

# TESTO 350

Flue gas analysis – brilliantly easy  
– the first flue gas analyzer that thinks ahead



The new flue gas analyzer testo 350 offers advantages and real benefits – as you can see!

- Innovative: The application-guided operation with helpful instrument pre-settings
- Elegant and clear: The large colour graphic display
- Robust design: The sealed housing makes the testo 350 insensitive to knocks and dirt
- Cost and time-savings: The new service concept offers fast access to wearing parts

**3**  
**Analyzer box**  
robust, stable housing with integrated rubber edges, protects the sensors, pumps, analysis and memory electronics

The status display shows the current operational status, visible from a distance

The connections are of industrial standard thanks to new, mechanically robust connection sockets



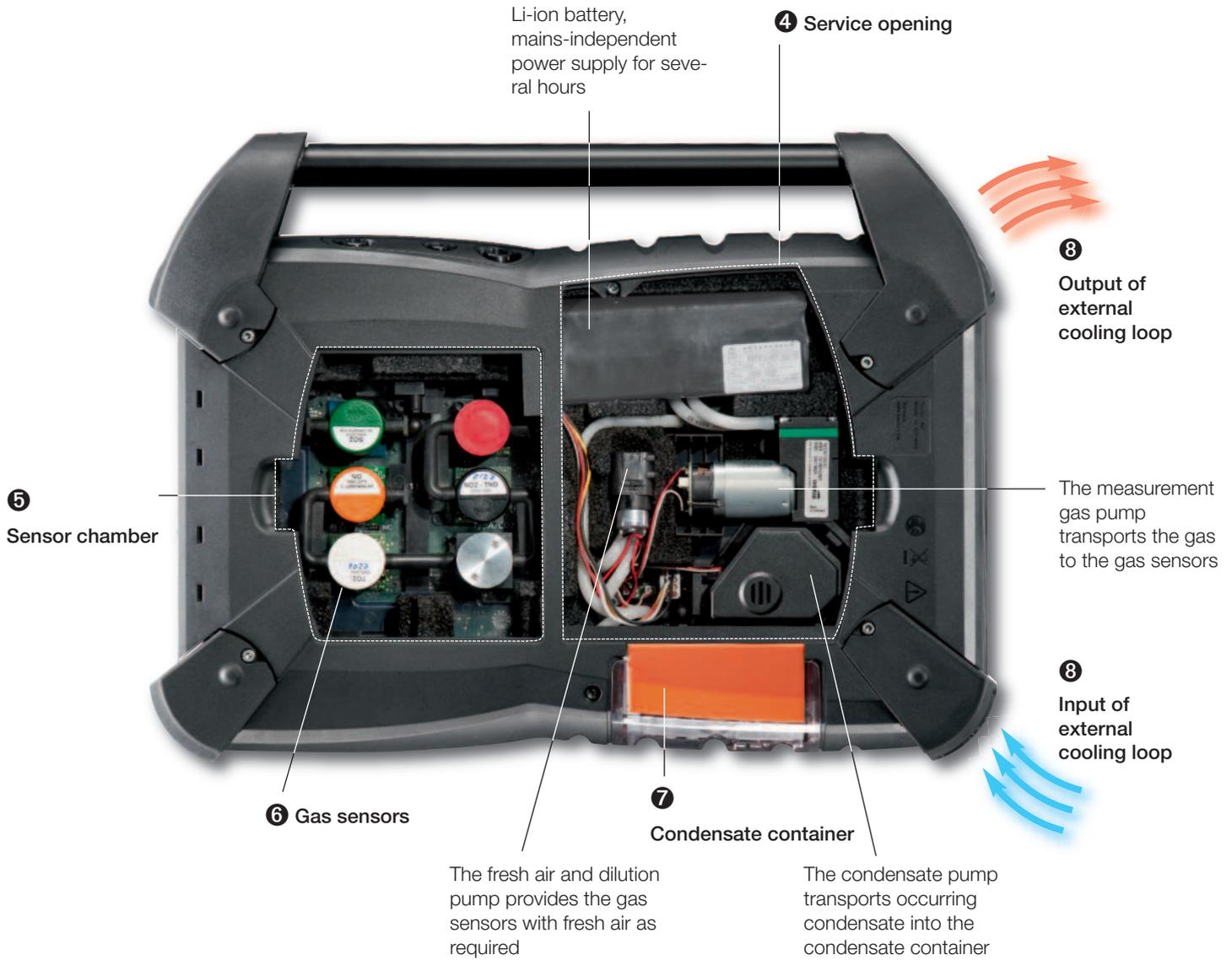
**1**  
**Control Unit**  
controls the analyzer box and displays the measurement values

