Mikrobiologisches Luftprobenahmesystem
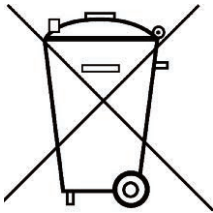## MicroBiological Air Sampling System

▶ **MBASS30v3**

Bedienungsanleitung
Operating Manual

Hinweis zu Altbatterien

In diesem Gerät befinden sich Batterien:

1 Stück Lithium Knopfzelle Typ CR2032 für Energiepufferung der Echtzeituhr
1 Stück Industriebatterie (Akku) Typ LiPo 14,4 Volt für den Betrieb des Gerätes

Altbatterien (auch Akkus sind Batterien im Sinne des Batteriegesetzes) dürfen nicht in den Hausmüll.

Verbraucher sind verpflichtet, Batterien zu einer geeigneten Sammelstelle bei Handel oder Kommune zu bringen.

Die Batterien dieses Gerätes können nach Gebrauch auch bei uns abgegeben werden.

Altbatterien enthalten möglicherweise Schadstoffe oder Schwermetalle, die Umwelt und Gesundheit schaden können.

Batterien werden wiederverwertet, sie enthalten wichtige Rohstoffe wie Eisen, Zink, Mangan oder Nickel. Das Symbol Mülltonne bedeutet: Batterien und Akkus dürfen nicht in den Hausmüll.
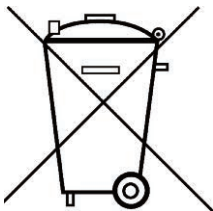
Die Batterien in diesem Gerät enthalten kein Blei, Cadmium oder Quecksilber.

Note on used batteries

This device contains batteries:

1 piece, Type CR2032 lithium button cell for energy buffering of the real-time clock
1 piece, Type LiPo 14.4 Volt industrial battery (rechargeable) for the operation of the device

Used batteries (rechargeable batteries are also batteries in terms of the Batteries Act) may not be disposed in household waste.

Consumers are obliged to take batteries to an appropriate collection point in the trade or local authority.

The batteries of this device may also be returned to us after use.

Batteries may contain harmful substances or heavy metals that can harm the environment or personal health.

Batteries are recycled; they contain important raw materials such as iron, zinc, manganese or nickel.

The rubbish bin symbol stands for: batteries and rechargeable batteries may not be disposed of in household waste.

The batteries in this device do not contain lead, cadmium or mercury.

Contents

This manual applies to **MBASS30v3** with color display and touch operation.

Air Sampling System   MBASS30v3

Thank you very much for choosing our air sampling system **MBASS30v3**.

Please read this manual and the safety instructions carefully before using the device.

MBASS30v3, including the sampling heads and other accessories, is a laboratory device and may only be used by trained personnel.

MBASS30v3 may only be used for the purposes described in this operating manual.

Please note the safety instructions in section 16 of this manual.

The following pictograms are intended to help you reading this operating manual:

We recommended reading this paragraph very carefully.

This paragraph contains more detailed information.

The actions listed in this paragraph are dangerous to persons and the device and are not permitted.

This paragraph describes troubleshooting and maintenance tasks.

The pictograms used are subject to the Creative Commons License; author of the pictograms is the Regional Computing Centre of Erlangen (RRZE).

The MicroBiological Air Sampling System **MBASS30v3** has been developed for different sampling methods:

Microbiological air sampling with the sampling heads **LKS100** and **LKS 30** for loading of culture media in 90 mm standard petri dishes for cultivating.

Particle sampling to detect the total spore concentration in the air with the particle sampler **PS 30** for loading adhesively coated microscope slides.

Filtration on sterile gelatine filters in single-use units with the filter adapter **FA 30** to load round sterile 80 mm gelatine filters.

Collection of antigenic and allergenic proteins in the air with the allergen sampler **AS100**.

Comparison of the methods air sampling and particle sampling:

Air sampling	Particle sampling
Analysis after cultivation	Microscopic analysis is possible directly after the sampling
Determination of the cultivable fraction	Determination of the total concentration (cultivable and non-cultivable)
Every cultivable unit results in a visible unit	Additional information on the environment (dust particles, fibers etc.)
Determination of the species possible	Spore clusters are visible as clusters
Selection by type of culture medium and conditions of cultivation	Transport time and temperature of the samples are not critical

Figure 1   **MBASS30v3** with sampling head **LKS100**

The features of **MBASS30v3**

▶ 10 individual presettings (description text, volume, volume flow, start delay, logging interval of the sampling process)

▶ Volume flow can be preset in the range from 30 to 100 l/min

▶ Sampling volume can be preset from 10 liters to 10,000 liters

▶ Start delay from 1 second to 24 hours

▶ 4.3 inch (109 mm) color display with additional glass cover

▶ Internal temperature sensor

▶ Connection socket for external temperature/humidity sensor

▶ Internal barometric sensor

▶ Export of the sampling data to a USB memory stick

▶ Robust anodized aluminum profile housing

▶ Integrated battery pack LiPo 14.4 V / 3600 mAh

▶ Quick-charger, usable worldwide

▶ Encapsulated flow of the sampling air to avoid contamination of the device interior

3. Package Contents

The delivery of the microbiological air sampling system **MBASS30v3** contains the following:

- ▶ the robust **MBASS30v3** base device
- ▶ quick-charger for operation at 100 - 240 V, 50 - 60 Hz
- ▶ this operating manual
- ▶ a USB connection cable for connection to a PC
- ▶ the software MBASSControl for configuration, remote control and adjustment of **MBASS30v3** on the included data medium (USB memory stick)
- ▶ a replacement 2A slow-blow fuse

And depending on your ordered configuration:

- ▶ the air sampling head **LKS 30** (Volume flow 30 l/min)
- ▶ the air sampling head **LKS100** (Volume flow 100 l/min)
- ▶ the particle sampling head **PS 30** (Volume flow 30 l/min)
- ▶ the allergen sampling head **AS100** (Volume flow 100 l/min)
- ▶ the filter adapter **FA 30** (Volume flow 30 l/min up to 50 l/min) **each as supplementary part** (without base unit with hose connector)
- ▶ temperature/humidity sensor HC2A-S by rotronic
- ▶ the handling case (Tanos systainer T-Loc with PE foam insert)

