

## Fine particle measuring system

### testo 380 – The innovative complete solution

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In combination with testo 330-2 LL, the innovative complete solution for solid fuels, oil and gas systems.

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Unrestricted TÜV test for the limit value levels 1/2 and according to VDI 4206 Sheet 2

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Parallel measurement of fine particles, O<sub>2</sub> und CO

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Graphic presentation of all measurement values in real time

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Especially economic in operation and maintenance

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Effortless handling and easy transport

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High-tech in a case: Measurement of all relevant values with only one probe

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mg/m<sup>3</sup>

°C

hPa

O<sub>2</sub>

CO/H<sub>2</sub>

NO

ΔP

The constantly growing number of solid fuel systems leads to a further increase in the emission of fine particles. The new amendment to the 1. BImSchV prescribes fine particle measurement, presenting chimneysweeps, heating constructors and service technicians with new challenges. With the new fine particle measuring system testo 380, fine particles can for the first time be measured simply on site. The completely new measurement method developed by Testo enables easy monitoring and implementation of the fine particle limit values. Combustion systems can be optimized to minimum emissions with the system.

The „command centre“ of the testo 380 is the proven emission analyzer testo 330-2 LL. When you take it out of the case, you can as usual determine, among other things, flue gas, flue draught and pressure on gas and oil systems. In connection with the testo 380, the simultaneous measurement of O<sub>2</sub>, CO and fine particles is possible for the first time.

# Overview of the measurement system

The fine particle measuring system testo 380 consists of two system components: the fine particle analyzer testo 380 including fine particle probe, and the testo 330-2 LL as a command centre and a flue gas analyzer. Together, this system offers the highest possible level of compactness, ease of handling and precision in the measurement of solid fuel, oil and gas systems.

**Fine particle case**

for easy transport of the fine particle measuring system. The entire measurement technology is contained in a convenient case with a weight of only 7.9 kg.

**Fine particle probe**

transforms a part of the raw gas into measurement gas. The contamination of the system is limited to a minimum, and a highly accurate measurement guaranteed at the same time. The innovative technology makes the fine particle probe compact and easy to use.

**Compartment for instruction manual**

The instruction manual is stored ready to hand in the lid.

**Flue gas analyzer testo 330--2 LL**  
(from version 2006)

The command centre of the system measures not only fine particles, but simultaneously also CO, O<sub>2</sub> and other flue gas parameters. The portable instrument can be removed from the case easily, and used for flue gas analysis on oil and gas systems.

**Condensate trap and filters**

The condensate trap and several filters prepare the raw gas for flue gas analysis in the testo 330-2 LL.

**Storage compartment**

for various materials such as the cleaning set.

**Fine particle sensor**

Thanks to sophisticated technology, Testo has succeeded in making fine particle measurement easy. The fine particle values are displayed in real time, so that the effect of any action taken on the boiler can be traced directly.

**Pre-heating stretch**

ensures optimum gas temperature, and therefore an extremely accurate fine particle measurement.



**Further storage space**  
e.g. for spare sensor module

**Printer**  
(optionally available) for documentation on site

**Mains unit**  
for testo 330-2 LL



## Innovative technology

### The fine particle probe

Everything you need for your professional fine particle measurement is contained in Testo's own development, the handy fine particle probe. The probe samples the raw gas directly from the flue gas flow and transports it to the testo 330-2 LL for flue gas analysis. Simultaneously, the raw gas is mixed with fresh air in the rotation diluter – creating the necessary measurement gas for the fine particle measurement. The fine particle probe is also responsible for the measurement of the flue gas temperature and the flue draught. The probe is equipped with a heating element which ensures a constant temperature of 120 °C, in order that the flue gas does not condense during the measurement. The probe can be quickly and effortlessly stored in the measurement box, and just as easily removed again. Other probes are not necessary for the measurement of fine particles.



### The rotation diluter

In order to achieve an especially reliable fine particle measurement, the raw gas is passed through a rotation diluter made of technical ceramics. Thanks to the patented technology, the particle concentration is diluted with the help of a defined quantity of fresh air, so that the contamination of the gas paths and the entire measurement system is reduced to a minimum, and at the same time a precise fine particle measurement takes place. This means the system works without deterioration, cleaning takes place using conventional household cotton buds.

### The fine particle sensor

The fine particle sensor measures the mass of the particles contained in the measurement gas. For this purpose, the measurement gas is passed on to the oscillating fine particle sensor through a jet. Depending on the mass of the particles deposited, the oscillation frequency changes, thus allowing the particle mass to be determined. Because this calculation can be carried out at very short intervals thanks to Testo technology\*, it is possible to follow the measurement values in the display of the testo 330-2 LL in real time during the entire duration of the measurement. This way, no smoke input is ever missed, any change in the heating boiler and its effects are immediately visible, and the system can be adjusted especially quickly and efficiently.

