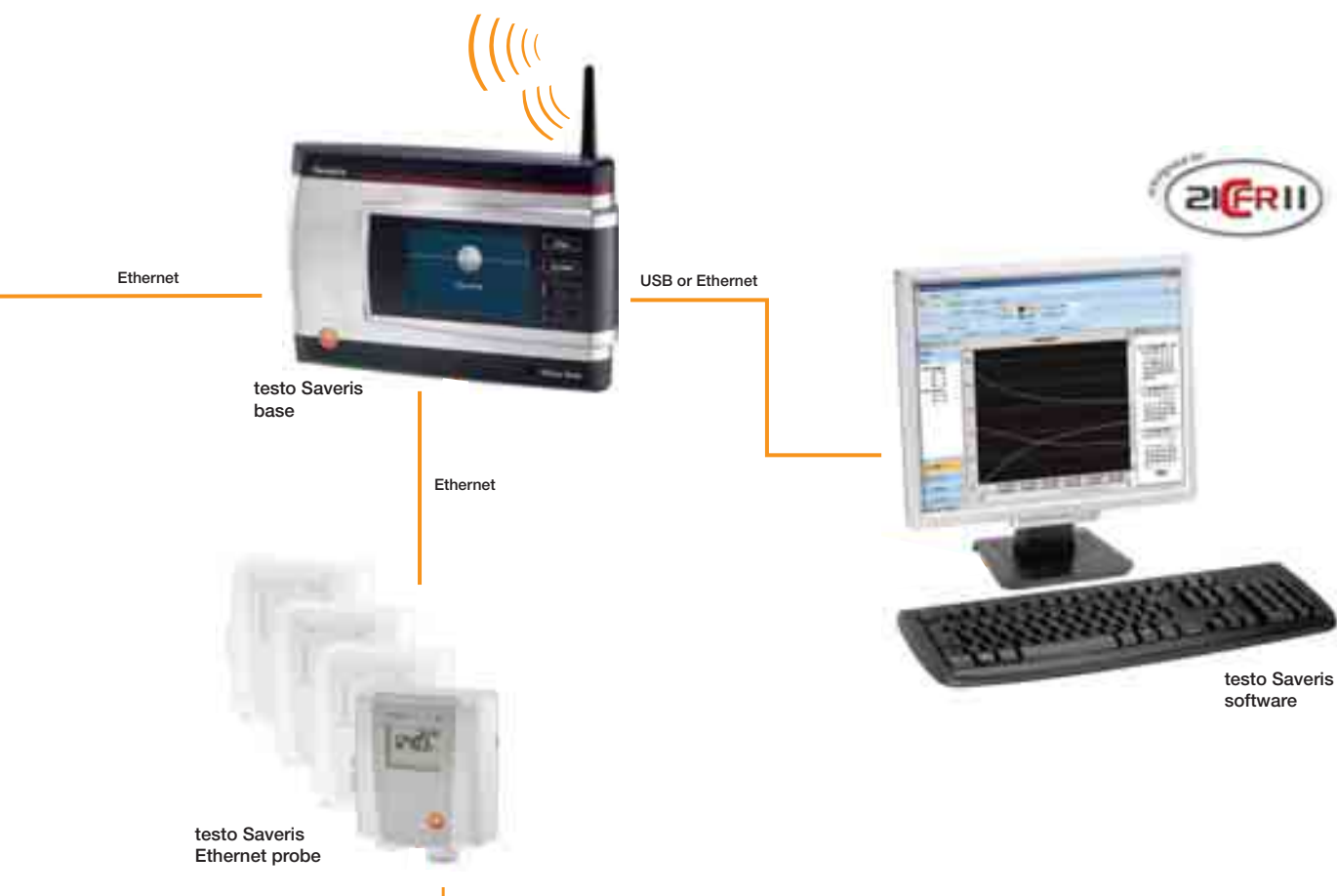
## testo Saveris™ System overview

### testo Saveris base

The base is the heart of testo Saveris and can save 40,000 readings per measurement channel independent of the PC. This corresponds to around one year of memory capacity at a measuring rate of 15 minutes. The system data and alarms are visible via the display of the Saveris base.

### testo Saveris software

The testo Saveris software offers simple operation and an intuitive user interface. The Saveris software is available in two different versions: as the basic version SBE (Small Business Edition) or the PROF (Professional) software version with diverse additional options, or as a CFR version. The CFR software fulfils the requirements of 21 CFR Part 11 of the FDA, and is thus validatable.








Overview of software versions	SBE	PROF	CFR
Simple installation and configuration	•	•	•
Diagrams/tables/alarm overview/PDF reports	•	•	•
Calendar management	•	•	•
Representation of probe groups	•	•	•
Transmission of alarms (e-mail, SMS, relay)	•	•	•
Comprehensive alarm management		•	•
Automatic refresh of measurement data ("Online mode")		•	•
Measurement data on background photo of locations		•	•
Integration into network (client server)		•	•
Conform to 21CFR11 (validatable)			•
Electronic signature			•
Audit trail			•
Allocation of access rights on 3 user levels			•





## testo Saveris™ Components: Radio probes

Probe versions with internal and external temperature sensors and with humidity sensors allow the adaptation to every application. The radio probes are available with or without a display as an option. Current measurement data, the battery status and the quality of the radio link are shown in the display.

		°C / °F			
					
	Radio	<b>Saveris T1</b> Radio probe with internal NTC	<b>Saveris T2</b> Radio probe with external probe connection and internal NTC, door contact	<b>Saveris T3</b> 2-channel radio probe with 2 external TC probe connections (Choice of TC characteristics)	<b>Saveris Pt</b> Radio probe with 1 external Pt100 probe connection
Internal sensor	Probe type	NTC	NTC		
	Meas. range	-35 to +50 °C	-35 to +50 °C		
	Accuracy	±0.4 °C (-25 to +50 °C) ±0.8 °C (remaining range)	±0.4 °C (-25 to +50 °C) ±0.8 °C (remaining range)		
	Resolution	0.1 °C	0.1 °C		
External probe	Probe type		NTC	TC type K	TC type J
	Meas. range (Instrument)		-50 to +150 °C	-195 to +1350 °C	-100 to +750 °C
	Accuracy (Instrument)		±0.2 °C (-25 to +70 °C) ±0.4 °C (remaining range)	TC type T	TC type S
				-200 to +400 °C	0 to +1760 °C
			±0.5 °C or 0.5% of mv		
	Resolution (Instrument)		0.1 °C	0.1 °C / TC type S 1 °C	Pt100
					-200 to +600 °C
					at 25 °C ±0.1 °C (0 to +60 °C) ±0.2 °C (-100 to +200 °C) ±0.5 °C (remaining range)
					0.01 °C
Conn.			NTC via mini-DIN socket, door contact connection cable included in delivery (1.80 m)	2 TCs via TC socket, max. difference in potential 2 V	1 Pt100 via mini-DIN socket
Dimensions (housing):	80 x 85 x 38 mm				
Weight	Approx. 240 g				
Battery life (Type: 4 AA batteries)	Battery life at +25 °C, 3 years; for freezer applications, 3 years with L91 Photo lithium Energizer batteries)				
Material/Housing	Plastic				
Protection class	IP68		IP54		IP68
Radio frequency	868 MHz / 2.4 GHz				
Measuring rate	Standard 15 min, 1 min to 24 h can be set				
Conformity with standards	DIN EN 12830				
Oper. temp.	-35 to +50 °C		-20 to +50 °C		
Storage temp.	-40 to +55 °C				
Display (optional)	LCD, 2 lines; 7-segment with symbols				
Transmission distance	approx. 300 m free field at a frequency of 868 MHz, approx. 100 m free field at a frequency of 2.4 GHz				
Wall bracket	included				

Ordering data Wireless probes	Part no.	Part no.	Part no.	Part no.
	Version without display		Version with display	
	868 MHz	2.4 GHz	868 MHz	2.4 GHz
Saveris T1 Radio probe with internal NTC	0572 1110	0572 1150	0572 1120	0572 1160
Saveris T2 Radio probe with external probe connection and internal NTC, door contact	0572 1111	0572 1151	0572 1121	0572 1161
Saveris T3 2-channel radio probe with 2 external TC probe connections (Choice of TC characteristics)	0572 9112	0572 9152	0572 9122	0572 9162
Saveris Pt Radio probe with 1 external Pt100 probe connection	0572 7111	0572 7151	0572 7121	0572 7161

The alkali manganese batteries AA (0515 0414) are included in these ordering data (analog coupler excluded). Saveris probes are delivered with a calibration protocol of the factory adjustment data. Calibration certificates must be ordered separately.

# testo Saveris™ Components: Radio probes



## Radio

°C / °F and %RH				mA and V	
%RH NTC external		%RH NTC internal		%RH NTC external	
Saveris H2D Wireless humidity probe		Saveris H3 Humidity radio probe		Saveris H4D Wireless probe with 1 external humidity probe connection	
Saveris U1 Wireless probe with current/voltage output					
Internal sensor	Probe type	NTC		Humidity sensor	
	Meas. range	-20 to +50 °C		0 to 100 %RH	
	Accuracy	±0.5 °C		±3 %RH	
	Resolution	0.1 °C		0.1 °C / 0.1 °C td	
External probe	Probe type	NTC	Humidity sensor	NTC	Humidity sensor
	Meas. range (Instrument)	-20 to +50 °C	0 to +100 %RH*	-20 to +70 °C	0 to +100 %RH*
	Accuracy (Instrument)	±0.5 °C	to 90 %RH: ±2 %RH > 90 %RH: ±3 %RH	±0.2 °C	see probes
	Resolution (Instrument)	0.1 °C	0.1% / 0.1 °C td	0.1 °C	0.1% / 0.1 °C td
Conn.		non-exchangeable stump probe		1 x external humidity probe mini DIN socket	
				2 or 4-wire current/voltage output Service interface mini DIN for adjustment	
Dimensions (housing):		85 x 100 x 38 mm		80 x 85 x 38 mm	
Weight		Approx. 256 g		Approx. 245 g	
Battery life (Type: 4 AA batteries)		Battery life at +25 °C, 3 years; for freezer applications, 3 years with L91 Photo lithium Energizer batteries)		Supply: Mains unit 6.3 V DC, 2 to 30 V DC max. 25 V AC	
Material/Housing		Plastic			
Protection class		IP54		IP54	
Radio frequency		868 MHz / 2.4 GHz			
Measuring rate		Standard 15 min, 1 min to 24 h can be set			
Oper. temp.		-20 to +50 °C			
Storage temp.		-40 to +55 °C			
Display (optional)		LCD, 2 lines; 7-segment with symbols		(no display)	
Transmission distance		approx. 300 m free field at a frequency of 868 MHz, approx. 100 m free field at a frequency of 2.4 GHz			
Wall bracket		included			

\*not for continuous high-humidity applications

Ordering data Wireless probes	Part no.	Part no.	Part no.	Part no.
	Version without display		Version with display	
	868 MHz	2.4 GHz	868 MHz	2.4 GHz
Saveris H3Wireless probe with internal humidity sensor	0572 6110	0572 6150	0572 6120	0572 6160
Saveris H2D Wireless probe with external humidity sensor 2%RH, radio frequency 868 MHz (with display)			0572 6122	0572 6162
Saveris H4D Wireless humidity probe with external probe connection, radio frequency 868 MHz (with display)			0572 6124	0572 6164
Saveris U1Analogkoppler with 1 current/voltage output (order mains unit separately)	0572 3110	0572 3150		

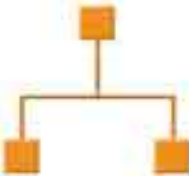



The alkali manganese batteries AA (0515 0414) are included in these ordering data (analog coupler excluded). Saveris probes are delivered with a calibration protocol of the factory adjustment data. Calibration certificates must be ordered separately.





## testo Saveris™ Components: Ethernet probes

The existing LAN infrastructure can be used through the Ethernet probe. This allows the data transfer from the probe to the base, even over long distances. Ethernet probes have a display.

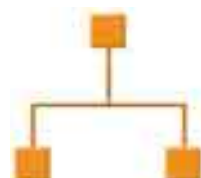
		°C		
	NTC	TC	Pt 100	
	external	external	external	
Ethernet				
	Saveris T1E	Saveris T4 E	Saveris Pt E	
	Ethernet probe with 1 external probe connection NTC	4-channel Ethernet probe with 4 external TC probe connections	Ethernet probe with external Pt100 probe connection	
Internal sensor				
External probe	Probe type	NTC	TC type K	Pt100
	Meas. range (Instrument)	-50 to +150 °C	-195 to +1350 °C	-200 to +600 °C
	Accuracy (Instrument)	±0.2 °C (-25 to +70 °C) ±0.4 °C (remaining range)	TC type T -200 to +400 °C	at 25 °C ±0.1 °C (0 to +60 °C) ±0.2 °C (-100 to +200 °C) ±0.5 °C (remaining range)
	Resolution (Instrument)	0.1 °C	0.1 °C / TC type S 1 °C	0.01 °C
Conn.	1 x NTC via mini DIN socket	4 TCs via TC socket, max. difference in potential 50 V		1 Pt100 via mini-DIN socket
Mini-DIN service interface for adjustment is accessible externally				
Dimensions (housing):	Approx. 85 x 100 x 38 mm			
Weight	Approx. 220 g			
Power	6.3 V DC mains unit; alternatively via 24 V AC/DC plug-in/screw terminals, PoE			
Buffer battery	Li-ion			
Material/Housing	Plastic			
Protection class	IP54			
Measuring rate	2 s to 24 h			
Oper. temp.	-20 to +60 °C			
Storage temp.	-40 to +60 °C			
Power consumption	PoE Class 0 (typical ≤ 3 W)			
Display (optional)	LCD, 2 lines; 7-segment with symbols			
Wall bracket	included			

Ordering data Ethernet probes	Part no.
Saveris T1E Ethernet probe with 1 external probe connection NTC	0572 1191
Saveris T4 E 4-channel Ethernet probe with 4 external TC probe connections (With display)	0572 9194
Saveris Pt E Ethernet probe with external Pt100 probe connection (With display)	0572 7191
Saveris H1 E Humidity Ethernet probe 1% (With display)	0572 6191
Saveris H2 E Humidity Ethernet probe 2% (With display)	0572 6192
Saveris H4E Ethernet humidity probe with external probe connection (with display)	0572 6194
Saveris U1E Ethernet analog coupler with 1 current/voltage output	0572 3190

Saveris probes are delivered with a calibration protocol of the factory adjustment data. Calibration certificates must be ordered separately. Mains units are not included in delivery.



# testo Saveris™ Components: Ethernet probes



Ethernet

°C / °F and %RH							
%RH NTC external		%RH NTC external		%RH NTC external		mA V internal	
<p><b>Saveris H1E</b> Humidity Ethernet probe 1%</p>		<p><b>Saveris H2 E</b> Humidity Ethernet probe 2 %</p>		<p><b>Saveris H4E</b> Ethernet probe with external humidity probe connection</p>		<p><b>Saveris U1E</b> Ethernet probe with current/voltage</p>	
Probe type						1 channel: current/voltage	
Meas. range						2-wire: 4 to 20 mA, 4-wire: 0/4 to 20 mA, 0 to 1/5/10V, load: max. 160 Ω at 24 V DC	
Accuracy						Current ±0.03 mA / 0.75 µA Voltage 0 to 1 V ±1.5 mV / 39 µV Voltage 0 to 5 V ±7.5 mV / 0.17 mV Voltage 0 to 10 V ±15 mV / 0.34 mV ±0.02% of m.v./K deviating from nominal temperature 22 °C	
Resolution							
Internal sensor	Probe type	NTC	Humidity sensor	NTC	Humidity sensor	NTC	Humidity sensor
	Meas. range (Instrument)	-20 to +70 °C	0 to 100 %RH*	-20 to +70 °C	0 to 100 %RH*	0.1 °C	0 to 100 %RH*
	Accuracy (Instrument)	±0.2 °C (0 to +30 °C) ±0.5 °C (remaining range)	to 90 %RH: ±(1 %RH + 0.7 % of mv) at +25 °C > 90 %RH: ±(1.4 %RH + 0.7 % of mv) at +25 °C	±0.2 °C (0 to +30 °C) ±0.5 °C (remaining range)	to 90 %RH: ±(1 %RH + 0.7 % of mv) at +25 °C > 90 %RH: ±(1.4 %RH + 0.7 % of mv) at +25 °C	±0.2 °C (-25 to +70 °C) ±0.4 °C (remaining range)	see external probes
	Resolution (Instrument)	0.1 °C	0.1% / 0.1 °C td	0.1 °C	0.1% / 0.1 °C td	0.1 °C	0.1% / 0.1 °C td
External probe	Conn.					1 x external Ethernet humidity probe mini DIN socket	1 x 2- or 4-wire current/voltage
	Dimensions (housing):					Mini-DIN service interface is accessible externally	
	Weight	Approx. 230 g				Approx. 85 x 100 x 38 mm	Approx. 254 g
	Power	6.3 V DC mains unit; alternatively via 24 V AC/DC plug-in/screw terminals					Approx. 240 g
Buffer battery		Li-ion					
Material/Housing		Plastic					
Protection class		IP54					
Measuring rate		2 s to 24 h					
Oper. temp.		-20 to +60 °C					
Storage temp.		-40 to +60 °C					
Power consumption		PoE Class 0 (typical ≤ 3 W)					
Display (optional)		LCD, 2 lines; 7-segment with symbols					no display
Wall bracket		included					

\*not for continuous high-humidity applications

Sintered caps for Saveris H1 E, H2 E and H2 D Ethernet probes	Illustration	Part no.
Metal protective cap (open), fast reaction time at flow velocities < 7 m/s (not suitable for dusty atmospheres), for measurement in flow velocities of less than 10 m/s		0554 0755
Stainless steel sintered filter, pore size 100 µm, probe protection in dusty atmospheres or higher flow velocities, for measurements at higher flow velocities or in contaminated air		0554 0647
Wire mesh filter, probe protection from coarse particles		0554 0757
Sintered PTFE filter, Ø 12 mm, for corrosive media, High humidity range (long-term measurements), high flow velocities.		0554 0756
testo saline pots for control and humidity adjustment of humidity probes, 11.3 %RH and 75.3 %RH with adapter for humidity probe, quick checks or calibration of humidity probe		0554 0660





## testo Saveris™ Components: Base, Router, Converter and accessories



Base	Part no.
Saveris base, radio frequency 868 MHz	0572 0120
Saveris base, radio frequency 868 MHz, GSM module integrated (for SMS alarm)	0572 0121
Saveris base, radio frequency 2.4 GHz	0572 0160
Saveris base, radio frequency 2.4 GHz, GSM module integrated (for SMS alarm)	0572 0161
No mains units or aerials with magnetic base are contained in this ordering data.	
Power supply	Part no.
Battery for radio probe (4 AA alkali manganese mignon batteries)	0515 0414
Battery for radio probe for use below -10 °C (4 Energizer L91 Photo lithium)	0515 0572
100-240 V AC / 6.3 V DC international mains unit for mains operation or battery charging in instrument	0554 1096
Mains unit (top-hat rail mounting) 90 to 264 VAC/24 VDC (2.5 A)	0554 1749
Mains unit (desk-top) 110 to 240 VAC/24 VDC (350mA)	0554 1748
Other features	Part no.
Magnetic foot aerial (dualband) with 3 m cable, for base with GSM module (not suitable for USA, Canada, Chile, Argentina, Mexico)	0554 0524
Magnetic foot aerial (quadband) for base with GSM module	0554 0525
Alarm module (visual + acoustic), can be connected to base alarm relay, Ø 70 x 164 mm, 24 V AC/DC / 320 mA, perm. light: red, perm. tone: buzzer approx. 2.4 kHz (Mains unit 0554 1749 required)	0572 9999 ID-Nr. 0699 6111/1
Programming adapter (from mini-DIN to USB) for Ethernet probe and converter (necessary if no DHCP server available)	0440 6723

Saveris router	Part no.
Saveris router, 868 MHz, radio transmission medium	0572 0119
Saveris router, 2.4 GHz, radio transmission medium	0572 0159
Saveris converter	Part no.
Saveris converter, 868 MHz, converts the radio transmission medium to Ethernet	0572 0118
Saveris converter, 2.4 GHz, converts the radio transmission medium to Ethernet	0572 0158
No mains units are contained in this ordering data.	
Software	Part no.
SBE software, incl. USB connecting cable base-PC	0572 0180
PROF software, incl. USB connecting cable base-PC	0572 0181
CFR software, incl. Ethernet connection cable PC to Base	0572 0182
Saveris adjustment software incl. connection cable for wireless and Ethernet probes	0572 0183
Calibration Certificates	Part no.
ISO calibration certificate/temperature Temperature probes; calibration points -8 °C; 0 °C; +40 °C per channel/instrument (suitable for Saveris T1/T2)	0520 0171
ISO calibration certificate/temperature Temperature probes; calibration points -18 °C; 0 °C; +60 °C; per channel/instrument (not suitable for Saveris T1/T2)	0520 0151
DKD calibration certificate/temperature Temperature probes; calibration points -20 °C; 0 °C; +60 °C; per channel/instrument (not suitable for Saveris T1/T2)	0520 0261
ISO calibration certificate humidity Humidity probe, calibration points 11.3 %RH and 75.3 %RH at +25 °C/+77 °F; per channel/instrument	0520 0076
DKD calibration cert./humidity Humidity probe, calibration points 11.3 %RH and 75.3 %RH at +25 °C; per channel/instrument	0520 0246

### Magnetic foot aerial (dualband)



Magnetic foot aerial (dualband) with 3 m cable, for base with GSM module (not suitable for USA, Canada, Chile, Argentina, Mexico)

Part no. 0554 0524

### Alarm module



Alarm module (visual + acoustic), can be connected to base alarm relay, Ø 70 x 164 mm, 24 V AC/DC / 320 mA, perm. light: red, perm. tone: buzzer approx. 2.4 kHz (Mains unit 0554 1749 required)  
ID-Nr. 0699 6111/1

Part no. 0572 9999

### Software versions



SBE software, incl. USB connecting cable base-PC

Part no. 0572 0180

PROF software, incl. USB connecting cable base-PC

Part no. 0572 0181

CFR software, incl. Ethernet connection cable PC to Base

Part no. 0572 0182

# testo Saveris™ Technical data



Technical data	
	<b>Saveris-Base</b>
Memory	40,000 values per channel (total max. 10,160,000 values)
Dimensions	225 x 150 x 49 mm
Weight	Approx. 1510 g
Protection class	IP42
Material/Housing	Diecast zinc / plastic
Radio frequency	868 MHz / 2.4 GHz
Power supply (absolutely necessary)	6.3 V DC mains unit; alternatively via 24 V AC/DC plug-in/screw terminals, power consumption < 4 W
Rech. batt.	Li-ion battery (for data back-up and for emergency SMS if power supply fails)
Oper. temp.	-10 to +50 °C
Storage temp.	-40 to +60 °C
Display	graphical display, 4 control keys
Interfaces	USB, radio, Ethernet
Connectable radio probe	max. 15 probes can be directly connected via radio interface, max. 150 total via radio / router / converter / Ethernet, max. 254 channels
Alarm relay	max. 1 A, max. 30 W, max. 60/25 V DC/AC, NC or NO contact
GSM module	850 / 900 / 1800 / 1900 MHz not valid for Japan and South Korea
Set up	Table base and wall bracket included

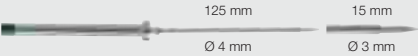
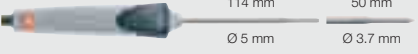



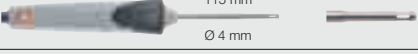
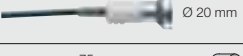
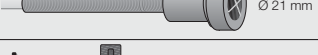
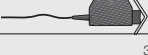
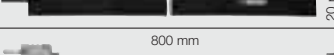
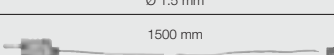
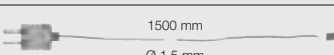

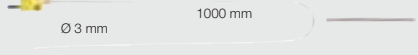
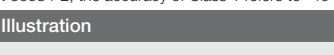
Technical data		
	<b>Saveris router</b>	<b>Saveris converter</b>
Dimensions	Approx. 85 x 100 x 38 mm	Approx. 85 x 100 x 35 mm
Weight	Approx. 180 g	Approx. 190 g
Power supply	6.3 V DC mains unit; alternatively via 24 V AC/DC plug-in/screw terminals, power consumption < 0.5 W	6.3 V DC mains unit; alternatively via 24 V AC/DC plug-in/screw terminals, PoE, power consumption < 2 W
Oper. temp.	-20 to +50 °C	-20 to +50 °C
Storage temp.	-40 to +60 °C	-40 to +60 °C
Material/Housing	Plastic	Plastic
Protection class	IP54	IP54
Interfaces	Radio	Radio, Ethernet
Connectable radio probe	max. 5	max. 15
Wall bracket	included	included





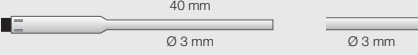
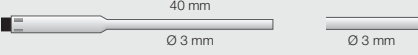
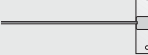
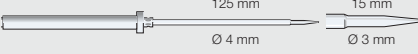
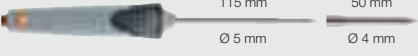



## testo Saveris™ Accessories: External temperature probes

Pt100	Plug-in probes	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
	Robust, Pt100 stainless steel food probe (IP65)	 125 mm Ø 4 mm 15 mm Ø 3 mm	-50 to +400 °C	Class A (-50 to +300 °C), Class B (remaining range)	10 s	0609 2272 Conn.: Fixed cable
	Robust, waterproof Pt100 immersion/penetration probe	 114 mm Ø 5 mm 50 mm Ø 3.7 mm	-50 to +400 °C	Class A (-50 to +300 °C), Class B (remaining range)	12 s	0609 1273 Conn.: Fixed cable
	Connection cable for unlimited Pt100 stationary probes with screw terminals (4-wire technology), max. cable length: 20 m					0554 0213



TC	Plug-in probes	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
	Stationary probe with stainless steel sleeve, TC Type K	 40 mm Ø 6 mm	-50 to +205 °C	Class 2*	20 s	0628 7533 Conn.: Fixed cable 1.9 m
	Robust air probe, T/C Type K	 115 mm Ø 4 mm	-60 to +400 °C	Class 2*	25 s	0602 1793 Conn.: Fixed cable 1.2 m
	Magnetic probe, adhesive force approx. 20 N, with magnets, for measurements on metal surfaces, TC Type K	 35 mm Ø 20 mm	-50 to +170 °C	Class 2*	150 s	0602 4792 Conn.: Fixed cable
	Magnetic probe, adhesive force approx. 10 N, with magnets, for higher temp., for measurements on metal surfaces, TC Type K	 75 mm Ø 21 mm	-50 to +400 °C	Class 2*		0602 4892 Conn.: Fixed cable 1.6 m
	Pipe wrap probe for pipe diameter 5 to 65 mm, with exchangeable measuring head. Meas. range short-term to +280°C, TC Type K	 395 mm 20 mm	-60 to +130 °C	Class 2*	5 s	0602 4592 Conn.: Fixed cable 1.2 m
	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	 395 mm 20 mm	-50 to +120 °C	Class 1*	90 s	0628 0020 Conn.: Fixed cable 1.5 m
	Thermocouple with TC adapter, flexible, 800mm long, fibre glass, TC Type K	 800 mm Ø 1.5 mm	-50 to +400 °C	Class 2*	5 s	0602 0644
	Thermocouple with TC adapter, flexible, 1500mm long, fibre glass, TC Type K	 1500 mm Ø 1.5 mm	-50 to +400 °C	Class 2*	5 s	0602 0645
	Thermocouple with TC adapter, flexible, 1500mm long, PTFE, TC Type K	 1500 mm Ø 1.5 mm	-50 to +250 °C	Class 2*	5 s	0602 0646
	Immersion tip, flexible, TC Type K	 500 mm Ø 1.5 mm	-200 to +1000 °C Class 1*		5 s	0602 5792
	Immersion measurement tip, flexible, for measurements in air/exhaust gases (not suitable for measurements in smelters), TC Type K	 Ø 3 mm 1000 mm	-200 to +1300 °C Class 1*		4 s	0602 5693

\*According to standard EN 60584-2, the accuracy of Class 1 refers to -40 to +1000 °C (Type K), Class 2 to -40 to +1200 °C (Type K), Class 3 to -200 to +40 °C (Type K).

NTC	Plug-in probes	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
	Stub probe, IP 54	 35 mm Ø 3 mm	-20 to +70 °C	±0.2 °C (-20 to +40 °C) ±0.4 °C (+40.1 to +70 °C)	15 s	0628 7510
	Stationary probe with aluminium sleeve, IP 65	 40 mm Ø 6 mm	-30 to +90 °C	±0.2 °C (0 to +70 °C) ±0.5 °C (remaining range)	190 s	0628 7503* Conn.: Fixed cable 2.4 m
	Accurate imm./pen. probe, 6m cable, IP 67	 40 mm Ø 3 mm Ø 3 mm	-35 to +80 °C	±0.2 °C (-25 to +74.9 °C) ±0.4 °C (remaining range)	5 s	0610 1725* Conn.: Fixed cable 6 m
	Accurate immersion/penetration probe, cable: 1.5 m long, IP 67	 40 mm Ø 3 mm Ø 3 mm	-35 to +80 °C	±0.2 °C (-25 to +74.9 °C) ±0.4 °C (-35 to -25.1 °C) ±0.4 °C (+75 to +80 °C)	5 s	0628 0006* Conn.: Fixed cable 1.5 m
	Wall surface temperature probe, e.g. to prove damage in building material		-50 to +80 °C	±0.2 °C (0 to +70 °C)	20 s	0628 7507 Conn.: Fixed cable 3 m
	Stainless steel NTC food probe (IP65) with PUR cable	 125 mm Ø 4 mm 15 mm Ø 3 mm	-50 to +150 °C <sup>2)</sup>	±0.5% of mv (+100 to +150 °C) ±0.2 °C (-25 to +74.9 °C) ±0.4 °C (remaining range)	8 s	0613 2211* Conn.: Fixed cable 1.6 m
	Waterproof NTC immersion/penetration probe	 115 mm Ø 5 mm 50 mm Ø 4 mm	-50 to +150 °C	±0.5% of mv (+100 to +150 °C) ±0.2 °C (-25 to +74.9 °C) ±0.4 °C (remaining range)	10 s	0613 1212 Conn.: Fixed cable 1.2 m
	Pipe wrap probe with Velcro for pipe diameter to max. 75 mm, T <sub>max</sub> +75°C, NTC	 300 mm 30 mm	-50 to +70 °C	±0.2 °C (-25 to +70 °C) ±0.4 °C (-50 to -25.1 °C)		0613 4611 Conn.: Fixed cable 1.5 m

\* Probe tested to EN 12830 for suitability in the transport and storage sectors

2) Long-term meas. range +125°C, short-term +150°C (2 minutes)

%RH	Plug-in probes	Illustration	Meas. range	Accuracy	Part no.
	Humidity / Temperature Probe 12mm	 Ø 12 mm	-20 to +70 °C, 0 to +100 %RH	±0.3 °C, ±2 %RH (2 to 98 %RH)	0572 6172
	Humidity / Temperature Probe 4 mm	 Ø 4 mm	0 to +40 °C, 0 to +100 %RH	±0.3 °C, ±2 %RH (2 to 98 %RH)	0572 6174

The specified accuracy class of the Saveris radio and Ethernet probe is achieved using these external probes.



## testo Saveris™ Examples of applications



### Documentation and alarms

During production and quality assurance, temperatures and humidity values must be recorded in many applications using a monitoring system:

- Heating cabinets
- Refrigerators
- Conditioning chambers/cabinet
- Storage climate
- Production climate...

When limit values are exceeded, an alarm should be issued; in addition the data should be safely stored and centrally compiled into reports for evaluations and proof. testo Saveris is ideally suited for these requirements.



### Avoiding incorrect humidity values in production and storage

Reiner Lippert, Technical Director  
Technocell Dekor GmbH & Co. KG



"With the testo Saveris measurement system, I am certain the the storage of our valuable products is always performed in the appropriate climate. I am immediately alarmed in the event of a breach of limit values."



### Protect valuable investments

When storing sensitive goods, like in the area of server rooms, it is imperative to ensure ideal temperatures (and often also humidity values).

testo Saveris monitors the limit values, sends an SMS or e-mail in the event of an alarm and centrally saves all values.

Thanks to the radio probes, no complex cabling is required. Alternatively, Ethernet probes are also available that rely on the existing IT network for the transmission.



### Recording of series of measurements

- in Research & Development
- in Production & Quality assurance

Jan Konietzny, Head of Department for  
Product Development, Irmischer Automobilbau GmbH & Co. KG



"With testo Saveris, I have the perfect overview over all temperature and humidity data in processes and in the environment. This saves valuable time."