**2**  
**Colour graphic display**  
innovative operating convenience thanks to an easy, clear menu structure

The dirt filters are easily accessible and can be changed without the use of tools



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Plug & play: Easy gas sensor replacement



Condensate container: Condensate container quickly and easily emptied

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## TESTO 350 – FLUE GAS MEASUREMENT AT THE HIGHEST LEVEL, THANKS TO:

### EASILY ACCESSIBLE SERVICE OPENING

The service opening in the underside of the instrument allows very easy access to all relevant service and wearing parts such as pumps and filters, which can then be quickly cleaned and/or exchanged on site. The advantages:

- Reduction of instrument unavailability due to service times.
- Cost savings due to instrument maintenance and/or exchange and cleaning of wearing parts by the user.
- Immediate access to all relevant wearing parts

### THERMALLY SEPARATED SENSOR CHAMBER

The sensor chamber is thermally separated from the other instrument components. This reduces possible sensor drifts caused by thermal influences.

This allows the maximum reliability of the measuring instrument to be achieved.

### EASY EXCHANGE OF THE GAS SENSORS

The gas sensors are pre-calibrated and can be exchanged, replaced or extended by further measurement parameters without test gas – if necessary directly on site.

- No more long service times
- Flexible extension of the testo 350 by further gas measurement parameters when applications or regulations change.
- A report is immediately issued when the NO sensor filter is used up. Then only the filter needs to be changed, and no longer the whole NO sensor.

### AUTOMATICALLY MONITORED CONDENSATE TRAP

The automatic monitoring of filling level reports when the condensate container needs to be emptied, and a few minutes after the report, the measurement gas pump is automatically stopped. This provides the highest protection of the analyzer box and the sensors from damage by condensate entry.

### EXTERNAL COOLING LOOP

Closed cooling loops isolate the instrument electronics and sensors from the ambient air. The interior of the instrument is cooled via a heat exchanger and therefore does not come into contact with dirty or aggressive ambient air.

- Damage to the internal electronics are thus effectively prevented.
- The instrument can also be safely used in dusty or dirty atmospheres

### FURTHER ADVANTAGES...

#### DIAGNOSIS FUNCTION – INTEGRATED AND INTELLIGENT

The testo 350 has a number of instrument diagnosis functions. Error reports are issued in clear text, and are thus easily understandable. The current status of the flue gas analyzer is constantly displayed.

This guarantees:

- Low downtimes thanks to early warning reports, for example when gas sensors are spent.
- No false measurements due to faulty instrument components.
- Better planning of measurement work
- More reliability in emission measurement and up-to-date information on the instrument status.

### AUTOMATIC ZEROING OF THE PRESSURE SENSOR

This option allows volume and mass flow velocity to be measured without supervision over a longer period of time and parallel to the emission measurement. The pressure sensor is automatically zeroed at regular intervals. This avoids the typical drift of the pressure sensor when ambient conditions change.

### GAS SENSOR ZEROING

When the instrument is switched on, or manually if needed, the gas sensors are zeroed with ambient air. In the testo 350, this procedure is already completed in 30 seconds. This means that fast availability with tested and zeroed gas sensors is always guaranteed.

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## FLUE GAS ANALYSIS – BRILLIANTLY EASY: TESTO 350, THE ONLY ONE THAT THINKS AHEAD!

The portable flue gas analyzer testo 350 is the ideal tool for professional flue gas analysis. Helpful instrument settings guide the user safely through typical measurement tasks such as:

- Flue gas analysis in commissioning, setting, optimization or operational measurements on industrial burners, stationary industrial engines, gas turbines and flue gas purification systems.
- Control and monitoring of officially prescribed emission limits in exhaust gas.
- Function testing of stationary emission measuring instruments.
- Control and monitoring of defined gas atmospheres in furnace rooms or kilns in different processes.