4. Operating Elements

4.1 Overview of the Operating Elements
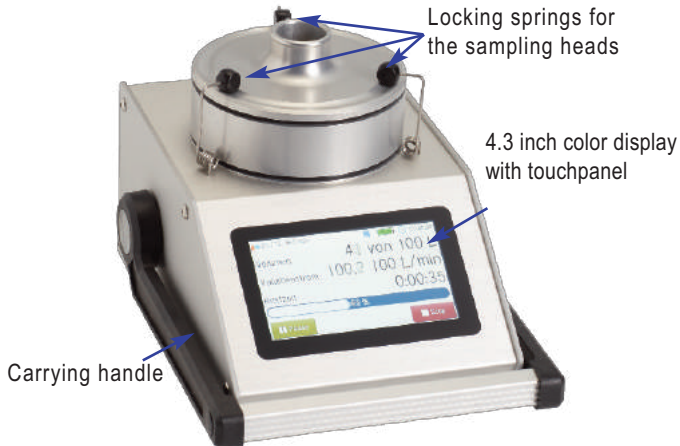

Figure 2   **MBASS30v3**
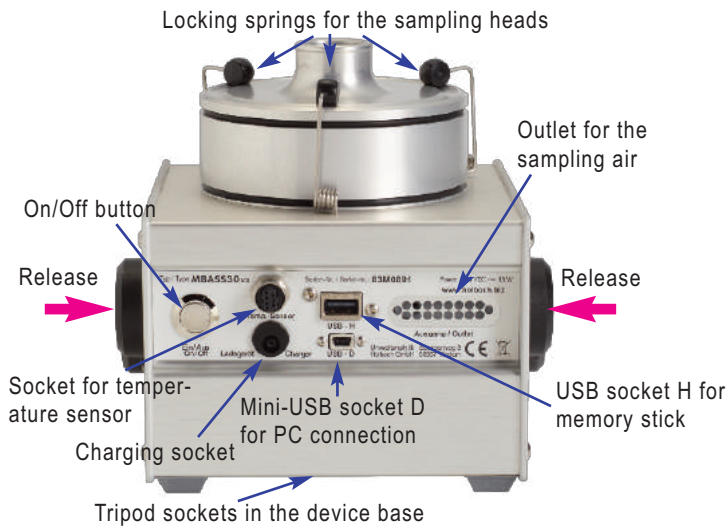

Figure 3   **MBASS30v3** rear view

4.2 Carrying Handle

The handle for comfortable carrying of **MBASS30v3** locks into place every 30 degrees. To adjust the handle, please push both metallic release buttons (violet arrows in figure 3) at once. Rotate the handle into the desired position and let go the release buttons. The handle will lock into place at the next 30 degree step.

4.3 4.3 Inch Color Display with Touchpanel

MBASS30v3 is completely operated using the 4.3 inch color display with touchpanel (except for the on/off button on the rear). The capacitive touchpanel can also be operated with common latex or nitrile gloves.

4.4 Acoustic Signaler

MBASS30v3 has an acoustic signaler which signals the following events:

Event	Tone Sequence
Power-on	2 short tones
Touch-Click	Click sound
Sampling finished	3-tone sequence
Device alarm	2-tone sequence
Battery voltage low	2-tone sequence
Switching off	2 short tones

4.5 Locking Springs

The three locking springs of **MBASS30v3** are made of stainless spring steel and are to quickly and easily secure the sampling heads **LKS100**, **AS100**, **LKS 30**, **PS 30** and **FA 30** to the base. The locking springs are not intended for carrying **MBASS30v3**. The shape of the locking springs is designed such that for proper closing only a light force is required. If the black locking knob does no longer remain in the groove on the sampling head, the locking spring can be bent a little at the first angle, seen from the knob, with flat pliers.

4.6 Tripod Sockets

There are two tripod sockets in the **MBASS30v3** device base: UNC 1/4 inch (photo) and UNC 3/8 inch (microphone)

Only use tripods that can support the weight of **MBASS30v3** (approx. 3 kg) and ensure that they provide a secure standing.
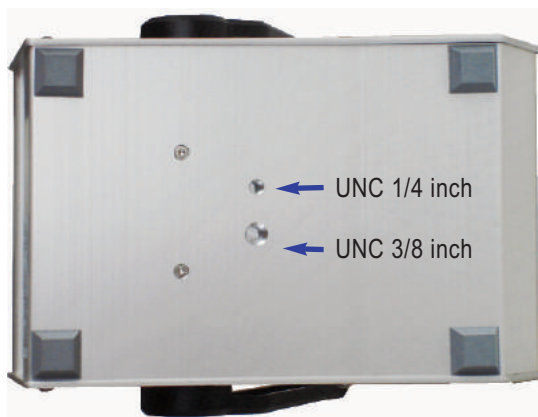
Figure 4   Tripod sockets in the device base

4.7 Media Centering Mechanism

MBASS30v3 is equipped with a fast setting mechanism for centering the sampling media (petri dishes and **PS 30** slide mount).

By turning the setting disk clockwise, the centering pins are moved towards the center (Figure 6). The setting disc snaps into 12 positions.

For the usage of culture media in common standard petri dishes, position 7 of the centering mechanism is usually suitable.

Again in short:

Turning clockwise   ➤ Centering pins narrow

Turning counter-clockwise   ➤ Centering pins widen

Figure 5 Centering mechanism wide open, disc in position 0

Figure 6 Centering mechanism narrow, disc in position 12

5. Connection Sockets

In the back of **MBASS30v3** there are 4 connection sockets:

5.1 Battery Charger Socket

Connect the charger plug of the delivered quick-charger into the round battery charger socket (low voltage plug EIAJ5).

Only use the charger that is included in the delivery for charging. Using any other charger can damage the electronics, the integrated rechargeable battery and the charger itself.
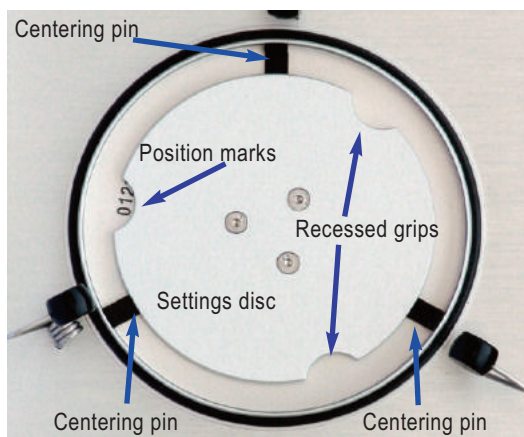
Polarity: Inner pin is "positive 14.4 volts", outer wall "ground".

