



testo 380 - Fine particle analyzer

Instruction manual



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2 Safety and the environment

2.1. About this document

Use

- > Please read this documentation through carefully and familiarize yourself with the product before putting it to use. Pay particular attention to the safety instructions and warning advice in order to prevent injuries and damage to the products.
- > Keep this document to hand so that you can refer to it when necessary.
- > Hand this documentation on to any subsequent users of the product.

Warnings

Always pay attention to information that is marked by the following warnings with warning pictograms. Implement the specified precautionary measures.

Representation	Explanation
 CAUTION	indicates potential minor injuries
NOTICE	indicates circumstances that may lead to damage to the products
 WARNING	Indicates potential serious injuries

Symbols and writing standards

Representation	Explanation
i	Note: Basic or further information.
1. ... 2. ...	Action: more steps, the sequence must be followed.
> ...	Action: a step or an optional step.
- ...	Result of an action.
[OK]	Control keys of the instrument or buttons of the program interface.

2.2. Ensure safety

- > Only operate the product properly, for its intended purpose and within the parameters specified in the technical data. Do not use any force.
- > The testo 380 must be checked for any visible damage before commissioning. Do not commission the testo 380 if there are any signs of damage on the housing, mains unit or supply lines.
- > Do not perform contact measurements on non-insulated, live parts.
- > Do not store the product together with solvents. Do not use any desiccants.
- > Carry out only the maintenance and repair work on this instrument that is described in the documentation. Follow the prescribed steps exactly. Use only original spare parts from Testo.
- > Any further or additional work must only be carried out by authorised personnel. Testo will otherwise refuse to accept responsibility for the proper functioning of the measuring instrument after repair and for the validity of certifications.
- > Only use the device in closed, dry rooms and protect it from rain and moisture.
- > Temperatures given on probes/sensors relate only to the measuring range of the sensors. Do not expose handles and feed lines to any temperatures in excess of 70 °C unless they are expressly permitted for higher temperatures.

- > The objects to be measured or the measurement environment may also pose risks: Note the safety regulations valid in your area when performing the measurements.
- > The measurement system has been verified as a short-term measuring instrument and should not be used as a safety (alarm) instrument.
- > Supervise the measurement system during operation.
- > The measuring instrument can be operated in closed rooms. The maximum allowable concentration (MAC) value for CO of 30 ppm is attained by operating the measuring instrument under the following boundary conditions after approx. 4.5 h measuring time at the earliest (in cases where there is no air exchange):

Room dimensions (L x W x H)	3 m x 3 m x 2 m
Flue gas concentration	5000 ppm CO

- > Do not store or transport any fluids in the transport case.
- > Do not operate the instrument if there is condensation on the housing.

 WARNING
There is water in the transport case. Risk of electric shock! <ul style="list-style-type: none">> Do not operate the measurement system.> Check for fluids before each start-up.

- > Do not store or transport any conductive incidentals (without protective cover/container) in the transport case.
- > Do not use mains cable if there is any external damage to it and protect it from hot surfaces.
- > Secure measurement system during transport in order to prevent damage to the measurement system.

2.3. Protecting the environment

i Before disposing of the product, the condensate trap must be emptied and the condensate in the crude gas tube disposed of in a suitable container.

- > Dispose of faulty rechargeable batteries/spent batteries in accordance with the valid legal specifications.
- > At the end of its useful life, send the product to the separate collection for electric and electronic devices (observe local regulations) or return the product to Testo for disposal.

3 Specifications

3.1. Use

The testo 380 must be used in conjunction with testo 330-2 LL.

The designation testo 330-2 LL includes the measuring instrument

- testo 330-2 LL/F, item no. 0632 3305 or
- testo 330-2 LL V2010, item no. 0632 3307.

The order no. is located on the label on the rear of the housing.

The testo 380 is a professional dust measuring instrument for determining particulate matter concentrations. The measuring instrument can be used to directly determine dust emissions in g/m^3 on site from solid fuel systems.

The instrument is suitable

- for official measurements in accordance with the first German Federal Immission Control Ordinance (BImSchV)
- as an adjustment aid for combustion processes
- for the approval test of individual room furnaces.

Changes in dust emissions, caused by a system's parameter settings for example, can be directly recorded via the online display.

Thus the particulate matter analyzer testo 380, in conjunction with the testo 330-2 LL, constitutes a measurement system.

3.2. Technical data

3.2.1. Examinations and licenses

As declared in the Certificate of Conformity, this product complies with Directive 2004/108/EC.

This product is TÜV-tested in accordance with the provisions of VDI 4206-2.

This product makes it possible to monitor limit value compliance for particles in accordance with **level 1** and **level 2** of the first German Federal Immission Control Ordinance (BImSchV).

This product complies with the provisions of VDI 50379-2.

The testo 380 and its components comply with the provisions of EN 61010-1.

The testo 380 complies with the provisions of EN 50270 for instrument class 1.

The testo 380 is approved for fuels in accordance with instrument class A, B and C of VDI 4206-2. This corresponds to fuel groups 1 - 8 in accordance with § 3 of the first German Federal Emission Control Ordinance (BImSchV):

1. Coal, non-pitch-bonded coal briquettes, coal coke
2. Lignite, lignite briquettes, lignite coke
3. Fuel peat, fuel peat pellets
- 3a. Barbecue charcoal, barbecue charcoal briquettes in accordance with DIN EN 1860, September 2005 edition
4. Natural chunky wood, including attached bark, especially in the form of split logs, chippings, brushwood or cones
5. Natural non-chunky wood, especially in the form of sawdust, shavings, abrasive dust or bark
- 5a. Pressed items made of natural wood in the form of wood briquettes in accordance with DIN 51731, October 1996 edition, or in the form of wood pellets in accordance with the fuel requirements of the DINplus Certification Program "Wood pellets for use in small furnaces in accordance with DIN 51731-HP 5", August 2007 edition, and other wood briquettes or wood pellets made of natural wood with equal quality.
6. Painted, varnished or coated wood and any scrap materials from the same, insofar as no wood preservatives have been applied or are included due to treatment, and coatings do not contain any halogenated organic compounds or heavy metals.
7. Plywood, chipboard, fibreboard or otherwise glued wood and any scrap materials from the same, insofar as no wood preservatives have been applied or are included due to treatment, and coatings do not contain any halogenated organic compounds or heavy metals.
8. Straw and other plant materials, cereal which is not intended as food, such as rolled grain, cracked grain, whole grain plants, cereal debris, husk and remainders of cornstalk and pellets from the aforementioned fuels.

For official measurements in accordance with the 1st BImSchV (chimney sweeps) and in accordance with VDI 4206 Part 2, the measuring instrument must be checked every six months by a technical testing body of the Guild of Master Chimney Sweeps or another testing body recognised by the authorities.

3.2.2. Declaration of Conformity



EG-Konformitätserklärung

EC declaration of conformity

Für die nachfolgend bezeichneten Produkte:

We confirm that the following products:

testo 380

Best. Nr.: / Order No.: 0632 3800

wird bestätigt, daß sie den wesentlichen Schutzanforderungen entsprechen, die in der Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (2004/108/EG) festgelegt sind.

corresponds with the main protection requirements which are fixed in the EEC "Council Directive 2004/108 EC on the approximation of the laws of the member states relating to electromagnetic compatibility" The declaration applies to all samples of the above mentioned product.

Zur Beurteilung der Erzeugnisse hinsichtlich elektromagnetischer Verträglichkeit wurden folgende Normen herangezogen:

For assessment of the product following standards have been called upon:

Störaussendung / Pertubing radiation:
Störfestigkeit: / Pertubing resistance:
Sicherheits-Richtlinie:

DIN EN 50270:2000-01 Typ 1
DIN EN 50270:2000-01 Typ 1
DIN EN 61010-1:2011-07

Diese Erklärung wird für:

This declaration is given in responsibility for:

Testo AG
Postfach / P.O. Box 1140
79849 Lenzkirch / Germany
www.testo.com



abgegeben durch / by:

Der Hersteller betreibt ein zertifiziertes Qualitätssicherungssystem nach DIN ISO 9001

The manufacturer operates a certified quality assurance system according to DIN ISO 9001

Dr. Jörk Hebenstreit
(Name / name)

Vorstand Managing Director
(Stellung im Betrieb des Herstellers) (Position in the company of the manufacturer)

Lenzkirch, 21.02.2013
(Ort, Datum / place, date)

(Rechtmäßige Unterschrift / Legally valid signature)

3.2.3. Measuring range, accuracy and resolution

Measurement parameter	Measuring range	Accuracy	Resolution
Particulate matter ¹	0 to 0.3 g/m ³	According to VDI 4206-2	0.0001 g/m ³
Flue gas temperature	0 to 500 °C	According to VDI 4206-1	0.1 °C

3.2.4. Instrument data

Feature	Values
Storage and transport temperature	-20 to 50 °C
Protection class	2
Operating temperature	+5 to 40 °C
Ambient humidity	0 to 90% RH, non-condensing
Protection class	IP40
Weight	testo 380: 7.9 kg, testo 330: 0.65 kg
Dimensions (L x W x H)	475 mm x 360 mm x 190 mm
Housing material	ABS
Power supply	via the internal mains unit: 100 V AC/2.1 A - 240 V AC/ 0.95 A (50-60 Hz)
Power consumption	max. 120 W
Readiness for operation	approx. 10 to 15 min

¹ Measurements over 0.3 g/m³ are possible, but are not part of the requirement outlined in VDI 4206-2.

3.2.5. Other instrument data

Feature	Values
Nozzle	No wear and tear when used as intended

3.2.6. Particulate matter probe

Feature	Values
Length	270 mm
Integrated elements	Draught path, sampling, temperature measurement, probe heater, rotation diluter
Flue gas temperature	max. 500 °C
Probe shaft heating	up to 120 °C
Rotation diluter	heated (up to 80 °C)
Status display	LED, displays warm-up phase and operational readiness
Probe cable	Length: 2.2 m
Probe shaft	Stainless steel 1,4301
Diameter of probe shaft	12 mm

3.2.7. Warranty

Feature	Values
Warranty	testo 380 with particulate matter probe: 24 months (excluding wear parts such as engines, pumps and filters) Sensor module: 12 months
Terms of warranty	see website www.testo.com/warranty

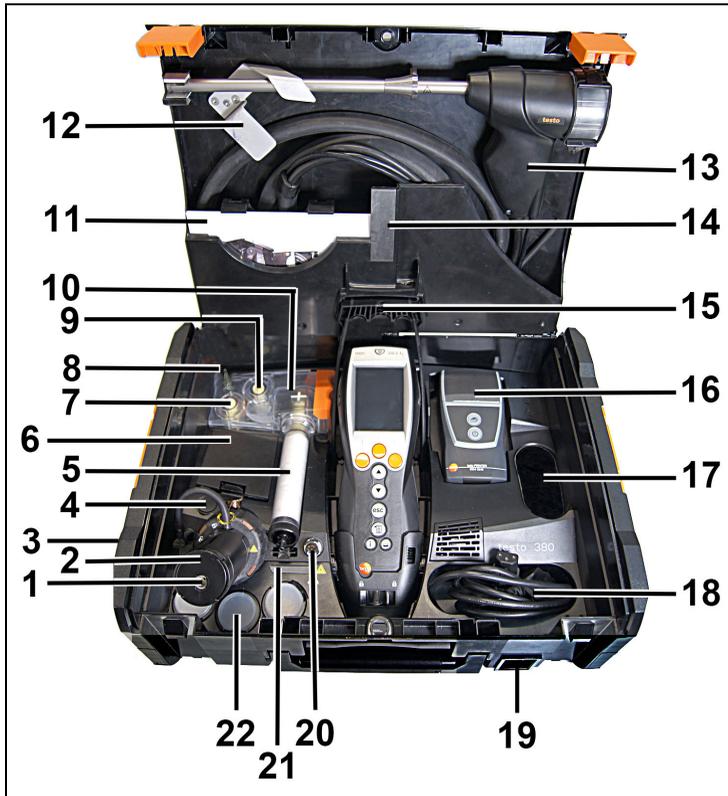
4 Product description

4.1. Scope of delivery

- Particulate matter analyzer testo 380 (item no. 0632 3800)
- Particulate matter probe
- Preheating section
- Cleaning material consists of:
 - Cotton buds
 - Syringe
 - Hose attachment for the syringe
 - Cleaning box for the nozzle
 - Cover cap for the probe shaft
 - Cover cap for the condensate trap
- Fixing chain for the particulate matter probe
- Cleaning brush for the probe shaft
- Instruction manual
- testo 380 mains cable

i The testo 380 is delivered in a specially designed shipping carton in order to prevent damage during transport. Testo recommends keeping the packaging unit and using it again if you need to return the product.

