testo 310 II – Flue gas analyser

0632 3104, 0632 3106

Instruction manual

Contents

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.
- 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: **Danger!** Risk of death! **Warning!** Serious physical injury may occur. **Caution!** Minor physical injury or damage to the equipment may occur. **Attention!** Indicates possible damage to equipment > Take the specified precautionary measures.
1 2 …	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

General safety instructions

- Always operate the product properly, for its intended purpose and within the parameters specified in the technical data. Do not use any force.
- Do not commission the instrument if there are signs of damage on the housing.
- Dangers may also arise from the systems being measured or the measuring environment: Make sure you comply with the locally valid safety regulations when carrying out measurements.
- Do not expose the product to temperatures above 50 °C (122 °F).
- Do not store the product together with solvents. Do not use any desiccants.
- Only maintenance and repair work that is described in the documentation may be carried out on this instrument. Follow the prescribed steps exactly when doing the work. Only use original spare parts from Testo.

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 50°C.

- 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.

2.1 Product-specific information

- Magnets are installed on the back of the device to attach it to metallic surfaces.

⚠ DANGER

Magnetic field
May be hazardous to the health of pacemaker wearers.

- **Keep a minimum distance of 20 cm between the pacemaker and the device.**

ATTENTION

Magnetic field
Damage to other devices!

- **Keep a safe distance from products that can be damaged by magnetism (e.g. monitors, computers, credit cards).**

- 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.

Use distilled water, or alternatively mild solvents to clean the flue gas analyzer.

Do not store any objects that have come into contact with solvents and/or degreasers in the case. Evaporating or leaking solvents and/or degreasers may cause damage to the instrument and to the sensors.

The use of strong or harsh alcohol or brake cleaner can result in damage to the instrument.

⚠ 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. 200 ml). Do not induce vomiting.

2.2 Disposal

- Dispose of faulty rechargeable batteries in accordance with the valid legal specifications.
  WEEE Reg. Nr. DE 75334352
- 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.

3 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 ISM band.

The use of radio connections may not be permitted, e.g. in airplanes or hospitals.

Make yourself familiar with this before use!

In this case, 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 Product-specific approvals

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

5 Intended use

The **testo 310 II** is a handheld measuring instrument for the professional flue gas analysis of combustion plants:

- Small combustion plants (oil and gas)
- Low-temperature and condensing boilers
- Gas water heaters

These systems can be adjusted using the **testo 310 II** and checked for compliance with the applicable limit values.

The following tasks can also be carried out using the **testo 310 II**:

- Regulating the O_2, CO and CO_2 values in combustion plants for the purpose of ensuring optimal operation.
- Draught measurement.
- Measuring and regulating the gas flow pressure in gas water heaters.
- Ambient CO measurement.

The **testo 310 II** must not be used:

- as a safety (alarm) device

6 Product description

6.1 Overview of the testo 310 II

1	Display	**2**	Control keys
3	Charging socket for mains unit (USB-C)	**4**	Cable to the flue gas probe
5	Gas outlet	**6**	Condensate outlet
7	Magnetic holder	**8**	Magnetic holder
9	Condensate trap	**10**	Area of the battery

Symbol explanation

	Observe operating instructions
	**ATTENTION** **Magnetic field** **Damage to other devices!** - **Keep a safe distance from products that can be damaged by magnetism (e.g. monitors, computers, credit cards).**

⚠ DANGER

Magnetic field
May be hazardous to the health of pacemaker wearers.

- **Keep a minimum distance of 20 cm between the pacemaker and the device.**

6.2 Flue gas probe

1	Thermocouple	**2**	Probe shaft
3	Probe handle	**4**	Connecting cable
5	Removable filter chamber with window, particle filter, and sealing plug for differential pressure measurement		

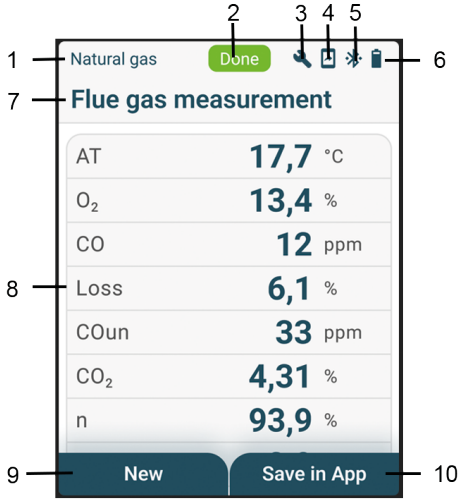
Symbol explanation

⚠ WARNING

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

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

6.3 Overview of main menu



1		Display of fuel
2		Measuring status
3		Indication that maintenance by testo is required (optional function depending on the country version of the device)
4		Display of Smart App connection
5		Display of Bluetooth connection
6		Display of rechargeable battery capacity: ○ : rechargeable battery is loading ○ : rechargeable battery is empty ○ : rechargeable battery is partly charged ○ : rechargeable battery is fully charged
7		Display of measuring function
8		Display of measuring values
9		Menu selectable with left function key
10		Menu selectable with right function key

6.4 Control keys

Symbol	Meaning
On/Off (long press) 	Switches the instrument on or off
CONFIG/ESC 	• Switches to the measurement view • Back to the menu
Print (long press) 	Transmit data to the protocol printer
MENU/ENTER 	• Open menu • Confirm input
	Change/navigate the display screen
	Select the function shown in the left lower corner of the display
	Select the function shown in the right lower corner of the display

7 First steps

7.1 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 0 °C … +35 °C.**

⚠ 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 left lower side of the instrument.

▸ The charging process will start. The charge status will be shown on the display. The charging process will stop automatically when the battery is fully charged.

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% = 2

segments, at an ambient temperature of 10-20°C, recharge completely before use).

- 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.

7.2 Mains operation

Do not perform any measurements during mains operation.

Measurements during mains operation can lead to measurement errors (measurement accuracy during mains operation may no longer be within the specification).

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

▸ The measuring instrument is powered by the mains unit.

8 Using the product

8.1 Performing settings

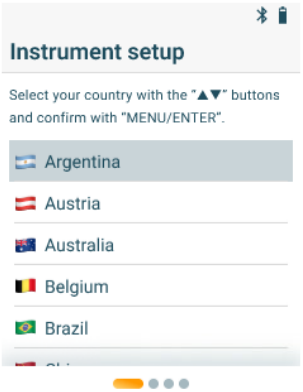
The instrument has two different configuration menus. The menu that is opened depends on the instrument status when called up.

8.1.1 Instrument configuration menu / commissioning

When the instrument is switched on initially, the configuration menu is opened automatically.

Making settings

1 Switch the instrument on:
Hold down [⏻], until the menu **Instrument Setup** is shown.

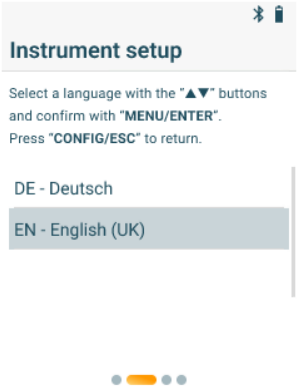


2 Use **[▼]** and **[▲]** to select the desired country and confirm the selection with **[MENU/ENTER]**.

▸ By selecting the country automatically the corresponding area version is activated with different calculation formulas and associated measurement parameters.

The language selection is shown.

3 Use [▼] and [▲] to select the desired language and confirm the selection with [MENU/ENTER].



▸ The device changes to the selected language and the menus for further settings are shown.

3 Make further settings:

Use [CONFIG/ESC] to revert to the previous parameter at any time.

Display / parameter	Explanation
Setting the time	• Set values: [▲] and [▼]. • Switch selection between hour, minute (tens) and minute (single units): [MENU/ENTER]. • Switch to the next parameter: [MENU/ENTER].
Setting the date	• Set values: [▲] and [▼]. • Switch selection between year, month and day: [MENU/ENTER]. • Switch to the next parameter: [MENU/ENTER].
Unit of pressure	• Select the unit: [▲] and [▼]. • Switch to the next parameter: [MENU/ENTER].
Unit of temperature	• Select the unit: [▲] and [▼]. • Switch to the next parameter: [MENU/ENTER].