## Overview: Temperature pro data logger in robust housing testostor 171

Type name	testostor 171-0	Ex 171-0	testostor 171-4	testostor 171-1	testostor 171-8
Description	Internal °C NTC	Internal °C NTC with Ex approval	4 x external °C NTC	Internal °C NTC + external °C NTC or %RH/°C	High temperature data logger 4 x external °C T/C
Illustration	<p>All data loggers can be validated<sup>1</sup></p>				
Sensor	NTC	NTC	NTC	NTC (Temperature probe) NTC (Combi-probe °C/%RH)	Type K (NiCr-Ni) Type T (Cu-CuNi)
Meas. range	-35 to +70 °C	-35 to +70 °C	-50 to +120 °C	-50 to +120 °C (ext.) -35 to +70 °C (int.) 0 to +100 %RH	-200 to +1000 °C Type K -50 to +350 °C Type T
Resolution	0.1 °C	0.1 °C	0.1 °C	0.1 °C 0.1 %RH	0.1 °C (-200 to +249.9 °C) 1 °C (+250 to +1000 °C) Type K 0.1 °C (-50 to +249.9 °C) 1 °C (+250 to +350 °C) Type T
Accuracy ±1 digit	±0.5 °C (-35 to +39.9 °C) ±0.6 °C (+40 to +70 °C)	±0.5 °C (-35 to +39.9 °C) ±0.6 °C (+40 to +70 °C)	±0.2 °C (-34.9 to +39.9 °C) ±0.4 °C (+40 to +120 °C) ±0.6 °C (-50 to -35 °C)	±0.2 °C (-35 to +39.9 °C) ±0.4 °C (+40 to +70 °C) (int.) ±0.2 °C (-34.9 to +39.9 °C) ±0.4 °C (+40 to +120 °C) ±0.6 °C (-50 to -35 °C) (ext.) ±2 %RH (+2 to +98 %RH)	±(0.4 °C ±0.2% of mv)
Memory	55000	55000	55000	55000	55000
Oper. temp.	-35 to +70 °C	-35 to +70 °C	-35 to +70 °C	-35 to +70 °C	0 to +70 °C
Storage temp.	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C
Battery type	Lithium battery	Lithium battery	Lithium battery	Lithium battery	Lithium battery
Battery life	> 5 years*	> 5 years*	> 5 years*	> 5 years*	> 5 years*
Dimensions	131 x 68 x 26 mm	131 x 68 x 26 mm	131 x 68 x 26 mm	131 x 68 x 26 mm	131 x 68 x 26 mm
Weight	305 g	305 g	305 g	305 g	305 g
Protection class	IP68	IP68	IP65	IP65	IP42
Warranty	2 years	2 years	2 years	2 years	2 years
Part no.	0577 1719	0577 1730	0577 1714	0577 1715	0577 1718

\*at a measuring rate of 15 mins. (-10 to +50 °C)

## Overview: Temperature compact/pro data logger testo 175/177

Type name	testo 175-T1	testo 175-T2	testo 175-T3	testo 175-S1	testo 175-S2
Description	1 channel temperature logger with internal sensor	2 channel temperature logger with internal sensor and external probe socket	2-channel temperature logger for external thermocouples	1 channel current/voltage logger, e.g. 4 to 20 mA	1 channel current/voltage logger with display
Illustration					
All data loggers can be validated <sup>1</sup>					
Sensor	NTC (internal)	NTC (internal + external)	Type T (Cu-CuNi) or Type K (NiCr-Ni)	Probe: Built-in screwed contact socket	Probe: Built-in screwed contact socket
Meas. range	-35 to +70 °C	-35 to +70 °C (int.) -40 to +120 °C (ext.)	-50 to +1000 °C (Type K) -50 to +400 °C (Type T)	0 to 1 V / 0 to 10 V 0 to 20 mA / 4 to 20 mA	0 to 1 V / 0 to 10 V 0 to 20 mA / 4 to 20 mA
Resolution	0.1 °C (-20 to +70 °C) 0.3 °C (-35 to -20.1 °C)	0.1 °C (-20 to +70 °C) (int.) 0.1 °C (-25 to +70 °C) (ext.) 0.3 °C (remaining range)	0.1 °C	1 mV (0 to 1 mV) 10 mV (1 to 10 mV) 0.01 mA (0 to 20 mA)	1 mV (0 to 1 mV) 10 mV (1 to 10 mV) 0.01 mA (0 to 20 mA)
Accuracy	<b>System internal</b> ±0.5 °C (-20 to +70 °C) ±1 °C (-35 to -20.1 °C)	<b>System internal</b> ±0.5 °C (-20 to +70 °C) ±1 °C (remaining range) <b>Instrument external</b> ±0.3 °C (-25 to +70 °C) ±0.5 °C (remaining range)	<b>Instrument without probes</b> Type K: ±0.7% of mv (+70.1 to +1000 °C) ±0.5 °C (-50 to +70 °C) Type T: ±0.7% of mv (+70.1 to +400 °C) ±0.5 °C (-50 to +70 °C)	<b>System</b> ± 2 mV (0 to 1 V) ± 20 mV (1 to 10 V) ± 0.05 mA (0 to 20 mA)	<b>System</b> ± 2 mV (0 to 1 V) ± 20 mV (1 to 10 V) ± 0.05 mA (0 to 20 mA)
±1 digit					
Memory	7800	16000	16000	16000	16000
Oper. temp.	-35 to +70 °C	-35 to +70 °C	0 to +70 °C	-10 to +50 °C	-10 to +50 °C
Battery life	> 2.5 years*	> 2.5 years*	> 2.5 years*	> 2.5 years*	> 2.5 years*
Measuring rate	10 s ... 24 h	10 s to 24 h	10 s to 24 h	1 s to 24 h	1 s to 24 h
Protection class	IP68	IP68	IP54		
Part no.	0563 1754	0563 1755	0563 1756	0563 1759	0563 1761

Type name	testo 177-T1	testo 177-T2	testo 177-T3	testo 177-T4
Description	1 channel temperature logger with internal sensor for long-term monitoring	1 channel temperature logger with internal sensor for long-term monitoring	3 channel temperature logger with internal sensor, 2 external probe inputs and 1 event input	4 channel temperature logger for external thermocouples
Illustration				
All data loggers can be validated <sup>1</sup>				
Sensor	NTC (internal)	NTC (internal)	NTC (int. + ext.) Event logging e.g. door contact	T/C-Type K, T or J (4 x external)
Meas. range	-40 to +70 °C	-40 to +70 °C	-40 to +70 °C (int.) -40 to +120 °C (ext.)	Type K (NiCr-Ni): -200 to +1000 °C Type T (Cu-CuNi): -200 to +400 °C Type J (Fe-CuNi): -100 to +750 °C
Resolution	0.1 °C	0.1 °C	0.1 °C	0.1 °C
Accuracy	<b>System internal</b> ±0.4 °C (-25 to +70 °C) ±0.8 °C (-40 to -25.1 °C)	<b>System internal</b> ±0.4 °C (-25 to +70 °C) ±0.8 °C (-40 to -25.1 °C)	<b>System internal</b> ±0.4 °C (-25 to +70 °C) ±0.8 °C (-40 to -25.1 °C) <b>Instrument external</b> ±0.2 °C (-25 to +70 °C) ±0.4 °C (remaining range)	<b>System</b> ±0.5% of mv (+70.1 to +1000 °C) ±1.5% of mv (-200 to -100.1 °C) ±0.3 °C (-100 to +70 °C)
±1 digit				
Memory	48000	48000	48000	48000
Oper. temp.	-40 to +70 °C	-40 to +70 °C	-40 to +70 °C (int.) -40 to +120 °C (ext.)	0 to +70 °C
Battery life	> 5 years*	> 5 years*	> 5 years*	> 5 years*
Measuring rate	2 s to 24 h	2 s to 24 h	2 s to 24 h	2 s to 24 h
Protection class	IP68	IP68	IP67	IP43
Part no.	0563 1771	0563 1772	0563 1773	0563 1774

\*at a measuring rate 15 min (-10 to +50 °C)



## The long-term, in full metal housing

### testostor 171-0

testostor 171-0 is a temperature data logger in a full-metal housing with built-in temperature probe. A long life is guaranteed even in tough conditions.

The data is read out to a PC via the attachable interface.

- 1 channel: internal °C
- Large memory for up to 55,000 readings
- Tamperproof readings
- Theft-proof mounting
- Waterproof, robust metal housing, IP68

### testostor 171-0

**Internal °C**  
testostor 171-0, temperature data logger, incl. starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

**Part no. 0577 1719**



testostor 171-0 monitors fluctuations in temperature constantly

Transport and Protection	Part no.
Holder with lock for data logger, theft-proof	0554 1782
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport	0516 0117
PC software and accessories	Part no.
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface)	0554 0830
ComSoft 3 - For requirements to CFR 21 Part 11, incl. database, analysis and graphics function, data analysis, trend curve (w/o interface)	0554 0821
Interface, attachable to testostor 171 data logger	0554 1781
Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit, facilitates data communication in network	0554 1711
Spare battery for testostor 171, quick and easy battery replacement	0515 0018
Calibration Certificates	Part no.
ISO calibration certificate/temperature, temperature probe; calibration points -18°C; 0°C; +60°C per channel/instrument	0520 0151
DKD calibration certificate/temperature, Temperature probe; cal. points -20°C; 0°C; +60°C (-4 °F, 92 °F, 140 °F); per channel/instrument	0520 0261
ISO calibration certificate/temperature, temp. data logger; calibration points -8°C; 0°C; +40°C per channel/instrument	0520 0171

Technical data	
Meas. range	-35 to +70 °C
Accuracy	±0.5 °C (-35 to +39.9 °C)
±1 digit	±0.6 °C (+40 to +70 °C)
Resolution	0.1 °C
Material/Housing	Aluminium, anodized
Protection class	IP68
Memory	55000
Oper. temp.	-35 to +70 °C
Storage temp.	-40 to +85 °C
Dimensions	131 x 68 x 26 mm
Weight	305 g
Battery life: lithium battery up to 5 years	
Software: menu-driven from Microsoft Windows 95 / ME / 2000 / XP / Vista	



## Data logger for Ex zone

### Ex 171-0

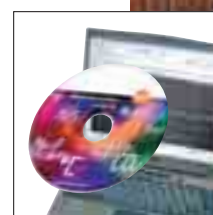
The Ex 171-0, in its extremely robust metal housing, guarantees a high measuring accuracy level for long-term measurements in hazardous areas.

The interface to download the data to your PC is attached outside the hazard area. The data is analysed in table or graphics form via easy-to-use software.

- 1 channel: Internal °C
- Large memory for 55,000 readings
- Tamper-proof readings
- Theft-proof mounting
- Water-proof, robust metal housing, IP 68



Data logger Ex 171-0



Data analysis with easy-to-use Windows® software



Temperature monitoring in hazardous areas

#### Ex 171-0

##### Internal °C

Ex 171-0, Temperature data logger, incl. starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

Part no. 0577 1730



Transport and protection	Part no.
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport. Not for use in Ex-zone	0516 0117
Holder with lock for data logger, theft-proof	0554 1782
Software and Accessories	Part no.
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface). Not for use in Ex-zone	0554 0830
ComSoft 3 - For requirements to CFR 21 Part 11, incl. database, analysis and graphics function, data analysis, trend curve (w/o interface). Not for use in Ex-zones	0554 0821
Interface, attachable to to teststor 171 data logger. Not for use in Ex-zone	0554 1781
Calibration Certificates	Part no.
ISO calibration certificate/temperature, temperature probe; calibration points -18°C; 0°C; +60°C per channel/instrument	0520 0151
ISO calibration certificate/temperature, temp. data logger; calibration points -8°C; 0°C; +40°C per channel/instrument	0520 0171
DKD calibration certificate/temperature, Temperature probe; cal. points -20°C; 0°C; +60°C (-4 °F, 92 °F, 140 °F); per channel/instrument	0520 0261



TÜV 00 ATEX 1586

#### Recommended Set: Ex 171-0, The Set in the Case

Ex 171-0, Temperature data logger, incl. starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately	0577 1730
ComSoft 3 - Professional with data management	0554 0830
Interface, attachable to to teststor 171 data logger. Not for use in Ex-zone	0554 1781
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport. Not for use in Ex-zone	0516 0117

Technical data			
Probe type	NTC (internal)	Battery type	Lithium battery
Meas. range	-35 to +70 °C	Dimensions	131 x 68 x 26 mm
Accuracy	±0.5 °C (-35 to +39.9 °C)	Weight	305 g
±1 digit	±0.6 °C (+40 to +70 °C)	Protection class	IP68
		Warranty	2 years
Resolution	0.1 °C	Battery life: Lithium battery up to 5 years	
Oper. temp.	-35 to +70 °C	Software: Menu-driven from Microsoft	
Storage temp.	-40 to +85 °C	Windows 95 / ME / 2000 / XP / Vista	
Memory	55000		
Material/Housing	Aluminium, anodized		



## The long-termers with external probes

### testostor 171-1

You can place the testostor 171-1 data logger beside the goods and attach the separate probe to doors or refrigeration appliances up to 12 m away. Air moisture can also be checked, if required.

- 2-channel: Internal °C or %RH/°C (testostor 171-1)
- 4-channel: 4 x external °C NTC (testostor 171-4)
- Recording of up to 55,000 readings
- Probe can be positioned quickly and easily
- Tamperproof measured data

### testostor 171-4

testostor 171-4 with up to 4 external temperature probe connections, for recording temperature simultaneously in different places.



testostor 171-1, external probe connection positionable up to 12 m distance



Data analysis on your PC/notebook with easy-to-use Windows® software



Recording temperature differences in different places with testostor 174-4

#### testostor 171-1

**Int.: °C + Ext.: °C or %RH/°C**

testostor 171-1, temperature data logger with °C/%RH probe connection, incl. starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

**Part no. 0577 1715**

#### testostor 171-4

**4 x external °C**

testostor 171-4, temperature data logger, 4 channels, with starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

**Part no. 0577 1714**



Temperature probes (NTC)	Illustration	Meas. range	Accuracy	Reaction time	Part no.
Robust immersion/air probe, quick-action, 6m cable, IP68 probe tip	40 mm Ø 3 mm	-50 to +80 °C	±0.2 °C (-25 to +80 °C) ±0.4 °C (-50 to -25.1 °C)	5 s t <sub>99</sub> (in water)	0610 1720 <b>Conn.:</b> Fixed cable, 6 m
Robust, accurate, waterproof food probe (IP65), made of stainless steel	125 mm Ø 4 mm	-50 to +120 °C	±0.2 °C (-25 to +80 °C) ±0.4 °C (-50 to -25.1 °C) ±0.5 °C (+80.1 to +120 °C)	10 s t <sub>99</sub> (in water)	0610 2217 <b>Conn.:</b> Fixed cable, 2 m
Pipe probe with Velcro, measures flow/return temperature, pipe diameter max. 80 mm	Ø 80 mm	-50 to +80 °C	±0.2 °C (-25 to +80 °C) ±0.4 °C (-50 to -25.1 °C)		0610 4617 <b>Conn.:</b> Fixed cable, 3 m
Wall surface temperature probe, e.g. provides proof of damage to building material, cable 6.1m long, probe tip 40x15x0.2 mm	40x15x0.2 mm	-50 to +120 °C	±0.5 °C (-50 to +120 °C)	20 s t <sub>90</sub>	0628 0007 <b>Conn.:</b> Fixed cable, 6 m

Humidity/temperature probes	Illustration	Meas. range	Accuracy	t <sub>90</sub>	Part no.
Humidity/temperature probe with standard plastic protection cap	180 mm Cable/length: 3 m Ø 12 mm	0 to +100 %RH -20 to +70 °C	±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C) ±0.5 °C (remaining range)	12 s	0636 9717
Mini humidity/temperature module for measurements at inaccessible points, module cable 1.5m long, probe tip 49x18x7mm	49x18x7 mm Cable/length: 1.5 m	0 to +100 %RH -20 to +120 °C	±2 %RH (+2 to +98 %RH) ±0.5 °C (-20 to +120 °C)	20 s	0628 0008

# testostor 171-1 / testostor 171-4 Accessories / Technical data

Transport and protection	Part no.
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport	0516 0117
Holder with lock for data logger, theft-proof	0554 1782
Software and Accessories	Part no.
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface)	0554 0830
ComSoft 3 - For requirements to CFR 21 Part 11, incl. database, analysis and graphics function, data analysis, trend curve (w/o interface)	0554 0821
Interface, attachable to to testostor 171 data logger	0554 1781
Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit, facilitates data communication in network	0554 1711
Spare battery for testostor 171, quick and easy battery replacement	0515 0018
Calibration Certificates	Part no.
ISO calibration cert./temperature, temperature data logger; calibration points selectable from -196 to +1260°C	0520 0141
ISO calibration certificate/temperature, temp. data logger; calibration points -8°C; 0°C; +40°C per channel/instrument	0520 0171
DKD calibration certificate/temperature, data logger, transmitter, probe without display; cal. points freely selectable from -196 to +1000°C	0520 0281
ISO calibration certificate humidity, Calibration points 11.3 %RH and 75.3 %RH at +25°C	0520 0006
ISO calibration certificate humidity, calibration points 11.3 %RH and 75.3 %RH at +25 °C/+77 °F; per channel/instrument	0520 0076
DKD calibration certificate/humidity, electronic hygrometers; calibration points 11.3%RH and 75.3%RH at +25°C	0520 0206
DKD calibration cert./humidity, humidity data logger; cal. points 11.3%RH and 75.3%RH at +25°C; per channel/instrument	0520 0246

## Recommended Set: testostor 171-1, Standard set

testostor 171-1, temperature data logger with °C/%RH probe connection, incl. starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately	0577 1715
Robust immersion/air probe, quick-action, 6m cable, IP68 probe tip	0610 1720
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface)	0554 0830
Interface, attachable to to testostor 171 data logger	0554 1781
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport	0516 0117

## Recommended Set: testostor 171-4, 4 x temperature measurement at different locations

testostor 171-4, temperature data logger, 4 channels, with starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately	0577 1714
4 x Robust immersion/air probe, quick-action, 6m cable, IP68 probe tip	0610 1720
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface)	0554 0830
Interface, attachable to to testostor 171 data logger	0554 1781
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport	0516 0117

Technical data, testostor 171-1			
Probe type	NTC (ext.)	NTC (int.)	Testo humid. sensor, cap.
Meas. range	-50 to +120 °C	-35 to +70 °C	0 to +100 %RH
Accuracy ±1 digit	±0.2 °C (-34.9 to +39.9 °C) ±0.4 °C (+40 to +120 °C) ±0.6 °C (-50 to -35 °C)	±0.2 °C (-35 to +39.9 °C) ±0.4 °C (+40 to +70 °C)	±2 %RH (+2 to +98 %RH)
Resolution	0.1 °C	0.1 °C	0.1 %RH
Technical data, testostor 171-4			
Probe type	NTC (ext.)	Accuracy	±0.2 °C (-34.9 to +39.9 °C) ±0.4 °C (+40 to +120 °C) ±0.6 °C (-50 to -35 °C)
Meas. range	-50 to +120 °C	±1 digit	
Resolution	0.1 °C		
Common Technical Data			
Oper. temp.	-35 to +70 °C	Dimensions	131 x 68 x 26 mm
Storage temp.	-40 to +85 °C	Warranty	2 years
Battery type	Lithium battery	Meas. rate: 2 s to 24 h, selectable	
Material/Housing	Aluminium, anodized	Battery life: up to 5 years with lithium battery	
Protection class	IP65	Software: menu-driven from Microsoft Windows 95 / ME / 2000 / XP / Vista	
Memory	55000		
Weight	305 g		



## The high temperature logger with heat protection

### testostor 171-8

testostor 171-8, a compact data logger with 4 external thermocouple connections. The data logger is equipped for two different types of thermocouple:

- Type K (NiCr-Ni), quick-action probes for measurements from -200 to +1000°C

- Type T (Cu-CuNi), fast, accurate probes for measurements from -50 to +350°C

When the heat-proof case is used, the data logger can handle processes with an operating temperature of up to +200°C

- 4 channel: 4 x external °C
- Large memory for up to 55,000 readings
- Connection to all Testo thermocouple probes (Type K/T) possible with thermocouple plug



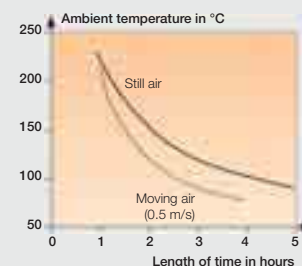
Convenient data analysis with ComSoft3, presentation as a graph or table



Monitors temperatures in a hardening furnace



Heat-proof case, aluminium full metal housing (anodized), 269 x 160 x 90 mm



The diagram shows how long testostor 171-8 in a heat-proof case can be subjected to a certain ambient temperature before the maximum inner temperature of +70°C is reached.

### testostor 171-8

#### 4 x external °C

testostor 171-8, temperature measurement data storage device, 4-channel, incl. starter magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

Part no. 0577 1718

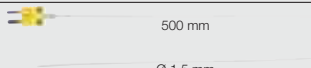
Temperature probes (thermocouples)	Illustration	Meas. range	Accuracy	t99	Part no.
Pipe wrap probe for pipe diameter 5 to 65 mm, with exchangeable measuring head. Meas. range short-term to +280°C, TC Type K		-60 to +130 °C	Class 2*	5 s	0602 4592 Conn.: Fixed cable, 1.2 m
Spare meas. head for pipe wrap 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 Conn.: Fixed cable, 1.2 m
Magnetic probe, adhesive force approx. 20 N, with magnets, for measurements on metal surfaces, TC Type K		-50 to +170 °C	Class 2*		0602 4792 Conn.: Fixed cable
Magnetic probe, adhesive force approx. 10 N, with magnets, for higher temp., for measurements on metal surfaces, TC Type K		-50 to +400 °C	Class 2*		0602 4892 Conn.: Fixed cable, 1.6 m
Immersion tip, flexible, TC Type K		-200 to +1000 °C	Class 1*	5 s	0602 5792
Thermocouple with TC adapter, flexible, 800mm long, fibre glass, TC Type K		-50 to +400 °C	Class 2*	5 s	0602 0644
Thermocouple with TC adapter, flexible, 1500mm long, fibre glass, TC Type K		-50 to +400 °C	Class 2*	5 s	0602 0645
Thermocouple with TC adapter, flexible, 1500mm long, PTFE, TC Type K		-50 to +250 °C	Class 2*	5 s	0602 0646

\*According to EN 60584-2, the accuracy of the Class 2 refers to -40 to +1200 °C (Type K), Class 1 to -40 to +1000 °C, Class 3 to -200 to +40 °C

Possibility of connecting all Testo thermocouple probes (Type K/T) with thermocouple plug



# testostor 171-8 Accessories / Technical data

Immersion/penetr. probes	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
Flexible, low-mass immersion measurement tip, ideal for measurements in small volumes such as petri dishes, or for surface measurements (e.g. attached with adhesive tape), TC Type K		-200 to +1000 °C <b>Conn.:</b> 2 m, FEP insulated thermal wire, temperature proof up to 200 °C, oval wire with dimensions: 2.2 mm x 1.4 mm	Class 1	1 s	0602 0493
Immersion tip, flexible, TC Type K		-200 to +40 °C	Class 3	5 s	0602 5793

Accessories, Transport and Protection	Part no.
Heat-proof case with heat-proof insert, rubber seal, 4 clamp screw connections for thermocouples with diameter of 1.5 mm, protects testostor 171-8 from hot environment, dimensions 260 x 160 x 90 mm	0553 1701
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport	0516 0117
Holder with lock for data logger, theft-proof	0554 1782
Extension cable, 5m, for thermocouple probe Type K	0554 0592
Spare battery for testostor 171, quick and easy battery replacement	0515 0018
Software and Accessories	
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface)	0554 0830
ComSoft 3 - For requirements to CFR 21 Part 11, incl. database, analysis and graphics function, data analysis, trend curve (w/o interface)	0554 0821
Interface, attachable to testostor 171 data logger	0554 1781
Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit, facilitates data communication in network	0554 1711
Calibration Certificates	
ISO calibration cert./temperature, temperature data logger; calibration points selectable from -196 to +1260°C	0520 0141
ISO calibration certificate/temperature, temp. data logger; calibration points -8°C; 0°C; +40°C per channel/instrument	0520 0171
DKD calibration certificate/temperature, data logger, transmitter, probe without display; cal. points freely selectable from -196 to +1000°C	0520 0281

## Recommended Set: testostor 171-8

testostor 171-8, temperature measurement data storage device, 4-channel, incl. starter magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately	0577 1718
4 x Immersion tip, flexible, TC Type K	0602 5792
ComSoft 3 - Professional with data management	0554 0830
Interface, attachable to testostor 171 data logger	0554 1781
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories	0516 0117

## Technical data

Technical data		
Probe type	Type K (NiCr-Ni)	Type T (Cu-CuNi)
Meas. range	-200 to +1000 °C	-50 to +350 °C
Accuracy ±1 digit	±(0.4 °C ±0.2% of mv)	±(0.4 °C ±0.2% of mv)
Resolution	0.1 °C (-200 to +249.9 °C) 1 °C (+250 to +1000 °C)	0.1 °C (-50 to +249.9 °C) 1 °C (+250 to +350 °C)
Oper. temp.	0 to +70 °C	
Storage temp.	-40 to +85 °C	
Battery type	Lithium battery	
Material/Housing	Aluminium, anodized	
Protection class	IP42	
Memory	55000	
Weight	305 g	
Dimensions	131 x 68 x 26 mm	
Warranty	2 years	
Measuring rate: 2s to 24h, selectable		
Battery life: up to 5 years		
Software: Menu-driven from Microsoft Windows 95 / NT 4 Servicepack 4 / ME / 2000 / XP / Vista		

## Heat-proof case

When the heat-proof case is used, the data logger can handle processes with an operating temperature of up to +200°C	Dimensions	260 x 160 x 90 mm
	Material/Housing	Aluminium, anodized
	Warranty	2 years



## Compact data loggers - for monitoring purposes

### What is the temperature really?



Wolfgang Schwörer,  
Head of Product  
Development  
Portable and  
Systems

How can you be sure that your analyser measures exactly what it should be measuring? Our certified DKD laboratories are unbeatable in their accuracy and provide the

values for all Testo measuring instruments - That's what true measurement efficiency is all about.

The competence of our engineers is held in high esteem by expert groups and committees in Berlin and Brussels where they are involved in the developments of future guidelines in their capacity as representatives of industry.

A comprehensive exchange of knowledge and experience with official measurement institutes around the world (e.g. DKD) ensures that your Testo measuring instrument can hold up to any comparison. Indeed, these efforts do have an objective: whoever uses Testo measurement engineering, can be assured that he is using the industrial standard.

Of further benefit to you: We know today about the guidelines and test specifications we will be faced with in the future.



On site: Fast printout on the testo 575 printer



testo 580 data collector collects and transmits data on site to PC



testo 581 alarm signal output for reliable warning of exceeded limits



Ethernet allows data communication in a network



## Fast and easy documentation of temperature

### testo 175-T1

The testo 175-T1 temperature data logger, ideal for accompanying goods, guarantees uninterrupted documentation of max. 7,800 readings.

The testo 575 fast printer provides proof that the goods have adhered to the specified temperature. All of the data which have been collected by the testo 580 data collector can be sent to your PC for analysis, if required.

- 1-channel: Internal °C
- Provides quick overview of current reading, last value saved, max/min value, number of times limits exceeded
- Non-volatile memory for secure data, even if battery is spent
- On-site: Fast documentation with infrared printer, 6 lines/s
- On site: Reset and boot up

### Alarm notification by SMS or e-mail

You require remote control of the measuring instrument, i.e. without the need to be present on site?

The testo alarm modem (GSM) is connected to the hand instrument and offers the following functions:

- Alarm by SMS/fax/e-mail which is sent when limit values are exceeded or the status changes
- Remote querying of measurement values via mobile phone
- Remote readout of stored data into the ComSoft software available on request

#### testo 175-T1

##### Internal °C

testo 175-T1, temperature data logger, 1 channel with internal sensor, incl. wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

Part no. 0563 1754



On-site data documentation with quick printer testo 575 (optional)



Data logger testo 175-T1, with display



Temperature monitoring in a warehouse

#### Recommended Set: testo 175-T1, Starter Set

testo 175-T1, temperature data logger, 1 channel with internal sensor, incl. wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately 0563 1754

Lock for wall holder for testo 175/177 data loggers 0554 1755

ComSoft 3 Set - Basic with USB interface 0554 1766

#### Technical data

Probe type	NTC (internal)	Measuring rate	10 s ... 24 h
Meas. range	-35 to +70 °C	Memory	7800
Accuracy	±0.5 °C (-20 to +70 °C) ±1 °C (-35 to -20.1 °C)	Weight	90 g
Resolution	0.1 °C (-20 to +70 °C) 0.3 °C (-35 to -20.1 °C)	Dimensions	82 x 52 x 30 mm
Oper. temp.	-35 to +70 °C	Warranty	2 years
Storage temp.	-40 to +85 °C	Battery life: 2.5 years at a measuring cycle of 15 min (-10 to +50°C) Measuring cycle: 10 s to 24 h Software: Microsoft Windows 95b / 98 / ME / 2000 / XP / Vista	
Battery type	Lithium battery		
Material/Housing	ABS		
Protection class	IP68		

Ordering data accessories see page 34



## Recording temperature - simultaneously at two sites

### testo 175-T2

With an additional external probe connection, the testo 175-T2 temperature data logger provides a further temperature measurement option.

#### testo 175-T2

##### Internal °C + external °C

testo 175-T2, temperature data logger, 2 channels, with internal sensor and external probe socket, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

**Part no. 0563 1755**

- 2 channel: Internal °C + external °C
- Fast overview of the current reading, the value last saved, the max/min values, the number of limits exceeded
- User-friendly operation, convenient analysis



Collect data on site, upload to PC and analyse



Tamper-proof with wall holder and lock (optional)



Monitoring room and product temperature

#### Technical data

<b>Chann. intern</b>	1
Meas. range	-35 to +70 °C
Accuracy ±1 digit	±0.5 °C (-20 to +70 °C)    ±1 °C (remaining range)
Resolution	0.1 °C (-20 to +70 °C)    0.3 °C (remaining range)
<b>Chann. external (var.)</b>	1
Meas. range	-40 to +120 °C
Accuracy ±1 digit	±0.3 °C (-25 to +70 °C)    ±0.5 °C (remaining range)
Resolution	0.1 °C (-25 to +70 °C)    0.3 °C (remaining range)
Memory	16000
Measuring rate	10 s to 24 h
Battery life	2.5 years at a meas. rate of 15 min (-10 to +50 °C)
Analysis software	MS Windows 95b / 98 / ME / 2000 / XP / Vista
Oper. temp.	-35 to +70 °C
Storage temp.	-40 to +85 °C
Protection class	IP68
Dimensions	82 x 52 x 30 mm
Weight	84 g

#### Recommended Set: testo 175-T2, Starter Set

testo 175-T2, temperature data logger, 2 channels, with internal sensor and external probe socket, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately	0563 1755
Lock for wall holder for testo 175/177 data loggers	0554 1755
Stationary probe with aluminium sleeve, IP 65	0628 7503
ComSoft 3 Set - Basic with USB interface	0554 1766

Ordering data accessories see page 34

Temperature probes (NTC)	Illustration	Meas. range	Accuracy	t99	Part no.
Stub probe, IP 54		-20 to +70 °C	±0.2 °C (-20 to +40 °C) ±0.4 °C (+40.1 to +70 °C)	15 s	0628 7510
Stationary probe with aluminium sleeve, IP 65		-30 to +90 °C	±0.2 °C (0 to +70 °C) ±0.5 °C (remaining range)	190 s	0628 7503* Conn.: Fixed cable, 2.4 m
Accurate imm./pen. probe, 6m cable, IP 67		-35 to +80 °C	±0.2 °C (-25 to +74.9 °C) ±0.4 °C (remaining range)	5 s	0610 1725* Conn.: Fixed cable, 6 m
Accurate immersion/penetration probe, cable: 1.5 m long, IP 67					0628 0006* Conn.: Fixed cable, 1.5 m
Probe for surface measurement		-50 to +80 °C	±0.2 °C (0 to +70 °C)	150 s	0628 7516* Conn.: Fixed cable, 2 m
Wall surface temperature probe, e.g. to prove damage in building material		-50 to +80 °C	±0.2 °C (0 to +70 °C)	20 s	0628 7507 Conn.: Fixed cable, 3 m
Pipe wrap probe with Velcro for pipe diameter to max. 75 mm, T <sub>max</sub> +75°C, NTC		-50 to +70 °C	±0.2 °C (-25 to +70 °C) ±0.4 °C (-50 to -25.1 °C)		0613 4611 Conn.: Fixed cable, 1.5 m
Stainless steel NTC food probe (IP65) with PUR cable		-50 to +150 °C	±0.5% of mv (+100 to +150 °C) ±0.2 °C (-25 to +74.9 °C) ±0.4 °C (remaining range)	8 s	0613 2211* Conn.: Fixed cable, 1.6 m

The specified seal class of the data loggers is achieved with these probes.

\* Probe tested to EN 12830 for suitability in the transport and storage sectors

2) Long-term measurement range +125°C, short-term +150°C or +140°C (2 minutes)



# Recording high temperatures with 2 external temperature probe sockets

## testo 175-T3

The 175-T3 temperature data logger logs temperature at 2 different points simultaneously over a period of several days, weeks or even months.

### testo 175-T3

#### 2 x external °C

testo 175-T3, temperature data logger, 2 channels, with 2 probe inputs, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

Part no. 0563 1756

- 2-channel: external °C
- Specially suited to measuring low and high temperatures
- Data analysis in table or graphics form, with email function
- Alarm message, reliable transmission of alarm value limits

Ordering data accessories see page 34



Data transfer to PC or notebook by attachable interface (optional)

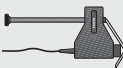
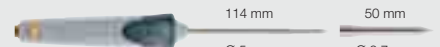
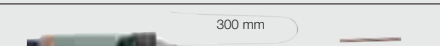


Fast measurement of high temperatures, e.g. in a hardening furnace

Technical data			
Chann. external (var.)	2		
Probe type	Type T (Cu-CuNi)	Meas. range	-50 to +400 °C
Probe type	Type K (NiCr-Ni)	Meas. range	-50 to +1000 °C
Accuracy ±1 digit	±0.7% of mv (+70.1 to +1000 °C) ±0.5 °C (-50 to +70 °C)		
Resolution	0.1 °C	Memory	16000
Measuring rate	10 s to 24 h	Protection class	IP54
Battery life	2.5 years at a measurement rate of 15 min. (-10 to +50 °C)		
Analysis software	MS Windows 95b / 98 / ME / 2000 / XP / Vista		
Oper. temp.	0 to +70 °C	Storage temp.	-40 to +85 °C
Dimensions	82 x 52 x 30 mm	Weight	90 g

### Recommended Set: testo 175-T3, temperature monitoring in processes

testo 175-T3, temperature data logger, 2 channels, with 2 probe inputs, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately	0563 1756
Lock for wall holder for testo 175/177 data loggers	0554 1755
Thermocouple with TC adapter, flexible, 1500mm long, fibre glass, TC Type K	0602 0645
Thermocouple with TC adapter, flexible, 1500mm long, fibre glass, TC Type K	0602 0645
testo 580 data collector set with USB, readout holders included, for testo 175/177 data loggers	0554 1764
ComSoft 3 Set - Basic with USB interface	0554 1766

Temperature probes (thermocouples)	Illustration	Meas. range	Accuracy	t99	Part no.
Stationary probe with stainless steel sleeve, TC Type K		-50 to +205 °C	Class 2*	20 s	0628 7533 Conn.: Fixed cable, 1.9 m
Pipe wrap probe with Velcro strip, for temperature measurement on pipes with diameter up to max. 120 mm, Tmax +120°C, TC Type K		-50 to +120 °C	Class 1*	90 s	0628 0020 Conn.: Fixed cable, 1.5 m
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 Conn.: Fixed cable, 1.2 m
Thermocouple with TC adapter, flexible, 800mm long, fibre glass, TC Type K		-50 to +400 °C	Class 2*	5 s	0602 0644
Thermocouple with TC adapter, flexible, 1500mm long, fibre glass, TC Type K		-50 to +400 °C	Class 2*	5 s	0602 0645
Thermocouple with TC adapter, flexible, 1500mm long, PTFE, TC Type K		-50 to +250 °C	Class 2*	5 s	0602 0646
Immersion tip, flexible, TC Type K		-200 to +1000 °C	Class 1*	5 s	0602 5792
Magnetic probe, adhesive force approx. 10 N, with magnets, for higher temp., for measurements on metal surfaces, TC Type K		-50 to +400 °C	Class 2*		0602 4892 Conn.: Fixed cable, 1.6 m
Waterproof immersion/penetration probe, TC Type K		-60 to +400 °C	Class 2*	7 s	0602 1293 Conn.: Fixed cable, 1.2 m
Efficient and fast-action immersion probe, waterproof, TC Type K		-60 to +1000 °C	Class 1*	2 s	0602 0593 Conn.: Fixed cable 1.2 m
Robust air probe, T/C Type K		-60 to +400 °C	Class 2*	25 s	0602 1793 Conn.: Fixed cable 1.2 m

The specified seal class of the data loggers is achieved with these probes.

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





## Current/voltage data logger

### testo 175-S1

Easy and highly affordable logging of current and voltage in industrial processes. testo 175-S1 can be connected, for example, to the supply line of a transmitter to log and monitor current signals.



- 1-channel: External current/voltage (mA/V)
- User-friendly operation, convenient analysis
- Non-volatile memory for secure data, even if the battery is empty
- On-site: Use testo 580 to collect data and transfer to your PC for analysis

### testo 175-S2

The testo 175 current/voltage data logger shows the scaled signal from the transmitter directly on the display. Scaling is via ComSoft. The display supplies a fast overview on site of the current reading, the last value saved, Min/Max values and the number of values exceeded.



