# testo 320 / testo 330 – flue gas analyzer

0633 3200 / 0633 3300

Instruction manual

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# 1 About this document

- The instruction manual is an integral part of the instrument.
- Pay particular attention to the safety instructions and warning advice in order to prevent injury and damage to the product.
- Keep this documentation at hand so that you can refer to it when necessary.
- Please read this instruction manual through carefully and familiarize yourself with the product before putting it to use.

**Symbols and writing standards**

| Display | Explanation |
|---|---|
| | Note: basic or further information |
| | Warning advice, risk level according to the signal word:<br>**Danger!** Risk of death!<br>**Warning!** Serious physical injury may occur.<br>**Caution!** Minor physical injury or damage to the equipment may occur.<br>**Attention!** Indicates possible damage to equipment<br>> Take the specified precautionary measures. |
| 1<br>2<br>… | Action: several steps, the sequence must be followed |
| - | Result of an action |
| ✓ | Requirement |
| ▸ | Action |
| **Menu** | Elements of the instrument, the instrument display or the program interface. |
| **[OK]** | Control keys of the instrument or buttons of the program interface. |

**Warnings**

Always pay attention to any information marked with the following warning notices along with warning pictograms. Implement the specified precautionary measures!

**⚠ DANGER**

Risk of death!

**⚠ WARNING**

Indicates possible serious injury.

**⚠ CAUTION**

Indicates possible minor injury.

**ATTENTION**

Indicates possible damage to equipment.

# 2 Safety and disposal

## 2.1 General safety instructions

- Only operate the product properly, for its intended purpose, and within the parameters specified in the technical data.
- Do not apply any force.
- Do not operate the product if there are signs of damage on the housing, mains unit or connected cables.
- Only use the product in closed, dry rooms and protect it from rain and moisture.
- The product must be checked for any visible damage before commissioning.
- Dangers may also arise from objects to be measured or the measuring environment. Always comply with the locally valid safety regulations when carrying out measurements.
- Only perform maintenance and repair work on this instrument that is described in this documentation. Follow the prescribed steps exactly when doing the work.
- Any additional work must only be carried out by authorized, qualified personnel. Otherwise, Testo will refuse to accept responsibility for the proper functioning of the product after repair and for the validity of approvals.
- Use only original spare parts from Testo.

- Temperature information given on probes/sensors relates only to the measuring range of the sensor technology. Do not expose handles and supply lines to temperatures above 45°C (113°F), unless they are explicitly approved for higher temperatures.

| ⚠ WARNING | |
|---|---|
| | **Risk of burns due to hot probes, probe shafts and sensor tips!**<br>- Do not get hold of hot parts (> 45°C/113°F) with bare hands immediately after a measurement.<br>- In the event of burns, immediately cool the relevant spot with cold water and consult a doctor if necessary.<br>- Allow probes, probe shafts and sensor tips to cool down. |

- The product must not be used in potentially explosive atmospheres, if it is not explicitly approved for these areas.
- Do not carry out any contact measurements on uninsulated, live parts.
- Do not expose the product to any extremely high or low temperatures. Avoid temperatures below 23°F or above 13°F. The exception is when a product has been explicitly approved for other temperatures.
- Protect the product from dust and dirt. Make sure that it is not exposed to an environment with dust, dirt, sand, etc.
- Prevent the product from falling.
- If operator safety can no longer be guaranteed, the product is to be taken out of service and secured against inadvertent use. This is the case if the product:
    - is obviously damaged
    - has fractures on the housing
    - has faulty measuring cables
    - has leaking batteries
    - no longer performs the required measurements
    - has been stored for too long in unfavourable conditions
    - has been exposed to mechanical stresses in transit

### Built-in rechargeable battery

**⚠ DANGER**

**Risk of death!**
**The built-in rechargeable battery can explode if it gets too hot.**

- Do not expose the product to ambient temperatures above 122° F.

- Do not remove the rechargeable battery.
- Improper use of rechargeable batteries may cause destruction of the batteries, injuries due to current surges, fire or the escape of chemicals.
- Do not deform rechargeable batteries. Rechargeable batteries must not be squashed, drilled, dismantled, pierced, modified or damaged in any other way. This may lead to the leakage of battery acid, to the escape of gases and/or to an explosion.
- In principle, contact with escaping battery components may present a risk to health and to the environment. Adequate body and respiratory protection is therefore required when in contact with batteries that exhibit abnormalities (escaping contents, deformations, discolourations, dents or the like).
- Rechargeable batteries must be disposed of in accordance with the local and country-specific regulations. In order to prevent short circuits and the associated heating, lithium batteries must never be stored unprotected in bulk. Appropriate measures against short circuits are, for instance, inserting the batteries into the original packaging or a plastic bag, masking the poles or embedding them in dry sand.
- Rechargeable lithium batteries must be transported and shipped in accordance with the local and country-specific regulations.
- If there is any contact with the skin or eyes, the areas must be rinsed with water for at least 15 minutes. If there is any contact with the eyes, a doctor must be contacted in addition to the rinsing.
- If burns are caused, these must be treated appropriately. You are also strongly advised to contact a doctor.
- Airways: leave the room immediately when smoke development or gas release is acute. Consult a doctor when amounts are larger and airways are irritated.

## 2.2 Product-specific safety information

- Not suitable for children under 14 years
- Do not carry out measurements on live components.
- Only open the measuring instrument if this is expressly described in the documentation for the purposes of maintenance or servicing.

**⚠ DANGER**

**Integrated magnet**
**Danger to life for persons with pacemakers!**

- Keep a distance of at least 8 in between your pacemaker and the measuring instrument.

**ATTENTION**

**Integrated magnet**
**Damage to other devices!**

- Keep a safe distance from devices that may be damaged by magnetism (e.g. monitors, computers, credit cards, memory cards, etc.).

**⚠ CAUTION**

**The flue gas condensate may be acidic.**
**Risk of burns to the hands!**

- Wear acid-resistant safety gloves, glasses and overalls to empty the condensate.

- Make sure that the condensate has been fully emptied out of the condensate trap before the measuring instrument is stored for a long time.
- 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.
- When testing a gas pipe, pay attention to the following:

**⚠ WARNING**

**Dangerous mixture of gases**
**Danger of explosion!**

- Make sure there are no leaks between the sampling point and the measuring instrument.
- Do not smoke or use naked flames during the measurement.

**⚠ CAUTION**

**Acid in the sensors.**
**May cause chemical burns!**

- Do not open the sensors.
- Eye contact: Rinse the affected eye thoroughly under running water for 10 minutes, keeping the eyelids wide open and protecting the unaffected eye. Remove contact lenses wherever possible.

**⚠ CAUTION**

**Powder in the sensor filters.**
**May cause irritation to the skin, eyes or respiratory tract!**

- Do not open the sensor filters.
- Eye contact: Rinse the affected eye thoroughly under running water for 10 minutes, keeping the eyelids wide open and protecting the unaffected eye. Remove contact lenses wherever possible.
- Skin contact: Remove the injured person's contaminated clothing, ensuring self-protection. Rinse affected skin areas under running water for at least 10 minutes.
- Inhalation: Move to fresh air and make sure that breathing is unrestricted.
- Ingestion: Rinse mouth out and spit out liquid. If conscious, drink 1 glass of water (approx. 7 fl. oz.). Do not induce vomiting.

