



BluFlame Combustion Analyzer

An all in one, high-tech, multi-tool, the handheld gas analyzer is ideal for the entire commissioning process from setting the input to the fuel pressure to verification of proper draft. Paired with a free innovative iOS and Android diagnostic and reporting application, this compact unit is a true breakthrough in the industry.

AccuTools.com

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General Information

1.1 COMPANY INFORMATION

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1.2 OPERATING INSTRUCTIONS



Everyone working with the BluFlame must carefully read and understand these operating instructions before starting their work. Always keep these operating instructions at the BluFlame's location of use.



These operating instructions are an important part of the package and are not only intended to illustrate how to operate and use the BluFlame, but also, and above all, to ensure the safety of its users and to protect the environment. Accordingly, every user must familiarize themselves with the contents of these operating instructions and follow all instructions without fail.

When handing over the BluFlame to other parties, make sure to include the operating instructions.

1.3 WARRANTY CLAIMS



Immediately check the initial shipment for damage in the presence of the person delivering it. All damage must be confirmed by the person delivering the shipment and reported within 3 days. Failure to do so will result in your claim being denied.



This is a high-quality electronic measuring device. In order to ensure that it will work for an extended period of time, the device features low self-discharge rechargeable batteries. Accordingly, it is recommended to charge the BluFlame after 2 to 3 months – even if it is not used during this period, turn it on, and wait for the calibration phase to be completed.

Keep the original box and the packaging material in case you need to send in the BluFlame.

1.4 IMPORTANT INFORMATION

- The BluFlame is only suitable for short-term measurements.
- The BluFlame must be visually inspected before being turned on. This visual inspection must also include checking for damage/soiling on the probe, on the tube ports on the BluFlame, and on the condensate trap with a star filter.
- When the BluFlame is turned on, it will automatically run a calibration routine for its sensors (zeroing – please refer to section 6.8, "Turning on and zeroing," on page 13). Once this routine starts, and depending on the sensors' state, it will take about 1 to 3 minutes for the BluFlame to be ready for operation.
- After zeroing, the required minimum time for a full correct measuring cycle will be 1.5 minutes.

- Aggressive acidic atmospheres (sulfur) and vapors from alcohol compounds (e.g., thinner, gasoline, ethanol, varnish) can ruin the sensors in the BluFlame.
- The expected service life for the sensors is approx. 2 years for the O₂ sensor, approx. 2–3 years for the CO sensor, and approx. 3 years for the NO sensor, with the actual service life depending on how the BluFlame is used, maintained, and cared for.
- The service life of the rechargeable battery is at least 500 charge/discharge cycles. The higher the number of cycles, the shorter the time that the device will be able to run after the battery is recharged.

1.5 PACKAGING

Keep the original box and the packaging material so as to prevent transit damage in case you need to send in the BluFlame to the factory.

1.6 PARTS CONTAINING HAZARDOUS MATERIALS AND TAKE-BACK GUARANTEE

AccuTools will take back any parts containing hazardous materials that have been supplied by us and that cannot be disposed of "normally."

The return shipment must be at no charge to AccuTools. Parts containing pollutants include, for example, electrochemical sensors, batteries, and rechargeable batteries.

1.7 CUSTOMER FEEDBACK

The products described in these operating instructions are being continuously developed and improved. Accordingly, we appreciate any customer feedback, comments, and suggestions concerning our product and these operating instructions that may help us improve our product, service, and/or documentation.

Safety

2.1 INTENDED USE

The BluFlame measuring device is intended for short-term measurements within the scope of emission checks and adjustment work on small-scale furnaces. The BluFlame acquires readings and stores them for further processing.

The BluFlame must be used exclusively in conformity with the specifications in these operating instructions.

Performing the actions specified in the "Maintenance and care" section at the specified intervals is also an integral part of the device's intended use.

Any other use will be considered an unintended use.

The following must be observed in particular within this context:

- Do not use the BluFlame as a safety device or as personal protective equipment.
- Do not use the BluFlame as a warning device in order to warn people of harmful gases.

2.2 SPECIFIC SAFETY INSTRUCTIONS

- Do not use any power adapter other than the one included in order to power the BluFlame.
- Do not, under any circumstance, use the probe's metal tube or any other metal parts / accessories as electrical conductors.
- Do not use the BluFlame in or under water.
- Do not use the BluFlame in the close or immediate proximity of open flames or significant heat.
- Do not exceed the specified temperature range for the probe – failure to observe this precaution may result in the probe tube and the temperature sensor being ruined.
- Do not throw the BluFlame down.

2.3 USER GUIDELINES FOR LITHIUM-ION BATTERIES

⚠ WARNING



Risk of fire and explosion posed by incorrect handling

This may result in burns or injuries.

- Observe the following guidelines.



The rechargeable battery is not accessible to end customers. However, make sure to observe the following instructions for handling rechargeable batteries in general.

- Do not use any other rechargeable battery in the BluFlame.
- Do not throw the rechargeable battery into open fire.
- Do not charge the rechargeable battery at high temperatures.
- Do not store the rechargeable battery in hot environments.
- Do not deform or modify the rechargeable battery.
- Do not short circuit the rechargeable battery.
- Do not use the rechargeable battery in or under water.
- Do not subject the rechargeable battery to strong mechanical loads and do not throw it anywhere.
- Do not cut or squeeze the rechargeable battery pack's connecting cable.
- Do not carry or store the rechargeable battery together with sharp-edged objects.
- Do not, under any circumstance, connect the (+) contact to the (-) contact or to metal.

2.4 SYMBOLS USED THROUGHOUT THESE OPERATING INSTRUCTIONS



Used to warn of a hazard source of any kind



Used to warn of caustic liquids



Used to warn of vapors and fumes that are harmful to health



Warning of a hot surface



Warning of electrical voltage



Environmental hazard



Used to point out additional information

2.5 WHAT THE SIGNAL WORDS USED IN THESE OPERATING INSTRUCTIONS MEAN

⚠ DANGER

Used to indicate a hazardous situation that will result in serious injury or death if the corresponding safety instructions are not followed.

⚠ WARNING

Used to indicate a hazardous situation that could result in serious injury or death if the corresponding safety instructions are not followed.

⚠ CAUTION

Used to indicate a hazardous situation that could result in minor or moderate injury if the corresponding safety instructions are not followed.

NOTE

Used to indicate a situation that is not related to injuries, but that will result in property damage.

2.6 HOW SAFETY INSTRUCTIONS ARE PUT TOGETHER IN THESE OPERATING INSTRUCTIONS

The safety instructions found throughout these operating instructions are made up of the following elements:

⚠ DANGER

Type and source of hazard

Consequences of the hazard.

- Countermeasures for avoiding the hazard.

2.7 MEASUREMENT

⚠ WARNING



Risk posed by fumes and vapors harmful to health

The flue gas sucked in by the BluFlame will be discharged to the surrounding air during the measurement.

