

The reference for air conditioning/ventilation units

testo 400

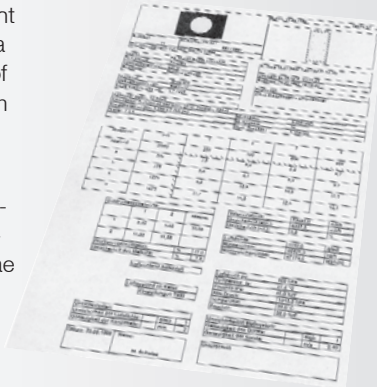
VAC module now included

testo 400, with the VAC module, is currently the only measurement system in the world with which a fast and objective assessment of the functionality of a VAC system is possible without the need for additional manual calculations.

Of course, measurement stipulations are based on the EN Standard 12599 as well as the Ashrae Standard USA.

The measurement technician always has one hand free.

The measurement data saved in testo 400 is uploaded to the PC at the touch of a button. Time-consuming manual written work is now a thing of the past, the required calculations are completed automatically by testo 400. Measurement results are documented in an EN standardised layout.



testo 400

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

Applications for:

- Flow velocity, volume flow
- Humidity, pressure
- Temperature
- CO₂, current/voltage

Part no. 0563 4001

Additional benefits of testo 400

- 2 freely selectable channels
- Memory for 500,000 readings
- Up to 6 measurement parameters simultaneously in display
- Extended software functions e.g. measurement program is started if readings are exceeded
- Attachable printer

Measurement data processing with "Retrieval Guarantee"

Data is filed using a clear tree structure with "retrieval guarantee" - in the large display and, of course, on your PC.

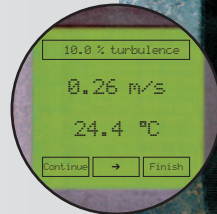
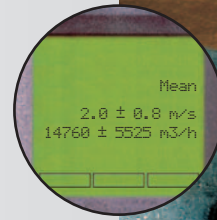
Versatile display, presentation and analysis options, e.g. calculation functions in tables, diagrams, histograms, digit boxes or forms, are available on your PC.

For scheduling purposes, locations with site can be compiled on your PC and then downloaded to your handheld instrument.

Specific sites are combined as required and divided into groups, e.g. according to products.

Assessment of measurement directly on site with built-in uncertainty calculation

Display with calculated degree of turbulence, mean air velocity and air temperature



The coordinates required for the grid measurement are shown in the display. The depth data on the vane telescope makes your work much easier.

Reference probes

Vane probes

- Professional telescopic handle for plug-in vanes Ø 16 mm and Ø 100 mm
- Vane measurement probe Ø 16 mm with built-in temperature measurement and extended measurement range 0.4 to 60 m/s
- Vane probe Ø 100 mm with meas. range from 0.1 m/s

Differential pressure probes

- Wide selection of probes for measuring smallest pressures from 100 Pa up to 400 bar high pressure probe

Precision probes

- Humidity probe with 1% accuracy
- Precision temperature probe with a system accuracy of up to 0.05 °C

Current/voltage cable

- For example, for measuring and adjusting stationary transmitters

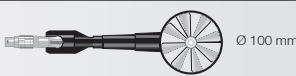
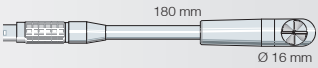
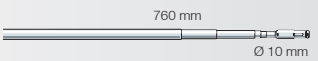

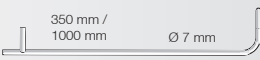










Comprehensive monitoring of processes

All relevant parameters such as beginning and end of measurement, measurement intervals, undershooting/exceeding and date/time are programmable.

Online measurement via PC is also possible.

Spot measurement with immedi-

ate printout of log which includes company logo, site and measurement data is also provided.