On-site: fast documentation on the infrared printer, 6 lines/second



testo 175-S2 with display: Direct display of the scaled signal



Recording the current of a measurement transmitter with testo 175-S1 (without display)

#### testo 175-S1 without display

##### External V/mA

testo 175-S1, current/voltage data logger, 1 channel, with external terminal block, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

**Part no. 0563 1759**

#### testo 175-S2 with display

##### External V/mA

testo 175-S2, current/voltage datalogger with display, 1 channel, with external terminal block, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

**Part no. 0563 1761**

#### Recommended Set: testo 175-S1, Starter set with fast-action printer

testo 175-S1, current/voltage data logger, 1 channel, with external terminal block, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

0563 1759

Lock for wall holder for testo 175/177 data loggers

0554 1755

Fast testo 575 printer, incl. 1 roll of thermal paper and batteries

0554 1775

ComSoft 3 Set - Basic with USB interface

0554 1766

#### Technical data

**Ext. chann. (fixed) 1**

Meas. range	0 to +1 V 0 to +10 V	0 to +20 mA +4 to +20 mA
Accuracy ±1 digit	±0.002 V (0 to +1 V) ±0.02 V (+1 to +10 V)	±0.05 mA (0 to +20 mA) ±0.05 mA (+4 to +20 mA)
Resolution	0.001 V (0 to +1 V) 0.01 V (+1 to +10 V)	0.01 mA (0 to +20 mA) 0.01 mA (+4 to +20 mA)

Memory 16000

Oper. temp. -10 to +50 °C

Storage temp. -40 to +70 °C

Battery type Lithium battery

Weight 80 g

Dimensions 82 x 52 x 30 mm

Battery life: 2.5 years with measuring cycle of 15 min (-10 to +50 °C)

Measuring cycle: 1 s to 24 h

Software: Microsoft Windows 95b / 98 / ME / 2000 / XP / Vista

#### Recommended Set: testo 175-S2, starter set with limit signal output

testo 175-S2, current/voltage datalogger with display, 1 channel, with external terminal block, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

0563 1761

testo 581 alarm signal output, floating, for testo 175/177

0554 1769

Lock for wall holder for testo 175/177 data loggers

0554 1755

ComSoft 3 Set - Basic with USB interface

0554 1766

Ordering data accessories see page 34

## Professional data logger for long-term monitoring

### testo 177-T1

The testo 177-T1 professional data logger (without display) monitors specified storage and transport conditions in the refrigeration and deep-freeze sector efficiently and accurately over a period of months and years.

Temperature fluctuations which cause damage are documented on the testo 575 fast printer or analysed on your PC via interface.



- 1 channel: internal °C
- Temperature logging of up to 48,000 readings
- Specially for use in low temperatures (up to -40°C)
- On-site: Fast documentation on the infrared printer, 6 lines/s
- Collect data on-site with testo 580 and download to your PC for analysis

### testo 177-T2

testo 177-T2, the professional data logger with display. It provides you with a quick overview of the current reading, the last value saved, max and min values and the number of times the limits were exceeded.

All of the values collected by the testo 580 data collector during long-term monitoring over months/years can be sent to your notebook/PC. Convenient analysis possible using software based on Windows®.



testo 177-T1 without display, data is documented on the fast testo 575 printer



Collects data on site which is uploaded to your PC for analysis



Long-term temperature logging with immediate display of limits exceeded e.g. during transport, in refrigerated rooms, warehouses etc. with testo 177-T2, with display

#### testo 177-T1 without display

##### Internal °C

testo 177-T1, temperature data logger, 1 channel, with internal sensor, wall holder and calibration; calibration certificates (ISO/DKD) must be ordered separately

Part no. 0563 1771

#### testo 177-T2 with display

##### Internal °C

testo 177-T2, temperature data logger, 1 channel, with internal sensor, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

Part no. 0563 1772

#### Technical data

Chann. intern	1
Probe type	NTC
Meas. range	-40 to +70 °C
Accuracy ±1 digit	±0.4 °C (-25 to +70 °C) ±0.8 °C (-40 to -25.1 °C)
Resolution	0.1 °C
Measuring rate	2 s to 24 h
Memory	48000
Oper. temp.	-40 to +70 °C
Storage temp.	-40 to +85 °C
Dimensions	103 x 64 x 33 mm
Weight	111 g (testo 177-T1) 122 g (testo 177-T2)
Battery life	5 years at a measurement rate of 15 min (-10 to +50 °C)
Analysis software	MS Windows 95b / 98 / ME / 2000 / XP / Vista

#### Recommended Set: testo 177-T1, Starter Set

testo 177-T1, temperature data logger, 1 channel, with internal sensor, wall holder and calibration; calibration certificates (ISO/DKD) must be ordered separately	0563 1771
Lock for wall holder for testo 175/177 data loggers	0554 1755
Set ComSoft 4 - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable	0554 1767

#### Recommended Set: testo 177-T2, Starter Set

testo 177-T2, temperature data logger, 1 channel, with internal sensor, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately	0563 1772
Lock for wall holder for testo 175/177 data loggers	0554 1755
Set ComSoft 4 - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable	0554 1767

Ordering data accessories see page 34



## The data logger with 2 temperature probe sockets and event logging

### testo 177-T3

The testo 177-T3 data logger simultaneously documents 3 temperatures and an event.

For example, complete monitoring of ambient air, intake and outgoing temperature with simultaneous monitoring of the door is possible when monitoring refrigerated store rooms. The measuring rate of the event can be set completely independently of the measuring rate of the temperature channels.

- 3 channel: Internal °C, 2x external °C, event input
- Temperature logging of up to 48,000 readings
- Reads out data without interrupting measurement
- Data analysis as table or graph, with e-mail function



#### testo 177-T3

Internal °C + 2 x external °C + event contact

testo 177-T3, temperature data logger, 3 channels, with internal sensor, 2 probe sockets, door contact connection cable, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

Part no. 0563 1773



Collects data on site which is uploaded to your PC for analysis



Simultaneous temperature monitoring at 3 different locations

Ordering data accessories see page 34

Temperature probes (NTC)	Illustration	Meas. range	Accuracy	t99	Part no.
Stub probe, IP 54		-20 to +70 °C	±0.2 °C (-20 to +40 °C) ±0.4 °C (+40.1 to +70 °C)	15 s	0628 7510
Stationary probe with aluminium sleeve, IP 65		-30 to +90 °C	±0.2 °C (0 to +70 °C) ±0.5 °C (remaining range)	190 s	0628 7503* Conn.: Fixed cable, 2.4 m
Accurate imm./pen. probe, 6m cable, IP 67		-35 to +80 °C	±0.2 °C (-25 to +74.9 °C) ±0.4 °C (remaining range)	5 s	0610 1725* Conn.: Fixed cable, 6 m
Accurate immersion/penetration probe, cable: 1.5 m long, IP 67					0628 0006* Conn.: Fixed cable, 1.5 m
Probe for surface measurement		-50 to +80 °C	±0.2 °C (0 to +70 °C)	150 s	0628 7516* Conn.: Fixed cable, 2 m
Wall surface temperature probe, e.g. to prove damage in building material		-50 to +80 °C	±0.2 °C (0 to +70 °C)	20 s	0628 7507 Conn.: Fixed cable, 3 m
Pipe wrap probe with Velcro for pipe diameter to max. 75 mm, Tmax. +75 °C, NTC		-50 to +70 °C	±0.2 °C (-25 to +70 °C) ±0.4 °C (-50 to -25.1 °C)		0613 4611 Conn.: Fixed cable, 1.5 m
Stainless steel NTC food probe (IP65) with PUR cable		-50 to +150 °C Long-term meas. range +125 °C, short-term +150 °C (2 minutes)	±0.5% of mv (+100 to +150 °C) ±0.2 °C (-25 to +74.9 °C) ±0.4 °C (remaining range)	8 s	0613 2211* Conn.: Fixed cable, 1.6 m

The specified seal class of the data loggers is achieved with these probes.

\* Probe tested to EN 12830 for suitability in the transport and storage sectors

#### Recommended Set: testo 177-T3, Temperature monitoring with printout on-site

testo 177-T3, temperature data logger, 3 channels, with internal sensor, 2 probe sockets, door contact connection cable, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately	0563 1773
Lock for wall holder for testo 175/177 data loggers	0554 1755
Stationary probe with aluminium sleeve, IP 65	0628 7503
Stationary probe with aluminium sleeve, IP 65	0628 7503
Fast testo 575 printer, incl. 1 roll of thermal paper and batteries	0554 1775
Set ComSoft 4 - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable	0554 1767

#### Technical data

Chann. intern 1	Chann. external (var.) 2
Meas. range -40 to +70 °C	Meas. range -40 to +120 °C
Accuracy ±1 digit ±0.4 °C (-25 to +70 °C) ±0.8 °C (-40 to -25.1 °C)	Accuracy ±1 digit ±0.2 °C (-25 to +70 °C) ±0.4 °C (remaining range)
Resolution 0.1 °C	Resolution 0.1 °C
Memory 48000	Battery type Lithium battery
Oper. temp. -40 to +70 °C	Weight 127 g
Storage temp. -40 to +85 °C	Dimensions 103 x 64 x 33 mm
External: Event logging e.g. door contact Battery life: 5 years with meas. rate of 15 min (-10 to +50 °C) Measuring rate: 2 s to 24 h Software: Microsoft Windows 95b / 98 / ME / NT4-Sp4 / 2000 / XP / Vista	

# Professional long-term monitoring, data logger with 4 probe sockets

## testo 177-T4

The testo 177-T4 professional data logger with up to 4 external temperature probe connections for simultaneous temperature measurement at different sites. Using testo 177-T4, production and storage conditions can be monitored non-stop and the data saved on PC.

- 4-channel: external °C
- Specially for use in high temperatures
- Data readout without interruption of the measurement series
- Data analysis as a table or graph, with e-mail function
- Memory up to 48,000 readings

### testo 177-T4

#### 4 x external °C

testo 177-T4, temperature data logger, 4 channels, with 4 probe inputs, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately; calibration certificates (ISO/DKD) must be ordered separately

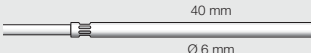
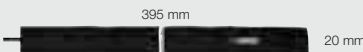
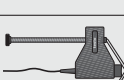
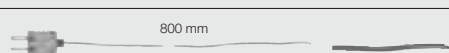
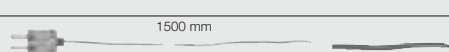
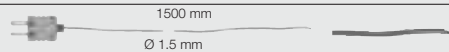
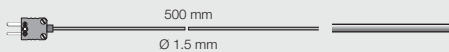

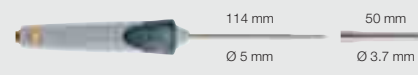
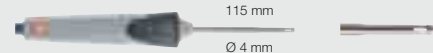
**Part no. 0563 1774**

Ordering data accessories see page 34

Collect data on site, upload to PC and analyse

Alarm notification, reliable indication of limits exceeded

Temperature recording in computer systems

Temperature probes (thermocouples)	Illustration	Meas. range	Accuracy	t99	Part no.
Stationary probe with stainless steel sleeve, TC Type K	 40 mm Ø 6 mm	-50 to +205 °C	Class 2*	20 s	0628 7533 Conn.: Fixed cable, 1.9 m
Pipe wrap probe with Velcro strip, for temperature measurement on pipes with diameter up to max. 120 mm, Tmax +120°C, TC Type K	 395 mm 20 mm	-50 to +120 °C	Class 1*	90 s	0628 0020 Conn.: Fixed cable, 1.5 m
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 Conn.: Fixed cable, 1.2 m
Thermocouple with TC adapter, flexible, 800mm long, fibre glass, TC Type K	 800 mm Ø 1.5 mm	-50 to +400 °C	Class 2*	5 s	0602 0644
Thermocouple with TC adapter, flexible, 1500mm long, fibre glass, TC Type K	 1500 mm Ø 1.5 mm	-50 to +400 °C	Class 2*	5 s	0602 0645
Thermocouple with TC adapter, flexible, 1500mm long, PTFE, TC Type K	 1500 mm Ø 1.5 mm	-50 to +250 °C	Class 2*	5 s	0602 0646
Immersion tip, flexible, TC Type K	 500 mm Ø 1.5 mm	-200 to +1000 °C	Class 1*	5 s	0602 5792
Magnetic probe, adhesive force approx. 10 N, with magnets, for higher temp., for measurements on metal surfaces, TC Type K	 75 mm Ø 21 mm	-50 to +400 °C	Class 2*		0602 4892 Conn.: Fixed cable, 1.6 m
Waterproof immersion/penetration probe, TC Type K	 114 mm Ø 5 mm 50 mm Ø 3.7 mm	-60 to +400 °C	Class 2*	7 s	0602 1293 Conn.: Fixed cable, 1.2 m
Robust air probe, T/C Type K	 115 mm Ø 4 mm	-60 to +400 °C	Class 2*	25 s	0602 1793 Conn.: Fixed cable, 1.2 m

The specified seal class of the data loggers is achieved with these probes.

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

Technical data			
Chann. external (var.)	4		
Probe type	Type T (Cu-CuNi)	Type K (NiCr-Ni)	Type J (Fe-CuNi)
Meas. range	-200 to +400 °C	-200 to +1000 °C	-100 to +750 °C
Accuracy ±1 digit	±0.5% of mv (+70.1 to +1000 °C) ±1.5% of mv (-200 to -100.1 °C) ±0.3 °C (-100 to +70 °C)		
Resolution	0.1 °C		
Memory	48000	Measuring rate	2 s to 24 h
Oper. temp.	0 to +70 °C	Protection class	IP43
Storage temp.	-40 to +85 °C	Weight	129 g
Battery type	Lithium battery	Dimensions	103 x 64 x 33 mm
Battery life	5 years at meas. cycle 15 min (-10 to +50 °C)		
Analysis software	MS Windows 95b / 98 / ME / 2000 / XP / Vista		

### Recommended Set: Set for monitoring technical systems

testo 177-T4, temperature data logger, 4 channels, with 4 probe inputs, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately; calibration certificates (ISO/DKD) must be ordered separately	0563 1774
Lock for wall holder for testo 175/177 data loggers	0554 1755
Pipe wrap probe for pipe diameter 5 to 65 mm, with exchangeable measuring head. Meas. range short-term to +280°C, TC Type K	0602 4592
Pipe wrap probe for pipe diameter 5 to 65 mm, with exchangeable measuring head. Meas. range short-term to +280°C, TC Type K	0602 4592
testo 580 data collector set with RS232, readout holders included	0554 1778
Set ComSoft 4 - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable	0554 1767





## Accessories for testo 175 and 177

### testo 575 fast printer



Fast printout and logger rebooting with testo 575

testo 575 - more than just a fast printer. Fast and easy documentation on-site without PC

#### Print functions

- Fast printer prints up to 6 lines per second (up to 40 readings/s)
- Easy paper loading (does not need to be fed in)
- Tabular printing at the press of a button
- Graphic printing at the press of a button
- Optional printout of short info or entire memory

- By setting a time marker in the logger with the press of a button, the printer recognizes the extract to be printed
- Self-adhesive Testo paper can also be used

#### Control functions

- Stops testo 175/177 loggers
- Reboots logger with saved parameters (reprogramming)
- Both buttons can be blocked by PC software

#### Technical data

Printer: Infrared thermal line printer with graphics function
Contrast: Can be adjusted
Paper width: 56 mm
Roll diameter: Up to 35 mm
Paper: Standard paper and two-layer adhesive
Number of characters per line: 24
Graphics resolution: 203 dpi
Operating temp.: -5 to +50°C (for 5 min at -30°C)
Storage temperature: -30 to +70°C
Power: 6x round cell 1AA
Battery life: Up to 40,000 print lines
Battery change: By user
Housing: ABS (black), with "Soft-Protect" inserts

Part no. 0554 1775

### testo 580 data collector



Collecting data onsite, central readout on a PC and analysis? No problem with the testo 580, the small, but high-performance data collector.

testo 580 - Data collector, collects and transports data on-site to PC

#### The readout function

- Readout of a complete testo 175/177 logger at the press of a button
- Display of all status information
- Can read out up to 25 full loggers testo 175 or 10 full loggers testo 177

#### Control functions

- Stops logger
- Reboots logger
- Both control functions can be blocked via PC

#### Technical data

Memory capacity: 1 MB (approx. 500,000 values)	Functions
Read out time in logger: Approx. 400 readings/s	Display: Logger memory used, testo 580 memory used, logger battery life, testo 580 battery life, data transfer in progress, data transfer ok or defective, wraparound display
Read out time in PC: Approx. 1,500 readings/s	Other: Data secure even if battery is spent
Logger interface: Infrared transfer, bidirectional	Power: 3x micro AAA cells
PC interface: RS232 (Sub_D socket) or USB	Housing: ABS (black)
Operating temperature: -30 to +70°C	
Storage temperature: -40 to +85°C	
On/Off switch: Off: AutoOFF to 1 min	

#### RS232 Version

Part no. 0554 1778

#### USB version

Part no. 0554 1764

### testo 581 alarm signal output



At the press of a button, testo 581 informs whether an alarm has occurred.

testo 581 - Alarm signal output for reliable notification of limits exceeded

The alarm signal output testo 581 makes it possible to send alarm messages to external components, e.g.: horns, lamps, PLC.

The external component is connected via a terminal strip in the battery compartment of testo 581, the signal is transferred via the floating signal output. This can be set as an NC or NO contact. Once connected to the data logger wall holder, communication between testo 175/177 and the limit signal output takes place via the infrared interface.

#### Technical data

Signal	Floating signal output, can be set as NC or NC contact	Conn.	Via terminal strip in battery compartment (output and power)
No. of switch channels	1 channel	Oper. temp.	-40 to +70 °C
Supply alarm switch output	Battery (Included) or 9 to 32V DC max. (external)	Storage temp.	-40 to +85 °C
max. switching voltage	60V DC/25V AC (SELV/PELV-switch circuits)	Battery type	Lithium (1/2 AA)
Max. duration switching-off current	1A DC/AC	Battery life	Approx. 5 years
max. switching performance	30W/30VA	Material/Housing	Polycarbonate (black)
		Protection class	IP68
		Dimensions	82 x 52 x 30 mm

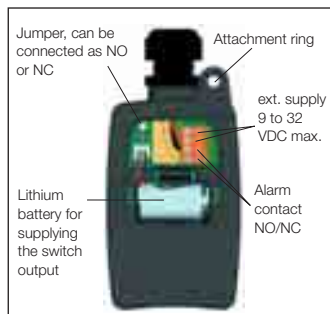
#### The control functions

You will be informed directly at the touch of a button, if the alarm has already been triggered. The alarm of the external components, e.g. the horn, can be reset using the reset button.

#### Alarm trigger:

- Programmed limit values in the data logger are exceeded
- Logger is stopped due to spent battery
- Probe is disconnected
- Alarm unit battery is spent

Part no. 0554 1769





# Accessories for testo 175 and 177

## Ethernet adapter



Read out the data stored in the logger via the PC network using the Ethernet adapter

### The Ethernet adapter enables the following:

- On-site measurements, e.g. in production, storage halls, Incoming Goods
- Measuring instrument remains on site, transport not necessary
- Data inspection from office or administration
- Centralised filing of measurement data

### Long-term monitoring of climate data

The parameters temperature, humidity, current and voltage are measured and saved on site by the data logger. Using the Ethernet adapter, measurement data stored in the logger can be read out and filed via the PC network. The measurement data is then easily analysed and checked on your PC in the office.

### Ethernet offers:

- Fast transmission of readings
- Use of an existing network without additional cabling
- Long transmission distances
- Identification of measuring instruments in system networks

The Ethernet adapter therefore has the following advantages:

- Affordable operation since it is no longer necessary to read out data on site or take the logger to the office.
- Fast access times because current measurement data can be accessed at any time.

Ordering data		Part no.	
Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit		0554 1711	
System accessories testo 175, testo 177			
ComSoft 3 - Professional with data management		0554 0830	
RS232 interface for testo 175/177 incl. desk-top holders, PC connection cable		0554 1757	
System accessories testostor 171			
ComSoft 3 - Professional with data management		0554 0830	
Interface, attachable to to testostor 171 data logger		0554 1781	
Technical data			
Power supply	Mains unit, 5 volt approx. 230 mA	Protocols	TCP/IP, LPR, Telnet, SNMP, DHCP DDNS, ARP, BOOTP, ICMP
Dimensions	45 x 48 x 14 mm		
Oper. temp.	+0 to +70 °C	Management and software configuration	Internet browser e.g. from Netscape or Microsoft Telnet
Humidity class	F to DIN 40040		
EMC	Radio interference and interference resistance	Interface	Serial interface on computer board with terminal program Provision of a local virtual COM port (Windows systems)
Interface	25 pin RS232 connection with 25/9 pin adapter		
Software	Microsoft Windows 2000 / NT 4.0 / ME / 98 / 95		




Printer and Accessories	Part no.
Fast testo 575 printer, incl. 1 roll of thermal paper and batteries, infrared thermal line printer with graphics function	0554 1775
Spare thermal paper for printer (6 rolls)	0554 0569
Spare thermal paper for printer (6 rolls), measurement data documentation legible for up to 10 years	0554 0568
Label thermal paper (Testo patent) for testo 575 printer (6 rolls), can be applied directly	0554 0561
Additional accessories	Part no.
testo 580 data collector set with RS232, readout holders included, for testo 175/177 data loggers	0554 1778
testo 580 data collector set with USB, readout holders included, for testo 175/177 data loggers	0554 1764
testo 581 alarm signal output, floating, for testo 175/177, forwards information efficiently when limits are exceeded to e.g. horns, lamps, PLC etc.	0554 1769
Battery, 3.6 V/0.8 Ah 1/2 AA, for testo 175-T3/175-H1/175-H2/175-S1/175-S2	0515 0175
Battery, 3.6 V/1.9 Ah 1AA, for testo 175-T1/175-T2 and all testo 177 loggers	0515 0177
Transport and Protection	Part no.
Lock for wall holder for testo 175/177 data loggers	0554 1755
Transport case for up to 6 testo 177 data loggers, testo 575 printer, testo 580 data collector and accessories	0516 1770

Software (ComSoft from p. 46)	Part no.
<b>For testo 175</b> ComSoft 4 Set - Basic with RS232 interface, Basic software with diagram and table function, incl. desk-top holder, PC connection cable	0554 1759
<b>For testo 175</b> ComSoft 3 Set - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable	0554 1766
<b>For testo 177:</b> ComSoft 3 Set - Basic with RS232 interface, Basic software with diagram and table function, incl. desk-top holder, PC connection cable	0554 1774
<b>For testo 177:</b> ComSoft 3 Set - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable	0554 1767
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface)	0554 0830
ComSoft 3 - For requirements to CFR 21 Part 11, incl. database, analysis and graphics function, data analysis, trend curve (w/o interface)	0554 0821
RS232 interface for testo 175/177 incl. desk-top holders, PC connection cable, (please also order for ComSoft 3 - Professional)	0554 1757
USB interface, for testo 175/177 incl. desk-top holders, PC conn. cable, (Please order with ComSoft 3 - Professional)	0554 1768
Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit, facilitates data communication in network	0554 1711
Calibration Certificates	Part no.
ISO calibration certificate/temperature, temperature probe; calibration points -18°C; 0°C; +60°C per channel/instrument	0520 0151
ISO calibration certificate/electrical, calibration in measurement ranges 0 to 20 mA; 4 to 20 mA; 0 to 1 V; 0 to 10 V	0520 1000

## Overview: Pro humidity data logger testostor 171

Type	testostor 171-1	testostor 171-6	testostor 171-2	testostor 171-3	Ex 171-3
Description	Internal °C NTC + external °C NTC or %RH/°C	2 x external %RH / °C or °C, td	Internal: %RH, °C, td	Internal %RH / °C 20,000 readings	Internal %RH / °C with Ex approval
Illustration					
Measurement value sensor	NTC (Temperature probe) NTC (Combi-probe °C/%RH)	NTC (temperature probe) NTC (combi-probe °C/%RH)	NTC	NTC	NTC
Meas. range	0 to +100 %RH -35 to +70 °C (int.) -50 to +120 °C (ext.)	0 to +100 %RH -50 to +120 °C (ext.) -30 to +50 °C td	0 to +100 %RH -20 to +70 °C -20 to +70 °C td	0 to +100 %RH -10 to +50 °C	0 to +100 %RH -10 to +50 °C
Resolution	0.1 %RH 0.1 °C 0.1 °C	0.1 %RH 0.1 °C	0.1 %RH 0.1 °C	0.1 %RH 0.1 °C	0.1 %RH 0.1 °C
Accuracy ±1 digit	System ±2 %RH (+2 to +98 %RH) (int.) ±0.2 °C (-35 to +39.9 °C) ±0.4 °C (+40 to +70 °C) (ext.) ±0.2 °C (-34.9 to +39.9 °C) ±0.4 °C (+40 to +120 °C) ±0.6 °C (-50 to -35 °C)	System ±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C) ±0.6 °C (-50 to -10.1 °C) ±0.6 °C (+50.1 to +120 °C)	System ±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C) ±0.5 °C (-20 to -10.1 °C) ±0.5 °C (+50.1 to +70 °C)	System ±3 %RH (+2 to +98 %RH) ±0.5 °C (-10 to +39.9 °C) ±0.6 °C (+40 to +50 °C)	System ±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C)
Memory	55000 Readings	55000 Readings	55000 Readings	20000 Readings	20000 Readings
Measuring rate	2 s to 24 h	2 s to 24 h	2 s to 24 h	2 s to 24 h	2 s to 24 h
Oper. temp.	-35 to +70 °C	-20 to +70 °C	-20 to +70 °C	-20 to +70 °C	-10 to +50 °C
Storage temp.	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C
Battery type	Lithium battery	Lithium battery (2032)	Lithium battery (2032)	Lithium battery	Lithium battery
Battery life	up to 5 years	up to 5 years	up to 5 years	up to 5 years	up to 5 years
Dimensions	131 x 68 x 26 mm	131 x 68 x 26 mm	131 x 68 x 84 mm	131 x 68 x 84 mm	131 x 72 x 68 mm
Weight	305 g	305 g	320 g	320 g	320 g
Protection class	IP65	IP65	IP65	IP65	IP65
Warranty	2 years	2 years	2 years	2 years	2 years
Other features					
Part no.	0577 1715	0577 1716	0577 1712	0577 1713	0577 1733

## Overview: Temperature compact/pro humidity logger testo 175/177

Type	testo 175-H1	testo 175-H2	testo 177-H1
Description	2-channel humidity/temperature logger with internal sensors	2-channel humidity/temperature logger with internal sensors and display	4-channel humidity/temperature logger with internal sensors and ext. probe input
Illustration			
Measurement value sensor	Testo humid. sensor, cap. NTC (internal)	Testo humid. sensor, cap. NTC (internal)	Testo humid. sensor, cap. NTC (internal) (external)
Meas. range	0 to +100 %RH -10 to +50 °C	0 to +100 %RH -20 to +70 °C	0 to +100 %RH -20 to +70 °C (int.) -40 to +120 °C (ext.) -40 to +70 °C td
Resolution	0.1 %RH 0.1 °C	0.1 %RH 0.1 °C	0.1 %RH 0.1 °C 0.1 °C 0.1 °C td
Accuracy ±1 digit	System ±3 %RH ±0.5 °C	System ±3 %RH ±0.5 °C	System ±2 %RH ±0.5 °C  Instrument ±0.2 °C (-25 to +70 °C) ±0.4 °C (remaining range)
Memory	3700 Readings	16000 Readings	48000 Readings
Measuring rate	10 s to 24 h	10 s to 24 h	2 s to 24 h
Oper. temp.	-10 to +50 °C	-20 to +70 °C	-20 to +70 °C
Storage temp.	-40 to +70 °C	-40 to +85 °C	-40 to +85 °C
Battery type	Lithium battery	Lithium battery	Lithium battery
Battery life	>2.5 years*	>2.5 years*	>5 years*
Dimensions	82 x 52 x 30 mm	82 x 52 x 30 mm	103 x 64 x 33 mm
Weight	80 g	85 g	130 g
Protection class			IP54
Warranty	2 years	2 years	2 years
Other features			
Part no.	0563 1757	0563 1758	0563 1775

\* at a measurement rate of 15 mins. (-10 to +50 °C)

### Compact data logger testo 175



- Memory up to 3,700 measurement values
- Measurement rate 10 sec to 24 h freely selectable
- Battery life more than 2.5 years\*

### Pro data logger testo 177



- Memory up to 48,000 measurement values
- Measurement rate 2 sec to 24 h freely selectable
- Battery life more than 5 years\*

### Pro-data logger testostor 171



- Robust metal housing
- Large selection of probes
- Memory up to 55,000 readings
- Measurement rate freely selectable 2 s to 24 h

All data loggers can be validated



## Electronic thermohygrograph in full-metal housing

### testostor 171-3

testostor 171-3, a compact measurement data storage instrument with internal humidity/temperature probe.

- 1-channel: Internal %RH/°C
- Suitable for outdoor use
- Control and adjustment option using adjustment set
- Recording of up to 20,000 readings
- Measuring cycle: 2 s to 24 h, selectable
- Sintered cap protection for dusty environments (see Accessories)



Checks relative humidity and temperature values in switchgear units

#### testostor 171-3

##### Internal %RH/°C

testostor 171-3, humidity data logger for %RH, °C with starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

**Part no. 0577 1713**

#### Set testostor 171-3

Set testostor 171-3, incl. humidity data logger for %RH, °C with starting magnet, battery, calibration protocol and software with interface; calibration certificates (ISO/DKD) must be ordered separately

**Part no. 0563 1713**

Accessories and spare parts	Part no.
Spare battery for testostor 171, quick and easy battery replacement	0515 0018
testo saline pots for control and humidity adjustment of humidity probes, 11.3 %RH and 75.3 %RH with adapter for humidity probe	0554 0660
Stainless steel sintered cap, Ø 21 mm, can be screwed onto humidity probe	0554 0640
Transport and Protection	Part no.
Holder with lock for data logger, theft-proof	0554 1782
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport	0516 0117
PC software and accessories	Part no.
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface)	0554 0830
ComSoft 3 - For requirements to CFR 21 Part 11, incl. database, analysis and graphics function, data analysis, trend curve (w/o interface)	0554 0821
Interface, attachable to testostor 171 data logger	0554 1781
Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit, facilitates data communication in network	0554 1711
Calibration Certificates	Part no.
DKD calibration cert./humidity, humidity data logger; cal. points 11.3%RH and 75.3%RH at +25°C; per channel/instrument	0520 0246
ISO calibration certificate humidity, calibration points 11.3 %RH and 75.3 %RH at +25 °C/+77 °F; per channel/instrument	0520 0076
ISO calibration certificate/temperature, temp. data logger; calibration points -8°C; 0°C; +40°C per channel/instrument	0520 0171

#### Recommended Set: The set in the case

Set testostor 171-3, incl. humidity data logger for %RH, °C with starting magnet, battery, calibration protocol and software with interface; calibration certificates (ISO/DKD) must be ordered separately	0563 1713
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport	0516 0117

Technical data	
Meas. range	-10 to +50 °C
Accuracy	±0.5 °C (-10 to +39.9 °C) ±1 digit ±0.6 °C (+40 to +50 °C)
Resolution	0.1 °C
Material/Housing	Aluminium, anodized
Protection class	IP65
Memory	20000
Oper. temp.	-20 to +70 °C
Storage temp.	-40 to +85 °C
Dimensions	131 x 68 x 84 mm
Weight	320 g
Measuring rate:	2 s to 24 h, selectable
Battery life:	up to 5 years
Software:	menu-driven from Microsoft Windows 95 / ME / 2000 / XP / Vista

# Electronic thermohygrograph for Ex-zones

## Ex 171-3

The Ex 171-3, in its extremely robust metal housing, guarantees a high measuring accuracy level for long-term measurements in hazardous areas.

The interface to download the data to your PC is attached outside the hazard area. The data is analysed in table or graph form via easy-to-use software.

- 1-channel: Internal %RH/°C
- Tamper-proof readings
- Theft-proof mounting
- Control and adjustment option with adjustment set

### Ex 171-3

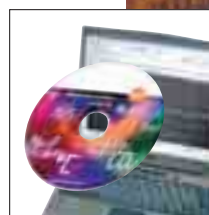
#### Internal %RH/°C

Ex 171-3, humidity data logger %RH, °C, incl. starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

**Part no.** 0577 1733



Data logger Ex 171-3



Tabular and graphic presentation of all measurement and limit values at a glance



Temperature monitoring in hazardous areas



TÜV 00 ATEX 1586



Accessories, Transport and Protection	Part no.
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport. Not for use in Ex-zone	0516 0117
Holder with lock for data logger, theft-proof	0554 1782
Stainless steel sintered cap, Ø 21 mm, can be screwed onto humidity probe, protection in case of high mechanical load and high velocities	0554 0640
Additional accessories and spare parts	Part no.
Control and humidity adjustment set 11.3%RH/75.3 %RH incl. adapter for humidity probes (not for use in Ex-zone)	0554 0660
PC software and accessories	Part no.
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface). Not for use in Ex-zone	0554 0830
ComSoft 3 - For requirements to CFR 21 Part 11, Incl. database, analysis and graphics function, data analysis, trend curve (without interface). Not for use in Ex-zones	0554 0821
Interface, attachable to testostor 171 data logger. Not for use in Ex-zone	0554 1781
Calibration Certificates	Part no.
ISO calibration certificate humidity, calibration points 11.3 %RH and 75.3 %RH at +25 °C/+77 °F; per channel/instrument	0520 0076
DKD calibration cert./humidity, humidity data logger; cal. points 11.3%RH and 75.3%RH at +25°C; per channel/instrument	0520 0246
ISO calibration certificate/temperature, temperature probe; calibration points -18°C; 0°C; +60°C per channel/instrument	0520 0151
ISO calibration certificate/temperature, temp. data logger; calibration points -8°C; 0°C; +40°C per channel/instrument	0520 0171
DKD calibration certificate/temperature, Temperature probe; cal. points -20°C; 0°C; +60°C (-4 °F, 92 °F, 140 °F); per channel/instrument	0520 0261

### Recommended Set: Ex 171-3, The Set in the Case

Ex 171-3, humidity data logger %RH, °C, incl. starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately	0577 1733
ComSoft 3 - Professional with data management	0554 0830
Interface, attachable to testostor 171 data logger. Not for use in Ex-zone	0554 1781
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport. Not for use in Ex-zone	0516 0117

Technical data		
Probe type	NTC	Testo humid. sensor, cap.
Meas. range	-10 to +50 °C	0 to +100 %RH
Accuracy ±1 digit	±0.4 °C (-10 to +50 °C)	±2 %RH (+2 to +98 %RH)
Resolution	0.1 °C	0.1 %RH
Oper. temp.	-10 to +50 °C	Protection class IP65
Storage temp.	-40 to +85 °C	Warranty 2 years
Memory	20000	Battery life: Lithium battery up to 5 years
Material/Housing	Aluminium, anodized	Software: Menu-driven Microsoft Windows 95 / ME / 2000 / XP / Vista
Battery type	Lithium battery	
Dimensions	131 x 72 x 68 mm	
Weight	320 g	



## Electronic thermohygrograph

### testostor 171-2

testostor 171-2 is a compact, accurate data logger with an internal probe, parallel dew point measurement and large memory capacity.



