GASTECH AUSTRALIA

testo 350 S/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.

Gas sensors can be changed quickly and easily by the user on site

Condensate trap – Built-in Peltier gas preparation unit with hose pump for disposing of condensate for long-term measurements lasting several hours

Infrared (NDIR) gas sensor for direct CO_2 measurement

Gas sensor heating element – protects from damage caused by condensate and increases sensor reaction times when ambient temperatures are low

NEW!
Now with
Bluetooth®
Wireless transmission

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Advanced Testing Program

GASTECH AUSTRALIA

Flexible flue gas analysis system testo 350 S/XL

testo 350 S/XL

testo 350 is a flexible, portable analysis system which is basically made up of a control unit, a flue gas analyzer and a flue gas probe, depending on customer requirements.

The detachable **control unit** can control the analysis system and read out data. The testo 350 XL control unit can also be used as a separate hand-held analyzer for differential pressure (built-in) and also for temperature, humidity, flow etc. thanks to its additional probe socket. Readings are printed on the built-in printer.

The **flue gas analyzer** is the "heart" of the analysis system and is available in two different versions:

- testo 350 S Basic version
- testo 350 XL Advanced version.

The **testo 350 S flue gas analyzer** is equipped with a gas sensor for O_2 as standard. One sensor must be fitted or up to 5 additional sensors for NO (option), NO_2 (option), SO_2 (option), NO_{low} (option), CO (Option), CO_{low} (option), H_2S (option), HC (Option) or CO_2 via infrared gas sensor (option) can be fitted. Temperature and differential pressure as well as the usual parameters such as Δ, qA, etc. are also calculated.

The even more convenient **testo 350 XL flue gas analyzer** is equipped with gas sensors for O_2, CO, NO and NO_2 as standard. Additional sensors for HC (option), NO_{low} (option), CO_{low} (option), SO_2 (Option), H_2S (option) or CO_2 via infrared gas sensor (option) are available. In addition to the features of the S version, the testo 350 XL flue gas analyzer also has a Peltier gas preparation unit with a hose pump to regulate condensate disposal as well as a fresh air valve for long-term measurements lasting several hours.

Both versions of the flue gas analyzers can be equipped with up to 6 gas sensors, have a built-in rechargeable battery as standard, (for battery operation), data logger (250,000 readings) as well as a Testo data bus connection.

The testo 350 S flue gas analyzer can be retrofitted with all the features/functions of the testo 350 XL flue gas analyzer.

Tests and permits

– TÜV Bayern RgG 211

– Conforms to DIN EN 50379 Part 2

Control unit for display and control, with printer

Flue gas analyzer with built-in gas sensors and measurement engineering

Easy and convenient measurement on engines for on-site check and tuning

Differences between control units at a glance

	testo 350 S control unit	testo 350 XL control unit
Built-in printer	■	■
Differential pressure measurement (-40 to +40 hPa / -200 to +200 hPa)	–	■
1 user-defined probe socket (for e.g. temperature, relative humidity measurement, etc.)	–	■
Touchscreen	–	○
Connection from a flue gas analyzer to the Testo data bus	■	■
Connection of several flue gas analyzers, analog output boxes and testo 454 loggers to the Testo data bus	–	■
NiMH rechargeable battery pack	–	○
Internal memory for 250,000 readings	–	■
BLUETOOTH® wireless transmission	○	–