5.2 Temperature and Humidity Sensor Socket

MBASS30v3 features a socket for the temperature and humidity sensor HC2A-S by rotronic. The temperature and humidity readings are read digitally. An optional extension cable can be connected between the sensor and **MBASS30v3**. The temperature values are required to calculate the volume flow. The external temperature/humidity sensor is automatically detected by **MBASS30v3** when connected and its value gets used for the calculations and the data recording. The advantage of the external temperature/humidity sensor is the much faster acclimatization after a change in temperature compared to the internal flow sensor.
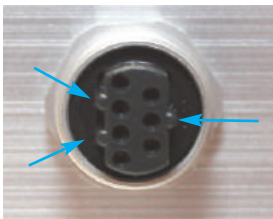
As the socket contacts are asymmetrical, the temperature and humidity sensor HC2A-S only fits in one position into the socket. The sensor is secured with the sleeve nut.

Figure 7 The temperature/humidity sensor rotronic HC2A-S

5.3 USB Socket H

A FAT formatted memory stick can be connected to the USB socket H

(host). Sampling data can be exported in CSV format from the history view to this memory stick.

Figure 8   The USB Socket H

5.4 USB Socket D

MBASS30v3 can be connected to a PC running Microsoft Windows

using the included USB cable (A to Mini) plugged into the Mini-USB socket D (device).

Figure 9 The USB socket D

6. Charger

A quick-charger for charging the integrated Lithium-Polymer battery pack (14.4 Volt / 3800 mAh) is part of the delivery of **MBASS30v3**

Status indicator

Figure 10 The quick-charger for **MBASS30v3**

The charger can be operated at a voltage of 100 - 240 volts and a mains frequency of 50 - 60 Hz.

6.1 Using the Charger

Insert the power plug into a mains socket.

After connecting to the mains supply the LED lights up in green.

Insert the plug of the quick-charger into the charger socket of **MBASS30v3**.

The state of the charger is indicated with a multi-colored LED:

Orange: Quick-charging until about 80 - 95% charged.

Yellow: Final charge until 100% completed.

Green: The battery is fully charged or the charger plug is not connected.

Fully charging a completely discharged battery can take up to 2.5 hours.

Manufacturer logo

Figure 11 The rear of the charger contains the status colors,
certification mark and manufacturer logo

Note: The charger can also be used as power supply. The available current is greater than the current required for the operation of **MBASS30V3**.

Please note the safety instructions in section 16!

7. Operating MBASS30V3

Operating **MBASS30V3** is simple and consists of the following steps:

Prior to sampling

Place **MBASS30V3** safely	Minimum distance of rear to a wall: 10 cm
Switch on **MBASS30V3**	Section 7.1
Acclimate with 300l of sampling air	Only for temperature differences of > 10 °C between **MBASS30V3** and the air
Set up **MBASS30V3**	See section 8 on how to modify the presettings

Sampling

Prepare the sampling head	**LKS**: Section 11.1 **PS**: Section 11.2 **FA**: Section 11.3
Start sampling	Sections 7.2 and 7.3

After sampling

Remove, label and store the sampling medium	maybe prepare and proceed with another sampling

After the last sampling

Switch off **MBASS30V3**	Section 7.8

7.1 Switching on MBASS30ᴠ₃

To switch on **MBASS30ᴠ₃**, press the on/off button on the back of the device (Figure 3). When switching on, two short signal tones will sound and the display shows the personalization text, the firmware version and the device's serial number for 5 seconds:

Figure 12 Display when switching on

The personalization text (4 lines with max. 25 characters each) can be defined by the customer prior to shipping and is stored encrypted in the memory of **MBASS30ᴠ₃**.

Afterwards, the main screen with all relevant information is shown:

Figure 13 Main screen after switching on

The external temp./humidity sensor is indicated by the symbol 🌡️.
The internal temperature measurement is indicated by the symbol 🌡️.
The symbol "Info" ⚠️ is only shown when an fault has been detected.
The symbol "Log" 💾 is shown during sampling if logging of the sampling process is enabled.

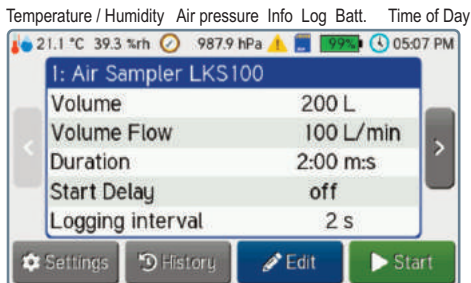Each preset program contains:

▶ a description text (editable using the MBASSControl software)
▶ the sampling volume in liters, range: 10 up to 10,000 l
▶ the volume flow in liters per minute, range: 30 up to 100 l/min
▶ the start delay, range: 1 second up to 24 hours
▶ the logging interval in seconds, range: 0 up to 240 s

7.2 Selecting a Preset Program

Selecting the desired presettings is done by tapping on one of the two buttons on the left and right of the screen.

Selection of the desired presettings   Selection of the desired presettings
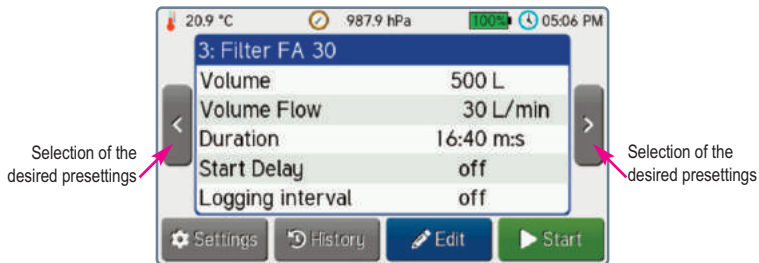
Figure 14 Selecting the desired presettings

If the present preset programs are not as desired, the parameters (except for the description text) can be modified directly at **MBASS30v3**.
See section 8 for details on this.
Note: The number of shown preset programs can be limited in the "Sampling" settings.

Note: The nominal volume flow stated on the sampling heads has to be respected, since the separation efficiency of the impaction depends on the volume flow.