- Make sure to use the BluFlame in well-ventilated spaces only.

2.8 MAINTENANCE AND CARE

⚠ WARNING



Risk posed by voltage when performing work on the BluFlame
Muscle cramps, electrical burns, unconsciousness, respiratory arrest, and death.

- Maintenance and repair work on electrical equipment should be performed exclusively by trained, qualified personnel.
- Check to make sure that the BluFlame is de-energized.

⚠ CAUTION



Maintenance work performed incorrectly

Bodily injury and property damage resulting from unauthorized maintenance work

- Maintenance work should be performed exclusively by personnel briefed on all safety aspects.
- Follow all safety instructions.

⚠ CAUTION



Risk of bodily injury and property damage posed by hot surfaces

When hot, the probe tube can cause burn injuries, as well as fire damage when placed on a combustible surface.

- Maintenance work should be performed exclusively by personnel briefed on all safety aspects.
- Follow all safety instructions.
- Let the probe cool down after the measurement is complete.

⚠ CAUTION



Risk of bodily injury and property damage posed by caustic liquid

The liquid emptied from the condensate trap may be slightly acidic.

- Follow all safety instructions.
- Wear work gloves.
- In case of skin contact, clean the affected areas IMMEDIATELY.
- Make sure that your eyes do not come into contact with the liquid.
- Thoroughly clean all parts that come into contact with the condensate.

2.9 ENVIRONMENTAL PROTECTION



During all work with the BluFlame, make sure to comply with all applicable legal regulations concerning waste prevention and the proper recycling and disposal of environmentally hazardous substances.

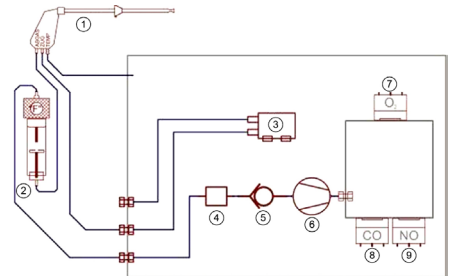
- Make sure that environmentally hazardous substances (cleaning liquids containing solvents) do not contaminate the ground or reach sewer systems.
- Collect, store, and transport environmentally hazardous substances in suitable containers and then dispose of them.

Device Description

The BluFlame measuring device can be used to obtain precise check and adjustment measurements on gas-fired, oil-fired, and wood-burning appliances.

3.1 SCHEMATIC GAS SYSTEM DIAGRAM

In combination with a flue gas probe, the BluFlame sucks in part of the flue gas from the combustion air duct and analyzes its components with the use of electrochemical sensors. The pressure (draft) and temperature are measured directly at the probe tip.



1. Flue Probe
2. Condensate Trap
3. Draft Measurement
4. Filter
5. Check Valve
6. Gas Pump
7. O₂ Sensor
8. CO Sensor
9. NO Sensor SKUA10773NO only

3.2 BLUFLAME OVERVIEW

The BluFlame features a compact and rugged fiber-reinforced plastic case. All the ports used for measurements are located on the lower front side.

The BluFlame is controlled exclusively with its touch display.



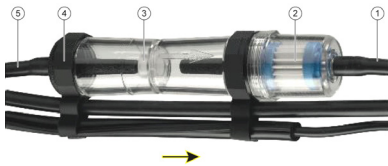
1. Touch Display
2. Port P2 for Draft Measurements
3. Temperature Port T2 for Gas Temperature
4. Port P1 (For Differential Pressure Measurements Only)
5. Temperature Port T1 for Air Temperature
6. Gas Inlet Port
7. Gas Outlet
8. Mini USB Port for Data Transfer and Charging The Rechargeable Battery
9. Reset Button
10. Infrared Interface for Printouts
11. Micro SD Card Slot

3.3 CONDENSATE TRAP

Condensate that accumulates during the measurement will be collected in the condensate trap.

The lower marking on the container wall indicates the maximum fill level up to which condensate will be collected.

Empty this condensate container on a regular basis in order to prevent condensate from being sucked into the BluFlame.



1. Upper Screwed Closure
2. Pocket Star Filter
3. Condensate Container with Marking for Max. Filling Capacity
4. Lower Screwed Closure
5. Gas From Flue Probe

The arrow symbolizes the gases' direction of flow towards the BluFlame.

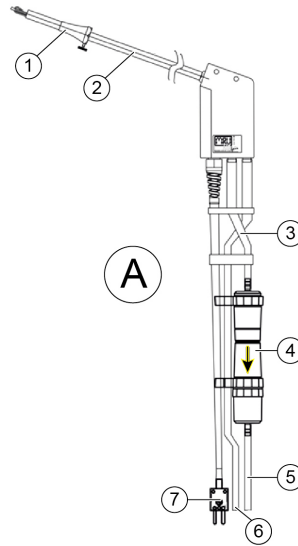
3.4 PROBES

A variety of flue probe models with non-detachable tubes and replaceable tubes are available for the BluFlame. For a full list, please refer to the company's latest price list.

Following are 2 models provided as examples:

PROBE (A)

Featuring a 250 mm probe tube (non-detachable) and a 1.5 mm gas sampling line

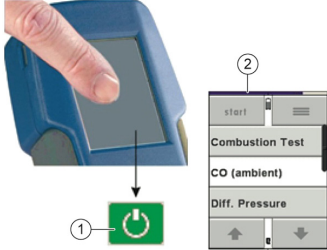


1. Stack Cone
2. Probe Tube
3. Condensate Trap Tube
4. Condensate Trap
5. Tube for Flue Gas Measurements
6. Tube for Draft Measurements
7. Stack Temperature Thermocouple

Using the BluFlame

4.1 TURNING THE BLUFLAME ON AND OFF

Turning on the BluFlame



1. Power Icon
2. Zeroing Status Bar

- Tap the display.
➔ The green Power icon will appear.
- Tap the green Power icon.
➔ The BluFlame will run a self-test and zero the sensors. The corresponding progress will be shown by the status bar.
- During this stage, make sure that the BluFlame sucks in fresh air and that there is no pressure at the pressure ports.
- ✓ Once the self-test is complete, the BluFlame will be ready for operation.

Turning off the BluFlame

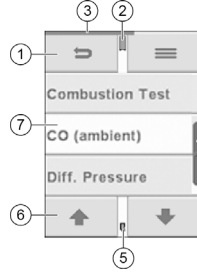


- Tap the context menu button.
➔ The context menu will appear.
- Tap the Power button.
- Confirm the “Yes, turn off” prompt.
- The BluFlame will now be off.

i After you turn off the BluFlame, a prompt will appear saying that the sensors must be purged with ambient air.

- You can instead continue to work with the BluFlame by selecting the “No, back” option.

