WÖHLER

Operation Manual
Portable Flue Gas Emissions Analyzer

Wohler A 550 INDUSTRIAL

The Measure of Technology

Contents

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1 General Information

1.1 Operation Manual Information

This operation manual allows you to work safely with the Wohler A 550 INDUSTRIAL. Please keep this manual for your information.

The Wohler A 550 INDUSTRIAL should be employed by professionals for its intended use only.

Liability is void for any damages caused by not following this manual.

1.2 Notes

⚠️ **WARNING!**
Not following this warning can cause injury or death.

❗ **ATTENTION!**
Not following this note can cause permanent damage to the device.

☞ *NOTE!*
Useful information

1.3 Intended Use

Use the Wohler A 550 INDUSTRIAL to perform emissions analysis in industrial applications including boiler and burner testing, heat processes, engine and turbine testing. The logger function allows user configurable longterm operation.

1.4 Basic features

Device	Basic equipment
Wohler A 550 INDUS-TRIAL	O_2, NO, CO_{High}, NO_2, SO_2 sensor
	Probe and hose assembly with 3,000 mm hose
	Modular Flue Gas Probe 1,000 mm with sinter filter
	Ambient Temperature Probe (plug)
	USB-Charger with micro-USB-cable
	1 Water stop filter
	1 Coarse Filter
	25 Wadding filters

1.5 Transport and stocking

! ATTENTION!
Improper transport can harm the instrument.

Always transport the analyzer in the provided carrying case in order to prevent damage.
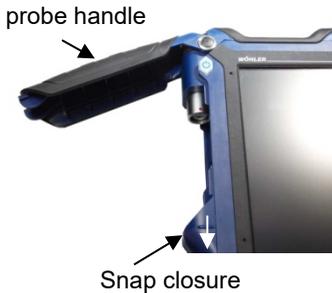
probe handle

Snap closure

Fig. 1: Wohler A 550 INDUSTRIAL with open probe compartment

- **To open the probe compartment pull down the snap closure under the black probe handle.**

Lock the analyzer
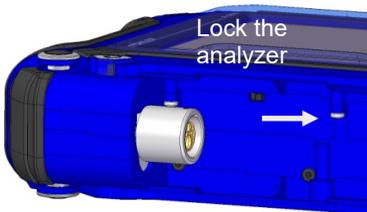
Fig. 2: Transport lock in the probe compartment

⚠ ATTENTION!

For the transport deactivate the battery with the transport lock.

- Deactivate the battery by pushing the transport lock to the right with a pointed object (wire or pen).

When the instrument is delivered, the battery is always deactivated.

1.6 Information on disposal

Electronic equipment does not belong into domestic waste, but must be disposed in accordance with the applicable statutory provisions.

You may hand in any defective batteries taken out of the unit to our company as well as to recycling places of public disposal systems or to selling points of new batteries or storage batteries.

1.7	Manufacturer	**Wohler Technik GmbH**

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1.8 Important information

⚠ ATTENTION!

In order to ensure the quality of the application and the measurement result, the analyser may only be used with original Wohler accessories and original Wohler spare parts. This applies in particular to legally regulated measurement tasks.

⚠ ATTENTION!

Do not expose the instrument to moist flue gas, if it has been exposed to temperatures below 0°C for a certain time. This may harm the instrument.

⚠ ATTENTION!

The instrument is equipped with strong magnets to fix it during the measurement. The magnetic field may harm heart pacemakers, hard disks, data mediums, magnetic stripe cards, controls etc. Keep sufficient distance to magnet-sensitive objects.

2 Features and functions

	Wohler A 550 INDUSTRIAL
Logger-function	✓
4 Pa-Test	✓
Wood moisture	✓
Spillage test	✓
Tuning guide	✓
Possible number of sensors	5

Start/Stop-Button: Remote control via the probe	✓
1,000 data sets	✓
USB and infrared interface	✓
Bluetooth interface	✓
Fresh air pump	✓

3 Specifications

3.1 Readings

Oxygen (O_2) concentration in flue gas	
Display	volume % referenced to dry flue gas
Measurement principle	electrochemical sensor
Range	0.0 to 21.0 %
Accuracy	± 0.3 Vol. -%
Carbon monoxide in flue gas (CO 100,000)	
Display	volume ppm referenced to dry flue gas
Measurement principle	electrochemical sensor
Range	0 to 100,000 vol. ppm, resolution 1 vol.-ppm
Accuracy	± 100 ppm (< 1,000 ppm), otherwise 10% of reading (when H_2 < 5 % of reading)

Nitric oxide concentration (NO) in flue gas

Display	volume ppm referenced to dry flue gas
Measurement principle	electrochemical sensor
Range	0 to 3,000 vol. ppm (continuously up to 1,000); resolution 0.1 vol. ppm (<1,000 vol. ppm), otherwise 1 vol. ppm
Accuracy	Resolution 0.1 ppm, ±5 vol. ppm (<100 vol. ppm), otherwise 5 % of reading

Nitrogen dioxide concentration (NO_2) in flue gas

Display	volume ppm referenced to dry flue gas
Measurement principle	electrochemical sensor
Range	0 to 1,000 Vol. ppm (continuously up to 200 vol. ppm); resolution 0.1 vol. ppm
Accuracy	±5 vol. ppm (<100ppm), otherwise 5 % of reading

Sulfur dioxide (SO_2) in flue gas (option)

Display	volume ppm referenced to dry flue gas
Measurement principle	electrochemical sensor
Range	0 to 5,000 vol. ppm resolution 0.1 vol. ppm (< 1,000 vol. ppm), otherwise 1 vol. ppm
Accuracy	± 10 vol. ppm (< 200 ppm), otherwise 5 % of reading

Differential pressure (P_D)

Display	Pascal
Measurement principle	Semi conductor diaphragm
Range	0.00 to ± 110.00 hPa, resolution 0.1 Pa (<1000,0 Pa), otherwise 1 Pa
Accuracy	0.3 Pa (<10 Pa), otherwise 3% of reading Drift < 0.2 Pa in 5 minutes

Flue gas temperature (T_S)	
Display	°C
Measurement principle	Thermocouple (NiCr-Ni)
Range	-20.0 °C to 800.0 °C, resolution 0.1 °C
Accuracy	0 - 133 °C ± 2°C; 133 to 800 °C: 1.5% of reading
Combustion air temperature (T_A)	
Display	°C
Measurement principle	Thermocouple (NiCr-Ni)
Range	-20.0 °C to 100 °C, resolution 0.1 °C
Accuracy	± 1°C

Wood moisture	
Reading	water mass related to the absolute dry fuel mass
Measurement principle	resistance measurement
Range	10.0 to 40.0 %, resolution 0.1 %
Accuracy	40 % of reading
wood temperature	5 to 25° C
lifetime of the electrodes	Depending on the frequency of utilization The electrodes will work correctly, if there is no surface damage or bending.

3.2 Calculated Values

Calculated Value	Explanation
Efficiency /SL	Efficiency and losses in accordance to ASME standards
ETA/QS	Efficiency and losses in accordance to European standards (0.0 to 120%)
CO_2 in Vol. -%	Range $0 - CO_{2max}$, resolution 0.1 %
CO_c, SO_{2c}; NO_c, NO_{2C}	air free (corrected) Default: 0% (oil and gas).
Dpt	°C Dew Point in the flue gas
Medium soot level	Soot number ± 0.1
Excess air coefficient	Lambda λ (e.g. 1,25 when the excess of air is 25%)
C_{on}	Condensate quantity in condensing conditions
Toxication index GI	CO/CO_2
Air velocity	0.1 to 130 m/s, resolution < 0.1 m/s, for the measurement of the ventilation loss (heating check)
Speed	Range 0 – 130.0 m/s
Flow	Range 0 – 9,990.000 m^3/h

3.3   Technical Data

Description	Data
Power supply	Lithium-Ion, rechargeable battery 3.7 V, 6700 mAh, charges via USB
Battery Operation time	Approx. 7 h (depends on operation status and display illumination)
Charging cycles of the batteries:	After 500 charging cycles, at least 70% of the capacity are still available
Storage Temperature	-20 °C to 50 °C
Operation temperature	+5 °C to 40 °C to maintain stated accuracy
Relative humidity	30% to 70 %
Weight	1,250 g
Dimensions	220 x 160 x 55 mm (without probe)
Length of cable hose	1,700 mm

4 Setting up the instrument

4.1 Component Explanation

Fig. 3: Device front

Explanation

1 On/off-button

2 Condensate trap

3 Opening handle for the condensate trap

4 Probe compartment

5 Opening handle for the probe compartment

☞ *NOTE!*
Open the probe compartment by pulling down the opening handle.

6 Bottom of the analyzer with connectors

7 Loops to fix the probe

14
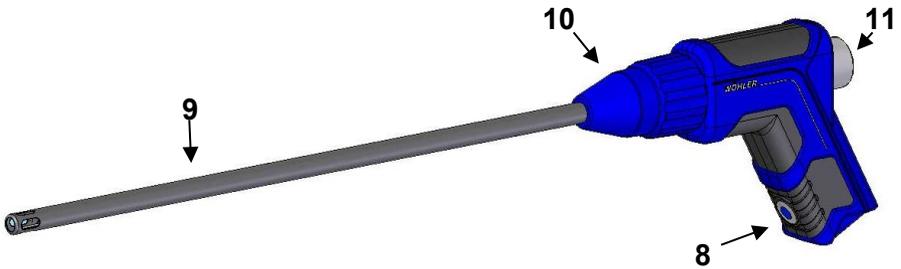
Fig. 4: Probe handle with gas probe 295 mm

Probe probe handle:

8 ON/Off-Key
9 Gas Probe
10 Union nut
11 Plexiglas plug with Coarse Filter

On/Off-key (8)

Fig. 5: Pressing the ON/Off-Key during the measurement

It is possible to start and stop the measurement with the On/Off-key (8) of the probe handle. This permits an easy handling in difficult measurement conditions.