## CONTROL UNIT – SMALL AND CONVENIENT

The control unit is the operating and display unit of the testo 350. It can be removed and equipped as standard with a Li-ion rechargeable battery. All settings are carried out using the cursor button. The presentation of the measurement values takes place via the colour graphic display. Thanks to the internal memory, measurement data can be transferred from the analyzer box to the control unit. If required by the measurement, several analyzer boxes can conveniently be operated and controlled using one control unit

### The advantages of the testo 350 control unit:

- Operation of the analyzer box and transfer of the measurement data even when the flue gas pipe and the adjustment site are separated, especially helpful for industrial burners, for example.
- Measurement data can be trans-

ferred from the analyzer box to the control unit. This means the analyzer box can remain at the measurement site for further measurements, and the control unit taken away in order to process the measurement data.

- In order to protect the display in measurements over a longer period or during transport to different measurement sites in a system, the control unit can be attached to the analyzer box face-down.

## LARGE COLOUR GRAPHIC DISPLAY WITH APPLICATION-SPECIFIC MENU

The following measurement objects are available:

- Burner
- Gas turbine
- Engines (Select I > 1 or I 1 regulated industrial engines)
- User-defined.

Typical fuels, a practicable order of the exhaust gas parameters in the display, the corresponding calculations as well as useful instrument pre-settings, are stored under each of these measurement objects. Examples of these are the activation of the dilution in measurements on I 1 regulated industrial engines and gas engines, or the testing of the relevant gas sensor in the dilution slot.

### The advantages of the application-specific menu

- Information in the display guides the user through the menu.
- Easy operation without previous knowledge of the instrument
- Reduction of the work steps before the start of the measurement.

## ANALYZER BOX – INDUSTRIAL STANDARD, ROBUST AND RELIABLE

In the analyzer box are the gas sensors, the measurement gas and rinsing pumps, the Peltier gas preparation (optional), gas paths, filters, analysis and storage electronics as well as the mains unit and the Li-ion battery.