Air Sampling System　　MBASS30V3

7.3 Starting the Sampling

Prior to sampling, the corresponding sampling head has to be prepared and the sampling medium is to be inserted. Please note the following sections describing the sampling heads **LKS100** / **LKS 30** (Section 11.1), **PS 30** (Section 11.2) and **FA 30** (Section 11.3) for this. The sampling is started by pressing the Start button.
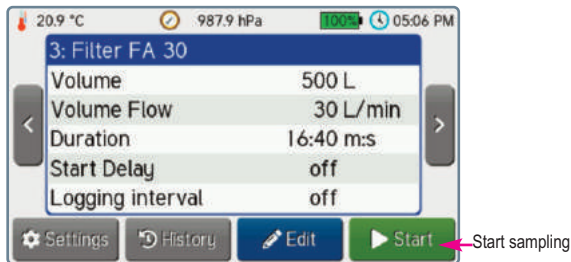
Figure 15　　Starting a sampling
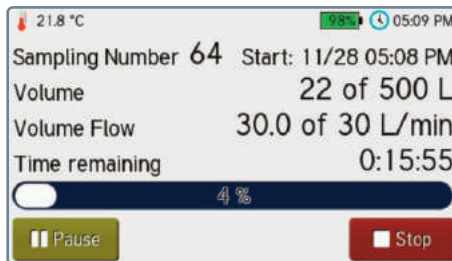
Figure 16　　Display during a sampling

Note: The air pressure is not shown during sampling.
The sampling number is increased at every start.
Along with the sampling number, the start date (day, month) and the start time is shown.
The running sampling can be interrupted by tapping the Pause button.
The running sampling can be aborted before the target volume is reached by tapping the Stop button.

If a start delay is configured, the sampling starts after this delay. While this time is running, the remaining delay time is displayed instead of the remaining time of the sampling.

Indicator fo the current delay until start
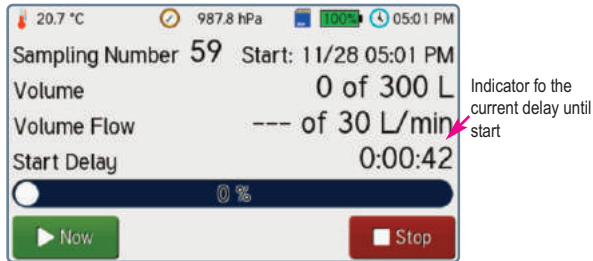
Figure 17   The start delay is elapsing

During the start delay time, the sampling can be started by tapping the Now button.
During the start delay time, the sampling can be aborted by tapping the Stop button.

7.4 Pausing the Sampling

The running sampling can be interrupted by tapping the Pause button.
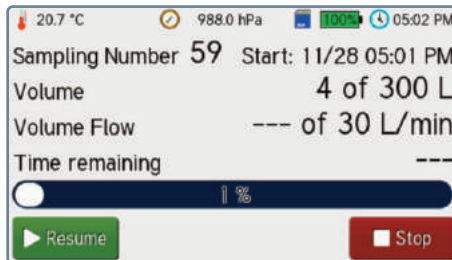
Figure 18   Sampling is paused

While a sampling is paused, it can be aborted by tapping the Stop button.
By tapping the Resume button, the pause will be ended and the sampling will continue.

Note: While the delay time is running and during a pause, the (climate) data is still being recorded, if the logging of the sampling process is enabled.

7.5 Finishing the Sampling

When the target sampling volume is reached, **MBASS30v3** shows a message box in the display, plays a 3-tone sequence and stops the sampling. (Figure 19).
The acoustic signalling can be deactivated in the device settings.
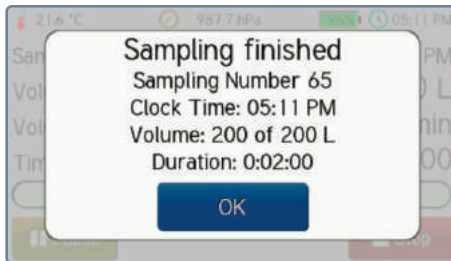
Figure 19   The sampling is finished

The fan motor is electronically braked, such that the additional air volume after the end is negligible.
The end of the sampling can be acknowledged by tapping the OK button.
The acoustic signalling lasts at most 60 minutes.
Once the end has been acknowledged, **MBASS30v3** switches back to the main screen and is ready for the next sampling (Figure 13).
Remove the sample-media and prepare **MBASS30v3** for the next sampling.

7.6 Aborting a Sampling

By tapping the Stop button and subsequent confirmation (Figure 20), the sampling can be aborted. Manual abortions are only signalled by a message (Figure 19). After acknowledging, **MBASS30v3** switches back to the main screen (Figure 13).
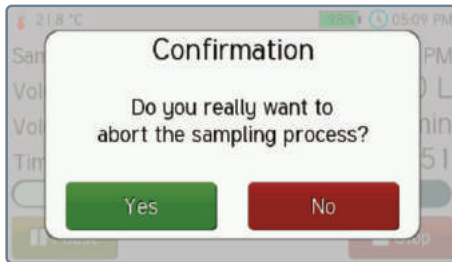
Figure 20   Dialog to confirm the abortion of a sampling

7.7 Sampling Disruptions

The following errors are detected and displayed by **MBASS30v3** during sampling:

▶ Low battery voltage

▶ The air flow is blocked. The preselected volume flow cannot be reached

▶ A sensor fault (pressure or temperature) has occurred

▶ The fan motor is faulty

In these cases the sampling is terminated. The reason for the disruption is shown (Figure 21) and the alarm is signalled by a 2 tone sequence.

The acoustic signalling can be deactivated.
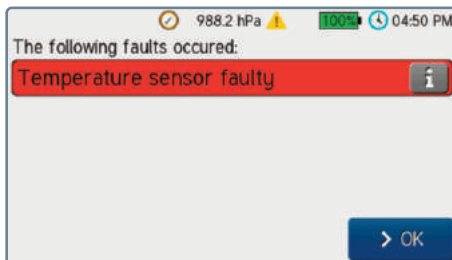
Figure 21   A disruption occurred

A hint on how to resolve the error can be displayed by tapping the 🛈 button. The error can be acknowledged by tapping the OK button.
As long as an error is present, no new samplings can be started. In that case, the button Info will be displayed instead of the Start button (Figure 22).