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Fig. 6: Connectors at the bottom

Connectors at the bottom of the analyzer

12 USB port for data transmission and charger

13 IR Interface for the printer

14 Moisture probe connector

15 Ambient temperature probe connector

16 Negative pressure connector

17 Positive pressure connector

18 Speaker for alarm signals

Fig. 7: Probe compartment

Probe compartment

19 Gas probe connector
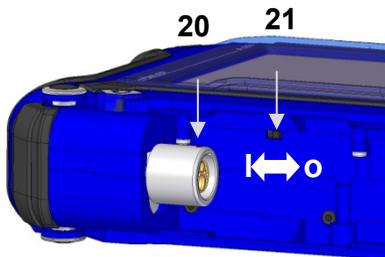
Fig. 8: Interior of the probe compartment Wohler A 550 INDUSTRIAL

20 Red point of orientation

21 Transport lock in the probe compartment

• Deactivate the battery by pushing the transport lock to the right (see figure opposite) with a pointed object (wire or pen).

4.2 Probes and sensors

Flue gas probe 1,000 mm to take emission measurements, even with heavy dust loads in difficult to reach locations.

Fig. 9: Flue gas probe 1,000 mm with sinter filter

Ambient Temperature Plug

Fig. 10: Ambient Temperature Plug

S-tube probe for measuring the flow speed

Fig. 11: S-tube probe

Flexible capillaries for the 4 PA test

Fig. 12: Flexible capillaries

Ambient Temperature Probe 185 mm

Fig. 13: Ambient Temperature Probe

Wood Moisture Probe

Fig. 14: Wood Moisture Probe

Spillage Probe

Fig. 15: Spillage Probe

4.3   Tightness test
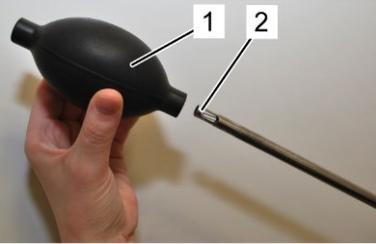
Fig. 16: Ball pump

Before the tightness test connect the gas probe (see chapter 5.2).

Proceed as follows:

1.   Squeeze the ball pump (part 1).
2.   Plug the ball pump (part 1) on the gas probe (part 2)
3.   Release the ball pump.

After the ball pump has been released, it may not fill with air or only fill very slowly. Otherwise the connection is not tight.

! ATTENTION!
Never plug the ball pump on the gas probe and squeeze it afterwards. In this case the draft probe will be damaged.

4.4 Display

The Wohler A 550 is operated via Touchscreen. The measurement menu is similar to the one of a smartphone. A fingertip on the icon starts the correspondent measurement mode. The active icons are graphically emphasized.

If there is a bar on the right of the display, the display can be scrolled by pulling it with the finger.
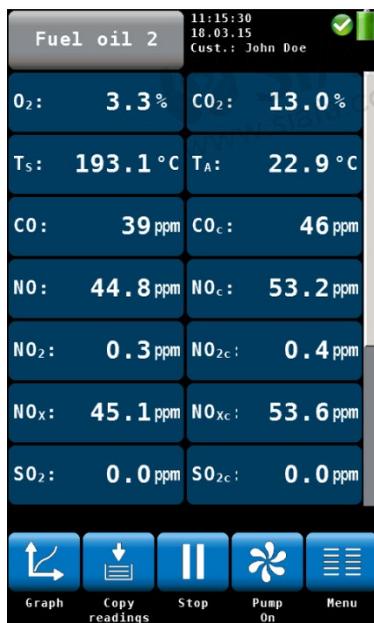
Fig. 17: Display details

The display is divided into different segments:

The fuel is shown in the topline on the left. The currently selected customer and measurement mode are shown on the right of the fuel.

Date and time, system diagnostic status and battery level are shown on the right.

The readings segment displays the current readings.

Click on P_R key for zeroing the pressure sensor.

☞ *NOTE!*
The user can set up the display according to his needs. He can arrange the readings and chose the units. Go to the setup-menu and select "change units" (see chapter 9.10).

The icon segment offers different options. These options are explained in chapter 6.3.1

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4.5 Gas sampling path Wohler A 550 INDUSTRIAL
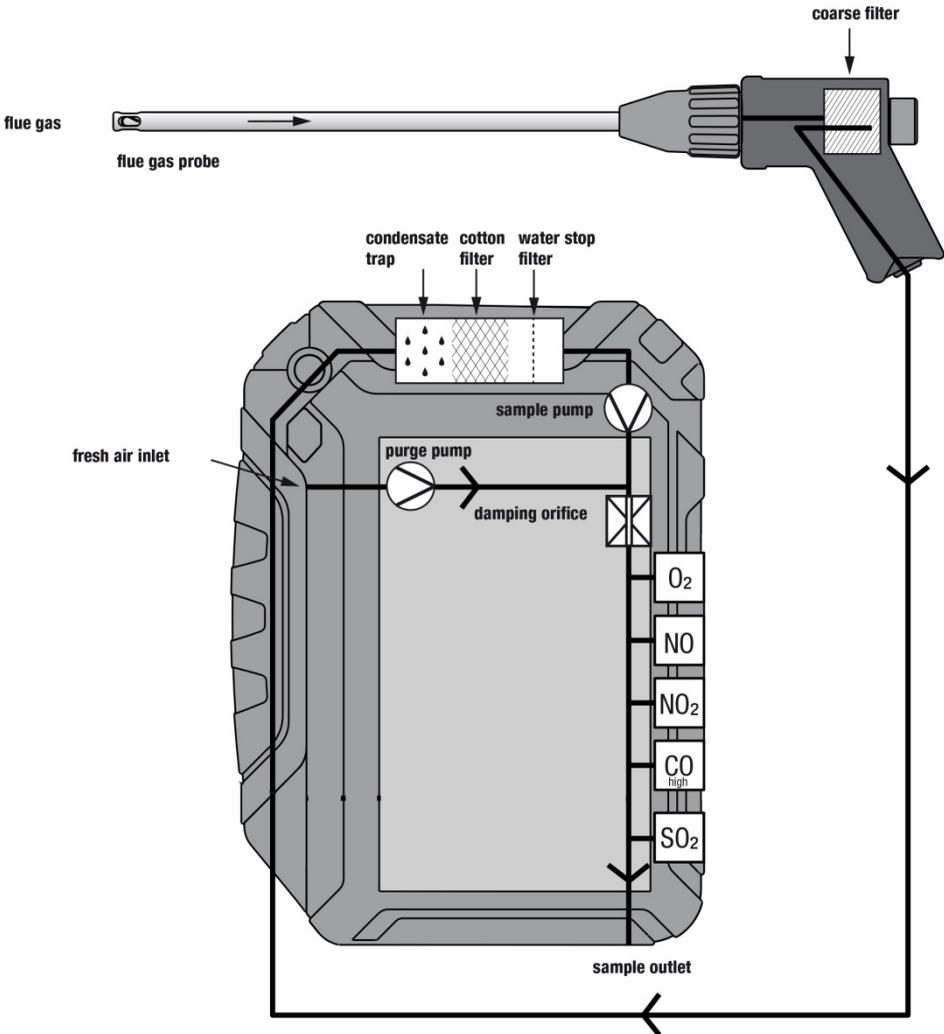
Fig. 18: Gas sampling path Wohler A 550 INDUSTRIAL

The Wohler A 550 INDUSTRIAL has two pumps. A sample pump sucks the flue gas through the probe and the cable hose. A purge pump pumps fresh air to all sensors during the calibration phase. As the sample pump is cut-off during the calibration, the hotspot can already be searched during this time.

The sensors are protected against condensate by a four-step-filter conditioning:

The first step is the coarse filter in the probe handle. Most of the particles will be removed from the sample. After that the gas passes the condensate trap, where the gas is cooled by a spiral and the condensate is collected.

The second step is an exchangeable cotton filter. Fine particles and rests of water will be removed from the sample.

The last step is the Water Stop Filter. This filter will not allow any kind of moisture to pass. The filter will clog automatically in contact with water, so that the sensors are protected against moisture.

The sample passes all sensors. O_2 is always the first sensor and CO (4.000 ppm) is always the last sensor.

The fourth step is the LT-filter. This chemical filter removes all harmful gas components. It is situated immediately in front of the CO sensor.

☞ *NOTE!*
When using the optional Wöhler USB Peltier cooler the coarse filter must not be installed!

5 Getting started

probe handle

Snap closure

Fig. 19: Wohler A 550 INDUSTRIAL with open probe compartment

- **To open the probe compartment pull down the snap closure under the black probe handle.**

Fig. 20: Push transport lock to the left: batteries activated.
Push transport lock to the right: batteries deactivated
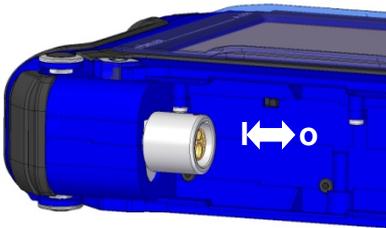
- **Before the first start up** activate the batteries by pushing the transport lock in the probe compartment (see Fig. 19) to the connector, see figure on the left. Use a pointed object to do so.

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5.1   Charging the battery

Fig. 21: USB port at the bottom

The battery indication is displayed in the upper right corner of the screen. A fully charged battery is shown as a solid green battery symbol.

If the battery symbol is red, the display illumination is automatically reduced to save energy. In this case, charge the battery or use the Wohler A 550 INDUSTRIAL in mains operation.

• Before you plug the USB-recharger into the outlet, connect it with the analyzer. To do so, plug the USB connector of the recharger to the USB port at the bottom of the analyzer.

During the charging process a jack-symbol will blink in the upper right part of the screen and the ON/OFF key will blink red.

🖝 NOTE!

Recharging empty batteries can take up to 7 hours. You can still go on measuring while battery charging is in progress. In this case charging time will be longer.

After the charging time has finished the ON/OFF key will shine red.

⚠ WARNING!
Risk of electrical shock!

Never touch the power supply with wet hands!

Protect the power supply against water and moisture!

Do not unplug the recharger by pulling the cable!

Do not use the power supply when the voltage requirements of the recharger and the supply do not match!