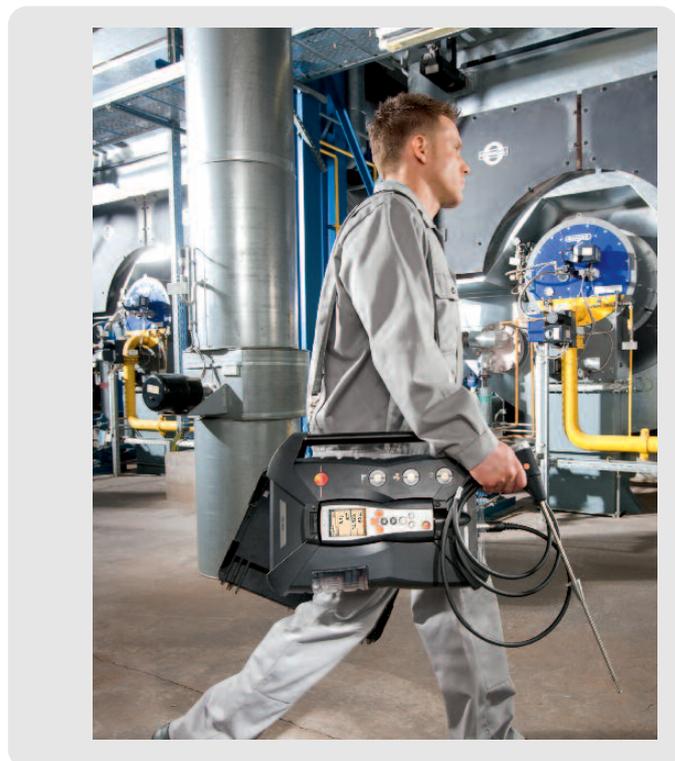
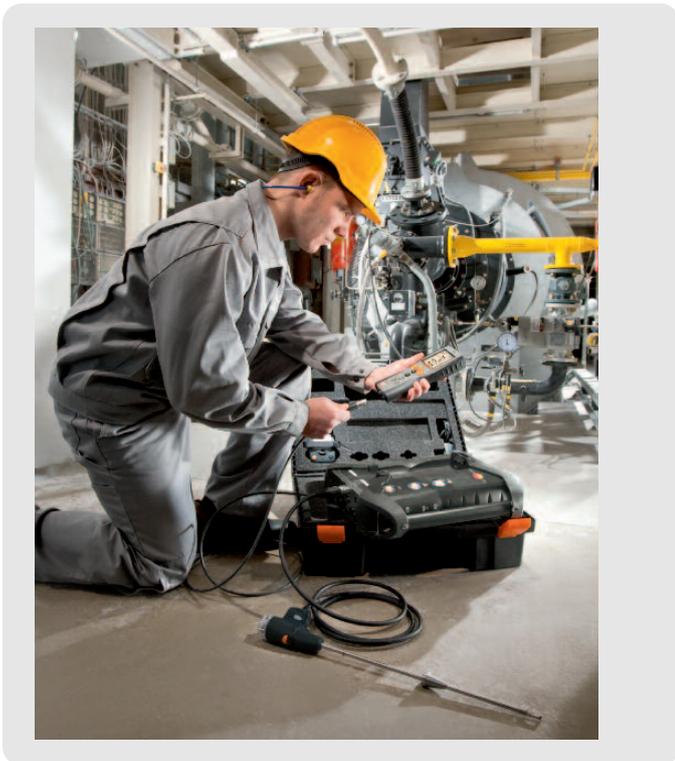
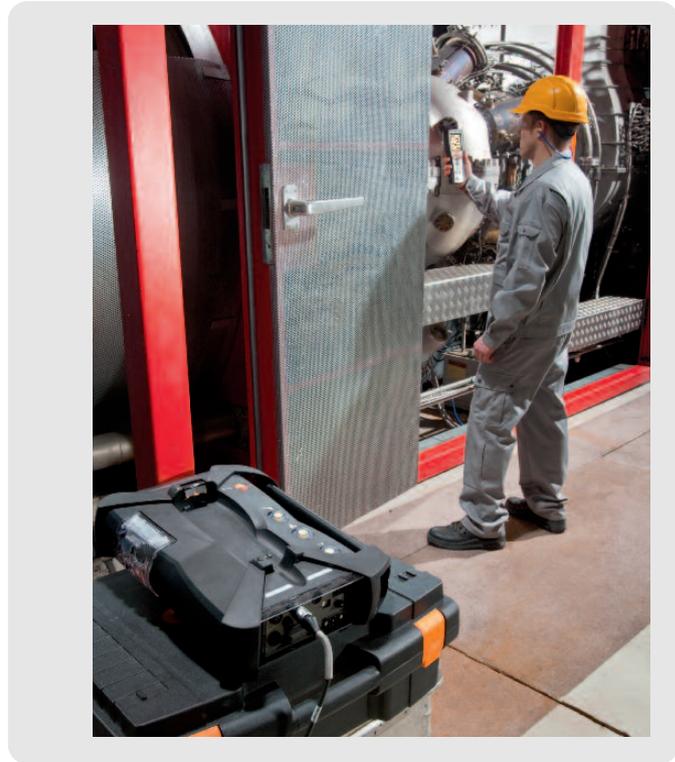
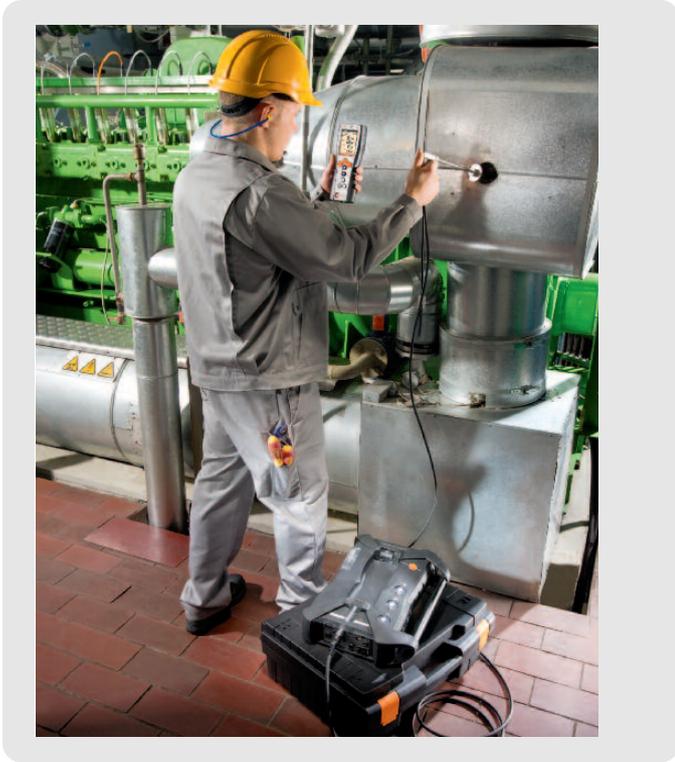
The robust housing has built-in impact protection (specially constructed X-shaped rubber edges), allowing the analyzer box to be used in tough conditions. Downtimes due to dirt in the instrument are almost completely eliminated by intelligent design and robustness. Inherently sealed chambers protect the interior of the instrument from dirt from the surroundings. Operation can be carried out with the control unit or in direct connection with a PC or notebook (CANCase oder Bluetooth® 2.0). The analyzer box can, after programming, independently carry out measurements and store measurement data.