By tapping this button, the errors are shown (Figure 21)
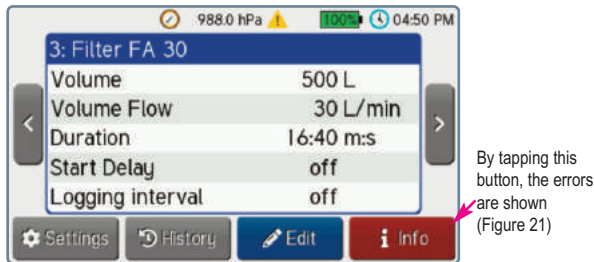
Figure 22   An error is present, sampling is not possible

7.8 Switching off **MBASS30v3**

MBASS30v3 is switched off using the on/off button on the back of the device (Figure 3). The button has to be pressed for at least 0,4 seconds. This is to prevent aborting a sampling by accidentally pressing the button.

Switching off **MBASS30v3** during a sampling will abort the running sampling immediately.

The switching off is signalled by **MBASS30v3** with two short tones.

Depending on the configuration, **MBASS30v3** will automatically switch off when it is idle for a defined time.

For the automatic power-off, it is distinguished between **MBASS30v3** showing an alarm or a message and being inactive and idle. The automatic power-off can be deactivated in the device settings.

As long as a connection to the MBASSControl software is active, the automatic power-off is disabled.

Note:

When the on/off button on the back of the device (Figure 3) is pressed for more than 10 seconds, a reset of the internal microcontroller is performed.

7.9 Battery Voltage too Low

If the battery voltage falls below 13 Volts, a running sampling will be aborted and acoustic and visual signals will be given.

In that case, recharge **MBASS30v3** immediately (Section 6.1) or switch it off (Section 7.8).

MBASS30v3 automatically turns off after 60 seconds in the low battery state.

7.10 Standby Mode

To save energy, **MBASS30v3** can be configured such that the display brightness will be reduced (standby mode). The time can be set from 0 up to 15 minutes. If it is set to 0, the standby mode is always deactivated. During a sampling and when connected to the MBASSControl software, the standby mode is also inactive.

The standby mode can be exited by tapping anywhere on the display.

Figure 23   **MBASS30v3** in standby mode

8. Configuring Presettings

8.1 Selecting Presettings

To configure and modify the 10 available sampling presets (programs), the respective program has to be selected first by tapping on the buttons on the left and right of the screen (Figure 14).

In the following example, the preset (program no. 2) will be modified such that the volume is set from 200 liters to 220 liters and the start delay from 50 seconds to 30 seconds.

Program No. →

The edit mode is started by tapping the Edit button

21.5 °C	987.9 hPa	100% 05:06 PM
2: Particle PS 30 200L		
Volume		200 L
Volume Flow		100 L/min
Duration		2:00 m:s
Start Delay		0:50 m:s
Logging interval		I s

Settings   History   Edit   Start
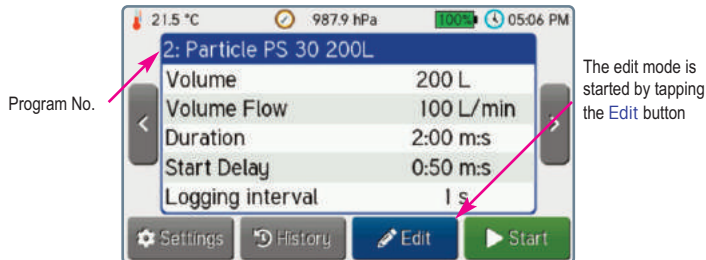
Figure 24   These presettings should be changed

The edit mode is started by tapping the Edit button.

Tap the pencil symbol to change the volume

21.5 °C	987.9 hPa	100% 05:06 PM
Volume		200 L
Volume Flow		30 L/min
Start Delay		0:00:50
Logging interval		I s

X Cancel   Save
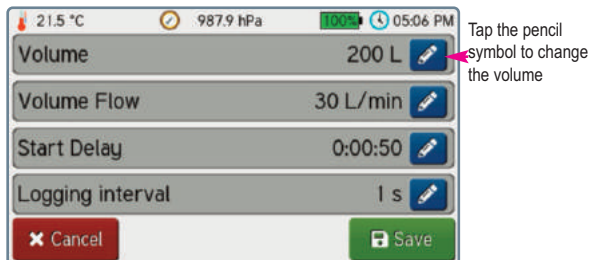
Figure 25   Selection of the preset parameter to be changed

To change the volume, the corresponding button with the pencil symbol has to be tapped.

Note: The description text can be changed using the MBASSControl software.

8.2 Editing the Presettings

After tapping the pencil symbol , the volume can be modified.

Figure 26   The editor shows the current value

The current value is cleared by tapping the CLR button. Afterwards, the new value can be entered.

Figure 27   The current value has been cleared
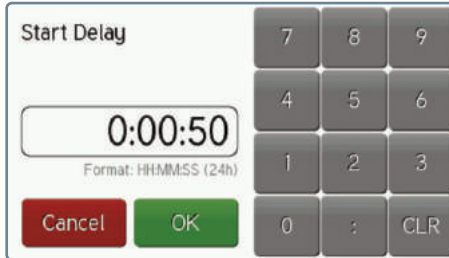
Figure 28   The editor shows the new value

The new value is accepted by tapping the OK button.

To change the start delay, the input mask for time entries is shown by tapping the corresponding pencil symbol ✏:

Figure 29　　　The editor for time entries

Time entries have to be input in the format Hours:Minutes:Seconds.

The new value is accepted by tapping the OK button. Prior to entering the new value, the content of the input field is cleared with the CLR button.

Figure 30　　　The new time value has been entered

To prevent input errors, the entry for the volume flow is prepended by a selection of fixed values for the different sampling heads (Figure 31).

By tapping the buttons Custom value and ✔, any other volume flow in the range from 30 l/min up to 100 l/min can be set.
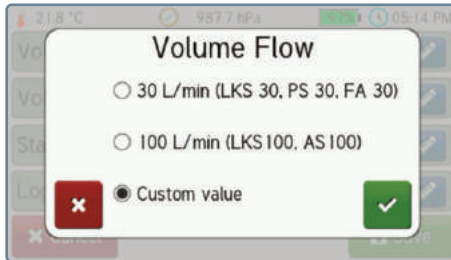
Figure 31   Selection mask for the volume flow

8.3 Saving the Presettings

The changes to the presettings are saved by tapping the button 🖫 Save

in the main edit mode screen (Figure 25). Tapping the button ✖ Cancel
discards the changes.