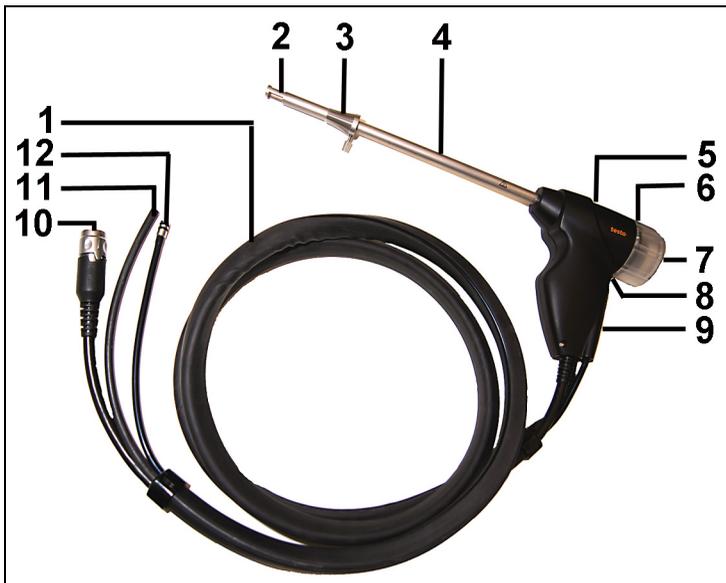
4.2. Overview of testo 380



- 1 Particulate matter sensor hose connection
- 2 Particulate matter sensor with preheating section and pressure tube
- 3 Combustion air temperature probe connection
- 4 USB connection for updating the testo 380
- 5 Cotton filters incl. crude gas primary filter
- 6 Cleaning materials storage compartment
- 7 Fresh air filter
- 8 Fresh air inlet
- 9 Crude gas secondary filter
- 10 Condensate container
- 11 Compartment for instruction manuals
- 12 Transport securing device

- 13 Particulate matter probe (probe is permanently assigned to the measurement system)
- 14 Magnetic holder for the printer
- 15 Holder for testo 330 and securing clip for case lid
- 16 Printer (accessory)
- 17 Storage compartment
- 18 Storage compartment for the mains cable
- 19 Mains connection and on/off switch
- 20 Probe connection
- 21 Status display
- 22 Storage compartments for containers

4.3. Overview of particulate matter probe



- 1 Probe cable
- 2 Probe basket
- 3 Cone
- 4 Heatable probe shaft
- 5 Probe handle
- 6 Rotation diluter
- 7 Rotation diluter cover
- 8 Eyelet for chain for fixing probe in place

- 9 Status display
- 10 Connecting plug to the testo 380
- 11 Crude gas tube to the cotton filter
- 12 Measurement gas tube to the particulate matter sensor

4.4. Overview of outlet nozzles in the testo 380



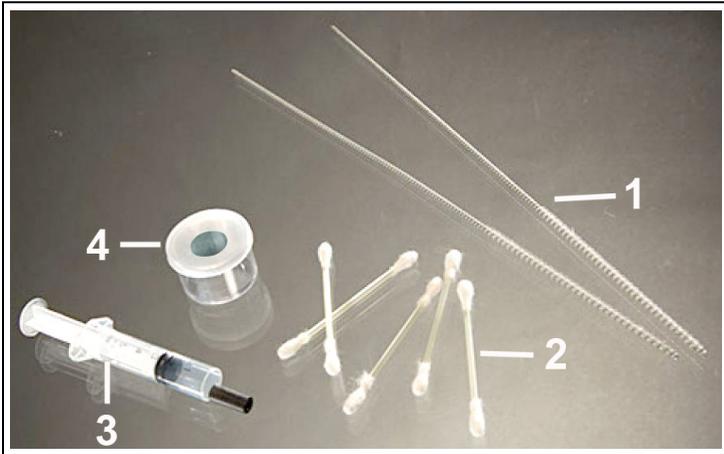
- 1 Test connection for the test bed (gradient check) of a technical testing body of the Guild of Master Chimney Sweeps or other testing body recognised by the authorities.

i The cover cap on the test connection should only be removed for the gradient check. Removal of the cover cap outside of a gradient check will cause the testo 380 to malfunction.

- 2 Air inlet nozzle
- 3 Measurement gas outlet nozzle

i To prevent incorrect measurement results, do not extend the measurement gas outlet nozzle and/or air inlet nozzle with a hose.

4.5. Overview of cleaning material



- 1 Cleaning brush for the probe shaft
- 2 Cotton buds
- 3 Syringe with hose attachment
- 4 Cleaning box for the nozzle

4.6. Overview of status displays

The status display indicates the operating status of the testo 380, the particulate matter probe and the measurement system.

4.6.1. testo 380 status display

Display	Status
Permanently green	Testo 380 is operational
Flashing green	Warming-up phase or standby mode, settings can be configured on the testo 330 LL.
Flashing yellow	Initialisation phase, system is not operational, no settings can be configured on the testo 330 LL.
Flashing red	System error, testo 380 is not operational.

4.6.2. Particulate matter probe status display

Display	Status
Permanently green	Particulate matter probe is operational
Flashing green	Warming-up phase
Flashing red	Fault

4.6.3. Measurement system status display

4.6.3.1. Status display of the testo 330-2 LL V2010 (item no. 0632 3307)

The measurement system status display is indicated on the testo 330 display.



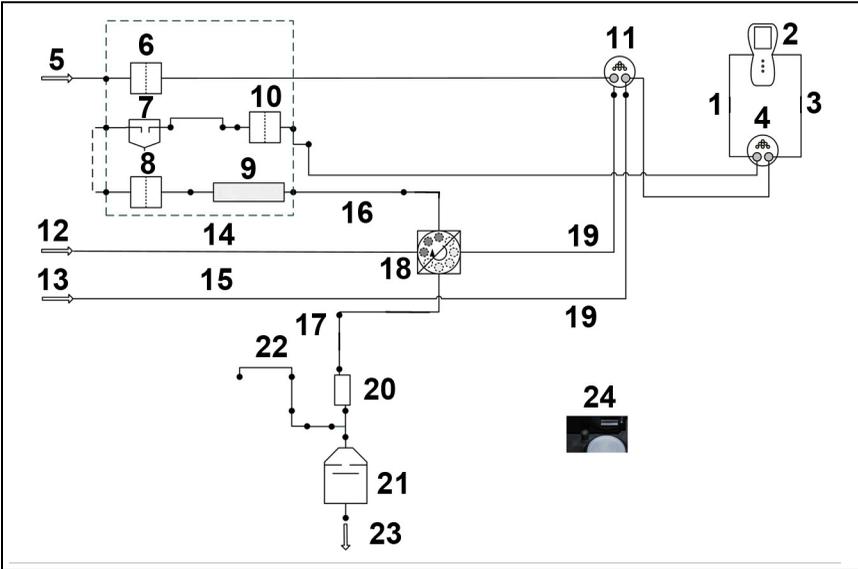
1 Measurement system status display

Display	Status
Permanently green	The system is ready for measurement.
Flashing green	The system is functional (e.g. tightness test can be started), but not yet ready for a measurement.
Flashing yellow	Initialisation phase, system is not operational, no settings can be configured on the testo 330 LL.
Flashing red	System error, system is not operational.

4.6.3.2. Status display of the testo 330-2 LL/F (item no. 0632 3305)

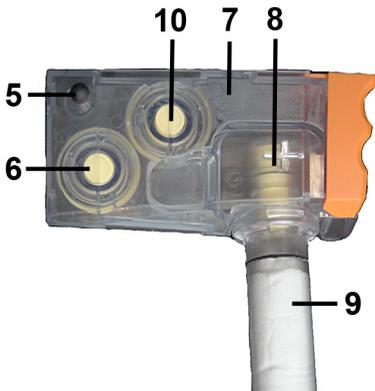
The message **Communication with t380 is tested...** is shown on the display.

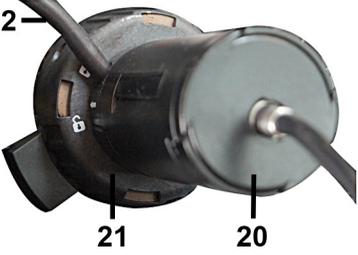
4.7. Gas path



Item / Designation	Illustration
<ul style="list-style-type: none"> 1 testo 330 2 Draught inlet 3 Adapter 4 Crude gas inlet 	

4 Product description

Item / Designation	Illustration
<p>5 Fresh air inlet</p> <p>6 Fresh air filter</p> <p>7 Condensate container</p> <p>8 Primary filter</p> <p>9 Cotton filter</p> <p>10 Secondary filter</p>	 <p>A cross-sectional diagram of a probe head assembly. It shows a clear plastic housing with an orange grip on the right side. A white cotton filter (9) is attached to the bottom. Inside, there are two circular filters: a primary filter (8) and a secondary filter (10). A condensate container (7) is located between the filters. A fresh air inlet (5) is on the left side, and a fresh air filter (6) is positioned below it.</p>
<p>11 Particulate matter probe socket</p>	 <p>A close-up photograph of a probe socket. The socket is circular with a metallic finish and contains several electrical contacts. A white callout line points to the socket with the number 11.</p>
<p>12 Crude gas inlet</p> <p>13 Draught inlet</p> <p>14 Crude gas path probe shaft</p> <p>15 Probe shaft</p> <p>16 Crude gas tube</p> <p>17 Measurement gas tube</p> <p>18 Rotation diluter</p> <p>19 Probe cable</p>	 <p>A photograph of a complete probe assembly. It consists of a black handle (18) with a silver-colored probe shaft (15) extending from it. The shaft has a crude gas path (14) and a draught inlet (13). A crude gas inlet (12) is located at the top of the shaft. A black probe cable (19) is connected to the handle. The cable has a measurement gas tube (17) and a crude gas tube (16) attached to it.</p>

Item / Designation	Illustration
20 Preheating section 21 Particle sensor 22 Pressure tube	 A photograph of a dark-colored cylindrical component. It has a larger diameter section on the right and a smaller diameter section on the left. A pressure tube (22) is attached to the top of the larger section. A particle sensor (21) is mounted on the side of the larger section. The preheating section (20) is the larger diameter part on the right.
23 Measurement gas outlet nozzle 24 Test connection for the test bed	 A photograph of a test bed assembly. It shows a complex arrangement of metal parts, including a nozzle (23) and a test connection (24). The nozzle is located on the right side, and the test connection is on the left side.