8.1.2 Instrument configuration menu / after commissioning

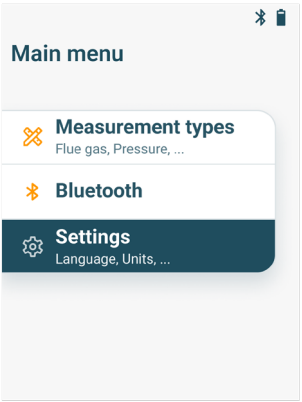
After initial commissioning, settings can be made via the device configuration menu.

Device settings can only be made if no measurements are running at the same time.

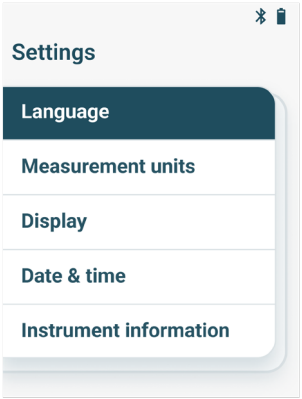
Making settings

1 Press **[MENU/ENTER]** when the device is switched on.

2 Use **[▼]** and **[▲]** to select **Settings** and confirm the selection with **[MENU/ENTER]**.



3 Use **[▼]** and **[▲]** to select the desired setting parameter and confirm the selection with **[MENU/ENTER]**.



▸ The following settings are possible:

- **Language**: Selection of available languages
- **Measurement units**: Changing temperature unit and pressure unit

- **Country**: Changing the country version (after changing the country version, the device restarts automatically)
- **Display**: Setting the brightness (25%, 50%, 75% or 100%) and the auto-off function
- **Date & time**: Setting the time and date
- **Reset factury settings**: Reset the device to factory settings
- **Instrument information**: Display of device information (pure information display, no change of settings)

8.1.3 Country-specific presettings

Country-specific calculation formulas, associated measurement parameters and fuels are activated with the country setting. Similarly, the setting influences the date and time format. The area version is set in the instrument configuration menu / commissioning.

Countries	Parameters	Fuels
USA, HU, IN, KR	Tstack, O_2, CO, CO AF, Eff, ExAir, CO_2, Tamb, AmbCO, Draft, Δp,	Natural gas Propane Fuel oil 2 Biomass 5% * Wood 20% w *
GB, RU, DK, AU, JP, CN	Ratio, FT, O_2, CO, uCO, ExAir, CO_2, AT, Effn, Effg, Draught, AmbCO, Δp	Natural gas LPG Propane Butane EL fuel oil Kerosene Heavy fuel oil Wood pellets *
NL, SE, TR, RO	FT, O_2, CO, PI, uCO, η, η+, CO_2, AT, λ, qAnet, Draught, AmbCO, Δp	Natural gas Hb Natural gas Ho Propane Hb Propane Ho Butane Ho LPG Ho EL fuel oil Wood pellets *

Countries	Parameters	Fuels
DE, AT, CH, CZ, FR, ES, BE, PL, PT, AR, BR	AT, O_2, CO, COunv, η, η+, CO_2, VT, qA, λ, Zug, COumg, Δp	Natural gas Propane Butane Coke oven gas Town gas Gasoleo A EL fuel oil Heavy fuel oil Gaz ziemny E Gaz ziemny Lw Gaz ziemny Ls Wood 15% w *
IT	TF, O_2, CO, uCO, CO_2, TA, Rend, λ, Qs, ET, Tiraggio, COamb, Δp	Natural gas Gasoline Fuel oil LPG (propane) LPG (butane) Wood pellets * Wood 15 % w *

* only testo 310 II (0563 3104)

8.1.4 Reading display

Display	Measurement parameter
AT	Ambient temperature
FT	Flue gas temperature
CO	Carbon monoxide
O_2	Oxygen
AmbCO	Ambient carbon monoxide
qAnet	Flue gas loss without due consideration of the calorific value range
Effn	Net efficiency (without due consideration of the calorific value range)
Effg / η+	Gross efficiency (with due consideration of the calorific value range)
Eff / η	Efficiency
λ	Air ratio
Δp	Differential pressure
CO_2	Carbon dioxide (calculation from O_2)
Draught	Flue draught
uCO	Carbon monoxide undiluted

Display	Measurement parameter
Ratio	Ratio
ExAir	Air surplus
ET	Heat of condensation

8.2 Preparing for measurement

8.2.1 Zeroing phases

Gas sensors

If flue gas measurement or ambient CO measurement is configured, the gas sensors are zeroed when the instrument is switched on (zeroing phase).

The flue gas probe must be in the open air during the zeroing phase!

Pressure sensor

If draught measurement or differential pressure measurement is configured, the pressure sensor is zeroed when the instrument is switched on (zeroing phase).

Measuring the combustion air temperature

During the zeroing phase, the temperature is measured via the thermocouple of the flue gas probe. This temperature is permanently accepted by the instrument once the zeroing phase has been completed.

All dependent parameters are calculated using this value. However, ensure that the flue gas probe is near the intake duct of the burner during the zeroing phase.

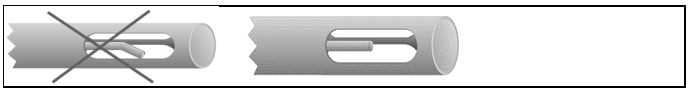
8.2.2 Using the flue gas probe

⚠ WARNUNG

Danger of burns from hot probes, probe tubes and sensor tips!

- **Do not touch hot parts (> 45 °C / 113 °F) with bare hands immediately after a measurement.**
- **In case of burns, cool the area immediately with cold water and consult a doctor if necessary. Allow probes, probe tubes and sensor tips to cool down.**
- **Before packing the device, switch off the device and allow the probe tube to cool down.**

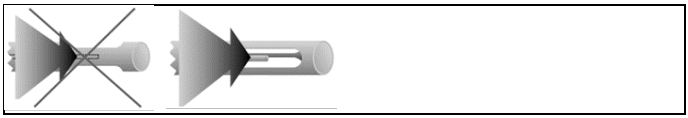
Checking the thermocouple



The thermocouple of the flue gas probe must not lie against the probe cage.

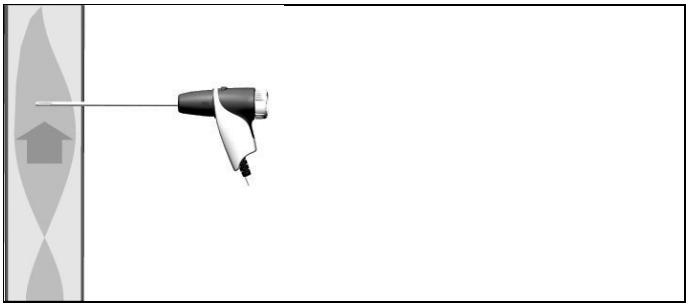
- Check before use. Bend the thermocouple back if necessary.

Aligning the flue gas probe



The flue gas must be able to flow freely past the thermocouple.

- Align the probe by turning it as required.



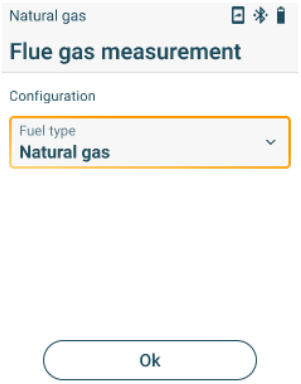
The tip of the probe must be in the core current of the flue gas flow.

- Align the flue gas probe in the flue gas duct so that the tip is in the core current (area of the highest flue gas temperature).

8.2.3 Setting fuel

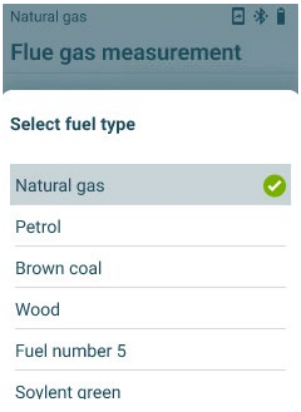
To carry out a flue gas measurement, the fuel must be set correctly.

1 Press **[CONFIG/ESC]** to open the configuration menu and open the **Fuel type** list with **[MENU/ENTER]**.



▸ The list of selectable fuel types is shown.