8.4 Presettings in Detail

The following parameters are available:

8.4.1 Description text

The description text can have up to 20 characters. Changing the text is possible with the MBASSControl software.

8.4.2 Sampling Volume

The sampling volume can be set in the range from 10 liters up to 10,000 liters.

8.4.3 Volume Flow

The volume flow can be preset in the range from 30 l/min up to 100 l/min. The nominal flow stated on the sampling heads has to always be respected, since the separation efficiency depends on the volume flow.

8.4.4 Start Delay

The start delay allows to prepare, start and bring **MBASS30v3** to the actual sampling location while the delay is running. This can be useful e.g. in air ducts or on high tripods.

The start delay can be set to the second in the range from 0 seconds (no start delay) up to 24 hours.

8.4.6 Logging interval

The sampling process can be logged in the set interval. Apart from the volume flow, the climate parameters are also recorded. The data is stored on an internal microSD card. In the history view, the data can be exported to a USB memory stick. The data can also be read and directly be transferred into an EXCEL chart using the MBASSControl software.

The logging interval can be set from 0 (deactivates the logging) up to 240 seconds. It is advisable to adapt the interval to the sampling time. Short interval times with long sampling times lead to a big amount of data which results in a long transfer time.

Note: The logging data is linked to the samplings in the history. This means that this data is deleted after 100 further samplings.

9. Sampling History

The data of the recent 100 samplings is stored for displaying in a ring-buffer. A sequential sampling number in the range from 0 to 65535 is assigned to each sampling.
The history data contains:

▶ Sampling number
▶ Start operation (date and time)
▶ Status of the sampling (finished, aborted, alarm)
▶ Sampling volume (actual value)
▶ Volume flow (target value)
▶ Sampling duration (actual value)
▶ Sampling start (date and time)
▶ Sampling volume (target value)
▶ Average temperature
▶ Average humidity (only with external sensor)
▶ Average air pressure

For samplings with start delay, the values of "Start operation" and "Sampling start" will differ.

9.1 Viewing the History

Tapping the History button in the main screen (Figure 13) will open the history view. The data of the most recent sampling is shown initially.

Selection of the sampling number

Selection of the sampling number
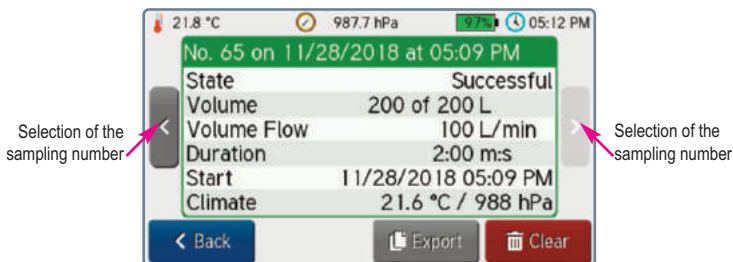
Figure 32   Sampling history view

The two buttons on the sides can be used to select the other entries. (Figure 32).

9.2 Exporting History Data

By tapping the Export button, the currently displayed data can be exported in CSV format to a connected USB memory stick into the directory "\sampling_data". The file name is formed from the sampling number and the timestamp of the start operation. The file names of the sampling data end with "_hist" and the ones of the sampling process log with "_log".

If there is logging data for the displayed sampling, it will be exported, too.

The sampling data can be read and transferred into an EXCEL chart by the MBASSControl software.

EXCEL is a registered trademark by Microsoft Corp. EXCEL is not part of the delivery of **MBASS30v3**.

9.3 Clearing History Data

By tapping the Clear button and confirming, all data in the ring-buffer as well as the recorded logging data is deleted and the sampling number is reset to 0.
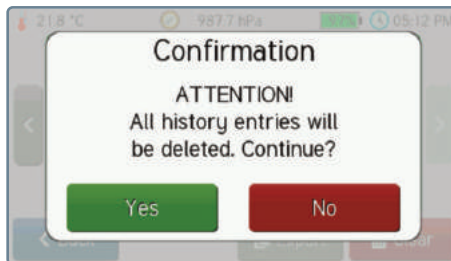
Figure 33   Dialog to confirm the deletion of all data

10. Configuring MBASS30v3

10.1 Device Settings

All configuration settings can be changed directly on **MBASS30v3** and also using the MBASSControl software.

By tapping the Settings button on the main screen (Figure 13), the settings menu is displayed:

Figure 34   The settings menu

Tap the blue Back button to go back to the main screen.

Tap the Device button to configure **MBASS30v3**. The first configuration page is shown.
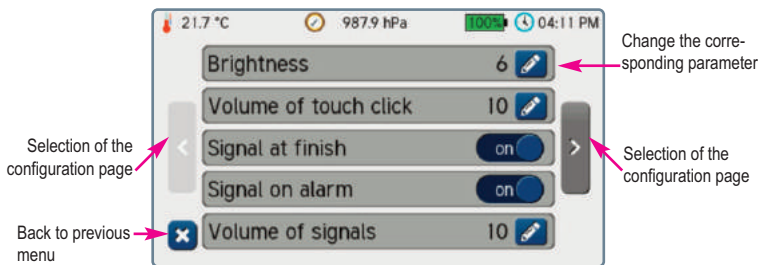
Figure 35   The first configuration page

Tap the ⊠. button to go back to the settings menu.

An on/off parameter can be directly changed by tapping the on toggle.

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The other settings can be changed by tapping the pencil button ✏️.
One of four different input masks will be shown:

1. Slider
Tap and move the blue knob to change the
value.
Save with button OK,
Discard with button Cancel.
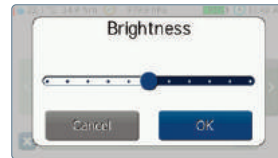
2. Selection Menu
To select the desired setting, tap the cor-
responding line.
Save with the green button.
Discard with the red button.
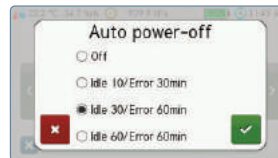
3. Time Input
To change the time, the input field has to
be cleared first with the CLR button. The
new time can then be entered in the given
format with colons as delimiters.
Accept with the green button.
Discard with the red button.
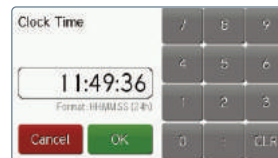
4. Date Input
To change the date, the input field has to
be cleared first with the CLR button. The
new date can then be entered in the given
format with dots as delimiters.
Save with the green button.
Discard with the red button.