\* several patents pending

## Ordering data

### testo 380 fine particle analyzer

- Without flue gas analyzer testo 330-2 LL (already owned testo 330-2 LL from version 2010 can be used after a Firmware update)



Part no. 0632 3800

### testo 380 fine particle measuring system

- testo 380 fine particle analyzer with fine particle probe and cleaning set
- Flue gas analyzer testo 330-2 LL with mains unit (incl. Bluetooth, H<sub>2</sub>-compensated CO cell)
- Modular flue gas probe 300 mm
- Combustion air temperature probe 190 mm



Part no. 0632 3801

## Accessories

#### Flue gas analyzer testo 330-2 LL

#### Part no.

|  |              |  |
|--|--------------|--|
| Bluetooth testo 330-2 LL flue gas analyzer set with Longlife gas sensors; BLUETOOTH® and H <sub>2</sub> -compensated CO sensor as well as integrated draught and gas zeroing, incl. rech. battery and calibration protocol; with graphic display | 0632 3307 70 |  |
|--|--------------|--|

#### Accessories testo 380

#### Part no.

|  |           |  |
|--|-----------|--|
| testo 606-2 wood and material humidity meter with integrated humidity measurement and NTC air thermometer incl. protection cap, batteries, belt holder and calibration protocol, TÜV permit according to VDI 4206 page 4 | 0560 6062 |  |
| Combustion air temperature probe, immersion depth 190 mm   | 0600 9787 |  |
| testo 317-3 CO monitor, incl. carrying case with belt clip, headphones, wrist strap, sampler and calibration protocol  | 0632 3173 |  |
| Testo fast printer IrDA with wireless infrared interface; 1 roll thermal paper; 4 AA batteries   | 0554 0549 |  |
| Testo Bluetooth®/IRDA printer incl. 1 roll of printer paper, rechargeable battery and mains unit   | 0554 0620 |  |
| Spare thermal paper for printer, permanent ink   | 0554 0568 |  |
| easyheat PC analysis software, shows measurement in form of diagrams, tables and manages customer data.  | 0554 3332 |  |
| USB connection cable instrument-PC, length 2 m   | 0449 0047 |  |

#### Spare parts testo 380

#### Part no.

|  |           |  |
|--|-----------|--|
| Spare fine particle sensor module                          | 0394 0001 |  |
| Spare jet  | 0394 0002 |  |
| Spare particle filter for testo 350 analyzer box (20 pcs.) | 0554 3381 |  |
| Probe attachment chain                                     | 0554 9356 |  |
| Probe cleaning brush                                       | 0554 0228 |  |

## Probes and accessories testo 330-2 LL

| Retrofits / spare gas sensors  | Part no.  |
|--|-----------|
| O <sub>2</sub> sensor for testo 330-1 LL/-2 LL   | 0393 0002 |
| CO sensor (without H <sub>2</sub> -compensation) for testo 330-1 LL/-2 LL                | 0393 0051 |
| CO sensor, H <sub>2</sub> -compensated, 0 to 8000 ppm for testo 330-1 LL/-2 LL           | 0393 0101 |
| Spare CO <sub>low</sub> sensor for testo 330-1 LL/-2 LL                                  | 0393 0103 |
| Spare NO sensor, 0 to 3000 ppm for testo 330-1 LL/-2 LL                                  | 0393 0151 |
| Upgrade NO-sensor; 0 to 3000 ppm; resolution 1 ppm                                       | 0554 2151 |
| NO <sub>low</sub> spare sensor 0 to 300 ppm, 0.1 ppm, ±2 ppm (0 to 39.9 ppm) ±5% of m.v. | 0393 0152 |



| Modular flue gas probes   | Part no.  |
|---|-----------|
| Flue gas probe modular, incl. cone for attachment; thermocouple NiCr-Ni; hose 2.2 m; particle filter; length 180 mm; Ø 8 mm; Tmax. 500 °C; TÜV-tested                       | 0600 9760 |
| Flue gas probe; length 300 mm; Ø 8 mm; Tmax. 500 °C; TÜV approval; probe stop; NiCr-Ni thermocouple; 2.2 m hose and particle filter included                                | 0600 9761 |
| Flue gas probe; length 180 mm; Ø 6 mm; Tmax. 500 °C; probe stop; NiCr-Ni thermocouple; 2.2 m hose and particle filter included  | 0600 9762 |
| Flue gas probe; length 300 mm; Ø 6 mm; Tmax. 500 °C; probe stop; NiCr-Ni thermocouple; 2.2 m hose and particle filter included  | 0600 9763 |
| Flue gas probe flexible; thermocouple NiCr-Ni; hose 2.2. m; dirt filter; length 330 mm; Ø 9 mm; Tmax. 180 °C; short-term 200 °C; ideal for measuring at inaccessible points | 0600 9770 |