5 First steps

5.1. Getting to know the product

 Please refer to the testo 330 instruction manual for information relating to commissioning and operation of the testo 330.

5.1.1. Checking the firmware version of the testo 330

In order to control the testo 380, the testo 330 used must have the following firmware version:

- 0632 3305 firmware version V 2.0 onwards
- 0632 3307 firmware version V 2.0 onwards

The firmware version status of the testo 330 can be called up in the **Device information** menu or via the **[i]** key.

Switch on the testo 330:

> Press .

testo 330-2 LL V2010 (0632 3307)

Call up function:

>  → **Instrument diagnosis** → **Device information** → **[OK]**.

or

> **[i]** → **Device information** → **[OK]**.

To download the current instrument software (firmware) for the testo 330- 2 LL V2010 (0632 3307), see Updating instrument software for testo 330-2 LL V2010 (0632 3307), page **82**.

testo 330-2 LL/F (0632 3305)

Call up function:

>  → **Instrument diagnosis** → **[OK]**.

or

> **[i]** → **Instrument diagnosis** → **[OK]**.

To download the current instrument software (firmware) for the testo 330-2 LL/F (0632 3305), see Updating instrument software for testo 330-2 LL/F (0632 3305), page **82**.

5.1.2. Inserting the testo 330



There is no need to switch off the testo 330 to insert it into the testo 380.



1. Fold up securing clip and click into place on the case lid.

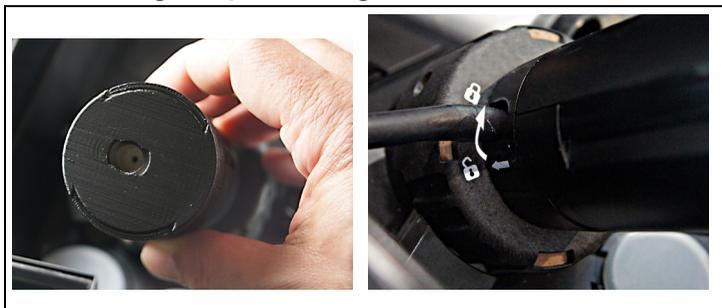


2. Lift up the repository for the testo 330 and insert the measuring instrument.



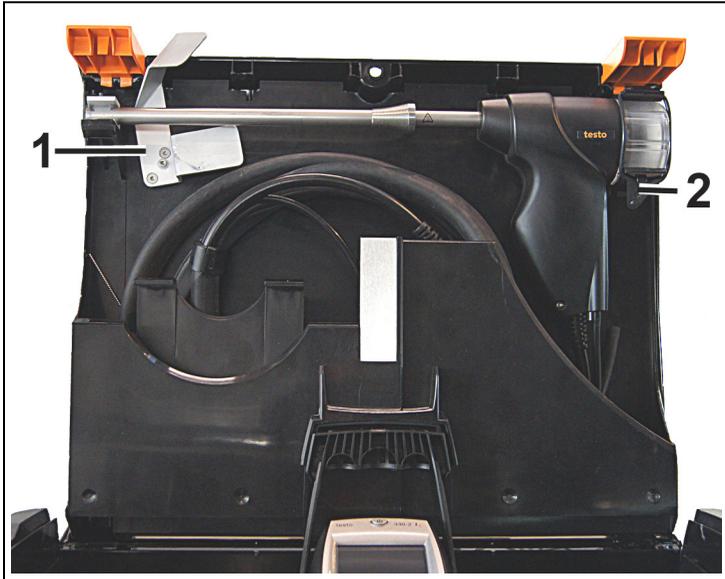
3. Insert the testo 330 into the holder and fix in place using the locking lever.

5.1.3. Connecting the preheating section



1. Remove the cover of the particulate matter sensor.
2. Put preheating section onto the particulate matter sensor and lock by turning (clockwise).

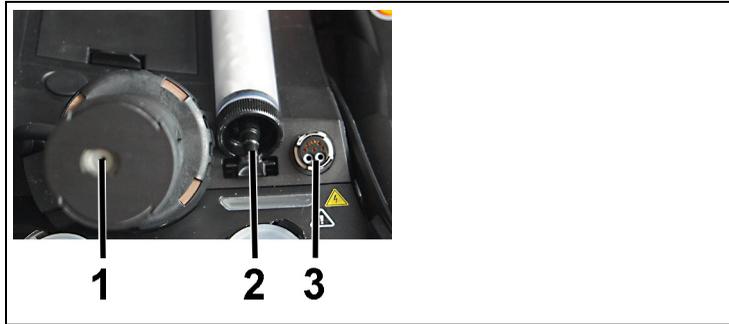
5.1.4. Connecting the particulate matter probe



- 1 Transport securing device
- 2 Rubber ring

i Always connect the particulate matter probe prior to switching on the testo 380. The particulate matter probe is detected during the testo 380 activation process. The particulate matter probe will not be detected by the testo 380 if it is not connected until after the testo 380 has been switched on or if it is disconnected from the testo 380 during a measurement. The particulate matter probe will only be detected once the testo 380 has been switched on again.

1. Open the transport securing device (1) and rubber ring (2).
2. Take the particulate matter probe cable out of the storage compartment.



3. Connect up the particulate matter probe connections
 - to the particulate matter sensor with preheating section (1)
 - to the condensate container cotton filter (2)
 - to the probe socket for the testo 380 (3).

⚠ CAUTION
Hot probe shaft due to automatic heat-up!
Risk of burns!
> Do not touch the probe shaft.

4. Take the particulate matter probe out of the holder.

5.1.5. Using the particulate matter probe

⚠ CAUTION

Hot probe shaft due to automatic heat-up!

Risk of burns!

- > Do not touch the probe shaft.

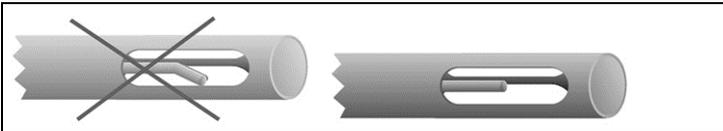
ATTENTION

Backflow of condensate from the crude gas tube!

Clogging of the rotation discs and damage to the testo 380.

- > Before removing the particulate matter probe from the flue gas duct, remove the crude gas tube from the particulate matter probe connection and dispose of the condensate in a suitable container.

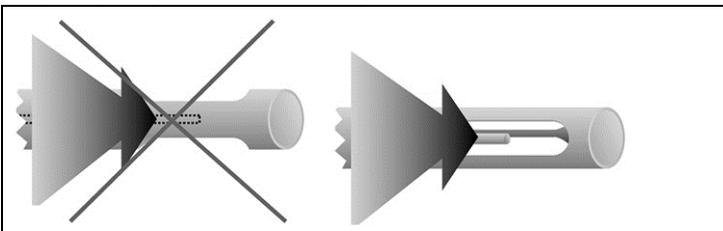
Checking the thermocouple



The thermocouple of the particulate matter probe must not lie against the probe cage.

- > Check before use. Bend the thermocouple back if necessary.

Aligning the particulate matter probe



- > Turn the particulate matter probe to align the thermocouple so that it is freely exposed to the flue gas flow.
- > Align the particulate matter probe in the flue gas duct so that the tip of the particulate matter probe is in the centre of flow (area of the highest flue gas temperature).

5.1.6. Mains operation

- > Connect the mains cable to the mains connection of the testo 380 and a mains socket with earthing contact.
- Power to the testo 330 is supplied via the testo 380.
- The rechargeable battery of the testo 330 is not charged while operated in conjunction with the testo 380.

 **CAUTION**

Operation of the measurement system when the cover is closed
Superheating of the measurement system!

- > Only conduct measurements when the cover is open.

5.1.7. Switching the measuring system on

1. Check that all system components are properly connected.
2. Switch on the measurement system: 
 - The start screen is displayed (duration: about 15 s).
 - If the voltage supply was interrupted for a longer period: The menu Date / Time is opened.
 - The gas sensors are set to zero.
 - If there is an instrument error, the **Error diagnosis** menu is displayed.
 - The **Measurement options** menu is displayed

5.1.8. Switching the measuring system off

1. Switch off the testo 330: Press 
 - As may be the case: the pump starts and the sensors are rinsed until the switch-off thresholds (O₂ > 20 %, other measurement parameters < 50 ppm) are reached. The maximum rinsing period is 3 minutes.
 - The measuring instrument switches off.
2. Switch off the testo 380: 

5.1.9. Removing the testo 330 from the testo 380

1. Release the locking lever.
2. Remove the testo 330.
3. Release securing clip on the case lid and fold down.

6 Using the product

6.1. Particle reading display

The measurement parameters for the Particle measurement type are predefined and cannot be adjusted.

Overview of measurement parameters:

Display	Measurement parameter
g/m³ PM\emptyset	Mean value of the particulate mass since the start of the measurement
g/m³ PM\emptysetu	Averaged end result dust less measurement uncertainty (only displayed at the end of a measurement).
g/m³ CO\emptysetu	Averaged end result CO less measurement uncertainty (the result is only displayed at the end of a measurement).
% O₂	Oxygen concentration
ppm CO	Carbon monoxide concentration
mg/m³ CO	Carbon monoxide concentration
°C FT	Flue gas temperature
°C AT	Combustion air temperature (measurement only possible and permitted with external temperature probe 0600 9787).
% FH	Flue gas humidity (calculated)



The mean value display of the following readings can also be set:

% O₂, ppm CO, mg/m³ CO, °C FT, °C AT, % qA, % FH, mbar draught

6.2. Conducting a measurement, testo 330-2 LL V2010 (0632 3307)

6.2.1. Preparing for measurement

The time required for an official measurement is approx. 30 min.

i If you switch to wood chips as fuel immediately following a measurement using wood pellets or split logs as fuel, the message **Particulate matter sensor and sensor cover need to cool down (this process may take a few minutes)** appears. Testo recommends opening the particulate matter sensor cover prior to selecting wood chips as fuel, so that the sensor can cool down, see **Cleaning/replacing the sensor module, page 64**. To shorten the cooling down period, the sensor should be moved to a cold environment or placed on a cold surface.

Overview of the fuels to be selected (based on VDI 4206 Sheet 2: 2011-06)

Instrument class	Fuel group acc. to § 3 of the 1st BImSchV	Form of fuel / fuel type	Fuel to be selected with testo 380
A	4	Split logs with attached bark	Split logs
	4, 5	Wood chips	Wood chips
	5a	Pellets or briquettes in accordance with DIN 51731	Pellets
B	6, 7	Laminated wood-based products (N content > 4.0 %)	Chipboard
	8	Straw and straw pellets	Straw
	8	Cereal grains	Cereals
C	1, 2, 3	Lignite briquettes	Lignite
		Anthracite	Anthracite

The **First steps** chapter must have been read.

CAUTION

Preventing measurement errors

- > Do not place or operate the measurement system on heat sources, e.g. boilers.