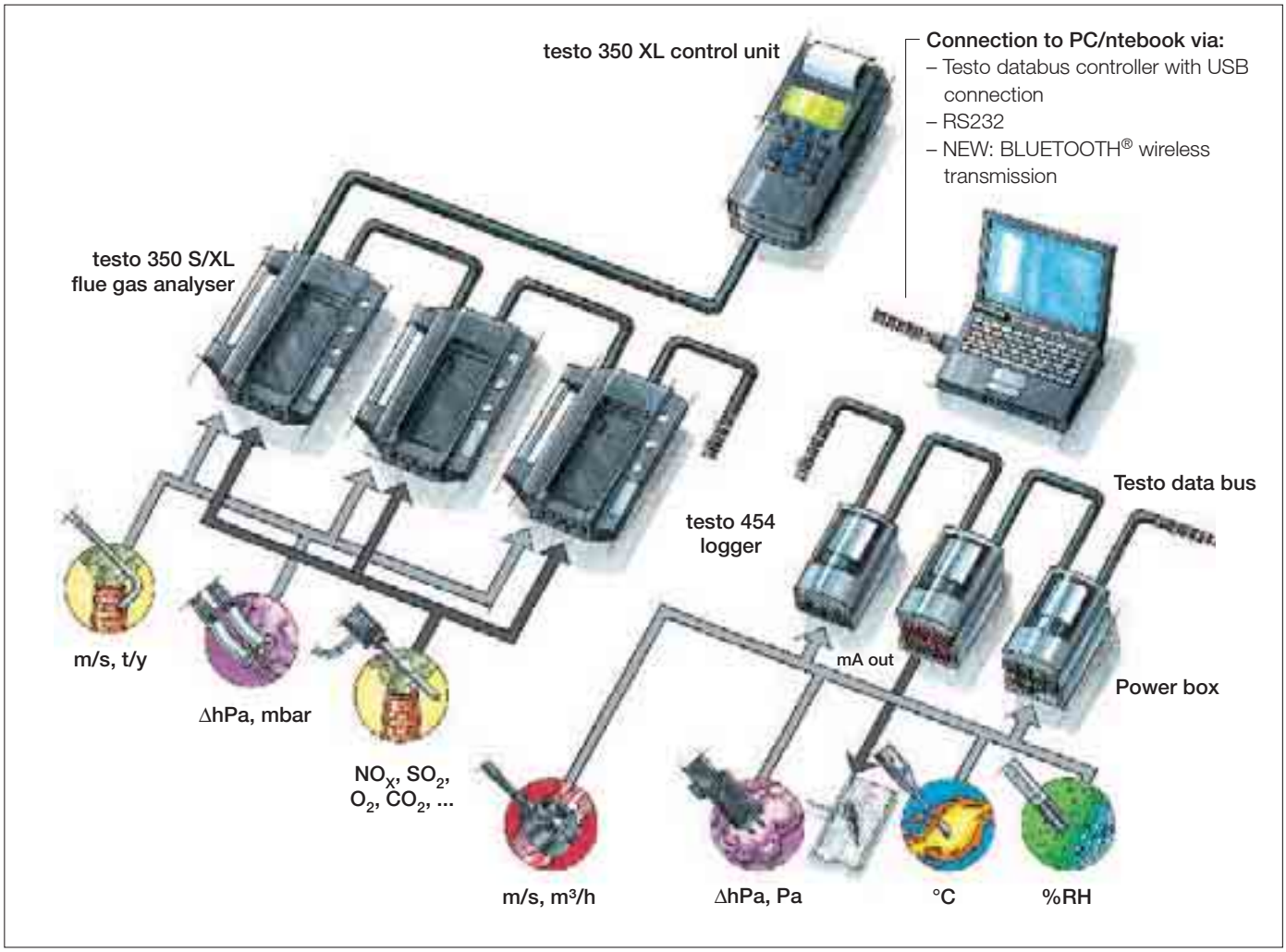
■ = Standard ○ = option – = Not possible

Differences between flue gas analysers at a glance

		testo 350 S	testo 350 XL
Maximum no. of gas sensors		6	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 (is recommended with high humidity levels in flue gas and during long-term measurements >2 hrs measuring time)		○	■
Automatic fresh air rinse with valve (incl. measurement range extension with dilution factor 5 for all sensors)		○	■
Special gas pump for long-term measurements with extended warranty		○	○
Measurement range extension for CO gas sensor (with selectable dilution factors)		○	○
CO gas sensor switch-off via adjustable switch-off threshold		■	■
Trigger input – stops and starts measurement externally		○	○
Differential pressure measurement (-40 to +40 hPa / -200 to +200 hPa)		■	■
Built-in rechargeable battery		■	■
2 temperature probe sockets (Type K NiCr-Ni)		■	■
Data logger (250,000 readings)		■	■
Testo data bus connection		■	■
BLUETOOTH® wireless transmission		○	○

■ = Standard ○ = option

Measurement system



The testo 350 S/XL system concept

For many applications in the industrial sector, an analyzer 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 various systems. The **testo 350 S/XL** measurement system fulfills these requirements. Several analyzer boxes, equipped differently, can be connected together, depending on the application.