10.2 Sampling Settings

In the sampling settings, the number of displayed presettings (programs) can be set in the range from 1 to 10.

To change the value, the input field has to be cleared first with the CLR button. Then, a new value can be entered.

Save with the green button.

Discard with the red button.

11. The Sampling Heads for MBASS30v3

The preparation of the sampling heads, except for **AS100**, is described in this section.

11.1 Air Samplers LKS100 / LKS 30

For air sampling, the two efficient sampling heads **LKS100** with a volume flow of 100 l/min and **LKS 30** with a volume flow of 30 l/min are available.

The air sampling heads **LKS100 / LKS 30**:

▶ are round jet impactors for microbiological air sampling of cultivable germs

▶ use culture media in standard petri dishes

▶ permit sampling in any operating position due to the mounting mechanism for petri dishes

▶ permit sampling from hollow and tight spaces

▶ are validated by the LGA Baden-Württemberg (DIN EN ISO 14698-1: 2003)

11.1.1 Functional Principle of LKS100 / LKS 30

The air samplers **LKS100** and **LKS 30** are designed for sampling of cultivable germs (Viable Microbial Sampling) on culture media in standard petri dishes. They work on the round jet impaction method which has proven itself for more than thirty years and which is internationally acknowledged.

The sampled air is drawn through the air sampler from top to bottom. Due to the aerodynamic shape of the inside of the upper chamber, the air stream is spread evenly across the jet surface. The velocity of the air flow gets vastly increased in the area of the jets and accelerates particles in the air in the direction of the petri dish. Due to the increased diameter below the jet surface, the flow is slowed down again to such an extent that the majority of the particles continue in their direction of acceleration because of their inertia and hit the culture medium in the petri dish.

Figure 36 Functional principle of the air samplers

Note: The following describes the sampling process for the **LKS100** air sampler. Sampling with the **LKS 30** air sampler is identical with the exception that it is operated with a volume flow rate of 30 l/min.

11.1.2 Preparation for Sampling

Remove the protective cap.

Open the sampler by lightly pushing the three black locking knobs to the outside.

Figure 37 Opening the locking springs

Figure 38 Taking off the top part

Clean the inner surfaces of the components (Middle part from top and bottom!) using a germicidal and fungicidal agent (e.g. 2-Propanol, 80% isopropanol).
Blow-dry the jets with pressurized air (e.g. duster spray).

Figure 39 Cleaning the middle part   Figure 40 Taking off the sampling head

After the cleaning agent has dried, **LKS100** can be assembled again.
Place a closed petri dish with culture media in the center of the setting disk. The centering pins are to be adjusted prior to this (Section 4.7).
Remove the lid from the dish and place the top and middle parts back on **MBASS30v3**.

Take care not to contaminate the lid of the petri dish.

Close **LKS100** by lightly pushing the locking springs towards the center until the locking knows snap into place.

Sampling can now begin (starting from section 7.2).

Recommended sampling volumes for **LKS100**

in the summer months:	50 liters up to 100 liters
in the winter months:	up to 200 liters
for thermotolerant germs:	up to 400 liters

If the sampling volume it too high, it is possible that the culture medium in the petri dish gets overloaded with germs.

11.1.3 After sampling

Open the locking mechanism.

Lift the top and middle parts from the base and close the petri dish with its lid.

Remove the petri dish from the sampler and put the middle and top parts back to the base.

Seal the petri dish with adhesive tape or another suitable sealing film.

Close **LKS100** by lightly pushing the locking springs towards the center until the locking knows snap into place.

Depending on the consistency and viscosity of the culture medium, the image of the jet holes may be visible on the culture medium after the sampling.
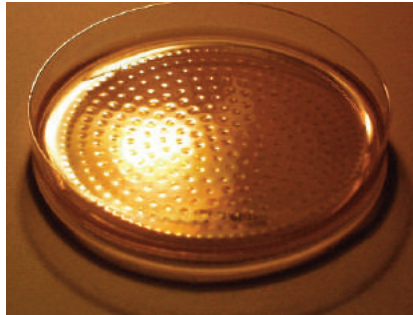
Figure 41 Petri dish after sampling

11.1.4 Notes

Avoid wedging the components when assembling **LKS100**.

Clean **LKS100** before and after each use.

Ensure that the inside of **LKS100** has dried before closing it with the protective cap!

11.2 Particle Sampler PS 30

The particle sampler **PS 30**:

▶ samples spores, pollen, bacteria, fibers and other airborne micro-particles on adhesively coated standard slides
(76 mm x 26 mm x 1 mm)

▶ permits microscopic analysis of all micro-organisms (including those that can not be cultivated) immediately after sampling

▶ fully utilizes the coating with three parallel samplings (no. 1 to 3) due to the movable slot jet

▶ permits sampling in any operating position due to the slide mounting mechanism

▶ permits sampling from hollow and tight spaces

▶ works on the slot jet impaction method

▶ is an analytical method according to DIN ISO 16000-20

11.2.1 Functional Principle PS 30

The particle sampler **PS 30** is designed for sampling airborne spores and other particles (non-viable microbial sampling).

The sampled air is drawn through **PS 30** from top to bottom. The sampling air is drawn from the outside to one of three possible positions of the slot jet. The increased air flow velocity at the jet accelerates the airborne particles towards the adhesive coating where they will stick.
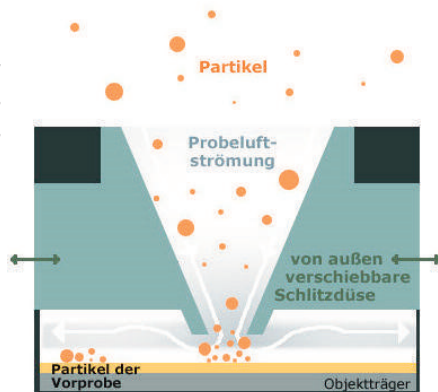
Figure 42 Functional principle of **PS 30**

11.2.2 Preparation for Sampling

Open the centering mechanism of **MBASS30v3** by turning the setting disk counter-clockwise (Section 4.7).