**⚠ CAUTION**

**Condensate entering the gas path!**
**Damage to sensors and flue gas pump!**

- **Do not hold the device upside down (with the side with connections at the top instead of the bottom) while the flue gas pump is in operation.**

- Only perform maintenance and repair work on this instrument that is described in this documentation. Follow the prescribed steps exactly when doing the work.

## 2.3 Storage

- Keep the product away from any liquids and do not put it into water. Protect it from rain and humidity.
- Do not store the product together with solvents (e. g. alcohol).

## 2.4 Disposal

- Dispose of faulty energy storage units in accordance with the valid legal specifications.
- At the end of its useful life, deliver the product to the separate collection point for electric and electronic devices (observe local regulations) or return the product to Testo for disposal.
- WEEE Reg. no. DE 75334352

# 3 Authorisations and certification

## 3.1 Product-specific approvals

For the relevant country approvals, please refer to the printed quick reference guides or short instructions enclosed with the products.

Please note the following country-specific information for the product authorization.

The use of a product with wireless technology is subject to the regulations and stipulations of the respective country of use and the module may only be used in countries for which a national certification has been granted. The user and every owner has the obligation to adhere to these regulations and prerequisites for use and acknowledges that the re-sale, export, import, etc., in particular in, to or from countries without wireless authorization, is their responsibility.

## 3.2 Products with wireless technology

Changes or modifications that have been made without the explicit consent of the competent approval authority may lead to cancellation of the type approval.

Data transfer may be disturbed by equipment that uses the same frequency range (ISM band).

Places where the use of radio communication links is not permitted include aeroplanes and hospitals. For this reason, the following points must be ensured before entering:

- Switch the instrument off.
- Disconnect the instrument from any external power sources (mains cable, external energy storage units, etc.).

# 4 Intended use

The testo 320 / testo 330 is a measuring instrument which enables the professional flue gas analysis of combustion systems, such as:

- small combustion plants (oil, gas, wood, coal)
- low-temperature and condensing boilers
- gas heaters

The solid fuel measurement adapter (0600 9765) is required for measurements on solid fuel systems. The adapter protects the measuring instrument from harmful substances (dust, organic compounds, etc.).

The measuring device can be used to take measurements on heating systems and verify compliance with applicable limits.

The instrument has been verified as a short-term measuring instrument and should not be used as a safety (alarm) device.

The following tasks can also be carried out using the instrument:

- Regulating the $O_2$, CO and $CO_2$, NO, $NO_x$ values in combustion plants to ensure optimum operation. (depending on sensor configuration, CO2 and NOx values are calculated)
- Draught measurement.
- 0.016 in wc measurement (only available for testo 330).
- Measuring and regulating the gas flow pressure in gas heaters.
- Measuring and optimising the flow and return temperatures of heating systems.
- Measuring the CO concentration in the ambient air.
- Measurements on CHP plants in accordance with the first German Federal Immission Control Ordinance (1. BImschV and 44. BImschV).
- In principle, the CO sensor can also be used for measurements on CHP plants. If you carry out more than 50 measurements on CHP plants per year, please contact your nearest Testo service centre or send the instrument to Testo Service for checking.

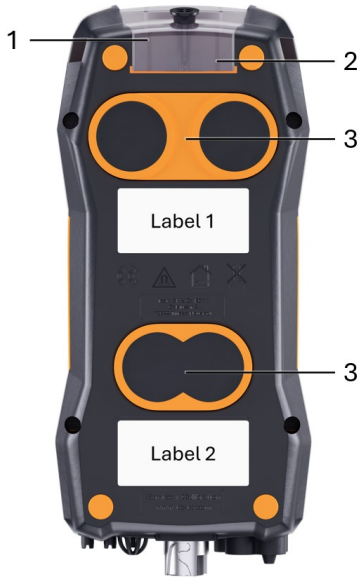
# 5 Product description

## 5.1 Front view

| | | | |
|---|---|---|---|
| **1** | On/Off button | **3** | Connections |
| **2** | User interface | | |

The device shown is a testo 330. The geometry, external components, and connections are identical on the testo 320.

## 5.2 Rear view




| | | | |
|---|---|---|---|
| **1** | Condensate container | **3** | Holding magnets |
| **2** | Status LED | | |

The device's battery is located directly behind the two upper holding magnets.

**Explanation of icons**

| | |
|---|---|
| | Observe operating instructions |
| | **ATTENTION**<br>**Magnetic field**<br>**Damage to other devices!**<br>- Keep a safe distance from products that can be damaged by magnetism (e.g. monitors, computers, credit cards). |
| | **DANGER**<br>**Magnetic field**<br>**May be hazardous to the health of pacemaker wearers.**<br>- Keep a minimum distance of 8 in between the pacemaker and the device. |

| | |
|---|---|
| | **⚠ WARNING**<br>**Caution! Risk of burns due to hot probe shaft after prolonged operation.**<br>- Before touching the probe shaft or packing the instrument: switch instrument off and let the probe shaft cool down. |
| CE | Declaration of conformity: products marked with this symbol comply with all applicable Community regulations of the European Economic Area. |
| | testo 320 / testo 330 is intended for indoor use only. |
| | At the end of its useful life, deliver the product to the separate collection point for electric and electronic devices (observe local regulations) or return the product to Testo for disposal. |
| | testo 320 / testo 330 is Bluetooth-enabled |

## 5.3 Connections

| | | | |
|---|---|---|---|
| **1** | Probe connections for additional probes (TUC 1 \| 2) | **4** | Gas outlets |
| **2** | Differential pressure measurement connection | **5** | Integrated ambient air probe |
| **3** | Power connection USB-C | **6** | Flue gas socket |

There must be no more than one extension lead (0554 1202) connected between flue gas socket and flue gas probe.

## 5.4 Compact flue gas probe

| | | | |
|---|---|---|---|
| **1** | Removable filter chamber with window and particle filter | **3** | Connector plug for measuring instrument |
| **2** | Probe handle | **4** | Connection cable |

## 5.5 Modular flue gas probe

| | | | |
|---|---|---|---|
| **1** | Removable filter chamber with window and particle filter | **4** | Connector plug for measuring instrument |
| **2** | Lock release | **5** | Probe handle |
| **3** | Probe module | **6** | Connection cable |

## 5.6 Solid fuel measurement module

| | | | |
|---|---|---|---|
| **1** | Connector plug for measuring instrument | **4** | Sintered filter |
| **2** | Condensate container | **5** | Connection for modular probe handle |
| **3** | Connection coupling for modular flue gas probe | | |

For handling, maintenance, and technical data, please refer to the enclosed operating instructions 0970 0390.

# 6 First steps

## 6.1 Commissioning

Take the information in the **quick guide** (Onepager 0971 3233) included with the product into account for this.

## 6.2 Charging the rechargeable battery

**⚠ DANGER**

- **Do not charge the rechargeable battery in potentially explosive atmospheres!**
- **The device must only be recharged using the corresponding charger outside of a potentially explosive atmosphere in the ambient temperature range from 32 °F … 90 °F.**

**⚠ WARNING**

**Risk of injury! The instrument may be damaged!**

**Deformation around the battery!**

Regularly check the instrument for deformations or damage around the battery. If you notice any deformation, the instrument must no longer be used. Switch it off to prevent physical injury or damage to the instrument. Dispose of the instrument properly (observe local regulations) or return it to Testo for disposal.

The rechargeable battery is permanently installed and can only be changed by a Testo service centre.

The measuring instrument is supplied with a partially charged rechargeable battery.

- **Charge the rechargeable battery fully before using the measuring instrument.**

Only charge the battery using the original Testo mains unit supplied.