2 Select the fuel type with **[▼]** and **[▲]** and confirm the selection with **[MENU/ENTER]**.



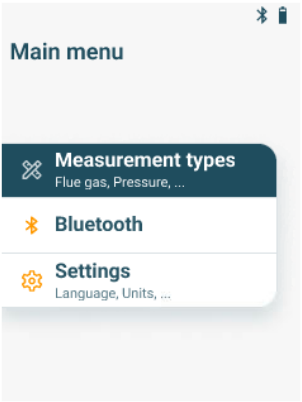
8.3 Perform flue gas measurement

In order to maintain the measuring accuracy of the instrument, the correct fuel must be selected or configured.

To achieve usable measurement results, the test time of a flue gas measurement should be at least 3 minutes and the measuring instrument should display stable readings.

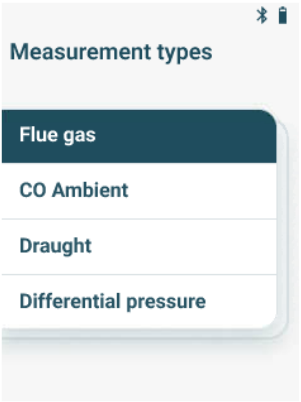
Select measurement type

1 Press **[MENU/ENTER]** to open the main menu and select **Measurement types** with **[MENU/ENTER]**.



▸ The menu **Measurement types** is shown.

2 Select the measurement type **Flue gas** with **[▼]** and **[▲]** and confirm the selection with **[MENU/ENTER]**.



Carry out the measurement

1 If required, the measurement device can manually be zeroed in fresh air.

2 Start measurement: select **[Start]** with the right function key.

▸ The measurement is started.

3 Quit measurement: select **[Stop]** with the right function key.

▸ The measured values are shown on the display.

In case the measurement device is connected with the testo Smart App, the measured values can be saved in the app with the right function key.

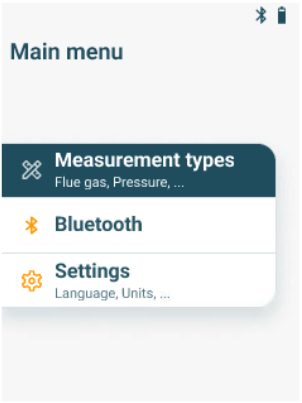
4 Remove flue gas probe from the flue gas duct and purge with fresh air.

8.4 Perform flue gas (UNI) measurement

With this function a series of measurements is carried out with 3 measuring phases (UNI 1 – UNI 3), to calculate a mean value.

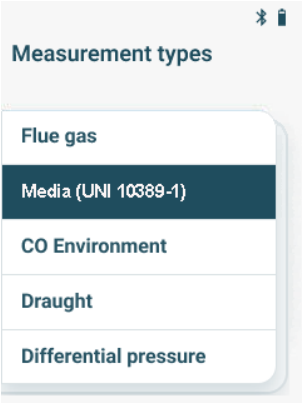
Select measurement type

1 Press **[MENU/ENTER]** to open the main menu and select **Measurement types** with **[MENU/ENTER]**.



▶ The menu **Measurement types** is shown.

2 Select the measurement type **Media (UNI 10389-1)** with **[▼]** and **[▲]** and confirm the selection with **[MENU/ENTER]**.



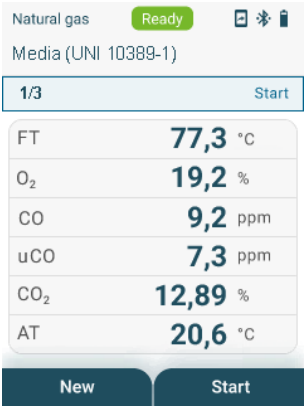
Carry out the measurement

1 If required, the measurement device can manually be zeroed in fresh air.

2 Start measurement: select **[Start]** with the right function key.

▸ Once the first measuring phase has lapsed, it is possible to interrupt the measurement via **[Stop]** and the intermediate results are shown.

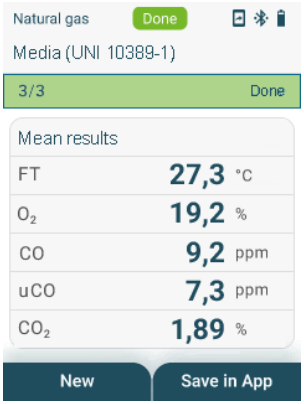
3 Start second measuring phase: select **[Start]** with the right function key.



▸ Once the second measuring phase has lapsed, it is possible to interrupt the measurement again via **[Stop]** and again the intermediate results are shown.

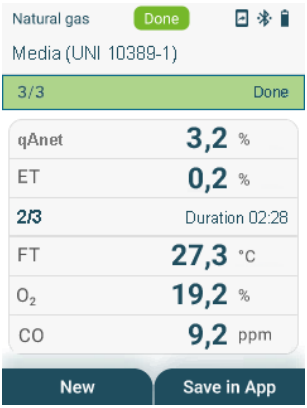
4 Start last measuring phase: select **[Start]** with the right function key.

▸ Once the measurement period has lapsed, the measuring results are shown.



In case the measurement device is connected with the testo Smart App, the measured values can be saved in the app with the right function key.

5 Use [▼] and [▲] to scroll within the list of measurement results, to display again the results of the previous measuring phases.



6 Remove flue gas probe from the flue gas duct and purge with fresh air.

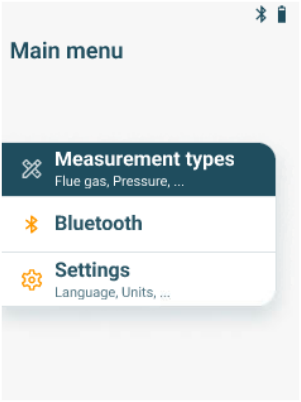
8.5 CO Environment

Cigarette smoke influences the measurement by more than 50 ppm. The breath of a smoker influences the measurement by about 5 ppm.

The probe must be in the open air (CO-free) during the zeroing phase!

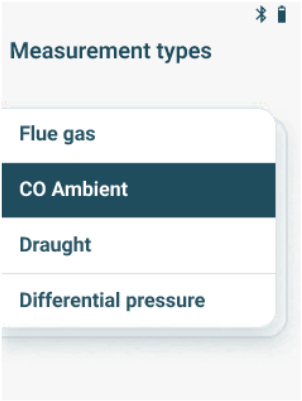
Select measurement type

1 Press [MENU/ENTER] to open the main menu and select Measurement types with [MENU/ENTER].



▸ The menu **Measurement types** is shown.

2 Select the measurement type **CO Environment** with **[▼]** and **[▲]** and confirm the selection with **[MENU/ENTER]**.



Carry out the measurement

1 If required, the measurement device can manually be zeroed in fresh air.

2 Start measurement: select **[Start]** with the right function key.

▸ The measurement is started.

3 Quit measurement: select **[Stop]** with the right function key.

▸ The measured values are shown on the display.

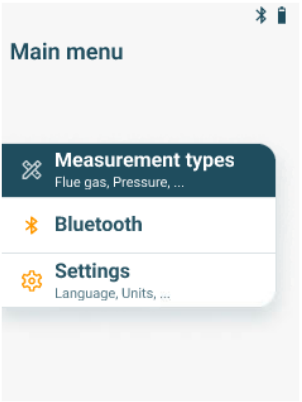
In case the measurement device is connected with the testo Smart App, the measured values can be saved in the app with the right function key.

8.6 Draught measurement

Do not measure for longer than 5 min, as a drift of the pressure sensor means that the readings could be outside the tolerance limits.

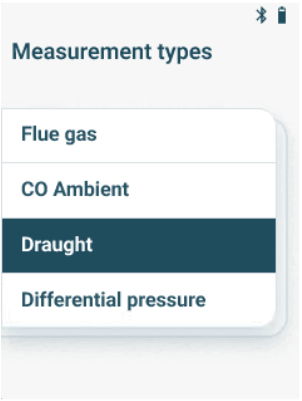
Select measurement type

1 Press [MENU/ENTER] to open the main menu and select Measurement types with [MENU/ENTER].



▸ The menu Measurement types is shown.

2 Select the measurement type Draught with [▼] and [▲] and confirm the selection with [MENU/ENTER].



Performing the measurement

✓ The flue gas probe must be outside the flue.

1 Start measurement: select **[Start]** with the right function key.

▸ Draught zeroing is carried out.

2 After zeroing, position the flue gas probe in the core current (area of the highest flue gas temperature).
The indication of the measured flue gas temperature in line 1 helps when positioning the probe.

