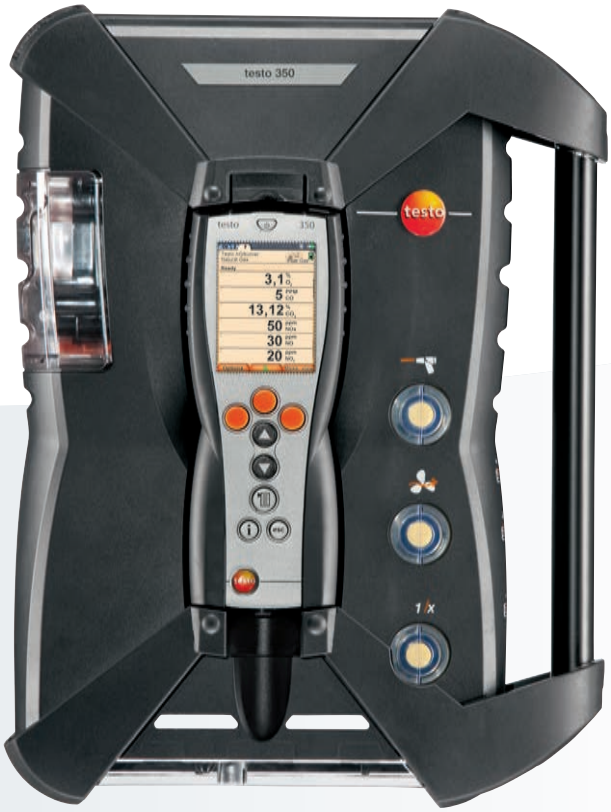
We measure it. testo

# Flue gas analyzer for industry

## testo 350 – Professional measurement system for portable, industrial emission measurement

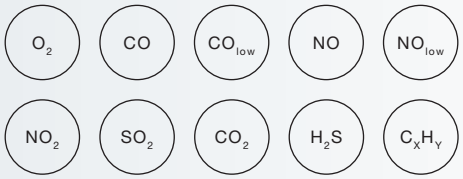



Application-guided operation with useful instrument pre-settings

Large colour graphical display

Industrial-standard design:
- insensitive to impact and dirt thanks to integrated impact protection
- robust plug-in connections
- closed chambers protect the interior of the instrument from dirt

Easy exchange of gas sensors and quick access to wearing parts




The portable flue gas analyzer testo 350 is the ideal tool for professional flue gas analysis. The Control Unit is the removable operation and display unit of the testo 350. 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, several analyzer boxes can be operated and controlled with one Control Unit. The measurement technology is situated in the analyzer box. The robust housing has integrated impact protection.

Downtimes due to contamination of the instrument are almost completely eliminated. Inherently closed chambers protect the interior of the instrument from dirt from the surroundings. Operation can also be carried out in direct connection to a PC or notebook, as an alternative to the Control Unit. After programming, the analyzer box is able to carry out measurements and store measurement data independently.

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# Product properties

## Control Unit

The Control Unit is the operating and display unit of the testo 350. It is removable and equipped as standard with a **Li-Ion rechargeable battery**. All settings are made via the cursor button. The presentation of the measurement values takes place in the **colour graphical 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 be simultaneously and conveniently operated and controlled by one Control Unit.

The **particle filters** are easily accessible and can be exchanged without tools.

## Analyzer box

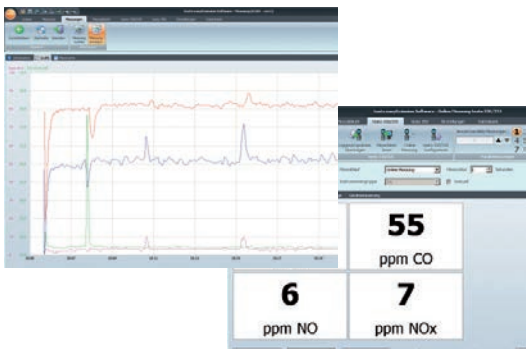
In the testo 350 analyzer box are the gas sensors, the measurement gas and rinsing pumps, the Peltier gas preparation (optional), the gas paths, filters, analysis and storage electronics as well as the mains unit and Li-ion rechargeable batteries. The robust housing has an integrated impact protection for use in tough surroundings. Inherently closed chambers protect the interior of the instrument from dirt from the surroundings. Operation can be carried out either with the Control Unit or in direct connection to a PC or laptop (USB, Bluetooth® 2.0 or CANCase). After programming, the analyzer box can automatically carry out measurements and store measurement data.

The **status display** shows the operational status, and is easily visible from a disance.

The **connections** are industrial-standard thanks to new, mechanically robust plug-in connections (the connections for probes and databus cable are fixed with a bayonet connection, and thus securely connected to the analyzer box. This prevents unintentional removal, avoiding incorrect measurements).

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

- Presentation of measurement values as a table or graph
- User-defined measurement intervals
- Online measurements via BLUETOOTH® wireless tranfer or by USB connection
- Customer- and application specific measurement protocols
- All instrument configurations and settings are easily carried out with easyEmission
- Direct transfer to Excel and PDF formats
- Easy implementation of individual formulae for customized calculations
- Calculation of fuel factors when using customer-specific fuels
- Conduction of individual cross-sensitivity adjustments of the gas sensors




**Large colour graphic display with application-specific menu**


The following measurement objects are available:

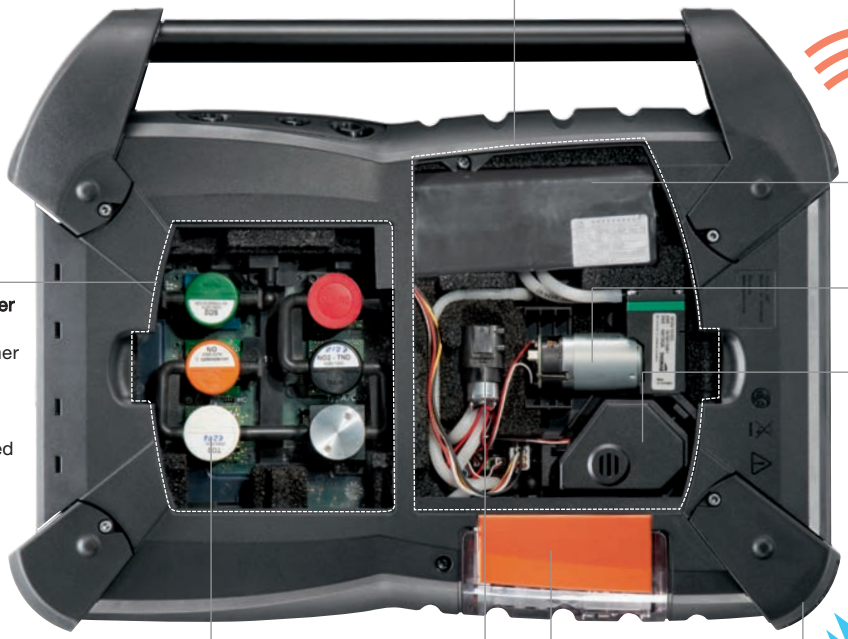
- Burner
- Gas turbine
- Engines (selection between $\lambda > 1$ nd $\lambda \leq 1$ regulated industrial engines)
- User-defined

Behind each of these measurement objects, typical fuels, a practicable order of the flue gas parameters in the display, corresponding calculations and useful instrument pre-settings are stored. These include, for example, the activation of the dilution in measurements on $\lambda \leq 1$ regulated industrial engines or the testing of the relevant gas sensor on the dilution slot.

The advantages of application-specific menus:

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

The **service aperture** on the underside of the instrument allows very easy access to all relevant service and wearing part such as pumps and filters, which can then be cleaned or exchanged easily on site.



**Li-Ion rechargeable battery**, mains-independent power supply over several hours

The **measurement gas pump** transports the gas to the gas sensors

The **condensate transport pump** pumps occuring condensate into the condensate trap. The filling level monitor reports when the condensate trap needs to be emptied. A few minutes after the report, the measurement gas pump is automatically stopped in order to avoid damage to the instrument.

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

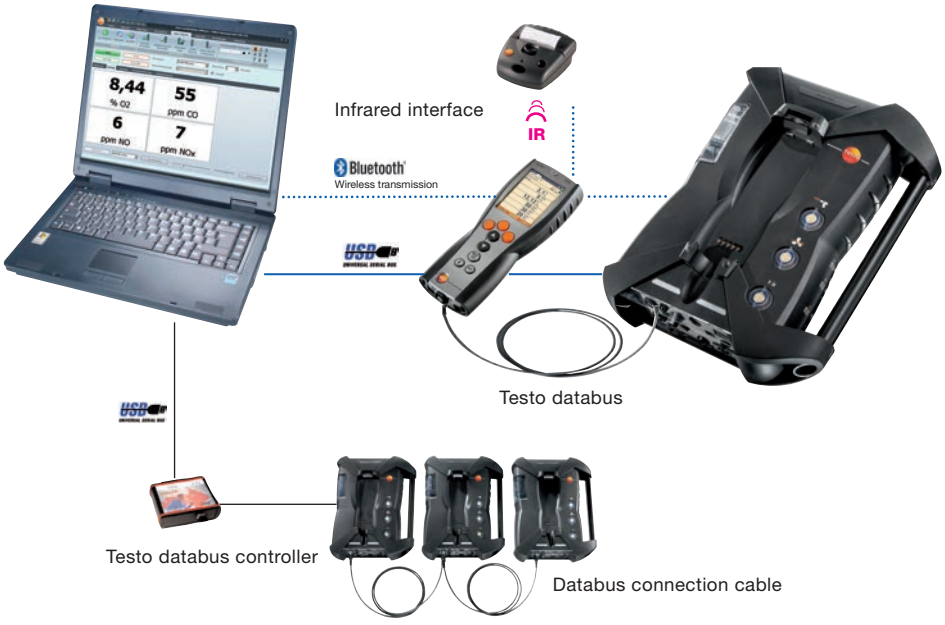
The **gas sensors** are pre-calibrated and can be exchanged, replaced or extended by further measurement parameters without test gas adjustment – if necessary, directly on site.

**Condensate trap**

The **fresh air and dilution pump** supplies the gas sensors with fresh air as required

The **closed cooling loop** isolates the instrument electronics and sensors from the surrounding air. The interior of the instrument is cooled by a heat exchanger, and does not come into contact with dirty or corrosive ambient air.

**Flexible data interfaces**
These data interfaces are available for easy communication and data transfer:
- Bluetooth® 2.0 (up to 100 m without obstruction)
- USB
- Infrared interface (communication with the Testo printer)
- Testo datenbus (up to 800 m cable length) for the simultaneous operation of up to 16 analyzer boxes. Control optionall via PC, Testo databus controller or Control Unit.