The instrument indicates that the battery needs to be charged via an unfilled battery symbol.

1. Connect the instrument to the mains via the mains unit. To do this, insert the plug of the mains unit into the charging socket on the right lower side of the instrument.

▸ The charging process starts. LED in the condensate trap flashes red.

The charging process stops automatically when the energy storage unit is fully charged. LED in the condensate trap has a continuous green light.

If the device is used for an extended period at elevated ambient temperatures, it may become so hot that the battery cannot be charged. It may take up to 1.5 hours for the device to cool down sufficiently.

**Battery care**

- Do not fully exhaust the rechargeable battery.
- Only store instrument with battery charged and at low temperatures, but not below 0°C (best storage conditions with a charge level of 50-75%, at an ambient temperature of 50-68°F, recharge completely before use).
- Since the device consumes a small amount of power even when turned off, it should be recharged every 4 months during extended storage.
- However, it is recommended that you do not leave the charger plugged in continuously for an extended period of time (> 1 week).
- The rechargeable battery life depends on the storage, operating and ambient conditions. The available useful life of the rechargeable battery reduces more and more with frequent use. If the useful life is significantly shortened, the rechargeable battery should be replaced by the Testo service.

## 6.3 Charging operation

1. Connect the instrument plug of the mains unit to the charging port on the measuring instrument.
2. Connect the mains plug of the mains unit to a mains socket.

▸ The measuring instrument is powered via the mains unit.

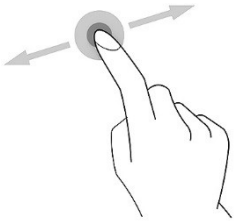
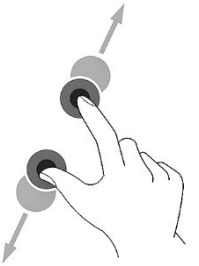
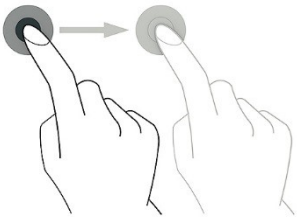
▸ If the instrument is switched off, the charging process will start automatically. Switching the measuring instrument on slows down the charging of the rechargeable battery and the measuring instrument is powered via the mains unit.

For longer measurements, Testo recommends using a combustion air temperature probe with connection cable. Self-heating of the instrument during mains operation may influence the combustion air temperature measurement using the integrated ambient air probe.

## 6.4 Touchscreen operating concept

Familiarize yourself with the touchscreen operating concept before you use the measuring instrument.

Actions are mostly carried out by:

| Description | |
|---|---|
| **Tapping**<br>To open applications, select menu symbols, press buttons on the display or enter characters with the keypad, in each case tap these with a finger. | |
| **Swiping**<br>Swipe to the right or left on the display to show further views, e.g., to navigate through the list view of saved measurements. |  |
| **Zooming**<br>In order to make a section of the display larger or smaller, touch the display with two fingers and move them apart or together. |  |
| **Dragging**<br>You can move an element by touching it, holding it and dragging it to the required position.<br>Example: Changing the display sequence of the measurement parameters. |  |

## 6.5 On-screen keyboard

Some functions require values (figures, numerical value, unit, characters) to be entered. The values are entered via an on-screen keyboard.

## 6.6 Switching the instrument on and off

| Current status | Action | Function |
|---|---|---|
| Instrument off | Press the button for a long time (> 0.5 s) | Instrument is switched on.<br>Time required to become operational: approximately 30 seconds |
| When the measuring instrument is started for the first time, the setup wizard guides you through the setting parameters step by step. | | |
| Instrument on | Press the button briefly (> 0.1 s) | Instrument is switched to standby mode. The instrument is re-activated when the button is pressed again. |
| Instrument on | Press the button for a long time (>1 s) | Selection: **[OK]** Instrument is switched off or cancel the instrument being switched off with **[Cancel]**. |

Unsaved readings are lost when the measuring instrument is switched off.

## 6.7 Connect probes

**Flue gas probes**

✓ Instrument is switched on.

1 Insert the connector plug into the flue gas socket.

2 Lock it in place by turning it slightly clockwise (bayonet lock).

There must be no more than one extension line (0554 1202) between measuring instrument and flue gas probe.

**Temperature probe**

✓ Instrument is switched on.

1 Insert the connector plug of the probe into the probe socket.

▸ System recognizes the probe (info is displayed).

The parameter which is measured with an external probe is identified on the display by "ext.".

## 6.8 Connecting Smart Probes an testo Smart App

The testo 320 / testo 330 has the option of establishing a Bluetooth® connection with wireless probes via the testo Bluetooth® Connector as well as a connection to the testo Smart App at the same time.

### 6.8.1 Connecting Smart Probes

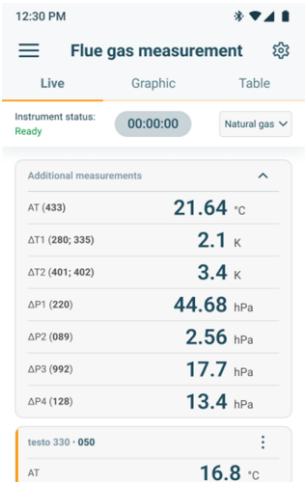
Several Smart Probes can be connected directly to the measuring device.

1 Press the ON button on the Smart Probe.

- The LED flashes yellow while connecting via Bluetooth® and then lights green when the connection is established.

- When Smart Probes are connected to the testo 320 or testo 330, they are displayed in separate fields below the main measurement.

  In some applications where certain smart probes are not required for measurement, they are not displayed.




- You can also calculate delta values for temperature and pressure from the Smart Probe values. These results can be found under ‘Additional measurements’ above the main measurement. The Additional measurements field can be expanded and collapsed.

  The measured values are assigned to the Smart Probes via the last three digits of the serial number.

### 6.8.2 Smart Probes compatible with the instrument

| Order number | Designation |
|---|---|
| 0560 2115 03 | testo 115i - clamp thermometer with smartphone operation |
| 0560 1510 01 | testo 510i - differential pressure measuring instrument with smartphone operation |
| 0563 3915 | testo 915i - temperature probe with smartphone operation |

### 6.8.3 Establishing a connection with the testo Smart App

In order to establish a connection, you need a tablet or smartphone with the testo App already installed on it. Bluetooth® and WLAN must be activated.

You can get the App for iOS instruments in the App Store or for Android instruments in the Play Store.

Compatibility:

Requires iOS 18.0 or later / Android 15 or later, requires a mobile device with Bluetooth® 4.2 for fast connection setup.

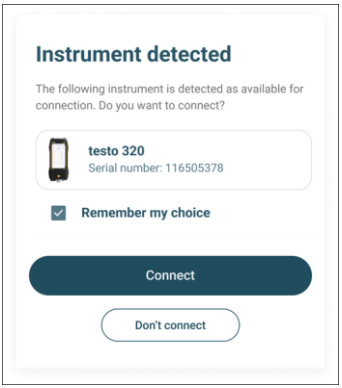
In the Testo Smart App, under ‘Help and Information’, you will find tutorials and help on how to use the app..

### 6.8.4 Connecting for the first time

To use the testo Smart App functions with the testo 320 or testo 330, you need to register for a free testo account.

1. Open the testo Smart App on your mobile device..
2. Log in with your testo account.

▸ After successfully logging in and with the testo 320 or testo 330 switched on, a dialogue box opens automatically.




