

Multi-function VAC measuring instrument

testo 480 – Cutting-edge
technology for professionals

Measurement of all VAC-relevant parameters: flow velocity, temperature, humidity, pressure, light intensity, radiant heat, degree of turbulence, CO₂, PMV/PPD and WBGT index

High-quality, digital probes and intelligent calibration concept

Highly accurate, integrated differential pressure sensor

Fast and professional report creation via PC software „EasyClimate“

Integrated, guided measurement programs:

- VAC grid measurement according to EN 12599
 - PMV/PPD measurement according to ISO 7730
 - degree of turbulence measurement according to EN 13779
 - WBGT-measurement based on ISO 7243 / DIN 33403
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With the testo 480, you record, analyze and document all VAC-relevant parameters with only one instrument. The multi-function VAC measuring instrument stands out above all thanks to its accuracy and practice-oriented handling. testo 480 supports assessors, consultants, technical service providers or service technicians in the ventilation and air conditioning field. Measurement tasks such as the standardized adjustment of VAC systems in office, residential and industrial buildings can be carried out quickly and efficiently.

In addition to this, you test the relevant quality parameters for your production and processing systems reliably and precisely – thanks to the measuring instrument's comprehensive probe range specially tailored to industrial requirements.

The multi-function VAC measuring instrument is equipped with intelligent, digital probes which are calibrated independently of the hand-held instrument.

Technical data

testo 480

High-end VAC measuring instrument testo 480, including „EasyClimate“ PC software, power supply, USB cable and calibration protocol

Part no. 0563 4800



Comfort measurement

- High-end VAC measuring instrument testo 480 incl. PMV/PPD measurement (Part no. 0563 4800)
- Comfort probe for degree of turbulence measurement according to EN 13779 (Part no. 0628 0143)*
- Globe probe Ø 150mm, TC Type K, for measuring radiant heat (Part no. 0602 0743)
- IAQ probe for analyzing Indoor Air Quality, CO₂, humidity, temperature and absolute pressure measurement, incl. table tripod (Part no. 0632 1543)*
- Lux probe for measuring light intensity (Part no. 0635 0543)
- 2 x Plug-in head cable for digital probes (Part no. 0430 0100)
- Tripod for workplace evaluation (Part no. 0554 0743)
- System case for comfort level measurement (Part no. 0516 4801)

*Plug-in head cable required (order no. 0430 0100)

General technical data

Probe connection	2 x TC Type K, 1 x differential pressure, 3 x digital
Interfaces	USB connection, SD card, mains unit, infrared for fast printer
Operating temperature	0 to +40 °C
Storage temperature	-20 to +60 °C
Power supply	Rechargeable battery, plug-in mains unit for long-term measurements and charging battery
Battery life	approx. 17 hours (hand instrument without probes, with 50 % display brightness)
Display	Colour graphic display
Memory	1.8 GB (approx. 60.000.000 measurement values)

HVAC measurement












- High-end VAC measuring instrument testo 480 incl. PMV/PPD measurement (Part no. 0563 4800)
- Vane measurement probe Ø 16 mm with telescope (scaling max. 960 mm) and integrated measurement button (Part no. 0635 9542)*
- Thermal flow velocity probe (hot wire) Ø 10 mm, bendable by 90° (200 mm) with telescope (scaling max. 1100 mm) and integrated measurement button (Part no. 0635 1543)*
- Humidity and temperature probe Ø 12 mm, highly accurate humidity measurement with 1% accuracy (Part no. 0636 9743)*
- Vane measurement probe Ø 100 mm, for measurements on ventilation outlets (Part no. 0635 9343)*
- Plug-in head cable for digital probes (Part no. 0430 0100)
- System case for HVAC measurements (Part no. 0516 4800)

*Plug-in head cable required (order no. 0430 0100)