If several analyzer boxes, for example, are connected to the Testo data bus, they can be controlled, read out or programmed via the following two options:

- **One analyzer box after the other** via the testo 350 XL control unit, for example, or via the PC and an RS 232 cable

Alternatively:

- **Several flue gas analyzers simultaneously** via your PC and the Testo data bus controller with USB connection.

Parameters

Parameters which can be measured using **testo 350 S/XL**:

a) testo 350 S/XL flue gas analyzer

- 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 testo 350 S or testo 350 XL flue gas analyzers are positioned at the respective measurement point. They are operated either connected to each other via the Testo data bus or as a separate data logger without being connected. Separate measurement programs are saved in the flue gas analyzer using the testo 350 XL control unit or PC. Included are, for example, start/stop criteria, measurement cycles, fresh air phases etc. **testo 350 S** and **testo 350 XL** flue gas analyzers, equipped differently, can be used. Likewise, logger boxes and analog output boxes (6 channels, 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 (no exhaust gas humidity)
- 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:

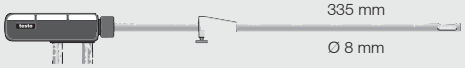
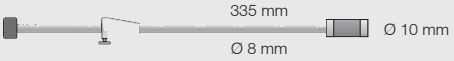
- High temperatures
- Corrosive condensate
- Dust
- Mechanical loads.

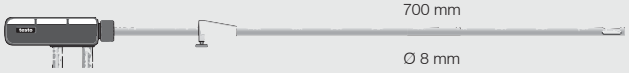
The selection of the right probe is critical for accurate and consistent measurements. Because the sampling locations are often different, it's beneficial to have a standard probe designed for a wide variety of applications. In addition to the standard sampling probes, Testo also offers probe systems 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 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, with probe stop, NiCr-Ni (TI) T/C, probe shaft: stainless steel 1.4361 (Tmax 500°C), 2.2 m hose, robust plug-in coupling 	0600 7451
Options: Heat-resistant probe shaft with pre-filter, Tmax. +1000 °C, 335 mm long, for dusty flue gases, 3 µm pore size, probe shaft: stainless steel 1.4841 	0440 7435
or: Heat-resistant probe shaft without pre-filter (material: stainless steel 1.4841), Tmax +1000 °C, with heat-resistant plate, 335 mm long	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, with probe stop, NiCr-Ni (TI) T/C, probe shaft: stainless steel 1.4361 (Tmax 500°C), 2.2 m hose, robust plug-in coupling 	0600 7452
Options: Heat-resistant probe shaft with pre-filter, Tmax. +1000°C, 700 mm long, for dusty flue gases, 3 µm pore size, probe shaft: stainless steel 1.4841 	0440 7436
or: Heat-resistant probe shaft without pre-filter (material: stainless steel 1.4841), Tmax +1000 °C, with heat-resistant plate, 700 mm long	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.

Accessories for outer pipe with filter	Part no.
Spare sintered filter (2 off)	0554 3372

TÜV approved gas sampling probes (specially for the trade sector)	Part no.
TÜV approved flue gas probe, 180 mm immersion depth, up to +500°C, corr. to the latest instr. test guidelines, also for meas. on atmospheric gas systems, 2.2 m hose 	0600 9556
TÜV approved flue gas probe, 335 mm immersion depth, up to +500°C, corresponding to the latest instrument test guidelines, also for atmospheric gas systems, 2.2 m hose 	0600 9557

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.

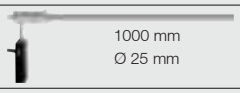
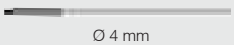
A thermocouple, which is connected to the testo 350 S/XL flue gas analyzer, is used for simultaneous temperature measurements. The probe can be adapted for larger flue gas ducts using extension pipes (up to max. 3m). A preliminary filter is screwed on to protect the probe in dusty gases.

The heated probe is used for moist flue gases to avoid incorrect readings caused by the absorption of NO_2 and SO_2 . 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.

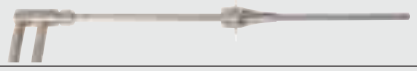
Ceramic sampling pipes which can withstand the enormous thermal load are used for measurements at more than 1200 °C.