3 Confirm the connection.

Optionally, you can activate automatic connections in future.

For the connection between the testo Smart App and the testo 320 or testo 330, Bluetooth and WLAN must be switched on on your mobile device.

▸ The connection is automatically established.

## 6.8.5 Carrying out the measurement

The measurement functions in the testo Smart App are operated in the same way as the measuring instrument.

All actions in the app are carried out in second screen mode: settings and commands in the app trigger the corresponding activity directly on the measuring instrument.

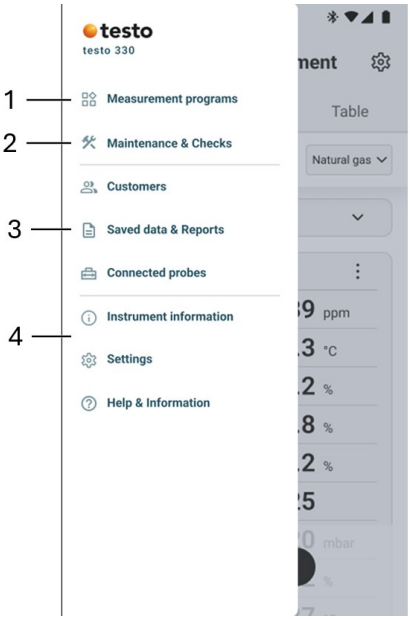
Detailed instructions, examples and further information can be found in the tutorial and help section of the Smart App.

# 7 Using the product

## 7.1 User interface

| | |
|---|---|
| **1** | Main menu |
| **2** | Select reading display type:<br>- Live<br>- Chart<br>- Table |
| **3** | Configuration/Settings |
| **4** | Open Fuels selection list |
| **5** | Additional measurements |
| **6** | Corestream |
| **7** | Edit measurement data |
| **8** | Start measurement<br>Pause measurement<br>Stop measurement |

## 7.2 Overview of main menu



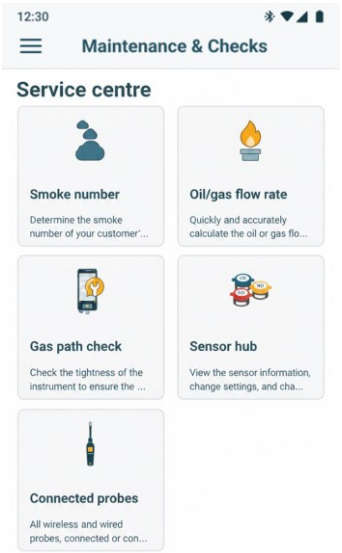

| | |
|---|---|
| **1** | Select Measurement menu |
| **2** | Maintenance and Service |
| **3** | Saved data |
| **4** | Settings and Help |

## 7.3 Gas path check

For flawless operation of the measuring instrument, regular tightness testing of measurement systems (measuring instrument + flue gas probe) is recommended.

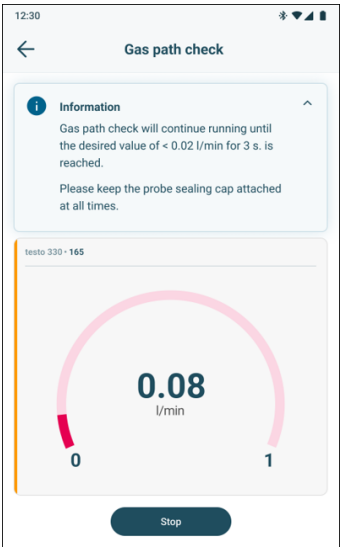
1 Call up function:

| Maintenance & Checks




2 Call up function Gas path ckeck.

Follow the instructions on the device.



3 Place the black sealing cap on the tip of the flue gas probe.

▸ The pump flow is displayed. If the flow rate is less than 0.001 cfm, the gas paths are not leaking and the measurement is ended.

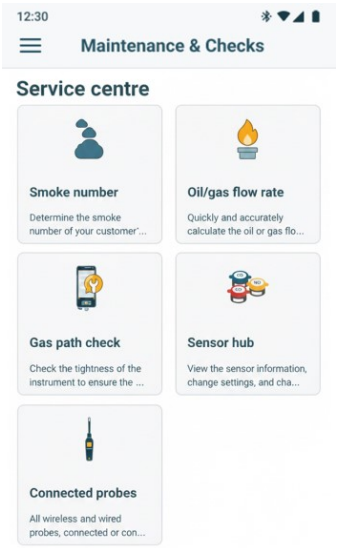
4 Remove the sealing cap from the probe tip.

## 7.4 Sensor information and settings

Alarms and thresholds can be set to protect the CO / NO sensors from overload. If the threshold is exceeded, sensor protection is activated.

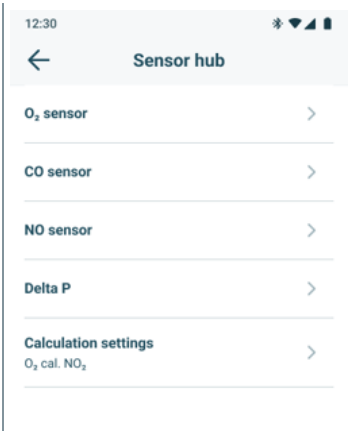
1 Call up function:

🛠 | **Maintenance & Checks**



2 Tap on **Sensor Hub**.

There you will find all the information about the sensors in your measuring device.




3 Select the sensor and set the desired parameters under **Settings**, e. g. the limit values (**Protection limit**).

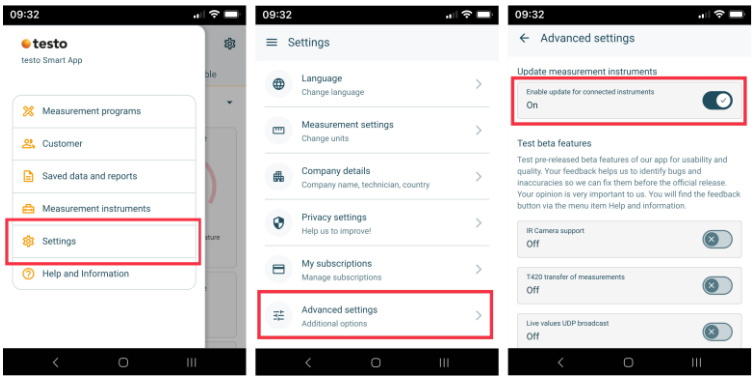
Follow the instructions behind the info buttons.

4 Select **Calculation settings** and specify the reference value for $O_2$ and the $NO_2$ surcharge.

Note the information in the info button.

## 7.5 Performing a firmware update

In **Advanced settings**, make sure that in the testo Smart App the toggle switch for **Enable update for connected instruments** is always enabled.



✓ New firmware versions are automatically downloaded from the testo server when the testo Smart App is open and connected to the internet.

If new firmware is available, an update notification will appear on the screen after you connect the measuring instrument to the testo Smart App.

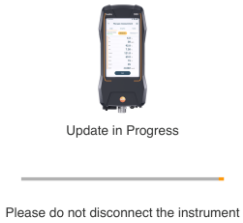
1 Click on **Start update** to carry out the update.

If you click on **Later**, the update notification will appear again the next time you connect.

The connection must **not** be interrupted during the instrument update.

The update must be carried out completely and takes approx. 5 to 10 minutes depending on the smartphone used.

If the battery charge is low, first charge the battery or connect the device to the power supply.




After the update, the measuring instrument will reboot.

The firmware can be checked in the instrument menu or via the app.