Technical data




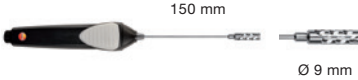




Sensor type	Differential pressure, integrated	Absolute pressure, integrated and external	Type K (NiCr-Ni)
Measuring range	-100 to +100 hPa	700 to 1100 hPa	-200 to +1370 °C
Accuracy ±1 digit	±(0.3 Pa +1% of m.v.) (0 to +25 hPa) ±(0.1 hPa + 1.5% of m.v.) (+25.001 to +100 hPa)	±3 hPa	±(0.3 °C +0.1% of m.v.)
Resolution	0.001 hPa	0.1 hPa	0.1 °C
Sensor type	Radiation temperature, globe	Pt100	Vane, 16 mm
Measuring range	0 to +120 °C	-100 to +400 °C	+0.6 to +50 m/s
Resolution	0.1 °C	0.01 °C	0.1 m/s
Sensor type	Vane, 100 mm	Hot wire, Hot bulb	Comfort probe
Measuring range	+0.1 to +15 m/s	0 to +20 m/s	0 to +5 m/s
Resolution	0.01 m/s	0.01 m/s	0.01 m/s
Sensor type	Testo humid. sensor, cap.	CO ₂	Lux
Measuring range	0 to 100 %RH	0 to 10000 ppm CO ₂	0 to 100000 Lux
Resolution	0.1 %RH	1 ppm CO ₂	1 Lux

Probes

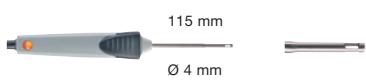
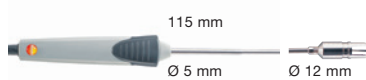
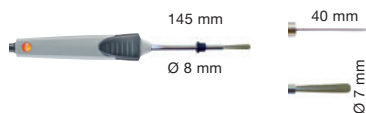

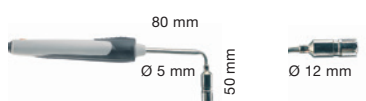
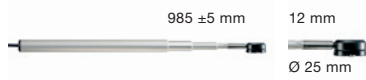

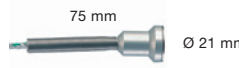
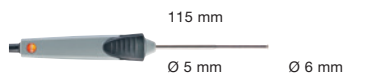
Probe type		Measuring range	Accuracy ± 1 digit	Part no.
Digital flow velocity probes				
Vane measurement probe \varnothing 16 mm with telescope (scaling max. 960 mm) and integrated measurement button*		0.6 to 50 m/s -10 to +70 °C	$\pm(0.2 \text{ m/s} + 1\% \text{ of m.v.})$ (0.6 to 40 m/s) $\pm(0.2 \text{ m/s} + 2\% \text{ of m.v.})$ (40.1 to 50 m/s) $\pm 1.8 \text{ }^\circ\text{C}$	0635 9542
High-temperature vane measurement probe \varnothing 16 mm with telescope (scaling max. 960 mm) and integrated measurement button*		0.6 to 50 m/s -30 to +140 °C	$\pm(0.2 \text{ m/s} + 1\% \text{ of m.v.})$ (0.6 to 40 m/s) $\pm(0.2 \text{ m/s} + 2\% \text{ of m.v.})$ (40.1 to 50 m/s) $\pm(2.5 \text{ }^\circ\text{C} + 0.8\% \text{ of m.v.})$	0635 9552
Thermal flow velocity probe (hot wire) \varnothing 10 mm, bendable by 90° (200 mm) with telescope (scaling max. 1100 mm) and integrated measurement button*		0 to +20 m/s -20 to +70 °C 0 to 100 %RH +700 to +1100 hPa	$\pm(0.03 \text{ m/s} + 4\% \text{ of m.v.})$ $\pm 0.5 \text{ }^\circ\text{C}$ $\pm(1.8 \text{ }^\circ\text{RH} + 0.7\% \text{ of m.v.})$ $\pm 3 \text{ hPa}$	0635 1543
