testo

testo 350 M/XL, Portable flue gas analysis system

Good advice IS possible!

Axel Rieple,
Head Sales Manager Germany

Highly qualified personnel is needed to provide it. Understanding, a little creativity, time to listen and accessibility when the matter is urgent are also necessary.

Our qualified personnel would be delighted to answer your questions. They are there when you need them. Good to know when the situation requires.

All of the above elements ensure that we can provide you with the highly qualified advice which is our standard.

Our experience has shown that it is needed and appreciated. Qualified advice provides you with the assurance you need to make the right decisions, particularly in the case of complicated measurement tasks.

Fast-action and user-friendly measurement cell exchange by the user on site
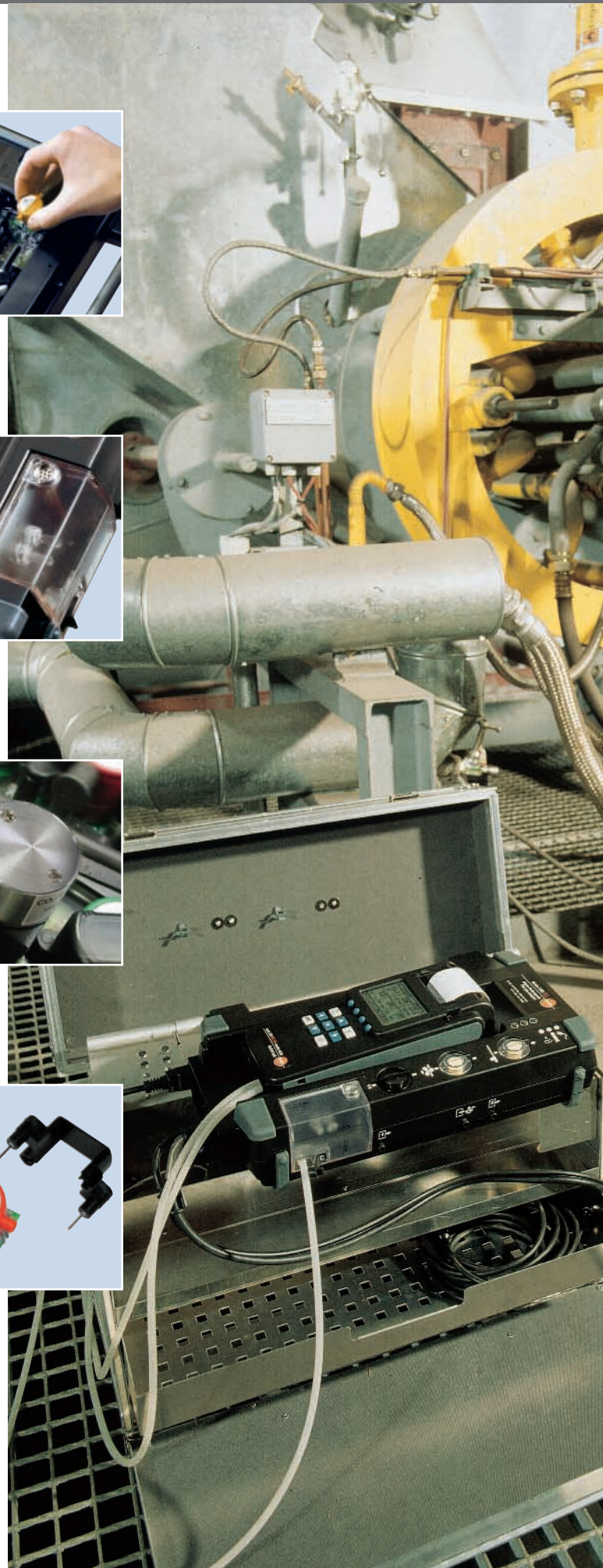
Condensate trap – Integrated Peltier gas preparation with hose pump for condensate disposal for long-term measurement lasting several hours

Infrared (NDIR) measurement module for direct CO_2 measurement

Measurement cell heating element – Protects from damage by condensate and increases sensor reaction times at low ambient temperatures

Flexible flue gas analysis system testo 350 M/XL

testo 350

testo 350 is a flexible portable measuring system. The measuring system basically consists of a control unit, an analyser box and a flue gas probe.

The detachable **control unit** can control the measuring system and read out data. Additionally, it can also be used as a separate hand-held instrument for measuring differential pressure (built-in) and also for temperature, humidity, flow etc. thanks to its additional probe socket. The readings are printed on the built-in printer.

The **analyser box** is the "heart" of the measuring system and is available in two different versions:

• Basic design testo 350 M

• Advanced design testo 350 XL.

testo 350 M can be equipped with **up to maximum 4 measurement modules**. Measurement modules are equipped for O_2 and CO by default. In addition, measurement modules for NO (optional), NO_2 (optional), SO_2 (optional) or CO_2 can be retrofitted with the infrared measurement module (optional). Standard parameters such as Δ, qA, etc. are calculated while temperature and differential pressure are also measured.

The more advanced **testo 350 XL** can be fitted with **up to maximum 6 measurement modules**.
Measurement modules for O_2, CO,

NO and NO_2 are fitted as standard. In addition, measurement modules for HC (optional), SO_2 (optional), H_2S (optional) or CO_2 can be selected via the infrared measurement module (optional). In addition to the features of the M version, the testo 350 XL analyser box also has a fresh air valve for long-term measurements lasting several hours.

Both versions of the analyser boxes include a built-in rechargeable battery (for battery operation, also with gas preparation unit of up to 2-3h), data memory (250,000 readings), Testo data bus adapter as well as a complete Peltier gas preparation unit with hose pump for controlled condensate disposal.