# Ordering suggestions

## Emission measurement on industrial engines

| | Part no. |
|---|---|
| **testo 350 Control Unit** | 0632 3511 |
| Option BLUETOOTH® wireless transmission | |
| **testo 350 analyzer box** | 0632 3510 |
| Option CO sensor ($H_2$-compensated), 0 to 10,000 ppm, resolution 1 ppm | |
| Option NO sensor, 0 to 4,000 ppm, resolution 1 ppm | |
| Option $NO_2$ sensor, 0 to 500 ppm, resolution 0.1 ppm | |
| Option $C_xH_y$ sensor, methane 100 to 40,000 ppm, propane 100 to 21,000 ppm, butane 100 to 18,000 ppm, resolution 10 ppm. Pellistor is adjusted to methane ex-works. | |
| Option Peltier gas preparation incl. peristaltic pump for automatic condensate trap evacuation | |
| Option BLUETOOTH® wireless transmission | |
| Option fresh air valve for long-term measurement, incl. measuring range extension with dilution factor 5 for all sensors. For long-term measurements >2 hours measurement time, the additional Peltier gas preparation option is recommended. | |
| Option measuring range extension for single slot with the following selectable dilution factors: 0, 2, 5, 10, 20, 40 | |
| Flue gas probe for industrial engines, immersion depth 335 mm, incl. cone and heat shield, Tmax. probe shaft +1000 °C, special hose for $NO_2$-/$SO_2$ measurement, length 5 m | 0600 7552 |
| BLUETOOTH printer set with wireless BLUETOOTH interface; incl. 1 roll thermal paper, rechargeable battery and mains unit | 0554 0553 |
| Software "easyEmission", incl. USB connection cable instrument-PC | 0554 3334 |
| Mains unit international 100-240 V AC / 6.3 V DC for mains operation or battery charging in instrument | 0554 1096 |
| Transport case for secure and tidy storage of testo 350 flue gas analyzer, flue gas probe and accessories, dimensions 570 x 470 x 210 mm (LxWxH) | 0516 3510 |

**Highly accurate NOx measurement**
The new testo 350 allows the separate measurement of NO and NO2. The high and fluctuating NO and NO2-components of engine exhaust gas make this measurement necessary in order to be able to display the real NOX value of the engine. In addition to this, the integrated gas preparation and the special flue gas probe for industrial engines with a special hose offer protection from $NO_2$-/ and $SO_2$ absorption.

**Automatic measuring range extension for unexpectedly high CO concentrations**
For measurements on unfamiliar systems or in a less than ideal operational status of the engine, unexpectedly high emission values can occur (e.g CO concentrations up to 50,000 ppm). In these cases, the automatic measuring range extension is activated. This means maximum sensor lifetime. These helpful pre-settings are already stored application-specifically in the instrument.

**Special instrument menu for testing flue gas post-preparation systems**
This flue gas menu allows the simultaneous measurement of flue gas concentrations before and after the catalytic converter. For this purpose, two analyzer boxes are shown parallel in the display of the Control Unit, allowing a fast overview of the status of the catalytic converter.

**Spatial distances**
At greater distances between the gas sampling site and the adjustment site, the Control Unit can be connected to the analyzer box via the testo databus cable or by Bluetooth®.

## Emission measurement on burners

| | Part no. |
|---|---|
| **testo 350 Control Unit** | 0632 3511 |
| Option BLUETOOTH® wireless transmission | |
| **testo 350 analyzer box** | 0632 3510 |
| Option CO sensor ($H_2$-compensated), 0 to 10,000 ppm, resolution 1 ppm | |
| Option NO sensor, 0 to 4,000 ppm, resolution 1 ppm | |
| Option $NO_2$ sensor, 0 to 500 ppm, resolution 0.1 ppm | |
| Option $SO_2$ sensor, 0 to 5,000 ppm, resolution 1 ppm | |
| Option Peltier gas preparation incl. peristaltic pump for automatic condensate trap evacuation | |
| Option BLUETOOTH® wireless transmission | |
| Option measuring range extension for single slot with the following selectable dilution factors: 0, 2, 5, 10, 20, 40 | |
| Modular gas sampling probe, incl. special hose for $NO_2$-/$SO_2$-measurement, cone, thermocouple NiCr-Ni (Tl), probe shaft length 335 mm, Tmax. probe shaft 1000 °C, hose length 2.2 m | 0600 8764 |
| Mains unit international 100-240 V AC / 6.3 V DC for mains operation or battery charging in instrument | 0554 1096 |
| Transport case for secure and tidy storage of testo 350 flue gas analyzer, flue gas probe and accessories, dimensions 570 x 470 x 210 mm (LxWxH) | 0516 3510 |

**High availability even under difficult circumstances**
The instrument diagnosis as well as warning reports in clear text inform you of the current status of the flue gas analyzer. The large service aperture of the testo 350 offers easy access to all relevant wearing parts such as sensors, filters and pumps. This allows these parts to be easily and quickly cleaned or exchanged on site. The pre-calibrated gas sensors enable sensor exchange without testo gas.

**High measurement accuracy even in unsupervised long-term measurements**
The integrated gas preparation prevents condensate from entering and damaging the measuring instrument. Any condensate occuring is automatically pumped off by a peristaltic pump. In addition to this, the gas preparation and the PTFE hose in the gas sampling probe avoid $NO_2$ and $SO_2$ absoption – allowing highly accurate measurement results.

**Useful instrument pre-settings which save time**
Typical fuels, a practicable order of the flue gas parameters and useful instrument settings are pre-programmed in the instrument behind each application (selection list in display). Information in the display guides the user through the measurement, instrument-specific previous knowledge is not necessary. The testo 350 is ready to use in minutes.

**Unrestricted measurement at high concentrations**
In the commissioning of burners and during measurements on unfamiliar systems, very high concentrations can occur unexpectedly. In these cases, the measuring range extension is automatically activated.