Flow probes	Illustration	Meas. range	Accuracy	Part no.	
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		+0.1 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/temperature probe, Ø 16 mm, attachable to 0430 3545 handle or 0430 0941 telescopic handle		+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	
Professional telescopic handle for plug-in vane probes, max. 1 m long				0430 0941	
Extension of telescopic handle, 2 m long, please also order the 0409 0063 extension cable				0430 0942	
Handle for plug-in vane probes				0430 3545	
Quick-action hot wire probe, Ø 10 mm, with telescopic handle, for measurements in the lower velocity range with direction recognition		0 to +20 m/s -20 to +70 °C	±(0.03 m/s ±4% of mv) (0 to +20 m/s)	0635 1041	
Differential pressure measurement	Illustration	Meas. range	Accuracy	Part no.	
Pressure probe in robust metal housing with impact protection, incl. magnet for fast attachment, measures differential pressure and flow speeds (in combination with Pitot tube)		Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	0 to +100 Pa	±(0.3 Pa ±0.5% of mv)	0638 1347
		0 to +10 hPa	±0.03 hPa	0638 1447	
		0 to +100 hPa	±0.5% of mv (+20 to +100 hPa) ±0.1 hPa (0 to +20 hPa)	0638 1547	
Pitot tube, 1000 mm long, stainless steel, measures flow speed in combination with pressure probes		Oper. temp. 0 to +600 °C	Length 1000 mm	0635 2345	
			Length 350 mm	0635 2145	
Low pressure probe, refrigerant-proof stainless steel, up to 10 bar		screw-in thread 7/16" UNF -1 to +10 bar	±1% of fsv Overload 25 bar	0638 1741 Conn.: Plug-in head, connection cable 0409 0202 required	
High pressure probe made of refrigerant-proof stainless steel Conn.: Plug-in head, connection cable 0409 0202 required		screw-in thread 7/16" UNF -1 to +40 bar	±1% of fsv Overload 120 bar	0638 1941	
		-1 to +400 bar	±1% of fsv Overload 600 bar	0638 2141	
More probes	Illustration	Meas. range	Accuracy	Part no.	
Comfort level probe for measuring degree of turbulence, with telescopic handle and stand. Fulfills EN 13779 requirements		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	
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 Conn.: Fixed cable	
CO2 probe measures indoor air quality and monitors the workplace. With plug-in head, connection cable 0430 0143 or 0430 0145 required		0 to +1 Vol. % CO ₂ 0 to +10000 ppm CO ₂	±(50 ppm CO ₂ ±2% of mv)(0 to +5000 ppm CO ₂) ±(100 ppm CO ₂ ±3% of mv)(+5001 to +10000 ppm CO ₂)	0632 1240 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	
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 0 to +120 °C	In accordance with ISO 7243 or DIN 33403	0635 8888 ID No. 0699 4239/1	
Highly accurate reference humidity/temp. probe incl. cal. cert.		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)	0636 9741 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	
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)	0636 9740 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	
Quick-action surface probe with sprung thermocouple strip, measuring range short-term to +500°C		150 mm Ø 10 mm -200 to +300 °C	Class 2	t99 3 s 0604 0194 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	
Highly accurate immersion/penetration probe incl. certificate		295 mm Ø 4 mm -40 to +300 °C	±0.05 °C (+0.01 to +100 °C) ±(0.05 °C ±0.05% of mv) (-40 to 0 °C) ±(0.05 °C ±0.05% of mv) (+100.01 to +300 °C)	t99 60 s 0614 0240 Conn.: Plug-in head, connection cable 0430 0143 or 0430 0145 required	

Accessories for measuring instrument/probes	Part no.
testovent 410, volume flow funnel, Ø 190 mm/330x330 mm, incl. case	0554 0410
testovent 415, volume flow funnel, Ø 190 mm/210x210 mm, incl. case	0554 0415
Rech. batt. set for instr. (2 rech. 2.4V/1100mAh), selected for quick recharging in instrument	0554 0196
Mains unit 230 V/ 8 V/ 1 A, for instrument (European plug), for mains operation and battery recharging	0554 1084
Connection hose, silicone, 5m long, max. load 700 hPa (mbar)	0554 0440
Software and Accessories	Part no.
ComSoft 3 - Professional with data management, incl. database, analysis and graphics function, data analysis, trend curve	0554 0830
RS232 cable, connects instrument to PC (1.8 m) for data transfer	0409 0178