▸ The reading is displayed.

3 Quit measurement: select **[Stop]** with the right function key.

8.7 Differential pressure

⚠ DANGER

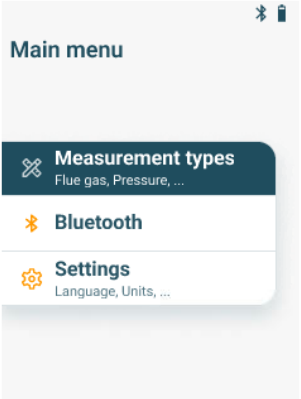
Danger of explosion due to dangerous mixture of gases!

- **Before measurement close the gas path with the sealing plug, as described below!**
- **If the gas path is not correctly closed with the sealing plug during differential pressure measurement, there is a risk of unburned gas mixture escaping.**
- **Escaping gas mixture can lead to an explosive atmosphere and thus to life-threatening situations.**
- **Make sure there are no leaks between the sampling point and the measuring instrument.**
- **Do not smoke or use naked flames during measurement, generally avoid ignition sources.**

Do not measure for longer than 5min, as a drift of the pressure sensor means that the readings could be outside the tolerance limits.

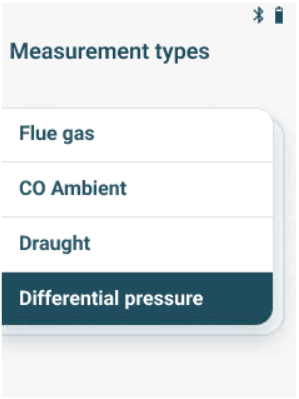
Select measurement type

1 Press [MENU/ENTER] to open the main menu and select Measurement types with [MENU/ENTER].

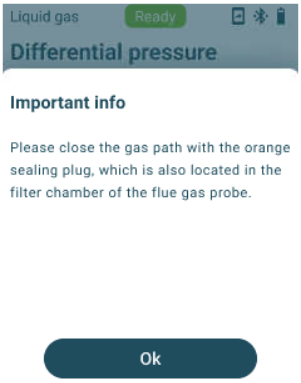


▸ The menu Measurement types is shown.

2 Select the measurement type Differential pressure with [▼] and [▲] and confirm the selection with [MENU/ENTER].



An information message is shown.



2 Close the gas path with the sealing plug. Please see the description below.

Prepare for measurement

1 Open filter chamber of the flue gas probe: turn it gently anti-clockwise.

2 Remove particle filter (1) and store it to reinsert it after the measurement.

3 Remove the sealing plug (2) in the filter chamber from the holder.

4 Close the gas path with the sealing plug.

5 Check that the sealing plug is fitted tightly. It should not yield at all on being tugged gently.

6 Close filter chamber of the flue gas probe.

⚠ CAUTION

Hot probe shaft! Risk of burns!

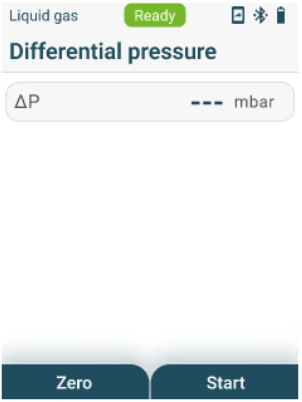
- **Allow the probe shaft to cool down after a measurement, before touching it!**
- **Only attach the silicone hose to the probe shaft once it has cooled down!**

7 Fit silicone hose onto the probe shaft of the flue gas probe. The probe shaft openings must be closed.

Carry out the measurement

✓ The silicone hose must be clear (pressureless, no kinks).

1 Start measurement: select **[Start]** with the right function key.



▸ Pressure zeroing.

2 Connect the silicone hose to the sampling point.

3 Pressurise the system.

▸ The reading is displayed.

4 Quit measurement: select **[Stop]** with the right function key.

After the measurement

1 Open filter chamber of the flue gas probe: turn it gently anti-clockwise.

2 Remove the sealing plug from the gas path.

3 Insert the particle filter again into the gas path and check that it is fitted securely.

4 Close filter chamber of the flue gas probe.

5 Remove silicone hose from the probe shaft.

8.8 Bluetooth

The **testo 310 II** can be connected to the testo Smart App via Bluetooth® connection.

8.8.1 Establishing a connection

To establish a connection via Bluetooth®, you need a tablet or smartphone with the Testo Smart App installed on it.

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

Compatibility:

Requires iOS 15.0 or later/Android 12.0 or later, requires Bluetooth® 4.0.

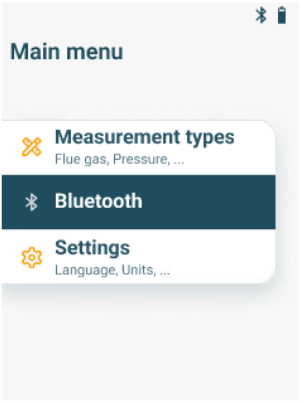
Once the connection between the app and the measurement device has been successfully established, device can be controlled via the app.

8.8.2 Switching on/off

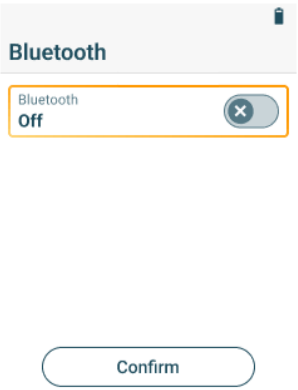
✓ The instrument is switched on and the measurement menu is displayed.

1 Press **[Menu/Enter]**.

2 Press [▲] / [▼] to select **Bluetooth**: and press [Menu/Enter] to confirm.



▸ The **Bluetooth** menu is displayed.



Display	Explanation
is displayed	There is no Bluetooth® connection, or a potential connection is being searched for.
is displayed	There is a Bluetooth® connection active.
is not displayed	Bluetooth® is disabled.

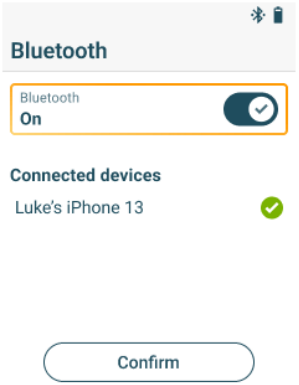
8.8.2.1 Switching on

✓ The Bluetooth menu is selected.

1 Press [Menu/Enter].

▸ In the On/Off switch icon, is displayed.

2 Enable Bluetooth®:
- Press [▼] to select line “Bluetooth Off” and press [Menu/Enter] to activate Bluetooth.
- Press [▼] to activate the [Confirm] button and press [Menu/Enter] to confirm.



▸ When the Bluetooth® icon is shown on the display, Bluetooth is switched on.

▸ After opening the App, the instrument is automatically connected if it is within range. The instrument does not have to be connected to the smartphone/tablet via settings beforehand.

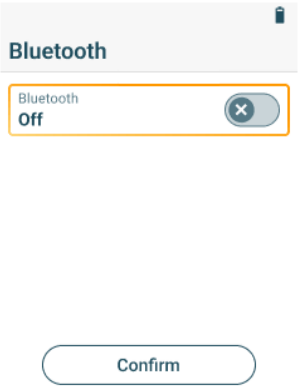
8.8.2.2 Switching off

✓ The Bluetooth® menu is activated.

1 Press [Menu/Enter].

▸ In the On/Off switch icon, is displayed.

3 Disable Bluetooth®:
- Press [▼] to select line “Bluetooth On” and press [Menu/Enter] to deactivate Bluetooth.
- Press [▼] to activate the [Confirm] button and press [Menu/Enter] to confirm.



▸ When the Bluetooth® icon is not shown on the display, Bluetooth® is switched off.

8.9 Print data

The current readings are printed via a Bluetooth® printer (accessories: Testo printer 0554 0622).

Print current readings

✓ The printer is switched on and within wireless range.

1 Press the button **[MENU/ENTER]** for >2s.

▸ **Printing** menu is opened and the device is searching for connected printers.