• Measuring range extension (optional) for CO with selectable dilution factors

• Extremely high accuracies in the lower range for CO and NO on account of special gas sensors

• Use as single instrument – user-friendly operation on account of low weight (approx. 4.5 kg) and compact size facilitates applications at difficult-to-access points

• Use of several analyser boxes in a bus system – enables simultaneous measurement of several parameters at different measurement locations

• Infrared measurement module with wide measurement range – for accurate CO_2 direct measurement independent of fuel

Control unit for display and control, incl. printer, touchscreen (optional)

Analyser box with built-in measurement modules and measurement engineering

User-friendly and convenient measurement on motors for monitoring and adjustment on site

testo 350, control unit

Control unit displays measurement data and controls the measuring system, incl. built-in printer, pressure measurement 80/200 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

testo 350 M analyser box

testo 350 M analyser box, with O2, CO (with switch-off and rinse functions), gas preparation, diff. pressure meas., 2 temperature probe sockets, can be upgraded to max. 4 measurement modules (with NO/NO_2/SO_2/CO_2 NDIR), Testo data bus connection, built-in rech. batt., data memory
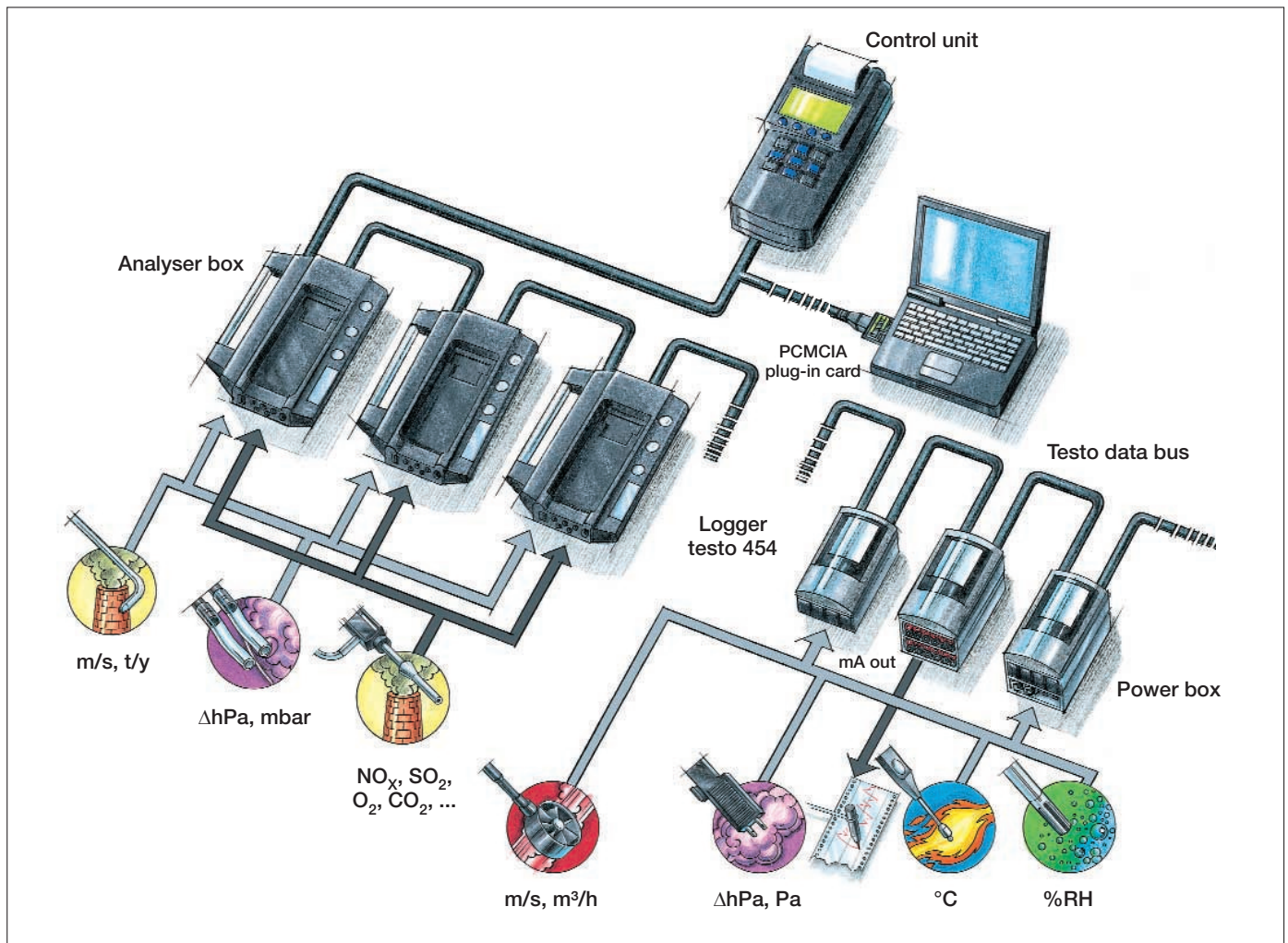
Part no.   0563 0351

testo 350 XL analyser box

testo 350 XL analyser box, equipped with O_2, CO (with switch-off and rinse function), NO, NO_2, differential pressure measurement, 2 temperature probe sockets, gas preparation, Testo data bus adapter, automatic fresh air rinse with valve, built-in rechargeable battery, data memory, can be upgraded to max. 6 measurement modules (with H_2S, HC, SO_2, CO_2 NDIR)

Part no.   0563 0350

Differences between analyser boxes at a glance

		testo 350 M	testo 350 XL
Maximum number of measurement modules		4	6
O_2	0 – 25 vol.%	■	■
CO (H2)	0 – 10,000 ppm	■	■
CO_{low} (H2)	0 – 500 ppm	○	○
NO	0 – 3,000 ppm (0.1 ppm resolution)	○	■
NO_{low}	0 – 300 ppm (0.1 ppm resolution)	○	○
NO_2	0 – 500 ppm (0.1 ppm resolution)	○	■
SO_2	0 – 5,000 ppm	○	○
HC	0 – 4 vol. % (0.001 % resolution)	–	○
H_2S	0 – 300 ppm (0.1 ppm resolution)	–	○
CO_2 (NDIR)	0 – 50 Vol. %	○	○
Built-in gas preparation unit		■	■
Automatic fresh air rinse with valve		○	■
Measuring range extension for CO meas. module (with selectable dilution factors)		○	○
CO measurement module switch-off and rinse (automatic overload protection)		■	■
Trigger inlet – to start and stop measurement externally		–	○
Differential pressure measurement (-40 to +40 hPa)		■	■
Built-in rechargeable battery		■	■
2 temperature probe sockets (Type K NiCr-Ni)		■	■
Data memory (250,000 readings)		■	■
Testo data bus adapter		■	■