Thermal flow velocity probe (hot wire) \varnothing 7.5 mm, with telescope (max. 820 mm) and fixed plug-in head cable		0 to +20 m/s -20 to +70 °C	$\pm(0.03 \text{ m/s} + 5\% \text{ of m.v.})$ $\pm 0.5 \text{ }^\circ\text{C}$	0635 1024
Thermal flow velocity probe (robust hot bulb) \varnothing 3 mm, with telescope, (max. 860 mm) and fixed plug-in head cable, for direction-independent flow velocity measurement		0 to +10 m/s -20 to +70 °C	$\pm(0.03 \text{ m/s} + 5\% \text{ of m.v.})$ $\pm 0.5 \text{ }^\circ\text{C}$	0635 1050
Vane measurement probe \varnothing 100 mm, for measurements on ventilation outlets*		+0.1 to +15 m/s 0 to +60 °C	$\pm(0.1 \text{ m/s} + 1.5\% \text{ of m.v.})$ $\pm 0.5 \text{ }^\circ\text{C}$	0635 9343
Thermal flow velocity probe (hot wire) \varnothing 10 mm, with telescope, (max. 730 mm) and fixed plug-in head cable, for the measurement of air flow velocity in laboratory extractors according to EN 14175-3/-4		0 to +5 m/s 0 to +50 °C	$\pm(0.02 \text{ m/s} + 5\% \text{ of m.v.})$ $\pm 0.5 \text{ }^\circ\text{C}$	0635 1048
Digital comfort probes				
Humidity and temperature probe \varnothing 12 mm, highly accurate humidity measurement with 1% accuracy*		0 to 100 %RH -20 to +70 °C	$\pm(1.0 \text{ }^\circ\text{RH} + 0.7\% \text{ of m.v.})$ 0 to 90 %RH $\pm(1.4 \text{ }^\circ\text{RH} + 0.7\% \text{ of m.v.})$ 90 to 100 %RH $\pm 0.2 \text{ }^\circ\text{C}$ (+15 to +30 °C) $\pm 0.5 \text{ }^\circ\text{C}$ (remaining range)	0636 9743
IAQ probe for analyzing Indoor Air Quality, CO ₂ , humidity, temperature and absolute pressure measurement, incl. table tripod*		0 to +50 °C 0 to 100 %RH 0 to +10000 ppm CO ₂ +700 to +1100 hPa	$\pm 0.5 \text{ }^\circ\text{C}$ $\pm(1.8 \text{ }^\circ\text{RH} + 0.7\% \text{ of m.v.})$ $\pm(75 \text{ ppm CO}_2 + 3\% \text{ of m.v.})$ 0 to +5000 ppm CO ₂ $\pm(150 \text{ ppm CO}_2 + 5\% \text{ of m.v.})$ 5001 to +10000 ppm CO ₂ $\pm 3 \text{ hPa}$	0632 1543
Comfort probe for degree of turbulence measurement according to EN 13779*		0 to +50 °C 0 to +5 m/s +700 to +1100 hPa	$\pm 0.5 \text{ }^\circ\text{C}$ $\pm(0.03 \text{ m/s} + 4\% \text{ of m.v.})$ $\pm 3 \text{ hPa}$	0628 0143
Globe probe \varnothing 150mm, TC Type K, for measuring radiant heat		0 to +120 °C	Class 1	0602 0743