- 1-channel, internal %RH/°C, td
- Control and adjustment possible using adjustment set
- Large memory for up to 55,000 readings
- Easy-to-change sensors
- Sintered cap protection for dusty environment

#### testostor 171-2

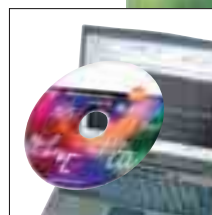
##### Internal: %RH, °C, td

testostor 171-2, humidity logger for %RH, °C, td, incl. starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

**Part no. 0577 1712**



testostor 171-2



Data analysis on your PC/Notebook with easy-to-use Windows® Software



Monitors constant ambient conditions in clean rooms during the manufacture of pharmaceutical products, electronic components... (testostor 1722 + signal device)

Software and Accessories	Part no.
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface)	0554 0830
ComSoft 3 - For requirements to CFR 21 Part 11, incl. database, analysis and graphics function, data analysis, trend curve (w/o interface)	0554 0821
Interface, attachable to testostor 171 data logger	0554 1781
Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit, facilitates data communication in network	0554 1711
Calibration Certificates	Part no.
ISO calibration certificate/temperature, temp. data logger; calibration points -8°C; 0°C; +40°C per channel/instrument	0520 0171
DKD calibration cert./humidity, humidity data logger; cal. points 11.3%RH and 75.3%RH at +25°C; per channel/instrument	0520 0246
ISO calibration certificate humidity, calibration points 11.3 %RH and 75.3 %RH at +25 °C/+77 °F; per channel/instrument	0520 0076
Accessories, Transport and Protection	Part no.
Transport case (plastic) for measurement data storage instruments (max. 6 off) and accessories, for safe transport	0516 0117
Holder with lock for data logger, theft-proof	0554 1782
Stainless steel sintered cap, Ø 21 mm, can be screwed onto humidity probe, protection in case of high mechanical load and high velocities	0554 0640
Additional accessories and spare parts	Part no.
Spare battery for testostor 171, quick and easy battery replacement	0515 0018
testo saline pots for control and humidity adjustment of humidity probes, 11.3 %RH and 75.3 %RH with adapter for humidity probe	0554 0660

Technical data testostor 171-2			
Probe type	NTC	Testo humid. sensor, cap.	Calc. parameter
Meas. range	-20 to +70 °C	0 to +100 %RH	-20 to +70 °C td
Accuracy ±1 digit	±0.4 °C (-10 to +50 °C) ±0.5 °C (-20 to -10.1 °C) ±0.5 °C (+50.1 to +70 °C)	±2 %RH (+2 to +98 %RH)	
Resolution	0.1 °C	0.1 %RH	
Oper. temp.	-20 to +70 °C		
Storage temp.	-40 to +85 °C		
Memory	55000		
Material/Housing	Aluminium, anodized		
Battery type	Lithium battery (2032)		
Dimensions	131 x 68 x 84 mm		
Weight	320 g		
Protection class	IP65		
Warranty	2 years		

# Electronic thermohygrograph with external probes

## testostor 171-6

The testostor 171-6 data logger has 2 probe sockets. Example: 2 separate multi-function %RH/°C probes for simultaneous checks on room and ambient humidity.

The Testo humidity sensor is PTB approved and guarantees a constant high measuring accuracy over a wide temperature range. Analysis of the humidity data can be expressed in %RH, dewpoint, g/m³ water level.

- 2-channel, external %RH, °C, or °C, °Ctd
- Wide range of probes
- Probes can be positioned quickly and easily Data analysis via PC
- On-site application: Testo software for Palm OS® replaces laptop/PC
- Large memory for 55,000 readings

## testostor 171-6

### External: %RH/°C or °C, °Ctd

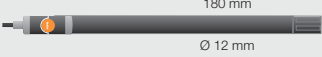

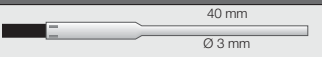
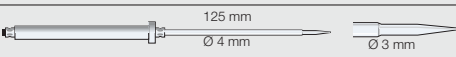


testostor 171-6, humidity data logger for %RH, °C, td, incl. starting magnet, battery and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

Part no. 0577 1716



Monitoring air humidity/temperature fluctuations in climatic cabinet



Humidity/temperature probes	Illustration	Meas. range	Accuracy	t90	Part no.
Humidity/temperature probe with standard plastic protection cap	 180 mm Ø 12 mm	0 to +100 %RH -20 to +70 °C	±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C) ±0.5 °C (remaining range)	12 s	0636 9717 Cable/length 3 m
Mini humidity/temperature module for measurements at inaccessible points, module cable 1.5m long, probe tip 49x18x7mm	 49x18x7 mm	0 to +100 %RH -20 to +120 °C	±2 %RH (+2 to +98 %RH) ±0.5 °C (-20 to +120 °C)	20 s	0628 0008 Cable/length 1.5 m
Temperature probes (NTC)	Illustration	Meas. range	Accuracy	Reaction time	Part no.
Robust immersion/air probe, quick-action, 6m cable, IP68 probe tip	 40 mm Ø 3 mm	-50 to +80 °C	±0.2 °C (-25 to +80 °C) ±0.4 °C (-50 to -25.1 °C)	5 s t <sub>90</sub> (in water)	0610 1720 Conn.: Fixed cable, 6 m
Robust, accurate, waterproof food probe (IP65), made of stainless steel	 125 mm Ø 4 mm Ø 3 mm	-50 to +120 °C	±0.2 °C (-25 to +80 °C) ±0.4 °C (-50 to -25.1 °C) ±0.5 °C (+80.1 to +120 °C)	10 s t <sub>90</sub> (in water)	0610 2217 Conn.: Fixed cable, 2 m
Pipe probe with Velcro, measures flow/return temperature, pipe diameter max. 80 mm	 300 mm	-50 to +80 °C	±0.2 °C (-25 to +80 °C) ±0.4 °C (-50 to -25.1 °C)		0610 4617 Conn.: Fixed cable, 3 m
Wall surface temperature probe, e.g. provides proof of damage to building material, cable 6.1m long, probe tip 40x15x0.2 mm		-50 to +120 °C	±0.5 °C (-50 to +120 °C)	20 s t <sub>90</sub>	0628 0007 Conn.: Fixed cable, 6 m

## Technical data

Probe type	NTC	Testo humid. sensor, cap.	Calc. parameter	Oper. temp.	-20 to +70 °C	Dimensions	131 x 68 x 26 mm
Meas. range	-50 to +120 °C	0 to +100 %RH	-30 to +50 °C td	Storage temp.	-40 to +85 °C	Warranty	2 years
Accuracy	±0.4 °C (-10 to +50 °C) ±0.6 °C (-50 to -10.1 °C) ±0.6 °C (+50.1 to +120 °C)	±2 %RH (+2 to +98 %RH)		Battery type	Lithium battery (2032)	Meas. cycle: 2s to 24h freely selectable	
±1 digit				Protection class	IP65	Software: menu-driven from Microsoft Windows 95 / ME / 2000 / XP / Vista	
Resolution	0.1 °C	0.1 %RH		Memory	55000	Battery life: 5 years	
				Weight	305 g		

Ordering data accessories see left page

## Compact data loggers - for monitoring purposes



On site: Fast printout on the testo 575 printer



testo 580 data collector collects and transmits data on site to PC



testo 581 alarm signal output for reliable warning of limits exceeded



Ethernet facilitates data communication in the network



## Monitor production conditions – reliably and efficiently

### testo 175-H1

The affordable testo 175-H1 humidity/temperature logger monitors ambient humidity and temperature fluctuations efficiently and unobtrusively.

Limit values can be entered, an alarm display is activated if the limits are exceeded. testo 575, the fast printer, supplies proof of fluctuations in ambient conditions.



- 2-channel: Internal %RH, °C
- Humidity sensor guaranteed long-term stable
- Memory for up to 3700 readings (testo 175-H1)
- Memory for up to 16000 readings (testo 175-H2)
- Data safe even when battery is spent
- Fast documentation on infrared printer, 6 lines/s
- Data transfer to PC or Notebook via interface or testo 580 data collector
- Large display (testo 175-H2)

#### testo 175-H1 w/o display

##### Internal %RH, °C

testo 175-H1, humidity/temperature logger, 2 channels, with internal sensors, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

Part no. 0563 1757

### testo 175-H2

The compact humidity/temperature logger with display. It provides you with a fast on-site overview of current readings, the last values saved, max and min values and the number of times limits were exceeded.

The testo 575 fast printer provides proof that the specified conditions have been adhered to. All of the values logged by the testo 580 data collector can then be uploaded to your PC for analysis.



Data collector testo 580 collects data and transfers them to a PC



Data analysis with easy-to-use Windows® software



testo 175-H2 with display, on site checks with the Testo fast printer

#### Recommended Set: testo 175-H1, Starter set

testo 175-H1, humidity/temperature logger, 2 channels, with internal sensors, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately 0563 1757

Lock for wall holder for testo 175/177 data loggers 0554 1755

ComSoft 3 Set - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable 0554 1766

#### Recommended Set: testo 175-H2, Starter Set

testo 175-H2, humidity/temperature logger, 2 channels, with internal sensors, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately 0563 1758

Lock for wall holder for testo 175/177 data loggers 0554 1755

ComSoft 3 Set - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable 0554 1766

Technical data	testo 175-H1 w/o display	testo 175-H2 with display
Channels	2	2
Probe type	Testo humid. sensor, cap. NTC	Testo humid. sensor, cap. NTC
Meas. range	0 to +100 %RH* -10 to +50 °C	0 to +100 %RH* -20 to +70 °C
Accuracy ±1 digit	±3 %RH ±0.5 °C	±3 %RH ±0.5 °C
Resolution	0.1 %RH 0.1 °C	0.1 %RH 0.1 °C
Memory	3700	16000
Oper. temp.	-10 to +50 °C	-20 to +70 °C
Storage temp.	-40 to +70 °C	-40 to +85 °C
Weight	80 g	85 g
Dimensions	82 x 52 x 30 mm	82 x 52 x 30 mm
Battery life	2.5 years at a meas. rate of 15 min (-10 to +50 °C)	
Measuring rate	10 s to 24 h	10 s to 24 h
Software	MS Windows 95b / 98 / ME / 2000 / XP / Vista	

\* not affected by condensation

Ordering data accessories see page 45





## Long-term monitoring of production conditions — professional and non-stop

### testo 177-H1

Sensitive products require the right ambient conditions during production and storage. Efficient measurement and documentation of the readings over months/years is possible with the testo 177-H1 professional data-logger.

Additional surface, immersion and air probes can be attached to the data logger e.g. for uninterrupted measurement of the dewpoint difference.

- 4 channels: Internal %RH, °C td + external °C
- Long-term stable humidity sensor with fast response time
- Memory for 48,000 readings
- Control and adjustment option with adjustment set
- Protection caps for dirt-ingressed or corrosive gases

#### testo 177-H1

**Intern. %RH, °C, °C td + extern. °C**  
testo 177-H1, humidity/temperature logger, 4 channels, with internal sensors and additional external temp. probe socket, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately

**Part no. 0563 1775**



#### Technical data

<b>Chann. intern</b>	3		
Meas. range	0 to +100 %RH	-20 to +70 °C	-40 to +70 °C td
Accuracy ±1 digit	±2 %RH	±0.5 °C	
Resolution	0.1 %RH	0.1 °C	0.1 °C td
<b>Chann. external (var.)</b>	1		
Meas. range	-40 to +120 °C		
Accuracy ±1 digit	±0.2 °C (-25 to +70 °C)		±0.4 °C (remaining range)
Resolution	0.1 °C		
Memory	48000		
Measuring rate	2 s to 24 h	Protection class IP54	
Oper. temp.	-20 to +70 °C	Storage temp. -40 to +85 °C	
Dimensions	103 x 64 x 33 mm	Weight	130 g
Battery life	5 years at meas. rate of 15 min (-10 to +50 °C)		
Analysis software	MS Windows 95b / 98 / ME / 2000 / XP / Vista		



Collect data on-site with the testo 580 data collector, download and analyse on PC/Notebook.



Alarm message, reliable indication when limits are exceeded

Efficient measurement of production conditions

#### Recommended Set: Set for logging production conditions and additional temperature measurement

testo 177-H1, humidity/temperature logger, 4 channels, with internal sensors and additional external temp. probe socket, wall holder and calibration protocol; calibration certificates (ISO/DKD) must be ordered separately	0563 1775
Lock for wall holder for testo 175/177 data loggers	0554 1755
Accurate imm./pen. probe, 6m cable, IP 67	0610 1725
testo 580 data collector set with RS232, readout holders included, for testo 175/177 data loggers	0554 1778
ComSoft 3 Set - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable	0554 1767

Ordering data accessories see page 45

Temperature probes (NTC)	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
Stub probe, IP 54		-20 to +70 °C	±0.2 °C (-20 to +40 °C) ±0.4 °C (+40.1 to +70 °C)	15 s	0628 7510
Stationary probe with aluminium sleeve, IP 65		-30 to +90 °C	±0.2 °C (0 to +70 °C) ±0.5 °C (remaining range)	190 s	0628 7503* Conn.: Fixed cable, 2.4 m
Accurate imm./pen. probe, 6m cable, IP 67		-35 to +80 °C	±0.2 °C (-25 to +74.9 °C) ±0.4 °C (remaining range)	5 s	0610 1725* Conn.: Fixed cable, 6 m
Accurate immersion/penetration probe, cable: 1.5 m long, IP 67					0628 0006* Conn.: Fixed cable, 1.5 m
Wall surface temperature probe, e.g. to prove damage in building material		-50 to +80 °C	±0.2 °C (0 to +70 °C)	20 s	0628 7507 Conn.: Fixed cable, 3 m
Stainless steel NTC food probe (IP65) with PUR cable		-50 to +150 °C Long-term meas. range +125 °C, short-term +150 °C (2 minutes)	±0.5% of mv (+100 to +150 °C) ±0.2 °C (-25 to +74.9 °C) ±0.4 °C (remaining range)	8 s	0613 2211* Conn.: Fixed cable, 1.6 m
Efficient, robust NTC air probe		-50 to +125 °C Long-term meas. range +125 °C, short-term +150 °C	±0.2 °C (-25 to +80 °C) ±0.4 °C (remaining range)	60 s	0613 1712 Conn.: Fixed cable, 1.2 m

□ The specified leakage class for data loggers is achieved with these probes.

\* Probe tested for suitability in transport and storage applications in accordance with EN 12830



# Accessories for testo 175 and 177

## testo 575 fast printer

- Fast-action print mechanism, 6 lines/s
- Prints tables/graphics
- Brief info. or full memory can be printed as required
- Determine section to be printed
- Your language can be set
- Self-adhesive Testo paper can also be used

Part no. 0554 1775



Fast printout and logger rebooting with testo 575

## testo 580 data collector

- Can read out up to 25 full testo 175 loggers or 10 full testo 177 loggers
- Displays all status information
- Download collected data to PC using Testo ComSoft 3

RS232 Version

Part no. 0554 1778

USB version

Part no. 0554 1764



The testo 580 data collector collects data on site for upload to PC and analysis

## testo 581 alarm signal output

- Transmission of alarm messages – e.g. when programmed limit values in the data logger are exceeded – to external components such as horns, lamps, PLC etc.
- Signal transfer via floating signal output

Part no. 0554 1769



Alarm signal output for reliable notification of limits exceeded

## Ethernet adapter

- Fast transfer of readings
- Use of an existing network without additional cabling
- Long transmission paths
- Identification of measuring instruments in system network
- In connection with ComSoft 3

Part no. 0554 1711



Read out the data stored in the logger via the PC network using the Ethernet adapter

Printer and Accessories	Part no.
Fast testo 575 printer, incl. 1 roll of thermal paper and batteries, infrared thermal line printer with graphics function	0554 1775
Spare thermal paper for printer (6 rolls)	0554 0569
Spare thermal paper for printer (6 rolls), measurement data documentation legible for up to 10 years	0554 0568
Label thermal paper (Testo patent) for testo 575 printer (6 rolls), can be applied directly	0554 0561
Additional accessories	Part no.
testo 580 data collector set with RS232, readout holders included, for testo 175/177 data loggers	0554 1778
testo 580 data collector set with USB, readout holders included, for testo 175/177 data loggers	0554 1764
testo 581 alarm signal output, floating, for testo 175/177, forwards information efficiently when limits are exceeded to e.g. horns, lamps, PLC etc.	0554 1769
Battery, 3.6 V/0.8 Ah 1/2 AA, for testo 175-T3/175-H1/175-H2/175-S1/175-S2	0515 0175
Battery, 3.6 V/1.9 Ah 1AA, for testo 175-T1/175-T2 and all testo 177 loggers	0515 0177
Transport and Protection	Part no.
Lock for wall holder for testo 175/177 data loggers	0554 1755
Transport case for up to 6 testo 177 data loggers, testo 575 printer, testo 580 data collector and accessories	0516 1770
Accessories for humidity probes	Part no.
testo saline pots for control and humidity adjustment of humidity probes, 11.3 %RH and 75.3 %RH with adapter for humidity probe	0554 0660
Metal protection cage, Ø 12 mm for humidity probes, for measurement in flow velocities of less than 10 m/s	0554 0755
Cap with wire mesh filter, Ø 12 mm	0554 0757
Sintered PTFE filter, Ø 12 mm, for corrosive media, High humidity range (long-term measurements), high flow velocities.	0554 0756
Stainless steel sintered filter, pore size 100 µm, sensor protection in dusty atmospheres or higher flow velocities, for measurements at higher flow velocities or in contaminated air	0554 0647

Software (ComSoft from p. 46)	Part no.
<b>For testo 175</b> ComSoft 4 Set - Basic with RS232 interface, Basic software with diagram and table function, incl. desk-top holder, PC connection cable	0554 1759
<b>For testo 175</b> ComSoft 3 Set - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable	0554 1766
<b>For testo 177:</b> ComSoft 3 Set - Basic with RS232 interface, Basic software with diagram and table function, incl. desk-top holder, PC connection cable	0554 1774
<b>For testo 177:</b> ComSoft 3 Set - Basic with USB interface, Basic software with diagram and table function, incl. desk-top holders, PC connection cable	0554 1767
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface)	0554 0830
ComSoft 3 - For requirements to CFR 21 Part 11, incl. database, analysis and graphics function, data analysis, trend curve (w/o interface)	0554 0821
RS232 interface for testo 175/177 incl. desk-top holders, PC connection cable, (please also order for ComSoft 3 - Professional)	0554 1757
USB interface, for testo 175/177 incl. desk-top holders, PC conn. cable, (Please order with ComSoft 3 - Professional)	0554 1768
Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit, facilitates data communication in network	0554 1711
Calibration Certificates	Part no.
ISO calibration certificate/temperature, temperature probe; calibration points -18°C; 0°C; +60°C per channel/instrument	0520 0151
ISO calibration certificate humidity, calibration points 11.3 %RH and 75.3 %RH at +25 °C/+77 °F; per channel/instrument	0520 0076
DKD calibration certificate/temperature, Temperature probe; cal. points -20°C; 0°C; +60°C (-4 °F, 92 °F, 140 °F); per channel/instrument	0520 0261
DKD calibration cert./humidity, humidity data logger; cal. points 11.3%RH and 75.3%RH at +25°C; per channel/instrument	0520 0246

Detailed information on accessories testo 175/177 on page 34/35



## ComSoft 3 - Basic: Easy operation, convenient analysis

### ComSoft 3 - Basic

The Basic version has all the functions needed to monitor, analyse, save and print data. The data loggers are programmed and read out using the instrument drivers supplied. The limit values to be monitored can be defined as required; short titles, text fields and channel names ensure clear allocation if several loggers are in use.

Once read out, data can be shown in table or line graphics and then analysed.

The recipient's e-mail address can be entered when programming so that data can be easily forwarded through your locally installed e-mail program by simply clicking on "Send...". The saved e-mail address is then entered in the address box.

- Axes can be scaled as required
- Frequently used scales can be saved for future use
- Min/Max and mean calculation in tables
- Printout as table or graphic on all printers compatible with Windows
- Data export to other applications via clipboard
- Automatic search for instrument driver during initial operation (Autodetect)
- Crosshair function, fast scanning in graphics with direct value display

#### Comsoft 3 -Basic for:

- Data loggers from the testo 175 and testo 177 series

#### ComSoft 4 Set - Basic with RS232 interface for testo 175

Basic software with diagram and table function, incl. desk-top holder, PC connection cable

Part no. 0554 1759

#### ComSoft 3 Set - Basic with USB interface for testo 175

Basic software with diagram and table function, incl. desk-top holders, PC connection cable

Part no. 0554 1766

#### ComSoft 3 Set - Basic with RS232 interface for testo 177:

Basic software with diagram and table function, incl. desk-top holder, PC connection cable

Part no. 0554 1774

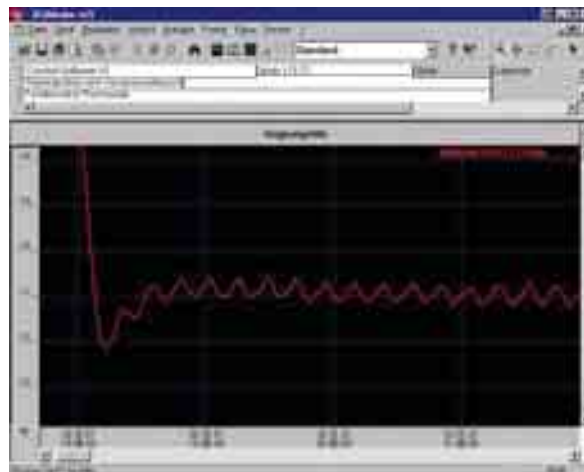
#### ComSoft 3 Set - Basic with USB interface for testo 177

Basic software with diagram and table function, incl. desk-top holders, PC connection cable

Part no. 0554 1767



Programming the logger



Analysing measurement data

ComSoft-Software V3				testo 175-T3	
Kühlaus 2				Fahrenheit, Sollwert: -18 °C	
Kühlaus 2	Datum	Uhrzeit	PC-Kanal 1		
1	13.02.02	16:43:56	22.7		
2	13.02.02	16:53:56	22.1		
3	13.02.02	17:03:56	22.1		
4	13.02.02	17:13:56	22.9		
5	13.02.02	17:23:56	22.9		
6	13.02.02	17:33:56	22.9		
7	13.02.02	17:43:56	22.9		
8	13.02.02	17:53:56	22.9		

Table view/documentation

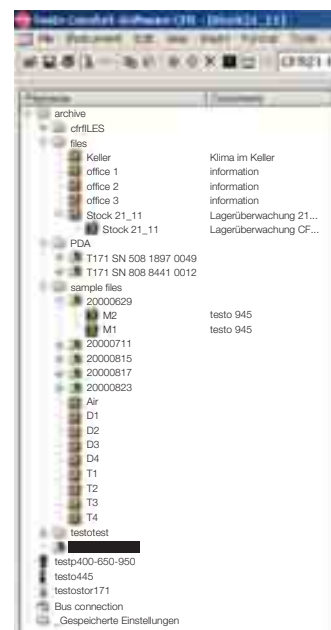
ComSoft 3 - Professional

- Adapt menus and range of functions
- Select different print heads when printing tables and graphics
- Extended display options such as digit box, bar chart, analog instrument and xy plot
- Input of mathematical functions with calculation on a new measurement channel
- Compensation functions 0 (mean) to 7th degree
- Developer ToolBox with functions for integrating the instrument driver in non-Testo software

- Data loggers from the tests 175, tests 177 and tests 171 series

incl. database, analysis and graphics  
function, data analysis, trend curve  
(without interface)

Part no. 0554 0830



Structured filing of measured data and parameters in folders, locations, logs and channels

Accessories	Part no.
RS232 interface for testo 175/177 incl. desk-top holders, PC connection cable, (please also order for ComSoft 3 - Professional)	0554 1757
USB interface, for testo 175/177 incl. desk-top holders, PC conn. cable, (Please order with ComSoft 3 - Professional)	0554 1768
Interface, attachable to to testostor 171 data logger	0554 1781

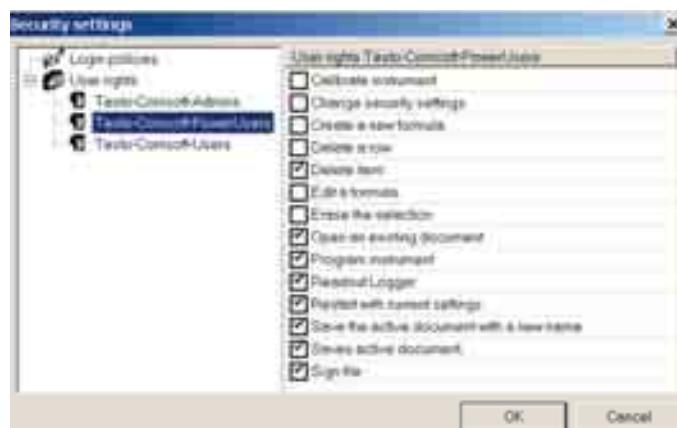
## CFR 21 Part 11

- Complete integration in the Windows 2000 security system (certificates, rights management, user and password management, user authentication)
- Option of data export in generally readable PDF file format e.g. to send to the FDA validation point responsible or to display during a company audit.

- User management in User Groups by Administrator (using Windows 2000 Rights management and three additional ComSoft-specific user groups)
- Save raw data in tamper-proof file format
- Identification of damaged or modified raw data
- Recognition of transfer errors using proof totals
- Inactivity lockout to prevent unauthorised access
- Monitors logins and logouts, successful/failed use of digital signatures and modification of raw data with the aid of Audit Trail

incl. database, analysis and graphics  
function, data analysis, trend curve  
(w/o interface)

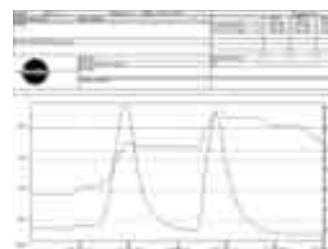
Part no. 0554 0821



## User management in groups



Display: Limit value violation in table format



### Graphic display of readings



More detailed information on validation-capable software CFR 21 Part 11 from p. 76



## testo 454, from measuring instrument to measuring system

### testo 454

#### The modular system – testo 454

Now you can measure many different parameters in one or many locations simultaneously using one portable system.

**testo 454** is a compact, portable measuring instrument and can be upgraded to a modular measuring system with more than 200 measurement channels.

#### The control unit

The control unit is a robust hand-held instrument for measuring temperature, humidity, pressure, velocity, CO<sub>2</sub>, rpm, current and voltage.

#### Efficient measurement

Our easily read graphics display allows simultaneous tracking of 6 parameters, simple menu driven operation and 4 user defined function buttons. Touch pen operation is available as an option.

#### Variable number of probe sockets

4 additional, user defined probe sockets can be added to the control unit with each attachable logger. Giving you the proper number of probes for your application.

#### Simultaneous measurement at several locations with the control unit

Simultaneous measurement of data at several locations is carried out by "slave" loggers. Measured data is transmitted via the Testo data bus. The control unit is able to control the entire measuring system.

#### Simultaneous measurement at several locations with the Testo data bus controller

Alternatively the Testo data bus controller for the laptop/PC can be used instead of the control unit for reading out and control of the decentralised loggers. The Testo data bus controller is connected via USB interface of the laptop/PC. Online measurement allows the readings from multiple loggers to be displayed easily and clearly on the screen. System-relevant data and readings are stored in the laptop/PC and in the loggers.

In connection with the Testo data bus controller and the ComSoft 3 software, the testo 454 loggers are validatable i. a. w. 21 CFR P11.



Connection option for up to 4 probes of your choice per logger



Comprehensive range of probes for temperature, humidity, pressure, velocity, CO<sub>2</sub>, rpm, current and voltage



Analysis, documentation and filing of measurement data on PC

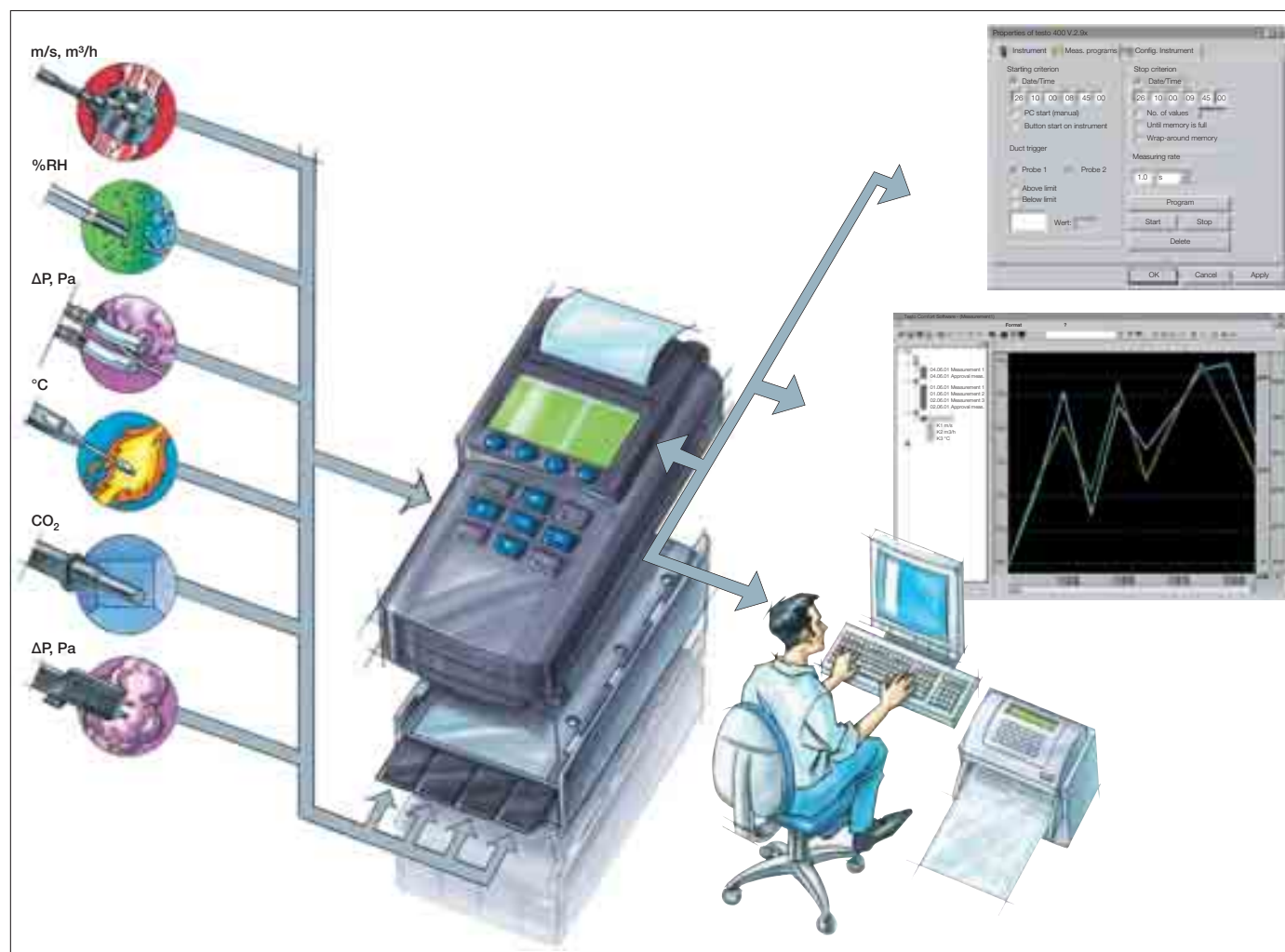


Large system case (aluminium) for control unit, up to 6 loggers, probes and accessories





## testo 454, on-site measurement



### Measuring on site

Efficient on site spot and control measurements require a mobile instrument with enough measuring channels.

### The control unit

The control unit is a portable and robust measuring instrument with a user defined probe socket and an integrated differential pressure probe.

Convenient measuring functions such as timed/multi-point mean calculations and measurement programs simplify the measuring task.

You can save up to 250,000 readings directly in the selected locations and then print them on location on the built-in printer.

### The logger

4 additional probe sockets are added with each clip-on logger attached to the control unit. Each logger provides 250,000 additional readings via the memory integrated in the logger. Up to 20 loggers can be connected to the control unit in this way.

### Parameters

A wide range of probes are available for accurate measurement in a variety of applications:

- Temperature with surface, immersion, penetration, air or precision probes
- Humidity with room climate, duct and reference probes, material moisture probes and pressure dewpoint probes
- Velocity and volume flow with vanes, hot wire, hot bulb probes and Pitot tubes
- Indoor Air Quality using CO<sub>2</sub> probe and comfort level probe
- Pressure with differential/absolute/low/high pressure probes
- rpm
- Current, voltage

### Scheduling

Scheduling allows for efficient on-site measurement. All scheduled locations of a tour are stored using the ComSoft software in the tour plan and transferred to the measuring instrument. This allows e.g. the channel cross section or nominal value of a location to be conveniently defined right in the office. It goes without saying that the **testo 454** can be used to correct or recreate definitions on site.

### Definition of measurement programs

Measuring tasks require a structured process. ComSoft software offers comprehensive options for program starting/closing and measuring cycles. For example, measurement programs can be started at a specific time, manually, value undershooting/exceeding or by way of an external trigger signal. Simplified user guidance ensures proper operation of the logger.

### Online measurement

For online measurement, it is not only possible to display readings in diagrams, tables and histograms; visualisation is also possible based on a plant diagram (e.g. flowchart or plant photo) created by the user.

### Analysis of measurement data

For data analysis, there is an extensive range of graphical representations with calculation capabilities such as mathematical smoothing, statistic functions and limit value display.

### Documentation

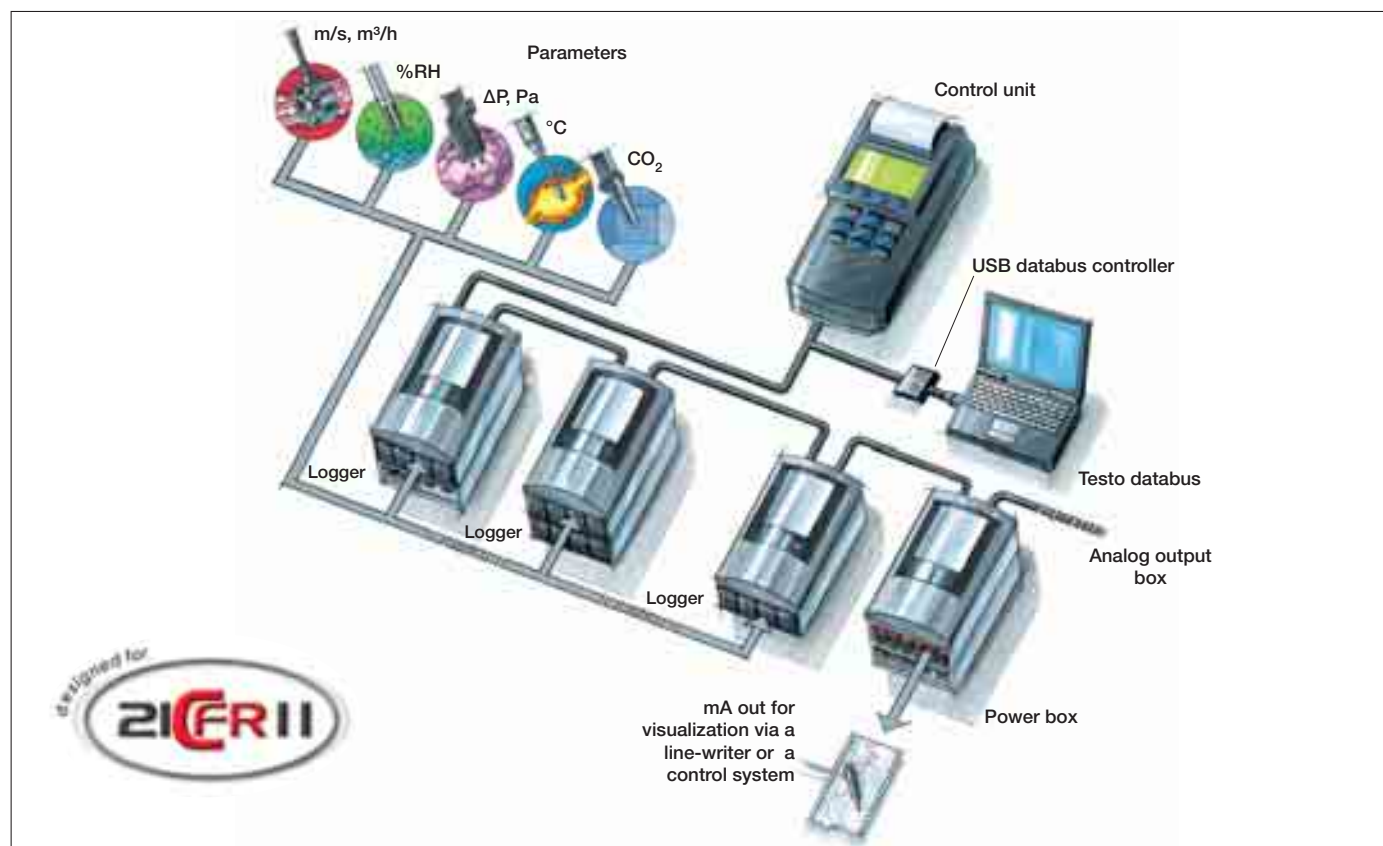
Protocols for the individual applications can be separately compiled. Only document relevant readings.