■ = Standard   ○ = Upgrade optional   – = Not possible

Measurement system

Control unit

Analyser box

PCMCIA
plug-in card

Testo data bus

Logger
testo 454

mA out

Power box

m/s, t/y

ΔhPa, mbar

NO_X, SO_2,
O_2, CO_2, ...

m/s, m³/h

ΔhPa, Pa

°C

%RH

The testo 350 M/XL system concept

For many applications in the industrial sector, an analyser with additional features is needed to fulfill the following requirements:
• Simultaneous gas and process analysis at different measurement points without a time-consuming measurement point changeover switch
• Option of connecting additional parameters such as °C; %RH; mA/mV etc.
• Long-term measurements in order to be able to assess different system cycles
• Flexibility of system in order to be able to react to the different requirements of the different systems. The testo 350 M/XL measurement system fulfills these requirements. Several analyser boxes, equipped differently or up 10 loggers are connected

together via the Testo data bus, over distances up to max. 1000m.
If several analyser boxes, for example, are connected to the Testo data bus, they can be controlled, read out or programmed via the following:
• **One analyser box after the other** via the Control Unit, for example, or via the PC and an RS 232 cable
Alternatively:
• **Several analyser boxes simultaneously** via the PC and a PCMCIA insert card.

Parameters

Parameters which can be measured using **testo 350 M/XL**:
a) testo 350 M/XL analyser box
• Flue gas parameters such as O_2, CO, NO_x, SO_2, H_2S, HC, CO_2(IR)

• Differential pressure, e.g. for combustion chamber pressure measurement
• Flow measurement with Pitot tube
The analyser boxes are positioned at the respective measurement point. They are operated either connected to each other via the Testo data bus or as a separate datalogger without being connected. Separate measurement programs are saved in the analyser box e.g. measurement cycles, fresh air phases etc. **testo 350 M** and **XL** and also boxes equipped differently can be used. Likewise loggers and analog outputs (6 ducts, 4-20mA) can be connected in this way.

b) Logger box
• Temperature, e.g. of surfaces, liquids

• Humidity, e.g. in suction ducts or ambient air
• Pressure, e.g. with differential pressure and high pressure probes
• Flow and volume flow, e.g. with vanes, hot wire probes
• rpm etc.

Standard gas sampling probes

The probe has to endure extreme conditions when measuring flue gases:

• High temperatures

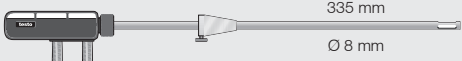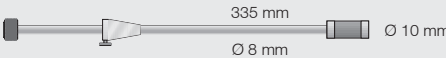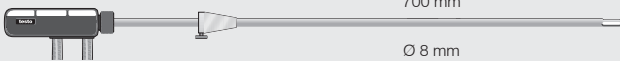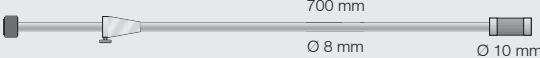• Corrosive condensate

• Dust

• Mechanical loads.

The selection of the right probe is critical for accurate and consistent measurements. Because the sampling locations are often different, it's beneficial to have a standard probe designed for a wide variety of applications. In addition to the standard sampling probes, Testo also offers probe systems for specific industrial applications.

Standard gas sampling probes

The affordable standard sampling probe is available in lengths of 335 mm and 700 mm and for different temperature ranges. The outer shaft with a sintered filter is used for dusty flue gases. The hose has a standard length of 2.2 m (5 m, optional).

Standard gas sampling probes, available in lengths of 335 mm and 700 mm

Standard flue gas sampling probe, 335 mm long		Part no.
Basic flue gas probe, 335 mm immersion depth incl. probe stop, NiCr-Ni (TI) T/C Tmax 500°C, probe shaft: stainless steel 1.4361, 2.2 m hose, robust plug-in coupling	335 mm Ø 8 mm	0600 7451
Options: Outer shaft with filter, Tmax. +800 °C, 335 mm long, for dusty flue gases, 3 µm pore size, probe shaft stainless steel 1.4841	335 mm Ø 8 mm Ø 10 mm	0440 7435
or: Heat-resistant probe shaft (material: stainless steel 1.4841) with heat-resistant plate, 335 mm long, Tmax + 1000 °C		0440 7437
Hose, 5 m long		0440 7443
Special hose for NO2/SO2 measurements, 2.2 m long*		0440 7442
Special hose for NO2/SO2 measurements, 5 m long*		0440 7445

Standard gas sampling probe, 700 mm long		Part no.
Basic flue gas probe, 700 mm immersion depth incl. probe stop, NiCr-Ni (TI) T/C Tmax 500°C, probe shaft: stainless steel 1.4361, 2.2 m hose, robust plug-in coupling	700 mm Ø 8 mm	0600 7452
Options: Outer shaft with filter, Tmax. +800°C, 700mm long, for dusty flue gases, 3 µm pore size, probe shaft: stainless steel 1.4841	700 mm Ø 8 mm Ø 10 mm	0440 7436
or: Heat-resistant probe shaft (material: stainless steel 1.4841) with heat-resistant plate, 700 mm long, Tmax +1000 °C		0440 7438
Hose, 5 m long		0440 7444
Special hose for NO2/SO2 measurements, 2.2 m long*		0440 7442
Special hose for NO2/SO2 measurements, 5 m long*		0440 7446
* Use outer shaft with filter for dusty flue gases.		

Industrial gas sampling probes – Modular system

We are dealing here with a modular, portable probe system. The basis for the system is the heated handle or the non-heated adapter to which the sampling hoses are connected.

A thermocouple, which is connected to the testo 350 M/XL, is used for simultaneous temperature measurements. The probe can be adapted for larger flue gas ducts using extension pipes (up to max. 3m). A preliminary filter is screwed on to protect the probe in dusty gases.

The heated probe is used for moist flue gases to eliminate absorption of NO2 and SO2. The probes are attached to the flue gas duct using the mounting flange.
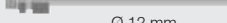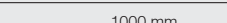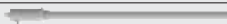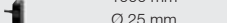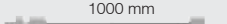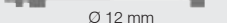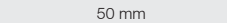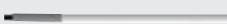
The heated probe is used for moist flue gases to eliminate incorrect readings caused by the absorption of NO2 and SO2. The probes are attached quickly and securely to the flue gas duct using the mounting flange.