It is recommended to restart the testo Smart App after performing the instrument update.

# 8 Performing the measurement

## 8.1 Prepare for measurement

1. Check the condensate container fill level and if necessary empty container, see Section 9.5 **Empty condensate trap**.
2. Check the particle filter of the flue gas probe for contamination and replace it in good time. If necessary, see Section 9.11 **Check/replace particle filter.**
3. Set the correct fuel depending on the measurement application.

## 8.2 Zeroing phases

**Measuring the combustion air temperature (AT)**

If no external combustion air temperature probe or testo 915i Smart Probe is connected, the combustion air temperature is measured via the integrated temperature probe.

**Gas zeroing**

The gas sensors are automatically zeroed after the instrument is switched on.

Follow the instructions on the display.
**testo 320:**
The flue gas probe must be in fresh air during the zeroing phase (30 seconds)!
**testo 330:**
The flue gas probe may already be in the flue gas duct during the zeroing phase (30 seconds).

In case the first zeroing wasn't successful, automatically a second zeroing phase is started.

> Start zeroing of the gas sensors manually: press the button ⋮ and select **Zeroing Gas Sensors**

**Draught/pressure zeroing**

The pressure sensors are zeroed when a pressure measuring function is called up.

Follow the instructions on the display.
**testo 320:**
The flue gas probe must be in fresh air during the zeroing phase! The instrument must not be pressurized during zeroing!
**testo 330:**
The flue gas probe may already be in the flue gas duct during the zeroing phase. The pressure socket of the instrument should be free (depressurized, not closed).

## 8.3 Carry out gas path check

Regularly check the measurement system (measuring instrument + flue gas probe) for leaks; details see chap. 7.3 "Gas path check".

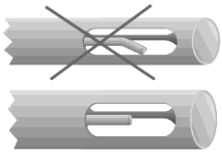
In particular, too high an $O_2$ value may be an indicator of a leaking measurement system.

## 8.4 Use of flue gas probe

**Check thermocouple before use**

> The thermocouple of the flue gas probe must not be touching the probe cage.

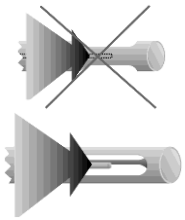
Carefully bend the thermocouple back if necessary.



**Align flue gas probe**

> The thermocouple must be freely exposed to the flue gas flow.

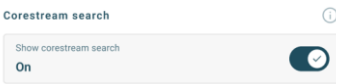
Align the probe by turning it as required.



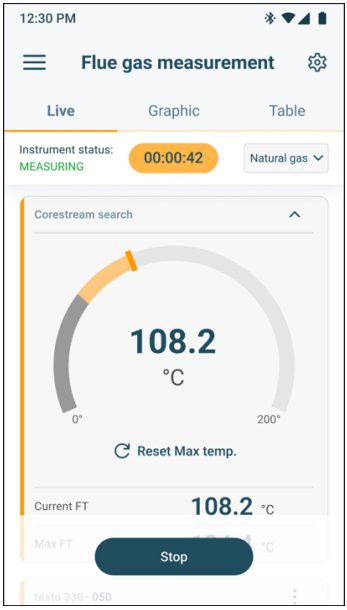
**Search for corestream**

The core search function can be activated and deactivated.

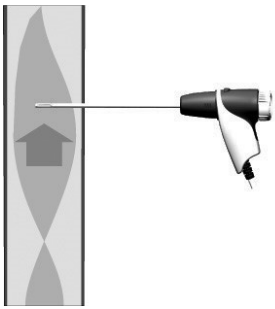
1 Open **Flue gas configuration** and activate the **Corestream search** option.



- When the search function is activated, it appears as a separate field that can be expanded and collapsed.

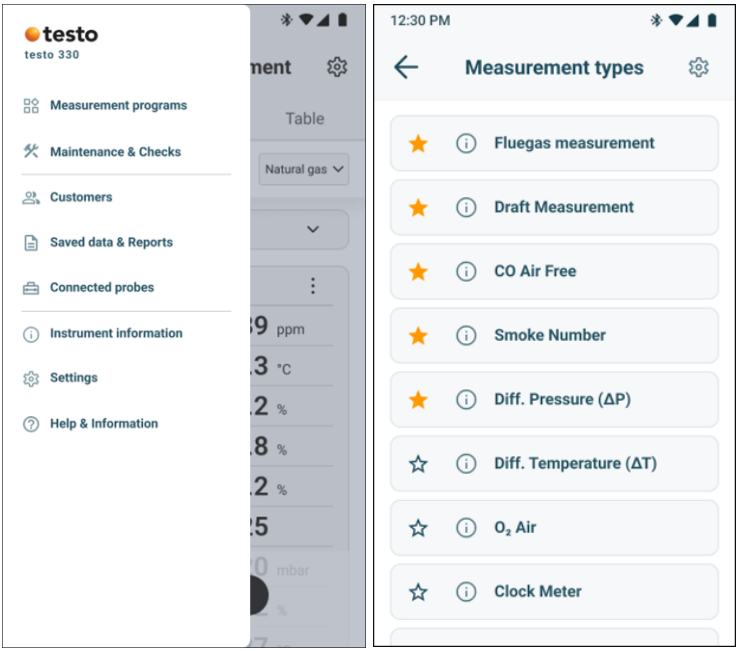



2 Align the flue gas probe in the flue gas duct so that the probe tip is in the corestream (area of the highest flue gas temperature Max FT).



- The maximum temperature can be reset if necessary.

## 8.5 Overview of measurement types




| Standard measurement types (varies depending on country version) | Brief description |
|---|---|
| **Flue gas** | Analysis of $O_2$, CO, $CO_2$, exhaust gas temperature, efficiency, and other parameters<br>Main application with the ability to perform four parallel differential pressure and three differential temperature measurements using Smartprobes and TUC sensors. |
| **Draught** | Measurement of chimney draft (negative pressure) to assess exhaust gas extraction |
| **CO undiluted** | Direct CO measurement without air dilution |
| **Smoke No.** | Determination of soot index for oil burners. An external soot pump is required |
| **Differential pressure** | Measurement of pressure differences, e.g., gas/air path, filter, fan |
| **Differential temp.** | Temperature difference between flow and return or two measuring points |

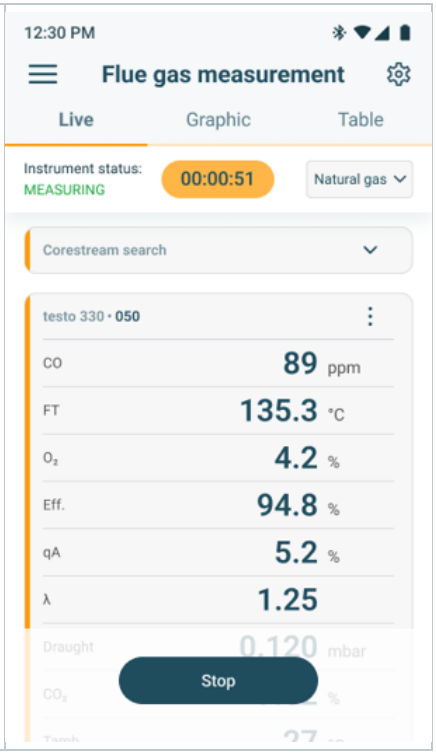
| Standard measurement types (varies depending on country version) | Brief description |
|---|---|
| **$O_2$ Air** | Measurement of oxygen content in combustion air/supply air |
| **Gas flow** | Calculation of gas volume flow for performance determination |
| **Oil flow** | Determination of burner output based on oil flow rate and oil pressure |
| **CO ambient** | Measurement of the CO content in the ambient air |
| **Tightness test 1** | Testing of gas pipes for leaks using test pressure and pressure drop |
| **Tightness test 2** | Testing of gas pipes for serviceability |
| **Let by test** | Testing of gas fittings for leaks |
| **0.016 in wc** Only for testo 330 | Measurement to verify sufficient combustion air supply in room-air-dependent fireplaces |

## 8.6 Measurement mode and view

Using the icon button the measurement mode and measurement parameters can be set.