5.2   Connecting the probe and cable-hose assembly
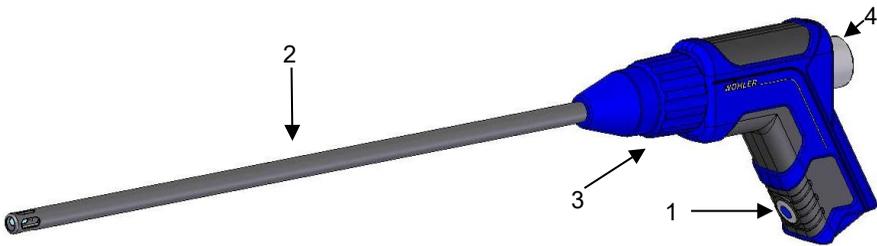
Fig. 22: Probe handle with gas probe 295 mm

Probe handle:

1   ON/Off-Key (only Wohler A 550 INDUS-TRIAL)

2   Gas probe

3   Union nut

4   Plexiglas plug with coarse filter

5.2.1   Connecting the probe

Use different probes depending on the measurement to be done. Connect the probe as follows:

Connecting the gas probe 295 mm

Fig. 23: Connecting the probe

- Remove the blue union nut from the probe handle.
- Plug the probe on the probe handle. Take care that the thermocouple connectors are plugged into the green slots.
- Screw blue union nut on the probe handle again.

Connecting the gas probe 1000 mm

Fig. 24: Removing the plug from the gas probe 1,000 mm

Fig. 25: Probe handle with gas probe 1,000 mm

- Remove the blue union nut from the probe handle.

- Remove the yellow plug and the grey union nut from the probe.

- Plug the probe on the probe handle. Take care that the thermocouple connectors are plugged into the green slots.
- Screw the grey union nut on the probe handle.

The gas probe 1,000 mm has an in-stack sinter-filter for dust protection. It removes dust (> 20 ym) from the sample gas to protect the analyzer against heavy dust loads.

- Before measuring make sure that the screw connection on the sinter filter is firmly tightened.

- To remove the sinter-filter carefully unscrew it from the probe.

☞ *NOTE!*
As the sinter-filter covers the temperature probe, a precise temperature will only be displayed after an adjustment period.
To get an exact temperature value we recommend to repeat the measurement without sinter filter

⚠ **ATTENTION!**
To prevent dust from entering into the gas channel, switch of the gas pump when measuring the temperature without sinter filter.

- Before inserting the gas probe without sinter filter into the stack, click on "pumps off".

5.2.2 Connecting the hose to the analyzer

Fig. 26: Wohler A 550 INDUSTRIAL with open probe compartment

- **To open the probe compartment pull down the snap closure under the black probe handle.**

- Plug the male connector on the female connector, so that the two red points of the male and the female connector are accurately positioned on top of each other. The connector must audibly engage. (To remove the connector, pull the snap shell down.)

- Guide the cable through the cable duct.

- Close the probe compartment as follows: Pull down the snap closure, lower the probe handle and engage the snap closure.
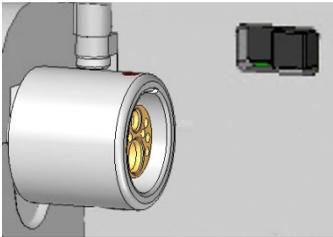
Fig. 27: Female connector for the probe Wohler A 550 INDUSTRIAL

6   Using the Analyzer

> **!** **ATTENTION!**
> Before use, always test if the instrument is in a proper condition as described in chapter
> 4 . Perform a tightness test according to chapter 4.3

6.1   Turning the analyzer on and off

- Press the ON/OFF key shortly to turn ON the analyzer. The startup screen will appear.

- Long press the ON/OFF-key for 3 seconds to turn the analyzer off.

6.2   Hotspot search

After the analyzer has been turned on, it will automatically start to calibrate the sensors with fresh air. During the calibration, the user can already insert the probe into the stack and search for the proper sampling position. In most cases it will be the position with the highest temperature reading (hotspot).
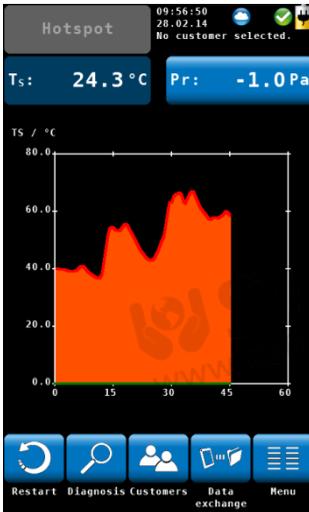
Fig. 28: Hotspot search

- Search the hotspot regarding the flue gas temperature T_S in the graph.

The graphical hotspot search is supported by an acoustic signal. The signal will be more intensive when the temperature is higher.

👉 *NOTE!*
Do not change the position of the probe after having found the hotspot. Fix the probe with a cone.

Restart	Restarts the hotspot search.
Diagnosis	Click on the "diagnosis" icon to finish the hotspot search and enter the analyzers self diagnosis mode (see chapter 13.3).
Customers	Click on the "Customers" icon to finish the hotspot search and enter the Customers menu. The Customers Menu allows to set up a new costumer or preselect a customer before the measurement. After the measurement the measured data can be stored to the customer folder, see chapter 7.3.
Data Exchange	Click on the "Data Exchange" icon to finish the hotspot search and enter the data exchange mode. In this mode data can be exchanged between the Wohler A 550 INDUSTRIAL and the PC via USB or Bluetooth.
Menu	Opens the main menu. Only those submenus are available which can be started without calibration.

6.3   Measuring

Upon conclusion of the 60 seconds calibration procedure and the hotspot search the analyzer will display the main combustion emission test screen. At the same time the purge pump will turn off and the sample pump will turn on.

6.3.1   Readings screen

Al readings (measured and calculated values) will be shown continuously in the readings segment.

☞ *NOTE!*
The user can change the order of the values. He can also select the unit of some of the values (see chapter 9.10) Up to 14 values can be shown on screen. The following screen is only an example.
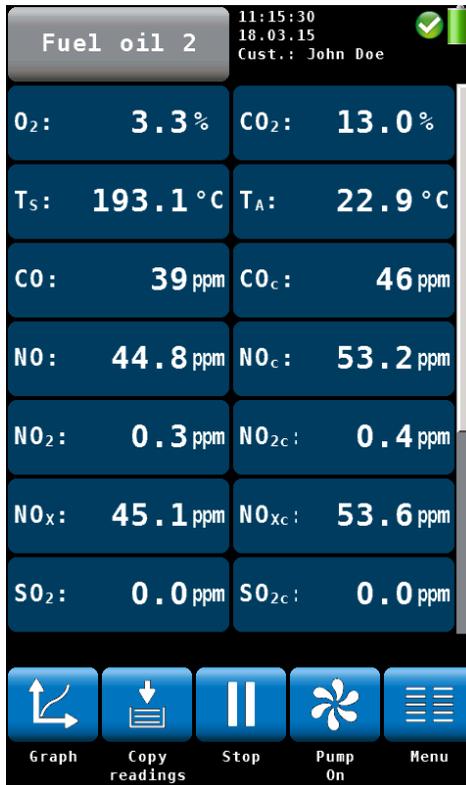
Fig. 29: Readings segment: touch and slide to scroll the display screen

	Possible units	Measured and computed values:
O_2	Vol.-%	Oxygen content
CO_2	Vol.-%	Carbon dioxide content
Q_S	%	Flue gas loss
CO	ppm; mg/m^3	Carbon monoxide, referred to dry flue gas, diluted value
CO_c	ppm, mg/m^3, mg/kWh, mg/MJ	Carbon monoxide, corrected (air free)
C_{on}	kg/m^2 or kg/kg (depending on the fuel)	Condensate qty. in condensing conditions
NO	ppm, mg/m^3	Nitrogen oxide
NO_c	ppm, mg/m^3 ,mg/kWh, mg/MJ, lbs/mmbtu, g/GJ	Nitrogen oxide, corrected (air free)
NO_2	ppm; mg/m^3	Nitrogen dioxide
NO_{2c}	ppm, mg/m^3 ,mg/kWh, mg/MJ, lbs/mmbtu, g/GJ	Nitrogen dioxyde, corrected (air free)
SO2	ppm; mg/m^3	Sulfur dioxide
SO_{2c}	ppm, mg/m^3 ,mg/kWh, mg/MJ, lbs/mmbtu, g/GJ	Sulfur dioxide, corrected (air free)
D_{pt}	°C/°F	Dew Point
GI	--	Toxication index CO/CO_2
T_A	°C/°F	Ambient Temperature
T_S	°C/°F	Flue Gas Temperature
η	%	Eta, Efficiency and losses calculated in accordance to EN standards
Efficiency /SL	%	Efficiency and losses in accordance to ASME standards
ETA/QS	%	Efficiency and losses in accordance to European standards (0.0 to 120%)

	Possible units	Measured and computed values:
Pr	Pa, hPa, mbar, mmH$_2$O, inwc, psi	Differential Pressure
λ	--	Theoretical air/ excess air
EA	%	Excess air
Spd	m/s, ft/min	Speed
Flow	m^3/h, m^3/s, cfm	Volume Flow

6.3.2   Selecting the fuel

Fig. 30: Fuel options

The selected fuel is shown in the topline on the left of the readings screen.

- Click on the fuel key to enter the fuel options menu.

Optional fuels as below:

Natural gas, Fuel Oil 2, Fuel Oil 4, Fuel Oil 6, Bio-fuel, LPG, Propane, Kerosene, Digester Gas, Coal, Wood, Pellets and four user defined fuels

> ☞ *NOTE!*
> *To see all fuels scroll by sliding your finger over the screen.*

- Click on a fuel. The fuel will be selected for the next measurement.

- After turning off and on the analyzer, the last selected fuel will be active again.

6.3.3   Setting the fuel parameters

The reference oxygen and the Lamda threshold values of all fuels can be individually set.

All values shown in the tuning guide display can be set for the user defined fuels.

- Click on the "Fuel data" icon to control or change the fuel parameters. The "Fuel data" icon will turn green.

- Click on the fuel whose parameters are to be changed.

- The analyzer enters the fuel parameter menu. Change the parameters and confirm with "OK".