Non-heated probe pipes are used for flue gases up to 1200 °C. The non-heated adapter can be used instead of a heated handle to measure O_2, CO and NO or dry flue gases.
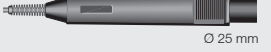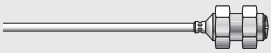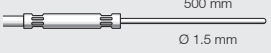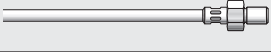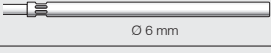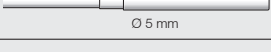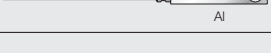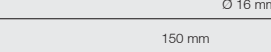
Ceramic sampling pipes which can withstand the enormous thermal load are used for measurements at more than 1200 °C.
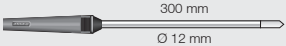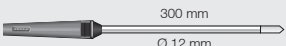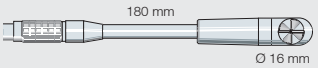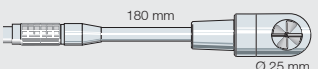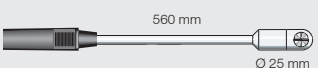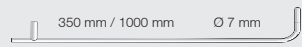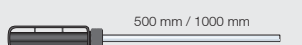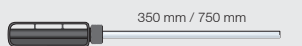
Industrial gas sampling probes, a modular probe system suitable for every application

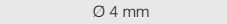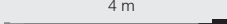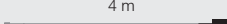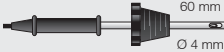| Industrial gas sampling probes – Modular system			Part no.
Heated handle, power supply 115 to 230 V, 50/60 Hz		Power consumption: 200 watts; Temp. gas path: > 180 °C; Ready to operate: after approx. 20 min; Length of mains cable: 3 m; Protection class: IP54; Ambient temp.: -20 to +50 °C; gas inlet: G1/4"; gas outlet: M 10x1 outer thread; weight: 1.7 kg	0600 7920
Adapter, non-heated		Ambient temp.: -20 to +50 °C; Protection class: IP54; Gas inlet: G1/4"; Gas outlet: M 10x1 outer thread; Weight: 0,4 kg	0600 7911
Non-heated sampling pipe to +600 °C, stainless steel 1.4571	1000 mm Ø 12 mm	Connection: G1/4"; Weight: 0.4 kg	0600 7801
Non-heated sampling pipe to +1200 °C, Inconel 625			0600 7803
Non-heated sampling pipe to +1800 °C, Al-Oxide	1000 mm Ø 12 mm	Connection: G1/4"; Weight: 0.4 kg	0600 7805
Heated sampling pipe, power supply 230 V / 50 Hz, stainless steel 1.4571	1000 mm Ø 25 mm	Heating: > +180 °C; power consumption: 650 watts; Connection: electr. connection to heated handle, connection adapter with thread connection/screw socket G1/4"; Max. flue gas temp.: +600 °C	0600 7820
Heated sampling pipe, power supply 115 V / 60 Hz, stainless steel 1.4571			0600 7821
Extension pipe to +600 °C, stainless steel 1.4571	1000 mm Ø 12 mm	Connection: Thread screw/screw socket G1/4"; Weight: 0.45 kg	0600 7802
Extension pipe to +1200 °C, Inconel 625			0600 7804
Preliminary filter for dusty flue gases, ceramic	50 mm Ø 20 mm	Dust load: max. 20 g / m3; filter fineness: 20 µm; Temperature: max. 1000 °C; Material: ceramic; Connection: G1/4" thread nipple; Weight: 0.2 kg	0554 0710
Thermocouple, NiCr-Ni, -200 to +1000 °C, Inconel 625, 1.2 m long	Ø 4 mm	Connection: To analyser via 4 m connection cable with 8 pin plug; Weight: 0.15 kg. The length depends on the number of sampling and extension pipes used.	0430 0065
Thermocouple, NiCr-Ni, -200 to +1000 °C, Inconel 625, 2.2 m long			0430 0066
Thermocouple, NiCr-Ni, -200 to +1000 °C, Inconel 625, 3.2 m long			0430 0067
Standard sampling hose for connection to the testo 350 M/XL analyser, 1 x Viton hose with robust plug	4 m	Weight: 0.4 kg	0554 3382
Special sampling hose for accurate NO2/SO2 measurements, for connection to testo 350 M/XL, patented 1x hose with robust plug	4 m	Hose material inside: PFFE hose with 2 mm inner diameter (lowest absorption, self-cleaning effect); Material outside: rubber; length: 4.0 m; Weight: 0.45 kg	0554 3384
Mounting flange, stainless steel 1.4571, adjustable quick-action fitting suitable for all sampling/extension pipes	130 mm Ø 160 mm		0554 0760

Cases	Part no.
Transport case for industrial probes, aluminium, Space for: handle, probes, flange and accessories, dimensions: 1270 x 320 x 140 mm	0516 7900

Suitable probes for control unit or testo 454 logger

Temperature probes	Illustration	Meas. range	Accuracy	t_{99}	Conn.	Part no.
Ambient air probe, 300 mm immersion depth, with probe stop for separate measurement of ambient air temperature (e.g. systems with outside primary air intakes)	300 mm / Ø 5 mm	0 to +100 °C		30 s		0600 9791
Mini ambient air probe, 60 mm immersion depth, w. probe stop, magnetic clip, Tmax +100°C, for dual wall clearance temp. meas. in systems w. outside primary air intakes	60 mm / Ø 4 mm	0 to +100 °C		30 s		0600 9797
Mini ambient air probe, Tmax +80°C, for separate ambient air temperature measurement		0 to +80 °C				0600 3692
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	Fixed cable	0600 4593
Spare meas. head for pipe wrap probe						0602 0092
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	3 s	Plug-in head. connection cable 0430 0143 or 0430 0145 required	0604 0194
Adapter to connect NiCr-Ni thermocouples and probes with open wire ends					Fixed cable	0600 1693