# Emission measurement on gas turbines

| | Part no. |
|---|---|
| **testo 350 Control Unit** | 0632 3511 |
| Option BLUETOOTH® wireless transmission | |
| **testo 350 analyzer box** | 0632 3510 |
| Option $CO_{low}$ sensor ($H_2$-compensated), 0 to 500 ppm, resolution 0.1 ppm | |
| Option $NO_{low}$ sensor, 0 to 300 ppm, resolution 0.1 ppm | |
| Option $NO_2$ sensor, 0 to 500 ppm, resolution 0.1 ppm | |
| Option Peltier gas preparation incl. peristaltic pump for automatic condensate trap evacuation | |
| Option BLUETOOTH® wireless transmission | |
| Option fresh air valve for long-term measurement, incl. measuring range extension with dilution factor 5 for all sensors. For long-term measurements >2 hours measurement time, the additional Peltier gas preparation option is recommended. | |
| Option measuring range extension for single slot with the following selectable dilution factors: 0, 2, 5, 10, 20, 40 | |
| Flue gas probe for industrial engines, immersion depth 335 mm, incl. cone and heat shield, Tmax. probe shaft +1000 °C, special hose for $NO_2$-/$SO_2$ measurement, length 5 m | 0600 7552 |
| BLUETOOTH printer set with wireless BLUETOOTH interface; incl. 1 roll thermal paper, rechargeable battery and mains unit | 0554 0553 |
| Mains unit international 100-240 V AC / 6.3 V DC for mains operation or battery charging in instrument | 0554 1096 |
| Transport case for secure and tidy storage of testo 350 flue gas analyzer, flue gas probe and accessories, dimensions 570 x 470 x 210 mm (LxWxH) | 0516 3510 |

**Easy, accurate test gas adjustment by the user**
In order to fulfil the highest accuracy and comparability requirements, the testo 350 can if necessary be adjusted with test gas on site.

**Use in rough conditions**
Special chambers and inhernetly closed cooling loops isolate the instrument electronics and the sensors from the ambient air. This means that the sensor chamber is thermally separated from other instrument components, reducing possible drifts caused by thermal influences.

**Highly accurate $NO_x$ measurements at low concentrations**
Emission measurement during test and adjustment work on Low$NO_x$ gas turbines requires a very high level of measurement accuracy because of the low NO concentrations. Thanks to the combination of an NO2 sensor and the special NOlow sensor with a resolution of 0.1 ppm, exactly these requirements are fulfilled. The integrated gas preparation and the special flue gas probe for industrial engines with a special hose additionally offer protection from NO2 absorption.

**Combination of measuring range extension and $CO_{low}$ sensor**
Thanks to the freely selectable dilution stages of the measuring range extension, measurement of concentrations of up to max. 20,000 ppm are no problem with the $CO_{low}$ sensor.

# Emission measurement on thermal processes

| | Part no. |
|---|---|
| **testo 350 Control Unit** | 0632 3511 |
| Option BLUETOOTH® wireless transmission | |
| **testo 350 analyzer box** | 0632 3510 |
| Option CO sensor ($H_2$-compensated), 0 to 10,000 ppm, resolution 1 ppm | |
| Option $CO_2$(NDIR) sensor, 0 to 50 Vol %, resolution 0.01 Vol %, infrared measurement principle, incl. absolute pressure measurement and $CO_2$-absoption filter with refill pack. For long-term measurements >15 minutes measurement time, the additional Peltier gas preparation option is recommended. | |
| Option NO sensor, 0 to 4,000 ppm, resolution 1 ppm | |
| Option $NO_2$ sensor, 0 to 500 ppm, resolution 0.1 ppm | |
| Option Peltier gas preparation incl. peristaltic pump for automatic condensate trap evacuation | |
| Option BLUETOOTH® wireless transmission | |
| Modular gas sampling probe, incl. special hose for $NO_2$-/$SO_2$-measurement, cone, thermocouple NiCr-Ni (TI), probe shaft length 335 mm, Tmax. probe shaft 1000 °C, hose length 2.2 m | 0600 8764 |
| Software "easyEmission", incl. USB connection cable instrument-PC | 0554 3334 |
| Mains unit international 100-240 V AC / 6.3 V DC for mains operation or battery charging in instrument | 0554 1096 |
| Transport case for secure and tidy storage of testo 350 flue gas analyzer, flue gas probe and accessories, dimensions 570 x 470 x 210 mm (LxWxH) | 0516 3510 |

**Excellently suited to long-term measurements**
Processes and furnace cycles can be monitored and analyzed over several days, controlled by defined measurement procedures. The testo 350 carries out the measurements automatically, and stores the data in the internal memory. Control can also take place directly via the PC and software.

**Simultaneous flue gas analysis of different measurement points**
In order to create a simultaneous profile of the furnace atmosphere or the combustion zones, up to 16 analyzer boxes can be connected to each other into a measurement system via the Testo databus. Control takes place either via the Control Unit or directly via a PC/notebook.

**Ideal for measurements at high concentrations**
Especially when recording extreme concentrations in the % range, the measuring range extension is automatically activated. The gas sensor is placed under no greater burden than at low gas concentrations, a maximum sensor lifetime is achieved – without additional costs for other gas sensors.

**Industrial-standard instrument functions for more security**
Inherently closed cooling loops isolate the instrument electronics and the sensors from the ambient air. This means that the testo 350 can also be used without restrictions in dirty and dusty atmospheres. The impact protection integrated into the housing protects the testo 350 from knocks and jars on the way to the measurement site.