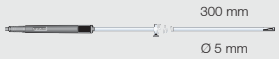
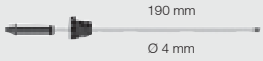
Industrial gas sampling probes, a modular probe system suitable for every application

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 Non-heated sampling pipe to +1200 °C, Inconel 625	Connection: G1/4" 1000 mm Ø 20 mm Ø 12 mm	Weight: 400 g	0600 7801 0600 7803
Non-heated sampling pipe to +1800 °C, Al-Oxide	Connection: G1/4" 1000 mm Ø 20 mm Ø 12 mm	Weight: 400 g	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
Extension pipe to +600 °C, stainless steel 1.4571 Extension pipe to +1200 °C, Inconel 625	1000 mm Ø 20 mm Ø 12 mm	Connection: Thread screw/screw socket G1/4"; Weight: 0.45 kg	0600 7802 0600 7804
Preliminary filter for dusty flue gases, ceramic **Preliminary filter can only be mounted on extension pipe 0600 7802 or 0600 7804.**	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 Thermocouple, NiCr-Ni, -200 to +1000 °C, Inconel 625, 2.2 m long Thermocouple, NiCr-Ni, -200 to +1000 °C, Inconel 625, 3.2 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 0430 0066 0430 0067
Standard sampling hose, length 4 m	4 m	Weight: 0.4 kg	0554 3382
Special sampling hose for accurate NO_2-/SO_2-measurements, length 4m	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

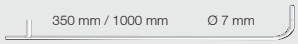
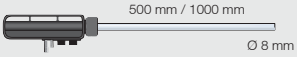
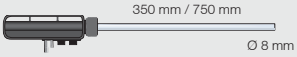
Suitable probes for testo 350 XL control unit or testo 454 logger

Gas sampling probes for measurements on industrial motors		Part no.
Flue gas probe for industrial motors, 335 mm immersion depth, with probe stop and heat protection plate, Tmax 1000 °C, special hose for NO_2/SO_2 measurements, 2.2 m long		0600 7550
Flue gas probe for industrial motors with probe shaft prefilter, 335 mm immersion depth, with probe stop and heat protection plate, Tmax 1000 °C, special hose for NO_2/SO_2 measurements, 2.2 m long		0600 7551
Accessories for the gas sampling probes for measurements on industrial engines		**Part no.**
Thermocouple for exhaust gas temperature measurement (NiCr-Ni, length 400 mm, Tmax. +1000 °C), with 2.4 m connection cable and additional temperature protection		0600 8894
Spare sintered filter (2 off)		0554 3372

Temperature probes	Illustration	Meas. range	Accuracy	t99	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)		0 to +100 °C		30 s		0600 9791
Ambient air probe, immersion depth 190 mm, with probe stop, magnetic clip, Tmax + 100°C, for ambient air temperature measurement in systems dependent on/independent of ambient air		0 to +100 °C				0600 9787
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		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, TC Type K						0602 0092
Quick-action surface probe with sprung thermocouple strip, measuring range short-term to +500°C		-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	Other features	Part no.
Gas leak probe		0 to +10000 ppm CH_4 / C_3H_8		0632 3330
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
CO2 probe measures indoor air quality and monitors the workplace. With plug-in head, connection cable 0430 0143 or 0430 0145 required		0 ... +1 Vol. % CO_2 0 ... +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
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

Suitable probes for testo 350 XL control unit and testo 454 logger

Velocity, pressure probes	Illustration	Meas. range	Accuracy	Part no.
Pitot tube, 350 mm long, stainless steel, for measuring flow velocity [1]		Oper. temp. 0 to +600 °C		0635 2145
Pitot tube, 1000 mm long, stainless steel, for measuring flow velocity [1]				0635 2345
Pitot tube, stainless steel, 500 mm long, measures flow velocity with temperature [2]		-40 to +600 °C		0635 2140
Pitot tube, stainless steel, 1000 mm long, measures flow velocity 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]		-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 CO_2, temperature and flow velocity probes	Part no.
Hose connection set, incl. silicone hose and connection adapter, For separate gas pressure measurement	0554 0315
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
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
Instrument cleaner (100 ml), for easy and fast removal of dirt from housing, display screen, keypad, probe handle and probe cable	0554 1207
ISO calibration certificate/temperature, meas. instr. with surface probe; calibration points +60°C; +120°C; +180°C	0520 0071
ISO calibration certificate/CO2, CO2 probes; calibration points 0; 1000; 5000 ppm	0520 0033