6.3.4   Options

Graph

In the **readings screen** a click on one of the icons at the bottom offers the following options:

- A click on the Graph icon generates a graph of the measured values.
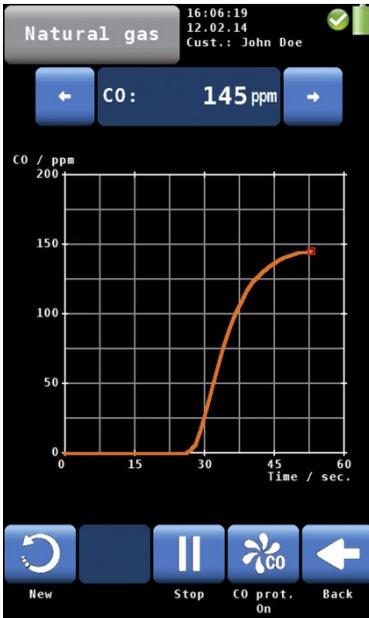
Fig. 31: Graph of the CO readings

- Above the graph the measured value, which is presented in the graph, is indicated as a number.
- Select the value to be presented with the arrow keys.

The options in the graph mode are as follows:

- Click **New** to start a new measurement.
- Click **Stop** to stop the measurement and hold the values.
- Click **Back** to return to the numeric screen.

Copy values

- Click on the "Copy values" icon to copy the readings into the clipboard. The "Copy values" icon will appear in the top right screen.

This way the user can save the readings in case of an early switching off of the burner. When the user continues the measurement after having copied the readings to the clipboard, he can decide if he wants to save the actual readings or those of the clipboard.

Clipboard readings

- To save the readings of the clipboard, stop the measurement. When the measurement is stopped click on "Clipboard readings".

In the clipboard screen, the "Current readings" icon will appear.

Current readings

☞ NOTE!
A click on the "current readings" icon enters the current readings screen. A click on the "Clipboard readings" icon enters the clipboard.

Stop	• Click **Stop** to stop the measurement and hold the values. The sample pump continues. or • Press the Start/Stop button of the probe handle to stop the measurement and hold the values. (The sample pump continues.)
Pumps off	• Click on "Pumps OFF" to turn off the gas pump.
Pumps on	• Click on "Pumps on" to turn on the gas pump.
Purging on	• If the measurement has stopped, click on "Purging on" In this case the sensors will be purged with fresh air without the need to remove the probe from the stack.
Accept	The "Accept" icon will only appear if the measurement is stopped. • Click on the "Accept" icon to enter the Readings menu. In the Readings menu you can save the readings in a customer folder (see chapter 7).
Proceed	• Click on "Proceed" to continue the measurement.

7 Readings Menu
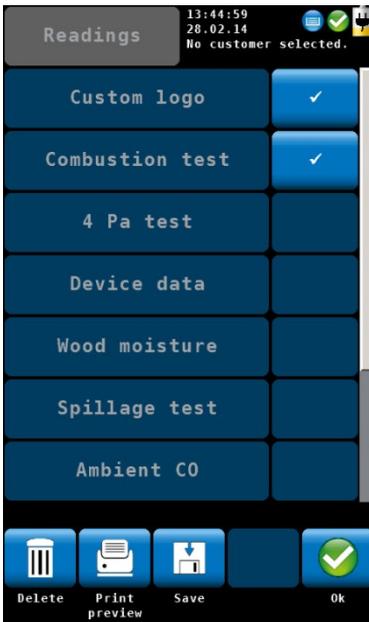
Fig. 32: Readings Menu

If the user accepts a record, the analyzer will enter the readings menu automatically. It is also possible to enter the readings menu by clicking on the readings icon in the main menu. In the readings menu a list with all possible measurements and tests is shown. Those tests that have already been done will appear with a checkmark. Those tests that have already been saved will be marked by a lock. Select a measurement to delete, print or save it.

"Customer Logo" and "Technician" (last item) will always be marked by a checkmark.

- If you do not want the logo or the technician to appear on the printout, remove the correspondent checkmark. This setting will be saved if you turn the analyzer off and on again.

7.1 Delete data

- Click on the "Delete data" icon to delete the selected data.

7.2 Print data

- Click on the "Print preview" icon to print the selected information on the Wohler TD 100 Thermoprinter.
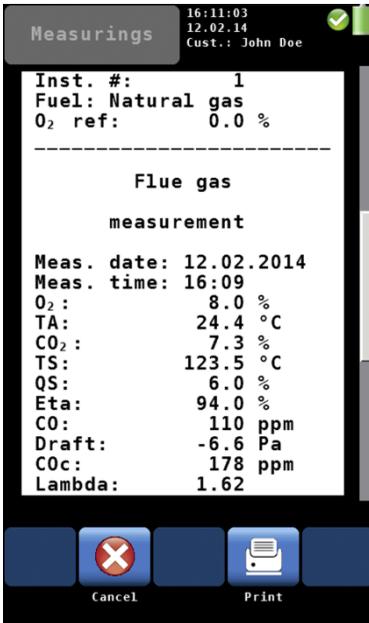
Fig. 33: Print Preview

A print preview will appear.

- Click on the "Cancel" icon, if you do not want to print the information shown in the preview

or

- Click on the "Print" icon to start the printout.

Fig. 34: Printing the readings of the Wohler A 550 INDUSTRIAL on the Thermoprinter Wohler TD 100.

☞ *NOTE!*
Place the printer with the IR receiver toward the IR interface of the analyzer.

After printing, the analyzer will enter the measurement mode again.

7.3 Save data in the customer menu.

- Click on the "Save" icon to save a customer record. The analyzer will enter the customer menu. Create a new customer folder or save the record in an existing customer folder.
- Proceed as described in chapter 10.

7.4 Save data with the "Quick save" option

Fig. 35 Data record saved with the quick save function

If the quick save option is activated in the Setup-Menu (see Chapter 9.10), the analyzer will automatically save the measurement records under a new customer. The customer name will be the measurement date and the measurement time.

• After the measurement click on "Accept".

• Click on the "Save" icon to save a customer record.

8 Mesuring the Air speed and the Volume Flow of the flue gas

The Wohler A 550 INDUSTRIAL can measure air speed and volume flow by using the differential pressure sensor. Prandtl and S-Tube probes are available in different lengths to measure air speed for example inside the stack. In order to calculate volume flow the user has to enter additional information.

Fig. 36: Setup > Flow Parameter

• In the Setup-menu select "Flow parameter"

• Enter the cross-section of the pipe.

• For the Temperature measurement, connect the gas probe to the analyzer and insert it into the measurement opening.

☞ *NOTE!*
If no gas probe is connected to the analyzer, no speed and flow value will appear on screen, because the temperature value will influence the calculation of the speed value

Fig. 37: Analyzer with pressure hoses

- Connect an S-tube probe as follows:
  - plug the two pressure hoses on the pressure connectors of the analyzer.

8.1.1 Measuring the Air Speed

Static pressure

Immersion depth

Flow

Knurled screws
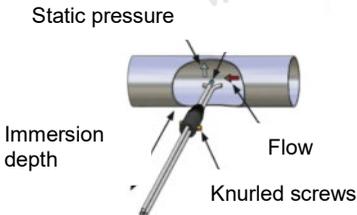
Fig. 38: Measuring the air speed with the S-tube

- In calm air, switch on the analyzer and wait 60 seconds.
- When closed, the S-tube can be inserted through the measurement opening into the gas flow.
- Fix the S-tube with a cone, open it and direct the sensors as shown in the figure.
- If necessary, adapt the S-tube to the cross section of the gas line with the help of the two knurled screws.

☞ *NOTE!*
The S-tube must be adjusted before the measurement procedure starts, since it is required to check and/or adjust the oppositely running orientation of the measuring tubes after loosening the knurled screws and adjusting the immersion depth.

Fig. 39: Values screen with speed and flow

- The speed and the volume flow values will be shown in the measurement screen.

-

☞ *NOTE!*
If the air speed probe is equipped with a thermo-couple it has to be connected to the stack probe thermocouple connector (see 5.2.1, Fig. 23)

9 Menu

Menu

- Click on the main "Menu" icon to enter the main menu.

Fig. 40: Main menu

In the main menu you can select the different measurement options or the setup-menu or the calibration menu.

The lower icon bar shows the "Customer" (see chapter 10) and the "Readings" icon (see chapter 7).

- Click on the "Back" icon to return to the normal measurement mode.

9.1 Device data
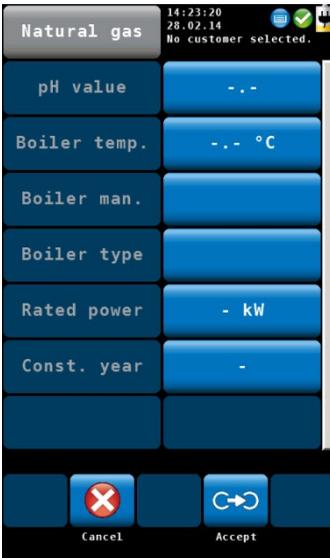
Fig. 41: "Device data" screen

In the "Device data" screen the user can enter information about the heating system. He can save this information together with the readings in the customer folder.

- Select a parameter.

Fig. 42: Entering the ph value

- Enter the correspondent information.
- Press OK to confirm.

NOTE!
The value to be entered must be within the preset limits (in the example on the left between 0.0 and 14.0). If the value is not between the preset limits, it will not be possible to confirm the value.

After confirming the analyzer will automatically return to the device data screen.

- To save the information, proceed as described see chapter 7.

NOTE!
It is possible to save the information about the heating system together with the readings.

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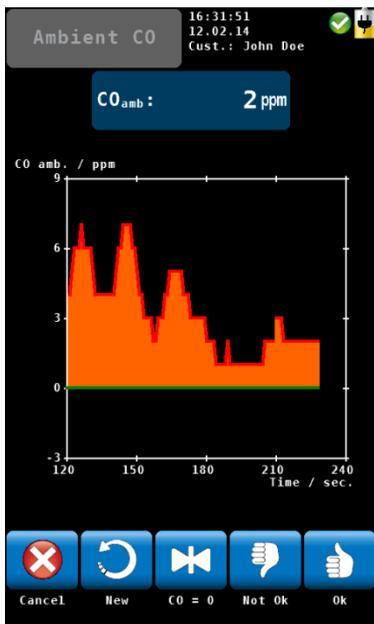
9.2 Ambient CO

Fig. 43: Ambient CO

The option 'Ambient CO' offers a graphical assisted ambient CO test.