Tightness test

For an official measurement, the tightness of the measurement system must be checked prior to every measurement.



The locking lever for fixing the testo 330 in place must be closed.

Call up function:

- >  → **Measurement options** → [OK] → **Particle** → [OK] → **[Options]** → **Tightness test** → [OK].

1. Take the cover caps for the condensate trap and for the particulate matter probe out of the enclosed plastic bag.



2. Place cover cap (1) on the fresh air inlet of the condensate container.



3. Place cover cap (2) on the probe shaft of the particulate matter probe.
 - The tightness of the crude gas and measurement gas path is indicated by a traffic light.
 - If leaks in the crude gas path and/or the measurement gas path were exposed during the tightness test, see Questions and answers, page **75**.

4. Once the tightness test has been successfully conducted (both traffic lights on green), remove the cover caps from the fresh air inlet and probe shaft.
5. Finish the tightness test: **[Close]**.
6. Put the cover caps back in the plastic bag.

6.2.2. Particle: test types – compliance measurement, adjustment help and approval test

i To prevent incorrect measurements, the position of the testo 380 and the particulate matter probe must not be changed during a measurement.

i For flue gas loss measurement, Testo recommends using a combustion air temperature probe with connecting cable (0600 9787). Self-heating of the measurement system during operation may influence the combustion air temperature measurement with a mini ambient air probe.

Call up function:

> **[F4]** → **Measurement options** → **[OK]** → **Particle** → **[OK]**.

The testo 380 has 3 test types:

- the **Compliance measurement** test is for official measurements in accordance with the 1st BImSchV
 - the **Adjustment help** test is for the adjustment of combustion processes
 - **Approval test** is for individual room furnaces
- > The operating status of the combustion system to be measured must comply with the national directives.

Options

- > **[Options]** → **Tightness test**: the tightness of the fresh air and gas path is tested.
- > **[Options]** → **Operation check**: an operation check of the measurement system can be carried out, see Operation check, page 74.
- > **[Options]** → **Instrument information particle probe**: information on the particulate matter probe is displayed.
- > **[Options]** → **Instrument information particle analyzer**: testo 380 information is displayed.
- > **[Options]** → **Edit cone data**: select and edit nozzle calibration data.

- > **[Options]** → **Recalibrate**: (this function is not available during a measurement): The gas sensors are set to zero.
- > **[Options]** → **Address/Location**: (this function is not available during a measurement): the Address/Location folder is opened.
- > **[Options]** → **Particle sensor pump: on/off**: the sensor pump is switched on or off.
- > **[Options]** → **Test Bed (gradient check)** (only for test beds and Testo Service): procedure for checking the determinant measurement parameters for the six-monthly inspection of the test bed with specialised equipment.
- > **[Options]** → **Diagnosis (service)**: only for Testo Service.

Measuring

1. Select compliance measurement, adjustment help or approval test: **[▼]** → **[OK]**.
2. Select solid fuel: **[▲]**, **[▼]** → **[OK]**.
3. Select parameter: **[▲]**, **[▼]** → **[Edit]** .

i Fuel humidity ($\pm 15\%$), ambient temperature ($\pm 3\text{ °C}$ amb. temp.) and ambient humidity ($\pm 15\%$ RH amb. humidity) influence the measurement result. The values specified are factory settings and need to be adapted to the existing conditions. At a measuring location, the ambient temperature and humidity should always be determined from the same location.

Testo recommends the testo 606-2 wood moisture measuring instrument for determining the above parameters (item no. 0560 6062-2).

i When the parameter **Part load** is selected, a signal is sounded after 5 min when a measurement is conducted. The signal is very helpful for measurements in the partial load range as per § 25 para 2 of the 1st BImSchV.

i If the measurement system is exposed to ambient temperatures that are outside the operating temperature range specified in the technical data, a longer stability time can be expected.

i The temperature of the measurement system should not differ significantly from the ambient temperature at the measuring location. If this is the case, allow the measurement system to adjust to the ambient temperature prior to operation.



4. Enter values: [▲], [▼] and sometimes [◀], [▶] → [OK].
 - Particulate matter probe is preheated to 50 °C (status display flashes green).
 - Measurement system is operational (status display lights up green).
5. [Next]
Adjustment help measurement: continue with point 9
Compliance measurement: continue with point 6
Approval test: continue with point 6
6. Start draught measurement: [▶].
 - Draught zeroing.
7. Position the particulate matter probe in the centre of flow (area of the highest flue gas temperature).
The display showing the maximum measured flue gas temperature (**FT max**) helps when positioning the probe.
 - The reading is displayed.
8. End draught measurement: [■]
9. [Next]

i If the message **Stability not yet achieved. Please wait...** appears, do not start any measurement until the message is no longer displayed.

10. Start measurement: [].

- The stability time (approx. 3 min) elapses. Following this, the measuring phase begins automatically.



The measuring phase can be interrupted early:

> press [**Cancel**] .

-
- The measurement result is displayed once the measuring phase has been completed

11. Prepare the instrument for rinsing.

> Remove particulate matter probe from the flue gas duct → [**OK**].

- Rinsing starts

12. Clean the sensor module, see Cleaning/replacing the sensor module, page 64.

13. [**OK**].

> A test report can be printed out if necessary.

Data is printed out via the [] key or the **Options** menu.

Only readings assigned a display field in the measurement view will be saved / printed out.



Measurement data can be printed out during a measurement.

To be able to transfer data to a record printer via infrared or Bluetooth interface, the printer used must be enabled.

Printout of a test report^{2, 3}

```

-----
                testo 330-2LL F
U2.00                01968080/D
-----
                testo 380
erw. Mess. CO:
95% KI:                11.4 %
erw. Mess. Staub:
95% KI:                46.0 %
Staubbox                U1.00/0250128
Letzter Service:        01.03.13
Sonde                   U1.01/02470383
Letzter Service:        01.03.13
-----
Protokoll
08.03.2013                16:05:12
-----
Messort:
SYSTEM1
Anlagentyp
                Atmosph. raumluftunabh.
-----
ORDNER
Brennstoff:            Hackschnitzel
O2Bezug:                13.0 %
CO2Max:                20.7 %
-----
                Feinstaub
Messrate                00:00:05
Messdauer               00:15:00
-----
Mittelwert
--- g/m³ PM
0.1756 g/m³ PM10
0.0948 g/m³ PM2.5
9.8692 g/m³ #COu
19.5 % O2
1914 ppm CO
11138 ppb/m³ CO
79.0 °C Abgastemp.
--- °C Verbr.-Temp.
--- % qA
3.7 % Abgasfeuchte
-0.31 mbar Zug
-----
Messort                Abnahme.
Grenzwert Staub       0.100 g/m³
B. Feuch. (u)         30 %
Umgeb. Temp.          22.6 °C
Umgeb. Feuchte         50.8 %
WTT                   60.0 °C
Nennleistung          25.0 kW
Lastbereich           Uolllast
Messd (soll)          15 min
-----

```

14. End measurement: **[Close]**.

Options:

- > **[Options]** → **Show Graphic**: the readings are displayed in the form of a line graph.

² KI= confidence interval

The measurement uncertainty indicates the possible dispersion around the reading established (as accurately as possible). The associated probability is characterised by the confidence interval.

The 95% confidence interval specifies the range around the reading within which the "true value" is presumed to be with 95% probability.

³ The system type can be changed via **Address/Location (Air Heater / Combination Boiler)**.

- > **[Options]** → **Configure Graphic**: the measurement parameters to be represented (max. 4) can be displayed (🟢) or hidden (🔴).
- > **[Options]** → **Mean**: the mean values of a measurement are displayed.
- > **[Options]** → **Number of lines**: change the number of readings shown per display page.
- > **[Options]** → **repeat**: in the case of the compliance measurement and approval test, the measurement can be restarted several times within the first 2 minutes if necessary.

6.3. Conducting a measurement, testo 330-2 LL/F (0632 3305)

6.3.1. Preparing for measurement

The time required for an official measurement is approx. 30 min.

- i** If you switch to wood chips as fuel immediately following a measurement using wood pellets or split logs as fuel, the message **Particulate matter sensor and sensor cover need to cool down (this process may take a few minutes)** appears. Prior to selecting wood chips as fuel, Testo recommends opening the particulate matter sensor cover so that the sensor can cool down, . To shorten the cooling down period, the sensor should be moved to a cold environment or placed on a cold surface.

The **First steps** chapter must have been read.

⚠ CAUTION

Preventing measurement errors

- > Do not place or operate the measurement system on heat sources, e.g. boilers.

Tightness test

For an official measurement, the tightness of the measurement system must be checked prior to every measurement.

- i** The locking lever for fixing the testo 330 in place must be closed.

Call up function:

- > **[📄]** → **Measurement options** → **[OK]** → **Particle** → **[OK]** → **Tightness test** → **[OK]**.



1. Place cover cap (1) on the fresh air inlet of the condensate container.



2. Place cover cap (2) on the probe shaft of the particulate matter probe.
 - The tightness of the crude gas and measurement gas path is displayed (crude gas path value < 0.02 l/min, measurement gas path value < 0.4 mbar).
 - If leaks in the crude gas path and/or the measurement gas path were exposed during the tightness test, see Questions and answers, page 75.
3. Once the tightness test has been successfully conducted, remove the cover caps from the fresh air inlet and probe shaft: **[OK]**.
4. Finish the tightness test: **[Finished]**.

6.3.2. Particle: test types – compliance measurement, adjustment help and approval test

i To prevent incorrect measurements, the position of the testo 380 and the particulate matter probe must not be changed during a measurement.

i For flue gas loss measurement, Testo recommends using a combustion air temperature probe with connecting cable. Self-heating of the measurement system during operation may influence the combustion air temperature measurement with a mini ambient air probe.

Call up function:

> **[F1]** → **Measurement options** → **[OK]** → **Particle** → **[OK]**.

The testo 380 has 3 test types:

- the **Compliance measurement** test is for official measurements in accordance with the 1st BImSchV
 - the **Adjustment help** test is for the adjustment of combustion processes
 - **Approval test** is for individual room furnaces
- > The operating status of the combustion system to be measured must comply with the national directives.

Options

- > **Operation check**: an operation check of the measurement system can be carried out, .
- > **Tightness test**: the tightness of the fresh air and gas path is tested.
- > **Particle analyzer info**: testo 380 information is displayed.
- > **Probe info**: information on the particulate matter probe is displayed.
- > **Nozzle data**: select and edit nozzle calibration data.
- > **Particle sensor pump: on** or **Particle sensor pump: off**: the sensor pump is switched on or off.
- > **[Options]** → **Test Bed (gradient check)** (only for test beds and testo Service): procedure for checking the determinant measurement parameters for the six-monthly inspection of the test bed with specialised equipment.
- > **[Options]** → **Diagnosis (service)**: only for Testo Service.

Measuring

1. Select compliance measurement, adjustment help or approval test: **[▼]** → **[OK]**.
 - System check: tightness test successfully completed?
 - > **[Yes]**: continue with point 2.
 - > **[No]**: Carry out tightness test.
2. Select solid fuel: **[▲]**, **[▼]** → **[OK]**.