2 Confirm with **[MENU/ENTER]**.

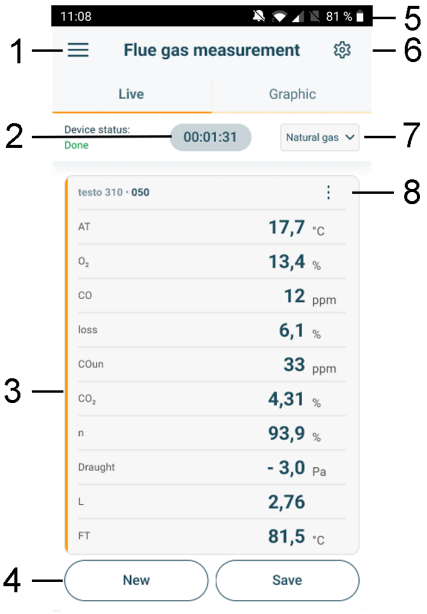
▸ The protocol is created and sent to the printer.

▸ The protocol is printed.

Once the measuring device is connected with the testo Smart App, printing the data is only possible via the app. The function key on the measuring device is disabled.

9 Smart App

9.1 App – user interface



1	☰	Open main menu
2		Display of the measurement period
3		Display of measurement results
4		Can be controlled with different function keys
5		Instrument status bar
6	⚙	Configuration
7		Selection of fuel
8	⋮	Edit reading display

Further symbols on the user interface (without numbering)

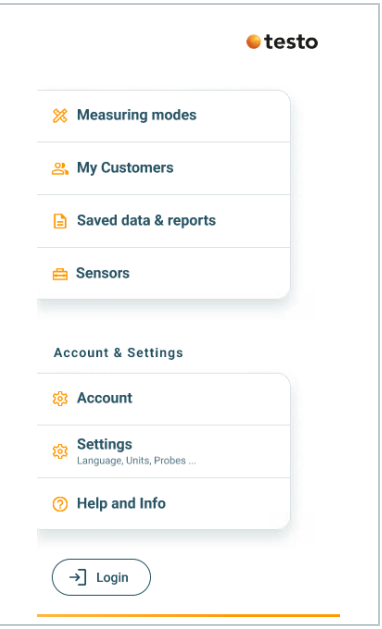
←	One level back
✕	Exit view
⋖	Share report

	Search
	Favourite
	Delete
	Further information
	Display report
	Multiple selection

9.2 Main menu

The Main menu can be accessed via the ☰ icon at top left. To exit the main menu, select a menu or right-click on the guided menus. The last screen displayed is shown.

Measuring modes
My Customers
Memory
Sensors
Account
Settings
Help and Info



Additional icons:

	One level back		Deleting
	Exit view		Further information
	Share measurement data/reports		Display report
	Search		Edit
	Favourite		

9.3 Measurement menu

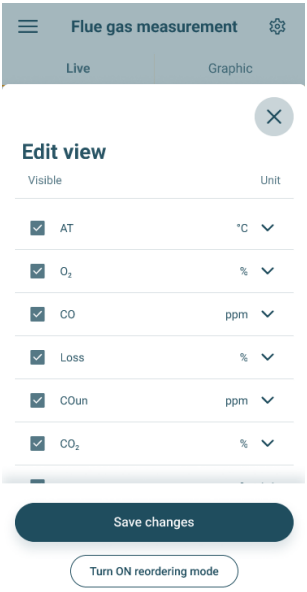
The **testo 310 II** has permanently installed measurement programs (flue gas measurement, CO ambient, draught and differential pressure). These enable the user to carry out convenient configuration and implementation of specific measuring tasks.

9.3.1 Customize view

The order of the displayed measured variables in the **Flue gas measurement** application menu can be adjusted via the app. The adjustment of the order then applies to the app and the display on the device.

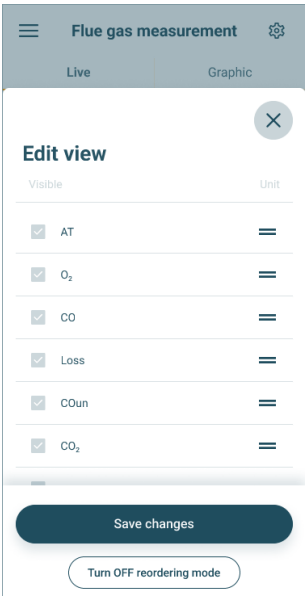
1 Click the symbol ⋮ and select **Edit View**.

▸ The menu **Edit View** is opened.



2 Disable check boxes, to disable the display of not needed measurement variables.

3 Click **Turn ON reordering mode** to enable the edit mode to reorder the display of measurement variables.



4 Tap the line of a measured variable and move it to the desired position.

5 Click **Turn OFF reordering mode** to disable the edit mode.

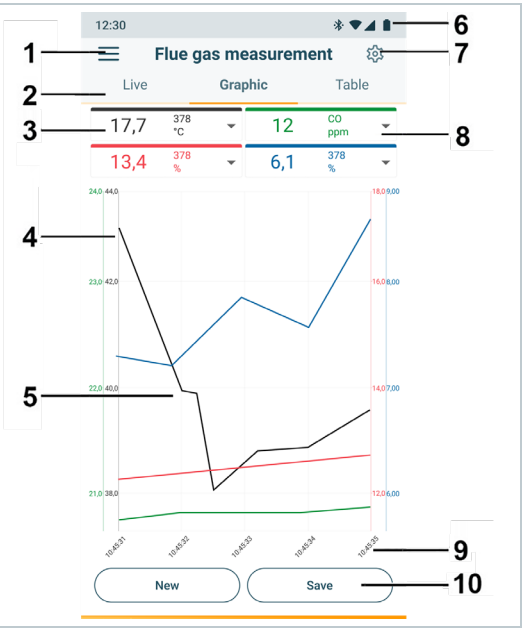
6 Click **Save changes** to save the changes and transfer them to the device.

9.3.2 Graphic view

In the Graphic view, the values for a maximum 4 channels can be displayed simultaneously in a chronological trend graph. All measured parameters can be displayed in the Graphic view via the channel selection (click on one of the four selection fields). Once a measurement parameter has been selected, the value is updated automatically.

The Zoom touch function allows individual parts of the graphic to be viewed in more detail or time progressions to be displayed compactly.

1	Open the main menu
2	Change of display
3	Reading for selected channel
4	Measurement parameter and measurement unit
5	Graphic with selected channels and 4 Y-axes
6	Status bar
7	Open the configuration menu
8	Selection of other channels
9	Time axis
10	New/Start/Stop/Save button



9.3.3 Perform flue gas measurement

In order to maintain the measuring accuracy of the instrument, the correct fuel must be selected or configured.

To achieve usable measurement results, the test time of a flue gas measurement should be at least 3 minutes and the measuring instrument should display stable readings.

Up to four Smart Probes can be used simultaneously during flue gas measurement. This enables parallel measurement of the combustion air temperature, the differential temperature and the differential pressure.

The following Smart Probes can be connected:

testo 915i (0563 3915), testo 510i (0560 1510), testo 115i (0560 2115 02)

Select measurement type

1 Open the main menu with ☰ and click on ✂ to select **Measuring modes**.

2 Select the measurement type **Flue gas**.

Carry out the measurement

1 Start measurement: **[Start]**.

▸ The readings are displayed.

2 Quit measurement: **[Stop]**.

3 Save measured values in the app: **[Save]**.

4 Remove flue gas probe from the flue gas duct and purge with fresh air.

In the **Basic view** application menu, the current measuring values can be read, recorded and saved. The Basic view is particularly suitable for fast, uncomplicated measurements without the specific requirements of a standard-compliant measurement.

All Bluetooth® probes compatible with the testo Smart App are displayed in the **Basic view**.

9.3.4 Ambient CO

Cigarette smoke influences the measurement by more than 50 ppm. The breath of a smoker influences the measurement by about 5 ppm.

The probe must be in the open air (CO-free) during the zeroing phase!

Select measurement type

1 Open the main menu with ☰ and click on ✖ to select **Measuring modes**.

2 Select the measurement type **CO Ambient**.

Carry out the measurement

1 Start measurement: **[Start]**.

▸ The reading is displayed.

2 Quit measurement: **[Stop]**.

3 Save measured values in the app: **[Save]**.

9.3.5 Draught measurement

Do not measure for longer than 5 min, as a drift of the pressure sensor means that the readings could be outside the tolerance limits.

Select measurement type

1. Open the main menu with ☰ and click on ✕ to select **Measuring modes**.
2. Select the measurement type **Draught**.

Performing the measurement

✓ The flue gas probe must be outside the flue.