*Plug-in head cable required (order no. 0430 0100)

Probes

Probe type	Dimensions Probe shaft/probe shaft tip	Measuring range	Accuracy	t ₉₉	Part no.
Digital comfort probes					
Lux probe for measuring light intensity		0 to +100000 Lux	Class C according to DIN 5032-7; f1 = 6% V-Lambda; f2 = 5% cos		0635 0543
WBGT set (Wet Bulb Globe Temperature) for the evaluation of heat workplaces affected by heat, based on ISO 7243 / DIN 33403-3, consisting of globe, ambient temperature and wet bulb temperature probes, plug-in head cables, tripod and case		0 to +120 °C +10 to +60 °C +5 to +40 °C	Class 1 ±(0.25 °C +0.3% of m.v.) ±(0.25 °C +0.3% of m.v.)		0635 8888 ID no. 0699 6920/1
Digital humidity probe					
Robust humidity probe		0 to 100 %RH -20 to +180 °C	±3 %RH (0 to 2 %RH) ±2 %RH (2.1 to 98 %RH) ±3 %RH (98.1 to 100 %RH) ±0.5 °C (-20 to 0 °C) ±0.4 °C (0.1 to +50 °C) ±0.5 °C (+50.1 to +180 °C)		0636 9753
Do not use in condensing atmosphere. For continuous use in high-humidity ranges >80 %RH at ≤30 °C for > 12 h >60 %RH at >30 °C for > 12 h please refer to Testo customer service or contact us via the Testo website.					
Digital temperature probe					
Digital precision air probe, Pt100, Plug-in head cable required (Order no. 0430 0100)	 150 mm Ø 9 mm	-100 to +400 °C	±(0.15 °C + 0.2 % of m.v.) (-100 to -0.01 °C) ±(0.15 °C + 0.05 % of m.v.) (0 to +100 °C) ±(0.15 °C + 0.2 % of m.v.) (+100.01 to +350 °C) ±(0.5 °C + 0.5 % of m.v.) (+350.01 to +400 °C)		0614 0072
Fast-reaction digital surface probe with sprung thermocouple Type K, short-term up to +500 °C, Plug-in head cable required (Order no. 0430 0100)	 150 mm Ø 10 mm	-200 to +300 °C	±(2.5 °C + 0.8 % of m.v.) (-40 to +300 °C) Remaining range (-200 to -40.1 °C) is not specified		0614 0195
Highly precise digital immersion/penetration probe, Pt100, Plug-in head cable required (Order no. 0430 0100)	 295 mm Ø 4 mm	-80 to +300 °C	±(0.3 °C (-80 to -40.001 °C) ±(0.1 °C + 0.05 % of m.v.) (-40 to -0.001 °C) ±(0.05 °C (0 to +100 °C) ±(0.05 °C + 0.05 % of m.v.) (+100.001 to +300 °C)		0614 0275
Flexible digital precision penetration probe, PTFE cable heat-proof to +300 °C, Plug-in head cable required (Order no. 0430 0100)	 1000 mm Ø 4 mm	-100 to +265 °C	±(0.30 °C + 0.3 % of m.v.) (-100 to -50.01 °C) ±(0.15 °C + 0.2 % of m.v.) (-50 to -0.01 °C) ±(0.15 °C + 0.05 % of m.v.) (0 to +100 °C) ±(0.15 °C + 0.5 % of m.v.) (+100.01 to +265 °C)		0614 0071
High-precision Pt100 immersion and penetration probe, Plug-in head cable required (order no. 0430 0100)	 200 mm Ø 3 mm	-100 to +400 °C	±(0.15 °C + 0.2% of m.v.) (-100 to -0.01 °C) ±(0.15 °C + 0.05% of m.v.) (0 to +100 °C) ±(0.15 °C + 0.2% of m.v.) (+100.01 to +350 °C) ±(0.5 °C + 0.5% of m.v.) (+350.01 to +400 °C)		0614 0073
Special versions of the Pt100 probe on request (e.g. as a surface probe or air probe, probe shaft extended, strengthened)					
Adapter cable for connecting analog Pt100 probe to testo 480					

Probes



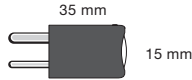


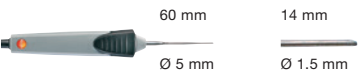



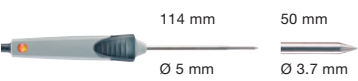


Probe type	Dimensions Probe shaft/probe shaft tip	Measuring range	Accuracy	t ₉₉	Part no.
Analog temperature probe					
Robust air probe, T/C Type K, Fixed cable		-60 to +400 °C	Class 2 ¹⁾	200 s	0602 1793
Fast-action surface probe with sprung thermocouple strip, also for uneven surfaces, measurement range short-term to +500°C, TC Type K, Fixed cable		-60 to +300 °C	Class 2 ¹⁾	3 s	0602 0393
Fast-reaction paddle surface probe, for measurements in inaccessible places, e.g. narrow apertures and slots, TC Type K, Fixed cable		0 to +300 °C	Class 2 ¹⁾	5 s	0602 0193
Efficient, waterproof surface probe with small measurement head for flat surfaces, TC Type K, Fixed cable		-60 to +1000 °C	Class 1 ¹⁾	20 s	0602 0693
Fast-action surface probe with sprung thermocouple strip, bent, also for uneven surfaces, measurement range short-term to +500°C, TC Type K, Fixed cable		-60 to +300 °C	Class 2 ¹⁾	3 s	0602 0993
Flat head surface probe with telescopic handle max. 680 mm for measurements at hard-to-access points, TC Type K, Fixed cable 1.6 m (correspondingly shorter when telescope extended)		-50 to +250 °C	Class 2 ¹⁾	3 s	0602 2394
Magnetic probe, adhesive force approx. 20 N, with magnets, for measurements on metal surfaces, TC Type K, Fixed cable		-50 to +170 °C	Class 2 ¹⁾	150 s	0602 4792
Magnetic probe, adhesive force approx. 10 N, with magnets, for higher temp., for measurements on metal surfaces, TC Type K, Fixed cable		-50 to +400 °C	Class 2 ¹⁾		0602 4892
Waterproof surface probe with widened measurement tip for flat surfaces, T/C Type K, Fixed cable		-60 to +400 °C	Class 2 ¹⁾	30 s	0602 1993

¹⁾ 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). A probe always corresponds to only one accuracy class.