3. Select parameter: [▲], [▼] → [Edit].

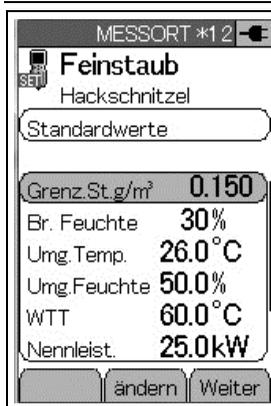
i Fuel humidity ($\pm 15\%$ u), ambient temperature ($\pm 3\text{ °C}$ amb. temp.) and ambient humidity ($\pm 15\%$ RH amb. humidity) influence the measurement result. The values specified are factory settings and need to be adapted to the existing conditions. At a measuring location, the ambient temperature and humidity should always be determined from the same location.

Testo recommends the testo 606-2 wood moisture measuring instrument for determining the above parameters (item no. 0560 6062-2).

i When the parameter **Part load** is selected, a signal is sounded after 5 min when a measurement is conducted. The signal is very helpful for measurements in the partial load range as per § 25 para 2 of the 1st BImSchV.

i If the measurement system is exposed to ambient temperatures that are outside the operating temperature range specified in the technical data, a longer stability time can be expected.

i The temperature of the measurement system should not differ significantly from the ambient temperature at the measuring location. If this is the case, allow the measurement system to adjust to the ambient temperature prior to operation.



4. Enter values: [**▲**], [**▼**] and sometimes [**◀**], [**▶**] → [**OK**].
 - Particulate matter probe is preheated to 50 °C (status display flashes green).
 - Measurement system is operational (status display lights up green).
5. [**Next**]
 - Adjustment help measurement: continue with point 9
 - Compliance measurement: continue with point 6
 - Approval test: continue with point 6
6. Start draught measurement: [**Start**].
 - Draught zeroing.
7. Position the particulate matter probe in the centre of flow (area of the highest flue gas temperature).
The display showing the maximum measured flue gas temperature (**FT max**) helps when positioning the probe.
 - The reading is displayed.
8. End draught measurement: [**Stop**]
9. [**Next**]

i If the message **Stability not yet achieved. Please wait...** appears, do not start any measurement until the message is no longer displayed.

10. Start measurement: [**Start**].
 - The stability time (approx. 3 min) elapses. Following this, the measuring phase begins automatically.

i The measuring phase can be interrupted early:

- > press [**Canc.**].

Options

- > **Mean**: the mean values of a measurement are displayed.
- > **New**: The measurement is restarted.

- The measurement result is displayed once the measuring phase has been completed
11. Prepare the instrument for rinsing.
 - > Remove particulate matter probe from the flue gas duct → [**OK**].
 - Rinsing starts
 12. Clean the sensor module, .

13. **[Finished]**.

> A test report can be printed out if necessary.

Data is printed out via the **[Print]** key.

Only readings assigned a display field in the measurement view will be saved / printed out.



Measurement data can be printed out during a measurement.

To be able to transfer data to a record printer via infrared or Bluetooth interface, the printer used must be enabled.

Printout of a test report^{4,5}

```

-----
                testo 330-2LL F
U2.00                01968080/D
-----
                testo 380
erw.Mess.CO:
95% KI:                11,4 %
erw.Mess.Staub:
95% KI:                46,0 %
Staubbox                U1.00/02520128
Letzter Service:        01.03.13
Sonde                    U1.01/02470383
Letzter Service:        01.03.13
-----
Protokoll
08.03.2013                16:05:12
-----
Messort:
SYSTEM1
Anlagetyp
                Atmosph. raumluftunabh.
ORDNER
-----
Brennstoff:                Hackschnitzel
O2Bezug:                    13,0 %
CO2Max:                    20,7 %
-----
                Feinstaub
-----
Messrate                00:00:05
-----
Messdauer                00:15:00
-----
                Mittelwert
--- g/m³ PM
0.1756 g/m³ PM10
0.0948 g/m³ PM10u
9.8692 g/m³ eCOu
19,5 % O2
1904 ppm CO
11138 mg/m³ CO
79,0 °C Abgastemp.
--- °C Verbr.-Temp.
--- % gA
3,7 % Abgasfeuchte
-0,31 mbar Zug
-----
Messart                Abnahme.
Grenzwert Staub        0,100 g/m³
B. Feuch.(u)            30 %
Umgab.Temp.            22,6 °C
Umgab.Feuchte          50,0 %
MTT                    60,0 °C
Nennleistung           25,0 kW
Lastbereich            Volllast
Messd (soll)           15 min
-----

```

14. End measurement: **[Finished]**.

⁴ KI:= confidence interval

The measurement uncertainty indicates the possible dispersion around the reading established (as accurately as possible). The associated probability is characterised by the confidence interval.

The 95% confidence interval specifies the range around the reading within which the "true value" is presumed to be with 95% probability.

⁵ The system type can be changed via **Address/Location (Air Heater / Combination Boiler)**.

6.4. Concluding measurement

1. Switch off the testo 330: Press .
2. Switch off the testo 380: .
3. Remove crude gas tube from the particulate matter probe connection.

ATTENTION

Backflow of condensate from the crude gas tube!

Clogging of the rotation discs and damage to the testo 380.

- > Before removing the particulate matter probe from the flue gas duct, remove the crude gas tube from the particulate matter probe connection and dispose of the condensate in a suitable container.



CAUTION

Hot probe shaft!

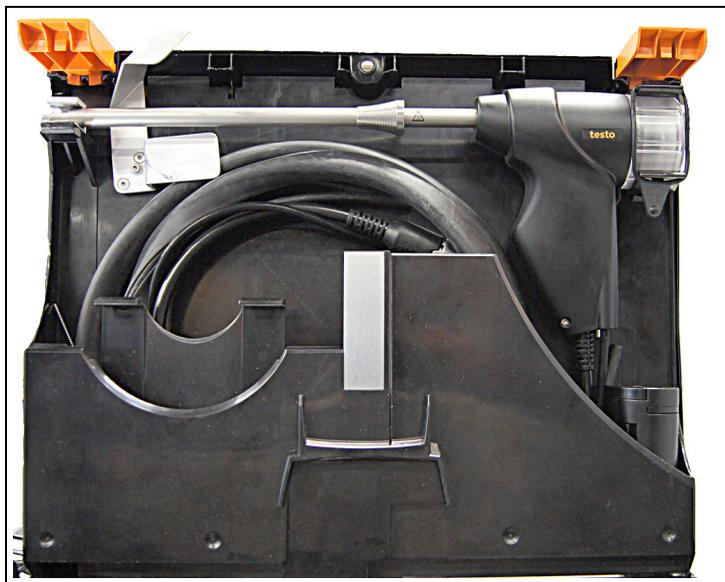
Risk of burns!

- > Allow the probe shaft to cool down before you touch or pack it!

4. Remove the particulate matter probe connections
 - to the probe socket
 - to the particulate matter sensor with preheating section
 - to the cotton filter.

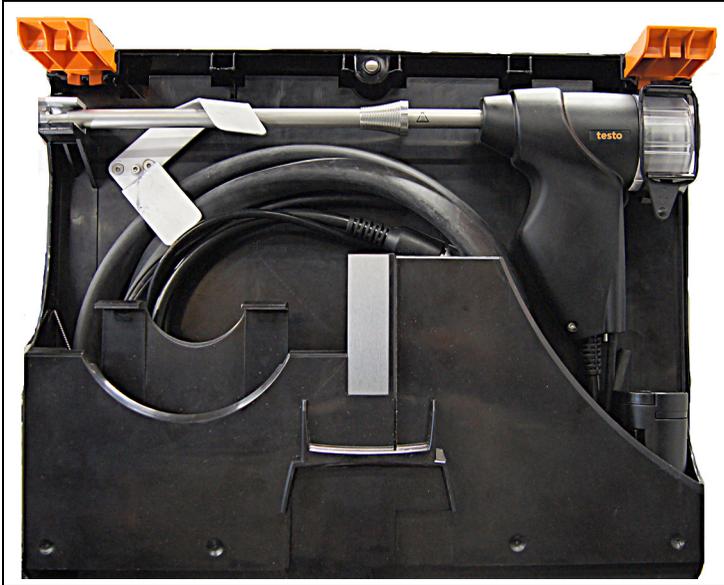


5. Put probe cable into the storage compartment.
6. Insert the particulate matter probe into the holder and secure with the rubber ring.



7. Wind up probe cable and stow away in the storage compartment.

i To prevent damage to the case lid, ensure that the probe cable is stowed away correctly in the storage compartment and that the case lid closes easily.



8. Lock the transport securing device.
9. Release the preheating section from the particulate matter sensor by turning it (anti-clockwise) and remove.
10. If necessary remove the testo 330, release the securing clip, then close the transport case.

6.5. Transferring data

6.5.1. Record printer

In order to be able to transfer data to a testo record printer via the infrared or Bluetooth interface (optional), the printer used must be enabled, see testo 330 instruction manual.

6.5.2. PC/pocket PC

Data can be transferred to a PC via USB, IrDA or Bluetooth®. You must also refer to the documentation that comes with the software.

6.5.3. Data transfer to IrDA record printer



To transfer data from the measurement system to the IrDA record printer, the printer is attached to the magnetic plate (on the top of the testo 330).

7 Maintaining the product

7.1. Servicing interval

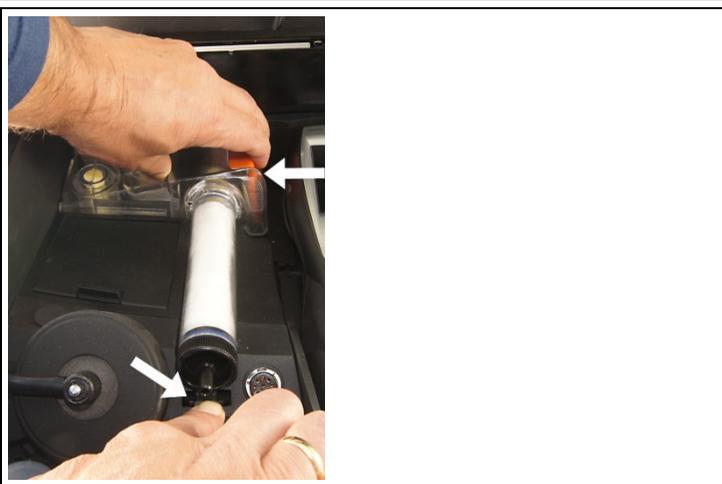
Testo recommends having the measurement system checked once a year by Testo Service.

7.2. Cleaning the testo 380 and testo 330

- > In order to prevent damage to the measurement system, the measurement system must be disconnected from the mains when being serviced and cleaned.
- > If the housing of the testo 380 and the testo 330 is dirty, clean it with a damp cloth. Do not use any aggressive cleaning agents or solvents! Mild household cleaning agents and soap suds may be used.
- > Clean ventilation slots, gas outlets, fresh air inlet and dilution air inlet with a vacuum cleaner. Do not blow out with compressed air.

7.3. Draining the condensate container

i The condensate consists of a weak mix of acids. Avoid skin contact. Make sure that the condensate does not run over the housing.



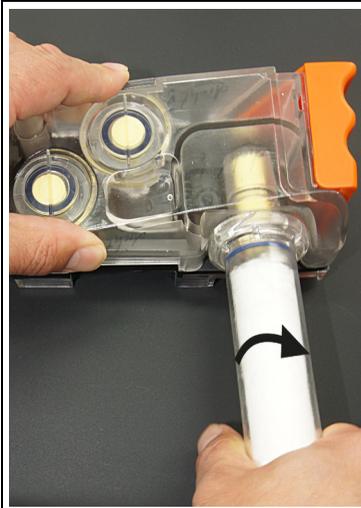
1. Remove the tube from the cotton filter connector, undo the cotton filter retaining clip and unlock the condensate container by the orange handle.