1. Start measurement: **[Start]**.

▸ Draught zeroing is carried out.

2. After zeroing, position the flue gas probe in the core current (area of the highest flue gas temperature).

   The indication of the measured flue gas temperature in line 2 helps when positioning the probe.

▸ The reading is displayed.

3. Quit measurement: **[Stop]**.
4. Save measured values in the app: **[Save]**.

9.3.6 Differential pressure

⚠ DANGER

Danger of explosion due to dangerous mixture of gases!

- **Before measurement close the gas path with the sealing plug, as described below!**
- **If the gas path is not correctly closed with the sealing plug during differential pressure measurement, there is a risk of unburned gas mixture escaping.**
- **Escaping gas mixture can lead to an explosive atmosphere and thus to life-threatening situations.**
- **Make sure there are no leaks between the sampling point and the measuring instrument.**
- **Do not smoke or use naked flames during measurement, generally avoid ignition sources.**

Do not measure for longer than 5min, as a drift of the pressure sensor means that the readings could be outside the tolerance limits.

Select measurement type

1. Open the main menu with ☰ and click on ✕ to select **Measuring modes**.
2. Select the measurement type **Differential pressure**.

▸ **PLUG** appears.

3. Close the gas path with the sealing plug. Please see the description below.

Prepare for measurement

1. Open filter chamber of the flue gas probe: turn it gently anti-clockwise.

2 Remove particle filter (1) and store it to reinsert it after the measurement.

3 Remove the sealing plug (2) in the filter chamber from the holder.

4 Close the gas path with the sealing plug.

5 Check that the sealing plug is fitted tightly. It should not yield at all on being tugged gently.

6 Close filter chamber of the flue gas probe.

⚠ WARNING

Hot probe shaft! Risk of burns!

> Allow the probe shaft to cool down after a measurement, before touching it!

> Only attach the silicone hose to the probe shaft once it has cooled down!

7 Fit silicone hose onto the probe shaft of the flue gas probe. The probe shaft openings must be closed.

Carry out the measurement

✓ The silicone hose must be clear (pressureless, no kinks).

1 Start measurement: **[Start]**.

▸ Pressure zeroing.

2. Connect the silicone hose to the sampling point.
3. Pressurise the system.

▸ The reading is displayed.

4. Quit measurement: **[Stop]**.
5. Save measured values in the app: **[Save]**.

After the measurement

1. Open filter chamber of the flue gas probe: turn it gently anti-clockwise.
2. Remove the sealing plug from the gas path.
3. Insert the particle filter again into the gas path and check that it is fitted securely.
4. Close filter chamber of the flue gas probe.
5. Remove silicone hose from the probe shaft.

9.4 Customer

In the **Customer** menu, all customer and measuring site information can be created, edited and deleted. Fields marked with * are mandatory. Without any information in this field, no customers or measuring sites can be stored.

9.4.1 Creating and editing a customer

1. Click on  .

▸ Main menu opens

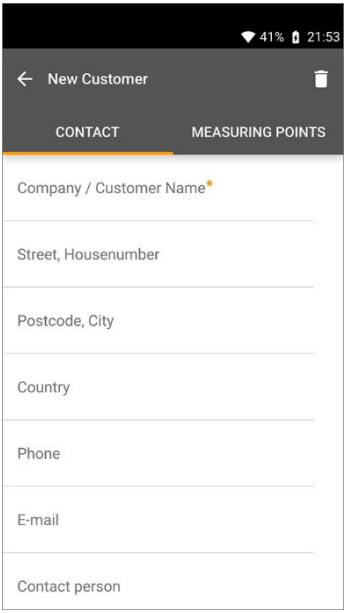
2.  Click on **Customer**.

▸ The Customer menu opens.

3. Click on **+ New Customer**.

▸ A new customer can be created.

4 Store all relevant customer data.



5 Click on **Save**.

▸ The new customer was saved.

9.4.2 Creating and editing measuring sites

1 Click on ☰.

▸ Main menu opens

2 Click on **Customer**.

▸ The Customer menu opens.

3 Click on **+ New Customer**.

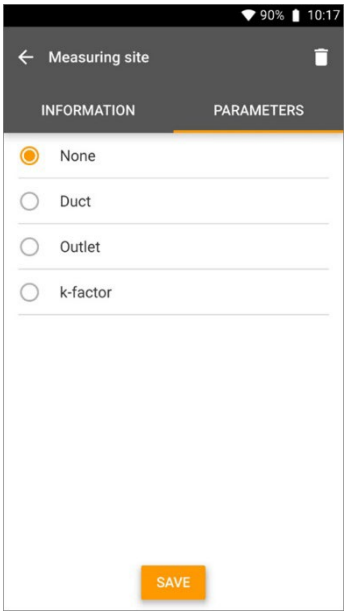
4 Click on the right tab **Measuring point**.

5 Click on **+ New Measuring Point**.

▸ A new measuring site can be created.

6 Store all relevant measuring site information.

7 Click on right tab **Parameters**.



8 Select further parameters.

For the duct, outlet or duct with k-factor measuring sites, further parameter settings can be implemented.

9 Click on **Save**.

▸ The new measuring site has been saved.

9.5 Memory

In the **Memory** menu, you can call up all the measurements from **testo 310 II** stored with the app, analyze them in detail and also create and save csv data and PDF reports. When clicking on a measurement, an overview of the measurement results is displayed.

9.5.1 Searching for and deleting measurement results

In the **Memory** menu, all stored measurements are sorted by date and time.

✓ The **Memory** menu is open.

1 Click on  .

▸ Search field with measurements opens.

2 Enter the customer name or measuring site or date/time in the search field.

▸ The result is displayed.

Deleting

1 Click on  .

▸ A check box is displayed in front of each measurement.

2 Click on the required measurement.

▸ A tick is displayed in the respective box.

3 Click on  .

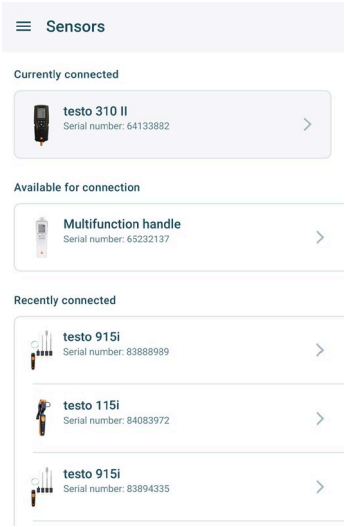
▸ Information window is displayed.

4 Acknowledge the information.

▸ Selected measurements were deleted.

9.6 Sensors

All devices used with the App can be found in the **My devices** menu. There, you can view general information about currently connected devices as well as recently connected devices.



9.6.1 Information

Information is stored for each device.

✓ The App is connected to **testo 310 II**.

1 - Click on ☰.

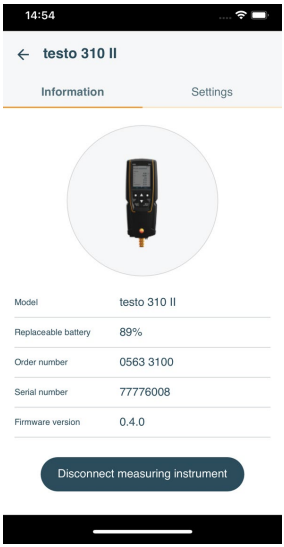
▸ Main menu opens.

2 - Click on **Sensors**.

▸ The **Sensors** menu opens.

3 - Click on one of the displayed devices.

▸ Information is displayed about the model, order number, serial number and firmware version.



9.6.2 Settings of connected devices

Settings can also be made for each device.

✓ The probe is connected to the App.

1 - Click on ☰.

▸ Main menu opens.

2 - Click on **Sensors**.

▸ The **Sensors** menu opens.

3 - Click on one of the displayed devices.

4 - Click on the Settings tab.

▸ Settings appear that can be changed if necessary.

9.7 App settings

9.7.1 Language

1 ⚙ Click on **Settings**.

▸ The **Settings** menu opens.

2 Click on **Language**.

▸ A window with different languages opens.

3 Click on the required language.

▸ The required language is set.

9.7.2 Measurement settings

1  Click on **Settings**.

▸ The Settings menu opens.

2 Click on **Measurement settings**.

▸ A window with different basic settings for measurement opens.

3 Click on the required settings and change if necessary.

▸ The required measurement settings are set.