### Archiving

A tree structure and free creation of directories and locations provide easy and clear management of measurement data.



## testo 454, simultaneous measurement at different sites



### Concept

The **testo 454** is the measuring system for flexible recording of multiple measurement data.

Particular advantages:

- Simultaneous measurement at several measuring locations
- Freely assignable probe inputs
- 1 to over 200 measurement channels
- Data transmission with the Testo databus
- Modular design of system components

### Parameters

A wide range of probes is available for accurate measurement in the respective applications:

- Temperature with surface, immersion, penetration, air or precision probes
- Humidity with room climate, duct and precision probes, material moisture probes and pressure dewpoint probes
- Velocity and volume flow with vanes, hot wire, hot bulb probes and Pitot tubes
- Indoor Air Quality using CO<sub>2</sub> probe or comfort level probe
- Pressure with differential/absolute/low pressure or high pressure probes
- rpm
- Current, voltage

### Logger

The data logger measures and saves readings without any connection to the control unit. Up to 4 more probes of your choice can be connected to this logger. Additional probe connection options are made possible by connecting more loggers. The following features give you flexibility when measuring data:

- Variable program start
  - Adjustable measuring cycle
  - Number of readings
  - Program cancel can be defined
- The measurement program can be started as follows:
- At a certain time or date
  - Manually using function buttons
  - If certain values are exceeded or undershot
  - Via an event trigger socket signal

The exceeded alarm values can be evaluated for display or control via a relay.

### Control unit

The control unit displays the measurement data and controls the **testo 454** measuring system. The following parameters are programmed in the control unit:

- Locations
- Measurement programs
- Limits
- Precision adjustment
- System configuration

Efficient operation of the measuring system is guaranteed by the probe-dependent menu guide, for example, or the clear display of readings with names. The control unit is connected via the serial interface in the laptop/PC.

Additionally the control unit has all options for mobile use of a hand-held instrument.

### Testo databus controller

Alternatively, the Testo databus controller for the laptop/PC can be used in place of the control unit for reading out and control of the decentralised loggers. The Testo databus controller is connected via the USB interface of the PC/laptop. Online measurement allows the readings from multiple loggers to be

displayed easily and clearly on one screen. System-relevant data and readings are stored in the laptop/PC and in the loggers.

### Testo databus

Communication between control unit/logger, Testo databus controller/logger and other boxes takes place via the Testo databus. Using the Testo databus, you have the option of operating loggers at different locations. Distances of up to several hundred metres pose no problem for the Testo databus. In combination with the Testo Databus controller and the software ComSoft 3, the testo 454 data loggers can be validated for requirements according to 21 CFR Part 11.

### Analog output box

The logger readings are output as a current signal (4-20 mA signal) for display units or output on an analog recorder.

### Power box

The power box is used to supply power to the loggers, control unit, analog output box and the Testo databus thus increasing operating life in the field.

## Ordering suggestions testo 454



### Data logging at several sites

The control unit can be connected to several loggers via connecting cables for the Testo databus. This gives you an overview of the measurement data at several processing stations for e.g. monitoring production processes.

#### Recommended Set: Data logging at several sites

Control unit displays measurement data and controls the measurement system, incl. built-in printer, pressure measurement 40/200 hPa, 1 user defined probe socket, programmable measurements and memory space for 250,000 readings, connection for Testo data bus, incl. terminal plug

0563 0353

Touch screen with pen (available only with original order)

0440 0559

Testo rechargeable battery pack NiMH for control unit, logger

0515 0097

Connection cable, 2 m, for Testo data bus

0449 0042

Logger, measures and saves (max. 250,000 readings), incl. 4 user defined probe sockets, alarm output/event trigger socket, stand/wall holder

0577 4540

Connection cable, 5 m, for Testo data bus

0449 0043

Logger, measures and saves (max. 250,000 readings), incl. 4 user defined probe sockets, alarm output/event trigger socket, stand/wall holder

0577 4540

Power box, connected to control unit to increase field operating life and supply power to Testo data bus

0554 1045

Power supply for power box (110/230 V; 50/60 Hz, 12 V, 3 A)

0554 1143

ComSoft 3 for data management, incl. RS 232 connection cable

0554 0841

Selection of probes and accessories

#### Accessories, we recommend:

DKD calibration certificates for temperature, humidity, flow velocity, pressure (see Calibration Services)



### Data measurement at several sites using the laptop/PC

The loggers are directly connected (without control unit) to the databus controller via USB connection for the laptop/PC. Recording of the measurement data takes place as an online measurement with the laptop/PC or the loggers automatically save the measurement data by way of a freely definable measurement program.

#### Recommended Set: Data measurement at several sites using the laptop/PC

Databus controller with USB connection incl. software ComSoft 3, cable for Testo databus, USB cable and terminal plug

0554 0589

Logger, measures and saves (max. 250,000 readings), incl. 4 user defined probe sockets, alarm output/event trigger socket, stand/wall holder

0577 4540

Logger, measures and saves (max. 250,000 readings), incl. 4 user defined probe sockets, alarm output/event trigger socket, stand/wall holder

0577 4540

Logger, measures and saves (max. 250,000 readings), incl. 4 user defined probe sockets, alarm output/event trigger socket, stand/wall holder

0577 4540

Connection cable, 2 m, for Testo data bus

0449 0042

Connection cable, 5 m, for Testo data bus

0449 0043

Connection cable, 20 m, for Testo data bus

0449 0044

Power box, connected to control unit to increase field operating life and supply power to Testo data bus

0554 1045

Power supply for power box (110/230 V; 50/60 Hz, 12 V, 3 A)

0554 1143

Selection of probes and accessories

#### Accessories, we recommend:

DKD calibration certificates for temperature, humidity, flow velocity, pressure (see Calibration Services)





## Accessories testo 454

### Control unit



Control unit displays measurement data and controls the measurement system, incl. built-in printer, pressure measurement 40/200 hPa, 1 user defined probe socket, programmable measurements and memory space for 250,000 readings, connection for Testo data bus, incl. terminal plug

**Part no. 0563 0353**

### Logger



Logger, measures and saves (max. 250,000 readings), incl. 4 user defined probe sockets, alarm output/event trigger socket, stand/wall holder

**Part no. 0577 4540**

### Analog output box (mA out)



Analog output box, 6 channels, 4 to 20 mA, for output on an analog recorder

**Part no. 0554 0845**

### Power box



Power box, connected to control unit to increase field operating life and supply power to Testo data bus

**Part no. 0554 1045**

### Databus controller



Databus controller with USB connection incl. software ComSoft 3, cable for Testo databus, USB cable and terminal plug

**Part no. 0554 0589**

Control Unit + Logger	Part no.
Control unit displays measurement data and controls the measurement system, incl. built-in printer, pressure measurement 40/200 hPa, 1 user defined probe socket, programmable measurements and memory space for 250,000 readings, connection for Testo data bus, incl. terminal plug	0563 0353
Touch screen with pen (available only with original order) for easy input of text and values	0440 0559
Logger, measures and saves (max. 250,000 readings), incl. 4 user defined probe sockets, alarm output/event trigger socket, stand/wall holder	0577 4540
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
Testo rechargeable battery pack NiMH for control unit, logger	0515 0097
Analog output box + Power box	Part no.
Analog output box, 6 channels, 4 to 20 mA for output on an analog recorder	0554 0845
Power box, connected to control unit to increase field operating life and supply power to Testo data bus	0554 1045
Power supply for power box (110/230 V; 50/60 Hz, 12 V, 3 A)	0554 1143
testo databus	Part no.
Connection cable, 2 m, for Testo data bus	0449 0042
Connection cable, 5 m, for Testo data bus	0449 0043
Connection cable, 20 m, for Testo data bus	0449 0044
Mains unit (110/230 V; 50/60 Hz, 12 V, 3 A) supplies power to Testo data bus	0554 1145
Terminal plug for Testo data bus	0554 0119
Software (see page 79) and accessories	Part no.
ComSoft 3 for data management, incl. RS 232 connection cable Incl. database, analysis and graphics function, data analysis, trend curve	0554 0841
Databus controller with USB connection incl. software ComSoft 3, cable for Testo databus, USB cable and terminal plug	0554 0589
Accessories	Part no.
Spare thermal paper for printer (6 rolls)	0554 0569
Spare thermal paper for printer (6 rolls) measurement data documentation legible for up to 10 years	0554 0568
Holder/theft-proof protection with lock for logger wall mounting device	0554 1782
Connection hose, silicone, 5m long max. load 700 hPa (mbar)	0554 0440
System case	Part no.
System case (aluminium) for measuring instrument, probes and accessories, probes in lid make it easy to find parts in case	0516 0410
Large system case (aluminium) for control unit, up to 6 loggers, probes and accessories 1 section for velocity probes, ample space in lid for probes and large section in base for accessories	0516 0420

**Large selection of probes from page 64  
Calibration certificates, see page 60**

# Technical data testo 454

Technical data					
Probe type	Vane	Thermal	Testo humid. sensor, cap.	Pressure	
Meas. range	0 to +60 m/s	0 to +20 m/s	0 to +100 %RH	10 to 30000 hPa	
Accuracy ±1 digit	See probe data for system accuracy	±0.01 m/s (0 to +1.99 m/s) ±0.02 m/s (+2 to +4.99 m/s) ±0.04 m/s (+5 to +20 m/s)	See probe data	Probe 0638 1345 Probe 0638 1445 Probe 0638 1545 Probe 0638 1645 ±0.1% of mv Probe 0638 1740 Probe 0638 1840 Probe 0638 1940 ±0.2% of mv	
Resolution	0.01 m/s (for Ø 60/100 mm), 0.1 m/s (for remaining probes)	0.01 m/s (0 to +20 m/s)	0.1 %RH (0 to +100 %RH)	0.001 hPa (Probe 0638 1345) 0.001 hPa (Probe 0638 1445) 0.01 hPa (Probe 0638 1545) 1 hPa (Probe 0638 1645) 0.01 bar (Probe 0638 1740) 0.01 bar (Probe 0638 1840) 0.01 bar (Probe 0638 1940)	
Probe type	Pt100	Type K (NiCr-Ni)	Type S (Pt10Rh-Pt)	Type J (Fe-CuNi)	Type T (Cu-CuNi)
Meas. range	-200 to +800 °C	-200 to +1370 °C	0 to +1760 °C	-200 to +1000 °C	-40 to +350 °C
Accuracy ±1 digit	±0.1 °C (-49.9 to +99.9 °C) ±0.4 °C (-99.9 to -50 °C) ±0.4 °C (+100 to +199.9 °C) ±1 °C (-200 to -100 °C) ±1 °C (+200 to +800 °C)	±0.4 °C (-100 to +200 °C) ±1 °C (-200 to -100.1 °C) ±1 °C (+200.1 to +1370 °C)	±1 °C (0 to +1760 °C)	±0.4 °C (-150 to +150 °C) ±1 °C (-200 to -150.1 °C) ±1 °C (+150.1 to +199.9 °C)	±0.4 °C (-40 to +200 °C) ±1 °C (+200.1 to +350 °C)
Resolution	0.001 °C (-9.999 to +300 °C) 0.1 °C (-200 to -100 °C) 0.1 °C (+301 to +800 °C)	0.1 °C (-200 to +1370 °C)	1 °C (0 to +1760 °C)	0.1 °C (-200 to +1000 °C)	0.1 °C (-40 to +350 °C)
Probe type	NTC	CO probe	CO2 probe	CO2 probe	
Meas. range	-40 to +150 °C	0 to +500 ppm CO	0 to +1 Vol. % CO <sub>2</sub>	0 to +10000 ppm CO <sub>2</sub>	
Accuracy ±1 digit	±0.2 °C (-10 to +50 °C) ±0.4 °C (-40 to -11 °C) ±0.4 °C (+51 to +150 °C)	±5% of mv (0 to +500 ppm CO)	See probe data	See probe data	
Resolution	0.1 °C (-40 to +150 °C)				
Probe type	mechanical	Current/voltage measurement	Current/voltage measurement	Control unit, integ. press. sensor	Control unit, integ. press. sensor
Meas. range	20 to 20000 rpm	0 to +20 mA	0 to +10 V	-200 to +200 hPa	-40 to +40 hPa
Accuracy ±1 digit	±1 digit	±0.04 mA (0 to +20 mA)	±0.01 V (0 to +10 V)	±1.5% of mv (-50 to -200 hPa) ±1.5% of mv (+50 to +200 hPa) ±0.5 hPa (-49.9 to +49.9 hPa)	±1.5% of mv (-3 to -40 hPa) ±1.5% of mv (+3 to +40 hPa) ±0.03 hPa (-2.99 to +2.99 hPa)
Resolution	1 rpm	0.01 mA (0 to +20 mA)	0.01 V (0 to +10 V)	0.1 hPa (-200 to +200 hPa)	0.01 hPa (-40 to +40 hPa)
	testo 454, control unit	Logger, measures and saves readings	Analog output box (mA out)	Power box	
Oper. temp.	-5 to +45 °C	-10 to +50 °C	-10 to +50 °C	0 to +40 °C	
Storage temp.	-20 to +50 °C	-25 to +60 °C	-25 to +60 °C	-20 to +50 °C	
Battery type	4 AA batteries	Alkali manganese			
Battery life	8 h <sup>*1</sup>	24 h <sup>*2</sup>		35 h	
Memory	250000 readings	250000 readings			
Weight	850 g	450 g	305 g	700 g/700 g	
Dimensions	252 x 115 x 58 mm	200 x 89 x 37 mm	200 x 89 x 37 mm	200 x 89 x 37 mm	
Warranty	2 years	3 years	3 years	3 years	

<sup>\*1</sup> Battery life in continuous operation with 1 T/C probe

<sup>\*2</sup> Battery life in continuous operation with a logger/4 T/C probes

Large selection of probes from page 64





## The reference testo 400, testo 650

### The right probe for every application

#### testo 400, testo 650

	Highly accurate immersion/penetration probe with a system accuracy of 0.05 °C in the measuring range from 0 to 100 °C and a resolution of up to 0.001 °C
	Fast reaction surface probe for measuring surface temperature
	Precision air probe for measuring the air temperature
	Magnetic probe, adhesive power approx. 10 N for measurements on metal surfaces
	Globe thermometer to measure radiant heat
	Current/voltage cable ( $\pm V$ , $\pm 10 V$ , 20 mA) for example for checking stationary measurement transmitters
	CO <sub>2</sub> probe for determining indoor air quality and monitoring the workplace
	Highly accurate reference humidity/temperature probe for highest accuracy requirements 1 %RH
	Pressure dewpoint probe for measuring the pressure dewpoint up to -60 °Ctpd in compressed air systems
	Robust humidity probe for equilibrium moisture or duct measurements up to 180 °C
	Differential (100 hPa / 10 hPa / 100 hPa / 1000 hPa / 2000 hPa) and absolute pressure probes for pressure measurement
	Refrigerant proof high-pressure probes for maintenance of refrigeration systems / water measurement

#### testo 400

	Straight and Prandtl Pitot tubes for measuring the flow velocity in dirty air and temperatures up to +600 °C
	12/16/25 mm – vane probes for measurement in ducts with temperature measurement
	Vane probes 60/100 mm for integrating measurements at outlets
	Fast reaction hot wire probe for low flow velocities in ducts
	Robust hot bulb probe for direction-independent flow measurement
	Comfort probe for measurements of degree of turbulence according to EN 13779

#### Temperature measurement

- DKD laboratory for temperature accredited by the PTB guarantees secure measurement values
- First DKD laboratory for surface temperature accredited by the PTB, developed together with the PTB and the University of Ilmenau
- Cross-band probe for fast surface measurements
- Customized temperature probes for your application
- System accuracy up to 0.05 °C with precision probe 0614 0240

#### Current-voltage measurement

- Additional connection of external measurement transmitters such as particle counters and pressure transmitters, and scaling in the instrument

#### CO and CO<sub>2</sub> measurement

- Long-term stable 2 beam method for measuring the reference and the measurement channel for CO<sub>2</sub>

#### Humidity measurement

- The first DKD laboratory for air humidity and dewpoint temperature accredited by the PTB guarantees secure measurement values
- Worldwide patented (capacitive) Testo humidity sensor
- Inter-laboratory tests in national and international institutes confirms a sensor accuracy of  $\pm 1$  %RH
- 2 years guaranteed long-term stability of the Testo humidity sensor under normal conditions
- Easy calibration or adjustment of the humidity probe (on site) with defined saline solutions (11.3 %RH, 33 %RH and 75.3 %RH)

#### Pressure measurement

- Very high accuracy in the lower measuring range (100 Pa) of  $\pm (0.3 \text{ Pa} + 0.5 \% \text{ of reading})$
- Temperature-compensated pressure measurement

#### Flow velocity measurement

- First laboratory for flow velocity accredited by the PTB ensures secure measurement values
- Reference laser-Doppler anemometer ensures calibration accuracy from 0.05 % of reading
- Thermal probes for a high accuracy up to  $\pm (0.03 \text{ m/s} + 5\% \text{ of reading})$  in the measuring range up to 20 m/s
- Density-independent measurement from 500 hPa absolute pressure or to 350 °C ambient temperature with vane probes in the measuring range from 0.4 m/s to 60 m/s
- Straight Pitot tubes with considerably improved accuracy compared to Prandtl Pitot tubes through a Pitot tube factor of 0.67

#### Comfort level measurement

- high accuracy for determining the degree of turbulence of  $\pm (0.03 \text{ m/s} + 4\% \text{ of reading})$

Wide selection of probes from page 64

## The reference testo 400, testo 650

### testo 400

testo 400 contains the basic parameters temperature, CO<sub>2</sub>, rpm, current, voltage, humidity, pressure, flow velocity and volume flow.

#### Useful instrument functions

##### testo 650, testo 400

- System accuracy up to 0.05 °C and up to a resolution of 0.001 °C
- Calculation of all parameters of the Mollier diagram
  - relative humidity %RH, dewpoint and pressure dewpoint (td, tpd)
  - absolute humidity g/m<sup>3</sup>, psychrometric wet bulb temperature
  - degree of humidity (g/kg), water vapour partial pressure in mbar/hPa
  - enthalpy kcal/kg
  - aw-value measurement with trend display
  - barometric air pressure

#### Useful instrument functions

##### testo 400

- Input of cross-sections for volume flow calculation
- Absolute pressure compensation in thermal probes
- Density calculation for flow velocity measurement, taking temperature, humidity and absolute pressure into account
- Degree of turbulence measurement according to DIN 13779
- Evaluation of volume flow measurements with calculation of the total measurement inaccuracy according to EN 12599 with VAC module

### testo 400

testo 400, multi-functional measuring instrument, incl. measurement value store up to 500,000 readings, VAC-module (determination of volume flow with error calculation), battery, Li-cell and calibration protocol

Can be used for:

- Velocity, volume flow
- Humidity, pressure
- Temperature
- CO<sub>2</sub>, rpm and current/voltage

Part no. 0563 4001

### testo 650

testo 650 contains the basic parameters temperature, CO<sub>2</sub>, rpm, current, voltage, humidity and pressure. testo 650 can be retrofitted to the multi-function instrument testo 400 by update.

#### Attachable printer (optional)

Print readings in seconds on site

#### Clear graphics display

#### 3 user defined function buttons

#### Saves or prints at the touch of a button

#### User-friendly operation with cursor via menu structure

#### 2 user-defined probe inputs

#### Mains connection/fast recharging



### testo 650

testo 650, reference humidity meas. instr., readings memory included (up to 500,000 readings), battery, Li cell and calibration protocol

Applicable for:

- humidity/pressure
- temperature
- CO<sub>2</sub>, rpm and current/voltage

Part no. 0563 6501



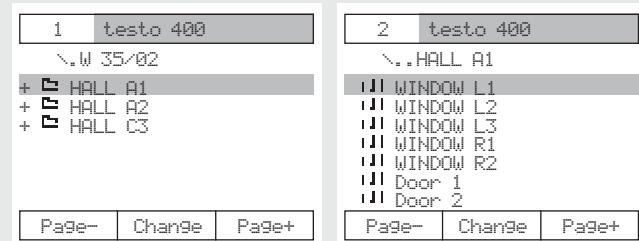


## testo 400/650 – With the measuring instrument, measurement data is:

### structured - recorded - printed out on-site

#### Structuring measurement data:

- Readings can be saved at individual locations
  - with guarantee of refinding.
- The “tree structure” - folders, sub-folders and measurement protocols - guarantees an uncomplicated view.
- Practical additional information such as measurement information or required value input can be saved with the location.
- The locations/product groups can be selected via barcode labels using the pen.
- It is easy to draw an effective tour plan using the locations list.



#### Long-term monitoring made easy:

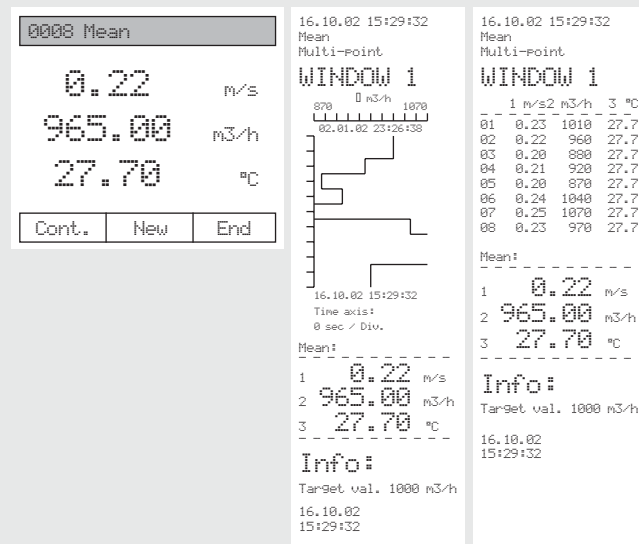
User-friendly data recording, not only for spot checks

- The beginning of the measurement can be...
  - determined manually each time.
  - activated if a user-defined limit value is exceeded.
  - set according to date/time.
- The measurement is completed when...
  - the predefined number of readings is reached.
  - date/time is reached.
  - the memory is full.
  - ended manually.
- Non-stop measurement via wrap-around memory...
  - deletes the oldest respective value.
  - is deactivated manually.



#### Documentation on-site:

- The individual measurement protocol can be either saved or deleted following analysis.
- The fast printer immediately supplies the documentation required.
- The attachable comfort printer also offers graphical analysis options.
- Thermal paper for long-term legible measurement data documentation of up to 10 years.

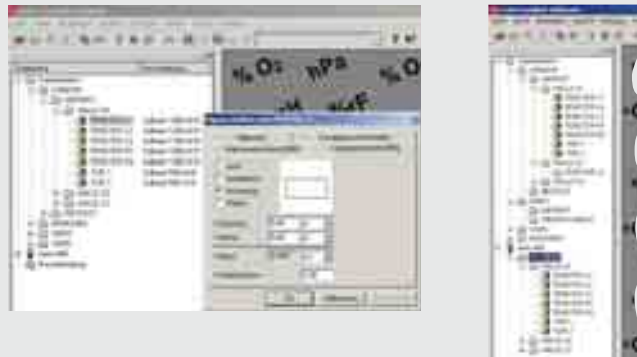


## testo 400/650 – With ComSoft 3 software, measurement data is:

### prepared - analyzed - archived - documented

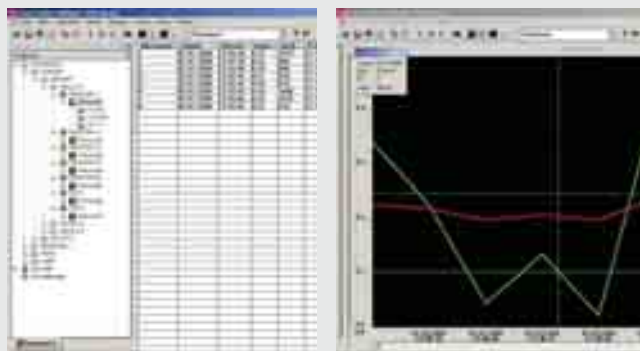
#### Easy reading management:

- Preparation of the measurement:
  - The measurement program is determined and loaded into instrument
  - Tour plan is drawn up based on locations and is loaded into instrument.
- The measuring instrument is downloaded once measuring is complete:
  - The saved protocols are conveniently filed via the software using "Drag & Drop" or are analyzed in Data.
- The readings are determined using the measuring instrument and can also be displayed online using the software.



#### Comprehensive analysis, easy archiving:

- Analysis:
  - with calculation functions
  - with crosshairs
  - with mean calculation
  - with calculation of standard deviation
  - taking all conventional refrigerants into consideration (refrigeration module, optional)
- Display:
  - as table or as graphic
  - as digit field or as histogram
  - with analog display
  - Measurement channels can be activated or deactivated at the touch of a button
- Documenting:
  - Data is easily transferred to Excel table using "Copy and Paste".



#### Individual configuration options:

- Your company logo can be included on the printouts.
- Functions can be selected from the function list and the finished profile can be saved.
- The online interface is available for LabVIEW software.
- Menu can be individually tailored to your needs.



## testo 650, Ordering suggestions

### The precision set for air humidity measurement

testo 650, reference humidity meas. instr., readings memory included (up to 500,000 readings), battery, Li cell and calibration protocol	0563 6501
Highly accurate reference humidity/temp. probe	0636 9741
Attachable printer (securely attached) including 1 roll of thermal paper and batteries	0554 0570
SoftCase (protects instrument from impact) with carrier strap, magnetic holder and probe holder	0516 0401
SoftCase for attachable printer (protects printer from dirt/impact)	0516 0411
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument	0430 0143
System case (plastic) for measuring instrument, probes and accessories	0516 0400



Measurements in climatic cabinets with the highly accurate reference humidity/temperature probe. Advantage: accurate monitoring of fluctuations in air humidity with an accuracy of  $\pm 1\%RH$

### The reference set for measurements in the high humidity level range

testo 650, reference humidity meas. instr., readings memory included (up to 500,000 readings), battery, Li cell and calibration protocol	0563 6501
High humidity level probe w/ heated sensor element, no humidity on sensor	0636 2142
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument	0430 0143
Attachable printer (securely attached) including 1 roll of thermal paper and batteries	0554 0570
SoftCase (protects instrument from impact) with carrier strap, magnetic holder and probe holder	0516 0401
SoftCase for attachable printer (protects printer from dirt/impact)	0516 0411
System case (plastic) for measuring instrument, probes and accessories	0516 0400



Humidity measurement in a bio-filter.  
Advantage: Accurate measurements in the high humidity range or in temperature fluctuations, without condensation on the probe which cause incorrect measurements.

### The reference set for aw value measurement

testo 650, reference humidity meas. instr., readings memory included (up to 500,000 readings), battery, Li cell and calibration protocol	0563 6501
aw value set: pressure-tight precision humidity probe with certificate, measurement chamber and 5 sample bowls (plastic)	0628 0024
Attachable printer (securely attached) including 1 roll of thermal paper and batteries	0554 0570
SoftCase (protects instrument from impact) with carrier strap, magnetic holder and probe holder	0516 0401
SoftCase for attachable printer (protects printer from dirt/impact)	0516 0411



Quality control monitoring of pharmaceuticals.  
Advantage: Results are traceable to national standards. testo 650 automatically indicates when a sample reaches equilibrium, signalling the end of the test. Constant monitoring is therefore not required. Calibration on location with control and adjustment set, with DKD calibration certificate if required.  
Advantage: This provides additional quality assurance.

### We recommend:

DKD calibration certificate/humidity, cal. points freely selectable from 5 to 95%RH at +25°C or -18°C to +70°C	0520 0216
testo saline pots for control and humidity adjustment of humidity probes, 11.3 %RH and 75.3 %RH with adapter for humidity probe	0554 0660



# testo 400, Ordering suggestions

## testo 400, the Pro set for comfort level meas. & occupational safety/health

testo 400, multi-functional measuring instrument, incl. measurement value store up to 500,000 readings, VAC-module (determination of volume flow with error calculation), battery, Li-cell and calibration protocol	0563 4001
Comfort level probe for measuring degree of turbulence, with telescopic handle and stand. Fulfills EN 13779 requirements	0628 0009
Attachable printer (securely attached) including 1 roll of thermal paper and batteries	0554 0570

### We recommend:

CO2 probe measures indoor air quality and monitors the workplace. With plug-in head, connection cable 0430 0143 or 0430 0145 required	0632 1240
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument	0430 0143
Standard ambient air probe up to +70°C, Measures all physical parameters in the psychrometric chart	0636 9740
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

## The pro set for assessing workplaces subjected to heat

testo 400, multi-functional measuring instrument, incl. measurement value store up to 500,000 readings, VAC-module (determination of volume flow with error calculation), battery, Li-cell and calibration protocol	0563 4001
Wet Bulb Globe temperature probe to assess workplaces subjected to heat, in accordance with ISO 7243 or DIN 33403, incl. WBGT case	0635 8888
Attachable printer (securely attached) including 1 roll of thermal paper and batteries	0554 0570

### We recommend:

ISO calibration certificate/temperature, for air/immersion probes, calibration points -8°C; 0°C; +40°C	0520 0181
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## The Pro Set for cleanroom technology

testo 400, multi-functional measuring instrument, incl. measurement value store up to 500,000 readings, VAC-module (determination of volume flow with error calculation), battery, Li-cell and calibration protocol	0563 4001
Precision pressure probe, 100 Pa	0638 1347
Precision air probe	0628 0017
Highly accurate reference humidity/temp. probe	0636 9741
Connection cable, length 1.5 m, for probes with plug-in heads	0430 0143
Connection cable, length 1.5 m, for probes with plug-in heads	0430 0143
Fast reaction hot wire probe, Ø 10 mm, with telescope	0635 1041
Bendable vane probe (90° bend radius) Ø 100 mm, attachable to handle or telescope	0635 9340
Pro telescope for plug-in vane probes, length max. 1 m	0430 0941
Current/voltage cable (±1 V, ±10 V, 20 mA)	0554 0007
System case (aluminium) for measuring instrument, probes and accessories	0516 0410
ComSoft 3 - Professional with data management	0554 0830
RS232 cable	0409 0178

### We recommend:

DKD calibration certificates for temperature, humidity, flow velocity, pressure (see Calibration Services)



For a comfortable climate in the workplace. The "thermal well-being" of a person at their workstation is very much a factor of the air temperature in the room, the air humidity, the air velocity and the air quality. These criteria can be measured on site using the prepared probes. Advantage: The testo 400 measuring instrument is compliant with the accuracy requirements as specified by DIN 1946, Part 2, VDI 2080, ISO 7726. The connectable printer documents the measurement data on site.



The measurement task is the evaluation of workplaces, especially those affected by heat radiation: With the WBGT probe, the WBGT (Wet Bulb Globe Temperature) is determined as per DIN 33403/ISO 7243. The testo 400 measuring instrument calculates the indexes and shows these in the display (current).



Monitoring the flow velocity in a cleanroom with the hot wire probe. Advantage: Measurements in the lower velocity range



## testo 400 ordering suggestion/calibration certificates - testo 400, testo 650

### testo 400 VAC module

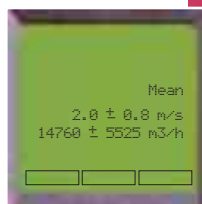
The testo 400 with VAC module is currently the only measuring system in the world that can be used to quickly and objectively evaluate the operability of a VAC system without additional manual calculations.

It goes without saying that the measurement requirements are based on internationally applicable standards VDI 2080 (Germany), EN 12599 draft (Europe) and ASHRAE (USA).

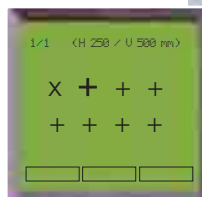
This is the first automated measuring method which meets the requirements of this standard.

#### Ordering suggestion: For fast measurements on VAC systems

testo 400, multi-functional measuring instrument, incl. measurement value store up to 500,000 readings, VAC-module (determination of volume flow with error calculation), battery, Li-cell and calibration protocol	0563 4001
ComSoft 3 - Professional with data management	0554 0830
RS232 cable	0409 0178
Bendable vane probe (90° bend radius) Ø 100 mm, attachable to handle or telescope	0635 9340
Vane/temperature probe, Ø 16 mm, attachable to 0430 3545 handle or 0430 0941 telescopic handle	0635 9540
Pro telescope for plug-in vane probes, length max. 1 m	0430 0941
Attachable printer (securely attached) including 1 roll of thermal paper and batteries	0554 0570
SoftCase (protects instrument from impact) with carrier strap, magnetic holder and probe holder	0516 0401
SoftCase for attachable printer (protects printer from dirt/impact)	0516 0411
System case (aluminium) for measuring instrument, probes and accessories	0516 0410



Direct evaluation of the measurement on site with integrated uncertainty calculation



The coordinates required for net measurement are shown in the instrument display. Depth specification at the vane telescope makes working in the field considerably easier.