2. Remove condensate container horizontally from the testo 380.



3. Unscrew the cotton filter (anti-clockwise) and remove.
4. Clean out all condensate and dab off any remaining drops with a cloth.



5. Insert cotton filter and close (clockwise).



6. Insert the condensate container into the testo 380 and click into place. Push the tube onto the connector.

7.4. Checking/replacing the crude gas fresh air filter and secondary filter

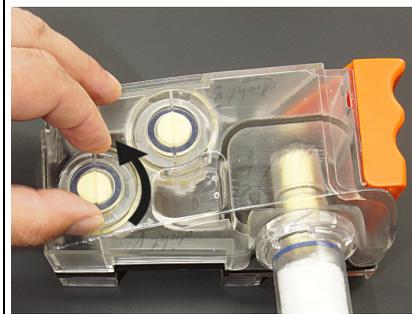
Checking the fresh air and secondary filters:

- > Check the fresh air and secondary filters regularly for contamination. In the event of visible contamination: change the filter.

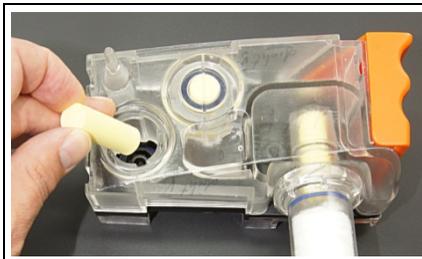
Replacing the fresh air and secondary filters:

i The filter chamber may contain condensate.

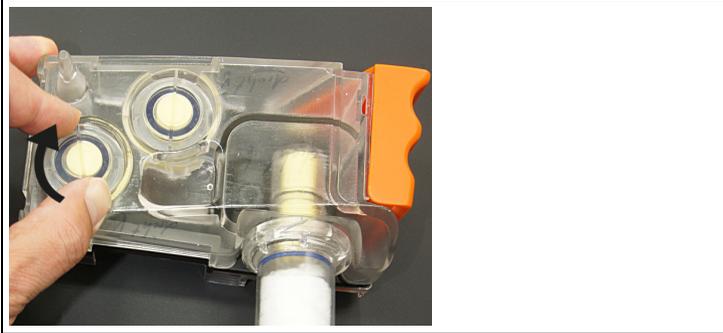
i When replacing the fresh air or the secondary filter, the condensate container must not be removed from the testo 380.



1. Open the filter chamber: turn the filter cover anti-clockwise and take it off.



2. Remove the exhausted filter and replace it with a new one.



3. Attach the filter cover and lock by turning it clockwise. The cross strut of the filter cover must be parallel to the orange handle of the condensate container.

7.5. Checking/replacing the crude gas primary filter

Checking the primary filter:

- > Check the primary filter regularly for contamination. In the event of visible contamination: change the filter.

Replacing the primary filter:



The filter chamber may contain condensate.

1. Remove crude gas tube from the cotton filter connector, unlock the condensate container by the orange handle and the cotton filter.
2. Remove condensate container horizontally from the testo 380.
3. Unscrew the cotton filter (anti-clockwise) and remove.



4. Remove the primary filter from the cotton filter.



5. Open the primary filter housing.



6. Remove the exhausted filter and replace it with a new one.



7. Close the primary filter housing, place back on the cotton filter and press into position. Pay attention to the notch on the primary filter.
8. Insert cotton filter into the condensate container and close (clockwise).
9. Insert the condensate container into the testo 380 and click into place. Push the tube onto the connector.

7.6. Checking/replacing the cotton filter

Checking the cotton filter

- > If contamination of the cotton filter is clearly visible (up to a half), the cotton wool must be replaced.



Use only 100% cotton wool as a filter material.

Replacing the cotton wool

1. Remove crude gas tube from the cotton filter connector, unlock the condensate container by the orange handle and the cotton filter.



The condensate consists of a weak mix of acids. Avoid skin contact. Make sure that the condensate does not run over the housing.

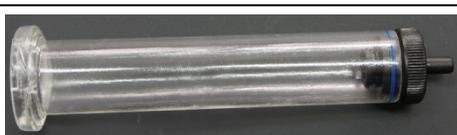
2. Remove condensate container horizontally from the testo 380 and drain if necessary.
3. Unscrew the cotton filter (anti-clockwise) and remove.
4. Remove the primary filter from the cotton filter.



5. Remove the connector from the filter chamber.



6. Remove the cotton from the filter chamber.
7. Clean the filter chamber with a cloth.



8. Insert connector into the filter chamber.



9. Fill the filter chamber evenly with 5 g new cotton wool. Do not compress cotton wool unnecessarily.
10. Place the primary filter back on the cotton filter and press into position. Pay attention to the notch on the primary filter.
11. Insert cotton filter into the condensate container and close (clockwise).
12. Insert the condensate container into the testo 380 and click into place. Push the tube onto the connector.

7.7. Cleaning the rotation and stator disc in the rotation diluter

i It is advisable to clean the rotation diluter after every measurement.

i The rotation diluter is aligned with the measurement system.

- > In order to prevent incorrect measurements, rotation discs must not be exchanged between measurement systems.
-

1. Take the particulate matter probe out of the holder in the transport case.



2. Open the rotation diluter cover (turn anti-clockwise).

⚠ CAUTION

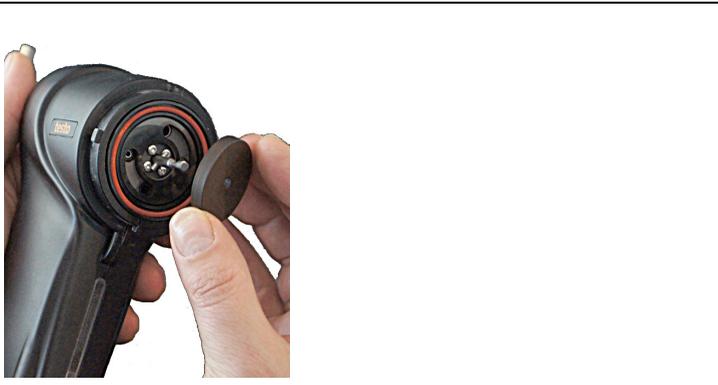
Hot rotation and stator discs!

Risk of burns!

- > Let rotation and stator discs cool down before touching them!



3. Depress the lock and pressure element and remove the lock. Then remove the pressure element via the shaft.



4. Remove the rotation disc via the shaft.



After cleaning, make sure that the sealing surfaces of the rotation and stator disc are free of dust and are not scratched.

Scratched sealing surfaces lead to incorrect measurement results and must be replaced by Testo Service.



i Use distilled water to clean the rotation and stator disc.

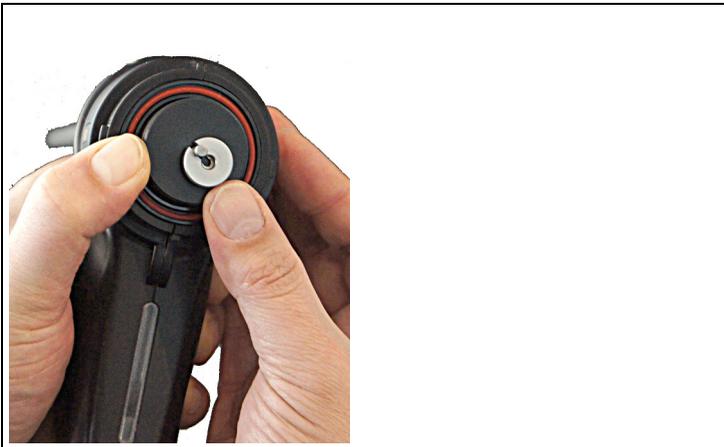
5. Clean the rotation disc using a moistened cotton bud on the running surface and in the cavities and rub dry with an unused cotton bud.



6. Clean the stator disc using a moistened cotton bud and rub dry with an unused cotton bud.



7. Replace the rotation disc (pay attention to the locking pin on the particulate matter probe and the protrusion on the rotation disc).



8. Reinsert the pressure element and lock.



9. Close the rotation diluter cover (turn clockwise).
10. Insert the particulate matter probe into the holder and secure with the rubber ring.

7.8. Cleaning the probe shaft of the particulate matter probe

In the event of any visible contamination, the probe shaft must be cleaned.

CAUTION

Hot probe shaft!

Risk of burns!

> Allow the probe shaft to cool down before you touch or pack it!

1. Take the particulate matter probe out of the holder in the transport case.



2. Open the rotation diluter cover (turn anti-clockwise).

3. Depress the lock and pressure element and remove.
4. Remove the rotation disc.



5. Insert the brushless side of the cleaning brush into the gas path



6. Push the cleaning brush through to the probe shaft tip.



7. Pull the cleaning brush out of the probe shaft. Repeat steps 5 and 6 several times depending on the degree of contamination.
8. Replace the rotation disc (pay attention to the locking pin on the probe and the protrusion on the rotation disc).
9. Reinsert the pressure element and lock.
10. Close the rotation diluter cover (turn clockwise).
11. Insert the particulate matter probe into the holder and secure with the rubber ring.
12. Lock the transport securing device.

7.9. Cleaning/replacing the sensor module

7.9.1. Removing the sensor module

i The sensor module must be cleaned after every measurement.

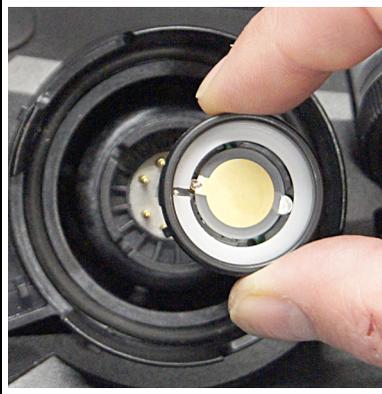
1. Remove the measurement gas tube from the preheating section.



2. Unlock the preheating section (anti-clockwise) and remove.
3. Remove the tube from the particulate matter sensor cover.



4. Unscrew the particulate matter sensor cover (anti-clockwise) and remove.



5. If the sensor module is located in the lower section of the particulate matter probe, remove the sensor module.
or
If the sensor module is located in the particulate matter sensor cover, proceed with the following steps:

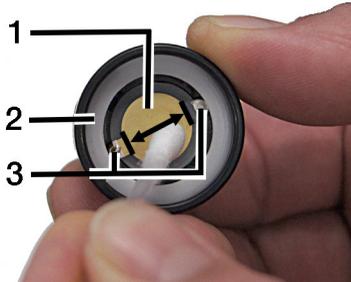


6. Turn the particulate matter sensor cover over.



7. Tap lightly on the sensor module with your index finger.
 - Remove the sensor module from the particulate matter sensor cover.

7.9.2. **Cleaning the sensor module**



- 1 Sensor module
- 2 Runner
- 3 Sensor contacts

1. Carefully wipe the sensor module (1) and runner (2) with a dry cotton bud, applying only slight pressure. Do not touch the sensor contacts (3). If particles of dirt cannot be removed, the sensor module can be cleaned using a cotton bud moistened with distilled water.