# Ordering data

| testo 350 Control Unit | Part no. | |
|---|---|---|
| testo 350 Control Unit, displays measurement values and controls analyzer box, incl. rech. battery, measurement data store, USB interface and connection for Testo databus | 0632 3511 | |
| Option BLUETOOTH® wireless transmission | | |
| Mains unit international 100-240 V AC / 6.3 V DC for mains operation or battery charging in instrument | 0554 1096 | |

| testo 350 analyzer box | Part no. | |
|---|---|---|
| testo 350 analyzer box, equipped with O2, incl. differential pressure sensor, temperature probe input Type K NiCr-Ni and Type S Pt10Rh-Pt, connection Testo databus, rech. battery, integrated combustion air probe (NTC), trigger input, measurement data store, USB interface, updatable to max. 6 gas sensors selected from CO, COlow, NO, NOlow, NO2, SO2, CO2 NDIR, CxHy, H2S | 0632 3510 | |
| **The testo 350 must be equipped with a second gas sensor, otherwise the instrument cannot function. A maximum of five additional sensors can be fitted.** | | |
| Option CO sensor ($H_2$-compensated), 0 to 10,000 ppm, resolution 1 ppm | | |
| Option $CO_{low}$ sensor ($H_2$-compensated), 0 to 500 ppm, resolution 0.1 ppm | | |
| Option NO sensor, 0 to 4,000 ppm, resolution 1 ppm | | |
| Option $NO_{low}$ sensor, 0 to 300 ppm, resolution 0.1 ppm | | |
| Option $NO_2$ sensor, 0 to 500 ppm, resolution 0.1 ppm | | |
| Option $SO_2$ sensor, 0 to 5,000 ppm, resolution 1 ppm | | |
| Option $CO_2$(NDIR) sensor, 0 to 50 Vol %, resolution 0.01 Vol %, infrared measurement principle, incl. absolute pressure measurement and $CO_2$-absoption filter with refill pack. For long-term measurements >15 minutes measurement time, the additional Peltier gas preparation option is recommended. | | |
| Option $C_xH_y$ sensor, methane 100 to 40,000 ppm, propane 100 to 21,000 ppm, butane 100 to 18,000 ppm, resolution 10 ppm. Pellistor is adjusted to methane ex-works. | | |
| Option $H_2S$ sensor, 0 to 300 ppm, resolution 0.1 ppm | | |
| Option BLUETOOTH® wireless transmission | | |
| Option Peltier gas preparation incl. peristaltic pump for automatic condensate trap evacuation | | |
| Option fresh air valve for long-term measurement, incl. measuring range extension with dilution factor 5 for all sensors. For long-term measurements >2 hours measurement time, the additional Peltier gas preparation option is recommended. | | |
| Option measuring range extension for single slot with the following selectable dilution factors: 0, 2, 5, 10, 20, 40 | | |
| Option DC voltage input 11 V to 40 V | | |
| Option special gas pump for long-term measurements with extended warranty. For long-term measurements >2 hours measurement time, the additional Peltier gas preparation option is recommended. | | |
| Option automatic zeroing of pressure sensor for continuous flow velocity/differential pressure measurement | | |

| Accessories testo 350 analyzer box | Part no. | |
|---|---|---|
| Cable with battery clips and adapter for connection to DC voltage input testo 350 analyzer box | 0554 1337 | |
| Exchangeable filter NO sensor (1 off), blocks cross-gas $SO_2$ | 0554 4150 | |
| Transport case for secure and tidy storage of testo 350 flue gas analyzer, flue gas probe and accessories, dimensions 570 x 470 x 210 mm (LxWxH) | 0516 3510 | |
| Transport backpack for testo 350 | 0516 3511 | |
| Carrying belt set for flue gas analyzer testo 350 | 0554 0434 | |
| Spare particle filter for testo 350 analyzer box (20 pcs.) | 0554 3381 | |
| Hose set to transport flue gas from testo 350 analyzer box, length 5 m | 0554 0451 | |
| Wall holder for analyzer box testo 350, can be locked | 0554 0203 | |
| Current/voltage cable (±1 V, ±10 V, 20 mA) | 0554 0007 | |

# Ordering data

| PC software and Testo databus | Part no. | |
|---|---|---|
| Software "easyEmission", incl. USB connection cable instrument-PC<br>Functions: user-defined measurement intervals, transfer of measurement values to Microsof EXCEL in seconds, user-defined fuels, presentation of measurement values as a table or graph, easy configuration of customer-specific reports, etc. | 0554 3334 | |
| Software "easyEmission" for testo 350 incl. Testo databus controller with USB connection instrument-PC, cable for Testo databus and terminal plug. If several testo 350 flue gas analyzers are connected to the Testo databus, they can then be controlled and read out on a PC (possible measurement interval in databus of 1 measurement per second). | 0554 3336 | |
| Connection cable for Testo databus between Control Unit and analyzer box or between several analyzer boxes, with bayonet connection, length 2 m. | 0449 0075 | |
| Connection cable for Testo databus between Control Unit and analyzer box or between several analyzer boxes, with bayonet fitting, length 5 m | 0449 0076 | |
| Connection cable for Testo databus between Control Unit and analyzer box or between several analyzer boxes, with bayonet fitting, length 20 m | 0449 0077 | |
| More cable lengths up to 800 m on request | | |
| Set Analog output box, 6 channels, 4 to 20 mA, for output of the measurement values on for example an analog recorder, set consists of analog output box, connection cable Testo databus, length 2 m, Testo databus terminal plug | 0554 3149 | |

| Printer and Accessories | Part no. | |
|---|---|---|
| Testo fast printer IRDA with wireless infrared interface; 1 roll thermal paper; 4 AA batteries | 0554 0549 | |
| BLUETOOTH printer set with wireless BLUETOOTH interface; incl. 1 roll thermal paper, rechargeable battery and mains unit | 0554 0553 | |
| Spare thermal paper for printer, permanent ink | 0554 0568 | |

| Calibration Certificates | Part no. | |
|---|---|---|
| ISO calibration certificate/flue gas | 0520 0003 | |
| 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 | |