Accessories for testo 350 S/ XL

"easyEmission" software, RS232 cable included

The complete data management solution for flue gas analysis
- User-defined measurement intervals (1 measurement/s up to 1 measurement/hour)
- Readings transferred in seconds to Microsoft EXCEL®
- User-defined fuels
- Readings shown in tables or graphs
- Easy to produce custom-designed measurement logs

"easyEmission" software for testo 350-S/-XL, RS232 cable for connecting instrument to PC included

Part no. 0554 3335

Software with analysis and graphics functions, online measurement

"easyEmission" software, Testo data bus controller with USB connection included

If, for example, several testo 350 S/ XL flue gas analyzers are connected to the Testo data bus, they can then be controlled and read out on your PC. In this way, a faster measurement cycle (<5 s) can be set for each flue gas analyzer than with the RS232 cable.

"easyEmission" software for testo 350 S/XL, Testo data bus controller included, with USB to connect instrument to PC, cable for Testo data bus and terminal plug

Part no. 0554 3336

Software with analysis and graphics functions, online measurement

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

Robust protective case with trolley function

- For the operation of testo 350 in the case in dusty and tough surroundings.
- Extendable handle and ball bearing steel rollers for effortless transport.
- Extremely impact-resistant polypropylene copolymer for high stability and flexibility to protect from external impact.
- The protective case is equipped with a ventilator as standard. A thermal switch switches this on at outer temperatures >+15 °C and off at temperatures <+15 °C.
- Operation of the testo 350 in the closed case.
- Thanks to a flap in the base of the case, all connections of the testo 350 are accessible from the outside.

Technical data:
- Dimensions: 56.5 x 45.5 x 26.5 cm
- Storage temperature: -20 to +50 °C
- Operating temperature (no direct sunlight): -10 to +50 °C
- Protection class: IP42

Part no. 0516 0355

Cases

1 Transport case for analyser, probes and accessories

Part no. 0516 0351

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

Part no. 0516 0352

1 Transport case
2 System case

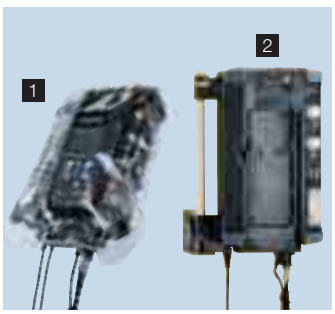
Protection hood and wall holder for analyzer box

1 Protection hood protects from dirt and dust

Part no. 0554 0199

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

Part no. 0554 0203



1 Protection hood
2 Wall holder

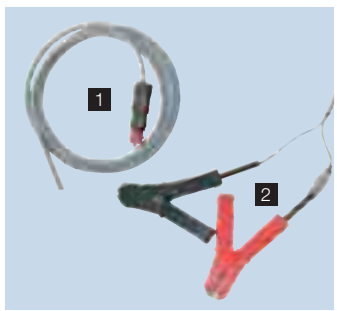
Cables and adapters

1 Cable with adapter for cigarette lighter and adapter for connection to testo 350-S/-XL

Part no. 0554 1336

2 Cable with battery clamps and adapter for connection to testo 350-S/-XL

Part no. 0554 1337



Measurement System and Practical Accessories

testo 350-S control unit	Part no.
Control unit displays measurement data and controls measurement system, built-in printer, connection for Testo data bus and terminal plug included	0563 0369
Further options only for Control Unit testo 350-S	
NEW! BLUETOOTH® wireless transmission*	0440 0550
Spare thermal paper for printer (6 rolls)	0554 0569
Testo rechargeable battery pack NiMH for control unit, logger	0515 0097

testo 350 XL control unit	Part no.
Control unit displays measurement data and controls the measurement system, incl. built-in printer, pressure measurement 40/200 hPa, 1 user defined probe socket, programmable measurements and memory space for 250,000 readings, connection for Testo data bus, incl. terminal plug	0563 0353
Additional options only for control unit testo 350 XL	
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
Testo rechargeable battery pack NiMH for control unit, logger	0515 0097
Mains unit 230 V/ 8 V/ 1 A, for instrument (European plug)	0554 1084