4.2 DISPLAY LAYOUT

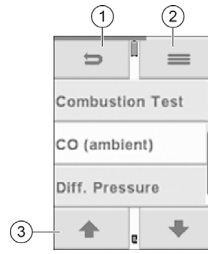


All the information required in order to use the BluFlame is provided on the display, which has the following layout:

1. Start Measurement
2. Battery Charge Indicator
3. Zeroing Status Bar
4. Scroll Bar
5. SD Card in Card Reader
– Green Indicator: Read and Write Access
– Yellow Indicator: Read Access Only (Write-Protected SD Card)
6. Buttons for Scrolling Up and Down
7. Menu Content Display

i After you turn on the BluFlame, the main menu shown above will be displayed.

4.3 FUNCTION BUTTON DESCRIPTION



The various operating screens will show a series of function buttons at the top and bottom.

The upper edge of the display will feature buttons such as the Back button and the context menu button. The lower edge, meanwhile, will display function buttons such as the ones used to scroll up and down.

1. Back Button
2. Context Menu Button
3. Function Buttons for Scrolling Up and Down

Depending on the screen that is being displayed, the function buttons may provide quick access to other functions instead. These functions are explained in the corresponding sections (e.g., “Turning off the BluFlame”).

4.4 CONTEXT MENU



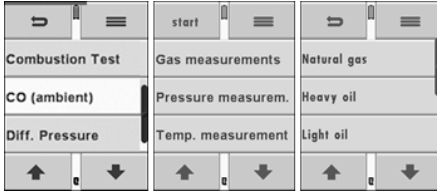
The context menu is an extension of the function buttons. It contains all the functions offered in the screen being displayed.

1. Turns Off the BluFlame
2. Exits the Screen
3. Closes the Context Menu Screen Without Any Action

4.5 CARRYING OUT A FLUE GAS MEASUREMENT



The vent opening at the back of the BluFlame must not be covered or otherwise obstructed during the measurement.



- Tap the Start button to start a flue gas measurement with the currently selected program.

or

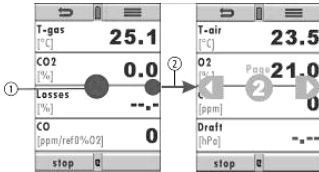
- Tap "Gas measurements."
- Select one of the four programs.
- Select the fuels you want. Up to 20 readings will be displayed on 5 pages.

To switch between these pages:

- Tap "page +" or "page -" in the context menu

or

- Tap the right or left edge of the display.
 ➔ A superimposed visualization of the active page and additional function buttons for scrolling between the pages will be displayed.



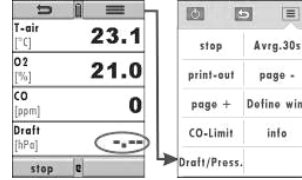
1. Info (Program/Fuel)
2. To Page 2

4.6 DRAFT / PRESSURE MEASUREMENT IN FLUE GAS MEASUREMENT

The BluFlame can be used to measure the draft in the flue pipe at the probe tip's location. This draft measurement is independent of the actual upstream or downstream flue gas measurement.

- Tap the context menu button.
- Tap "Draft/Press."

During this measurement, the measuring gas pump will not suck in any gas, and the gas value measurement will stop.



The "Draft/Press." reading screen will show the current pressure reading.

This value can be used for the draft or pressure measurement. The difference between these two parameters is simply their name and their sign. Within this context, a vacuum in the flue will be stored as a positive reading.



The pressure sensor used for the draft measurement must be zeroed while in the measuring position.

- Tap the Back button.
- ✓ The BluFlame will switch to the flue gas measurement, and the transferred reading will be displayed in green there.



1. Select the Pressure Type
2. Accept the Selected Pressure Type
3. The Pressure Reading Will Be Automatically Inserted into the Reading Screen

4.7 CONNECTION CONFIGURATION FOR DRAFT MEASUREMENTS



1. Temperature Port T2 for Gas Temperature
2. Temperature Port T1 for Air Temperature
3. Gas Inlet Port
4. Port P1 (Not Used When Carrying Out a Draft Measurement)
5. Port P2 for Draft Measurements

4.8 MENU STRUCTURE

The BluFlame organizes all available actions into three main menus:

- Measurement
- Storage
- Extras

To switch between main menus, tap the context menu and select the main menu you want there.

Measurement menu (1):

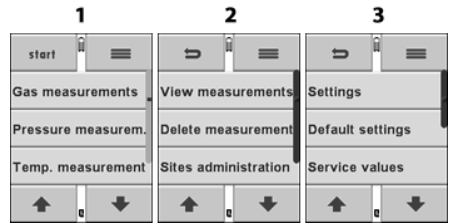
All actions for the measurement tasks that can be carried out with the BluFlame. All installed measuring tasks are selected and run from here.

Storage menu (2):

All actions for managing storage.

Extras menu (3):

All other actions for managing and configuring the BluFlame.



i Measurement menu: Please refer to section 7, "Carrying out measurements," on page 13.

Storage Menu: Please refer to section 8, "Storage," on page 14.

Extras Menu: Please refer to section 9, "EXTRAS / Settings," on page 16.

Initial Setup

Once the BluFlame is ready for operation, you can take advantage of the initial setup to configure a number of settings as required for your specific needs. All settings can be changed at any time.

5.1 GETTING THE BLUFLAME READY FOR OPERATION

i The BluFlame is shipped fully assembled and ready for use.

- Unpack the BluFlame and fully read the operating instructions.
- Check the BluFlame to make sure it is complete and undamaged.
- Charge the battery for 8 hours before using the device for the first time.
- Turn on the BluFlame (please refer to section 4.1, "Turning the BluFlame on and off," on page 7).
- Select the following:
 - ☰ ➡ Menu: Extras ➡ Date & time.
- Set the date and time.
- ✓ The BluFlame is now ready for operation.

5.2 CONFIGURING DEVICE SETTINGS

- Select the following:

 → Menu: Extras → Settings.

- You can configure the following settings in this menu:

SETTING	VALUE	DECLARATION
Country	Option	Changing the country will cause the set O2 reference values to be lost. The list of fuels will be reset. This will also activate country-specific preferences and measuring methods. Make sure that the country is configured correctly by carrying out the measurement in order to make sure that all relevant country-specific requirements for the BluFlame are set up.
Language	Option	Used to select the user interface language.
Brightness	5 – 100%	Display contrast; depends on the temperature and on the operator's personal sensitivity; a setting of approx. 50% is normal for a temperature of 20 °C.
Button Signal	ON/OFF	Used to specify whether there should be an acoustic signal when a button is pressed.
Prompts	ON/OFF	Used to turn prompts on and off.
Temperature Unit	°C or °F	Used to select the temperature unit.

5.3 SETTING THE DATE AND TIME

- Select the following:

 → Menu: Extras → Date & time

You can check and set the current date and time here.