# Probes

| Standard gas sampling probes: Modular flue gas probes, available in 2 lengths, incl. probe stop, NiCr-Ni thermocouple, 2.2 m hose and particle filter | Part no. | |
|---|---|---|
| Modular flue gas probe 335 mm immersion depth, incl. cone, thermocouple NiCr-Ni (TI) Tmax 500 °C and $NO_2/SO_2$ special hose 2.2 m | 0600 9766 | |
| Modular flue gas probe 700 mm immersion depth, incl. cone, thermocouple NiCr-Ni (TI) Tmax 500 °C and $NO_2/SO_2$ special hose 2.2 m | 0600 9767 | |
| Modular flue gas probe 335 mm immersion depth, incl. cone, thermocouple NiCr-Ni (TI) Tmax 1000 °C and $NO_2/SO_2$ special hose 2.2 m | 0600 8764 | |
| Modular flue gas probe, 700 mm immersion depth, incl. cone, thermocouple NiCr-Ni Tmax 1000 °C and $NO_2/SO_2$ special hose 2.2 m | 0600 8765 | |
| Modular flue gas probe with pre-filter Ø 14 mm 335 mm immersion depth, incl. cone, thermocouple NiCr-Ni (TI) Tmax 1000°C and $NO_2/SO_2$ special hose 2.2 m | 0600 8766 | |
| Modular flue gas probe with pre-filter Ø 14 mm 700 mm immersion depth, incl. cone, thermocouple NiCr-Ni (TI) Tmax 1000°C and $NO_2/SO_2$ special hose 2.2 m | 0600 8767 | |

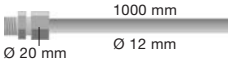
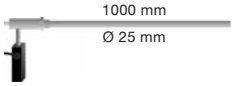
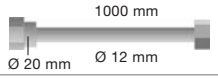
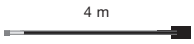
| Probe accesories/standard gas sampling probes | Part no. | |
|---|---|---|
| Hose extension; 2.8 m; extension cable for probe and analyzer | 0554 1202 | |
| Probe shaft with pre-filter, length 335 mm, incl. cone, Ø 8 mm, Tmax 1000 °C | 0554 8766 | |
| Probe shaft with pre-filter, length 700 mm, incl. cone, Ø 8 mm, Tmax 1000 °C | 0554 8767 | |
| Spare sintered filter, 2 off | 0554 3372 | |
| Spare dirt filter, modular probe; 10 off | 0554 3385 | |
| Probe shaft length 700 mm,incl. cone, Ø 8 mm, Tmax 500 °C | 0554 9767 | |
| Probe shaft length 335 mm, incl. cone, Ø 8 mm, Tmax 1000 °C | 0554 8764 | |
| Probe shaft length 700 mm, incl. cone, Ø 8 mm, Tmax. 1000 °C | 0554 8765 | |

| Engine probes | Part no. | |
|---|---|---|
| Flue gas probe for industrial engines, immersion depth 335 mm, incl. cone and heat shield, Tmax. probe shaft +1000 °C, special hose for $NO_2$-/$SO_2$ measurement, length 5 m | 0600 7552 | |
| Flue gas probe for industrial engines with probe shaft pre-filter, 335 mm immersion depth incl. cone and heat shield, Tmax +1000 °C, special hose for NO2-/SO2 measurements, length 5 m | 0600 7553 | |
| 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 | |
| Thermocouple for exhaust gas temperature measurement, NiCr-Ni, length 400 mm, Tmax. +1000 °C with 5.2 m connection cable and additional temperature protection | 0600 8895 | |
| Spare probe shaft with pre-filter for flue gas probe for industrial engines, probe shaft length 335 mm, Tmax 1000 °C | 0554 7455 | |

| Temperature probes | Part no. | |
|---|---|---|
| Combustion air temperature probe, immersion depth 60 mm | 0600 9797 | |

| Pitot tubes | Part no. | |
|---|---|---|
| Pitot tube, 350 mm long, stainless steel, measures flow velocity | 0635 2145 | |
| Pitot tube, 1000 mm long, stainless steel, measures flow velocity | 0635 2345 | |
| Connection hose; silicone; 5 m long; max. load 700 hPa (mbar) | 0554 0440 | |
| Pitot tube, stainless steel, 750 mm long, measures flow velocity with temperature, 3x hoses (5 m long) and heat shield | 0635 2042 | |

# Probes

| Industrial probes | | | Part no. | |
|---|---|---|---|---|
| Heated handle, power supply 115 to 230 V, 50/60 Hz, temperature gas path > 180 °C, IP54, gas input G1/4", gas exit M10x1 external thread |  | Power consumption: 200 Watt<br>Ready to use : after aprox. 20 min<br>Amb. temperature.: -20 to +50 °C<br>Weight: 1.7 kg | 0600 7920 | |
| Adapter, non-heated, IP54, gas input G1/4", gas exit M10x1 external thread |  | Ambient temp.: -20 to +50 °C<br>Weight: 0.4 kg | 0600 7911 | |
| Non-heated sampling pipe to +600 °C, stainless steel 1.4571 | | | 0600 7801 | |
| Non-heated sampling pipe to +1200 °C, Inconel 625 |  | Connection: G1/4“<br>Weight: 0.4 kg | 0600 7803 | |
| Non-heated sampling pipe to +1800 °C, Al-Oxide, 1 m | | | 0600 7805 | |
| Heated sampling pipe, power supply 230 V / 50 Hz, stainless steel 1.4571, heating > 180 °C, flue gas temperature max. +600 °C |  | Power consumption.: 650 Watt; connection: electr. connection in heated handle, connection adapter with screw thread/thread ring G1/4“ * | 0600 7820 | |
| Extension pipe to +600 °C, stainless steel 1.4571, 1 m |  | Connection: Thread screw/screw socket G1/4“;<br>Weight: 0.45 kg | 0600 7802 | |
| Extension pipe to +1200 °C, Inconel 625, 1 m | | | 0600 7804 | |
| Pre-filter for dusty flue gases, ceramic, dust load max. 20 g/m³, filter pore size 20 µm, temperature max. 1000 °C pre-filter can only be mounted on extension pipe 0600 7802 or 0600 7804. |  | Connection: G1/4'' Thread;<br>Weight: 0.2 kg | 0554 0710 | |
| Thermocouple, NiCr-Ni, -200 to +1200 °C, Inconel 625, length 1.2 m |  | Connection: To analyzer 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 +1200 °C, Inconel 625, length 2.2 m | | | 0430 0066 | |
| Special sampling hose for precise $NO_2/SO_2$ measurements, length 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 | |
| Extension cable, 5 m long, between plug-in head cable and instrument | | | 0409 0063 | |
| Mounting flange, stainless steel 1.4571 adjustable quick-action fitting suitable for all sampling/extension pipes |  | | 0554 0760 | |
| Transport case for industrial probes, aluminium, space for: handle, probes, flange and accessories, dimensions 1270 x 320 x 140 mm (LxWxH) | | | 0516 7900 | |