Particle residues may be visible in the form of a ring in the centre of the sensor module or a change of colour. It is not necessary to remove the remaining particle residues by increased pressure on the sensor module (risk of damage!), as the measurement system is recalibrated prior to every measurement.

> Wipe between the sensor contacts, from one to another (3).

2. Rub the sensor module dry with an unused cotton bud.

7.9.3. **Inserting a cleaned or new sensor module**

1. Insert sensor module (observe markings)
2. Put the top part of the particulate matter sensor on and tighten (clockwise).
3. Attach the tube to the top part of the particulate matter sensor.
4. Attach the preheating section and lock (clockwise).
5. Attach the measurement gas tube.

7.10. Cleaning the nozzle

- Necessary cleaning of the nozzle is indicated.

7.10.1. Removing the nozzle

1. Remove the measurement gas tube from the preheating section.
2. Unlock the preheating section (anti-clockwise) and remove.
3. Remove the tube from the top part of the particulate matter sensor.
4. Unscrew the top part of the particulate matter sensor (anti-clockwise) and remove.
5. Place the top part on a lint-free cloth on a flat surface.



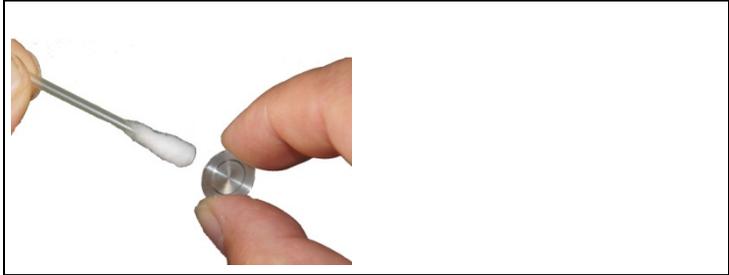
6. Push down on the orange markings with a suitable tool and remove the cover.



7. Carefully remove the nozzle from the nozzle pot. Avoid touching the nozzle area.

7.10.2. Cleaning the nozzle

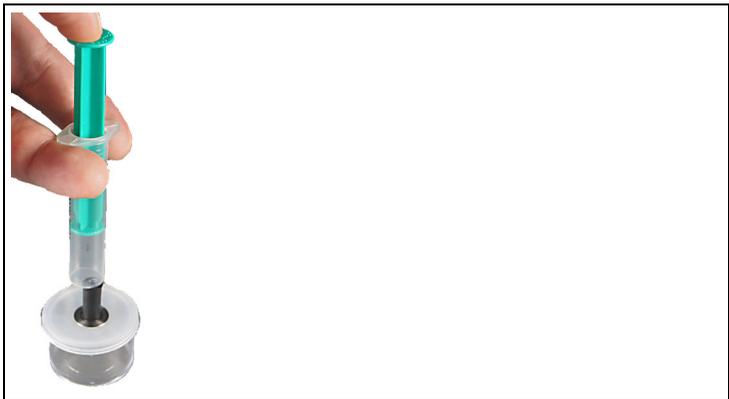
- > Fill the syringe with approx. 4 ml clean or distilled water and provide cleaning container.



1. Carefully remove more substantial surface contamination on the front and back with a moistened cotton bud.



2. Place nozzle at the opening of the cleaning container.
3. Push rubber hose onto the syringe.



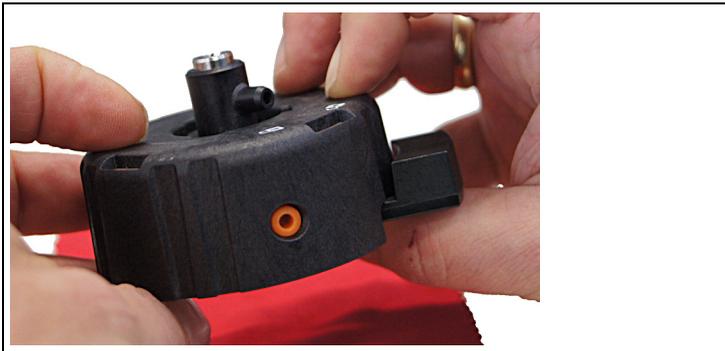
4. Place the syringe with hose onto the nozzle so that no water escapes from the sealing surface.

5. Use constant pressure to push the water through the nozzle holes, so that two equally powerful jets of water are visible.
6. Remove the nozzle from the opening of the cleaning container and clean the areas on front and back with a lint-free cloth.
7. Rub nozzle dry using a lint-free cloth. Make absolutely sure that there are no residues on the nozzle after cleaning.

7.10.3. Inserting the nozzle



1. Carefully insert nozzle into the nozzle pot (the side with the inscription facing downwards).



2. Put cover and nozzle pot together and click into place.



3. Move snap coupling backwards and forwards several times.
4. Put the top part of the particulate matter sensor on the sensor module and tighten (clockwise).
5. Attach the tube to the top part of the particulate matter sensor.
6. Attach the preheating section and lock (clockwise).
7. Attach the measurement gas tube.

7.11. Replacing the nozzle

1. Remove the nozzle, see Removing the nozzle, page 67.
 - > Place the nozzle into a protective container.
2. Insert nozzle, see Inserting the nozzle , page 69.

7.11.1. Using a used nozzle



Use only cleaned nozzles.

Select the nozzle calibration data.

testo 330-2 LL V2010 (0632 3307)

Call up function:

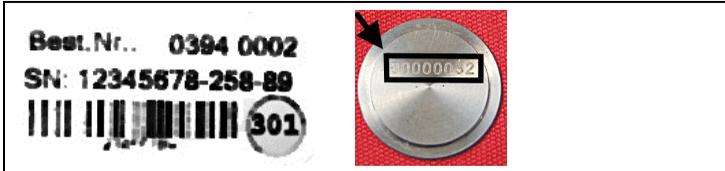
- >  → **Measurement options** → **[OK]** → **Particle** → **[OK]** → **[Options]** → **Edit cone data** → **[OK]**.

testo 330-2 LL/F (0632 3305)

- > [] → **Measurement options** → [OK] → **Particle** → [OK] → **Nozzle data** → [OK].

Select nozzle:

- > Select the line: [▲], [▼]



The 8 numbers on the nozzle or the first 8 numbers on the package leaflet are of assistance when selecting the nozzle.

- > Save selection: [OK]
- The selected nozzle is activated.

7.11.2. Using a new nozzle

Enter the calibration data for the new nozzle.

testo 330-2 LL V2010 (0632 3307)

Call up function:

- > [] → **Measurement options** → [OK] → **Particle** → [OK] → **[Options]** → **Edit cone data** → [OK].

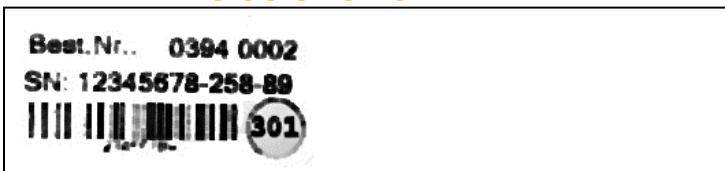
testo 330-2 LL/F (0632 3305)

Call up function:

- > [] → **Measurement options** → [OK] → **Particle** → [OK] → **Nozzle data** → [OK].

Enter the nozzle data:

- > Select the line: [▲], [▼] → [Edit].



- > When commissioning a new nozzle, enter the 13-digit code on the package leaflet.



- 1 Serial number
- 2 Sensor-specific data.

The serial number (1) must be entered in reverse order from right to left. The sensor-specific data (2) is entered from left to right.

- > Enter values: [Edit] → [▲], [▼] and [◀], [▶] → [OK].
- > [Finished] for testo330-2 LL V2010 (0632 3307), [OK] for testo330-2 LL/F (0632 3305).

7.12. Changing the crude gas and/or measurement gas tube

1. Remove crude gas and/or measurement gas tube from the relevant particulate matter probe connection.



1. Open sealing clip and remove from the protective cover.
2. Take out the crude gas and/or measurement gas tube.



3. Insert new crude gas and/or measurement gas tube. Please ensure that the hose is inserted into the protective cover correctly. Connect crude gas and/or measurement gas tube to the particulate matter probe.



4. Insert crude gas and/or measurement gas tube each into one half of the sealing clip and carefully push the halves together (audible click).

7.13. Operation check

The operation check is conducted to check the measurement system with respect to the determinant measurement parameters according to VDI 4206-2 via the test beds.

This operation check can also be conducted by the operator outside of the regular checks, as required.

The operation check takes approx. 40 min and is split into 3 sections:

- Achieving system stability (approx. 10 min)
- Determining the transport uncertainty (15 min)
- Zero-point calibration (15 min)

testo 330-2 LL V2010 (0632 3307)

Call up function:

- >  → **Measurement options** → [OK] → **Particle** → [OK] → **[Options]** → **Operation check** → [OK].

testo 330-2 LL/F (0632 3305)

Call up function:

- >  → **Measurement options** → [OK] → **Particle** → [OK] → **Operation check** → [OK].

1. The measurement system stability check is carried out.

2. Start measurement: .

- Diluter speed

The rotation diluter's revolutions per minute over 15 minutes are displayed (while determining the transport uncertainty).

- Transport uncertainty

Over 15 minutes the cavities transported are counted and compared to the setpoint value (setpoint = number of rotation diluter cavities x number of rotations per minute x test duration). In the event of a deviation of less than +/- 15 cavities, the measurement system is fully functional.

- Zero-point calibration

Once the transport uncertainty has been determined, the zero point of the sensor is stored and monitored over the next 15 minutes. In the event of a deviation of max. +/- 1.5 Hz, the measurement system is fully functional.

- The operation check is assessed automatically by the measurement system.

3. End operation check: **[Close]**.

8 Tips and assistance

8.1. Questions and answers

Error messages

Error message	Possible causes / solution
<p>Particulate matter sensor pressure incorrect! Check pressure tube.</p>	<p>Cover of the particulate matter sensor is loose. Please check.</p> <ul style="list-style-type: none"> > Check cover. <p>Seal ring in the cover of the particulate matter sensor is damaged, dirty or not inserted.</p> <ul style="list-style-type: none"> > Check seal ring. <p>Sealing surface of the nozzle is dirty.</p> <ul style="list-style-type: none"> > Check sealing surface. <p>Air inlet nozzle and/or measurement gas outlet nozzle is blocked, e.g. by attached sealing cap.</p> <ul style="list-style-type: none"> > Remove sealing cap. <p>Kink in the pressure tube</p> <ul style="list-style-type: none"> > Remove the kink in the pressure tube. <p>Pressure sensor defective.</p> <ul style="list-style-type: none"> > Contact Testo Service.
<p>Nozzle data incorrect. Please enter again. See instruction manual.</p>	<p>Nozzle data has not been entered correctly.</p> <ul style="list-style-type: none"> > Enter nozzle data again.
<p>Nozzle flow unstable. See instruction manual. (Error occurs during measurement).</p>	<p>Nozzle is dirty.</p> <ul style="list-style-type: none"> > Clean the nozzle. <p>Hoses are not connected correctly or are kinked.</p> <ul style="list-style-type: none"> > Check hoses. <p>Rotation diluter is leaky.</p> <ul style="list-style-type: none"> > Check whether the cover of the rotation diluter or the discs are inserted correctly.
<p>Particle sensor module open! (Pump not running).</p>	<p>Cover of the particulate matter sensor is open.</p> <ul style="list-style-type: none"> > Close the cover.