The BluFlame automatically switches to and from daylight savings time.



If the internal battery loses all of its charge, you will need to set these values again.

5.4 CONFIGURING MEASURING PROGRAMS


To carry out a flue gas measurement, you must select one of the 4 pre-configurable measuring programs. Three of the measuring programs are already predefined, but can be modified. You can define the remaining measuring program according to your specific needs.

The following parameters are defined in the measuring programs:

- Fuels (a selection from the list containing all possible fuels)
- Reading display layout (which 4 readings need to be displayed on each of the 5 reading screens)
- Pictograms

The following measuring programs come predefined already:

- Flue gas measurement
- CO measurement
- Test bed program (for use when testing and calibrating the device, without a fuel selection)

To configure a measuring program, open it with Gas measurements  Gas measurement.

5.5 SETTING THE CO LIMIT




Gases with a high CO content can shorten the CO sensor's service life.

The BluFlame can warn users when a preset CO limit is exceeded during a measurement, with the warning consisting of both visual and acoustic signals.

If the CO limit is exceeded, remove the probe from the flue pipe.

The CO limit can be set individually for each measuring program.


- Select the following: Reading screen  → CO-Limit.
 - The CO-Limit menu will appear.
- Tap the value shown.
- Now use the arrow buttons to set the value you want (in 100 ppm increments).

- ✓ The CO limit is now set.

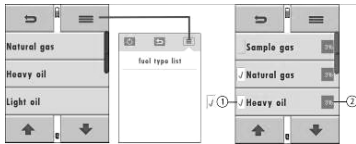


5.6 FUEL SELECTION AND O₂ REFERENCE VALUE

Every time you open a measuring program for the flue gas measurement, you can select a fuel from the . This list will show all available fuels.

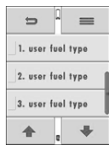
- Select the following:
Gas measurements → Gas measurement →  → fuel type list
→ The fuel type list screen will appear.
- To add a fuel to the program list, enable the corresponding checkbox.
- Set the O₂ reference value as a %.
- Tap the Back button to exit the screen.

✓ You will be able to select the fuel from the measuring programs.




1. Enabling the Checkbox for a Specific Fuel
2. Setting the O₂ Reference Value (as a %)

5.7 CUSTOM FUELS



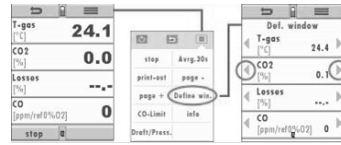
You can configure four fuels according to your specific needs (the fuel parameters are configurable).


-  The last 4 fuels in the list will be the custom fuels that you can configure as necessary. These custom fuels are identified as “user fuel types” and shown in green.

5.8 CONFIGURING THE READING DISPLAY

The BluFlame will display a total of 20 readings distributed among 5 pages with 4 readings each.

You can define which readings should be shown where on each reading screen.



- Select the following: Reading screen →  Define win.
→ The screen configuration mode will be displayed.
 - You can use the arrow buttons to change the value that should be displayed in each reading line.
 - You can configure this for each measuring line on each page.
 - Tap the Back button once you have made the changes you want.
- ✓ The reading display is now configured.

5.9 CONFIGURING BLUETOOTH PARAMETERS

You can use the following MRU software for this purpose:
MRU4u (Bluetooth), available at the Apple App Store and Google Play Store.
For iOS communications with a PC, tablet, or smartphone, low-energy module #66173 is required as well.

SMARTdata (Bluetooth)	(SMARTdata Version 1.2.0 or higher required)
MRU-Win (USB)	(MRUwin Version 2.7.4.0 or higher required)
ONLINEview (USB/Bluetooth)	(ONLINEview Version 2.9.5 or higher required)

-  The Bluetooth passkey is: 1234

Devices with firmware version 1.06.00 or higher with a dual Bluetooth module:

 → Menu: Extras → Settings to select the Bluetooth mode.

- For Android devices, select the following mode: Bluetooth Classic BT-CL
- For Apple devices, select the following mode: Bluetooth Low Energy BT-LE
- If “DUAL” appears in the settings window instead of the selection ANDROID and iOS, the Bluetooth module supports all applications without further settings.

-  Always set the BLUEGAZsmart setting to OFF.

Preparing for a Measurement

6.1 POWERING THE DEVICE

The BluFlame can run on either of the following:

- The internal rechargeable battery (included)
- The power adapter (included)

i Do not connect any external accessories unless the BluFlame is turned off.

6.2 AUTO-OFF



The auto-off function will turn off the BluFlame in the measurement, storage, and extras menus after 60 minutes of no user input.

i The auto-off function will be disabled during a measurement, as well as when the rechargeable battery is being charged with the charger/USB connection.

A prompt will be displayed for a short time before the device is turned off. To prevent the device from being turned off, simply tap a button.

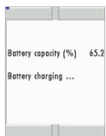
6.3 MEASUREMENTS WITH POWER ADAPTER / BATTERY CHARGING

When you use the power adapter to connect the BluFlame to a line voltage of 90–260 V, 50/60 Hz, the rechargeable battery will be recharged.

You can continue to use the BluFlame and carry out measurements while the battery is charging.

Once the battery is fully charged, the device will switch to trickle charging mode in order to keep the battery at full charge.

6.4 BATTERY STATE OF CHARGE



The battery icon on the display will show the remaining charge on the battery.

Approx. 15 minutes (depending on the device configuration) before the rechargeable battery is empty, the battery charge indicator will start flashing red (around once a second).

When the battery is nearly empty and the BluFlame is not connected to an outlet within one minute, the BluFlame will be turned off in order to prevent the battery from being deeply discharged.

6.5 OPERATING TEMPERATURE

NOTE

Excessively low BluFlame temperature
Condensate formation inside the BluFlame

- Do not turn the BluFlame on if it has been stored outside the operating temperature range.
- Store the BluFlame within its operating temperature range.

i If the operating temperature does not fall within the permissible range, a prompt to this effect will appear after the device is turned on.

In this state, it will not be possible to use any functions on the BluFlame – an acoustic signal will be emitted during the warm-up phase.

- Turn off the BluFlame immediately and store it in a warm environment.

6.6 EMPTYING THE CONDENSATE TRAP

CAUTION

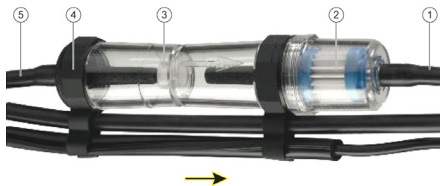
Risk of bodily injury and property damage posed by caustic liquid

The liquid emptied from the condensate trap may be slightly acidic.