Using the icon button the sequence and unit of measurement parameters and the alarm configuration can be edited. In addition, the sensors can be manually reset to zero.

Further information is available via the respective info buttons.



## 8.7 Process measurement data

After completing a measurement, the measurement results can be further processed.

| Transmission | Description |
|---|---|
| **Print measured values** | Print measured values directly via Bluetooth® printer 0554 0622. |
| **Save measured values** | Save measured values on the measuring instrument and recall them at any time via the device memory. |
| **Create reports using the testo Smart App** | Using the testo Smart App, saved measured values can be created as a PDF report; to do this, follow the instructions in the testo Smart App. |
| **Transfer measured values** | Measurement values can be transferred to external software via QR code. Please note: This is not a transfer of raw values that can be easily read out using the camera function. To use the QR function in external software, implementation in accordance with the Testo interface is required. |

# 9 Maintenance

## 9.1 Service

Testo recommends an annual check of the testo 320 / testo 330; this can be carried out by a Testo-authorised service centre. Please contact Testo at http://www.testo.com for more information.

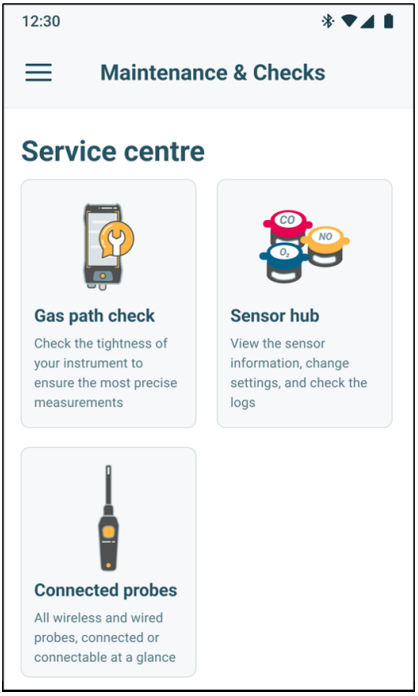
## 9.2 Calibration

The measuring instrument is supplied with a calibration protocol as standard. To maintain the specified accuracy of measurement results, Testo recommends an annual check of the testo 320 / testo 330 by a Testo-authorised service centre.

Please contact Testo at http://www.testo.com for more information.

## 9.3 Check instrument status

The testo 320 and testo 330 measuring instruments provide summary system and diagnostic information via the maintenance and service menu.



## 9.4 Clean the measuring instrument

> If the housing of the measuring instrument is dirty, clean it with a damp cloth.

Use distilled water or a weak solvent to clean the flue gas analyzer.

**IMPORTANT**

**Leaking solvents and degreasers!**
**Damage to the instrument and sensors!**
The following substances can cause damage to the device or the sensors:
- Solvent-containing vapours such as those contained in cleaning agents, degreasers, wax polishes and adhesives
- Formaldehyde

Do not store cleaning cloths, solvents and degreasers, such as isopropanol, in the case.

**IMPORTANT**

**Strong or harsh alcohol or brake cleaner!**
**Damage to the instrument!**

- Do not use any strong or harsh alcohol or brake cleaner.

## 9.5 Drain condensate container

The fill level of the condensate container can be read from the markings. Hold the instrument horizontally or vertically to check the fill level.

**⚠ CAUTION**

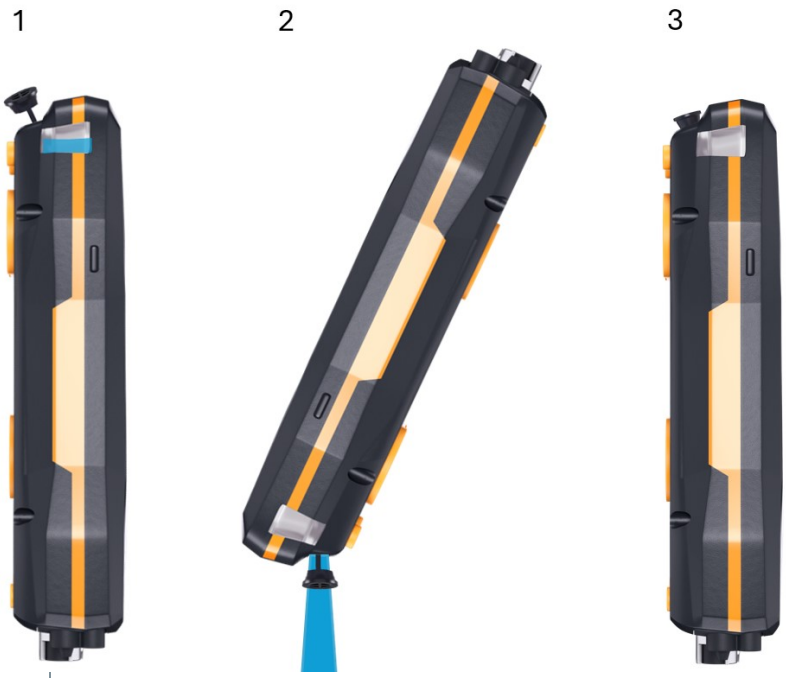
**Weak mix of acids in the condensate!**
**Minor injuries!**

- **Avoid skin contact.**
- **Make sure that the condensate does not run over the housing.**

**⚠ CAUTION**

**Condensate entering the gas path!**
**Damage to sensors and flue gas pump!**

- Do not empty condensate container while the flue gas pump is in operation.




1 Open the condensate outlet on the condensate container.

2 Let the condensate run out into a sink

3 Wipe off any drops still on the condensate outlet with a cloth and close the condensate outlet.

The condensate outlet must be completely closed, otherwise incorrect measurements could occur due to infiltration of external air.

If the condensate container overflows or water enters due to incorrect positioning of the measuring device (e.g., device held upside down while the pump is running), proceed as follows: :

- Stop the pump or measurement immediately.
- Empty the condensate container.
- Rinse the sensors or gas path with air for at least 30 minutes until dry

The sensors have a water protection membrane and are not usually permanently damaged if the membrane is intact.

## 9.6 Open the measuring instrument

Only open the measuring instrument when this is required for maintenance purposes (replacing gas sensors).

✓ The measuring instrument must not be connected to a mains socket via the mains unit. The measuring instrument must be switched off.

When opening/assembling the instrument, take care not to lose any screws that have been removed. It is advisable to place a cloth on the work surface.

1. Place the instrument on its front so that the back is facing upwards.
2. Using a torx screwdriver (size T 10), remove all four housing screws on the bottom of the instrument.

3. Lift off the back of the instrument.

When lifting the back of the device, hold the condensate trap in place - for example, by pressing down on it with your thumb - so that the battery isn't pulled out as well.

**Assembly**

Perform in reverse order to assemble. Please note:
- Lay hoses and lines in the guides intended for this purpose.
- Make sure that hoses and lines do not get jammed.