The current ambient CO concentration is shown over the elapsed measurement time. The figure on the left shows an 'Ambient CO' test over a time period of 230 seconds and the current CO level is 2 ppm.

The options during the ambient CO test are as follows:

- Cancel (left icon): click the left key to exit without performing an "Ambient CO" test and return to the main menu.

- New: Start a new "Ambient CO" test

- Option "CO=0": click to zero-out the CO sensor offset reading.

- To evaluate the test click on "Not OK" or "OK". The analyzer will enter the data menu where you can save and/or print the information.

☞ *NOTE!*
Due to temperature effects and aging of the CO sensor it is possible that the 0 ppm offset level changes. Check regularly in clean air that the ambient CO level is reading zero. If the reading is not zero in clean air, click the 'CO=0' key to zero-out the readings.

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9.3   Wood moisture

The Wohler A 550 INDUSTRIAL can perform a wood moisture test based on a re-sistance measurement. In order to obtain an exact measurement, the respective mate-rial will be considered.

As the measured value depends on the material temperature, the meter will perform an automatic temperature compensation on the basis of the temperature entered by the user.

☞ *NOTE!*
It is necessary to connect the Wood moisture probe Wohler A 550 INDUSTRIAL to the analyzer before performing the wood moisture test.

! **ATTENTION!**
Before starting the test, check that the needles/electrodes are not bent. If the elec-trodes are bent, the distance will not be 25 mm any more, so that the measurement result may not be correct.

9.3.1   Theoretical background

The resistance measurement uses the needles of the wood moisture probe. The meter will automatically determine the wood moisture *U*. This is the water mass m_w bound in the fuel and related to the absolute dry fuel mass m_B according to equation (1):

$$u = \frac{m_w}{m_B} \cdot 100\% \qquad\qquad \text{Equation 1}$$

Explanation:

U = wood moisture

mw = water mass bound in the wood

mb = absolut dry fuel mass

☞ *NOTE!*
According to the above equation the wood moisture may be higher than 100 %.

The wood moisture must not be confused with the water content. The water content is the water mass related to the total mass of fuel and water (wet basis).

$$w = \frac{m_w}{m_B + m_w} \cdot 100 \ \%$$ Equation 2

Explanation:

m = water content

m_w = water mass bound to wood

m_b = absolute dry fuel mass

The wood moisture can be converted to the water content as follows:

$$w = \frac{u}{1+u} \cdot 100\%$$ Equation 3

Explanation:

w = water content
u = wood moisture

9.3.2   Connecting the Probe

Fig. 44: Connectors for the wood moisture probe at the bottom of the analyzer

- Plug the connectors of the Wood Moisture Probe Wohler A 550 INDUSTRIAL or the Wood Moisture Probe Wohler HBF 420 to the female connector at the bottom of the analyzer.

Fig. 45: Wood moisture measurement with Probe Wohler HBF 420.

☞ *NOTE!*
The result of the resistance measurement will be more exact, if the large wood moisture probe Wohler HBF 420 is used, because the needles of the probe can be inserted more deeply into the wood.

9.3.3   Measuring

- In the main menu, click on the "Wood moisture" icon.

The analyzer will enter the wood moisture screen.

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Selecting the type of wood

Fig. 46: Different types of wood

- Click on the wood in the upper left corner of the screen.
- A list with different woods will appear :

The following woods can be selected.

Maple, birch, beech, oak, ash, spruce, chestnut, pine, larch, linden, poplar, plane, fir, elm.

- Select the wood of the object to be measured and confirm with "Accept".

Entering the wood temperature
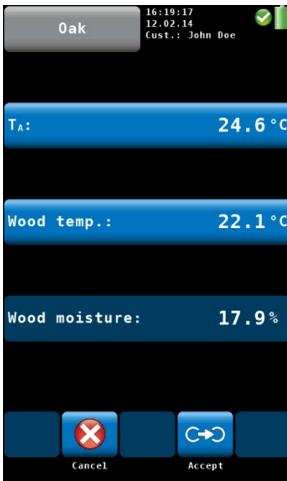
Fig. 47: Wood moisture test

If a temperature probe or plug is connected, the measured wood temperature will appear under T_A.

- Click on T_A.

The analyzer will save the T_A temperature as the wood temperature. Therefore the same temperature value will appear under "T_A" and "Wood temperature".

If no temperature sensor is connected, no temperature value will appear under T_A.

- In this case, click on "wood temperature", enter the wood temperature and confirm with OK.

Measuring the wood moisture

- Split the wood log in the middle and perform the measurement immediately after that at the inside part of the log.

- The electrodes should penetrate into the wood approx. 6 mm.

> ⚠️ **ATTENTION!**
> *Insert the electrodes only if possible without applying force.*

> 👉 *NOTE!*
> *Insert the electrodes diagonally to the direction of the fibers; in other words, a line drawn between the measurement needles would dissect the fiber of the wood.*

The wood moisture content in per cent will be displayed.

Average value

Fig. 48: Situation of the measurement points at the log

In general the wood moisture should be measured at three different points (see figure on the left). After that, the user has to calculate the average. Please note the following points when performing the measurement:

> 👉 *NOTE!*
> *Chose a measuring point without any knobs, resin or fissures.*

- Do not measure at the front side or at the exterior side of the split log.

Amongst other factors, the following should be observed:

> 👉 *NOTE!*
> *The wood to be measured should have a temperature between 0°C to 30 °C.*

Accept

- After the measurement, click on the "Accept" icon to save the readings in the readings menu, see chapter 7.

9.4   Spillage test

The option "Spillage test" offers a search function which will help the user to control the flue gas spillage of gas devices dependent on room air.

Spilled flue gas is characterized by a higher temperature and moisture content compared with the ambient air. Flue gas spillage can be extremely dangerous, when it contains CO which is highly toxic.

Two independent measurements guaranty a reliable result of the measurement.

1 Measurement of the condensation on the sensor board.

2 Temperature measurement

☞ *NOTE!*
Connect the spillage probe Wohler A 550 INDUSTRIAL to the analyzer.

Fig. 49: Connector for the spillage probe at the bottom of the analyzer

• Plug the connector of the Spillage Probe Wohler A 550 INDUSTRIAL to the female connector at the bottom of the analyzer.

Spillage

• In the main menu, click on the "Spillage test " icon.

Fig. 50: Spillage test: Searching for condensate

Fig. 51: Spillage test screen

- Guide the probe along the areas to be inspected.

The dew point will be indicated on a scale from 1 to 100. (0% = no condensation)

In the display the user can observe on the graph, when condensation rises. Additionally an acoustic signal is emitted, that will become more intensive when the condensate content is getting higher.

The available menu options are:

- Cancel: Click on "Cancel" to cancel the measurement.
- New: Click on "New" to start a new graph.
- To evaluate the test click on "Not OK" or "OK". The analyzer will enter the data menu where you can save and/or print the information.

9.5 Tuning Guide

In the "Tuning Guide" menu all combustion test related readings are presented in a graph over the excess air. The tuning guide offers an advanced guidance to the technician to properly adjust the burner.

Tuning Guide

- In the main menu, click on the "Tuning guide" icon.

The graph for adjusting the burner will be shown.

The current reading is marked with a red box and any former reading is tracked with a green line.

The 'Green Zone' indicates the best combustion performance excess air range of the burner. The range is user changeable for any selected fuel (see chapter 6.3.3).

The figure on the left shows that the CO content in the flue gas increases significantly when the available excess air decreases.

- Click on "New" to delete the graph and start a new one.
- Click on "Back" to return to the main menu.

Fig. 52: Tuning Guide

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9.6 Manifold Pressure

Fig. 53: Pressure connector

- To perform a manifold pressure test click on the "Manifold Pressure" icon in the main menu screen.
- Connect a pressure hose to one of the pressure connectors at the bottom of the analyzer .
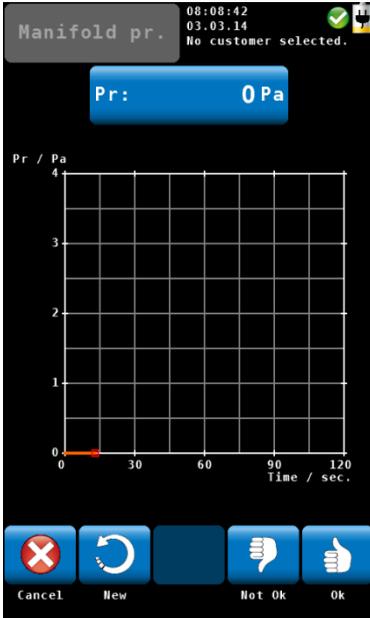
Figure 1: Manifold Pressure mode screen

The options in the "Manifold Pressure" mode screen are:

- Option "Cancel": click "Cancel" to exit the "Manifold Pressure" test and return to the main menu.
- Option "New": click "New" to clear the graph and all captured readings and start a new "Manifold Pressure" test.
- To evaluate the test click on "Not OK" or "OK". The analyzer will enter the data menu where you can save and/or print the information.

9.7 Temperatures

- To measure the temperature click on the "Temperature" icon in the main menu screen.

☞ *NOTE!*
Make sure you connect the Ambient Air Plug, see Fig. 10.

The options in the "Manifold Pressure" mode screen are:

- Option "Cancel": click "Cancel" to exit the "Temperature" mode and return to the main

Figure 2: Manifold Pressure mode screen

menu.

- Option "Accept": click "Accept" to save the temperature readings in the readings menu, see chapter 7.3

9.8   4 Pa - Test

The 4 Pa Pressure Test is a simple control of the depression limit 4 Pa. With the 4 Pa-Test the user controls if there is sufficient combustion air in the room where the fire place is installed.

In a closed room or in connected rooms, simultaneous operation of non-roomsealed heating appliances and ventilation and air conditioning systems can cause dangerous depression.

With the 4 Pa Pressure Test the depression value can be controlled. The readings are plotted in a graph during about 4 minutes. They can be saved and print out.

☞ *NOTE!*
For the 4 Pa Test two equal capillary hoses must be connected, see Fig. 12.