- Follow all safety instructions.
- Wear work gloves.
- In case of skin contact, clean the affected areas IMMEDIATELY.
- Make sure that your eyes do not come into contact with the liquid.
- Thoroughly clean all parts that come into contact with the condensate.
- Check the condensate trap before and after every measurement.
- Check to make sure that the condensate trap has been emptied and that the pocket star filter is still white.
- Empty the condensate container after every measurement.

i When the device is turned off, a prompt will appear reminding you to empty the condensate container.



Emptying the condensate container

- Disconnect tubes (1) and (5).
- Unscrew the condensate container's upper (in the arrow's direction) sealing plug (3) and empty the condensate that has accumulated.
- Unscrew the pocket star filter (2).
- Clean and dry all parts.
- If the pocket star filter (2) is heavily soiled or not working, replace it.
- Both sealing plugs have a gasket. Make sure that these gaskets are correctly inserted and undamaged. If they are damaged, replace them.
- Reassemble the condensate trap.

6.7 CHECKING THE CONNECTIONS AND CHECKING FOR LEAKS

- Check all connections to make sure they are fitted properly.
- Check all tubes, tube connections, and the condensate container (from the probe tip all the way to the gas port on the BluFlame) for leaks.



The BluFlame features an integrated automatic test for checking the gas circuits for leaks. The corresponding procedure is described in section 9.4, "Leak test," on page 17.

6.8 TURNING ON AND ZEROING

- Tap the display and then the Power icon.
 - ➔ The BluFlame will run a zeroing routine automatically.



Make sure that the probe is not in the flue gas stream during zeroing.



During zeroing, a blue bar will be shown at the top of the display in order to indicate the zeroing routine's progress.

Once the zeroing routine is complete, the BluFlame will be ready for measurements.

If any of the sensors are faulty, this will be detected during zeroing and indicated with an error message.

Running the zeroing routine again

- You can run the zeroing routine again during operation. To do so, go to the "Measurement" main menu and select the "Zero setting..." option.

Carrying out Measurements

Every BluFlame features the full functionality required to carry out flue gas measurements. Following is a description of the process for this flue gas measurement.

After it is turned on, the BluFlame will have the Measurement menu active.

7.1 SELECTING A MEASURING PROGRAM

- Under "Gas measurement," select one of the four defined measuring programs.
- or
- In the "Gas measurement" main menu, tap the "Start button" to directly start the most recently selected measuring program.

7.2 READING SCREENS

The readings will be organized into five screens with 4 readings each, and can be configured as described in section 5.4, "Configuring measuring programs," on page 10.

Both direct measurands such as oxygen content and temperature and calculated values such as dew point, CO₂ content, etc. are available as readings. In addition, it is possible to have the same reading be converted to various different units, e.g., CO in ppm or mg/kWh.

Unavailable readings will be shown as hyphens. Reasons why a reading is not available can include the following:

- An electrochemical sensor was diagnosed as being faulty during zeroing.
- External temperature sensors are not connected.

7.3 CO LIMIT

If the CO limit is exceeded, the CO readings' color will change (red).

This CO limit can be adjusted – please refer to section 5.5, "Setting the CO limit," on page 10.

7.4 SPECIFIC MEASURING APPLICATIONS


Test Bed Program

The test bed program is used with test beds in order to test the BluFlame with test gas in the measuring program.

No calculations are performed during this test, and no alarm will be emitted if the CO limit is exceeded.

The test bed program has no relevance to you as a user, as it is not intended for end user applications.

7.5 PRINTING OUT MEASUREMENT RESULTS

- In each measuring program, you can use the print-out button on the reading screen /  to print out the readings shown on reading screens 1 through 5. Duplicate values will be skipped.

7.6 STOPPING A MEASUREMENT

You can stop an ongoing flue gas measurement at any time by using the stop button. When you do this, the screen will change color and the readings will be frozen.

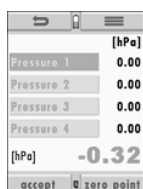
All the readings available at the time the measurement stops will continue to be available in the BluFlame, and it will still be possible to display them. To go back to the Measurement main menu, tap the Back button.

7.7 LAST MEASUREMENT VALUES

The BluFlame has the option of continuing to work with the most recent readings after a measurement ends.

- To do this, select “Last measurement values” in the main menu. Once there, you will be able to display, print out, or save the readings.

7.8 PRESSURE MEASUREMENTS



Four pressure readings can be recorded in the “Pressure measurement.” menu.

While the current reading is being displayed, you can copy it to the selected storage space. These settings are available in the context menu.

You will need to connect the tube (e.g., for a draft measurement) to port P2.

For a differential pressure measurement, you will need to connect the second tube to port P1 – please refer to section 4.7, “Connection configuration for draft measurements.” on page 9.

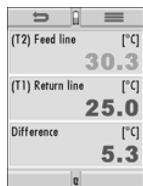
NOTE

“Pressure too high” draft sensor error message

Excessively high pressure may ruin the draft sensor.

- Make sure to stay within the pressure sensor’s measuring range.

7.9 DIFFERENTIAL TEMPERATURE MEASUREMENT



Two temperatures can be measured in the “Temp. measurement” menu. When temperature sensors are connected to ports T1 and T2, the temperature differential will be measured and displayed.



Make sure to only use AccuTools temperature sensors in order to ensure that you will get an accurate differential temperature measurement.

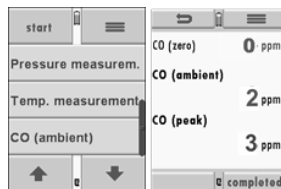
7.10 CO (AMBIENT)

The goal of this measuring program is to verify a CO concentration in the measuring location’s surroundings. When you change the country, the CO (ambient) menu option will appear.

- Run a zeroing routine on fresh air (outside of the measuring location’s surroundings).
- Run the “CO (ambient)” function on fresh air.

The current CO value from the zeroing will be shown for reference purposes – this value must be close to 0 ppm.

The current CO (ambient) value and the peak value will be shown.



7.11 AFTER MEASUREMENT

Once the measurement is complete, remove the flue probe from the flue pipe and seal the inspection hole properly (with sealing compound or adhesive tape).

CAUTION



Risk of burns and fire posed by hot flue probe

This may result in physical injuries and material damage.

- Let the hot probe tube cool down.

NOTE

Risk of thermocouple damage

- Once the probe has cooled down, slide the probe cone over the probe tip and secure the probe cone.

Storage

8.1 HOW DATA IS STORED

The basic way in which data is stored in the BluFlame is in the form of a stored set of sites. You can save data records in each of these sites. Each site will have a unique site number. You can use up to eight text lines per site and name these lines, e.g., customer names, addresses, etc.



New sites created in the BluFlame cannot be transferred to a PC.

When transferring data from the BluFlame to the PC, only readings will be transferred (identified by the site number). Measurements are stored when they are assigned to a site.