* Supply via heated handle

# Technical data

## testo 350 Control Unit

| | testo 350 Control Unit | Analog output box (mA Out) |
|---|---|---|
| Oper. temp. | -5 to +45 °C | -5 to +45 °C |
| Storage temp. | -20 to +50 °C | -20 to +50 °C |
| Battery type | Lithium battery | – |
| Battery life | 5 h (without wireless connection) | – |
| Memory | 2 MB (250,000 meas. values) | – |
| Weight | 440 g | 305 g |
| Dimensions | 88 x 38 x 220 mm | 200 x 89 x 37 mm |
| Protection class | IP40 | – |
| Warranty | 2 years | 3 years |

**Country permits BLUETOOTH® wireless transmission for testo 350**

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and Turkey

**European countries (EFTA)**
Iceland, Liechtenstein, Norway, Switzerland

**Non-European countries**
Canada, USA, Japan, Ukraine, Australia, Columbia, El Salvador, Mexico, Venezuela

## Technical data testo 350 analyzer box

| | Meas. range | Accuracy ±1 digit | Resolution | Reaction time $t_{90}$ |
|---|---|---|---|---|
| **$O_2$ measurement** | 0 to +25 Vol. % $O_2$ | ±0.8% of fsv (0 to +25 Vol. % $O_2$) | 0.01 Vol. % $O_2$ (0 to +25 Vol. % $O_2$) | 20 s ($t_{95}$) |
| **CO measurement ($H_2$ compensated)*** | 0 to +10.000 ppm CO | ±5% of mv (+200 to +2.000 ppm CO)<br>±10% of mv (+2.001 to +10.000 ppm CO)<br>±10 ppm CO (0 to +199 ppm CO) | 1 ppm CO (0 to +10.000 ppm CO) | 40 s |
| **$CO_{low}$ measurement ($H_2$ compensated)*** | 0 to 500 ppm CO | ±5% of mv (+40 to +500 ppm CO)<br>±2% of mv (0 to +39,9 ppm CO) | 1 ppm CO (0 to +500 ppm CO) | 40 s |
| **NO measurement** | 0 to +4.000 ppm NO | ±5% of mv (+100 to +1.999 ppm NO)<br>±10% of mv (+2.000 to +4.000 ppm NO)<br>±5 ppm CO (0 to +99 ppm CO) | ±1 ppm NO (0 to +4.000 ppm NO) | 30 s |
| **$NO_{low}$ measurement** | 0 to +300 ppm NO | ±5% of mv (+40 to +300 ppm NO)<br>±2 ppm NO (0 to +39.9 ppm NO) | ±0.1 ppm NO (0 to +300 ppm NO) | 30 s |
| **$NO_2$ measurement** | 0 to +500 ppm $NO_2$ | ±5% of mv (+100 to +500 ppm $NO_2$)<br>±5 ppm $NO_2$ (0 to +9,99 ppm $NO_2$) | ±0.1 ppm $NO_2$ (0 to +500 ppm $NO_2$) | 40 s |
| **$SO_2$ measurement** | 0 to +5.000 ppm $SO_2$ | ±5% of mv (+100 to +2.000 ppm $SO_2$)<br>±10% of mv (+2.001 to +5.000 ppm $SO_2$)<br>±5 ppm $SO_2$ (0 to +99 ppm $SO_2$) | ±1 ppm $SO_2$ (0 to +5.000 ppm $SO_2$) | 30 s |
| **$CO_2$ measurement (IR)** | 0 to +50 Vol. % $CO_2$ | ±0.3 Vol. % $CO_2$<br>+ 1% of mv (0 to 25 Vol. % $CO_2$)<br>±0.5 Vol. % $CO_2$<br>+ 1.5% of mv (>25 to 50 Vol. % $CO_2$) | 0.01 Vol. % $CO_2$ (0 to 25 Vol. % $CO_2$)<br>0.1 Vol. % $CO_2$ (>25 Vol. % $CO_2$) | 10 s |
| **$H_2S$ measurement** | 0 to +300 ppm $H_2S$ | ±5% of mv (+40 to +300 ppm)<br>±2 ppm (0 to +39.9 ppm) | 0.1 ppm (0 to +300 ppm) | 35 s |