testo 350 S flue gas analyzer	Part no.
testo 350-S flue gas analyser, equipped with: O_2, differential pressure measurement, 2 temperature probe sockets, testo data bus connection, built-in rechargeable battery, data logger, can be upgraded to max. 6 sensors (with NO, NO_2, CO, H_2S, HC, SO_2, CO_2 NDIR)	0563 0368
A second gas sensor must be installed in testo 350-S, otherwise the instrument is unable to function. Up to 5 additional sensors can be fitted.	
Option: COlow sensor	0440 3936
Option: CO gas sensor	0440 3988
Option: CO2 sensor (infrared meas. principle, absolute pressure meas. and CO2 absorption filter with refill pack incl.)	0440 0417
Option: HC sensor (nonburned hydrocarbons)	0440 3929
Option: H2S sensor	0440 3930
Option: NO gas sensor	0440 3935
Option: NOlow gas sensor	0440 3928
Option: NO2 gas sensor	0440 3926
Option: SO2 gas sensor	0440 3927
NEW! BLUETOOTH® wireless transmission*	0440 0550
Option: Peltier gas preparation with hose pump to empty condensate automatically	0440 0355
Fresh air valve for long-term measurement (measurement range extension with dilution factor 5 for all sensors included)	0440 0557
Measuring range extension for CO sensor (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
Special gas pump for long-term measurements with extended warranty (For continuous measurements >2 h measurement time, the option Peltier gas praparation 0440 0355 is additionally recommended).	0440 0378

testo 350 XL flue gas analyzer box	Part no.
testo 350 XL analyzer 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 (including measurement range extension with dilution factor 5 for all sensors), built-in rechargeable battery, data memory, can be upgraded to max. 6 gas sensors (with H_2S, HC, SO_2, CO_2 NDIR)	0563 0350
Option: COlow gas sensor	0440 3925
Option: CO2 sensor (infrared meas. principle, absolute pressure meas. and CO2 absorption filter with refill pack incl.)	0440 0417
Option: NOlow gas sensor	0440 3934
Option: SO2 gas sensor	0440 3927
Option: HC sensor (nonburned hydrocarbons)	0440 3929
Option: H2S sensor	0440 3930
NEW! BLUETOOTH® wireless transmission*	0440 0550
Measuring range extension for CO sensor (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
Special gas pump for long-term measurements with extended warranty	0440 0378

Transport case and accessories for flue gas analyzer box	Part no.
Robust protective case with trolley function for operating the testo 350 in the case in dusty and tough surroundings	0516 0355
Wall holder for analyzer 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
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 analyzer 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
Power supply 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, (please also order mains unit 0554 1084)	0554 0845
Testo rechargeable battery pack NiMH for control unit, logger	0515 0097

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.
"easyEmission" software for testo 350-S/-XL, RS232 cable for connecting instrument to PC included	0554 3335
"easyEmission" software for testo 350 S/XL, Testo data bus controller included, with USB to connect instrument to PC, cable for Testo data bus and terminal plug	0554 3336
Software upgrade of "easyEmission" testo 335 to "easyEmission" testo 350-S/-XL	0450 3335
Software upgrade of "easyEmission" testo 350-S/-XL to "easyEmission" testo 335	0450 3334
Multiple licence software "easyEmission" for testo 350-S/-XL	0554 3337

Accessories for flue gas analyzer	Part no.
Cable to connect measuring instrument to pulse counter for gas flow measurement	0554 0536
Cable with adapter for cigarette lighter and adapter for connection to testo 350-S/-XL	0554 1336
Cable with battery clamps and adapter for connection to testo 350-S/-XL	0554 1337

Instrument options as upgrades
Information about instrument upgrades and prices available on request.