The 4 PA-test measures the pressure difference between the room where the fireplace is installed and another room which is not connected (e.g. outside air, stairway etc.) .
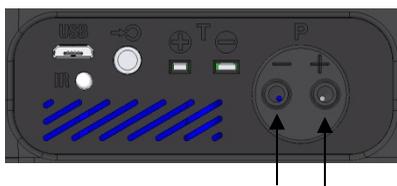
Fig. 54: Negative Pressure Connector at the bottom of the analyzer.

Before starting the measurement:

- Connect the capillary hose, that leads to the reference point (stairway or outside air), to the negative pressure connector.

- Connect the capillary hose, which will remain in the room, on the positive pressure connector.

- Depression in the fireplace room in relation to the pressure at the reference point will lead to a negative differential pressure.

4 PA test

- In the main menu select 4 Pa test.
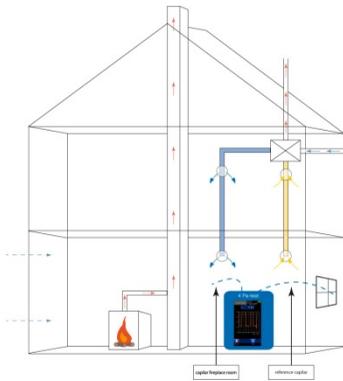
Fig. 55: Plan of the 4 Pa Test

How to perform the 4 Pa Pressure Test:

1. Switch on appliance and all air conditioning (fan, dryer) with maximum power.

2. Open an outside window or a door to the reference room and test proper operation of the appliance, ensure that there are no back-draft conditions.

3. Zero the pressure sensor.

☞ *NOTE!*

During the zeroing proces the 🔲 *icon will appear at the top of the screen.*

4. How to position the reference capillary hose: Lead the hose outside through a window seal or into the stairways through the door rebate or the keyhole.

☞ *NOTE!*
Especially on stormy days, the stairways may be a stable reference room.

If the stairways are used as reference room, all windows, doors, cellar doors and trap doors have to be closed.

The second capillary hose will stay uncut in the fireplace room.

1. Click on "Start" to start the 4 PA-test.
   The meter will now record the pressure profile for 4 minutes.

2. Open the window/door for about 30 seconds, so that the zero line can be registered. (Every 30 seconds an acoustic signal will sound.)

3. Close the window/door for about 30 seconds, control depression.

4. Open the window/door for about 30 seconds, the zero line should be reached again.

5. Close the window/door for about 30 seconds, control depression.

6. Open the window/door for about 30 seconds, the zero line should be reached again.

7. Close the window/door for about 30 seconds, control depression.

For a better orientation, every 30 seconds there are auxiliary lines in the diagram. After a maximum of 4 minutes, the measurement will stop automatically.

☞ *NOTE!*
Click on "Stop" to stop the 4 PA Test earlier.
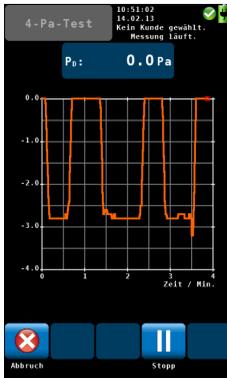
Fig. 56: Screen during 4 Pa test

Normally a diagram as shown in figure on the left will appear. The pressure peaks in the diagram are caused by the rapid movement of the window or the door and therefore they are not relevant for the interpretation of the diagram.

In the figure on the left the pressure drop is about 2,8 Pa.

The reliability of the system is considered sufficient, when the pressure drop caused by opening and closing the window is less or equal to 4 Pa (8 Pa in the case of wood burning depending on room air.)

- After the 4 Pa test is completed, click on "Measurement OK" or "Measurement not OK" according to the test result.

☞ *NOTE!*
"Measurement OK" or "Measurement not OK" will appear on the printout.

The analyzer will automatically enter the data menu: "4 Pa test" will be marked by a checkmark.

- To save and print the information, proceed as described in chapter 7.

☞ *NOTE!*
For the detailed procedure according to the Technical Rules for Gas Installations (TRGI), working sheet G 625 (2009), it is necessary to replace the fireplace by the Wohler DP 600 (see manual Wohler DP 600).

9.9   Logger Measurement

The Logger option allows to perform long term measurements. The user can configure the logger measurement to the application needs (see Fig. 58: Configuration of the logger measurement). It is possible to change the start date and time, the interval and the total amount of measurements. Depending on the measurement interval the analyser can perform additional purging sequences.

Interval < 8 min:
The analyser will not turn off between two measurements.
A purging interval can be configured.

Interval > 8 min:

The analyser will turn off between two measurements.
Measurement cycle:
Automatic start of the analyser

1 min calibration
3 min stabilization

Take measurement readings and save data

3 min purging

Automatic shut down of the analyser

When the logger configuration is completed the Wohler A 550 will calculate the ending date and time of the measurement for information purposes.
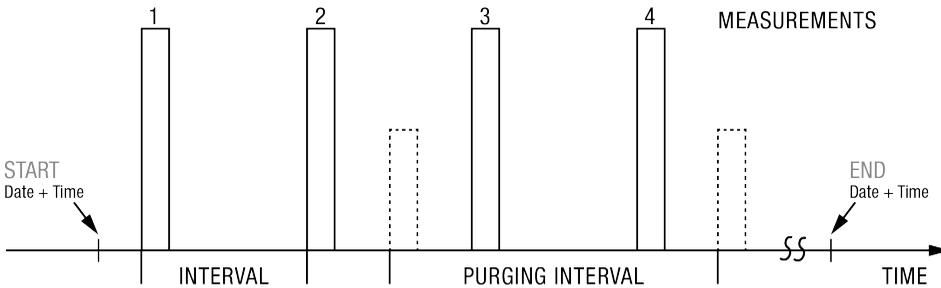
Fig. 57: schematic representation of a logger measurement

Fig. 58: Configuration of the logger measurement

- Enter the start date and time
- Enter the measurement interval, the interval duration in the sample in the figure on the left is 10 seconds
- Enter the number of measurements (up to 9,999 measurements are possible).

☞ *NOTE!*
The analyzer calculates the date and time of completion of the logger measurement for information purposes.

- Select Purging 'On', to activate the fresh air pump in a selected interval. (only available when interval duration is < 8 min).

In this case the sensors will be purged with fresh air in the selected purging interval.

☞ *NOTE!*
During a purging cycle the analyzer will not log measurements. A purging cycle needs about 3 minutes to complete.

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Long time measurements with the USB Peltier cooler

For continuous long term measurements with interval < 8 min it is recommended to use the USB Peltier cooler. The peltier cooler will remove condensate from the sample gas. During operation the condensate trap of the cooler needs to be emptied.

Fig. 59: Probe grip with Peltier Cooler and USB power bank

• Connect the Peltier Cooler and ist portable USB power bank as described in the Manual USB Peltier cooler.

•

☞ NOTE!

Take care that the Peltier Cooler has enough power during the long time measurement. For measurements that take more than 5 hours we recommend to connect the USB power bank.

Before starting

Before starting a long term logger measurement:

• Configure the logger measurement.

• Ensure sufficient battery power is available or connect the analyzer to main power.

• Press Start button to activate the logger measurement

• The ON/OFF button will flash during intervals > 8 min

• When the logger measurement is finished connect the analyzer to a computer to download the data (please refer to Wöhler A 550 Data Management PC Software manual).

9.10   SETUP

In the setup-menu the user can adjust the screen or the measurement process. In order to see all parameters, scroll to the top or the bottom of the screen by draging the left column with a finger.

SETUP

- In the main menu, click on the setup icon.

- The analyzer will enter the setup menu. 7 of the 13 parameters are displayed.
- Sweep the left column with a finger to navigate through the setup menu.
- To change a parameter click on the correspondent key in the right column.
- Click on "OK" to save the new setting before leaving the setup menu.

The following options are available:

Fig. 60: Setup menu, the scroll bar shows that there are more parameters available.

Option "Date"   Change the current date of the analyzer's internal calendar with day, month and year.

Option "Time"   Change the current time of the analyzer's internal clock (24 h mode) with hours and minutes.

Option "Date format"   Select a date format. Possible options are dd.mm.yyyy / mm.dd.yyyy

Option "Time format"   Select a time format. Possible options are 24 h / 12 h

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Option "Brightness"	Change the brightness of the display in 9 steps.

- Click on the upwards arrow to set the back-light brighter, click on the downwards arrow to set the display darker.

☞ *NOTE!*
A bright display will increase the power consumption.

Option "Buzzer"	Change the sound of the buzzer. The options are Standard, Loud or Off,
Option "Quick save"	If the quick save option is activated, the analyzer will automatically save the measurement records under a new customer. The customer name will be the measurement date and the measurement time. (see Chapter 7.4)

Default: "Quick save" off

Option "Customer Search by"	Change the order of the saved records between customer name or ID (Number)
Option "Devicen Search by"	Change the order of the saved records between name or ID (Number) of the fireplace
Option "NO$_2$ calculation"	In case the Wohler A 550 is not equipped with a NO$_2$ sensor the user can enter the NO$_2$ percentage on which the calculation of the NO$_X$ value is based. The default NO$_2$ percentage is 5 %.

NOx calculation.

The user can select the formula for calculation NO$_x$:

"Sum NO + NO$_2$"

$NO_x = NO \times 1{,}34 + NO_2 \times 2{,}05$

"NO$_x$ as NO$_2$"

$NO_x = (NO + NO_2) \times 2{,}05$

☞ *NOTE!*
If the Wohler A 550 INDUSTRIAL is equipped with a NO$_2$ sensor, the NO$_2$ factor parameter will not be active, because the NO$_x$ calculation will be directly based on the measurement signals.

Option "Flow para"

When a Prandtl or S-Tube is connected, the Wohler A 550 INDUSTRIAL measures the air speed for example inside the stack. In order to calculate volume flow the user has to enter the cross section.

4 Pa duration

Here the user can determine how long the analyzer shall log the pressure during the 4 PA- test.

The default 4 Pa-duration is 4 minutes.

Signals

The user can set up the reading segment according to his needs.

- Click on "change" to enter the signals menu.