More probes	Illustration	Meas. range	t_{90}	Other features	Part no.
Gas leak detection probe to detect leaks in gas heating systems	200 mm / Ø 20 mm	0 to +10000 ppm CH_4	2 s	1st alarm limit: 200 ppm CH4 2nd alarm limit: 10,000 ppm CH4 Alarm: optical display (LED) and audible signal (buzzer) triggered if alarm limit is exceeded	0632 1246
Ambient CO probe to measure CO level in ambient air	190 mm / Ø 25 mm	0 to +500 ppm CO	35 s		0632 1247
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		$\pm$(50 ppm CO_2 $\pm$2% of mv)(0 to +5000 ppm CO_2) $\pm$(100 ppm CO_2 $\pm$3% of mv)(+5001 to +10000 ppm CO_2)	0632 1240
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
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		Plug-in head. connection cable 0430 0143 or 0430 0145 required	0640 0340

Stationary probes	Illustration	Meas. range	Accuracy	t_{99}	Part no.
Robust, quick-action surface probe, NiCr-Ni, with M14 x 1.5 thread, incl. 2 nuts for mounting, 2 m cable (silicone)		-50 to +180 °C	Class 2	3 s	0628 6021
Universal probe, NiCr-Ni, for measurements in liquids and gases, 2 m cable (PVC), IP 42 connection socket	500 mm / Ø 1.5 mm / Inconel	-200 to +1100 °C	Class 1	2 s	0628 6004
Screw-in probe, Pt100, for measurements at hard-to-access points, M 6 thread, 2 m cable (PVC)	SW 13 / 1.4305	-10 to +80 °C	Class A	70 s	0628 6014
Immersion probe, Pt100, for measurements in water and unclean environments, 2 m cable (silicone)	100 mm / Ø 6 mm / 1.4571	-50 to +180 °C	Class A	70 s	0628 6003
Immersion probe, Pt100, for measurements in corrosive substances, 2 m cable (PTFE), IP 67	60 mm / Ø 5 mm / PFA	-50 to +260 °C	Class A	50 s	0628 6008
Resistance thermometer, Pt100, for surface measurement, 2 m cable (silicone), IP 65	40 mm / 8x8 mm / Al	-30 to +180 °C	Class A	150 s	0628 6016
Universal probe, Pt100, for measurements in liquids and gases, 2m cable (PVC), IP 42	200 mm / Ø 3 mm / 1.4571	-50 to +400 °C	Class A	15 s	0628 6044
Vane probe, Ø 16 mm, for stationary assembly, 3 m cable (PVC)	250 mm / Ø 16 mm	+0.4 to +60 m/s	±(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

Suitable probes for control unit and testo 454 logger

Humidity probes	Illustration	Meas. range	Accuracy	t_{90}	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 **Conn.:** 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	300 mm Ø 12 mm	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 **Conn.:** Plug-in head. connection cable 0430 0143 or 0430 0145 required
Robust high temperature/humidity probe up to +180°C	300 mm Ø 12 mm	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 **Conn.:** Plug-in head. connection cable 0430 0143 or 0430 0145 required

Velocity, pressure probes	Illustration	Meas. range	Accuracy	Part no.
Vane/temperature probe, Ø 16 mm, attachable to handle or telescopic handle	180 mm Ø 16 mm	+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 to +50 m/s)	0635 9540
Vane/temperature probe, Ø 25 mm, can be attached to handle or telescopic handle	180 mm Ø 25 mm	+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
High temperature vane probe, Ø 25 mm, with handle for continuous measurements up to +350°C	560 mm Ø 25 mm	+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
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 conjunction with Pitot tube)		0 to +100 Pa	±(0.3 Pa ±0.5% of mv)	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 conjunction with Pitot tube)		0 to +10 hPa	±0.03 hPa	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 conjunction with Pitot tube)		0 to +100 hPa	±0.5% of mv (+20 to +100 hPa) ±0.1 hPa (0 to +20 hPa)	0638 1547
Pitot tube, 350 mm long, stainless steel, measures flow speed [1]	350 mm / 1000 mm Ø 7 mm	Oper. temp. 0 to +600 °C		0635 2145
Pitot tube, 1000 mm long, stainless steel, measures flow speed [1]				0635 2345
Pitot tube, stainless steel, 500 mm long, measures flow speed with temperature [2]	500 mm / 1000 mm Ø 8 mm	-40 to +600 °C		0635 2140
Pitot tube, stainless steel, 1000 mm long, measures flow speed with temperature [2]				0635 2240
Pitot tube, stainless steel, 350 mm long, measures flow speed with temperature, 3 x hoses (5 m long) and heat protection plate [2]	350 mm / 750 mm Ø 8 mm	-40 to +1000 °C		0635 2041
Pitot tube, stainless steel, 750 mm long, measures flow speed with temperature, 3x hoses (5 m long) and heat protection plate [2]				0635 2042

1) Direct connection to control unit or analyser box possible, please also order hose connection set 0554 0315
2) Direct connection to control unit or analyser box possible

Accessories for stationary probes	Part no.
Wall holder with screw-in connection for vane probe, Ø 16mm	0628 0037
Clamp screw connection (steel) with M 8x1 thread, to attach temperature probes with Ø 3mm	0400 6163
Clamp screw connection (steel) with G 1/4" thread, to attach temperature probes with Ø 6mm	0400 6166

Accessories for velocity probes, pressure probes	Part no.
Professional telescopic handle for plug-in vane probes, max. 1 m long, extension on request	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
Magnetic holder for pressure probes	0554 0225
Hose connection set, incl. silicone hose and connection adapter, For separate gas pressure measurement	0554 0315
ISO calibration certificate/Pressure, 0.1 to 0.6 (% of fsv) 0 to 70 bar > 70 to 5000 bar	0520 0025
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; calibration points 0.5; 0.8; 1; 1.5 m/s	0520 0024
ISO calibration certificate velocity, hot wire, vane anemometer, Pitot tube; calibration points 5; 10; 15; 20 m/s	0520 0034

Accessories for temperature, humidity, CO2 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
Control and humidity adjustment set 11.3%RH/75.3%RH incl. adapter for humidity probes	0554 0660
Telescopic handle, 340 - 800mm long	0430 9715
ISO calibration certificate/Temperature, meas. instr. with surface probe; calibration points +60°C; +120°C; +180°C	0520 0071
ISO calibration certificate humidity, electronic hygrometers; calibration points 11.3 %RH and 75.3 %RH at +25°C	0520 0006
ISO calibration certificate/CO2, CO2 probes; calibration points 0; 1000; 5000 ppm	0520 0033

Accessories for testo 350

ComSoft 3, Operation and analysis software

ComSoft 3 software offers extensive options such as:
- Definition of measurement programs
- Tour plan
- Online measurement
- Analysis and graphics functions
- Analysis of measurement data
- Trend curve
- Documentation
- Filing

ComSoft 3 for data management

ComSoft 3 incl. PCMCIA insert card

For example, if several testo 350 M/XL analyser boxes are connected to the Testo databus, **several analyser boxes** can then be controlled and read out **simultaneously**.