4  Exit **Measurement settings**.

9.7.3 Company details

1  Click on **Settings**.

▸ The Settings menu opens.

2 Click on **Company details**.

▸ A window with company details opens.

3 Click on the required data and enter if necessary.

▸ The required company details are set.

4  Exit **Company details**.

9.7.4 Privacy settings

1 Click on **Settings**.

▸ The Settings menu opens.

2 Click on **Privacy settings**.

▸ A window with privacy settings opens.

3 Activate or deactivate the required settings.

▸ The required settings are set.

4 Exit **Privacy settings**.

9.8 Help and Information

Under Help and Information, you will find information about the measurement device, and the tutorial can be called up and implemented. This also where legal information can be found.

9.8.1 Instrument information

1 Click on **Help and Information**.

▸ The Help and Information menu opens.

2 Click on **Instrument information**.

▸ The current App version, Google Analytics instance ID, refrigerant version and update are displayed for the connected instrument.

Automatic updates for instruments can be enabled or disabled.

> Use the slider to activate or deactivate **Update for connected instruments**.

9.8.2 Tutorial

1 Click on **Help and Information**.

▸ The Help and Information menu opens.

2 Click on **Tutorial**.

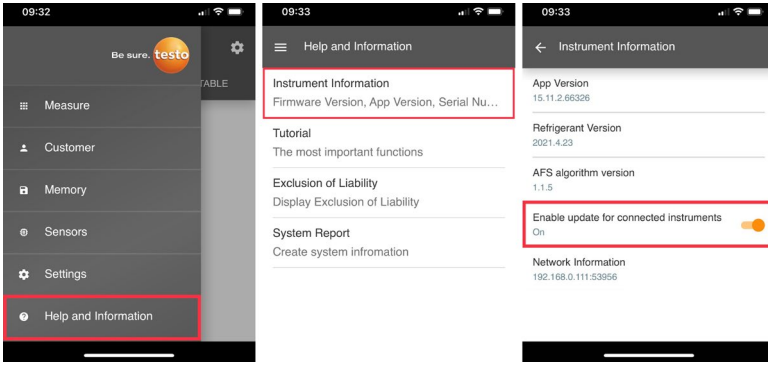
- The tutorial shows you the most important steps prior to commissioning.

9.8.3 Exclusion of liability

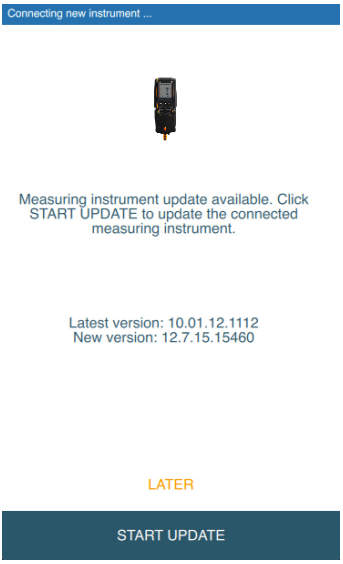
1. Click on **Help and Information**.
   - The Help and Information menu opens.
2. Click on **Exclusion of liability**.
   - The data protection information and licence usage information is displayed.

9.8.4 Wireless firmware update

Make sure that **Enable update for connected instruments** under **Help and Information** I **Instrument information** is always activated.



✓ As soon as a new update is available, a notification will appear in the display.



1 Tap **Start update**.

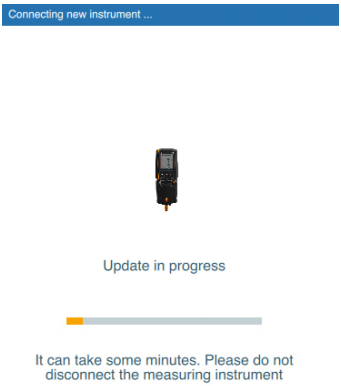
▸ The update is carried out.

1.1 Tap **Later**.

▸ The notification will appear again upon the next connection.

The Bluetooth connection must not be interrupted during the instrument update. The update must be carried out completely and takes approx. 15 minutes depending on the smartphone used.

- 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.



For wireless firmware updates, a battery power of >25% must be ensured on the measuring instrument for an update to be carried out completely.

9.9 testo DataControl archiving software

The free testo DataControl measurement data management and analysis software enhances the functionality of the testo Smart App measuring instrument with lots of useful functions:

- Manage and archive customer data and measuring site information
- Read out, evaluate and archive measurement data
- Presenting readings in graphic form
- Create professional measurement reports from the existing measurement data
- Conveniently add pictures and comments to measurement reports
- Data import from and data export to the measuring instrument

9.9.1 System requirements

Administrator rights are required for installation.

9.9.1.1 Operating system

The software can be run on the following operating systems:

- Windows® 8
- Windows® 10
- Windows® 11

9.9.1.2 PC

The computer must meet the requirements of the operating system in each case. The following requirements must also be met:

- Interface USB 2 or higher
- DualCore processor with minimum 1 GHz
- Minimum 2 GB RAM
- Minimum 5 GB available hard disk space
- Screen with a resolution of at least 800 x 600 pixels

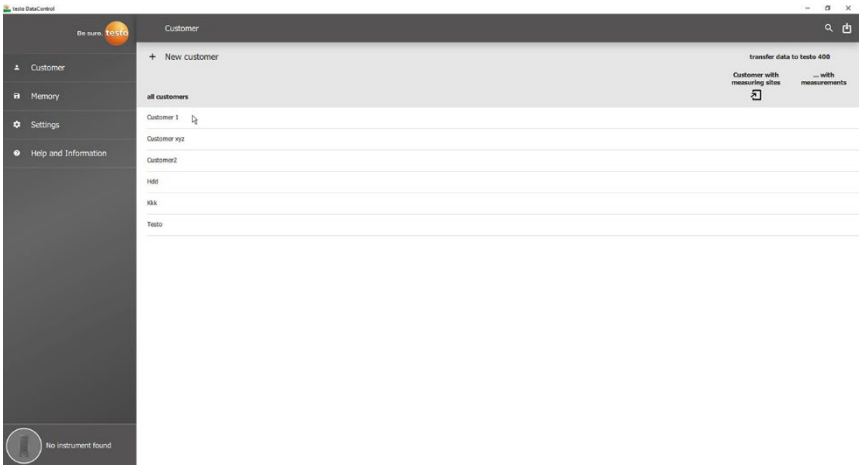
9.9.2 Procedure

✓ To transfer the data from the App to testo DataControl, both instruments must be in the same network.
For example: A notebook with installed testo DataControl and a smartphone with installed testo Smart App are connected to the same WLAN.

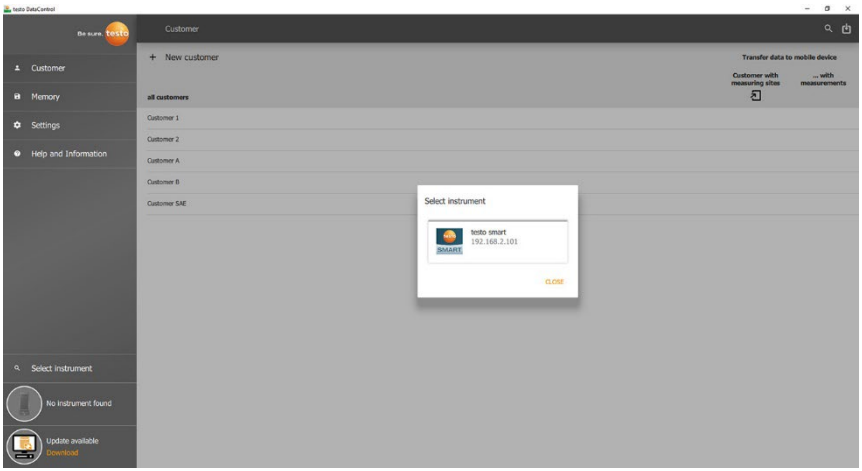
1 Open testo Smart App on the smartphone or tablet.

2 Open the testo DataControl archiving software on the PC.

3 Click on **Select instrument**.



An overview with available instruments opens.



4 Select instrument.

A safety notice is displayed.

5 Click on **Transfer data to DataControl and delete from instrument**.

Data has been successfully transferred from the app to testo DataControl.