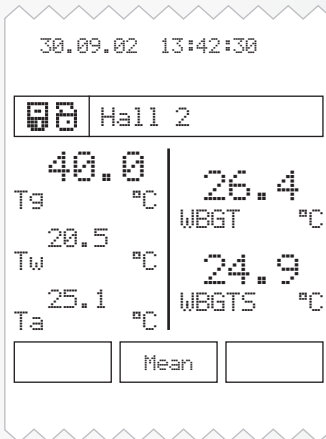
Printer and Accessories	Part no.
Attachable printer (securely attached) including 1 roll of thermal paper and batteries	0554 0570
Testo printer with wireless IRDA and infrared interface, 1 roll of thermal paper and 4 AA batteries, for printout of reading on site	0554 0547
SoftCase for instrument and 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)	0516 0411
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

For more information, refer to the brochure "Reference Measurement Technology for Industry" and www.testo.com.

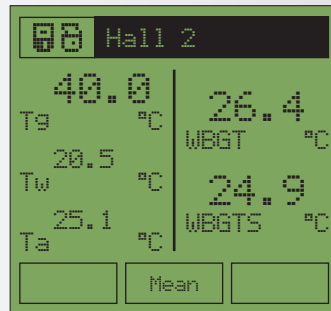
The professional set for assessing workplaces subjected to heat, testo 400



Measure with testo 400 and WBGT probe



testo 400 on-site printout e.g. with attachable printer



Calculated WBGT and WBGTS indices are displayed directly

Wet Bulb Globe Temperature Probe

The measurement task involves assessing workplaces, particularly those subjected to heat radiation:

The WBGT probe is used to determine the WBGT (Wet Bulb Globe Temperature) climate index in accordance with DIN 33403 and ISO 7243.

The WBGT index is used to determine the maximum allowable exposure time at workplaces subjected to heat.

Possible applications are e.g.:

- Steel industry
- Foundries
- Glass industry
- Furnaces
- Ceramics industry.

Heat radiation causes an increase in temperature based on:

- the thermal influence of the surroundings
- Work intensity
- Thermal transfer of clothing
- Duration of exposure.

If this burden is too high, there is a risk of a circulatory collapse, heat cramps or heat stroke.

Three different temperatures have to be measured for WBGT calculation:

- Temperature of a naturally aired, humidified thermometer (T_w), natural wet bulb temperature
- Globe temperature (T_g)
- Air temperature (T_a).

Calculation occurs inside and outside the building without exposure to sun:

$$\text{WBGT} = 0.7 T_w + 0.3 T_g$$

Outside buildings with exposure to sun:

$$\text{WBGTS} = 0.7 T_w + 0.2 T_g + 0.1 T_a$$

The testo 400 measuring instrument calculates indices and shows them in its display.



The WBGT case for fast assessment of workplaces

Recommended Set:

Recommended Set:	Part no.
testo 400, multi-functional meas. instr., incl. meas. value store up to 500,000 readings, VAC-module (determination of volume flow with error calc.), 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 ID No. 0699 4239/1
Attachable printer (securely attached) including 1 roll of thermal paper and batteries, quickly prints readings on location	0554 0570

We recommend the following for each of the 3 temperature probes:

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 comfort level measurements & occupational safety/health, testo 400

The thermal well-being of humans depends to a great extent on ambient air flow. Humans react sensitively to draughts. Draught air is the most common reason for complaints about ambient conditions.

Testo's direction-independent comfort probe has been specially designed to analyse draughts. When used together with the testo 400 reference measuring instrument, it is possible to set up a reading sequence and to calculate the corresponding mean.