Information on surface measurement:




- The response times t₉₉ stated are measured on ground steel or aluminium plates at +60 °C.
- The stated accuracies are sensor accuracies.
- The accuracy in your application is dependent on the surface structure (roughness), material of the measurement object (heat capacity and heat transfer), as well as sensor accuracy. Testo creates a corresponding calibration certificate for the deviations of your measurement system in your application. For this purpose, Testo uses a surface test bench developed in cooperation with the PTB (Physikalisch Technische Bundesanstalt).

Probes

Probe type	Dimensions Probe shaft/probe shaft tip	Measuring range	Accuracy	t ₉₉	Part no.
Analog temperature probe					
Pipe wrap probe with velcro strip; for temperature measurement on pipes with diameter up to max. 120 mm; Tmax. +120 °C; TC Type K, Fixed cable		-50 to +120 °C	Class 1 ¹⁾	90 s	0628 0020
Pipe wrap probe for pipe diameter 5 to 65 mm, with exchangeable measuring head. Meas. range short-term up to +280 °C, TC Type K, Fixed cable		-60 to +130 °C	Class 2 ¹⁾	5 s	0602 4592
Spare meas. head for pipe wrap probe, TC Type K		-60 to +130 °C	Class 2 ¹⁾	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, Fixed cable		-50 to +100 °C	Class 2 ¹⁾	5 s	0602 4692
Efficient and fast-action immersion probe, waterproof, TC Type K, Fixed cable		-60 to +1000 °C	Class 1 ¹⁾	2 s	0602 0593
Fast-action, waterproof immersion/penetration probe, TC Type K, Fixed cable		-60 to +800 °C	Class 1 ¹⁾	3 s	0602 2693
Immersion tip, flexible, TC Type K		-200 to +1000 °C	Class 1 ¹⁾	5 s	0602 5792
Immersion tip, flexible, TC Type K		-200 to +40 °C	Class 3 ¹⁾	5 s	0602 5793
Immersion measurement tip, flexible, for measurements in air/exhaust gases (not suitable for measurements in smelters), TC Type K		-200 to +1300 °C	Class 1 ¹⁾	4 s	0602 5693
Waterproof immersion/penetration probe, TC Type K, Fixed cable		-60 to +400 °C	Class 2 ¹⁾	7 s	0602 1293
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, 2 m, FEP insulated thermal wire, temperature proof up to 200 °C, oval wire with dimensions: 2.2 mm x 1.4 mm		-200 to +1000 °C	Class 1 ¹⁾	1 s	0602 0493
Waterproof food probe made of stainless steel (IP65), TC Type K, Fixed cable		-60 to +400 °C	Class 2 ¹⁾	7 s	0602 2292

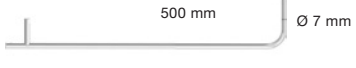
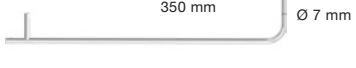
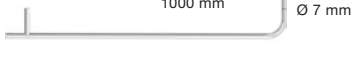
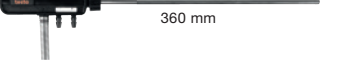


¹⁾ According to standard EN 60584-2, the accuracy of Class 1 refers to -40 to +1000 °C (Type K), Class 2 to -40 to +1200 °C (Type K), Class 3 to -200 to +40 °C (Type K). A probe always corresponds to only one accuracy class.

Probes

Probe type	Dimensions Probe shaft/probe shaft tip	Measuring range	Accuracy	t ₉₉	Part no.
Thermocouples					
Thermocouple with TC adapter, flexible, 800 mm long, fibre glass, TC Type K		-50 to +400 °C	Class 2 ¹⁾	5 s	0602 0644
Thermocouple with TC adapter, flexible, length 1500 mm, fibreglass, TC Type K		-50 to +400 °C	Class 2 ¹⁾	5 s	0602 0645
Thermocouple with TC adapter, flexible, 1500 mm long, PTFE, TC Type K		-50 to +250 °C	Class 2 ¹⁾	5 s	0602 0646

¹⁾ 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). A probe always corresponds to only one accuracy class.