8.2 STORAGE INFORMATION

- In the “Storage” menu option, select the “Storage info” option to view information about the saved site and the measurements.
- Up to 1,000 sites and 3,000 readings can be stored.

8.3 SITES ADMINISTRATION

In the “Sites administration” menu option, you can:

- View all the data for the saved sites
- Create new sites
- Delete sites



Changes made to the data for a site will not be transferred to the PC.



New sites created in the BluFlame will not be transferred back to the PC.

Viewing sites

When you select the “Site administration” option, a page with the following will be shown for each saved appliance:

- The unique site number in the first line, shown in color
- The eight additional free-form text lines

Use the arrow buttons to scroll through all the sites.

Creating new sites

In the “Sites administration” menu option, you can create new sites and edit the data for existing sites.

Select “New” to create a new site. The following will appear:

The first line, which must contain a unique site number used to identify the site. The BluFlame will automatically assign a free site number.

All additional free-form text lines, which can contain, for example, a name and address.

Deleting sites

In the “Sites administration” menu option, you can individually delete the sites being displayed by selecting “Delete” or delete all sites at the same time.

You will need to confirm the prompt that appears.

8.4 TRANSFERRING DATA WITH AN SD CARD

CSV is the format used to transfer data. The file used is a text file in which each line represents a data record and the individual entries (fields) in the data records are separated with a semicolon (;) (see below for an example). This format ensures that the information can be read and generated in spreadsheet programs and databases (e.g., Microsoft Excel™ or Access™).

There are also other programs that can work with this format, as it is widespread and easy to implement.

The following functions are available in Version 1.11 and higher:

- Importing sites
- Exporting sites
- Exporting flue gas measurements

Importing sites

With this function, the BluFlame can import a site master from a PC or from a different measuring device. The filename for the master must be “anlagen.csv”.

Moreover, the file must not have any column headers, i.e., the first line must already contain payload data. Every line that is not empty and that does not start with a semicolon (both result in the first field (Site No.) being empty, which is impermissible) will be imported.

For each line / data record, the max. number of fields that will be imported are the first 9, and the max. number of characters that will be imported per field will be 24 (characters beyond this limit will be truncated).

Site examples

SITE	USED TO WARN OF A HAZARD SOURCE OF ANY KIND
9 Fields	A1-F1;A1-F2;A1-F3;A1-F4;A1-F5;A1-F6;A1-F7;A1-F8;A1-F9
2 fields (1 and 4)	A4-F1;;A4-F4
1 Field	A5-F1

Sample lines with 3 invalid sites and reason for error in parentheses

;A1-F2;A1-F3;A1-F4;A1-F5;A1-F6;A1-F7;A1-F8;A1-F9
(semicolon at the beginning) (empty line)



During the import, the device will not check for duplicate site numbers (line 1) within the file or between the file and sites already found in the BluFlame. And while the BluFlame can handle these duplicates without any problem, they may make it impossible later on to determine which site certain measurements correspond to in PC programs.

After a successful import, the BluFlame will mark the site file. If you attempt to import the same file from the same device later on, a prompt with a red font color will appear.

Exporting sites

You can use this function to back up a site master to an external PC or, if you have manually changed site data in the BluFlame (e.g., updated phone number), to transfer it to an external PC program.

You can also use the export function to transfer a site master to a different measuring device (BluFlame).

The filename for the exported file will be “ANLxxxxx.csv”, where xxxxx is a consecutive five-digit number with leading zeros. If you want to import the site master into another measuring device, you will first need to rename the file “anlagen.csv”.

Exporting flue gas measurements

You can use this function to export saved flue gas measurements to an external PC.



This function is not suitable as a backup function or as a way to transfer measurements to other measuring devices, as these measurements cannot be imported afterwards.

The filename for the exported file will be “EMlxxxxx.csv”, where xxxxx is a consecutive five-digit number with leading zeros.

The file will include column headers and will contain the site No., date/time, measuring program, fuel, CO, max, O₂ reference value, all readings with units that are also available in the BluFlame, e.g., smoke numbers, derivatives, and boiler temperature.

Excerpt from a sample file

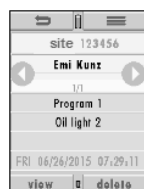
AdressNr	Datum & Uhrzeit	Messprogramm	Brennstoff	CO2max [%]	CO2ref [%]	T.Gas [%]	T.GWR [%]	O2 [%]	Verkate [%]
A1-21	MO 16.11.2010 16:32:54	Abgasmessung	Erogas BlueServ	11,8	3	32,7	26,1	19,1	2,4
A1-21	MO 16.11.2010 16:33:26	CO-Messung	Erogas BlueServ	11,8	3	32,7	26,0	19,0	3,2
A1-21	MO 16.11.2010 16:33:48	Riisgasmessung	Erogas BlueServ	11,8	3	29,7	26	18,7	1,1
A1-21	MO 16.11.2010 16:34:19	Abgasmessung	Heizöl EL	16,4	3	32,8	26,8	19,9	2,9

8.5 STORED MEASUREMENTS

Viewing measurements

To view stored measurements, tap the "View measurements" menu option.

After selecting this menu option, you will first be taken to an overview of the number of stored measurements per measurement type.



- Select "Gas measurements" or a different measurement type.

➔ You will first be taken to a page with context information for the stored measurement.

- Use the arrow buttons to scroll through the context information for the stored measurements.
- Tapping "view" will show the readings for the stored measurement in detail.
- Tapping "Back" will take you back to the context information for the measurement.

Deleting measurements

You can delete individual measurements:

By tapping the "delete" button while the measurement is being shown

Or by deleting all measurements for a measurement type

You will need to confirm your decision before the measurements are actually deleted.

Transferring measurements to a micro SD card

The BluFlame offers the option of transferring all stored measurements to a micro SD card.

Confirming with the F2 button will start the data transfer/export to the SD card.

During the transfer, the display will show "please wait." If there is no micro SD card present, or if the card is write-protected or faulty, an error message saying "Error. Writing to the memory card is not possible" will appear.

The data records will be stored as a CSV file (e.g., EM101032.csv) on the micro SD card. The filename will consist of a consecutive number assigned by the BluFlame.

In the file, each measurement will be identified with the corresponding site number and the date and time when the measurement was carried out.

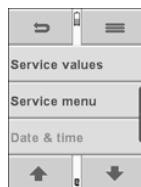
You can edit this file on an external PC with the use of a spreadsheet program such as Microsoft® EXCEL or OpenOffice® Calc.

i If you run into any problems using your computer programs, please consult the corresponding software documentation.

Extras / Settings

The BluFlame originally comes with software that is configured with default settings that in most cases will cover your needs. Nevertheless, these settings can be customized flexibly as required for your specific needs to a large extent.

9.1 AFTER-SALES SERVICE CALIBRATION MENU



The after-sales service calibration menu is protected against unauthorized access by means of a PIN.