### Ordering data calibration certificates for testo 400, testo 650

Calibration certificates/temperature	Part no.
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

Calibration certificates/humidity	Part no.
ISO calibration certificate/humidity, cal. points freely selectable from 5 to 95%RH at +15 to +35°C or at -18 to +80°C	0520 0106
ISO calibration certificate humidity, Calibration points 11.3 %RH and 75.3 %RH at +25°C	0520 0006
ISO calibration certificate/pressure dew point, two adjustment points -10/-40 °C tpd at 6 bar	0520 0136
ISO calibration certificate/humidity, saturated saline solutions: calibration point 11.3%RH	0520 0013
ISO calibration certificate/humidity, saturated saline solutions, calibration point 75.3%RH	0520 0083
DKD calibration certificate/humidity, electronic hygrometers; calibration points 11.3%RH and 75.3%RH at +25°C	0520 0206
DKD calibration certificate/humidity, cal. points freely selectable from 5 to 95%RH at +25°C or -18°C to +70°C	0520 0216
DKD calibration certificate/humidity, saturated saline solutions; calibration point 11.3%RH	0520 0213
DKD calibration certificate/humidity, saturated saline solutions; calibration point 75.3%RH	0520 0283

Calibration certificates/pressure	Part no.
ISO calibration certificate/pressure, differential pressure; 5 points distributed over meas. range	0520 0005
DKD calibration certificate/pressure, diff. and pos. pressure; 6 meas. points distributed over meas. range (>0.6% of fsv)	0520 0225
ISO calibration certificate/pressure, differential pressure, accuracy 0.1 to 0.6 (% of fsv)	0520 0025
DKD calibration certificate/pressure, diff. and pos. pressure; 11 measuring points distributed over the instr. meas. range	0520 0215
ISO calibration certificate/absolute pressure, 5 measurement points distributed over meas. range, absolute pressure, accuracy 0.1 to 0.6 (% of fsv)	0520 0125
DKD calibration certificate/pressure, absolute pressure; 11 measuring points distributed over meas. range	0520 0212

Calibration certificates/velocity	Part no.
ISO calibration certificate/velocity, all velocity probes, calibration points selectable from 0.3 to 50 m/s at +25°C	0520 0104
ISO calibration certificate velocity, hot wire, vane anemometer, Pitot tube; calibration points 1; 2; 5; 10 m/s	0520 0004
ISO calibration certificate/Velocity, hot wire, vane anemometer, Pitot tube; calibration points 5; 10; 15; 20 m/s	0520 0034
ISO calibration certificate velocity, hot wire, vane anemometer; calibration points 0.5; 0.8; 1; 1.5 m/s	0520 0024
DKD calibration certificate/velocity, hot wire, vane anemometer; calibration points 0.5; 1; 2; 5; 10 m/s	0520 0244
DKD calibration certificate/velocity, hot wire, vane anemometer, Pitot tube; calibration points 2; 5; 10; 15; 20 m/s	0520 0204
DKD calibration certificate/velocity, hot wire anemometer; calibration points 0.1; 0.2; 0.5; 0.8; 1 m/s	0520 0224

## Accessories testo 400, testo 650

### ComSoft 3 - Professional



ComSoft 3 - Professional with data management incl. database, analysis and graphics function, data analysis, trend curve

Part no. 0554 0830

### Ethernet adapter



Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit, facilitates data communication in network

Part no. 0554 1711

### Attachable printer



Attachable printer (securely attached) including 1 roll of thermal paper and batteries, quickly prints readings on location

Part no. 0554 0570

### Testo fast printer



with 1 roll thermal paper and 4 AA batteries

Testo fast printer Part no. 0554 0549

testo 575 fast printer Part no. 0554 1775

Part no. 0554 0549

Part no. 0554 1775

### SoftCase



SoftCase for measuring instrument (impact protection) incl. carrying strap, magnetic and probe holder

Part no. 0516 0401

SoftCase for attachable printer (protects printer from dirt/impact)

Part no. 0516 0411

Part no. 0516 0401

Part no. 0516 0411

Update of measuring instrument testo 650 to testo 400	Part no.
Velocity module, incl. volume flow, degree of turbulence... Additional upgrading at service point	0450 4003
Accessories for measuring instrument	Part no.
Mains unit 230 V/ 8 V/ 1 A, for instrument (European plug), for mains operation and battery recharging	0554 1084
Rech. batt. set for instr. (2 rech. 2.4V/1100mAh), selected for quick recharging in instrument	0554 0196
Lithium battery, button cell, type CR 2032	0515 0028
Printer and Accessories	Part no.
Attachable printer (securely attached) including 1 roll of thermal paper and batteries	0554 0570
Testo fast printer with wireless infrared interface, 1 roll thermal paper and 4 AA batteries	0554 0549
Fast testo 575 printer, incl. 1 roll of thermal paper and batteries, infrared thermal line printer with graphics function	0554 1775
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), measurement data documentation legible for up to 10 years	0554 0568
Label thermal paper (Testo patent) for testo 575 printer (6 rolls), can be applied directly	0554 0561
SoftCase for instrument and printer	Part no.
SoftCase (protects instrument from impact) with carrier strap, magnetic holder and probe holder	0516 0401
SoftCase for attachable printer (protects printer from dirt/impact), protects from impact and falls	0516 0411
Software and Accessories	Part no.
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve (without interface)	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
System case	Part no.
System case (plastic) for measuring instrument, probes and accessories, probes in lid make it easy to find parts in case (540 x 440 x 130 mm)	0516 0400
System case (aluminium) for measuring instrument, probes and accessories, probes in lid make it easy to find parts in case	0516 0410



## Accessories and technical data for testo 400, testo 650

### Ethernet adapter



#### Spot-checks on site

Spot checks are carried out on site in production or incoming goods with the Testo hand-held measuring instruments. The data can be immediately transferred to a central office via the Ethernet connection. This allows fast reaction times when further measures need to be taken.

#### The Ethernet adapter allows.

- Measurement on site, e.g. in production, warehouses, incoming goods
- Measuring instrument stays on site, transport not necessary
- Data monitoring from the office administration
- Central archiving of measurement data

#### Ethernet offers:

- Fast transfer of measurement data
- Use of the existing network without additional wiring
- Long transfer distances
- Identification of measuring instruments in the system net

#### Ordering data

#### Part no.

Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit 0554 1711

#### System accessories testo 400, testo 650

ComSoft 3 - Professional with data management 0554 0830

RS232 cable 0409 0178

#### Technical data

Power supply	Mains unit, 5 Volt approx. 250 mA	Protocols	TCP/IP, LPR, Telnet, SNMP, DHCP DDNS, ARP, BOOTP, ICMP
Dimensions	45 x 48 x 14 mm	Management and software configuration	Internet browser e.g. from Netscape or Microsoft Telnet
Oper. temp.	+0 to +70 °C	Interface	Serial interface on the main board with terminal program Availability of a local virtual COM port (Windows systems)
Humidity class	F acc. to DIN 40040		
EMC	Radio interference and interference resistance		
Interface	25 pin RS232 connection with adapter 25/9 pin		
Software	Microsoft Windows 2000 / NT 4.0 / ME / 98 / 95		

#### Technical data

Probe type	Vane testo 400	Thermal testo 400	Testo humid. sensor, cap.	Pressure	aw value
Meas. range	0 to +60 m/s	0 to +20 m/s	0 to +100 %RH	0 to +2000 hPa	0 to +1 aW
Accuracy ±1 digit	See probe data for system accuracy	See probe data for system accuracy	See probe data	Probe 0638 1347 Probe 0638 1447 Probe 0638 1547 Probe 0638 1647 Probe 0638 1747 Probe 0638 1847 ±0.1% of mv Probe 0638 1741 Probe 0638 1841 Probe 0638 1941 Probe 0638 2041 Probe 0638 2141 ±0.2% of mv	See probe data
Resolution	0.01 m/s (for Ø 60/100 mm), 0.1 m/s (for rem. probes)	0.01 m/s (0 to +20 m/s)	0.1 %RH (0 to +100 %RH)	0.001 hPa (Probe 0638 1347) 0.001 hPa (Probe 0638 1447) 0.01 hPa (Probe 0638 1547) 0.1 hPa (Probe 0638 1647) 0.1 hPa (Probe 0638 1747) 0.1 hPa (Probe 0638 1847) 0.01 bar (Probe 0638 1741) 0.01 bar (Probe 0638 1841) 0.01 bar (Probe 0638 1941) 0.01 bar (Probe 0638 2041) 0.01 bar (Probe 0638 2141)	
Probe type	NTC	Pt100	Type K (NiCr-Ni)	Type S (Pt10Rh-Pt)	Type J (Fe-CuNi)
Meas. range	-40 to +150 °C	-200 to +800 °C	-200 to +1370 °C	0 to +1760 °C	-200 to +1000 °C
Accuracy ±1 digit	±0.2 °C (-10 to +50 °C) ±0.4 °C (-40 to -10.1 °C) ±0.4 °C (+50.1 to +150 °C)	±0.1 °C (-49.9 to +99.9 °C) ±(0.1 °C + 0.1% of mv) (remaining range)	±(0.3 °C + 0.1% of mv)	±1 °C (0 to +1760 °C)	±0.4 °C (-150 to +150 °C) ±1 °C (-200 to -150.1 °C) ±1 °C (+150.1 to +1000 °C)
Resolution	0.1 °C (-40 to +150 °C)	0.01 °C (-99.9 to +300 °C) 0.1 °C (-200 to -100 °C) 0.1 °C (+300.1 to +800 °C)	0.1 °C (-200 to +1370 °C)	1 °C (0 to +1760 °C)	0.1 °C (-200 to +1000 °C)
Probe type	CO2 probe	CO probe	Mechanical	Current/voltage measurement	Current/voltage measurement
Meas. range	0 to +1 Vol. % CO <sub>2</sub> 0 to +10000 ppm CO <sub>2</sub>	0 to +500 ppm CO	20 to 20000 rpm	0 to +20 mA (0554 0007) 0/4 to +20 mA (0554 0528)	0 to +10 V
Accuracy ±1 digit	See probe data	±5% of mv (0 to +500 ppm CO)	±1 digit	±0.04 mA (0 (0554 0007) to +20 mA) See probe (0554 0528) data	±0.01 V (0 to +10 V)
Resolution			1 rpm	0.01 mA (0 to +20 mA)	0.01 V (0 to +10 V)
Oper. temp.	0 to +50 °C	PC	RS232 interface	Current supply: Battery/rech. battery, alternatively 8V mains unit battery life in continuous operation with 2 TC probes	
Storage temp.	-25 to +60 °C	Weight	500 g	Miscellaneous: Automatic recognition of all connected probes	
Display	LCD, 4 lines	Material/Housing	ABS		
Battery type	1,5 V AA	Warranty	3 years		
Battery life	18 h	Memory capacity	1 MB, corresponds to approx. 50,000 readings		



## Suitable probes for humidity, multifunction measuring instruments

testo 650 reference humidity measuring instrument

testo 400 reference multifunction measuring instrument

testo 454 measuring system



Probes for	testo 454	testo 400	testo 650
<b>Temperature</b>			
Surfaces	X	X	X
Liquid/viscous media	X	X	X
Gaseous media	X	X	X
Radiant heat	X	X	X
<b>Humidity</b>			
Air humidity	X	X	X
Process humidity	X	X	X
Equilibrium/material moisture	X	X	X
aw value	X	X	X
<b>Pressure</b>			
Differential pressure	X	X	X
Absolute pressure	X	X	X
Low/high pressure	X	X	X
<b>Velocity</b>	X	X	
<b>Comfort</b>	X	X	
<b>Miscellaneous</b>			
Current/Voltage, RPM, CO, CO <sub>2</sub>	X	X	X






Extensive range of probes, page 64–71

Measuring technology from page 80









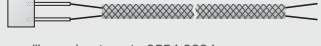
Notes on making the right selection of probe, load tests of testo sensors and application and practical tips.

## Suitable probes for testo 454, testo 400, testo 650

### Air probes

Probes NTC	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
Highly accurate air probe for air and gas temperature measurements with bare, mechanically protected sensor	 150 mm Ø 9 mm	-40 to +130 °C	To UNI curve	60 s	0610 9714 <b>Conn.:</b> Fixed cable
Probes Pt100	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
Standard air probe	 150 mm Ø 3 mm	-200... +600 °C	Class A***	75 s	0604 9773 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Precision air probe	 150 mm Ø 3 mm	-100 to +400 °C	1/10 Class B (0 to 100 °C) 1/5 Class B (rem. range) to EN 60751***	75 s	0628 0017 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Probes Type K (NiCr-Ni)	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
Super quick-action immersion/penetration probe for measurements in gases and liquids with a low-mass tip	 150 mm Ø 1.4 mm	-200 to +600 °C	Class 1**	1 s	0604 9794 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Thermocouple, made of fibre-glass insulated thermal pipes, pack of 5	 2000 mm	-200 to +400 °C	Class 1**	5 s	0644 1109 Insulation: twin conductor, flat, oval, opposed and covered with fibre-glass, both conductors are wrapped together with fibre-glass and soaked with lacquer, please order adapter 0600 1693

### Surface probes

Probes Pt100	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
Robust surface probe	 150 mm Ø 4 mm	-50 to +400 °C	Class B***	40 s	0604 9973 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Probes Type K (NiCr-Ni)	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
Quick-action surface probe with sprung thermocouple strip, measuring range short-term to +500 °C	 150 mm	-200 to +300 °C	Class 2**	3 s	0604 0194 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Super quick-action surface probe, probe tip at 90° angle, with sprung thermocouple strip	 100 mm	-200 to +300 °C	Class 2**	3 s	0604 0994 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Robust surface probe	 150 mm Ø 4 mm	-200 to +600 °C	Class 1**	25 s	0604 9993 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Robust surface probe with sprung thermocouple strip for high temperature range up to +700 °C	 200 mm	-200 to +700 °C	Class 2**	3 s	0600 0394 <b>Conn.:</b> Fixed cable, coiled, 0.5 m, max. 1.6 m
Roller surface probe for measurements on rollers and rotating drums, max. circumferential velocity 18 to 400 m/min	 274 mm Ø 33 mm	-50 to +240 °C	Class 2**		0600 5093 <b>Conn.:</b> Fixed cable, coiled, 0.3 m, max. 1.0 m
Magnetic probe, adhesive power approx. 20 N, with magnets, for measurements on metal surfaces	 35 mm Ø 20 mm	-50 to +170 °C	Class 2**		0600 4793 <b>Conn.:</b> Fixed cable, 1.5 m
Magnetic probe, adhesive power approx. 10 N, with magnets, for higher temperatures, measures on metal surfaces	 75 mm Ø 21 mm	-50 to +400 °C	Class 2**	25 s	0600 4893 <b>Conn.:</b> Fixed cable, 1.5 m
Adhesive thermocouple, pack of 2, carrier material: aluminium foil Is fixed at the measuring point using conventional adhesives or silicone heat paste 0554 0004		-200 to +200 °C	Class 1**		0644 1607
Adapter to connect NiCr-Ni thermocouples and probes with open wire ends					0600 1693

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


\*\*\* According to EN 60751, the accuracy of Classes A and B refers to -200 to +600 °C

### Accessories





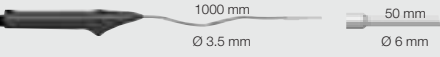
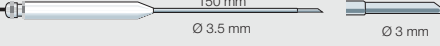


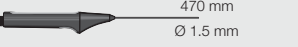
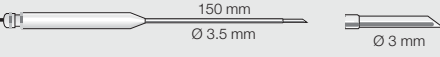

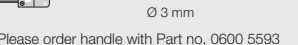
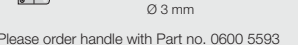
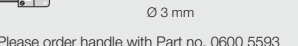
Part no.
Silicone heat paste (14g), T <sub>max</sub> = +260 °C, improves heat transfer in surface probes

# Suitable probes for testo 454, testo 400, testo 650

## Pipe wrap probes

Probes Pt100	Illustration	Meas. range	Accuracy	t99	Part no.
Velcro probe for pipes with diameter of max. 75 mm	 280 mm	-50 to +150 °C	Class B***	40 s	0628 0019 Conn.: Fixed cable, 1.6 m
Probes Type K (NiCr-Ni)	Illustration	Meas. range	Accuracy	t99	Part no.
Pipe wrap probe for pipes with diameter of up to 2", for flow/return temp. meas. in hydronic systems		-60 to +130 °C	Class 2**	5 s	0600 4593 Conn.: Fixed cable, 1.5 m
Spare meas. head for pipe wrap probe, TC Type K	 15 mm 35 mm	-60 to +130 °C	Class 2**	5 s	0602 0092

## Immers./penetr. probes


Probes Pt100	Illustration	Meas. range	Accuracy	t99	Part no.
Standard immersion/penetration probe	 200 mm Ø 3 mm Stainless Steel	-200 to +400 °C	Class A***	20 s	0604 0273 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required
Standard immersion/penetration probe	 200 mm Ø 3 mm Nickel	-200 to +600 °C	Class A***	20 s	0604 0274 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required
Highly accurate immersion/penetration probe incl. certificate	 295 mm Ø 4 mm Stainless Steel	-40 to +300 °C	$\pm 0.05\text{ °C}$ (+0.01 to +100 °C) $\pm (0.05\text{ °C} \pm 0.05\% \text{ of mv})$ (-40 to 0 °C) $\pm (0.05\text{ °C} \pm 0.05\% \text{ of mv})$ (+100.01 to +300 °C)	60 s	0614 0240 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required
Highly accurate immersion/penetration probe	 200 mm Ø 3 mm	-100 to +400 °C	1/10 Class B (0 to 100 °C) 1/5 Class B (rem. range) to EN 60751***	30 s	0628 0015 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required
Flexible precision immersion probe, cable heat-proof up to +300 °C	 1000 mm Ø 3.5 mm 50 mm Ø 6 mm	-100 to +265 °C	1/10 Class B (0 to 100 °C) 1/5 Class B (rem. range) to EN 60751***	80 s	0628 0016 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required
Robust immersion/penetration probe with sharpened measuring tip, waterproof and oven-proof	 150 mm Ø 3.5 mm Ø 3 mm	-200 to +400 °C	Class A***	30 s	0604 2573 Conn.: Fixed cable, 1.5 m
Probes Type K (NiCr-Ni)	Illustration	Meas. range	Accuracy	t99	Part no.
Fast response immersion/penetration probe	 150 mm Ø 3 mm	-200 to +400 °C	Class 1**	3 s	0604 0293 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required
Super quick-action immersion/penetration probe for measurements in liquids	 150 mm Ø 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
Super quick-action immersion/penetration probe for high temperatures	 470 mm Ø 1.5 mm	-200 to +1100 °C	Class 1**	1 s	0604 0593 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required
Robust immersion/penetration probe made of V4A stainless steel, waterproof and oven-proof, e.g. for the food sector	 150 mm Ø 3.5 mm Ø 3 mm	-200 to +400 °C	Class 1**	3 s	0600 2593 Conn.: Fixed cable, 1.5 m
Smelting probe for measurements in non-ferrous melting baths, with exchangeable measuring tip	 1100 mm Ø 6.5 mm	-200 to +1250 °C	Class 1**	60 s	0600 5993 Conn.: Fixed cable, 1.5 m
Plug-in measuring tip, 750mm long, flexible, for high temperatures, outer casing: stainless steel 1.4541	 750 mm Ø 3 mm Please order handle with Part no. 0600 5593	-200 to +900 °C	Class 1**	4 s	0600 5393
Plug-in measuring tip, 550mm long, flexible, for high temperatures, outer casing: Inconel 2.4816	 550 mm Ø 3 mm Please order handle with Part no. 0600 5593	-200 to +1100 °C	Class 1**	4 s	0600 5793
Plug-in measuring tip, 1030mm long, flexible, for high temperatures, outer casing: Inconel 2.4816	 1030 mm Ø 3 mm Please order handle with Part no. 0600 5593	-200 to +1100 °C	Class 1**	4 s	0600 5893






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

\*\*\*According to EN 60751, the accuracy of Classes A and B refers to -200 to +600 °C


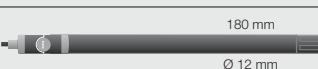





## Suitable probes for testo 454, testo 400, testo 650

Other temperature probes	Illustration	Meas. range	Accuracy	Part no.
Globe thermometer to measure radiant heat	 Ø 150 mm <b>Conn.:</b> Fixed cable	0 to +120 °C	±0.5 °C (0 to +49.9 °C) ±1 °C (+50 to +120 °C) Accuracy corresponds to ISO 7243, ISO 7726, DIN EN 27726, DIN 33403 requirements	0554 0670

More probes	Illustration	Meas. range	Accuracy	Part no.
Ambient CO probe, for detecting CO in buildings and rooms		0 to +500 ppm CO	±5% of mv (+100.1 to +500 ppm CO) ±5 ppm CO (0 to +100 ppm CO)	0632 3331 <b>Conn.:</b> Fixed cable, 1.5 m
CO <sub>2</sub> probe measures indoor air quality and monitors the workplace. With plug-in head, connection cable 0430 0143 or 0430 0145 required		0 ... +1 Vol. % CO <sub>2</sub> 0 ... +10000 ppm CO <sub>2</sub>	±(50 ppm CO <sub>2</sub> ±2% of mv)(0 to +5000 ppm CO <sub>2</sub> ) ±(100 ppm CO <sub>2</sub> ±3% of mv)(+5001 to +10000 ppm CO <sub>2</sub> )	0632 1240 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Mechanical rpm probe with plug-in head  Included 2 probe tips Ø 8 and Ø 12 mm 1 hollow cone Ø 8 mm 1 surface speed disc Ø 19 mm to measure rotational speed: rpm = rotational speed in mm/s		20 to 20000 rpm	±1 digit	0640 0340 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Current/voltage cable (±1 V, ±10 V, 20 mA)		0 to +1000 mV 0 to +10 V 0 to +20 mA	±1 mV (0 to +1000 mV) ±0.01 V (0 to +10 V) ±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: 1 channel, transmitter connection via terminal board Auxiliary energy output: 18V DC ± 20% max. connection load: 30 mA	±0.04 mA	0554 0528 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required

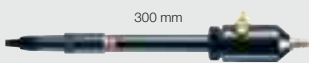
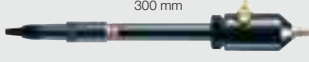
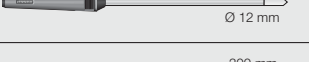
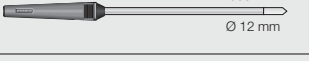

Accessories	Part no.	Accessories	Part no.
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument, PUR coating material	0430 0143	Adapter to connect NiCr-Ni thermocouples and probes with open wire ends	0600 1693
Cable, 5 m long, connects probe with plug-in head to measuring instrument, PUR coating material	0430 0145	Handle for plug-in measuring tip	0600 5593
Extension cable, 5 m long, between plug-in head cable and instrument, PUR coating material	0409 0063	Silicone heat paste (14g), Tmax = +260°C, improves heat transfer in surface probes	0554 0004
Telescopic handle, max. 1 m, for probe with plug-in head, cable: 2.5 m long, PUR coating material	0430 0144		



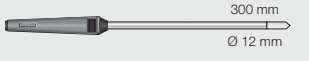
Humidity probes	Illustration	Meas. range	Accuracy	t <sub>99</sub>	Part no.
Standard ambient air probe up to +70°C	 Ø 12 mm	0 to +100 %RH -20 to +70 °C	±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C) ±0.5 °C (remaining range)	12 s	0636 9740 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Duct humidity/temperature probe, can be connected to telescopic handle 0430 9715	 180 mm Ø 12 mm	0 to +100 %RH -20 to +70 °C	±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C) ±0.5 °C (remaining range)	12 s	0636 9715 <b>Conn.:</b> Fixed cable
Thin humidity probe incl. 4 attachable protection caps for ambient air measurements, measurements in exhaust air ducts and equilibrium moisture measurements	 250 mm Ø 4 mm	0 to +100 %RH -20 to +70 °C	±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C) ±0.5 °C (-20 to -10.1 °C) ±0.5 °C (+50.1 to +70 °C)	15 s	0636 2130 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Highly accurate reference humidity/temp. probe	 Ø 21 mm	0 to +100 %RH -20 to +70 °C	±1 %RH (+10 to +90 %RH)* ±2 %RH (remaining range) ±0.2 °C (+10 to +40 °C) ±0.4 °C (remaining range)	12 s	0636 9741 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Humidity/temperature probe	 Ø 21 mm	0... +100 %RH -20 to +70 °C	±2 %RH (+2... +98 %RH) ±0.4 °C (+0.1 to +50 °C) ±0.5 °C (-20 to 0 °C) ±0.5 °C (+50.1 to +70 °C)	12 s	0636 9742 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required


\* in the temperature range from +15°C to +30°C








# Suitable probes for testo 454, testo 400, testo 650

Probes process humidity	Illustration	Meas. range	Accuracy	t99	Part no.
Standard pressure dew point probe for measurements in compressed air systems		0 to +100 %RH -30 to +50 °C tpd	±0.9 °C tpd (+0.1 to +50 °C tpd) ±1 °C tpd (-4.9 to 0 °C tpd) ±2 °C tpd (-9.9 to -5 °C tpd) ±3 °C tpd (-19.9 to -10 °C tpd) ±4 °C tpd (-30 to -20 °C tpd)	300 s	0636 9840 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Precision pressure dew point probe for measurements in compressed air systems incl. cert. with test point -40°C tpd		0 to +100 %RH -60 to +50 °C tpd	±0.8 °C tpd (-4.9 to +50 °C tpd) ±1 °C tpd (-9.9 to -5 °C tpd) ±2 °C tpd (-19.9 to -10 °C tpd) ±3 °C tpd (-29.9 to -20 °C tpd) ±4 °C tpd (-40 to -30 °C tpd)	300 s	0636 9841 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
High humidity level probe w/ heated sensor element, no humidity on sensor		0 to +100 %RH -20 to +85 °C	±2.5 %RH (0 to +100 %RH) ±0.4 °C (-10 to +50 °C) ±0.5 °C (-20 to -10.1 °C) ±0.5 °C (+50.1 to +100 °C)	30 s	0636 2142* <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Robust high temperature/humidity probe up to +180°C		0 to +100 %RH -20 to +180 °C	±2 %RH (+2 to +98 %RH) ±0.4 °C (+0.1 to +50 °C) ±0.5 °C (remaining range)	30 s	0628 0021 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Flexible humidity probe (does not retain shape) for measurements in inaccessible places		0 to +100 %RH -20 to +180 °C	±2 %RH (+2 to +98 %RH) ±0.4 °C (+0.1 to +50 °C) ±0.5 °C (+50.1 to +180 °C)	30 s	0628 0022 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required

Probes material and equilibrium moisture	Illustration	Meas. range	Accuracy	t99	Part no.
Flexible humidity probe with mini module for meas. e.g. on material testing rigs, module cable length 1500mm, probe tip 50x19x7mm		0 to +100 %RH -20 to +125 °C	±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C) ±0.5 °C (remaining range)	20 s	0628 0013 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Sword probe for measuring humidity and temperature in stacked material		0 to +100 %RH -20 to +70 °C	±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C) ±0.5 °C (-20 to -10.1 °C) ±0.5 °C (+50.1 to +70 °C)	12 s	0636 0340 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required
Robust humidity probe e.g. for measuring equilibrium moisture or for measurements in exhaust ducts to +120°C		0 to +100 %RH -20 to +120 °C	±2 %RH (+2 to +98 %RH) ±0.4 °C (-10 to +50 °C) ±0.5 °C (remaining range)	30 s	0636 2140 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required

Probes aw-value	Illustration	Meas. range	Accuracy	Part no.
aw value set: pressure-tight precision humidity probe with certificate, measurement chamber and 5 sample bowls (plastic)	 Reproducibility of aw value ±0.003	0 to +1 aW 0 to +100 %RH -20 to +70 °C	±0.01 aW (+0.1 to +0.9 aW) ±0.02 aW (+0.9 to +1 aW) ±0.4 °C (-10 to +50 °C) ±0.5 °C (remaining range)	0628 0024

Differential pressure probes	Illustration	Meas. range	Accuracy	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	±(0.3 Pa ±0.5% of mv)	0638 1347 <b>Conn.:</b> 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	±0.03 hPa	0638 1447 <b>Conn.:</b> 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	±0.5% of mv (+20 to +100 hPa) ±0.1 hPa (0 to +20 hPa)	0638 1547 <b>Conn.:</b> 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	±1 hPa (0 to 200 hPa) ±0.5% of mv (200 to 1000 hPa)	0638 1647 <b>Conn.:</b> 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	±2 hPa (0 to 400 hPa) ±0.5% of mv (400 to 2000 hPa)	0638 1747 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required

Absolute pressure probe	Illustration	Meas. range	Accuracy	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	±5 hPa (0 to +2000 hPa)	0638 1847 <b>Conn.:</b> Plug-in head, connection cable 0430 0143 or 0430 0145 required



## Suitable probes for testo 454, testo 400, testo 650

relative pressure probes (media compatible)	Illustration	Meas. range	Accuracy	Conn.	Part no.
Low pressure probe, refrigerant-proof stainless steel, up to 10 bar		-1 to +10 bar	±1% of fsv Overload 25 bar	screw-in thread 7/16" UNF	0638 1741 <b>Conn.:</b> Plug-in head, connection cable 0409 0202 required
High pressure probe, refrigerant-proof stainless steel, up to 30 bar		-1 to +30 bar	±1% of fsv Overload 120 bar	screw-in thread 7/16" UNF	0638 1841 <b>Conn.:</b> Plug-in head, connection cable 0409 0202 required
High pressure probe, refrigerant-proof stainless steel, up to 40 bar		-1 to +40 bar	±1% of fsv Overload 120 bar	screw-in thread 7/16" UNF	0638 1941 <b>Conn.:</b> Plug-in head, connection cable 0409 0202 required
High pressure probe, refrigerant-proof stainless steel, up to 100 bar		-1 to +100 bar	±1% of fsv Overload 250 bar	Screw-in thread 7/16" UNF	0638 2041 <b>Conn.:</b> Plug-in head, connection cable 0409 0202 required
High pressure probe, refrigerant-proof stainless steel, up to 400 bar		-1 to +400 bar	±1% of fsv Overload 600 bar	Screw-in thread 7/16" UNF	0638 2141 <b>Conn.:</b> Plug-in head, connection cable 0409 0202 required

Accessories: Humidity probes	Part no.
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument, PUR coating material	0430 0143
Cable, 5 m long, connects probe with plug-in head to measuring instrument, PUR coating material	0430 0145
Extension cable, 5 m long, between plug-in head cable and instrument, PUR coating material	0409 0063
Telescopic handle, max. 1 m, for probe with plug-in head, cable: 2.5 m long, PUR coating material	0430 0144
Adapter for surface humidity measurement, for humidity probes Ø 12 mm, locates damp spots on walls, for example	0628 0012
Cap for bore holes, for humidity probe Ø 12 mm, Measures equilibrium moisture in bore holes	0554 2140
testo saline pots for control and humidity adjustment of humidity probes, 11.3 %RH and 75.3 %RH with adapter for humidity probe	0554 0660

Accessories: Pressure probes	Part no.
Connection cable, 2.5 m long, for pressure probes 0638 1741/1841/1941/2041/2141	0409 0202
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument, PUR coating material	0430 0143
Cable, 5 m long, connects probe with plug-in head to measuring instrument, PUR coating material	0430 0145
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, for probe 0638 1647/1747/1847	0554 0441

Caps for humidity probes Ø 12 mm and 21 mm	Part no.
① Metal protection cage, Ø 12 mm for humidity probes, material: stainless steel V4A. Quick adjustment time, robust and temperature-proof. Used when measuring velocities of less than 10 m/s.	0554 0755
② Cap with wire mesh filter, Ø 12 mm	0554 0757
③ PTFE sintered filter, Ø 21 mm, PTFE. Not affected by condensation, water-repellent, resistant to corrosive substances. Applications: compressed air measurements, high humidity range (continuous measurements), high flow velocities	0554 0666

Covering caps for humidity probes Ø 5, 12 and 21 mm	Part no.
④ Sintered PTFE filter, Ø 12 mm material PTFE. Favourable behaviour in condensation, water repellent, high resistance to aggressive media. Applications: Compressed air measurements, high humidity range (long-term measurements), high flow velocities.	0554 0756
⑤ PTFE sintered filter, Ø 12 mm, PTFE. Not affected by condensation, water-repellent, resistant to corrosive substances. Applications: compressed air measurements, high humidity range (continuous measurements), high flow velocities	0554 0758
⑥ Stainless steel sintered cap, Ø 21 mm, made of stainless steel V2A. Highly robust, suitable for penetration, clean with compressed air, mechanical protection of sensor. Applications: high mechanical loads, high flow velocities.	0554 0640
⑦ Sintered stainless steel cap, Ø 12 mm, material stainless steel V2A. Very rugged, suitable for penetration, can be cleaned with compressed air, mechanical sensor protection. Applications: High mechanical loads, high flow velocities.	0554 0647
⑧ PTFE cap, Ø 5 mm, attachable, PTFE material, (5 off). Applications: dust protection, high humidity level measurements, high flow velocities	0554 1031



① Metal protection cage, Ø 12 mm, stainless steel V4A, for 0636 9740, 0636 9715



② Cap with wire mesh filter, Ø 12 mm, for humidity probes Ø 12 mm



③ Sintered PTFE filter, Ø 21 mm, PTFE, for humidity probes Ø 21 mm



④ Sintered PTFE filter, Ø 12 mm, PTFE for 0636 9740, 0636 9715



⑤ Sintered PTFE filter, Ø 12 mm, PTFE for 0636 2142



⑥ Sintered stainless steel cap, Ø 21 mm, stainless steel V2A, for humidity probes Ø 21 mm

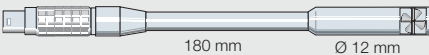
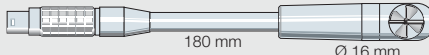
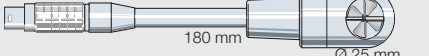


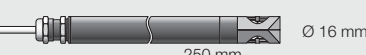
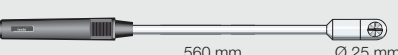


⑦ Sintered stainless steel cap, Ø 12 mm, stainless steel V2A for 0636 9740, 0636 9715

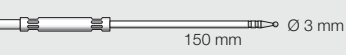

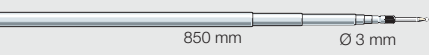
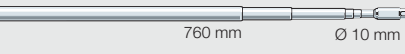
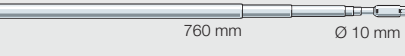


⑧ PTFE cap, Ø 5 mm, PTFE for 0636 2130

# Suitable probes for testo 454, testo 400

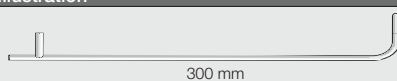
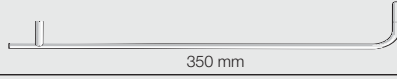
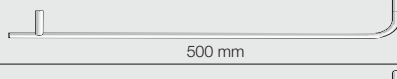
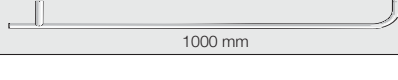
Vane probes	Illustration	Probe type	Meas. range	Accuracy	Part no.
Vane probe, Ø 12 mm, can be attached to handle 0430 3545 or telescopic handle 0430 0941	 180 mm Ø 12 mm	Vane	+0.6 to +20 m/s Oper. temp. -30 to +140 °C	±(0.2 m/s ±1% of mv) (+0.6 to +20 m/s)	0635 9443
Vane/temperature probe, Ø 16 mm, attachable to 0430 3545 handle or 0430 0941 telescopic handle	 180 mm Ø 16 mm	Vane Type K (NiCr-Ni)	+0.4 to +60 m/s -30 to +140 °C	±(0.2 m/s ±1% of mv) (+0.4 to +40 m/s) ±(0.2 m/s ±2% of mv) (+40.1 to +50 m/s)	0635 9540
Vane/temperature probe, Ø 25 mm, can be attached to 0430 3545 handle or 0430 0941 telescopic handle	 180 mm Ø 25 mm	Vane Type K (NiCr-Ni)	+0.4 to +40 m/s -30 to +140 °C	±(0.2 m/s ±1% of mv) (+0.4 to +40 m/s)	0635 9640
Bendable vane probe (can be bent by 90°), Ø 60 mm, attachable to handle 0430 3545 or telescopic handle 0430 0941, for meas. on ventilation outlets	 Ø 60 mm	Vane	+0.25 to +20 m/s Oper. temp. 0 to +60 °C	±(0.1 m/s ±1.5% of mv) (+0.25 to +20 m/s)	0635 9440
Bendable vane probe (can be bent by 90°), Ø 100 mm, attachable to handle 0430 3545 or telescopic handle 0430 0941, for measurements on ventilation outlets	 Ø 100 mm	Vane	+0.2 to +15 m/s Oper. temp. 0 to +60 °C	±(0.1 m/s ±1.5% of mv) (+0.1 to +15 m/s)	0635 9340
Vane probe, Ø 16 mm, for stationary assembly, 3 m cable (PVC)	 250 mm Ø 16 mm		+0.4 to +60 m/s Oper. temp. 0 to +70 °C	±(0.2 m/s ±1% of mv) (+0.4 to +60 m/s)	0628 0036
High temperature vane probe, Ø 25 mm, with handle for continuous measurements up to +350 °C	 560 mm Ø 25 mm	Vane Type K (NiCr-Ni)	+0.6 to +20 m/s -40 to +350 °C	±(0.3 m/s ±1% of fsv) (+0.6 to +20 m/s)	0635 6045