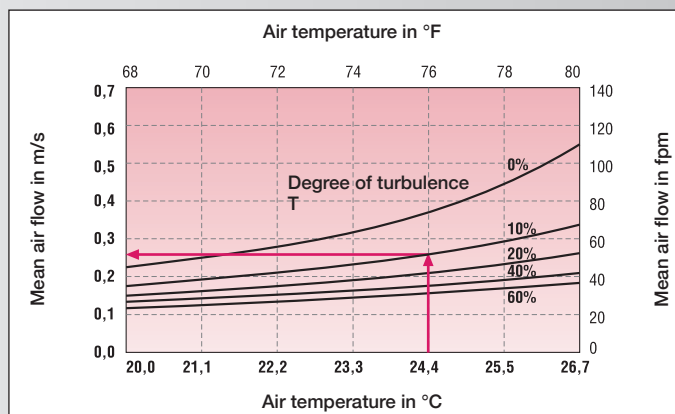
However, the mean air flow alone is not sufficient to assess the effect on people. The fluctuations over time in ambient air flow are also of interest. The degree of turbulence required in the respective standards and guidelines is a measure of this. It is also calculated automatically by the testo 400 reference measuring instrument.

Standards recommend that air flow is measured directly at the workplace at a height of 0.1 m, 0.6 m and 1.1 m (for seated persons) or 0.1 m, 1.1 m and 1.7 m (for standing persons).

The maximum mean air flow depends on the air temperature measured and the degree of turbulence calculated in each case (see graphic).

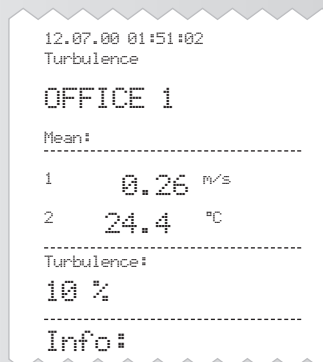
- Draught prevention in the workplace

- Measure ambient air flow in air-conditioned rooms in accordance with EN 13779
- Automatic calculation of degree of turbulence (with testo 400)

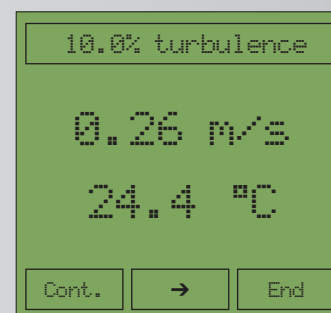


The normally time-consuming degree of turbulence calculation is carried out automatically by the testo 400 measuring instrument.

Example: Air temp.: 24.4°C, degree of turbulence: 10%
Degree of turbulence calculation: maximum mean air flow 0.26 m/s



testo 400 printout e.g. on attachable printer



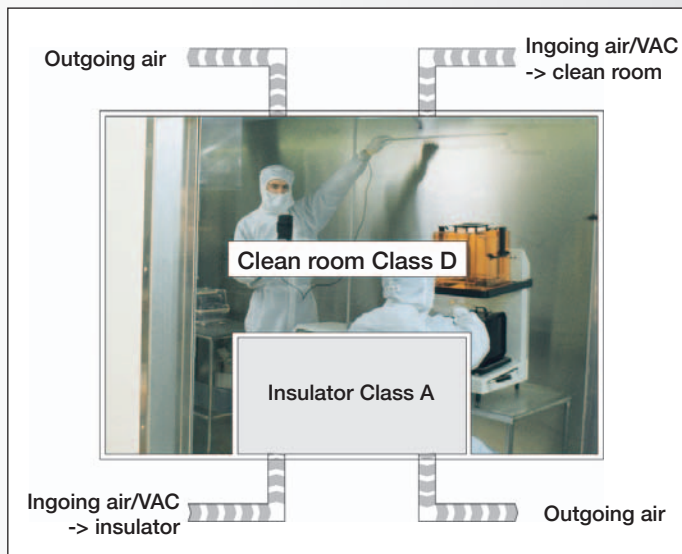
testo 400 display with calculated degree of turbulence, mean air flow and air temperature

Recommended Set:	Part no.
testo 400, multi-functional meas. instr., incl. meas. value store up to 500,000 readings, VAC-module (determination of volume flow with error calc.), battery, Li-cell and calibration protocol 2 channel multi-function measuring instrument	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
Standard ambient air probe up to +70°C Measures all physical parameters in the psychrometric chart, Plug-in head, connection cable 0430 0143 or 0430 0145 required	0636 9740
Quick-action surface probe with sprung thermocouple strip, measuring range short-term to +500°C, Plug-in head, connection cable 0430 0143 or 0430 0145 required	0604 0194
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	0430 0145



testo 400 set up with turbulence degree probe

The pro set for cleanroom technology, testo 400



Example of layout of a clean room



testo 400 display during the calibration of a stationary transmitter:

Left display half: Reference humidity probe

Right display half: 4-20 output measurement in a transmitter using current/voltage cable (scaling 0-100%RH)

The Pro Set for clean room technology

testo 400, multi-functional meas. instr., incl. meas. value store up to 500,000 readings, VAC-module (determination of volume flow with error calc.), battery, Li-cell and calibration protocol	0563 4001
Precision pressure probe, 100 Pa (differential pressure)	0638 1347
Precision air probe, Plug-in head, connection cable 0430 0143 or 0430 0145 required	0628 0017
Highly accurate reference humidity/temp. probe incl. cal. cert., Plug-in head, connection cable 0430 0143 or 0430 0145 required	0636 9741
Connection cable, length 1.5 m, for probes with plug-in heads	0430 0143
Connection cable, 5 m long, for probe with plug-in head	0430 0145
Thermal anemometer probe, Ø 10 mm, w. telescopic handle, measures air flow in lab fume cupboards to DIN EN 14175	0635 1047
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, velocity, pressure

Defined process ambient conditions must be assured for the qualification and validation of the high quality standards of production units in clean rooms.

Air exchange and the resulting air flow are linked directly to air temperature and air moisture. Specified air flows produce defined positive pressures which prevent the ingress of impurities from outside.

Testo's measurement technology has proven to be ideal for testing process ambient conditions.

With the testo 400 reference measuring instrument, you have the possibility of connecting 2 probes simultaneously. The measuring instrument can then be used to monitor measurements on-site or for long-term measurements thanks to the integrated readings memory with capacity for 500,000 data.

Typical measurement tasks: differential pressure monitoring using the 100 Pa probe

The testo 100 Pa probe with an accuracy of $\pm(0.3 \text{ Pa} + 0.5 \% \text{ of the reading})$ is the ideal solution.

Position dependencies are completely eliminated thanks to the revolutionary double membrane technology and fluctuations in temperature no longer have any influence on the measured result thanks to temperature compensation.

Accurate air temp. measurement

testo 400 achieves a system accuracy of 0.1°C and a resolution of 0.01°C when used together with the precision air probe (Pt100 Class B 1/10).

Accurate air moisture measurement

The task at hand is to monitor exactly the fluctuations in air moisture with an accuracy of up to $\pm 1\% \text{RH}$. testo 400 sets new standards in terms of accuracy and long-term stability. The worldwide inter-laboratory test with the patented humidity sensor in leading, international institutes confirm the stated values.

Measurement of ideal air supply

testo 400, with its thermal, vane and pitot tube measurements, has all the engineering available to measure air flow. A calibration accuracy from 0.5% of the reading is assured thanks to the first PTB accredited DKD laboratory for flow.

Measuring laminar flow

The probe 0635 1047 for testing laboratory fume cupboards and for measuring laminar flow is new. Owing to its optimum flow impact characteristics with a direction-independent measurement within a possible twist angle (20°) and an accuracy of $\pm(0.02 \text{ m/s} + 5 \% \text{ of reading})$, the probe is optimally designed for the measurement of laminar flow.

Stationary transmitters

The check is carried out using the current/voltage cable (0 to 20 mA, 0 to 1 V, 0 to 10 V) and there is a possibility of integrating additional parameters.



Checking flow speed using the hot wire probe Part no.: 0635 1047

On site test procedure to DIN EN 14175, testo 400

Laboratory fume cupboard probe

The thermal anemometer probe is used for measurements and monitoring of fume cupboards. The probe corresponds to the new DIN EN 14175.

The advantages of the new thermal anemometer probe are the optimum flow impact behaviour and the easy handling. testo 400 provides necessary calculation such as mean value and standard deviation.

The objective of the on-site test procedure is to test the correct set-up of the fume cupboard, and to establish the performance of the fume cupboard under the prevailing conditions (indoor air flow/outgoing air system). For this purpose, the inflow as well as the outflow is measured.