*Country permits for BLUETOOTH® wireless transmission are listed on page 24

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Recommended for your applications

testo 350 S: Set for fast emission monitoring on industrial burners (O_2, CO, NO)

testo 350-S control unit	0563 0369
testo 350-S flue gas analyser box	0563 0368
Option: NO gas sensor	0440 3935
Option: CO gas sensor	0440 3988
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (Tl), Hose 2.2 m	0600 7451
Heat-resistant probe shaft, 335 mm long, Tmax. +1000°C	0440 7437
Connection cable, 2 m, for Testo data bus	0449 0042
Protective cover for analyzer box	0554 0199
Carrying belt set for analyzer 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 XL control unit	0563 0353
Testo rechargeable pack for control unit	0515 0097
testo 350 XL flue gas analyzer box	0563 0350
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (Tl), Hose 2.2 m	0600 7451
Heat-resistant probe shaft, 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
"easyEmission" software for testo 350 S/XL	0554 3335
Protective cover for analyzer box	0554 0199
Carrying belt set for analyzer 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 XL control unit	0563 0353
Testo rechargeable pack for control unit	0515 0097
testo 350 XL flue gas analyzer box	0563 0350
Measurement range extension for CO gas sensor (dilution)	0440 0555
Flue gas probe for industrial motors	0600 7550
Connection cable, 5 m, for Testo data bus	0449 0043
"easyEmission" software for testo 350 S/XL	0554 3335
Protective cover for analyzer box	0554 0199
Carrying belt set for analyzer 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 gas turbines (O_2, CO_{low}, NO_{low}, NO_2)

testo 350 XL control unit	0563 0353
Testo rechargeable pack for control unit	0515 0097
Touchscreen with reader	0440 0559
testo 350 XL flue gas analyzer box	0563 0350
COlow gas sensor, 0 to 500 ppm, built-in in analyzer box	0440 3925
NOlow gas sensor, 0 to 300 ppm, built-in in analyzer box	0440 3934
Measurement range extension for CO gas sensor (dilution)	0440 0555
Flue gas probe, 335 mm immersion depth, Thermocouple NiCr-Ni (Tl), Hose 2.2 m	0600 7451
Heat-resistant probe shaft, 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
"easyEmission" software for testo 350 S/XL	0554 3335
Protective cover for analyzer box	0554 0199
Carrying belt set for analyzer 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

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Technical Data for testo 350 S/XL control unit and testo 454 logger box

	testo 350-S control unit	testo 350 XL control unit	Logger, measures and saves readings	Analog output box (mA out)
Oper. temp.	-5 to +45 °C	-5 to +45 °C	-10 to +50 °C	-10 to +50 °C
Storage temp.	-20 to +50 °C	-20 to +50 °C	-25 to +60 °C	-25 to +60 °C
Battery type	4 AA batteries	4 AA batteries	Alkali manganese	–
Battery life	8 h	8 h	24 h	–
Memory	–	250000 readings	250000 readings	–
Weight	850 g	850 g	450 g	305 g
Dimensions	252 x 115 x 58 mm	252 x 115 x 58 mm	200 x 89 x 37 mm	200 x 89 x 37 mm
Warranty	2 years	2 years	3 years	3 years

Country permits BLUETOOTH® wireless transmission for control unit testo 350-S and the flue gas analyzers testo 350-S/-XL

The BLUETOOTH® radio module used by Testo is permitted for the following countries and may only be used in those countries, i.e. the BLUETOOTH® wireless transmission may not be used in any other country!

Europe including all EU member states
Austria, Belgium, Bulgaria, Czech Republic, Cyprus, Denmark, Estonia, Finnland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Sweden, Slovakia, Slovenia, Spain and Turkey

European countires (EFTA)
Iceland, Liechtenstein, Norway, Switzerland

Non-European countries
Canada, USA and Japan

Technical data for testo 350 XL 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	0.001 °C (-9.999 to +300 °C) 0.1 °C (-200 to -100 °C) 0.1 °C (+301 to +800 °C)	0.1 °C (-200 to +1370 °C)	1 °C (0 to +1760 °C)	0.1 °C (-200 to +1000 °C)	0.1 °C (-40 to +350 °C)