The plug-in connections for the probes and bus cables are locked by bayonet fittings, and therefore securely connected to the analyzer box. This prevents unintentional removal, avoiding false measurements.

### The advantages of the analyzer box

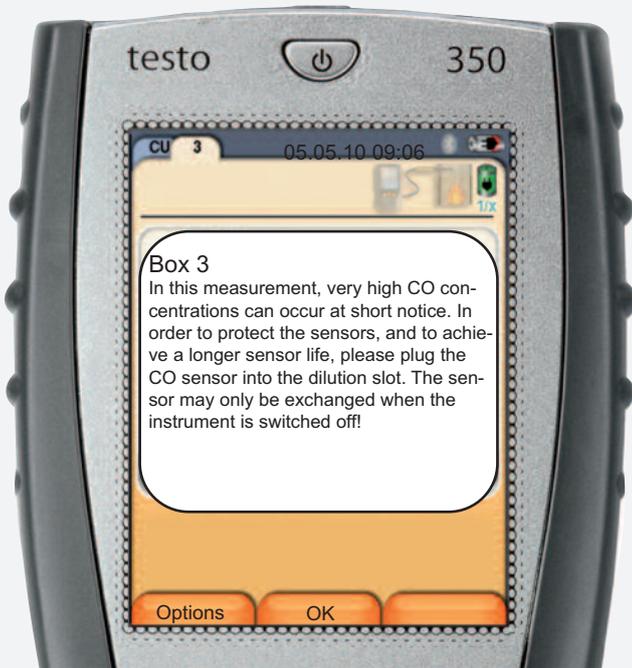
Special chambers offer comprehensive protection for the sensors and electronics from dust and deposits, and against knocks and jars.

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## testo 350 facilitates emission measurements ...



Example of display of the control unit diagnosis function and information in clear text

### ... thanks to a colour display with graphic menu

- ✓ Step by step – Information in the display guides through the measurement, meaning no previous familiarity with the instrument is necessary
- ✓ Specific fuels are pre-set for the application
- ✓ Application-specific flue gas parameters are stored in the menu
- ✓ Instrument settings such as the dilution factor of gas sensors are activated by application
- ✓ Automatic testing of whether the relevant gas sensors are connected to the intended dilution slot
- ✓ Special measurement mode for the testing of catalytic converters with two flue gas analyzers
- ✓ Faster and easier analysis of the system status thanks to graphic and coloured presentation of the measurement values – a glance is enough!

### ... thanks to the instrument diagnosis

- ✓ Information on the current status of the flue gas analyzer testo 350 at any time
- ✓ Early warning reports of approaching replacement of wearing parts – to be on the safe side.

## Efficient emission measurements which are also cost-effective in the long term:

- Easy exchange of the gas sensor by the user.
- After a warning report from the flue gas analyzer, wearing parts can always be replaced in time.
- Probe shafts can be easily exchanged or replaced.
- Further gas measurement parameters can be added at any time. Simply order additional gas sensors, install, and measure safely.
- Thanks to the unique measuring range extension, measurements can be carried out flexibly with only one gas sensor.
- The cross-sensitivity filter of the NO sensor can be exchanged by the user after a report



Exchanging probe shaft

Replacing filter

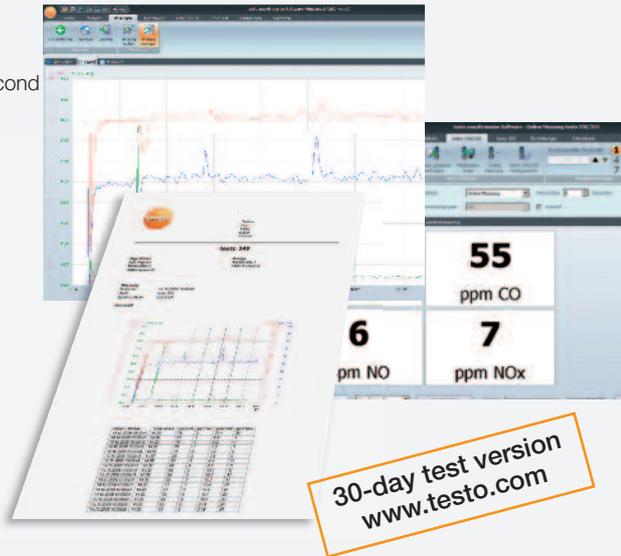
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## easyEmission software – convenient measurement data management

Using the "easyEmission" software, data can be read out, conveniently processed, archived and managed.