ComSoft 3, Testo insert card PCMCIA incl. cable for Testo data bus, adapter and terminal plug

Part no.   0554 0590

Testo insert card PCMCIA incl. connection to Testo data bus cable

ComSoft 3 with RS232

For example, if several testo 350 M/XL analyser boxes are connected to the Testo data bus **only one single analyser box** respectively can then be controlled and read out on the PC.

ComSoft 3 with RS 232 cable to connect PC and control unit

Part no.   0554 0841

RS 232 connection cable

Analog output box (mA out)

Analog output boxes can be looped into the data bus to output the measurement data as an analog signal (4 – 20 mA). Each box has 6 user-defined channels which can be scaled according to application.

Part no.   0554 0845

Analog output box for output on an analog recorder or for control purposes

Touchscreen (optional)

Touchscreen incl. pen for easy and fast operation and input

Part no.   0440 0559

Optional measurement module equipment

NO_2, SO_2 options for flexible instrument combinations, take into consideration when ordering your first testo 350 M/XL. Subsequent measurement module upgrades can be carried out by the user using upgrade modules.

CO_2 infrared measurement module

Part no.   0440 0417

Protection hood and wall holder for analyser box

1 Protection hood protects from dirt and dust

Part no.   0554 0199

2 Wall holder for analyser box incl. heat protection plate, can be locked

Part no.   0554 0203
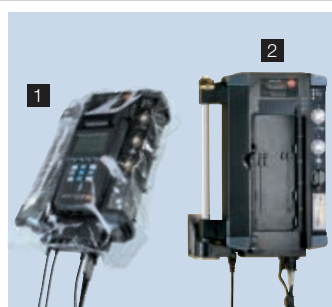
1   Protection hood
2   Wall holder

Cases

1 Transport case for analyser, probes and accessories

Part no.   0516 0351

2 System case (aluminium), for analyser, probes, incl. drawer for accessories

Part no.   0516 0352

1   Transport case
2   System case

Measurement System and Practical Accessories

testo 350, control unit	Part no.
Control unit displays measurement data and controls the measuring system, incl. built-in printer, pressure measurement 80/200 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
Spare thermal paper for printer (6 rolls)	0554 0569
Barcode reader to read in measurement locations, quick and accurate allocation of reading to site	0554 0460
Barcode labels, self-adhesive (1200 off), for labelling site with barcode, printing via software	0554 0411
Adhesive pockets (50 off) for printout, paper barcode labels...	0554 0116
Testo rechargeable battery pack NiMH for control unit, logger	0515 0097
Power unit 230 V/ 8 V/ 1 A, for instrument (European plug)	0554 1084

testo 350 M analyser box and equipment, upgradeable to max. 4 meas. modules	
testo 350 M analyser box, with O2, CO (with switch-off and rinse functions), gas preparation, diff. pressure meas., 2 temperature probe sockets, can be upgraded to max. 4 measurement modules (with NO/NO2/SO2/CO2 NDIR), Testo data bus connection, built-in rech. batt., data memory	0563 0351
COlow measurement module, 0 to 500 ppm, highly accurate, instead of standard CO measurement module, built into analysis box	0440 3925
CO2 measurement module, 0 to 50 vol.%, infrared measurement principle, absolute pressure measurement, CO2 absorption filter with refill pack	0440 0417
Option: NO measurement module	0440 3935
Option: NOlow measurement module	0440 3928
Option: NO2 measurement module	0440 3926
Option: SO2 measurement module	0440 3927
Fresh air valve for long-term measurement, built into analyser box	0440 0557
Measuring range extension for CO measurement module (dilution), built into analyser box, selectable dilution factors: 0, 2, 5, 10, 20, 40	0440 0555

testo 350 XL analyser box and equipment, upgradeable to max. 6 meas. modules	
testo 350 XL analyser box, equipped with O2, CO (with switch-off and rinse function), NO, NO2, differential pressure measurement, 2 temperature probe sockets, gas preparation, Testo data bus adapter, automatic fresh air rinse with valve, built-in rechargeable battery, data memory, can be upgraded to max. 6 measurement modules (with H2S, HC, SO2, CO2 NDIR)	0563 0350
COlow measurement module, 0 to 500 ppm, highly accurate, instead of standard CO measurement module, built into analysis box	0440 3925
CO2 measurement module, 0 to 50 vol.%, infrared measurement principle, absolute pressure measurement, CO2 absorption filter with refill pack	0440 0417
NOlow measurement module, 0 to 300 ppm, highly accurate, instead of standard NO measurement module, built into analyser box	0440 3934
Option: SO2 measurement module	0440 3927
HC measurement module (nonburned hydrocarbons), built into analyser box	0440 3929
H2S measurement module, built into analyser box	0440 3930
Measuring range extension for CO measurement module (dilution), built into analyser box, selectable dilution factors: 0, 2, 5, 10, 20, 40	0440 0555
Event trigger socket, for starting and stopping measurement externally, built into analyser box	0440 3932