Probe type	NTC	CO probe	CO2 probe	CO2 probe	
Meas. range	-40 to +150 °C	0 to +500 ppm CO	0 to +1 Vol. % CO_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	
Meas. range	20 to 20000 rpm	0 to +20 mA	0 to +10 V	-200 to +200 hPa	-40 to +40 hPa
Accuracy ±1 digit	±1 digit	±0.04 mA (0 to +20 mA)	±0.01 V (0 to +10 V)	±1.5% of mv (-50 to -200 hPa) ±1.5% of mv (+50 to +200 hPa) ±0.5 hPa (-49.9 to +49.9 hPa)	±1.5% of mv (-3 to -40 hPa) ±1.5% of mv (+3 to +40 hPa) ±0.03 hPa (-2.99 to +2.99 hPa)
Resolution	1 rpm	0.01 mA (0 to+20 mA)	0.01 V (0 to +10 V)	0.1 hPa (-200 to +200 hPa)	0.01 hPa (-40 to +40 hPa)

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Technical data/testo 350 S/XL flue gas analyzer

Probe type	Temperature measurement	O_2 measurement	CO (H2 compensated)	COlow meas. (H2 compensated)	CO_2	NO measurement	NOlow measurement	NO_2 measurement	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 NO	0 to +300 ppm NO	0 to +500 ppm NO_2	0 to +5000 ppm SO_2
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)	H2S measurement
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	0 to +300 ppm H_2S
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)	±5% of mv (+40 to +300 ppm) ±2 ppm (0 to +39.9 ppm)
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)	0.1 ppm (0 to +300 ppm)
Reaction time						<10 s	35 s
Reaction type						t_{90}	t_{90}

Measurement range extension

Single dilution with selectable dilution factor (option)		
CO measurement (H_2 compensated) CO_{low} meas. (H_2 compensated)	Meas. range	depending on factor selected
	Accuracy	±2 % of mv (additional error)
	Resolution	1 ppm or 0.1 ppm at CO_{low}

Dilution of all sensors by factor 5 (standard testo 350 XL)		
O_2 measurement	Reading is not shown in display	
HC measurement	Reading is not shown in display	
CO_2(IR) meas.	Reading is not shown in display	
CO measurement (H_2 compensated)	Meas. range	2500 to 50000 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -150 to 0 mbar at probe tip
	Resolution	1 ppm
CO_{low} meas. (H_2 compensated)	Meas. range	500 to 2500 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -100 to 0 mbar at probe tip
	Resolution	0.1 ppm
NO measurement	Meas. range	1500 to 15000 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -100 to 0 mbar at probe tip
	Resolution	1 ppm
NO_{low} measurement	Meas. range	300 to 1500 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -150 to 0 mbar at probe tip
	Resolution	0.1 ppm
NO_2 measurement	Meas. range	500 to 2500 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -50 to 0 mbar at probe tip)
	Resolution	0.1 ppm
SO_2 measurement	Meas. range	500 to 25000 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -100 to 0 mbar at probe tip
	Resolution	1 ppm
H_2S measurement	Meas. range	200 to 1500 ppm
	Accuracy	±5 % of mv (additional error) Pressure range -100 to 0 mbar at probe tip
	Resolution	0.1 ppm

Technical data for HC sensor

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 sensor is adjusted to methane in the factory. It can be adjusted to another gas (propane or butane) by the user.

Additional Technical data

Dimensions: 395 x 275 x 95 mm
Weight: 3200 g
Storage temperature: -20 to +50 °C
Operating temperature: -5 to +45 °C
Housing material: ABS
Memory: 250 000 readings
Power supply: Via built-in mains unit (90 V to 260 V, 47 to 63 Hz) or exchangeable rechargeable batteries
Electrial power consumption: 0.5 A (110 V AC), 0.3 A (230 V AC)
Dewpoint calculation: 0 to 99 °C td
Maximum positive pressure/flue gas: 50 hPa (500 mm water column)
Maximum negative pressure: 200 hPa (2000 mm water column)
Pump flow: 1 l/min. with flow monitoring
Max. dust load: 20 g/m³ dust in flue gas
Max. humidity load: +70 °C
Dewpoint temperature at sample gas inlet of analyzer box
Trigger input: Voltage 5 to 12 Volt (rising or falling edge)
Pulse width > 1 s
Load: 5 V/max, 5 mA, 12 V/max. 40 mA
Warranty: Analyzers 2 years (excluding working parts, e.g. gas sensors...); CO/NO/NO2/SO2/H2C/HC: 1 year; O2 gas sensor: 1 1/2 years; CO2 IR gas sensor: 2 years; special gas pump for long term measurements: 2 years

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