9.2 DEFAULT SETTINGS

This option will reset the BluFlame to its default configuration:

The fuel list for flue gas measurement / CO measurement / custom program 1 and custom program 2 will be set to Natural gas, EL heating oil, P/B liquefied gas, and Pellets.

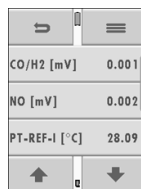
The O₂ reference values will be set to the default values.

SETTING	DEFAULT VALUE
LCD Brightness (%)	50
Prompts	ON
Button Signal	ON

The program names for the emission measurement will be set to Gas measurement, CO measurement, Custom program 1, and Custom program 2.

The reading screen layout will be reset to its default configuration.

9.3 SERVICE VALUES



If the BluFlame has a fault (e.g., message during calibration: "O₂ sensor not OK"), it will usually be possible to pinpoint this fault on the service screen.

The screen will show the service values for all sensors. If there is an error message, contact our After-Sales Service Department. Our After-Sales Service technicians may then ask you to provide them with certain service values so that they can pinpoint the fault.


9.4 LEAK TEST


When running a leak test, the BluFlame will test the system (incl. the condensate trap/the gas cooler) all the way to the probe tip for leaks.

To do this, the internal gas pump will generate a vacuum that will be measured with the integrated draft sensor and monitored for a period of 10 seconds.

The magnitude of the observed pressure drop will then be used to determine whether the system has any leaks.

Running a leak test

 Clean the probe tip before the leak test (if there are any deposits on the surface, the test cap will not create a seal).

- Slide test cap #61382 (for probe tubes with a diameter of 8 mm) over the probe tip.
- Select the following: Main menu  Instrument leak test.

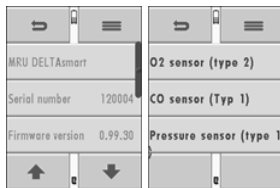


If the leak test is not passed, check the probe and its tubing, as well as the condensate trap.

If you cannot find any leaks on these external parts, the BluFlame will need to be checked at a service location. To find your local service location, please visit www.accutools.com.

9.5 DEVICE INFORMATION, WARRANTY MANAGEMENT, AND IDENTIFICATION NUMBER

- Select the following: Main menu   Menu: Extras  Device info in order to show the device information.



Maintenance and Care

CAUTION



Acid from the condensate

Chemical burns may result due to contact with slightly acidic liquids from the condensate.

- If you come into contact with acid, immediately rinse the area thoroughly with water for an extended period of time.

10.1 CLEANING AND CARE

The BluFlame requires very little maintenance in order to remain in good condition in the long term:

- After every measurement, disconnect the gas sampling line from the BluFlame so that it can dry off.
- If soiled, clean the probe and the probe tube.
- In the event of extended periods of non-use, first charge the battery fully. Then charge the battery every 8 weeks.
- Replace the pocket star filter on a regular basis.
- Replace the pocket star filter after cleaning it 4 – 5 times.



Frequent measurements will result in a high degree of soiling; accordingly, replace the pocket star filter on a regular basis.

10.2 MAINTENANCE

In order to ensure that the device is kept in good condition, we recommend arranging for an AccuTools service location to perform an annual inspection and a sensor calibration (www.accutools.com).

Attachment

11.1 REPLACING SENSORS



1. Screws (Torx T10)
2. Sensor Lid

- Remove the 4 screws from the sensor lid.



1. Tube

- Slightly lift the sensor lid and carefully turn it clockwise in order to reveal the compartment underneath it. Make sure not to squeeze the tube leading to the lid.



1. CO Sensor
2. O₂ Sensor
3. NO Sensor

- Pull out the sensor that you want to replace.
- Insert the new sensor.



1. Tube

- Turn the sensor lid counterclockwise back to its original position. Make sure not to squeeze the tube leading to the lid.
- Screw the sensor lid screws back in.
- When you turn on the BluFlame, a prompt saying “New sensor” will appear.
- i** As soon as a new compatible sensor is inserted, the BluFlame will detect it and ask whether the sensor should be installed.
- Confirm the prompt with “Yes.”
- The calibration will be transferred once from the sensor and applied in the BluFlame.
- i** If the new sensor is not installed, it will not do anything.
- Now check that the BluFlame is working properly.
- Run a leak test (please refer to section 9.4, “Leak test,” on page 17).
- i** If the leak test is not passed, this means that the tube leading to the lid was twisted “airtight” when the lid was turned.
- Use your finger to seal the sensor chamber outlet and check whether the pump generates a backpressure.
 - ➔ The motor noise will change as a result of the pressure that the pump needs to apply in this case.

11.2 TECHNICAL DATA

GENERAL DATA	
Operating Temperature	41 °F ... 113 °F
Relative Humidity During Operation, Non-Condensing	95%
Bearing Temperature	-4 °F ... 122 °F
Internal Rechargeable Battery	Li-ion
Operating Time	> 10 h
Power Supply	100 - 240 V / 5 VDC / 500 mA
Dimensions	160 x 82 x 44 mm
Case Material	PA6
Protection Class	IP30
Max. Gas Pump Vacuum Range	150 hPa / 2.17 psi
Typical Gas Flow Rate	20 l/h / 5.28 gal/h

READINGS	
ELECTROCHEMICAL SENSOR	O ₂
Measuring Range	0 ... 21%
Resolution	0.1 Vol. %
Abs. Accuracy	± 0.2 Vol. %
T90 Response Time	< 30 s
Expected Service Life Years on Air	2

ELECTROCHEMICAL SENSOR (H ₂ – COMPENSATED)	CO/H ₂
Nominal Measuring Range	0 ... 4000 ppm
Overload Range	< 10000 ppm
Resolution	1 ppm
Absolute Accuracy / % of Reading	± 10 ppm / 5% (0 ... 4000 ppm) 10% (> 4000 ppm)
T90 Response Time	< 40 s

ELECTROCHEMICAL SENSOR (NOT H ₂ – COMPENSATED)	CO
Nominal Measuring Range	0 ... 5000 ppm
Overload Range	< 10000 ppm
Resolution	1 ppm
Absolute Accuracy / % of Reading	± 10 ppm / 5% (0 ... 4000 ppm) 10% (> 4000 ppm)
T90 Response Time	< 30 s

ELECTROCHEMICAL SENSOR (NOT H ₂ – COMPENSATED)	CO (#65929)
Nominal Measuring Range	0 ... 10000 ppm
Overload Range	< 20000 ppm
Resolution	1 ppm
Absolute Accuracy / % of Reading	± 10 ppm / 5% (0 .. 10000 ppm) 10% (> 20000 ppm)
T90 Response Time	< 30 s

ELECTROCHEMICAL SENSOR	NO
Nominal Measuring Range	0 ... 5000 ppm
Overload Range	< 10000 ppm
Resolution	1 ppm
Absolute Accuracy / % of Reading	± 5 ppm / 5% (0 ... 1000 ppm) 10% (> 1000 ppm)
T90 Response Time	< 50 s