Error message	Possible causes / solution
<p>Particle sensor module open! (Pump running).</p>	<p>Leak in the cover of the particulate matter sensor, e.g. seal ring damaged, dirty or not inserted. > Check seal ring. Hose is kinked. > Check hose. Cover of the particulate matter sensor is defective. > Contact Testo Service.</p>
<p>Particulate matter sensor and sensor cover need to cool down (this process may take a few minutes).</p>	<p>The temperature of the sensor module is too high. This can occur when switching from wood pellets to wood chips as fuel within a short period of time. > Open the cover of the particulate matter sensor to allow it to cool down faster.</p>
<p>Instrument temperature outside specified range.</p>	<p>Operating temperature is outside the specified range. Instrument temperature is too low or too high (e.g. due to being stored in the car). > Allow the instrument to cool down or adapt to the ambient temperature.</p>
<p>Unstable ambient temperature, no valid measurement possible. Please restart the system. See instruction manual!</p>	<p>Cold/thermal radiation due to draught, cold/hot instrument base. > Protect instrument from cold/thermal radiation. Diluter cover open. > Close diluter cover. Diluter not closed at the start. > Check diluter.</p>
<p>Measurement gas flow in the measurement gas path obstructed! See instruction manual</p>	<p>Fresh air filter dirty. > Change fresh air filter. Measurement gas tube, pressure tube kinked. > Check measurement gas tube, pressure tube. Gas path in the area of the preheating section obstructed. > Check gas path. Switch to mains operation.</p>

Error message	Possible causes / solution
<p>Measurement gas flow in the area of the nozzle too great. See instruction manual.</p>	<p>Cone seal in the cover of the particulate matter sensor is damaged, dirty or not inserted.</p> <ul style="list-style-type: none"> > Check cone seal. <p>Sealing surface of the nozzle is dirty.</p> <ul style="list-style-type: none"> > Clean sealing surface. <p>Wrong nozzle selected.</p> <ul style="list-style-type: none"> > Check nozzle calibration data. <p>Nozzle defective.</p> <ul style="list-style-type: none"> > Please change the nozzle.
<p>Pump flow of the crude gas pump is too low. No valid measurement possible. See instruction manual!</p>	<p>Crude gas tube is kinked.</p> <ul style="list-style-type: none"> > Check crude gas tube. <p>Primary filter, secondary filter or cotton filter blocked.</p> <ul style="list-style-type: none"> > Change relevant filter.
<p>Sensor module temperature not reached. See instruction manual!</p>	<p>Sensor module not connected correctly.</p> <ul style="list-style-type: none"> > Check the sensor module contact.
<p>Probe communication interrupted. Please check probe connection. See instruction manual!</p>	<p>Probe not correctly plugged in.</p> <ul style="list-style-type: none"> > Check plug-in connection.

Other descriptions of problems

Description of problem	Possible causes / solution
Leaks in the crude gas path were exposed during the tightness test.	<p>The rotation disc in the rotation diluter is not inserted correctly.</p> <ul style="list-style-type: none"> > Check the fit of the rotation disc. <p>Crude gas tube is not correctly attached to the particulate matter probe.</p> <ul style="list-style-type: none"> > Check crude gas tube connection. <p>Crude gas tube is not correctly attached to the probe's cotton filter.</p> <ul style="list-style-type: none"> > Check crude gas tube connection to the cotton filter. <p>Condensate container is not correctly fitted.</p> <ul style="list-style-type: none"> > Insert condensate container correctly and click into place. <p>Insert the condensate container into the testo 380 and click into place.</p> <p>The cotton filter connector is not closed correctly.</p> <ul style="list-style-type: none"> > Close the connector. <p>Cotton filter is not fitted on the condensate trap correctly.</p> <ul style="list-style-type: none"> > Fit cotton filter correctly. <p>Primary filter is not inserted into the cotton filter correctly.</p> <ul style="list-style-type: none"> > Insert cotton filter correctly. <p>Secondary filter in the condensate trap is not closed correctly.</p> <ul style="list-style-type: none"> > Check secondary filter and close. <p>The testo 330 is not connected to the testo 380 correctly.</p> <ul style="list-style-type: none"> > Fix the testo 330 in place using the locking lever. <p>Condensate outlet on the testo 330 is not closed correctly.</p> <ul style="list-style-type: none"> > Close condensate outlet. <p>Cover cap is not plugged onto the probe shaft.</p> <ul style="list-style-type: none"> > Plug cover cap onto the probe shaft.

Description of problem	Possible causes / solution
<p>Leaks in the measurement gas path were exposed during the tightness test.</p>	<p>Fresh air filter is not correctly closed. > Close fresh air filter.</p> <p>Rotation diluter: the rotation disc is not correctly inserted.</p> <ol style="list-style-type: none"> 1. Remove the cover of the rotation diluter. 2. Establish tightness by slightly rotating the rotation disc. <p>> Check the fit of the rotation disc.</p> <p>Measurement gas tube is not correctly connected to the particulate matter probe.</p> <p>> Attach measurement gas tube to the particulate matter probe.</p> <p>Measurement gas tube is not correctly connected to the preheating section.</p> <p>> Connect measurement gas tube to the preheating section correctly.</p> <p>Preheating section is not correctly connected.</p> <p>> Attach preheating section correctly and lock (clockwise).</p> <p>Probe connection is not correctly connected.</p> <p>> Attach connecting plug correctly and lock.</p> <p>Pressure tube is not correctly connected to the particulate matter sensor.</p> <p>> Connect pressure tube to the particulate matter sensor correctly.</p> <p>Sealing element in the cover of the particulate matter sensor is damaged or not correctly inserted.</p> <p>> Replace sealing element (item no. 0137 0287) or insert correctly.</p> <p>Seal ring of the particulate matter sensor (underside) is damaged / not correctly inserted.</p> <p>> Replace seal ring of the particulate matter sensor (item no. 0137 0285) or insert correctly.</p> <p>Cover cap is not fitted onto the fresh air inlet of the condensate container.</p> <p>> Fit cover cap onto the fresh air inlet.</p>

Description of problem	Possible causes / solution
The cover of the particulate matter sensor cannot be opened to clean the sensor module.	<p>The particulate matter sensor has already established pressure of 400 mbar.</p> <ul style="list-style-type: none"> > If the sensor module needs to be cleaned, switch off the sensor pump:  → Measurement options → [OK] → Particle → [OK] → Options → Particle sensor pump: on/off
When creating a new customer, the Solid Fuel menu is not displayed.	<p>The testo 330 is not connected to the testo 380.</p> <ul style="list-style-type: none"> > Insert the testo 330 into the testo 380 holder. The Solid Fuel menu is selectable and the master data is transferred. <hr/> <p>i If another fuel is selected for a measurement, it is automatically transferred to the master data.</p>
On the printout the furnace setting Combination Boiler/Air Heater is not correct.	<p>Master data is not created correctly.</p> <ul style="list-style-type: none"> > In the Address/Location menu customise the furnace setting Combination Boiler/Air Heater.

If we have not been able to answer your question, please contact your dealer or Testo Customer Service. For contact details, see the back of this document or visit the website www.testo.com/service-contact.

8.2. Accessories and spare parts

Description	Item no.
Cleaning kit	0554 0237
Sensor module	0394 0001
Nozzle	0394 0002
Fixing chain for particulate matter probe	0554 9356
Cleaning brush for probe shaft	0554 0228
Replacement dirt filter for condensate trap	0554 3381
Cover cap for condensate trap	0192 0099
Cover cap for probe shaft	0192 2455

Description	Item no.
Sealing ring (red) for diluter	0135 0277
Sealing rings for measurement gas tube to the particulate matter sensor (2 pcs.)	0135 0153
Sealing rings for preheating section (2 pcs.)	0135 0289
Sealing ring for primary filter housing	0135 2025
Sealing ring for primary filter to the cotton filter	0135 0189
Sealing rings for cotton filter (2 pcs.)	0135 0071
Sealing rings for particulate matter sensor (2 pcs.)	0135 0200
Sealing element for particulate matter sensor	0135 0287
Gas path connector	0135 0231
Wood moisture measuring instrument testo 606-2	0560 6062
Testo fast printer	0554 0549
Bluetooth® printer, incl. rechargeable battery and charging adapter	0554 0553
Spare thermal paper for printer (6 rolls)	0554 0568
Mains unit for testo 330 and fast printer	0554 1096
Testo easyHeat (PC configuration software)	0554 3332
Combustion air temperature (AT) probe, 190mm	0600 9787
Modular flue gas probe 300 mm, 500 °C, thermocouple 0.5 mm, probe shaft diameter: 8 mm	0600 9761

For a complete list of all accessories and spare parts, please refer to the product catalogues and brochures or visit our website www.testo.com

8.3. Updating instrument software for testo 330-2 LL V2010 (0632 3307)

At www.testo.com/download-center you can download the current instrument software (firmware) for the testo 330-2LL (0632 3307) (registration required).

> Unplug the mains unit and switch off the testo 330.

1. Hold down **[▲]**.
2. Plug in the mains unit, continue holding down **[▲]**.
 - The display shows **Firmware update** along the bottom edge.
3. Release **[▲]**.
4. Insert the connecting cable (0449 0047) into the USB-port on the instrument, then connect it to the PC.
 - Your PC recognises the testo 330 as a removable medium.
5. Copy the new file (ap330rel.bin) to the detected removable medium.
 - In the display the status bar progresses from left to right. This process may take a few minutes.
6. Disconnect the connecting cable from the testo 330.
 - Once the instrument software (firmware) has been updated, the system will automatically reboot and is ready for use.

8.4. Updating instrument software for testo 330-2 LL/F (0632 3305)

At www.testo.com/download-center you can download the current instrument software (firmware) for the testo 330-2 LL/F (0632 3305) (registration required).

8.5. Updating instrument software for testo 380

At www.testo.com/download-center you can download the current instrument software (firmware) for the testo 380 (registration required).

1. Connect particulate matter probe to the testo 380.
2. Switch on the testo 380.
3. Insert the connecting cable (0449 0047) into the USB port on the testo 380, then connect it to the PC.
4. Open the executable file **USBFlashUpdate.exe**.
 - The window **testo 380 Update (USB)** is displayed.
5. Select testo 380 or particulate matter probe.
6. Select connected testo 380.

7. Select new file via the **Browse** key
 - testo 380: appbox_dbg.bin
 - particulate matter probe: appsonde_dbg.bin
8. If necessary, set the transmission speed (baud rate 19200).

i On commencement of the update, the existing firmware version will be overwritten and this action cannot be undone.

9. Start update: **[Start]**

i Do not cancel an update, because the testo 380 and the particulate matter probe can only be started up with fully-installed firmware.

- The testo 380 or the particulate matter probe is switched to update mode via the USB interface, and transmission and programming of the new firmware begins.
- Particulate matter probe status display

Display	Status
Flashing yellow/red	Firmware update is being prepared
Flashing green/red	Firmware is being transferred

- testo 380 status display

Display	Status
Flashing yellow	Firmware update is being prepared
Status bar progresses from left to right	Firmware is being transferred

- > If an update is cancelled, repeat steps 1 – 9.
10. Once the firmware has been updated, the testo 380 automatically restarts and is ready for use once again. For the particulate matter probe to be detected by the testo 380 after an update, the testo 380 needs to be restarted (switch mains connection off and on again).