Transport case and accessories for analyser boxes	Part no.
Wall holder for analyser box incl. heat protection plate, can be locked	0554 0203
Protective cover for analyser box (can also be used with wall holder)	0554 0199
Carrying belt set for analyser box and control unit	0554 0434
Transport case for analyser, probes and accessories	0516 0351
System case (aluminium), with drawer for accessories, for transport and protection during measurement	0516 0352
Additional box for system case 0516 0352, can be snapped on	0516 0353
Transport case for industrial probes, aluminium; Space for: handle, probes, flange and accessories	0516 7900
Calculation of fuel-specific factors to accurately display calculated variables in deviating fuels (calculation for one fuel)	0991 0030
Spare particle filter, pack of 20	0554 3381
Hose set to convey flue gas from analyser box, 5 m long	0554 0451
Refill pack of filter pellets for CO2 absorption filter	0554 0369
ISO calibration certificate/Flue gas, Calibration points 2.5% O2; 100 and 1000 ppm CO; 800 ppm NO; 80 ppm NO2; 1000 ppm SO2	0520 0003

testo 454 logger and accessories	Part no.
Logger, measures and saves (max. 250,000 readings), incl. 4 user defined probe sockets, alarm output/event trigger socket, stand/wall holder	0577 4540
Alarm/trigger cable	0554 0012
Holding unit/Theft-proof with lock for logger wall holder	0554 1782
Power box, connected to control unit to increase operating life, For a battery-operated measuring system	0554 1045
Mains unit for power box (110/230 V; 50/60 Hz, 12 V, 3 A)	0554 1143
Analog output box, 6 channels, 4 to 20 mA, For output on an analog recorder or process control, (please also order mains unit 0554 1084)	0554 0845
Testo rechargeable battery pack NiMH for control unit, logger	0515 0097
Recharger for control unit or logger (with 4 standard rechargeable batteries), Rechargeable batteries are recharged externally	0554 0110
Power unit 230 V/ 8 V/ 1 A, for instrument (European plug), For separate use of control unit	0554 1084

Accessories for Testo data bus	Part no.
Mains unit (110/230 V; 50/60 Hz, 12 V, 3 A) supplies power to Testo data bus, When using the Testo plug-in card	0554 1145
Terminal plug for Testo data bus, For loggers and special lengths	0554 0119
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

Additional cable lengths up to 1000 m on request

PC software	Part no.
ComSoft 3 for data management, incl. RS 232 connection cable, Incl. database, analysis and graphics function, data analysis, trend curve	0554 0841
Testo PCMCIA plug-in card incl. ComSoft 3 software, cable for Testo data bus, adapter and terminal plug	0554 0590
Electrical isolation for RS232 (connects measuring instrument to PC)	0554 0006

Recommended for your applications

testo 350 M: Set for fast emission monitoring on industrial burners (O$_2$, CO, NO, SO$_2$)

testo 350, control unit	0563 0353
Testo rechargeable pack for control unit	0515 0097
testo 350 M analyser box	0563 0351
Option: NO measurement module	0440 3935
SO2 measurement module, 0 to 5000 ppm, built into analyser box	0440 3927
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (TI), Hose 2.2 m	0600 7451
Heat-proof probe pipe, 335 mm long, Tmax. +1000°C	0440 7437
Connection cable, 2 m, for Testo data bus	0449 0042
ComSoft 3 for data management, incl. RS 232 connection cable	0554 0841
Protective cover for analyser box	0554 0199
Carrying belt set for analyser box	0554 0434
Transport case for analyser, probes and accessories	0516 0351
Spare particle filter, pack of 20	0554 3381
Spare thermal paper for printer (6 rolls)	0554 0569

testo 350 XL: Standard set for measurements on process systems (O$_2$, CO, NO, NO$_2$)

testo 350, control unit	0563 0353
Testo rechargeable pack for control unit	0515 0097
testo 350 XL analyser box	0563 0350
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (TI), Hose 2.2 m	0600 7451
Heat-proof probe pipe, 335 mm long, Tmax. +1000°C	0440 7437
Special hose for NO2/SO2 measurements, 2.2 m long	0440 7442
Connection cable, 2 m, for Testo data bus	0449 0042
ComSoft 3 for data management, incl. RS 232 connection cable	0554 0841
Protective cover for analyser box	0554 0199
Carrying belt set for analyser box	0554 0434
Transport case for analyser, probes and accessories	0516 0351
Spare particle filter, pack of 20	0554 3381
Spare thermal paper for printer (6 rolls)	0554 0569

testo 350 XL: Portable measurements on motors (O$_2$, CO, NO, NO$_2$)

testo 350, control unit	0563 0353
Testo rechargeable pack for control unit	0515 0097
testo 350 XL analyser box	0563 0350
Measurement range extension for CO measurement module (dilution)	0440 0555
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (TI), Hose 2.2 m	0600 7451
Heat-proof probe pipe, 335 mm long, Tmax. +1000°C	0440 7437
Special hose for NO2/SO2 measurements, 2.2 m long	0440 7442
Connection cable, 5 m, for Testo data bus	0449 0043
ComSoft 3 for data management, incl. RS 232 connection cable	0554 0841
Protective cover for analyser box	0554 0199
Carrying belt set for analyser box	0554 0434
System case (aluminium), incl. drawer	0516 0352
Spare particle filter, pack of 20	0554 3381
Spare thermal paper for printer (6 rolls)	0554 0569

testo 350 XL: Portable measurements on turbines (O$_2$, CO$_{low}$, NO$_{low}$, NO$_2$)

testo 350, control unit	0563 0353
Testo rechargeable pack for control unit	0515 0097
Touchscreen with reader	0440 0559
testo 350 XL analyser box	0563 0350
COlow measurement module, 0 to 500 ppm, built-in in the analyser box	0440 3925
NOlow measurement module, 0 to 300 ppm, built-in in analyser box	0440 3934
Measurement range extension for CO measurement module (dilution)	0440 0555
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (TI), Hose 2.2 m	0600 7451
Heat-proof probe pipe, 335 mm long, Tmax. +1000°C	0440 7437
Special hose for NO2/SO2 measurements, 5 m long	0440 7445
Connection cable, 5 m, for Testo data bus	0449 0043
ComSoft 3 for data management, incl. RS 232 connection cable	0554 0841
Protective cover for analyser box	0554 0199
Carrying belt set for analyser box	0554 0434
System case (aluminium), incl. drawer	0516 0352
Spare particle filter, pack of 20	0554 3381
Spare thermal paper for printer (6 rolls)	0554 0569