TEMPERATURE MEASUREMENT	T ₁ , T ₂
Number of Type K Thermocouple Inputs	2
Measuring Range	-40 °C ... 1200 °C / -40 °F ... 2192 °F
Accuracy	±2 °C / ±3.6 °F 0.50%

FLUE GAS TEMPERATURE (WITH PROBE)	T _A
Measuring Range with Stainless Steel Gas Sampling Tube	0 °C ... 650 °C / 32 °F ... 1202 °F
Abs. Accuracy / of Reading	±2 °C / ±3.6 °F 0.50%

COMBUSTION AIR TEMPERATURE (WITH USER SUPPLIED K-TYPE SEN.)	T _i
Measuring Range with Combustion Air Sensor	0 °C ... 100 °C / 32 °F ... 212 °F
Abs. Accuracy	1 °C / 1.8 °F

FLUE DRAFT	
Measuring Range	± 200 hPa / 2.9 psi
Abs. Accuracy / of Reading	0.00029 psi 1%

DIFFERENTIAL PRESSURE	
Measuring Range	± 200 hPa / 2.9 psi
Abs. Accuracy / of Reading	0.00029 psi 1%

CALCULATED VALUES	
	CO ₂
Measuring Range (Fuel-Dependent)	0 - CO ₂ max
Abs.Accuracy	± 0.3 Vol. %
Lambda (Air/Fuel Ratio)	
Measuring Range	Jan 20
Excess Air	
Measuring Range	0 - 999%
Poison Index	
Measuring Range	0.0001 - 10.0
Flue Gas Loss qA	
Measuring range	0 - 99.9%
Efficiency	
Measuring Range	0 - 120%
Readings Can Be Shown In	mg/Nm ³ O ₂ Ref mg/kWh NO _x : mg/Nm ³ NO ₂

11.3 UPDATING THE FIRMWARE



- Turn on the BluFlame.
- Select the following: **☰** → Extras → Device info → The third line will show, e.g.: Firmware version 0.99.30

If you run into any problems during the update, we will need you to provide certain information.

Write down your firmware version here _____

Write down your serial number here _____

11.3.1 CARRYING OUT AND CHECKING THE UPDATE

Preparing a micro SD card

If you did not receive the new firmware on a micro SD card, e.g., if you received it by e-mail instead, you must first copy the "1107.fwb" file to the SD card's root directory (i.e., not to a subfolder).

If you received this file packed in a ZIP file, you will need to unzip it before copying it.

Carrying out the update

i The BluFlame must have at least 60% of its battery charge remaining before an update can be applied.

- Copy file 1107.fwb to the SD card (to the root directory, i.e., not to a folder).
- Insert the micro SD card into the BluFlame's card slot and turn on the BluFlame.

i The SD card contacts must be facing upwards when the card is inserted into the SD card slot, and the SD card must lock into place inside the BluFlame. To remove the SD card, lightly push it into the BluFlame in order to release the card lock.

- Wait until a message saying "New firmware... found" appears.
- Select "Install firmware" and confirm.
 - ➔ The update mechanism will start.
- Wait about 45 seconds. Do not press any buttons during this time.
- After the update, turn on the BluFlame with the Power icon.
- Confirm the "Firmware update completed..." prompt with OK.
- ✓ The update has been successfully completed.

How can I check if the update was successful?

- Turn on the BluFlame.
- Select the following: **☰** → Extras → Device info
- ✓ The firmware version will be shown.

What can I do if the old firmware version is still being shown?

Repeat the update procedure.

Where can I get help if the update was not successful?

Contact your outside sales representative or e-mail: info@accutools.com

11.4 ANALYSIS AND CALCULATION

VARIABLES MEASURED CONTINUOUSLY	UNIT
O ₂	[%]
Air Temp. (Thermocouple)	[°F]
Flue Gas Temp. (Thermocouple)	[°F]
CO	[ppm]
Draft	[psi]

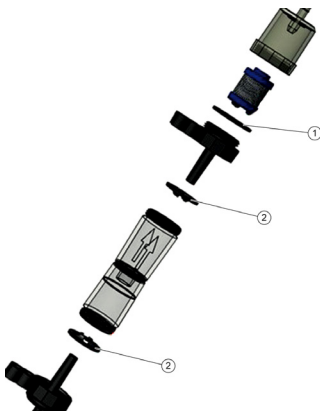
CONTINUOUS CONVERSIONS TO CO	CO	NO
[ppm] Related to 0% Remaining O ₂ (Undiluted)	X	X
[ppm] Relative to Fuel-Dependent O ₂ Reference Value	X	X
[mg/m ₃]	X	X
[mg/kWh]	X	X
[mg/MJ]	X	X
[mg/m ₃] Relative to Fuel-Dependent O ₂ Reference Value	X	X

ADDITIONAL CONTINUOUSLY CALCULATED VARIABLES	UNIT
CO ₂	[%]
ETA	[%]
ETA, Condensed	[%]
Loss	[%]
Loss, Condensed	[%]
Lambda	-
Dew Point	[°F]
CO/CO ₂ Ratio	[%]

11.5 TROUBLESHOOTING

SIGN	FAULT	CAUSE	SOLUTION
The BluFlame is not responding at all		The BluFlame is not responding to touch controls	Press the Reset button
Excessive cooling inside the device; the BluFlame cannot be used	Display prompt: "Device too cold" or beep every 5 seconds	The BluFlame was stored in an excessively cold environment	Place the BluFlame in a warm room and wait until it is ready
Incorrect readings	Zeroing error	The sensors were already exposed to gas during calibration	Purge the BluFlame with fresh air and restart it
The BluFlame will not turn on or is not responding after being turned on		No more battery charge	Connect the BluFlame to an outlet so that the battery is charged
Measurement without accurate temperature values	Temperature display: ---, - °C / °F	Faulty thermocouple, compensating cable discontinuity or compensating cable not connected	Call After-Sales Service. Remove the probe from the flue pipe and condensate from the probe tube
Incorrect gas readings	Measuring range exceeded: O2 value too high, CO and CO2 values too low	"Probe-device" connection not established properly Probe / tube / condensate trap leak Pump not sucking correctly	Run a leak test – refer to section 9.4, "Leak test," on page 17 Leaky spots can be detected by visually inspecting the probe, tubes, condensate trap
Incorrect temperature readings	Gas temperature too high or jumping	Probe connector not connected correctly Cable discontinuity in probe line Condensate formation on probe tip	Check the probe connector and the probe line for breaks (loose contact) Shake off condensate from the probe tip

11.6 O-RING KIT FOR CONDENSATE TRAP



1. Outer gasket #65627
2. Inner gasket #65628



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