### Advantages of easyEmission

- ✓ Presentation of the measurement values as a table or a graph
- ✓ User-defined measurement intervals (from one measurement / second to one measurement / hour)
- ✓ Online measurement via BLUETOOTH® wireless transfer or by USB connection
- ✓ Customer and application-specific measurement protocols
- ✓ Data structure and measurement information are transferrable from the PC/notebook to the instrument
- ✓ All instrument configurations and settings are easily carried out with easyEmission
- ✓ Direct export to Excel and PDF formats
- ✓ Easy implementation of individual formulas for the user's own calculations
- ✓ Calculation of fuel factors when using customer-specific fuels
- ✓ Control of the bus system with up to 16 flue gas analyzer boxes
- ✓ Implementation of individual cross-sensitivity adjustments of the gas sensors



## An overview of the testo 350 data interfaces

It is this easy to control measurements, read out, transfer and print measurement data! These data interfaces are selectable for easy communication and data transfer:

- **Bluetooth®**  
2.0 (up to 100 m without obstruction)
- **USB**
- **Infrared interface**  
(Communication with the Testo printer)
- **Testo databus**  
(up to 800m cable length) for the simultaneous operation of up to 16 analyzer boxes. Control optionally via PC, Testo databus controller or control unit.





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## INDIVIDUAL DILUTION WITH SELECTABLE DILUTION FACTOR (X2, X5, X10, X20, X40)

	CO (H <sub>2</sub> compensated)	COlow meas. (H <sub>2</sub> compensated)	NO measurement	NOlow measurement	SO <sub>2</sub> measurement	HC-Pellistor
<b>Meas. range</b>	dilution factor-dependent	dilution factor-dependent	dilution factor-dependent	dilution factor-dependent	dilution factor-dependent	dilution factor-dependent
<b>Accuracy</b>	±2 % of m.v. (additional error)	±2 % of m.v. (additional error)	±2 % of m.v. (additional error)	±2 % of m.v. (additional error)	±2 % of m.v. (additional error)	±2 % of m.v. (additional error)
<b>Resolution</b>	1 ppm	0.1 ppm	0.1 ppm	0.1 ppm	1 ppm	10 ppm

## DILUTION OF ALL SENSORS (FACTOR 5)

	CO (H <sub>2</sub> compensated)	COlow meas. (H <sub>2</sub> compensated)	NO measurement	NOlow measurement	SO <sub>2</sub> measurement	NO <sub>2</sub> measurement	H <sub>2</sub> S measurement
<b>Meas. range</b>	2500 to 50000 ppm	500 to 2500 ppm	1500 to 20000ppm	300 to 1500 ppm	500 to 25000 ppm	500 to 2500 ppm	200 to 1500 ppm
<b>Accuracy</b>	±5 % of m.v. (additional error) Pressure range -100 to 0 mbar at probe tip	±5 % of m.v. (additional error) Pressure range -100 to 0 mbar at probe tip	±5 % of m.v. (additional error) Pressure range -100 to 0 mbar at probe tip	±5 % of m.v. (additional error) Pressure range -100 to 0 mbar at probe tip	±5 % of m.v. (additional error) Pressure range -100 to 0 mbar at probe tip	±5 % of m.v. (additional error) Pressure range -100 to 0 mbar at probe tip	±5 % of m.v. (additional error) Pressure range -100 to 0 mbar at probe tip
<b>Resolution</b>	1 ppm	0.1 ppm	1 ppm	0.1 ppm	1 ppm	0.1 ppm	0.1 ppm