Technical data/testo 350 M analyser box, testo 350 XL

Probe type	Temperature measurement	O2 measurement	CO (H2 compensated)	COlow meas. (H2 compensated)	CO2	NO meas. (option for testo 350 M)	NOlow measurement	NO2 measuring module (option for testo 350 M)	SO2 measurement
Meas. range	-40 to +1200 °C	0 to +25 Vol. % O_2	0 to +10000 ppm CO	0 to +500 ppm CO	0 to CO_2 max Vol. % CO_2	0 to 3000 ppm	0 to 300 ppm	0 to 500 ppm	0 to 5000 ppm
Accuracy ±1 digit	±0.5% of mv (+100 to +1200 °C) ±0.5 °C (-40 to +99.9 °C)	±0.8% of fsv (0 to +25 Vol. % O_2)	±5% of mv (+200 to +2000 ppm CO) ±10% of mv (+2001 to +10000 ppm CO) ±10 ppm CO (0 to +199 ppm CO)	±5% of mv (+40 to +500 ppm CO) ±2 ppm CO (0 to +39.9 ppm CO)	Calculated from O_2	±5% of mv (+100 to +1999.9 ppm NO) ±10% of mv (+2000 to +3000 ppm NO) ±5 ppm NO (0 to +99 ppm NO)	±5% of mv (+40 to +300 ppm NO) ±2 ppm NO (0 to +39.9 ppm NO)	±5% of mv (+100 to +500 ppm NO_2) ±5 ppm NO_2 (0 to +99.9 ppm NO_2)	±5% of mv (+100 to +2000 ppm SO_2) ±10% of mv (+2001 to +5000 ppm SO_2) ±5 ppm SO_2 (0 to +99 ppm SO_2)
Resolution	0.1 °C (-40 to +1200 °C)	0.01 Vol. % O_2 (0 to +25 Vol. % O_2)	1 ppm CO (0 to +10000 ppm CO)	0.1 ppm CO (0 to +500 ppm CO)	0.01 Vol. % CO_2	1 ppm NO (0 to +3000 ppm NO)	0.1 ppm NO (0 to +300 ppm NO)	0.1 ppm NO_2 (0 to +500 ppm NO_2)	1 ppm SO_2 (0 to +5000 ppm SO_2)
Reaction time		20 s	40 s	40 s	20 s	30 s	30 s	40 s	30 s
Reaction type		t_{95}	t_{90}	t_{90}	t_{95}	t_{90}	t_{90}	t_{90}	t_{90}

Probe type	Efficiency	Flue gas loss	Differential pressure 1	Differential pressure 2	Velocity	CO_2 meas. (IR)			
Meas. range	0 to +120 %	-20 to +99.9 % qA	-200 to +200 hPa	-40 to +40 hPa	0 to +40 m/s	0 to 50 Vol. % CO_2			
Accuracy ±1 digit			±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 (-40 to -3 hPa) ±1.5% of mv (+3 to +40 hPa) ±0.03 hPa (-2.99 to +2.99 hPa)		±0.3 Vol. % CO_2 + 1% of mv (0 to 25 Vol. % CO_2) ±0.5 Vol. % CO_2 + 1.5% of mv (>25 to 50 Vol. % CO_2)			
Resolution	0.1 % (0 to +120 %)	0.1 % qA (-20 to +99.9 % qA)	0.1 hPa (-200 to +200 hPa)	0.01 hPa (-40 to +40 hPa)	0.1 m/s (0 to +40 m/s)	0.01 Vol. % CO_2 (0 to 25 Vol. % CO_2) 0.1 Vol. % CO_2 (>25 Vol. % CO_2)			
Reaction time						<10 s			
Reaction type						t_{90}			

		Additional technical data:	Measuring range extension (dilution) for CO:	Warranty:
Dimensions	395 x 275 x 95 mm	Memory: 250 000 readings	dilution factors 0, 2, 5, 10, 20, 40	Analysers: 2 years (excluding working parts e.g. measuring cells...)
Weight	3200 g	Power supply: Via integrated mains unit (90 V to 260 V, 47 to 63 Hz)	Dilution gas: Fresh air or N2	CO/NO/NO2/SO2/H2S/HC/CO2 sensor: 1 year
Storage temp.	-20 to +50 °C	or exchangeable rechargeable batteries	Accuracy: Reading plus max. 2%	O2 measuring cell: 1.5 years
Oper. temp.	-5 to +45 °C	Electrical power required: 0.5 A (110 V AC), 0.3 A (230 V AC)	Trigger input testo 350XL:	
Material/Housing	ABS	Dew point calculation: 0 to 99°C td	Voltage: 5 to 12 volt (rising or falling edge)	

Maximum positive pressure of flue gas: 50 hPa (500 mm water column)
Maximum negative pressure: 200 hPa (2000 mm water column)
Pump flow: 0.8 m/s with flow monitoring
Max. dust load: 20 g/m³ dust in flue gas
Max. humidity load: +70°C
Dew point temperature at analyser box inlet

Pulse width > 1 second
Load: 5 V/max. 5 mA, 12 V/max. 40 mA

Additional technical data for testo 350 XL analyser box only

Probe type	H2S measurement
Meas. range	0 to +300 ppm
Accuracy ±1 digit	±5% of mv (+40 to +300 ppm) ±2 ppm (0 to +39.9 ppm)
Resolution	0.1 ppm (0 to +300 ppm)
Reaction time	35 s
Reaction type	t_{90}

Additional technical data:
Trigger input: 5 to 12 V
(rising or falling edge)

Technical data for HC module

Parameter	Methane	Propane	Butane
Meas. range [1]	100 to 40,000 ppm	100 to 21,000 ppm	100 to 18,000 ppm
Accuracy	less than 400 ppm (100 to 4000 ppm less than 10 % of m.v. (greater than 4000 ppm)	less than 400 ppm (100 to 4000 ppm less than 10 % of m.v. (greater than 4000 ppm)	less than 400 ppm (100 to 4000 ppm less than 10 % of m.v. (greater than 4000 ppm)
Resolution	10 ppm	10 ppm	10 ppm
Min. 02 req. in flue gas	2% + (2 x methane reading)	2% + (5 x propane reading)	2% + (6.5 x butane reading)
Reaction time t90	less than 40 s	less than 40 s	less than 40 s
Response factor [2]	1	1.5	2

[1] Lower explosion limit must be adhered to.
[2] The HC module is adjusted to methane in the factory. It can be adjusted to another gas by the user.

Technical Data for Control unit and testo 454 logger box

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 m.v.	
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)	

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	0.01 °C (-99.9 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_2	0 to +10000 ppm CO_2	
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	(+20 to +20000 rpm)	±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 (+20 to +20000 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 350, 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	24 h		35 h	
Memory	250000	250000			
Weight	850 g	450 g	305 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	