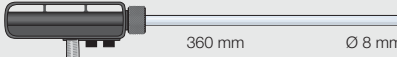
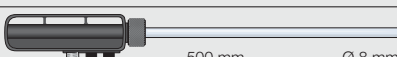
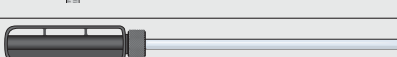
Accessories: Vane probes	Part no.
Professional telescopic handle for plug-in vane probes, max. 1 m long	0430 0941
Extension for telescopic handle, 2 m long, please also order the 0409 0063 extension cable	0430 0942
Handle for plug-in vane probes	0430 3545

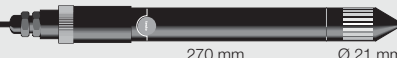

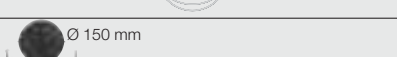
Thermal probes	Illustration	Probe type	Meas. range	Accuracy	Part no.
Robust hot bulb probe, Ø 3 mm, for measurements in the lower velocity range, 2m cable (PVC)	 150 mm Ø 3 mm	Hot bulb NTC	0 to +10 m/s -20 to +70 °C	±(0.03 m/s ±5% of mv) (0 to +10 m/s)	0628 0035
Affordable, robust hot bulb probe, Ø 3 mm, for measurements in the lower velocity range, with handle	 150 mm Ø 4 mm Ø 3 mm	Hot bulb NTC	0 to +10 m/s -20 to +70 °C	±(0.03 m/s ±5% of mv) (0 to +10 m/s)	0635 1549
Robust hot bulb probe, Ø 3 mm, with handle and telescopic handle for measurements in the lower velocity range	 850 mm Ø 3 mm	Hot bulb NTC	0 to +10 m/s -20 to +70 °C	±(0.03 m/s ±5% of mv) (0 to +10 m/s)	0635 1049
Quick-action hot wire probe, Ø 10 mm, with telescopic handle, for measurements in the lower velocity range with direction recognition	 760 mm Ø 10 mm	Hot wire NTC	0 to +20 m/s -20 to +70 °C	±(0.03 m/s ±4% of mv) (0 to +20 m/s)	0635 1041
Thermal anemometer probe, Ø 10 mm, w. telescopic handle, measures air flow in lab fume cupboards to DIN EN 14175	 760 mm Ø 10 mm	Hot wire NTC	0 to +5 m/s 0 to +50 °C	±(0.02 m/s ±5% of mv) (0 to +5 m/s)	0635 1047




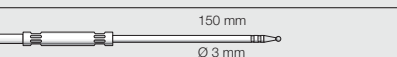
## Suitable probes for testo 454, testo 400

Prandtl's Pitot tubes	Illustration	Accuracy	Part no.
Pitot tube, 300 mm long, stainless steel, measures flow speed	 300 mm Ø 4 mm	Oper. temp. 0 to +600 °C	0635 2245
Pitot tube, 350 mm long, stainless steel, for measuring flow velocity	 350 mm Ø 7 mm	Oper. temp. 0 to +600 °C	0635 2145
Pitot tube, 500 mm long, stainless steel, for measuring flow velocity	 500 mm Ø 7 mm	Oper. temp. 0 to +600 °C	0635 2045
Pitot tube, 1000 mm long, stainless steel, for measuring flow velocity	 1000 mm Ø 7 mm	Oper. temp. 0 to +600 °C	0635 2345

Straight Pitot tubes	Illustration	Probe type	Meas. range	Part no.
Pitot tube, stainless steel, 360 mm long, measures velocity with temperature, for pressure probes 0638 1345/..1445/..1545	 360 mm Ø 8 mm	Type K (NiCr-Ni)	-40 to +600 °C	0635 2040
Pitot tube, stainless steel, 500 mm long, measures velocity with temperature, for pressure probes 0638 1345/..1445/..1545	 500 mm Ø 8 mm	Type K (NiCr-Ni)	-40 to +600 °C	0635 2140
Pitot tube, stainless steel, 1000 mm long, measures velocity with temperature, for pressure probes 0638 1345/..1445/..1545	 1000 mm Ø 8 mm	Type K (NiCr-Ni)	-40 to +600 °C	0635 2240

Comfort level measurement	Illustration	Probe type	Meas. range	Accuracy	Part no.
3-function probe for simultaneous measurement of temperature, humidity and velocity. With plug-in head, 0430 0143 connection cable required	 270 mm Ø 21 mm	Hot bulb Testo humid. sensor, cap. NTC	0 to +10 m/s 0 to +100 %RH -20 to +70 °C	±(0.03 m/s ±5% of mv)(0 to 10 m/s) ±2 %RH (+2 to +98 %RH) ±0.4 °C (0 to +50 °C) ±0.5 °C (remaining range)	0635 1540
Comfort level probe for measuring degree of turbulence, with telescopic handle and stand. Fulfills EN 13779 requirements	 890 mm Ø 90 mm	Hot wire NTC	0 to +5 m/s 0 to +50 °C	±(0.03 m/s ±4% of mv) (0 to +5 m/s) ±0.3 °C (0 to +50 °C)	0628 0009
Wet Bulb Globe temperature probe to assess workplaces subjected to heat, in accordance with ISO 7243 or DIN 33403, incl. WBGT case	 Ø 150 mm 560 mm		0 to +120 °C	In accordance with ISO 7243 or DIN 33403	0635 8888 ID No. 0699 4239/1

Accessories: 3-Function probe	Part no.
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument, PUR coating material	0430 0143
testo saline pots for control and humidity adjustment of humidity probes, 0554 0660 11.3 %RH and 75.3 %RH with adapter for humidity probe	

Stationary probes	Illustration	Meas. range	Accuracy	t99	Part no.
Vane probe, Ø 16 mm, for stationary assembly, 3 m cable (PVC)	 250 mm Ø 16 mm	+0.4 to +60 m/s Oper. temp. 0 to +70 °C	±(0.2 m/s ±1% of mv) (+0.4 to +60 m/s)		0628 0036
Robust hot bulb probe, Ø 3 mm, for measurements in the lower velocity range, 2m cable (PVC)	 150 mm Ø 3 mm	0 to +10 m/s -20 to +70 °C	±(0.03 m/s ±5% of mv) (0 to +10 m/s)		0628 0035

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

Accessories for stationary probes	Part no.
Clamp screw connection (steel) with M 8x1 thread, to attach temperature probes with Ø 3mm	0400 6163



## Notes



## Reference pressure gauge for all measurement ranges

### testo 521-3

The testo 521-3 is used to measure the smallest differences in pressure (to 2.5 hPa). High accuracy and a resolution of 0.1 Pa make the instrument ideal for measurements in cleanrooms. When it comes to Pitot tube measurements in the range of 1 to 20 m/s, the testo 521-3 allows you to work with a high degree of accuracy.

#### testo 521-3

##### 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

#### Advantages during measurement

- The shorttext menu greatly facilitates navigation
- Two measurement channels are shown in the large two-line LCD display, arrow buttons switch to the calculated measurement parameters
- Zeroing of the differential pressure probe takes place directly via the P=0 button
- In measurement, you can choose between the following units: mbar, hPa, bar, Pa, kPa, inH<sub>2</sub>O, mmH<sub>2</sub>O, torr and psi
- Button for Hold, Max, Min and Mean
- The fast measurement rate of 0.04 seconds is ideal for recognizing pressure peaks
- Hands free: TopSafe (protection from impact) including carrying strap and magnet as a useful accessory to the instrument



Store data by measurement location and analyze on a PC



Differential pressure measurement in a cleanroom

#### Documentation at the measurement site

- The individual measurement protocols can be printed out on site using the fast printer - via an infrared interface without awkward cables.
- Long-term legible thermal paper enables measurement data documentation up to 10 years.

#### Measurement data manement on a PC

- The stored data can be conveniently analyzed and further processed via the software.
- The measurement data are recorded with the instrument and can be presented online with the software.
- In the menu Fast Measurement, pressure peaks can be protocolized online at a rate of 0.05 seconds. Since pressure peaks are usually unforeseen, a rule can be defined via the trigger function, which filters out the pressure peaks and archives them separately for the user in the corresponding register pages.

#### Long-term monitoring made easy

- The measurement data can be stored individually or as a measurement series. The measurement rate (0.04 seconds, 1 second to 24 hours) and the number of values to be stored are user-defined. The maximum storage capacity is 25,000 readings.
- The measurement values are stored under individual titles for the measurement sites (max. 99 measurement sites) - retraceability guaranteed.
- Online measurement for larger quantities of data can be activated by PC

#### Wide selection of probes

The differential pressure sensor is permanently integrated in testo 521. Up to two additional probes can be connected via user-defined probe inputs.

- Differential pressure probes up to 2000 hPa
- Absolute pressure probes up to 2000 hPa
- Temperature probes from -200 to +1250 °C

#### Differential pressure probes

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)



Meas. range  
0 to +100 Pa

Accuracy  
±(0.3 Pa ±0.5% of mv)

Conn.  
Plug-in head, connection cable 0430 0143 or 0430 0145 required

Part no.  
0638 1347

Pressure probe, 10 hPa, in robust metal housing with impact protection incl. magnet for fast attachment, to measure differential pressure and flow speeds (in combination with Pitot tube)



Meas. range  
0 to +10 hPa

Accuracy  
±0.03 hPa

Conn.  
Plug-in head, connection cable 0430 0143 or 0430 0145 required

Part no.  
0638 1447

Pressure probe, 100 hPa, in robust metal housing with impact protection, incl. magnet for fast attachment, to measure differential pressure and flow speeds (in combination with Pitot tube)



Meas. range  
0 to +100 hPa

Accuracy  
±0.5% of mv (+20 to +100 hPa)  
±0.1 hPa (0 to +20 hPa)

Conn.  
Plug-in head, connection cable 0430 0143 or 0430 0145 required

Part no.  
0638 1547

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



Meas. range  
0 to +1000 hPa

Accuracy  
±1 hPa (0 to 200 hPa)  
±0.5% of mv (200 to 1000 hPa)

Conn.  
Plug-in head, connection cable 0430 0143 or 0430 0145 required

Part no.  
0638 1647

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



Meas. range  
0 to +2000 hPa

Accuracy  
±2 hPa (0 to 400 hPa)  
±0.5% of mv (400 to 2000 hPa)

Conn.  
Plug-in head, connection cable 0430 0143 or 0430 0145 required

Part no.  
0638 1747

#### Absolute pressure probe

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



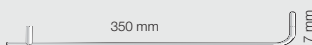
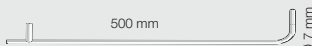
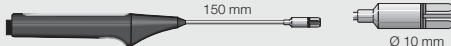

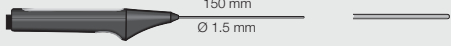
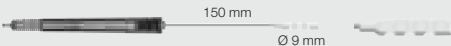
Meas. range  
0 to +2000 hPa

Accuracy  
±5 hPa (0 to +2000 hPa)

Conn.  
Plug-in head, connection cable 0430 0143 or 0430 0145 required

Part no.  
0638 1847

# Probes and accessories for testo 521-3

Pitot tubes for flow measurement		Illustration	Oper. temp.	Part no.		
Pitot tube, 350 mm long, Ø 7 mm, stainless steel, measures flow velocity, in conjunction with 0638 1347 / 0638 1447 / 0638 1547 pressure probes or testo 521, with internal sensor			0 to +600 °C	0635 2145		
Pitot tube, 500 mm long, Ø 7 mm, stainless steel, measures flow velocity, in conjunction with 0638 1347 / 0638 1447 / 0638 1547 pressure probes or testo 521, with internal sensor			0 to +600 °C	0635 2045		
Temperature probes			Meas. range	Accuracy	t99	Part no.
Quick-action surface probe with sprung thermocouple strip, measuring range short-term to +500°C			-200 to +300 °C	Class 2*	3 s	0604 0194 <b>Conn.:</b> 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			-60 to +130 °C	Class 2*	5 s	0600 4593 <b>Conn.:</b> Fixed cable
Super quick-action immersion/penetration probe for measurements in liquids			-200 to +600 °C	Class 1*	1 s	0604 0493 <b>Conn.:</b> 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			-40 to +130 °C	To UNI curve	60 s	0610 9714 <b>Conn.:</b> Fixed cable
Accessories		Part no.	Software and Accessories			Part no.
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument, PUR coating material		0430 0143	ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve			0554 0830
Cable, 5 m long, connects probe with plug-in head to measuring instrument, PUR coating material		0430 0145	RS232 cable, connects instrument to PC (1.8 m) for data transfer			0409 0178
Connection hose, silicone, 5m long, max. load 700 hPa (mbar)		0554 0440	Ethernet adapter, RS232 - Ethernet incl. software driver, mains unit, facilitates data communication in network			0554 1711
9V rech. battery for instrument, instead of battery		0515 0025	Calibration Certificates			Part no.
Recharger for 9V rechargeable battery, for external recharging of 0515 0025 battery		0554 0025	DKD calibration certificate/Pressure, Positive pressure; 11 measuring points distributed over the measuring range (less than 0.1% fsv)			0520 0205
Transport and protection		Part no.	DKD calibration certificate/pressure, differential pressure, accuracy 0.1 to 0.6 (% of full-scale value)			0520 0215
TopSafe (protection case), incl. carrier strap, bench stand and magnet. Protects instrument from dust, impact, scratches		0516 0446	DKD calibration certificate/pressure, differential pressure, accuracy > 0.6 (% of full-scale value)			0520 0225
Transport case, for measuring instrument, probes, Prandtl Pitot tube, accessories		0516 0527	DKD calibration certificate/pressure, absolute pressure, accuracy 0.1 to 0.6 (% of full-scale value)			0520 0212
System case, For measuring instrument, probes, straight or Prandtl Pitot tube, accessories		0516 0526	ISO calibration certificate/Pressure, Differential pressure, accuracy < 0.1 (% of full scale value)			0520 0035
Printer and Accessories		Part no.	ISO calibration certificate/pressure, differential pressure, accuracy 0.1 to 0.6 (% of fsv)			0520 0025
Testo fast printer with wireless infrared interface, 1 roll thermal paper and 4 AA batteries, for printing out measurements on site		0554 0549	ISO calibration certificate/absolute pressure, 5 measurement points distributed over meas. range, absolute pressure, accuracy 0.1 to 0.6 (% of fsv)			0520 0125
Spare thermal paper for printer (6 rolls)		0554 0569	ISO calibration certificate sound pressure calibrators			0520 0411
Spare thermal paper for printer (6 rolls), measurement data documentation legible for up to 10 years		0554 0568				

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

Technical data testo 521-3								
Probe type	Piezoresistive pressure sensor	Probe type	Piezoresistive pressure sensor for external pressure probes	NTC		Type K (NiCr-Ni)		
Meas. range	0 to 2.5 hPa	Meas. range	0 to 2000 hPa	-40 to +150 °C		-200 to +1370 °C		
Accuracy ±1 digit	±0.5 Pa (0 to 20 Pa) ±(0.5 Pa ±0.5% of mv) (20.1 to 250 Pa)	Accuracy* ±1 digit	±0.1 % of mv	±0.2 °C (-10 to +50 °C) ±0.4 °C (remaining range)		±0.4 °C (-100 to +200 °C) ±1 °C (remaining range)		
Resolution	0.1 Pa	Resolution	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		
Static pressure	100 hPa							
Overload	50 hPa			*Accuracy information applies only to instrument without probes connected				
Oper. temp.	0 to +50 °C	Conn.	Hose: inner Ø 4 mm outer Ø 6 mm	Dimensions	219 x 68 x 50 mm		Other features	Mains connection and battery recharging in instrument Automatic recognition of all connected probes
Storage temp.	-20 to +70 °C			Weight	300 g			
Power supply	Battery/Rechargeable battery,Mains unit 12 V	Display	LCD display with symbol, 7 segment display and dot matrix	Warranty	2 years			
Battery type	9 V (6LR61)			Material/Housing	ABS			
Battery life	Continuous operation w/ internal pressure sensor: 30 h With rech. battery: 10 h			PC	RS232 interface			
		Update rate in display	2 x per second, in fast measurement 4 x per second	Memory	100 kB (corresponds to approx. 25,000 readings)			



## Huminator, accurate humidity generator for climate calibrations

### Huminator

The Huminator is one of the smallest and therefore one of the most suitable climate chambers available on the market for mobile as well as stationary applications. Humidity readings in the range from 5 to 95%RH can be determined quickly and efficiently stabilised. The built-in temperature control function generates temperatures in the range from 15° to 40°C. Using an appropriate reference, it is possible to carry out fast and easy humidity calibrations on the measuring instruments, probes and data loggers from Testo and other manufacturers. The desk-top instrument is ideally suitable

for testing the performance of all types of material, electronic components and instruments under special climatic conditions. The timed programming function facilitates extensive automation of test runs and calibrations, since up to 3 humidity/temperature readings can be activated one after the other. The time for this can be defined by the user.

- Can be programmed individually
- User-friendly
- LCD display
- High adjustment speed
- RS232 interface

#### Huminator

Huminator with Testo sensor incl. 15 probe adapters (5 of each: 12mm, 21mm, flexible)

Part no. 0519 0801

Accessories Ordering data	Part no.
testo 650, reference humidity meas. instr., readings memory included (up to 500,000 readings), battery, Li cell and calibration protocol	0563 6501
2 channel humidity and temperature meas. instrument with aw value measurement, pressure measurement with option of connecting pressure probes, CO, CO <sub>2</sub> , rpm, mV/mA transmitters	
Highly accurate reference humidity/temp. probe	0636 9741
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument PUR coating material	0430 0143
Case for Huminator	0519 0820
Calibration Certificates	Part no.
DKD calibration certificate humidity Electronic hygrometer; calibration points 11.3 %RH, 50 %RH and 75.3 %RH at +25 °C	0520 0266

#### Recommended Set: Huminator Kit

Huminator	0519 0801
Case for Huminator	0519 0820
Reference humidity measuring instrument	0563 6501
Highly accurate reference humidity/temperature probe	0636 9741
Connection cable, 1.5 m long	0430 0143
DKD calibration certificate humidity	0520 0266



Fast and easy humidity calibration of measuring instruments, probes and data loggers



Preparation of a logger calibration (testostor 171)



Application, simulation, calibration

Technical data			
Meas. range	+15 to +40 °C +5 to +95 %RH	Measurement chamber	Diameter: approx. 147 mm Probe imm. depth: app. 170 mm
Accuracy ±1 digit	0.5 °C (10 to 85 %RH at 25 °C) 2 %RH (10 to 85 %RH at 25 °C)	Dimensions	350 x 470 x 200 mm
Stability	0.2 °C (10 to 85 %RH at 25 °C) 1 %RH (10 to 85 %RH at 25 °C)	Display	LCD graphics display
Power supply	85 to 264 VAC, 47 to 63 Hz	Conn.	RS232 interface
		Weight	14.5 kg



## Mini wind tunnel

### Mini wind tunnel

You can draw up your own ISO certificates using the wind tunnel and a certified Testo measuring instrument. All of Testo's velocity probes can be checked and calibrated using the mini wind tunnel (except Ø 100 mm vane probes).

Draw up your own ISO calibration certificates! The Testo mini wind tunnel can be used for regular checks on velocity probes and measuring instruments in your company.

- 3 speed levels can be set: 2.5/5/10 m/s
- The readings are traceable to the PTB standard if Testo's DKD certified testo 400 reference instrument is used
- Accuracy of wind tunnel:  $\pm 1\%$  of reading (at least 0.1 m/s) plus calibration uncertainty of the respective reference instrument's certificate



Exact positioning of the probe in the wind tunnel



Mini wind tunnel for creating in-house ISO certificates

### Mini wind tunnel

You already have a Testo measuring instrument with velocity probe and calibration certificate and you want to calibrate more probes of the same type using the wind tunnel.

Mini wind tunnel incl. power connection cable

**Part no. 0554 0450**

### Recommended Set: Testo mini wind tunnel with reference measurement system

Mini wind tunnel incl. power connection cable	0554 0450
testo 400, multi-functional measuring instrument, incl. measurement value store up to 500,000 readings, VAC-module (determination of volume flow with error calculation), battery, Li-cell and calibration protocol, 2 channel multi-function measuring instrument	0563 4001
Vane/temperature probe, Ø 16 mm, attachable to 0430 3545 handle or 0430 0941 telescopic handle	0635 9540
Cable, 1.5 m long, for connecting vane probes with plug-in head to the measuring instrument	0409 0045
DKD calibration certificate/velocity	0520 0254

### Technical data

Length: 610 mm	Range of application: +10 to +40 °C
Ø meas. tunnel: approx. 100 mm (interior)	Motor: Direct current fan
Velocities: 2.5/5/10 m/s, can be switched	Power supply: 230 V/50 Hz or 110 V can be switched, built-in IEC socket
Probe holder: For all of Testo's velocity probes except vane probes with Ø 100 mm	Warranty: 2 years

## Fulfilling FDA regulation 21 CFR, Part 11 with Testo

### FDA

The Food and Drug Administration is the U.S. regulatory agency responsible for monitoring manufacturing processes in the food, chemical and pharmaceutical industries. Companies operating in these industries and exporting to the United States also are monitored by the FDA and are subject to their legal stipulations.

### 21CFR Part 11

The Code of Federal Regulations is a binding body of rules and regulations that apply to the affected industries. Part 11, which became effective in 1997, deals with electronic data records and signatures. These electronic data records and signatures are treated in the same manner as are paper documents and manual signatures when Title 21 CFR, Part 11 is maintained.

### GMP

The EU Guide to **Good Manufacturing Practice** is a standard reference work that regulates the manufacture and import of medical products for consumption in the European Union.

### Validation

Manufacturers of FDA-regulated products (especially pharmaceutical and chemical products as well as foodstuffs) are subjected to a strict obligation to validate. The FDA stipulates ongoing documentation and long-term archival of process variables. The regulations imposed by the FDA on the use of electronic data records and electronic signatures have been summarised in 21 CFR, Part 11:

**Authenticity:** Users and administrators of electronic records must be uniquely identifiable and authentic.

**Integrity:** The data of electronic records must be clearly referenced to the processes they document. All changes must be documented long-term throughout the course of archival process.

**Non-repudiation:** The electronic signature inseparably linked to the data record must uniquely identify the respective originator.

### Validatable software and measuring instruments plus services



The requirements placed on certification, qualification and validation are growing. With Testo as a partner, the customer has a choice: for example, validatable products and software are offered. Testo also can offer various supporting service packages,

beginning with the drawing of the master plan, to SOPs and risk analysis, all the way to complete solutions. As such, the customer is able to select the solution that is optimal for him. Thorough validation of the entire system increases process reliability in the company and reduces difficult to calculate long-term costs and risks.

### ComSoft 3.3 21CFR Part 11

Testo specially designed the ComSoft 3.3 (in conjunction with the Testo data loggers) to meet 21 CFR, Part 11 requirements, making a complete tool available.

### Validatable loggers

Measurement data storage devices from Testo have proven reliability for more than 10 years. The most important criteria for validatability as per 21 CFR, Part 11 are the unique identification of

the device and the possibility of access control. This is why our measurement data storage devices have a unique serial number and the option of protecting the measurement program from unauthorised access by a device password



## Data loggers • Software • Services

### Tested measurement systems (with certificate)

The Fraunhofer Institute for Experimental Software Engineering confirms that the measurement system comprising data loggers testostor 171, testo 175, testo 177, testo 454 and the ComSoft software meets 21

CFR, Part 11 requirements. The test took place in accordance with the evaluation guidelines of the GAMP Special Interest Group: Complying with 21 CFR Part 11, Electronic Records and Electronic Signatures.



### Validation of logger systems

Testo industrial services offers comprehensive services in the areas of calibration and validation/qualification.

### Calibration on-site and in the laboratory

Testo is a leader in establishing accredited calibration laboratories. The first DKD laboratories for relative humidity and flow velocity were established in our company. Today, almost all electronic and climatic parameters can be calibrated. Our mobile technicians are also available for on-site calibrations.

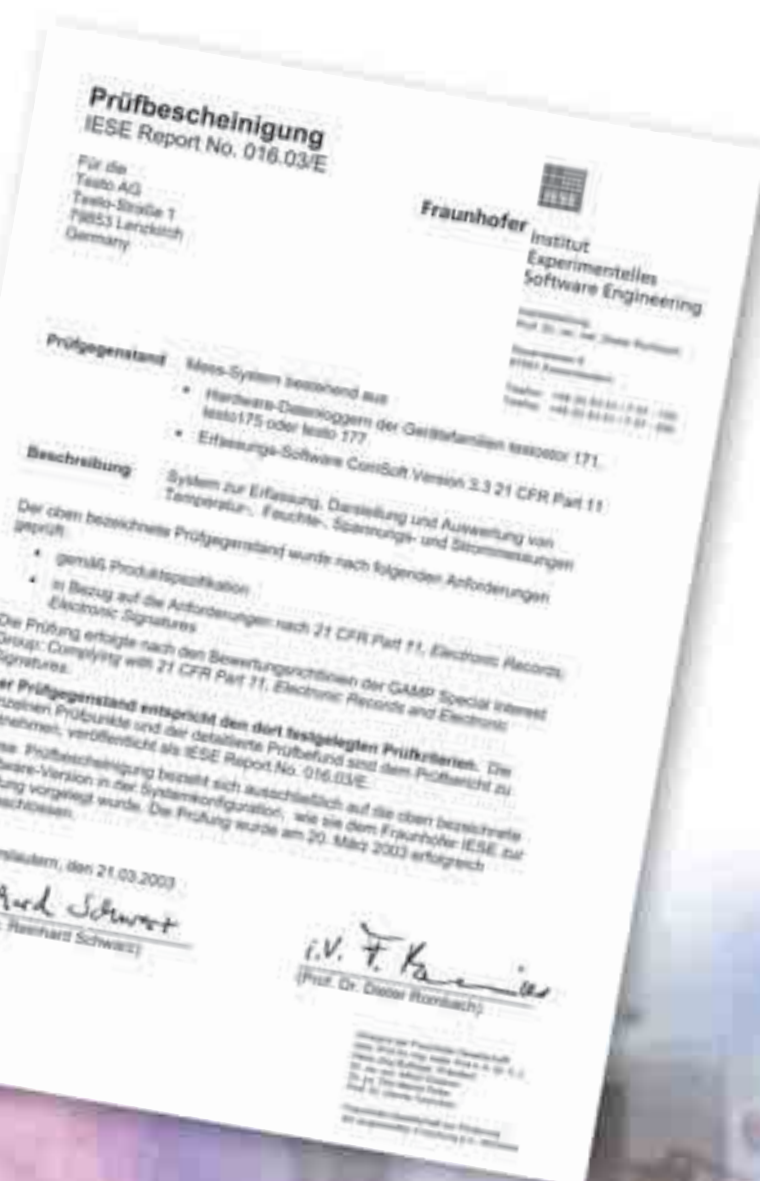
### Validation and qualification of systems

Testo industrial services offers custom solutions, from the drawing of a master validation plan, to SOPs, risk analysis for processes and systems all the way to qualification preparation. You only need one partner. This saves you resources, expense and time.

### Calibration services

With a unique combination of DKD calibration laboratories accredited to ISO 17025, for temperature, relative humidity, flow velocity and pressure, Testo industrial services commands a unique position worldwide. ISO calibrations, which offer a cost-effective alternative to DKD calibrations, are accepted during many audits as per ISO 9001, HACCP, GMP, FDA, VDA 6.1, ISO TS 16949, QS 9000 etc.

**Please feel free to contact us for comprehensive consultation on the different performance packages available.**



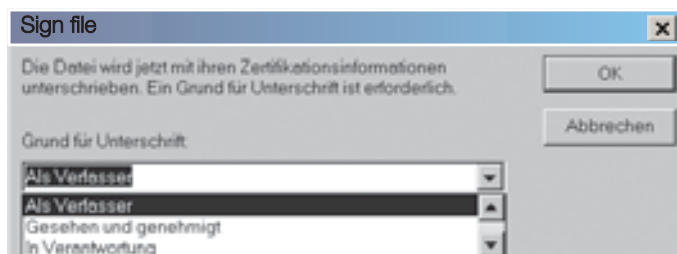
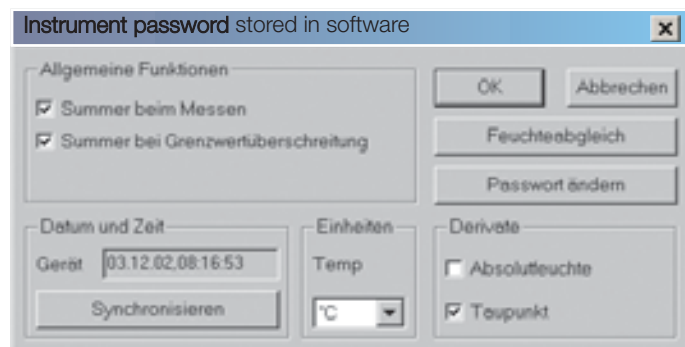
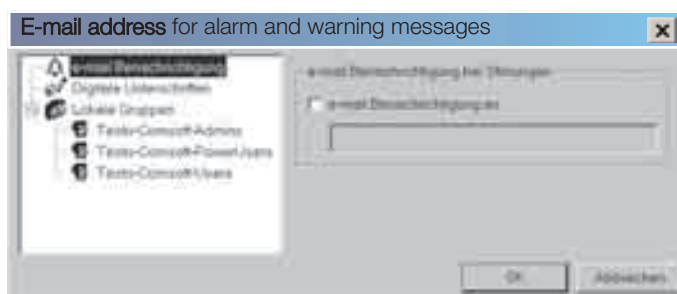
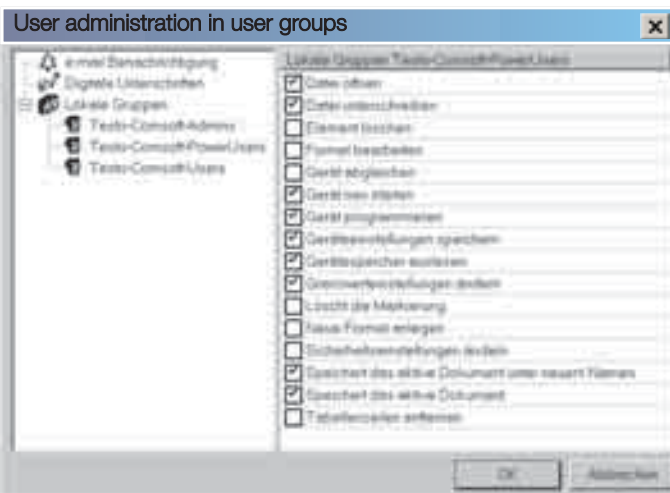


## Fulfilling FDA regulation 21 CFR, Part 11 with Testo

### Validatable ComSoft 3.4 software, version 21CFR11

All FDA requirements are met as part of a closed system when this specially developed software application is used:

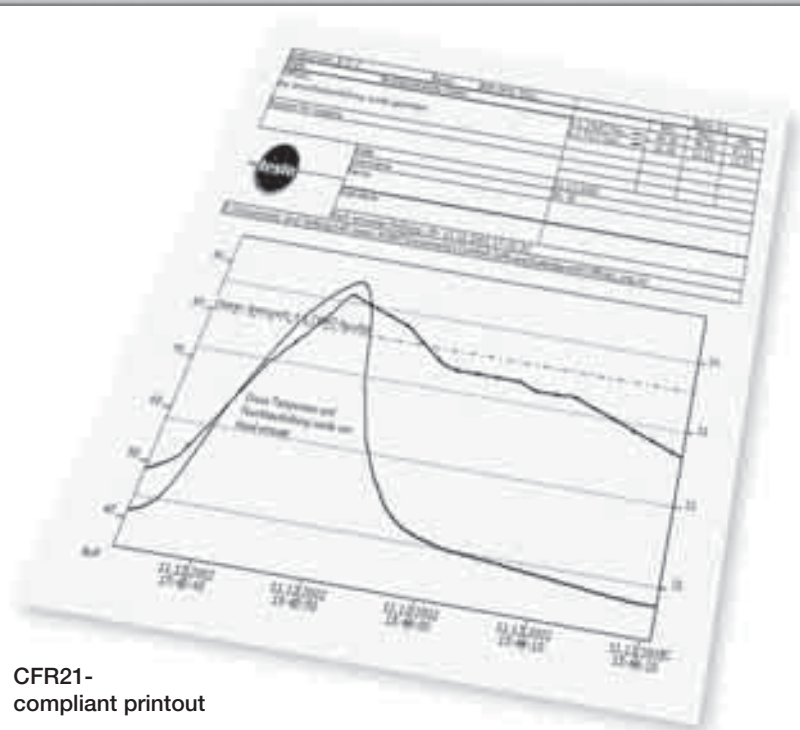
- User administration in user groups by the administrator
- Saving of raw data in a file format protected against manipulation
- Detection of transmission errors by way of checksums
- Inactivity lockout to prevent unauthorised access
- Monitoring of log on/log off procedures, successful/failed application of digital signatures and alteration of raw data with the aid of an audit trail
- Full integration into the Windows 2000 security system (certificates, rights management, user and password management, user authentication)
- Option of exporting data in generically readable PDF format, e.g. for sending to the respective FDA validation centre or for illustration during a company audit.





Audit Trail				
Datum/Zeit	Benutzer	Ereignis	Beschreibung	
03.12.2002 08:26:57	cfr	File created		
03.12.2002 08:26:57	cfr	Lower limit	Office K:1 [%rF] Feuchte 30.00	
03.12.2002 08:26:57	cfr	Upper limit	Office K:1 [%rF] Feuchte 80.00	
03.12.2002 08:26:57	cfr	Lower limit	Office K:2 [°C] Temperatur 15.00	
03.12.2002 08:26:57	cfr	Upper limit	Office K:2 [°C] Temperatur 25.00	

Seitenansicht    Drucken    Schließen



CFR21-  
compliant printout

As a market leader in high quality measuring systems, Testo places a high degree of importance on ensuring that your measurement data remain absolutely secure. In light of security-relevant access control, rights and the associating documentation, we consciously built on Microsoft's Windows® NT security concept for the 21CFR11-compliant ComSoft 3.4. The Windows NT core operating system has been successfully tested by the NCSC as meeting security level C2 of the so-called Orange Book. This ensures the security of user authentication and of the audit trail as well as of electronic records file protection (incorporating the NTFS standard) as employed by ComSoft 3.4, version 21 CFR 11.

## Ordering data

ComSoft 3.4 Version 21CFR11  
for loggers 175, 177, 171

Part no. 0554 0821

Multiple licences available upon request

### Minimum requirements

PC with operating system:

- Windows® 2000 or higher (if compatible)
- Windows® XP Professional or higher (if compatible)

## Software:

- Internet Explorer 5.0 or higher

Note: The ComSoft CFR software does not run on earlier Windows® versions (Windows® 9x). These operating systems do not provide the necessary facilities in the area of security settings, user ID and password and are suitable for use in CFR related environments only under limited conditions.

Hardware requirements:

- CD-ROM drive
- Pentium 133 MHz
- 64 MB RAM
- 15 MB free on hard disk
- Free serial interface (COM) or corresponding adapter

In order to export files in \*.pdf format (Adobe Portable Document Format) you require, as additional software, Adobe Acrobat 5.0 or higher (if compatible).

## Measurement technology for measuring temperature

### Sensor type selection

The probe type is determined by the measurement task. The selection of the most suitable temperature sensor is made according to the following criteria:

- Measurement range
- Accuracy
- Measurement site design
- Reaction time
- Durability

In order to be able to provide the right probe for your requirements, Testo offers a large selection of sensor elements and temperature measuring instruments:

- Thermocouples
- Resistance sensor (Pt100)
- Thermistors (NTC)

#### Thermocouples

Temperature measurement with thermocouples is based on the thermoelectric effect. Thermocouples consist of two wires spot-welded to each other and made of different metals or metal alloys. The basic values of the thermoelectric voltages and the permitted tolerances of thermocouples are defined in the norms IEC 584. The most common thermoelement is NiCr-Ni (type designation K).