Pitot tubes

Pitot tube, 500 mm long, Ø 7 mm, stainless steel, for measuring flow velocity*		Measuring range: 1 to 100 m/s Operating temperature: 0 to +600 °C Pitot tube factor: 1.0	0635 2045
Pitot tube, 350 mm long, Ø 7 mm, stainless steel, for measuring flow velocity*		Measuring range: 1 to 100 m/s Operating temperature: 0 to +600 °C Pitot tube factor: 1.0	0635 2145
Pitot tube, 1000 mm long, stainless steel, for measuring flow velocity*		Measuring range: 1 to 100 m/s Operating temperature: 0 to +600 °C Pitot tube factor: 1.0	0635 2345
Straight pitot tube with integrated temperature measurement, incl. connection hose, length 360 mm		Measuring range: 1 to 30 m/s Operating temperature: 0 to +600 °C Pitot tube factor: 0.67 Minimum immersion depth: 150 mm	0635 2043
Straight pitot tube with integrated temperature measurement, incl. connection hose, length 500 mm		Measuring range: 1 to 30 m/s Operating temperature: 0 to +600 °C Pitot tube factor: 0.67 Minimum immersion depth: 150 mm	0635 2143
Straight pitot tube with integrated temperature measurement, incl. connection hose, length 1000 mm		Measuring range: 1 to 30 m/s Operating temperature: 0 to +600 °C Pitot tube factor: 0.67 Minimum immersion depth: 150 mm	0635 2243

*Connection hose required (order no. 0554 0440) or (order no. 0554 0453)

Accessories

Accessories for measuring instrument	Part no.	
Telescope for digital probes, with ball joint and probe bracket, length 1.8 m. Use 5 m plug-in head cable (order no. 0430 0101).	0430 0946	
Tripod for workplace evaluation With holders for hand-held instrument and probe. Can also be used as telescope extension	0554 0743	
Plug-in head cable for digital probes	0430 0100	
Plug-in head cable for digital probes, length 5 m	0430 0101	
testovent 417 funnel set for plate outlets (Ø 200 mm) and funnel for ventilator (330 x 330 mm) for ingoing and outgoing air	0563 4170	
Flow straightener testovent 417	0554 4172	
Control and adjustment set for Testo humidity probes, salt solution with 11.3% RH and 75.3% RH, incl. adapter for Testo humidity probes	0554 0660	
Connection hose; silicone; length 5 m; max. load 700 hPa (mbar)	0554 0440	
Connection hose silicone-free for differential pressure measurement, length 5 m, load up to maximum 700 hPa, (mbar)	0554 0453	
Transport and Protection		
Soft case testo 480 incl. carrying strap	0516 0481	
System case for comfort level measurement For instrument, probes and other accessories	0516 4801	
System case for HVAC measurements, For instrument, probes and other accessories	0516 4800	
Printer and Accessories		
Testo fast printer IrDA with wireless infrared interface; 1 roll thermal paper; 4 AA batteries for printing out measurements on site	0554 0549	
Spare thermal paper for printer (6 rolls), permanent ink, measurement data documentation legible for up to 10 years	0554 0568	
Calibration Certificates		
ISO calibration certificate/temperature for air/immersion probes, calibration points -18°C; 0°C; +60°C	0520 0001	
DAkkS calibration certificate/temperature; meas. instr. with air/immersion probe; calibration points -20 °C; 0 °C; +60 °C	0520 0211	
ISO calibration certificate humidity; Calibration points 11.3 %RH and 75.3 %RH at +25 °C	0520 0006	
DAkkS calibration certificate/humidity; electronic hygrometers; calibration points 11.3%RH and 75.3%RH at +25°C	0520 0206	
ISO calibration certificate pressure; accuracy 0.1 to 0.6 (% of fsv), 5 points distributed over meas. range	0520 0025	
ISO calibration certificate pressure; accuracy > 0.6 (% of fsv)	0520 0005	
ISO calibration certificate 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/light; Calibration points 0; 500; 1000; 2000; 4000 Lux	0520 0010	
ISO calibration certificate/CO ₂ ; CO ₂ probes; calibration points 0; 1000; 5000 ppm	0520 0033	
More calibration certificates on request		