10 Maintenance

10.1 Calibration

The measuring instrument is supplied with a calibration protocol as standard. To maintain the specified accuracies of the measurement results, Testo recommends having the **testo 310 II** checked once a year by a Testo authorized service center.

For more information, please contact Testo at http://www.testo.com

10.2 Cleaning the instrument

Do not use any aggressive cleaning agents or solvents! Mild household cleaning agents and soap suds may be used.

Do not store any objects that have come into contact with solvents and/or degreasers in the case. Evaporating or leaking solvents and/or degreasers may cause damage to the instrument and to the sensors.

The use of strong or harsh alcohol or brake cleaner can result in damage to the instrument.

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

10.3 Keeping connections clean

> Keep screw connections clean and free of grease and other deposits; clean with a damp cloth as required.

10.4 Removing oil residues

> Carefully blow out oil residues in the valve block using compressed air.

10.5 Ensuring measuring accuracy

Testo Customer Service will be happy to help you as required.

10.6 Cleaning the flue gas probe

> In case of contamination, clean the probe shaft and the handle of the flue gas probe with a damp cloth. Do not use any aggressive cleaning agents or solvents! Mild household cleaning agents and soap suds may be used.

Any cleaning of contamination within the probe shaft may only be carried out by Testo Customer Service.

10.7 Draining the condensate container

The fill level of the condensate trap can be monitored via the markings on the condensate trap.

Draining the condensate container

⚠ CAUTION

Skin irritation due to condensate!

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

ACHTUNG

Damage to the sensors and the flue gas pump due to condensate entering the gas path!

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

1. Hold the instrument upright, so that the condensate outlet points upwards.

2. Open the sealing plug of the condensate trap.
3. Let the condensate run out into a sink.
4. Dab off any remaining drops on the condensate outlet with a cloth.
5. Close condensate outlet with sealing plug and press on it firmly.

The condensate outlet must be completely closed, other-wise measuring errors could occur if external air gets in.

10.8 Checking / replacing the particle filter

Checking the particle filter

1 Check the particle filter of the flue gas probe for contamination at regular intervals: check visually by looking through the window of the filter chamber.

Replace the filter if there are signs of contamination.

Replacing the particle filter

The filter chamber may contain condensate.

1 Open the filter chamber: Turn gently anti-clockwise.

2 Remove the filter and replace it with a new one (0554 0040).

3 Attach the filter chamber and lock it Turn gently clockwise.

11 Technical data

11.1 Measurement ranges and resolution

11.1.1 testo 310 II (0632 3104)

Measure-ment parameter	Measure-ment range	Resolution	Accuracy	Response time t90 @ 22 °C / 72 °F
O_2	0.0 ... 21.0 Vol.%	0.1 Vol.%	±0.2 Vol.%	30 s
CO	0 ... 4000 ppm	1 ppm	±20 ppm (0 ... 400 ppm) ±5 % of m.v. (401 ... 2000 ppm) ±10 % of m.v. (2001 ... 4000 ppm)	60 s
CO_{amb}	0 ... 4000 ppm	1 ppm	±20 ppm (0...400 ppm) ±5% of m.v. (401... 2000 ppm) ±10% of m.v. (2001...4000 ppm)	60 s
Draught	-0.5 hPa … +2 hPa / -0.2 … +0.8 InH_2O	0.01 hPa / 0.01 InH_2O	± 0.02 hPa / ± 0.01 InH_2O or ±5 % of m.v.	10 s
ΔP	-10.0 ... 40.0 hPa / -4 … +16 InH_2O	0.1 hPa / 0.1 InH_2O	± 0.5 hPa / ± 0.2 InH_2O (0 … 40 hPa / 0 … +16 InH_2O) ±1 % of m.v. (rest of range)	10 s
Flue gas temperature	0 ... 400 °C / +32 … +752 °F	0.1 °C / 0.1 °F	± 1 °C (0 ... 100 °C) / ± 1.8 °F (+32 ... +212 °F) ± 1.5 % of m.v. (rest of range)	50 s
Combustion air temperature	-20...100°C/ -4 … 212°F	0,1 °C / 0.1 °F	± 1 °C / ± 1 °F	50 s

11.1.2 testo 310 II (0632 3106)

Measure-ment parameter	Measure-ment range	Resolution	Accuracy	Response time t90 @ 22 °C / 72 °F
O_2	0.0 ... 21.0 Vol.%	0.1 Vol.%	±0.2 Vol.%	30 s

Measure-ment parameter	Measure-ment range	Resolution	Accuracy	Response time t90 @ 22 °C / 72 °F
CO	0 ... 4000 ppm	1 ppm	±20 ppm (0 ... 400 ppm) ±5 % of m.v. (401 ... 2000 ppm) ±10 % of m.v. (2001 ... 4000 ppm)	60 s
CO_{amb}	0 ... 4000 ppm	1 ppm	±20 ppm (0...400 ppm) ±5% of m.v. (401... 2000 ppm) ±10% of m.v. (2001...4000 ppm)	60 s
Draught	-20 … +20 hPa / -8 … +8 InH_2O	0.01 hPa / 0.01 InH_2O	± 0.02 hPa (-0.6 ... +0.6 hPa) / ± 0.01 InH_2O (-0.24 … +0.24 InH_2O) ±0,03 hPa (-3 ... -0.6 hPa and +0.6 ... +3 hPa) / ± 0.012 InH_2O (-1.2 ... -0.24 InH_2O and +0.24 ... +1.2 InH_2O) ±1,5 % of m.v. (-20 … -3 hPa and +3 ... +20 hPa) / (-8.0 … -1.2 InH_2O and +1.2 ... +8.0 InH_2O)	10 s
ΔP	-40 ... +100 hPa / -16 … +40 InH_2O	0.1 hPa / 0.1 InH_2O	± 0.5 hPa / ± 0.2 InH_2O (-40 … +50 hPa / -16 … +20 InH_2O) ±1 % of m.v. (rest of range)	10 s
Flue gas temperature	0 ... 400 °C / +32 … +752 °F	0.1 °C / 0.1 °F	± 1 °C (0 ... 100 °C) / ± 1.8 °F (+32 ... +212 °F) ± 1.5 % of m.v. (rest of range)	50 s
Combustion air temperature	-20...100°C/ -4 … 212°F	0,1 °C / 0.1 °F	± 1 °C / ± 1 °F	50 s

11.2 Other instrument data

Storage and transport temperature	-20 … +50 °C / -4 … +122 °F
Operating temperature	-5 … +45 °C / +23 … +113 °F

Humidity application range	0 … 80 %RH
Operating altitude	≤ 2000 m / ≤ 6562 ft
Protection class	IP40
Pollution degree	PD2
Power supply	Rechargeable battery: 1500 mAh
Power Rating	4 W
Mains unit	5 V / 2 A, USB charger (mains unit from Testo) with connection via USB C
Battery charge time	approx. 8 h
Rechargeable battery life	> 8 h (pump on, 20°C ambient temperature)
Weight incl. probe	690 g / 24.3 oz
Dimensions	203 x 83 x 46 mm / 8.0 x 3.3 x 1.8 In
Certification (only testo 310 II 0632 3106)	TÜV-tested according EN 50379, Parts 1 and 3

12 Tips and assistance

12.1 Questions and answers

Question	Possible causes/solution
Rechargeable battery low	➢ Switch to mains operation.
Measuring instrument switches off automatically or cannot be switched on	Rechargeable battery empty. ➢ Charge rechargeable battery or switch to mains operation.

12.2 Error Codes

Error messages and corresponding instructions for action are shown on the unit display.

Follow the instructions on the unit. If in doubt, contact your local dealer or the Testo Customer Service. You can find contact details on the back of this document or online at **www.testo.com**.

12.3 Accessories and spare parts

Printer

Description	Item no.
Bluetooth®/IRDA printer	0554 0622
Spare thermal paper for printer (6 rolls)	0554 0568

Accessory for flue gas probe

Description	Item no.
Particle filter, 10 pcs.	0554 0040

Other accessories

Description	Item no.
Mains unit 5V 2A	0554 1108
Connection cable USB-C - USB-A	0449 0174

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

13 Support

You can find up-to-date information on products, downloads and links to contact addresses for support queries on the Testo website at: www.testo.com.

If you have any questions please contact your local dealer or the Testo Customer Service. You can find contact details on the back of this document or online at **www.testo.com/service-contact.**

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