| Probe accessories  | Part no.  |
|--|-----------|
| Probe shaft; length 180 mm; 8 mm; Tmax. 500 °C                         | 0554 9760 |
| Probe shaft; length 300 mm; Ø 8 mm; Tmax. 500 °C                       | 0554 9761 |
| Probe shaft, length 335 mm, incl. cone, Ø 8 mm, Tmax 1000 °C           | 0554 8764 |
| Probe shaft flexible; length 330 mm; Ø 9 mm; Tmax. 180 °C              | 0554 9770 |
| Probe shaft multi-hole; length 300 mm; Ø 8 mm; for mean CO calculation | 0554 5762 |
| Probe shaft multi-hole; length 180 mm; Ø 8 mm; for mean CO calculation | 0554 5763 |
| Hose extension; 2.8 m; extension cable for probe                       | 0554 1202 |
| Probe stop 8 mm; steel; with spring clamp and handle; Tmax. 500 °C     | 0554 3330 |
| Probe stop 6 mm; steel; with spring clamp and handle; Tmax. 500 °C     | 0554 3329 |

| Additional probes  | Part no.  |
|--|-----------|
| Dual wall clearance probe for O <sub>2</sub> supply air measurement  | 0632 1260 |
| Gas leak detection probe; 0 to 10000 ppm CH <sub>4</sub> /C <sub>3</sub> H <sub>8</sub>  | 0632 3330 |
| Ambient CO probe, for detecting CO in buildings and rooms; 0 to +500 ppm   | 0632 3331 |
| Connection cable for ambient CO <sub>2</sub> probe   | 0430 0143 |
| Fine pressure probe: highly accurate probe for the measurement of differential pressure and temperature, as well as Pitot tube measurement of flow velocities (see technical data) | 0638 0330 |

## Probes and accessories testo 330-2 LL

| <b>Combustion air temperature probes</b>                 | <b>Part no.</b> |
|--|-----------------|
| Combustion air temperature probe, immersion depth 190 mm | 0600 9787       |
| Combustion air temperature probe, immersion depth 60 mm  | 0600 9797       |

  

| <b>Additional temperature probes</b>  | <b>Part no.</b> |
|---|-----------------|
| Mini ambient air probe; for separate ambient air temperature measurement; 0 to +80 °C | 0600 3692       |
| Very fast reaction surface probe  | 0604 0194       |
| Connection cable  | 0430 0143       |

  

| <b>Accessories testo 330-2 LL</b>   | <b>Part no.</b> |
|---|-----------------|
| Mains unit international 100-240 V AC / 6.3 V DC for mains operation or battery charging in instrument  | 0554 1096       |
| Spare battery 2600 mA   | 0515 5107       |
| Smoke tester with oil and soot sheet, for measuring soot in flue gas, excl. cone (part no. 0554 9010)   | 0554 0307       |
| Hose connection set with adapter for separate gas pressure measurement                                  | 0554 1203       |
| Pressure set for testing gas line testo 330-1/-2 LL version 2010  | 0554 1213       |
| Differential temperature set; consisting of 2 Velcro probes and temperature adapter                     | 0554 1208       |
| Spare dirt filter, modular probe; 10 off  | 0554 3385       |
| easyheat PC analysis software, shows measurement in form of diagrams, tables and manages customer data. | 0554 3332       |
| USB connection cable instrument to PC testo 330-1/-2 LL / testo 335                                     | 0449 0047       |
| ISO calibration certificate/flue gas  | 0520 0003       |

## Technical data

### Measuring range, accuracy, resolution

|                 |  |
|-----------------|--|
| Measuring range | 0 to 300 mg/m <sup>3</sup>                   |
| Accuracy        | acc. VDI 4206-2                              |
| Resolution      | 0.1 mg/m <sup>3</sup> (>5mg/m <sup>3</sup> ) |
| Memory          | 500.000 readings                             |

### Other instrument information

|                                   |  |
|-----------------------------------|--|
| Storage and transport temperature | -20 to +50 °C  |
| Operating temperature             | +5 to +40 °C   |
| Protection class                  | IP40   |
| Weight                            | testo 380: 7.9 kg, testo 330-2 LL: 0.65 kg                               |
| Dimensions                        | 475 x 360 x 190 mm   |
| Housing material                  | ABS  |
| Power supply                      | via internal mains unit: 100 V AC/0.45 A to 240 V AC/0.2 A (50 to 60 Hz) |
| Power consumption                 | max. 100 W   |

### Information fine particle probe

|                      |   |
|----------------------|---|
| Probe length         | 270 mm  |
| Probe shaft diameter | 12 mm   |
| Probe shaft material | Stainless steel 1.4301  |
| Probe cable length   | 2.2 m   |
| Integrated elements  | Draught measurement, sampling, temperature measurement, probe heating, rotation diluter |
| Flue gas temperature | max. +500 °C  |
| Probe shaft heating  | to +120 °C  |
| Rotation diluter     | heated up to +80 °C   |
| Status display       | LED, shows warm-up phase and operational readiness                                      |