## TECHNICAL DATA ANALYZER BOX TESTO 350

	Degree of effectivity	Exhaust gas loss	CO <sub>2</sub> calculation	Differential pressure 1	Differential pressure 2	Flow velocity	Absolute pressure! <sup>k</sup> (opt. if IR sensor equipped)	Flue gas dewpoint calculation
<b>Meas. range</b>	0 to +120 %	0 to +99.9 % qA	0 to CO <sub>2</sub> max Vol % CO <sub>2</sub> .	-40 to +40 hPa	-200 to +200 hPa	0 to +40 m/s	-600 to +1150 hPa	0 to +99.9 'Ctd
<b>Accuracy</b>			Calculated from O <sub>2</sub> ±0.2 Vol. %	±1.5% of m.v. (-40 to -3 hPa) ±1.5% of m.v. (+3 to +40 hPa) ±0.03 hPa (-2.99 to +2.99 hPa)	±1.5% of m.v. (-200 to -50 hPa) ±1.5% of m.v. (+50 to +200 hPa) ±0.5 hPa (-49.9 to +49.9 hPa)		± 10 hPa	
<b>Resolution</b>	0.1 % (0 to +120%)	0.1 % qA (-20 to +99.9 % qA)	0.01 Vol. % CO <sub>2</sub>	0.01 hPa (-40 to +40 hPa)	0.1 hPa (-200 to +200 hPa)	0.1 m/s (0 to +40 m/s)	1 hPa	0.1 'Ctd (0 to +99.9 'Ctd)
<b>Reaction time</b>			430 s					
<b>Reaction type</b>			too					

## TESTO 350

## RANGE OF GASES DETECTED

Measurement Parameter	Methane	Propane	Butane
Meas. range <sup>1</sup>	100 to 40,000 ppm	100 to 21,000 ppm	100 to 18,000 ppm
Accuracy	< 400 ppm (100 to 4000 ppm) < 10 % of m.v. (> 4000 ppm)	< 400 ppm (100 to 4000 ppm) < 10 % of m.v. (> 4000 ppm)	< 400 ppm (100 to 4000 ppm) < 10 % of m.v. (> 4000 ppm)
Resolution	10 ppm	10 ppm	10 ppm
Min. O <sub>2</sub> requirement in flue gas	2% + (2 x m.v. methane)	2% + (5 x m.v. propane)	2% + (6.5 x m.v. butane)
Response time t <sub>90</sub>	< 40 sec.	< 40 sec.	< 40 sec.
Response-Faktor <sup>2</sup>	1	1.5	2

<sup>1</sup> Lower explosion limit must be adhered to .

<sup>2</sup> The HC sensor is adjusted to methane in the factory. It can be adjusted to another gas (propane or butane) by the use

Meas. range	Type K (NiCr - Nil)	Type S (Pt10Rh-Pt)	Ambient temperature probe (NTC)
	-200 to +1370°C	0 to +1760°C	-20 to +50°C
Accuracy ± 1 digit	±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)	±0.2 °C (-10 to +50°C)
Resolution	0.1°C (-200 to +1370°C)	0.1°C (0 to +1760°C)	0.1°C (-20 to +50°C)

## SPECIFICATIONS Specifications subject to change without notice

Dimensions	330 x 128 x 438 mm	Hose length:	max 16.2 m (corresp. to 5 probe hose extensions)
Weight:	4800 g	Max. humidity load:	+70 °C
Storage temperature	-20 to +50 °C	Dewpoint temperature at measurement gas input of analyzer box	
Operating temperature:	-5 to +45 °C	Trigger input	Voltage 5 to 12 Volt (rising or falling flank) Impulse width > 1 sec Load: 5 V/max, 5 mA, 12 V/max. 40 mA
Housing material	ABS	Warranty	Measuring instrument 2 years (apart from wearing parts, e.g. gas sensors)
Memory	250,000 Measurement values	Gas sensors	CO/NO/NO <sub>2</sub> /SO <sub>2</sub> /H <sub>2</sub> S/ICxHY: 1 year
Power supply	AC mains unit 90V to 260V (47 to 65 Hz)	O <sub>2</sub> sensor:	1 ½ years
DC voltage supply	11V to 40V	CO <sub>2</sub> - IR sensor:	2 years.
Max. dust load	20 g/m <sup>3</sup> dust in flue gas	Rech. battery	1 year
Dewpoint calculation:	0 to 99 °C td	Protection class	IP40
Max. pos. pressure flue gas	max. +50 mbar	Battery life	Maximum load approx. 2.5 h
Max. neg. pressure:	min. -300 mbar		
Pump through-put	1 l/min . with through-put monitoring		



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