* $H_2$ only as an indicator

| | Single dilution with selectable dilution factor (x2, x5, x10, x20, x40) | | | Dilution of all sensors (factor 5) When dilution of all sensors is activated, the measurement values of $O_2$, $CO_2$-(IR) and $C_xH_y$ are not shown in the display. | | |
|---|---|---|---|---|---|---|
| | Meas. range | Accuracy ±1 digit | Resolution | Meas. range | Accuracy ±1 digit | Resolution |
| **CO measurement ($H_2$ compensated)** | depending on selected factor | ±2% of m.v. (additional error) | 1 ppm | 2.500 to 50.000 ppm | ±5 % of m.v. (additional error) Press. range -100 to 0 mbar at probe tip | 1 ppm |
| **$CO_{low}$ measurement ($H_2$ compensated)** | depending on selected dil. factor | | 0.1 ppm | 500 to 2.500 ppm | | 0.1 ppm |
| **NO measurement** | | | 1 ppm | 1.500 to 20.000 ppm | | 1 ppm |
| **$NO_{low}$ measurement** | | | 0.1 ppm | 300 to 1.500 ppm | | 0.1 ppm |
| **$SO_2$ measurement** | | | 1 ppm | 500 to 25.000 ppm | | 1 ppm |
| **$C_xH_y$ measurement** | Methane: 100 to 40,000 ppm<br>Propane: 100 to 21,000 ppm<br>Butane: 100 to 18,000 ppm | | 10 ppm | | | |
| **$NO_2$ measurement** | | | | 500 to 2.500 ppm | | 0.1 ppm |
| **$H_2S$ measurement** | | | | 200 to 1.500 ppm | | 0.1 ppm |

# Technical data

## Technical data testo 350 analyzer box

| | Meas. range | Accuracy ±1 digit | Resolution | Reaction time $t_{90}$ |
|---|---|---|---|---|
| **Degree of effectivity** | 0 to +120 % | | 0.1 % (0 to +120 %) | |
| **Flue gas loss** | 0 to +99.9 % qA | | 0.1 % qA (-20 to +99.9 % qA) | |
| **$CO_2$ calculation** | 0 to $CO_{2\ max}$ Vol. % $CO_2$ | calculated from $O_2$ ±0.2 Vol.% | 0.01 Vol. % $CO_2$ | 40 s |
| **Differential pressure 1** | -40 to +40 hPa | ±1.5% of mv (-40 to -3 hPa)<br>±1.5% of mv (+3 to +40 hPa)<br>±0.03 hPa (-2.99 to +2.99 hPa) | 0.01 hPa (-40 to +40 hPa) | |
| **Differential pressure 2** | -200 to +200 hPa | ±1.5% of mv (-200 to -50 hPa)<br>±1.5% of mv (+50 to +200 hPa)<br>±0.5 hPa (-49.9 to +49.9 hPa) | 0.1 hPa (-200 to +200 hPa) | |
| **Flow velocity** | 0 to +40 m/s | | 0.1 m/s (0 to +40 m/s) | |
| **Absolute pressure (opt. when equipped with IR sensor)** | -600 to +1.150 hPa | ±10 hPa | 1 hPa | |
| **Flue gas dewpoint calculation** | 0 to 99.9 °C td | | 0.1 °C td (0 to 99.9 °C td) | |
| | | | | |
| **Type K (NiCr-Ni)** | -200 to +1.370 °C | ±0.4 °C (-100 to +200 °C)<br>±1 °C (-200 to -100.1 °C)<br>±1 °C (+200.1 to +1370 °C) | 0.1 °C (-200 to +1.370 °C) | |
| **Type S (Pt10Rh-Pt)** | 0 to +1.760 °C | ±1 °C (0 to +1.760 °C) | 0.1 °C (0 to +1.760 °C) | |
| **Ambient temperature probe (NTC)** | -20 to +50 °C | ±0.2 °C (-10 to +50 °C) | 0.1 °C (-20 to +50 °C) | |

## Technical data CxHy sensor

| Meas. parameter | Meas. range[1] | Accuracy ±1 digit | Resolution | Min. $O_2$ requirement in flue gas | Reaction time $t_{90}$ | Response factor[2] |
|---|---|---|---|---|---|---|
| **Methane** | 100 to 40.000 ppm | ‹400 ppm (100 to 4.000 ppm)<br>‹10% of mv (>4.000 ppm) | 10 ppm | 2% + (2 x m.v. methane) | ‹40 s | 1 |
| **Propane** | 100 to 21.000 ppm | | | 2% + (5 x m.v. propane) | | 1.5 |
| **Butane** | 100 to 18.000 ppm | | | 2% + (6.5 x m.v. butane) | | 2 |

[1] Lower explosion limit (LEL)must be adhered to.
[2] The HC sensor is adjusted to methane ex-works. It can be adjusted to a different gas (propane or butane) by the user.

## General technical data

| | |
|---|---|
| Dimensions | 330 x 128 x 438 mm |
| Weight | 4800 g |
| Storage temperature | -20 to +50 °C |
| Operating temperature | -5 to +45 °C |
| Housing material | ABS |
| Memory | 250,000 readings |
| Power supply | AC mains unit 100V to 240V (50 to 60 Hz) |
| DC voltage input | 11 V to 40 V |
| Max. dust load | 20 g/m³ dust in flue gas |
| Dewpoint calculation | 0 to 99 °Ctd |
| Max. positive pressure | max. +50 mbar |
| Max. negative pressure | min. -300 mbar |
| Pump through-flow | 1 l/min. with through-flow monitoring |
| Hose length 16.2 m (corresponds to 5 probe hose extensions) | |
| Max. humidity load | +70 °C dewpoint temperature |

| | |
|---|---|
| Trigger input | Voltage 5 to 12 Volt<br>(rising or trailing edge) pulse width > 1 sec<br>load: 5 V/max, 5 mA, 12 V/max. 40 mA |
| Warranty | *Measuring instrument* 2 years (excepting wearing parts e.g. gas sensors...)<br>*Gas sensors*<br>CO/NO/$NO_2$/$SO_2$/$H2_2$/$C_xH_y$: 1year<br>$O_2$ sensor: 1 1/2 years<br>$CO_2$-IR sensors: 2 years<br>The warranty applies to average sensor load.<br>Rech. *battery:* 1 year |
| Protection class | IP40 |
| Battery life | Maximum load approx. 2.5 h |

We measure it.

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