The left two columns of the screen show the current display configuration. The right two columns show the available signals. To change a displayed signal:

- Click on the signal you want to change in the display columns. The signal will turn green.
- Now click on the signal in the signals column that shall substitute the green signal in the display.
- The new signal will appear in the display columns.
- To change a unit, in the left column (display) click several times on the key whose unit has to be changed. You will find the possible units in the table of chapter 6.3.1.

The icons in the footer have the following function:

- Cancel: Escape without saving the modifications.
- Restore defaults: Reset to default settings
- Remove signal: Remove a value from the display.
- OK: Confirm the modification and return to the Setup menu.

Fig. 61: Configuration of the readings segment.

Customer Logo
- Click on "Change", enter your logo and confirm with OK.

  Your logo will now appear on all printouts.

9.11   Calibration
In the calibration menu a digitally assisted calibration of all sensors can be done. To open the calibration menu it is necessary to enter an internal password. This way unauthorized persons cannot calibrate the analyzer and incorrect settings are avoided.

The calibration of the analyzer is allowed to trained personnel ONLY. Please contact Wohler for more information.

10   Customer data

The analyzer saves data records by devices. A customer can have multiple devices like burners and boilers. Each device has a uniqe identification number. The device name and device number can be entered by the user.

10.1   Set up a new customer

- There are two possibilities:
  1. Go to the main menu and click on the Customer icon or
  2. Click on the customer icon during the search for the hotspot.

- Click on the New Customer Icon to create a New Customer folder.

Fig. 62: Creating a new customer folder

- Enter the name and the number of the customer and the device. Confirm with OK.

10.2 Save records

- In the Readings menu (see chapter 7) click on the Save-icon to save all marked measurement records under a customer and a device. The analyzer will enter the customer menu.

The customer menu shows a list of all customers.

- Click on a customer. The analyzer will enter the device menu.
- Click on a device.

The analyzer will save the marked measurement records under this device.

Fig. 63: Selecting a customer in the customer menu.

10.3 Search function :
customer, installation,
customer number,
installation number

Fig. 64: Customer research

Research for the customer
number and the installation
number

- In the customer menu click on the "customer search" icon.

- Enter any part of the customer name. In this case it is not necessary to observe the upper and lower case.

At the bottom the first result will be shown. Click on the arrow key to see the other results and select the customer.

When the customer is selected, search the installation in the same way.

- Click on the icon „installation research".

☞ *Note!*
In the setup menu you have the possibility to determine that always the customer number or the installation number has to be searched.

10.4 New customer

- Click on the new customer icon in the main menu to create a new customer folder.

10.5 Delete customer

In the customer menu it is possible to cancel a selected customer.

- Click on the "Delete customer" icon. The icon will become green.
- Select the customer to be canceled and confirm.

10.6 Delete all

- To delete all customers from the analyzer click on the "Delete all" icon.

11 Data exchange with the PC

With the Wohler A 550 Sorftware it is possible to exchange the data with the PC via USB or Bluetooth.

☞ *NOTE!*
The data transfer and the functions of the Software are explained in the Manual Wohler A 550 PC Software.

12 Troubleshooting

Problem	Possible reason	Solution
Empty battery icon	Battery is empty.	Recharge battery.
No reaction of the analyzer		Reset: Push the transport lock to the right and then to the left again (see Fig. 20)

13 Maintenance

Proper operation of the Wohler A 550 INDUSTRIAL requires regular maintenance.

13.1 Maintenance work

Interval	Maintenance work
After every combustion test	Remove condensate from the coarse filter.
	Check the condensate trap and remove condensate and water if necessary.
	Check the cotton filter. Replace it if polluted or wet.
	Clean the sinter filter by rinsing it with water or putting it into an Ultrasonic bath.
After the wood moisture measurement	Control the distance between the needles: Replace needles if necessary
After every working day	Dry coarse filter
Regularly	Replace the cotton filter.
Once a year	Return analyzer for check and calibration to a Wohler certified service station
If necessary	Grease the seal rings with silicone.

13.2 Replacing the filters

The sensible sensors are protected against condensate by different filters. The filters must be replaced or dried regularly.
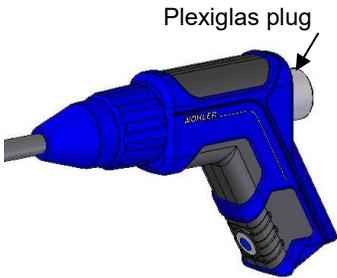
13.2.1 Coarse Filter

Plexiglas plug

Fig. 65: Probe handle with gas probe

- A coarse filter located in the probe handle prevents soot from entering the hose. After every measurement control if it is wet. Proceed as follows:

- Pull the plexiglas plug out of the probe handle.

- Use tweezers or a similar tool to remove the filter from its chamber.

- Press (not rub) the filter to remove humidity.

- Replace the plexiglas filter into its old position.

- After the working day, remove the coarse filter and clean it by rinsing it in warm water. Dry it afterwards.

👉 *Note!*
For most accurate SO_2 and NO_2 readings the coarse filter should not be installed during measurement.

13.2.2 Removing condensate

The condensate will be collected in the condensate trap. To remove the condensate follow the steps below:
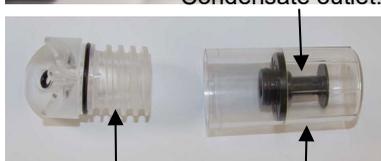

Fig. 66: Open the condensate trap compartment

- Open the condensate trap compartment as follows: Press the cover on the right side (1) and then pull it up (2).

Condensate outlet.

Condensate spiral   Condensate cup

Fig. 67: Condensate trap

• Pull the condensate trap from the unit.

• Remove the condensate cup from the condensate spiral. The condensate outlet remains in the cup.

• Spill the condensate out of the cup.

13.2.3 Replace cotton filter
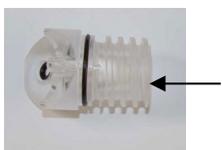
Fig. 68: Condensate spiral with cotton filter (internally located).

The cotton filter is located in the condensate spiral.

• After every combustion test control the cotton filter and replace it if wet or dirty.

13.2.4 Water Stop Filter

Fig. 69: Water stop filter

Behind the condensate spiral a water stop filter is located. The water stop filter blocks water from entering the analyzer. When the water stop filter closes, it will change color.

• In this case replace the water stop filter as follows:

• Remove the Water Stop Filter from the unit.

• Plug the new water stop filter into the opening so that the red letters are on the unit's side.

13.3   Sensor diagnosis and replacement

Electrochemical gas sensors are subject to wear. The life of the measuring sensors will be determined by numerous parameters such as the removal of condensate, the frequency of use and regular maintenance.

Therefore this information about the average life of measuring sensors is based on specific experience.

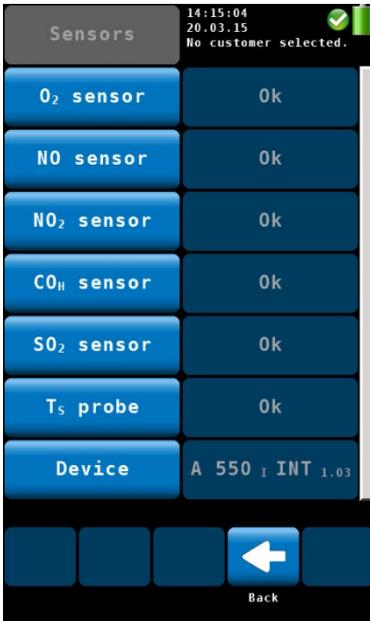|	
O_2 - sensor	4 years
CO-sensor	2 years
NO-sensor	2 years
NO_2-sensor	2 years
SO_2-sensor	2 years

The sensors can be changed by the customer or by an authorized service point or at the factory.

The Wohler A 550 INDUSTRIAL has an advanced electronic self diagnosis program.

You can enter the diagnosis screen directly after having switched on the analyzer during self check and calibration .

- Click on the Diagnosis icon when the hotspot screen appears.

Sensors	14:15:04 20.03.15 No customer selected. ✓
O₂ sensor	Ok
NO sensor	Ok
NO₂ sensor	Ok
COₕ sensor	Ok
SO₂ sensor	Ok
Tₛ probe	Ok
Device	A 550 ᵢ INT ₁.₀₃
	← Back

Fig. 70: Sensor diagnosis

- The diagnosis screen shows the sensor status (OK or NOT OK) and the firmware version.
- A click on the sensor opens a window with important sensor information.
- Click on "Back" to start the search for the hotspot again.

✓ Status: OK:

⚠ Status: Service

▶◀ Zeroing sensor

The sensor status is continuously displayed in the right top of the screen . The list below shows the possible diagnosis feedback:

- Status icon: Yellow sign icon indicates a problem.
- "OK" or "Service" will appear for all sensors.
- Zeroing pressure sensor: During zeroing of the pressure sensor the blue icon appears on the screen. Do not expose any differential pressure to the analyzer now.

> ☞ *NOTE!*
> *If the "service" message appears, first turn the analyzer off and on again. After the analyzer has been turned on, it will automatically start to calibrate the sensors with fresh air. Start the diagnosis screen again. Only if the service message still appears on screen, the sensor will have to be changed.*

The sensors can be replaced in the factory, in the service points or by the user himself. The order of the sensors is as follows (from the left to right): O_2-Sensor, NO-Sensor, NO_2-Sensor, CO_{high}-Sensor, SO_2-Sensor.

☞ *NOTE!*
If the user himself replaces the sensors, the sensor date shown in the diagnosis menu will update automatically.

Replace the sensor as follows:

- Switch off the analyzer.
- Loosen the three bolds of the cover.

 Disengage the cover hooks as follows:

- First press with both thumbs on the rubber coating in the middle and then on the two outer rubber coatings.
- Remove the cover.