#### Resistance sensors (Pt100)

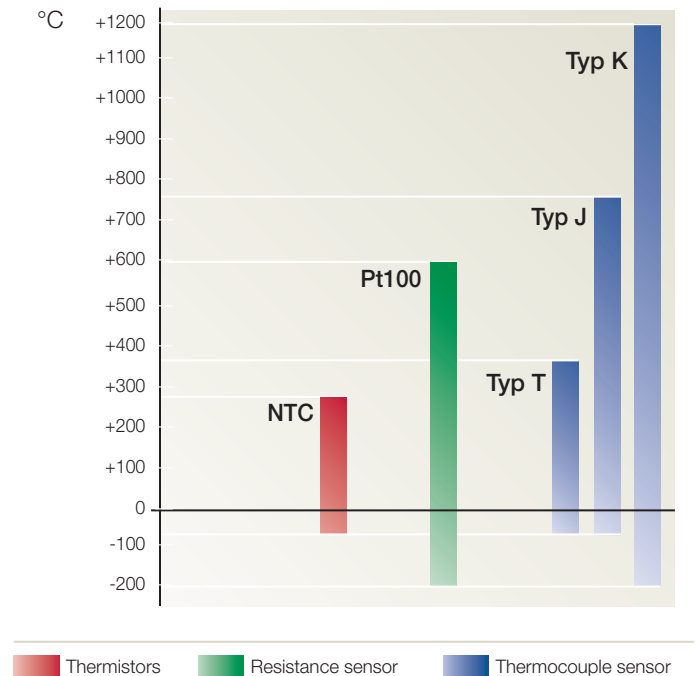
When measuring temperature with resistance sensors, use is made of the temperature sensitive resistance change in the platinum „resistance“.

The measurement resistance is supplied with a constant current and the voltage drop, which changes with the resistance value via the temperature, is measured. Basic values and tolerances for resistance thermometers are defined in the IEC 751.

#### Thermistors (NTC)

Temperature measurement with thermistors is also based on a temperature-dependent change of resistance in the sensor element. Contrary to resistance thermometers, thermistors have a negative temperature coefficient (resistance becomes smaller with increasing temperature). Characteristic curves and tolerances are not normed.

#### Temperature measurement thermocouples



### Accuracy data

Measurement value sensor	Temperature range	Class	Permitted tolerances	
			fixed value	Referred to temperature
Thermocouple Typ K (NiCr-Ni)	-40 ... +1000 °C	1	±1.5 °C	±0.004 • Itl
	-40 ... +1200 °C	2	±2.5 °C	±0.0075 • Itl
	-200 ... +40 °C	3	±2.5 °C (-167 ... +40 °C)	±0.015 • Itl (-200 to -167.1 °C)
Typ T	-40 ... +350 °C	1	±0.5 °C	±0.001 • Itl
Typ J	-40 ... +750 °C	1	±1.5 °C	±0.004 • Itl
Pt100	-200 ... +600 °C	B	± (0.3 + 0.005 • Itl)	
	-200 ... +600 °C	A	± (0.15 + 0.002 • Itl)	
NTC (Standard)	-50 ... -25.1 °C	—	±0.4 °C	±0.5 % of full scale value
	-25 ... +74.9 °C		±0.2 °C	
	+75 ... +150 °C		±0.5 % of full scale value	
NTC (High temp.)	-30 ... -20.1 °C	—	±1 °C	±0.5 °C ±0.5 % of full scale value
	-20 ... 0 °C		±0.6 °C	
	+0.1 ... +75 °C		±0.5 °C	
	+75.1 ... +275 °C	— °C	±0.5 °C ±0.5 % of full scale value	

Itl = measurement temperature value

Data for thermocouples according to EN 60584-2 (formerly IEC 584-1).

Data for Pt100 according to EN 60751 (formerly IEC 751). No standardization exists for NTC sensors.

## Measurement technology for measuring temperature

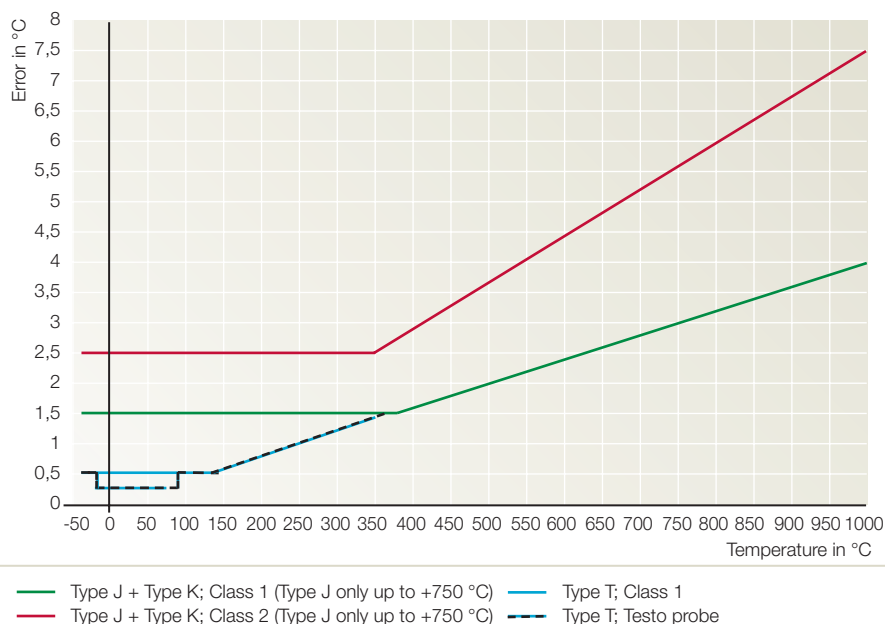
### Accuracy thermocouples

Data for thermocouples to EN 60584-2 (formerly IEC 584-1). Two values are given, one fixed value in °C and one formula. The larger value always applies.

For thermocouples of Class 1, the accuracies are specified for the measuring range -40 to +1000°C.

For thermocouples of Class 2, the accuracies apply for the measuring range -40 to +1200 °C

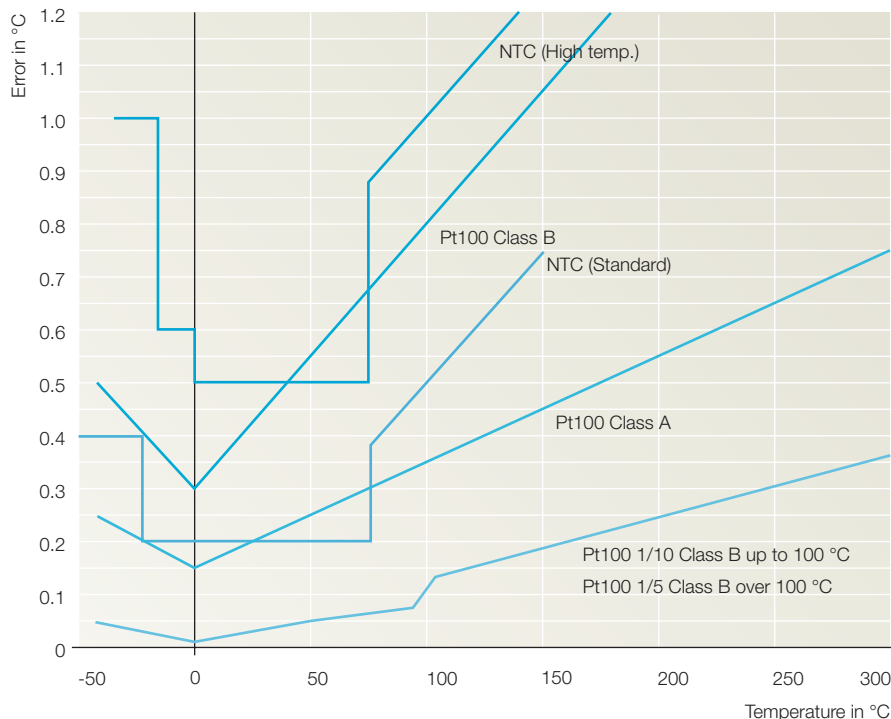
For thermocouples of Class 3, the accuracies apply for the measuring range -200 to +40.1 °C



### Accuracies Pt100/NTC

Data for Pt100 according to EN 60751 (formerly IEC 751). No standardization exists for NTC measurement values sensors.

In addition to fast and reliable thermocouple probes, Pt100 probes according to EN 60751 (formerly IEC 751) or selected high-precision probes based on Pt100 with 1/10 DIN accuracy are also available. These would precision sensors are 10 times more accurate than „normal“ Pt100 sensors, which are already very accurate. Applied to Class B, whose error is  $\pm 0.3 + 0.005 \times I$  temperature I, this means an error of only  $\pm 0.03 + 0.0005 \times I$  temperature I.



## Measurement technology for measuring temperature

### Probe design selection

#### Reaction time

$$t_{99} - \text{Time} = \text{Time until probe shows 99\% of temperature change}$$

$$t_{99} = 4.6 \times t_{63} - \text{Time}$$

$$t_{99} = 2 \times t_{90} - \text{Time}$$

#### Durability

The probe shaft of thermocouple probes is made of Inconel (2.4816). In all other designs, stainless steel V4A (1.4571) is used for the probe shaft. The high quality material used generally ensures sufficient resistance to corrosive substances. Testo offers glass-coated probes for applications in highly corrosive media.



Design in NiCr-Ni probes

Our recommendation for fast measurements, also on rough surfaces: Use the patented cross-band measurement head with a sprung thermocouple band. The cross-band takes on the actual temperature of the measurement object in only a few seconds:

- Easy handling (without silicon heat conductive paste)
- Fast measurement result

#### Immersion-penetration probe



Immersion probe (NiCr-Ni, Pt100, NTC) for measurements in liquids, but also for measurements in powdery substances or in air.



Penetration probes (NiCr-Ni, Pt100, NTC) for measurements in plastic or paste-like media.

#### Air probes



(NiCr-Ni, Pt100, NTC) In order to enable fast measurement, the sensor usually lies bare.

- The specified reaction time  $t_{99}$  is measured in a wind tunnel at 2 m/s and 60 °C.
- Immersion/penetration probes can also be used for air measurements. However, the reaction time is 40 to 60 times higher than the specified value which was measured in water.

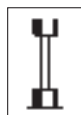
#### Information

- The specified reaction times  $t_{99}$  are measured on polished steel or aluminium plates at 60 °C.
- The specified accuracies are sensor accuracies.
- The accuracy in your application is dependent on the surface texture (roughness), the material of the measurement object (heat capacity and heat transfer) as well as the sensor accuracy. Testo provides the corresponding calibration certificate for the deviations of the measurement system in your application. For this purpose, Testo uses a surface test rig developed in cooperation with the German Federal Physical and Technical Institute (PTB).

#### Information

- The specified reaction time  $t_{99}$  is measured in moving liquid (water) at 60 °C.
- Generally, the thinner the probe, the faster it is and the shallower the necessary immersion depth into the measurement object.
- In order to be able to assume the real temperature of the measurement object, the probe must be immersed into the measurement object at least 10 x the diameter of the probe (better still 15 x diameter).
- However: The thinner the probe, the more carefully it has to be handled.
- Thermocouple probes can be manufactured with a very small diameter (0.25 mm) and are therefore ideal for fast measurements and measurements made on small objects.
- Resistance sensors can be manufactured at low cost with a diameter of 2 mm, but are usually more accurate than thermocouple probes.

#### Surface probes



Design in NiCr-Ni, Cu-CuNi; Pt100; NTC probes. With a widened measurement tip for measurements on smooth, flat surfaces. For optimum heat transfer we recommend silicone conductive paste (Tmax 260 °C)

#### Advantage:

- Robust design
- Higher sensor accuracy

#### Disadvantage:

- Long reaction time
- Requires exact handling

Only suitable for smooth surfaces and objects with a high heat capacity, e.g. large metal objects.



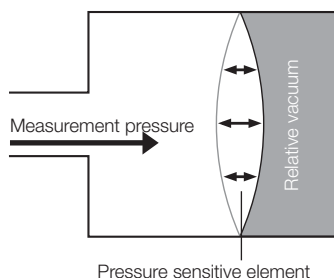
# Measurement technology for measuring pressure

## Different pressure types

### Absolute pressure ( $P_{abs}$ )

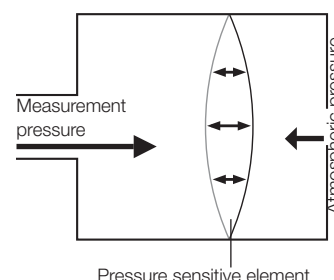
The pressure which applies to the airless space of the universe (zero pressure), is referred to as absolute pressure.

Absolute pressure is identified by the index "abs".



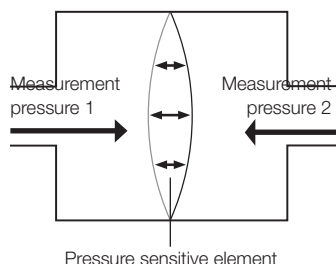
### Atmospheric pressure difference, positive pressure

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



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

The difference between two pressures  $p_1$  and  $p_2$  is referred to as a pressure difference ( $\Delta p = p_1 - p_2$ ). If the difference between two pressures represents the measurement parameter, it is referred to as differential pressure ( $p_1, p_2$ ).



### 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 an altitude height of approx. 500 km. Pressure decreases constantly up to this altitude (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 1023.25 hectopascal (hPa) or millibar (mbar/normal pressure according to DIN 1343). Typically this value can fluctuate by  $\pm 5\%$  if there are low or high pressure weather areas.

## The measurement principle

In the construction of pressure measuring instruments, the principle of pressure influence on a defined area is almost always used. It is thus reduced to a measurement of force. The following interrelationship then applies:

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

## Pressure gauges

### Advantages of electronic pressure gauges

In sprung-elastic pressure gauges, a deflection of 1–3 mm occurs. In electrical pressure sensors, the deformation amounts to only a few  $\mu\text{m}$ . Because of this very slight mechanical deformation, electrical pressure gauges / sensors show excellent dynamic performance and very low wear. The result of this is high durability and long-term stability. The electrical pressure gauges are also available in very small designs.

A further advantage is the exact legibility of the display. An accurate measurement of pressure is becoming more and more important with today's state-of-technology. Precision

measuring instruments have an accuracy of 0.05% of the final value. In mechanical manometers, such accuracies cannot be read because of parallax error and the mechanical performance of the springs. Some of the electrical precision instrument with an LCD display have a resolution in the thousandth range of 0.001.

### Types of pressure gauge

#### Liquid pressure measuring instruments

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

#### Pressure balances with sealing liquid

#### Piston pressure measuring instruments

- Piston pressure measuring instruments with spring-loaded piston
- Piston pressure balances

#### Elastic pressure measuring instruments

#### Electric pressure sensors and pressure measuring instruments

- Sensor principles with strain measuring instruments
- 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
Pa	1	100	1.000	1.000.000	100.000	6.895	9.807	249.1	133.3	3.386
hPa/mbar	0.01	1	10	10.000	1.000	68.948	0.09807	2.491	1.333	33.864
kPa	0.001	0.1	1	1.000	100	6.895	0.009807	0.2491	0.1333	3.386
MPa	0.000001	0.0001	0.001	1	0.1	0.006895	0.000009807	0.0002491	0.0001333	0.003386
bar	0.00001	0.001	0.01	10	1	0.0689	0.00009807	0.002491	0.001333	0.0339
psi	0.0001451	0.0145	0.14505	145.05	14.505	1	0.001422	0.0361	0.0193	0.4912
mmH <sub>2</sub> O	0.102	10.2	102	102.000	10.200	704.3	1	25.4	13.62	345.9
inH <sub>2</sub> O	0.004016	0.4016	4.016	4.016	401.6	27.73	0.0394	1	0.5362	13.62
mmHg	0.007501	0.7501	7.501	7.501	750.1	51.71	0.0734	1.865	1	25.4
inHg	0.0002953	0.0295	0.2953	295.3	29.53	2.036	0.002891	0.0734	0.0394	1



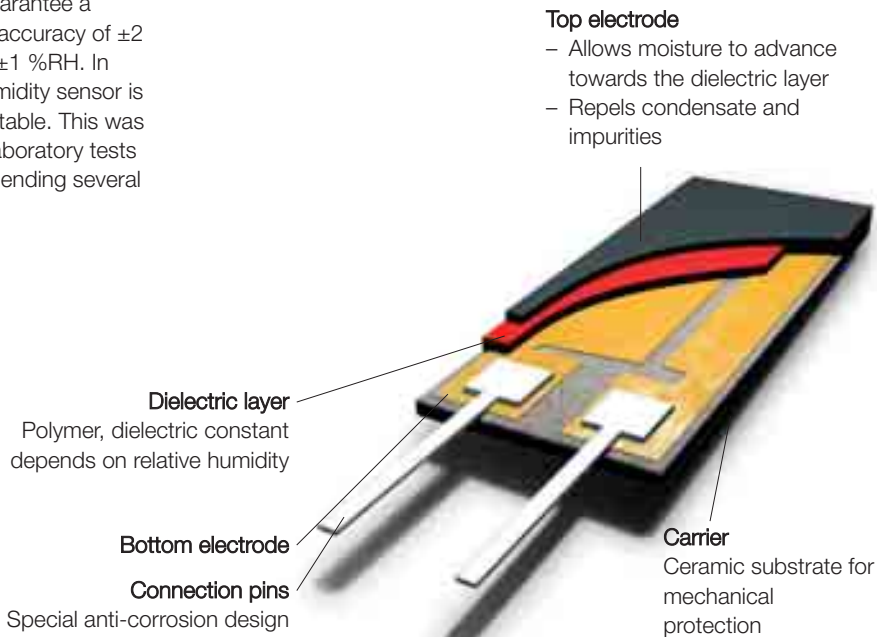
Measurement technology for measuring humidity

Testo's humidity sensor

With its humidity sensor, developed more than fifteen years ago and since then continually improved, our attention was focussed from the start on two accuracy parameters, measurement uncertainty and long-term stability. The basic design was developed by Testo and has since been reverse engineered by several manufacturers: a polymer sensitive to humidity serves as a dielectric between two condenser electrodes. However, its distinctive feature is the way in which the individual layers lie perfectly on top of each other. This is particularly clear in the top electrode which has to carry out two tasks which, at first glance, appear to be contradictory: it must be permeable for the water vapour which is to be fed to the polymer dielectric. But it must also be leak-proof, smooth and capable of repelling condensate, oil and dirt particles in order to protect the sensor. This

combination has succeeded perfectly in Testo's humidity sensor thanks to extensive research. On account of this design and Testo's highly stable manufacturing and adjustment, it is possible to guarantee a measurement inaccuracy of  $\pm 2\%$  RH or also of  $\pm 1\%$  RH. In addition, the humidity sensor is also long-term stable. This was proven in inter-laboratory tests which involved sending several

Testo humidity sensors to a number of international calibration laboratories (PTB, NIST etc.) where the  $\pm 1\%$  RH limit was not exceeded, without the need for readjustment.



International 5 year inter-laboratory tests on Testo's humidity sensor



Country	1 Germany	2 France	3 USA	4 Italy	5 England	6 Spain	7 Japan	8 Korea	9 China	10 Germany
Institute	PTB	CETIAT	NIST	IMGC	NPL	INTA	JQA	KRISS	NRCCRM	PTB
Arrival	04/96	10/96	12/96	07/97	09/98	10/98	03/99	05/00	10/00	03/01
Departure	08/96	10/96	05/97	10/97	09/98	10/98	04/00	09/00	12/00	08/01

## Measurement technology for measuring humidity

### Testo humidity sensor

With the humidity sensor developed by Testo's own experts, the company has succeeded in considerably extending the areas of application for capacitive sensors.

- Use in temperatures up to +180 °C
- Dewpoint determination from -50 °C to +100 °C
- Long-term drift-free measurement under extreme conditions
- Very accurate in the high humidity range (>95 %RH)

The excellent properties of the Testo humidity sensor are:

- Accuracy
- Long-term stability
- Temperature stability
- Robustness

#### The technical data

**Measuring range:**  
0 to 100 %RH

**Temp. range:**  
-40 to +180 °C

**Hysteresis**  
(3 h cycle 15...90...15 %RH):  
< 1.0 %RH

**Reaction time t90:**  
< 15 sec.

**Temp. dependency:**  
0.03 %RH/°C

**Dewpoint td:**  
-50 to +100 °C

**Reproduceability:**  
< 0.03 %RH

### Reference humidity probe for highest accuracy

- Accuracy:  $\pm 1$  %RH within 15-30 °C and 10-90 %RH, outside this range the accuracy  $\pm 1$  %RH + 0.03 %RH per degree of temperature difference from 25 °C applies.
- 2 years guaranteed long-term stability under normal conditions

### Endurance test

More than 100 sensors were exposed to the stated test conditions. The sensors were measured before and after in a climate cabinet.

### The arguments for the Testo humidity sensor

1. 24h in cooled (20 °C) flue gas at 90 %RH:  
The flue gas from an oil burner ( $O_2 = 5.9$  %,  $CO = 70$  ppm,  $NO_x = 50$  ppm,  $SO_2 = 70$  ppm) was drawn out of the flue into a container with the sensors and automatically cooled
2. 2 h in the smoke from 3000 cigarettes/m<sup>3</sup>
3. 5 minutes in tap water
4. 12 months in a weather house, July '90 to July '91
5. 5 minutes immersion in isopropyl alcohol
6. 6 months in silica gel at 20 °C/0.1 %RH
7. 3 months at -25 °C/95 %RH
8. 3 months in 92 %RH (at 20 °C)
9. Shock test: 16 h at -20 °C  
-> 10 mins boiling water  
-> still wet in -20 °C for 1 h  
-> convection oven at +125 °C for 3 h  
-> shocked in ice water at +4 °C and left immersed for 5 mins  
-> 5 mins heating at 125 °C

10. 9 months in a cheese factory: 7 °C/70 %RH
11. 9 months in a chicken coop: 15 °C/80 %RH
12. 9 months in a pigsty: 17 °C/70 %RH
13. 5 h in an convection oven: 150 °C/10 %RH
14. 30 days in high humidity: 20 °C/98 %RH
15. 7 days wood drying process: 20 to 80 °C/90 to 15 %RH

The display performance was not influenced by more than  $\pm 1$  %RH by the endurance tests

### Applications

Over 100,000 Testo humidity sensors are in use world-wide, in portable hand instruments, in measurement storage instruments and in stationary measurement transmitters

- In the tobacco industry
- For monitoring the room climate in IT rooms
- For the storage of sensitive goods
- In garden centres and greenhouses
- In the food sector
- In wood production
- In the pharmaceutical industry
- In drying processes
- and... and... and...

### Determination of dewpoint td:

- In compressed air
- In  $CO_2$
- In natural gas
- In  $O_2$

## Measuring technology for flow velocity measurement

### General

#### Probe selection

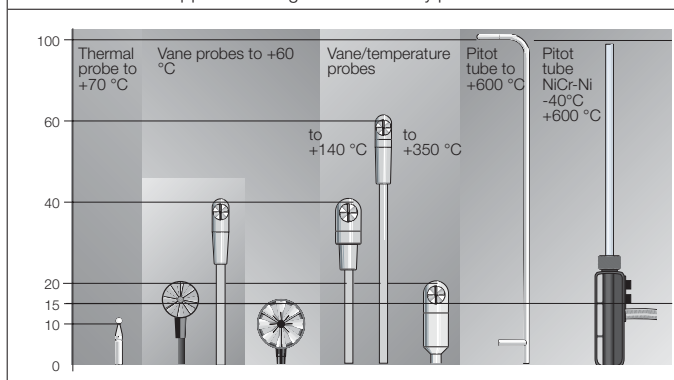
The flow measuring range 0 to 100 m/s can be divided into three sections:

- Low velocity 0 to 5 m/s
- Mid velocity 5 to 40 m/s
- High velocity 40 to 100 m/s.

Thermal probes are used for accurate measurements in the range 0 to 5 m/s. Vane probes are ideal for velocities ranging from 5 to 40 m/s. The measuring range of the Pitot tube depends on the differential pressure probe used. The new 100 Pa probe can therefore be used for the exact measurement of flow speed from approx. 1 m/s to 12 m/s. The Pitot tube yields optimum results in the higher velocity range. An additional criterion when selecting the right velocity probe is the temperature.

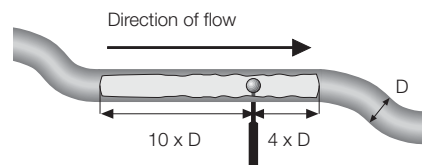
Thermal sensors can normally be used at up to approx. +70 °C. Special design vane probes can be used to max. +350 °C. Pitot tubes are used for temperatures above +350 °C.

Measurement and application ranges of the velocity probes



#### Location selection

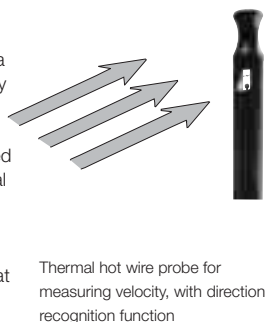
You should measure in a straight part of the duct, if possible. The duct part should have a minimum of ten diameters of straight run upstream the measuring point and four diameters of straight run downstream the measuring point. The flow profile should not be interrupted in any way by flaps, reducers, angles etc.



### Thermal probes

#### Thermal probes

The principle of the thermal probe is based on a heated element from which heat is extracted by the colder impact flow. Temperature is kept constant via a regulating switch. The controlling current is directly proportional to the velocity. When thermal velocity probes are used in turbulent flows, the measured result is influenced by the flows impacting the heated body from all directions. In turbulent flows, a thermal velocity sensor indicates higher measured values than a vane probe. This can be observed especially during measurements in ducts. Depending on the design of the duct, turbulent flows can occur even at low velocities.



### Vane probes

#### Vane probes

The measuring principle of the vane probe is based on the conversion of a rotation into electric signals. The flowing agent makes the vane rotate. An inductive proximity switch „counts“ the revolutions of the vane and supplies a pulse sequence which is converted in the measuring instrument and is then indicated as a velocity value. Large diameters (Ø 60 mm, Ø 100 mm) are suitable for the measurement of turbulent flows (e.g. at outlet ducts) at smaller or medium velocities. Small diameters are more suitable for measurements in ducts; in which case the duct cross-section must be 100 times bigger than the probe cross-section being impacted.

The 16mm probe has proven to be very versatile. It is large enough to have good starting qualities and is small enough to withstand velocities of up to 60 m/s.



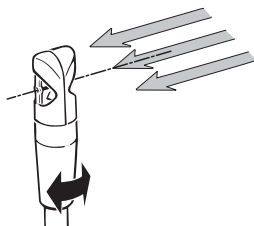
### Vane probes, advice on use

#### Positioning in the air flow

The vane probe is set exactly if the flow direction is parallel to the vane axis.

If the measuring probe is turned slightly in the air current, the value shown in the instrument changes. The measuring probe is positioned exactly in the air current if the value shown is at max.

When measuring in a duct there should also be a minimum of ten diameters of straight run upstream the measuring point and four diameters of straight run downstream the point for best results. By design, vanes are less influenced by turbulence than thermal probes or Pitot tubes.



#### Measuring flow velocities in ducts

As part of approval measurements, indirect measuring methods (grid measurements) are used to measure air flows.

The following methods are suggested in VDI 2080/EN 12599:

- Trivial method for grid measurements in square cross-sections.
- Centroidal axis methods for grid measurements in circular cross-sections
- Loglinear method for grid measurements in circular cross sections.

**Please request! Detailed information on air flow measurement can be found in the informative Testo climate guide.**



# Measuring technology for flow velocity measurement

## Vane probes, advice on use

### Air vent/extraction

The air outlet grid greatly changes the relatively uniform flow inside the duct. Areas of higher flow velocity are created at the free vent surfaces and areas of low flow velocity and swirl at the grids. The flow profile steadies at a distance from the grid depending on the grid design but is usually 20 cm. For best accuracy, a large diameter vane is recommended. Large vane areas help to get an average reading of the turbulent flow from the grid.



### Taking measurements at intake openings using the volume flow measuring funnel

Even without the disturbing effects of a grid in an aperture, the lines of flow are not directional and the flow profile is irregular. Because a partial vacuum in the duct draws air out of the room in a funnel shape, even at a short distance from the aperture, there is no defined area in the room over which a volume flow measurement could be made.

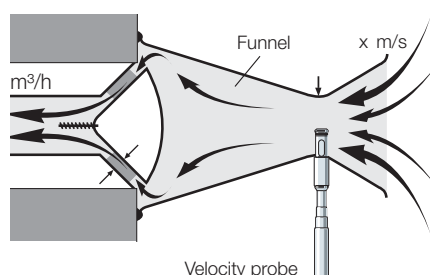
Therefore, only the duct or funnel measurement yields reproducible results. Measuring funnels of various sizes are available for such applications. These create defined flow conditions at some distance from the poppet valve in a fixed cross-section. A velocity probe is positioned centrally and secured at this point. The extracted volume flow is calculated from the velocity probe reading multiplied by the funnel factor (e.g. funnel factor 22).

### Measuring volume flow with a funnel

$$v \left[ \frac{\text{m}^3}{\text{h}} \right] = x \left[ \frac{\text{m}}{\text{s}} \right] \cdot 22$$

v = Volume  
x = Velocity  
22 = Funnel factor

### testovent 410/415



### testovent 417



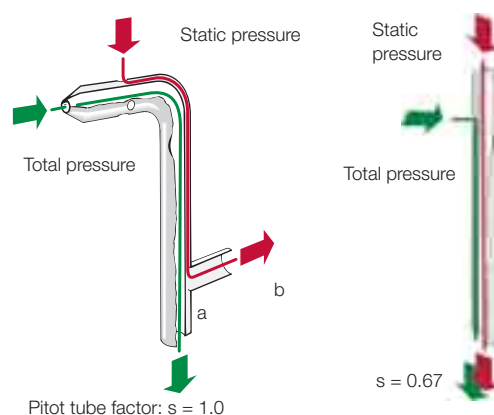
## The Pitot tube

### Flow velocity using a Pitot tube

The total pressure is transferred to connection (a) of the pressure probe via the Pitot tube aperture. The purely static pressure is taken on via the lateral slots and passed on to the connection (b). The differential pressure resulting from this is the velocity-dependent dynamic pressure. This is evaluated and displayed. Similarly to thermal probes, the Pitot tube is more likely to react to turbulent flows than a vane probe. It is therefore important to ensure uninterrupted inflow and outflow stretches in Pitot tube measurement.

$$v = s \cdot \sqrt{\frac{2 \cdot p}{\rho}}$$

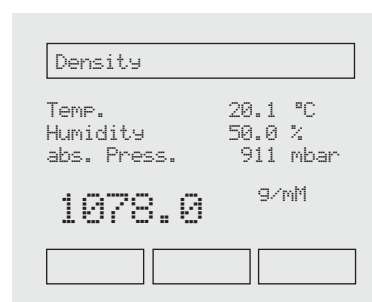
v = Velocity in m/s  
s = Pitot tube factor  
ρ = Air density in kg/m³  
p = Differential pressure in Pascal measured at Pitot tube



### Absolute pressure correction for avoiding significant measurement errors

Measurement errors are often caused by calculating with a mean density of 1200 g/m³. When measuring outdoor air flows, the actual air density can deviate by up to ± 10% of the above value. This results in an inaccuracy of the air flow of up to ± 5%. Here you can make use of the possibilities of testo 400/testo 521 via the configuration menu.

- Activate the automatic conversion of the Pitot tube pressure into the flow velocity.
- It is important that you first enter the correct air density or the absolute pressure, temperature and humidity in the configuration menu. The testo 400/testo 521 automatically calculates the density on the basis of the measured values.



## Calibration Services / Certificates



### Who needs DKD calibration certificates?

In Germany, laboratories have been working for approximately 30 years under the state-approved supervision of the German Calibration Service (DKD). The laboratories function in the name of the State in order to guarantee quality and efficiency in the measurement industry. DKD laboratories are therefore “semi-official” points which are monitored on a regular basis. The calibration results achieved in these laboratories have - in accordance with the German Federal Institute for Physics (PTB) – the highest reliability level and are legally recognised. They also apply internationally. DKD calibration certificates are for all users of measuring instruments requiring a particularly high efficiency level. For example, factory

measurement standards, with which other testing equipment is calibrated, is often “backed up” by a DKD calibration certificate. DKD calibration certificates are also required for measuring instruments in medical technology or the pharmaceutical industry.

#### DKD calibration certificates for:

- Factory measurement standards
- Pharmaceuticals
- Medical technology
- Specialists
- High accuracy

DKD calibration certificates are available in the following language versions:

- German, English, French
- German, Italian, Spanish

### ISO calibration certificates

The QS systems in industrial companies have been ISO 9000:2000 certified since 1987. Nowadays, even services such as banks, insurance companies and hospitals cannot avoid this trend. Other sector-specific quality guidelines are GMP, FDA (pharmaceutics / medical technology) and ISO TS 16949, QS 9000, VDA (vehicle industry)

The implementation and maintenance of testing equipment calibration and monitoring is required for all guidelines and standards. ISO calibration certificates are the lower-priced alternative to DKD calibration certificates.

#### Testo's ISO calibration certificates fulfil all the requirements of

- ISO 9000:2000
- ISO 10012-1
- GMP
- FDA
- QS 9000
- VDA
- ISO TS 16949
- HACCP

## Notes



Notes



## Notes



# Always at your service!

Please send for more information:

Monitoring Instruments for Food Production, Transport and Storage  
Measurement Engineering for Restaurants, Catering and Supermarkets  
Measurement Engineering for Air Conditioning and Ventilation  
Measurement Engineering for Heating and Installation  
Measurement Solutions for Emissions, Service and Thermal Processes  
Measurement Solutions for Refrigeration Technology  
Stationary Measurement Solutions for Air Conditioning, Drying, Cleanrooms and Compressed Air  
Measurement Solutions for Production, Quality Control and Maintenance  
Measurement Solutions for Climate Applications in Industry  
Reference Measurement Technology for Industry

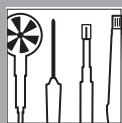
Measuring Instruments For Temperature  
Measuring Instruments for Humidity  
Measuring Instruments For Velocity  
Measuring Instruments for Pressure and Refrigeration  
Multi-Function Measuring Instruments  
Measuring Instruments for Flue Gas and Emissions  
Measuring Instruments for RPM, Analysis, Current/Voltage  
Measuring Instruments For Indoor Air Quality, Light And Sound  
Stationary Measurement Technology Humidity / Differential Pressure / Temperature / Process Displays  
Stationary Measurement Technology Compressed Air Humidity / Compressed Air Consumption

Subject to change without notice.

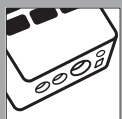
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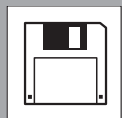
## Icon explanation



Probe/sensor selection



Multi-channel measuring instrument (number of probe inputs >1)



Measurement data store integrated in the instrument



Backlit display



User-friendly operation thanks to menu-guided processes



SoftCase or TopSafe for protecting the instrument in rough field use



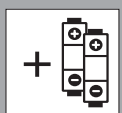
Impact-proof



Infrared printer  
Reliable on-location paper documentation of measurement results



PC interface  
for analysis of measurement data on the PC



Battery and rechargeable battery operation possible



Rechargeable battery can be charged in instrument



Radio probe connectable



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