## 9.7 Replace sensors

You can replace the sensor yourself. Please refer to the separate sensor replacement instructions. These are available on the Testo website or upon request from a Testo service center.

## 9.8 Clean modular flue gas probe

**⚠ WARNING**

**Caution! Risk of burns due to hot probe shaft after prolonged operation.**

- **Before touching the probe shaft: switch instrument off and let the probe shaft cool down.**

✓ Disconnect flue gas probe from the measuring instrument.

1 Release probe catch by pressing the key on the probe handle and remove probe module.

**⚠ WARNING**

**Risk of eye injuries when blowing off dust with compressed air guns**

- **Wear safety goggles when working with compressed air**

2 Blow compressed air through flue gas ducts of the probe module and probe handle (see illustration). Do not use a brush!

3 Fit probe module onto the probe handle and click into place.

## 9.9 Replace the probe module

**⚠ WARNING**

**Caution! Risk of burns due to hot probe shaft after prolonged operation.**

- **Before touching the probe shaft: switch instrument off and let the probe shaft cool down.**

✓ Disconnect the flue gas probe from the measuring instrument.

1 Press the key on the top of the probe handle and remove the probe module.

2 Fit new probe module and click into place.

## 9.10 Check/replace particle filter

### Check particle filter

- Particle filters of the modular flue gas probe must be checked regularly for contamination: check visually by looking through the window of the filter chamber.
- If there is visible contamination or inadequate pump flow, replace the filter.

### Replace particle filter

The filter chamber may contain condensate. This is not a malfunction and will not cause incorrect readings.

**⚠ CAUTION**

**The condensate may be acidic.**
**Risk of burns to the hands!**

- Wear acid-resistant safety gloves, glasses and overalls to empty the condensate.

1 Open filter chamber: turn slightly anti-clockwise.

2 Remove filter chamber.

3 Remove filter plate and replace it with a new one (0554 3385).

4 Attach the filter chamber and lock it: turn slightly clockwise.

For compact exhaust gas probes with a permanently installed probe module, a different filter is used (0554 0040). The replacement procedure is similar. However, the filter is not disc-shaped but rather truncated cone-shaped. When inserting it, make sure that the thicker side is positioned in the probe handle.

## 9.11 Replace thermocouple

The following steps apply only to modular flue gas probes.

1. Release probe catch by pressing the key on the probe handle.
2. Loosen the two Phillips screws in the orange part (see illustration) and pull out the probe element (orange).

3. Push out the gray plastic element together with the thermocouple.
4. Install the new element in reverse order.

# 10 Technical data

**Measurement specific data testo 320 / testo 330**

| Measurement Parameter | Measuring Range | Accuracy (±1 digit) | Resolution |
|---|---|---|---|
| $O_2$ measurement | 0 … 21 vol.% | ±0.2 vol.% | 0.1 vol.% |
| CO measurement (without $H_2$ compensation) | 0 … 5,000 ppm | ±20 ppm (0 … 400 ppm) | 1 ppm |
| | | ±5% of m.v. (401 … 2,000 ppm) | |
| | | ±10% of m.v. (2,001 … 5,000 ppm) | |
| CO measurement (with $H_2$ compensation) | 0 … 10,000 ppm | ±10 ppm or ±10% of m.v. (0 … 200 ppm) | 1 ppm |
| | | ±20 ppm or ±5% of m.v. (201 … 2,000 ppm) | |
| | | ±10% of m.v. (2,001 … 10,000 ppm) | |
| CO measurement (without $H_2$-compensation with dilution), only testo 330 | 0 … 20,000 ppm | ±200 ppm or ±20% of m.v. | 1 ppm |
| CO measurement (with $H_2$ compensation and dilution), only testo 330 | 0 … 40,000 ppm | ±100 ppm or ±10% of m.v. | 1 ppm |
| NO measurement, only testo 330 | 0 … 3,000 ppm | ±5 ppm (0 to 100 ppm) | 1 ppm |
| | | ±5% of m.v. (101 … 2,000 ppm) | |
| | | ±10% of m.v. (2,001 … 3,000 ppm) | |
| Efficiency calculation (Eta) | 0 … 120% | – | 0.1% |
| Flue gas loss | 0 … 100% | – | 0.1% |
| $CO_2$ determination (calculation from $O_2$) | Display range 0 … $CO_2$ max. | ±0.2 vol.% | 0.1 vol.% |
| Draught/ Draft measurement | -9.99 … +40 hPa<br>-4.01 … 16.08 in$H_2O$ | ±0.005 hPa (0 … 0.1 hPa)<br>±0.002 in$H_2O$ (0 … 0.04 in$H_2O$) | 0.001 hPa (0 … 0.1 hPa)<br>0.0001 in$H_2O$ (0 … 0.04 in$H_2O$) |

| Measurement Parameter | Measuring Range | Accuracy (±1 digit) | Resolution |
|---|---|---|---|
| | | ±0.02 hPa<br>(0.1 … +3.00 hPa)<br>±0.008 in$H_2O$<br>(0.04 … +1.2 in$H_2O$) | 0.01 hPa /<br>0.001 in$H_2O$<br>(remaining meas. range) |
| | | ±1.5% of m.v.<br>(+3.01 … +40 hPa /<br>+1.2 … +16 in$H_2O$) | |
| 4 Pa measurement (only testo 330) | -50 … +50 Pa<br>-0.20 … 0.20 in$H_2O$ | ±0.3 Pa (<10 Pa)<br>±0.0012 in$H_2O$ (<0.04 in$H_2O$)<br>±3% of m.v. (remaining measuring range) | 0.1 Pa<br>0.001 in$H_2O$ |
| Pressure measurement | -100 … +200 hPa<br>-40.00 … 80.00 in$H_2O$ | ±0.5 hPa<br>(0 … +50.0 hPa)<br>±0.2 in$H_2O$<br>(0 … +20 in$H_2O$) | 0.01 hPa<br>0.01 in$H_2O$ |
| | | ±1% of m.v.<br>(+50.1 … +100.0 hPa /<br>+20 … +40 in$H_2O$) | |
| | | ±1.5% of m.v.<br>(+100.1 … +200 hPa /<br>+40 … +80 in$H_2O$) | |
| Temperature (device) | -40 … +1200 °C<br>-40 … +2192 °F | ±0.5 °C<br>(0.0 … +100.0 °C)<br>±1 °F<br>(+32 … +212 °F) | 0.1 °C (-40 … +999.9 °C)<br>0.1 °F (-40 … +1830 °F) |
| | | ±0.5% of m.v.<br>(remaining measuring range) | 1 °C / 1 °F<br>(remaining measuring range) |
| Ambient CO measurement (internal/ flue gas probe) | 0 … 2,000 ppm | ±10 ppm<br>(0 … 100 ppm) | 1 ppm |
| | | ±10% of m.v.<br>(101 … 2,000 ppm) | |
| Ambient CO measurement (external with CO probe) | 0 … 500 ppm | ±3 ppm (0 … 29 ppm) | 1 ppm |
| | | ±10% of m.v.<br>(30 … 500 ppm) | |
| Service life $O_2$ sensor | Up to 72 months based on usage | | |

| Measurement Parameter | Measuring Range | Accuracy (±1 digit) | Resolution |
|---|---|---|---|
| Service life CO sensor | Up to 72 months based on usage | | |
| Service life NO sensor | Up to 72 months based on usage | | |