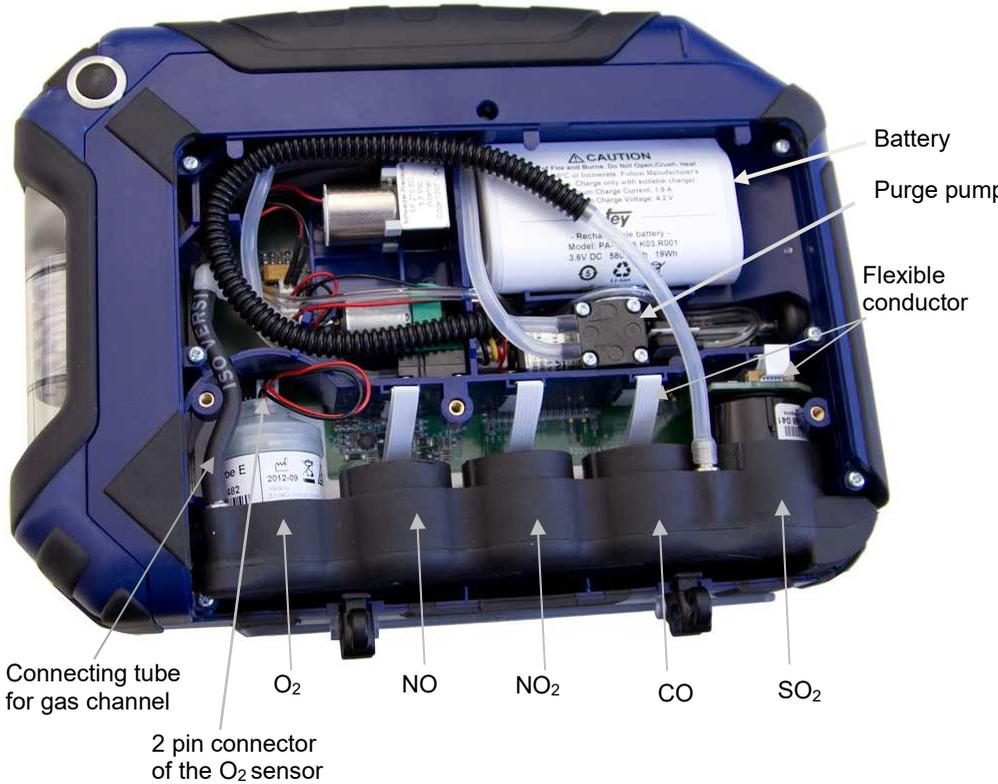*Fig. 71: Bottom of the unit - Press to open the cover.*

Fig. 72: Bottom of the analyzer without cover

	• Slightly lift the left side of the sensor holder and remove the black connecting tube for the gas channel.
	• Take the sensor holder out of the unit (first the left and then the right side).
Replacing the O_2 Sensor	• Remove the 2-pin connector of the O_2 sensor.
	• Replace the O_2 sensor by a new one.
	• Plug the new 2-pin connector where the old one was.

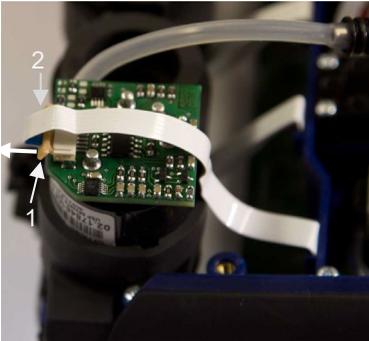Replacing the other sensors (NO, NO_2, SO_2, CO_{high}, CO)

Fig. 73: Sensor with locking mechanism (1) and flexible conductor (2)

Pull the small locking mechanism (1) forward.

- Take off the white flexible conductor (2).
- Replace the sensor by a new one.
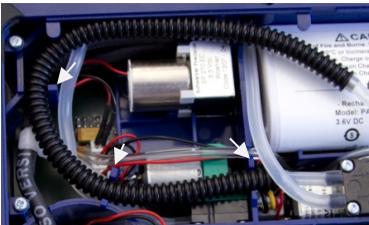- Plug the flexible conductor in his place and push the locking mechanism back.

- Put the sensor holder back to its place, first the right side and then the left side.
- Connect the gas channel again by inserting the connecting tube of the gas channel into the sensor holder.

Fig. 74: Corrugated tube, correctly positioned, guiding hooks marked by an arrow.

❗ ATTENTION!
Make sure that the flexible connectors are not bent.

- Make sure that the corrugated tube is in its original position marked by the guiding hooks.

❗ ATTENTION!
After the NO sensor has been replaced, an activation time of 24 hours must be observed. During the activation time, the position of the transport lock in the probe compartment must be "ON", so that the battery is active (see Fig. 8).

13.4   Replacing the battery

⚠ WARNING!
Incorrect use of the battery can cause injury!
Never dispose the battery to fire or high temperatures. Danger of explosion!

Liquids can leak out of the battery due to mistreatment. Never touch the liquid. If you get in contact to the liquid, remove it with water. If liquid has got into your eyes, remove it with water and see your doctor as soon as possible.

The Wohler A 550 INDUSTRIAL is equipped with a rechargeable lithium ion battery 3.7 V. Only after a long working period the battery has to be changed. In this case send the analyzer to your dealer or change the battery as follows:

- Switch off the analyzer. Open the analyzer as described before in the chapter "sensor replacement".

- Carefully remove the purge pump out of the analyzer, so that the battery plug is not covered any more.

Purge pump

! ATTENTION!
Take care that the tube connections of the purge pump do not get out of place.
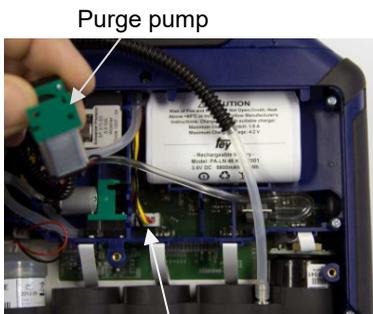
Battery plug

Fig. 75: Before exchanging the battery remove the purge pump

- Pull out the battery plug and remove the battery.

- Install a new battery and plug in the battery plug.

- Replace the purge pump and the connected tubes to its original position.

- Make sure that the corrugated tube is in its original position marked by the guiding hooks.

- Replace the cover.

- Secure the cover with the three screws.

Fig. 76: Corrugated tube, correctly positioned

13.5	**Replacing the electrodes of the wood moisture probe**

- Control if the electrodes are damaged. Take care that the distance between the electrodes is 25 mm.
- Broken or damaged electrodes can be exchanged by the user. Loosen the damaged electrodes with an appropriate tool (gripper, screw wrench or ring wrench).
- Replace the damaged electrodes by the electrode-kit and fix the new electrodes with the tool.

14 Analyzer check

We recommend to check the analyzer at least every 12 month at an authorized service center. Local regulations may require more frequent checking of the analyzer.

The following tests have to be performed:
- With test gas: O_2 measurement, CO measurement, NO measurement, , NO_2 measurement and SO_2 measurement
- The flue gas temperature T_S has to be checked with a reference standard at two measuring points: one point in the lower part and one point in the upper part of the measuring range.
- The ambient air temperature T_A will be checked at one measuring point with a reference standard.
- The draft has to be checked with an adequate draft regulator.
- The flow of the flue gas will be controlled by a rotameter at the sucking side of the gas probe.
- The gas probe and the analyzer will be optically checked for pollution, condensation etc.
- Control of the measuring channel for wood moisture with a reference resistance. According to VDI 4206, page 4 the displayed wood moisture may not differ more than ± 5% from the reference value.

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15 Warranty and Service

Each Wohler A 550 INDUSTRIAL will be tested in all functions and will leave our factory only after extensive quality control testing. The final control will be recorded in detail in a test report and delivered with any unit.

If used properly, the warranty period for the Wohler A 550 INDUSTRIAL will be 12 month from the date of purchase. Consumables (e.g. thermocouple) are not covered by this warranty.

This warranty does not cover the freight and packing costs when the device is sent to the factory for repair.

Service by non authorized personnel or making modifications to the analyzer voids any warranty.

Wohler has built our reputation on excellence in customer service. Therefore, of course, we are readily available to assist you after the warranty period ends.

- Send us the device and we will repair it and return it to you with our package service.
- Immediate help is provided by our technical staff over the telephone.
-

16 Declaration of conformity

The manufacturer:

Wohler Technik GmbH

Wöhler Platz 1. 41, D-33181 Bad Wünnenberg

declares that the product

product name: Flue gas analyzer

model number: Wohler A 550 INDUSTRIAL

complies with the key safety requirements set down in the guidelines of the Council for the Harmonization of the Legal Requirements of the Member States in relation to the electromagnetic compatibility (2014/30/EU).

The analyzer complies with :

EN 50379-2

VDI 4206-1

VDI 4206-4

The following standards were availed of to evaluate the product in respect of the electromagnetic compatibility:

EN 50270:2006
EN 61000-6-3:2007 + A1:2011

17   Accessories

USB Peltier Cooler

USB Peltier Cooler for Wöhler A 550	P/N 4435

Probes

Flue gas probe 1,000 mm with filter holder and stainless steel sinter filter	P/N 4435
Flue gas probe 1,000 mm with filter holder and stainless steel sinter filter	P/N 4187
Wohler A 550 Gas Probe 500 mm	P/N 9614
Wohler A 550 Gas Probe 295 mm	P/N 9622
Wohler A 550 Flue Gas Probe 1,000 mm	P/N 9695
Wohler A 550 Air Temperature Probe 280 mm, with 1.7 m cable	P/N 5511
Wohler Velocity Probe Type S for Wohler A 550, to measure gas velocity	P/N 5579
Pitot Tube, length 100 cm, 7 mm dia.	P/N 9489

Printer

Wohler TD 100 Thermal Printer	P/N 4160
Paper for Wohler TD 100 Thermal Printer	P/N 4145

Extras

Wohler Magnet Holder	P/N 6142
Wohler Clamping Cone for probes 8 mm Ø	P/N 2494
Wohler PTFE Cone for probes 8 mm Ø	P/N 2463

Spare parts and consumables

Water Stop Filters, 3 pcs.	P/N 9621
Coarse Filters, 5 pcs.	P/N 9632
Wadding Filters, short, pack with 150 pieces	P/N 5290

Software

PC Software Wohler A 550	P/N 4428

Field Replacable Sensors

NO sensor Wöhler A 550	P/N 5597
NO_2 sensor Wöhler A 550	P/N 5598
CO_{High} sensor 100.000 ppm Wöhler A 550	P/N 5596
O_2 sensor Wöhler A 550	P/N 5594
SO_2 sensor Wöhler A 550	P/N 5665

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