For commissioning test (Part 4), the requirements of the measuring instrument are identical to those in the design check (Part 3).

- Direction-dependent, however measurement must be possible within $\pm 20^\circ$
- Time constant (t_{63}) 0.5 s
- Accuracy $\pm (0.02 \text{ m/s} + 5\% \text{ of reading})$ in measuring range 0.2 to 1 m/s
- Anemometers must be calibrated

For the repetition test (Part 3), the anemometer must show an accuracy of 10% of reading for the inflow velocity test, and $\pm(0.02 \text{ m/s} + 5\% \text{ of reading})$ for the outflow velocity test in the range from 0.3 m/s. The new laboratory fume cup-

board probe here fulfils the requirements from Parts 3 and 4.

General indoor air conditions during air tests, including temperature, air pressure, air humidity and pressure difference between indoor air input and indoor air output, must continue to be measured. According to DIN EN 14175-3: 2003, the anemometer must be able to measure indoor air velocity independently of direction.

With additional probes testo 400 offers the possibility of measuring the general indoor conditions.

testo 400

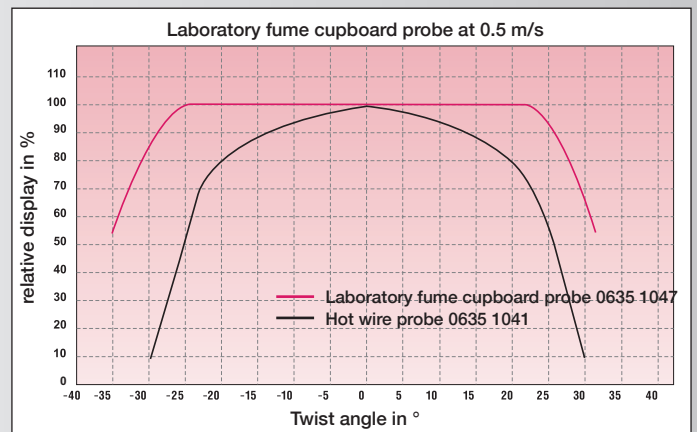
- Multi-function instrument testo 400 for measuring temperature, humidity, ΔP , flow velocity, absolute pressure
- PC interface and ComSoft 3

Advantages of the laboratory exhaust probe

- optimum flow impact characteristics
- robust probe with protective cap
- corresponds to norm DIN EN 14175



On-site testing of a laboratory fume cupboard with testo 400



Optimum flow impact behaviour of the laboratory fume cupboard probe (0635 1047)

Hot wire probe (0635 1041) optimized for duct measurement with direction recognition

Recommended set	
testo 400, multi-functional meas. instr., incl. meas. value store up to 500,000 readings, VAC-module (determination of volume flow with error calc.), battery, Li-cell and calibration protocol	0563 4001
Mains unit 230 V/ 8 V/ 1 A, for instrument (European plug)	0554 1084
Rech. batt. set for instr. (2 rech. 2.4V/1100mAh)	0554 0196
Thermal anemometer probe, \varnothing 10 mm, w. telescopic handle, measures air flow in lab fume cupboards to DIN EN 14175	0635 1047
Standard ambient air probe up to $+70^\circ\text{C}$, Plug-in head, connection cable 0430 0143 or 0430 0145 required	0636 9740
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	0638 1847
Precision pressure probe, 100 Pa, measures differential pressure, in robust metal housing with impact protection, incl. magnet for fast attachment	0638 1347
Cable, 1.5 m long, connects probe with plug-in head to meas. instrument	0430 0143
Comfort level probe for measuring degree of turbulence, with telescopic handle and stand. Fulfills EN 13779 requirements	0628 0009

We recommend:	
ComSoft 3 - Professional with data management	0554 0830
RS232 cable	0409 0178
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
DKD calibration certificate/velocity, hot wire anemometer; calibration points 0.1; 0.2; 0.5; 0.8; 1 m/s	0520 0224
ISO calibration certificate velocity, hot wire, vane anemometer; calibration points 0.5; 0.8; 1; 1.5 m/s	0520 0024

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