**General technical data**

| Feature | Value |
|---|---|
| Storage and transport temperature | -20 … +50°C / -4 … 122 °F |
| Operating temperature | -5 … +45°C / 23 … 113 °F |
| Charging temperature | 0 … 35°C / 32 … 95 °F |
| Humidity application range | 15 … 90 %RH, non-condensing |
| Max. operating altitude | 2,000 m / 6562 ft |
| Power supply | Integrated rechargeable battery, USB-C mains unit 5 V, 3 A |
| Battery | Rechargeable Lithium-Ion battery<br>Nom. Voltage: 3.63 V<br>Min. Capacity: 9,506 mAh<br>Typ. Capacity: 9,800 mAh<br>Nom. Energy content: 34.5 Wh<br>Max. Charge current: 5.5 A<br>Max. Discharge current: 5.5 A |
| Battery service life | 10 hrs<br>20 minutes of battery charging = approx 60 min measurement operation @25°C / 77°F |
| Battery liifetime | > 500 charging cycles / approx. 5 years |
| Degree of protection | IP 40 |
| Pollution degree | PD2 |
| Display | 5.5" touch display, 1268x702 pixels |
| Weight | Approx. 685 g / 24 oz |
| Dimensions | L: 227 mm / 8.94 in<br>H: 47 mm / 1.85 in<br>W: 102 mm / 4.01 in |
| System requirements | Requires iOS 17.0/18.0 or newer, Android 14.0/15.0 or newer, mobile device with Bluetooth 4.2 |

| Feature | Value |
|---|---|
| Warranty | 24 month warranty and additional 12 month of guarantee from testo.<br>For details on the requirements and the registration process, please visit the testo website. |

## 10.1 Accessories and spare parts

**Replacement Sensors testo 320**

| Sensor | Item no. | Warrenty |
|---|---|---|
| $O_2$ | 0393 0020 | 2 Years |
| CO | 0393 0070 | 2 Years |
| CO-$H_2$ | 0393 0120 | 2 Years |

**Replacement Sensors testo 330**

| Sensor | Item no. | Warrenty |
|---|---|---|
| $O_2$ | 0393 0021 | 4 Years |
| CO | 0393 0071 | 4 Years |
| CO-$H_2$ | 0393 0121 | 4 Years |
| NO | 0393 0170 | 2 Years |

**Accessories**

| Description | Item no. |
|---|---|
| Bluetooth®/IRDA printer | 0554 0622 |
| Spare thermal paper for printer (6 rolls) | 0554 0568 |
| Smoke tester, including oil and soot papers for measuring soot in flue gas, excluding cone (order no. 0554 9010) | 0554 0307 |
| Filter paper for determining soot number, 40 measuring strips for approx. 200 measurements | 0554 0308 |
| USB mains unit, including USB-C cable | 0554 1131 |
| ISO calibration certificate, flue gas | 0520 0003 |

**Cases and carrying bags**

| Description | Item no. |
|---|---|
| Instrument case (height: 130 mm) for instrument, probes and accessories | 0516 3300 |
| Instrument case with double base (height: 180 mm) for instrument, probes and accessories | 0516 3301 |
| Instrument bag with carrying strap | 0516 3001 |

**Compact flue gas probes**

| Description | Item no. |
|---|---|
| Compact basic flue gas probe, 180 mm, Ø 6 mm, $T_{max}$ +500 °C | 0600 9740 |
| Compact basic flue gas probe, 300 mm, Ø 6 mm, $T_{max}$ +500 °C | 0600 9741 |

**Modular flue gas probes**

| Description | Item no. |
|---|---|
| Modular flue gas probe including dirt filter and thermocouple, 180 mm; Ø 8 mm; $T_{max}$ +500 °C, TÜV-tested | 0600 9760 |
| Modular flue gas probe including dirt filter and thermocouple, 300 mm; Ø 8 mm; $T_{max}$ +500 °C, TÜV-tested | 0600 9761 |
| Modular flue gas probe including dirt filter and thermocouple, 180 mm; Ø 6 mm; $T_{max}$ +500 °C | 0600 9762 |
| Modular flue gas probe including cone for fixing, thermocouple and dirt filter, 300 mm; Ø 6 mm; $T_{max}$ +500 °C | 0600 9763 |
| Flexible flue gas probe including dirt filter and thermocouple, 330 mm; Ø 9 mm; $T_{max}$ +180 °C; short-term +200 °C | 0600 9770 |

**Probe accessories and probe filter**

| Description | Item no. |
|---|---|
| Modular probe shaft, 180 mm, Ø 8 mm, $T_{max}$ +500 °C | 0554 9760 |
| Modular probe shaft, 300 mm, Ø 8 mm, $T_{max}$ +500 °C | 0554 9761 |
| Probe shaft including cone, 335 mm, Ø 8 mm, $T_{max}$ +1,000 °C | 0554 8764 |
| Probe shaft including cone, 700 mm, Ø 8 mm, $T_{max}$ +1,000 °C | 0554 8765 |
| Flexible probe shaft, 330 mm, Ø 9 mm, $T_{max}$ +180 °C | 0554 9770 |
| Hose extension 2.8 m, probe-instrument extension tube | 0554 1202 |

| Description | Item no. |
|---|---|
| Spare dirt filter, modular probe, 10 off | 0554 3385 |
| Spare dirt filter, compact probe, 10 off | 0554 0040 |
| Multi-hole probe shaft, 12 in, Ø 0.3125 in, for mean CO calculation | 0554 5762 |
| Multi-hole probe shaft, 7 in, Ø 0.3125 in, for mean CO calculation | 0554 5763 |
| Cone with spring clamp and handle option, $T_{max}$ 392 °F, Teflon material, Ø 0.25 in | 0554 3327 |
| Cone with spring clamp and handle option, $T_{max}$ 392 °F, Teflon material, Ø 0.3125 in | 0554 3328 |

**Further accessories**

| Description | Item no. |
|---|---|
| Dual wall clearance probe for $O_2$ supply air measurement | 0632 1260 |
| Ambient CO probe (digital), fixed cable (TUC) | 0632 1272 |
| Solid fuel kit, including probe shaft, adapter | 0600 9765 |
| Hose connection set for separate gas pressure measurement | 0554 1203 |
| Pressure connection hose, single, Ø 4/6 mm | 0554 0449 |
| Pressure test kit for gas pipe test | 0554 1213 |

**TUC probes**

| Description | Item no. |
|---|---|
| Combustion air temperature probe with 190 mm probe shaft incl. cone and magnets for attachment (TUC) | 0600 9799 |
| Clamp probe with NTC temperature sensor for measurements on pipes (Ø 6 to 35 mm) (TUC) | 0615 5505 |
| Pipe wrap probe (NTC) for pipe diameters from 5 to 65 mm (TUC) | 0615 5605 |
| Waterproof immersion/penetration probe with NTC temperature sensor (TUC) | 0615 1212 |
| Temperature probe with Velcro (NTC) (TUC) | 0613 4611 |

**Smart probes**

| Description | Item no. |
|---|---|
| testo 510i, differential pressure measuring instrument with smartphone operation (via Bluetooth) | 0560 1510 01 |
| testo 115i, clamp thermometer operated via smartphone (via Bluetooth) | 0560 2115 03 |
| testo 915i, thermometer with immersion/penetration probe and smartphone operation (via Bluetooth) | 0563 4915 01 |

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

## 10.2 Contact and support

If you have any questions or need further information, please contact your dealer or Testo Customer Service. For contact details, please visit:
**www.testo.com/service-contact**

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