Clean the individual components (slide mount and top part) using a germicidal and fungicidal agent (e.g. 2-Propanol, 70 % to 80% isopropanol). The cleaning agent can be sprayed directly through the slot jet. Do not tamper with objects on the jet outlet.

Place the slide mount on **MBASS30v3**.

Take the coated slide out of its shipping container. Please also note section 12 "The Coated Slide" on that.

Place the coated slide – with the coating facing up – into the recess of the mount (Figure 43), such that the track labels match.

Avoid touching the coating of the slide. Otherwise, it will be contaminated and useless for sampling.

Track 1 matches label 1 and Track 3 matches label 3
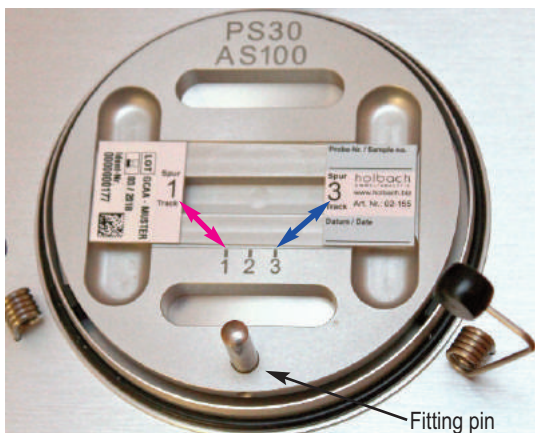
Figure 43 Slide mount with inserted slide

Remove the protective cap from the top of **PS 30**.

Place the top part of **PS 30** on **MBASS30v3** in such a way, that the sample numbers on the top part match the sample numbers of the slide mount.

The fitting pin on the slide mount inserts into a guide hole in the top part. This ensures the correct alignment of the two parts. The top is tightly fitting the base.

Close **PS 30** by lightly pushing the sealing springs towards the center. The black knobs should noticeably snap into place.

Move the slot jet to the desired sample number.

11.2.3 Recommendations for Sampling Air Volume

Overloading of the slide with particles such as gypsum, plaster or skin cells can result in insufficient impaction of the spores. In this case, an analysis is no longer reasonable and, in case of an extremely high concentration of particles, often also no longer possible. Overloaded samplings often also impact on neighboring tracks, which means that these also need to be discarded, even if they could be analysed. In spaces, where no excessive particle concentration (e.g. due to construction work during measurement or due to a lack of fine cleaning after a remediation) is present, sampling of 200 liters of air is recommended. An overload of the particle track can usually be recognized by very high turbidity of the track and a width of more than approx. 1.1 mm, as well as visible elevations in some cases. If the particle track turns out to be overloaded after sampling, a new sampling at the same location with 100 liters or 50 liters, depending on the estimation, is recommended. This significantly reduces the risk of not having taken a sample suitable for analysis. Notifying the laboratory to only analyze the more suitable particle track of both samples prevents duplicate analyses.

Sampling can now begin (starting from section 7.2).

Figure 44 Completely overloaded particle tracks (cannot be evaluated)

11.2.4 After Sampling

Another sampling can take place after moving the slot jet to the next position.

11.2.5 Removing the Slide

After all samples have been taken on the inserted slide, remove the loaded slide in the following sequence:

Open the sampler by lightly pushing the locking springs at the black knobs outwards.

Carefully remove the loaded slide and slide it into the previously opened shipping container. Close the shipping container

When shipping, protect the slide from damage by providing sufficient padding (e.g. air bubble wrap).

11.2.6 Notes

Avoid wedging the components when assembling **PS 30**

Clean **PS 30** before and after each use.

Ensure that the inside of **PS 30** has dried before closing it with the protective cap!

11.3 The Filter Adapter FA 30

The filter adapter **FA 30**:

▶ samples spores, pollen, bacteria, fibers and other airborne microparticles by filtration using round 80 mm gelatine filters in single-use units

▶ is suited for air sampling and evaluation according to the BIA (Berufsgenossenschaftliches Institut für Arbeitsschutz) worksheet 9420, ISBN 3 503 07432 5, previously described in TRBA 430 (TRBA: Technische Regeln für biologische Arbeitsstoffe, Technical Regulations for Biological Materials)

▶ can also be operated with the separate pump **MP2/39** using the optional base unit

11.3.1 Preparation for Sampling

Clean the filter adapter **FA 30** by using a germicidal and fungicidal agent (e.g. 2-Propanol,70 % to 80 % isopropanol).

Place the filter adapter **FA 30** on **MBASS30v3** and close it.

Place the filter mount with the inserted filter or a single-use unit on the filter adapter **FA 30** (Figure 45).

The sampling volume setting depends on the type of filter used. Please consult the specifications of the manufacturer of the filters.

Sampling can now begin (starting from section 7.2).

Figure 45 Mounting a gelatine filter in a single-use unit

11.3.2 After Sampling

Remove the filter with the single-use unit and store it according to the (handling) instructions of the manufacturer.

11.3.3 Notes

Avoid wedging **FA 30** and **MBASS30v3** when installing.

Clean **FA 30** before and after each use.

Only use filters with a suitable flow resistance. Especially the use of filter materials other than gelatine (e.g. polycarbonate) may lead to abortion of the sampling with the message "Air flow blocked", due to the higher air flow resistance.

12. The Coated Slide

We recommend the adhesively coated slides for **PS 30**.
Dimensions: 76 mm x 26 mm (Article no.: 02-155).

Figure 46   Coated slide 76 mm x 26 mm x 1 mm

The slides and the shipping container are both identified by a label containing a unique identity number. The information on the label are also present in the DataMatrix code.

The shelf life of the coated slide is 2 years after production. The expiry date is given in the form month / year.

▶ Never touch the coating of the slide!

▶ The coated slides are made of glass. Protect the slides against mechanical stress.

▶ Only use slides with a plane coating surface!

▶ Only use slides that did not yet exceed their shelf live.

▶ Store the slides at room temperature (up to 25 °C).

▶ Usage at temperatures from -30 °C up to +50 °C is possible.

▶ The maximum width for cover glasses for microscopy is 32 mm.

The coated slides are shipped in a white disposable shipping container (Section 12.1).

12.1 The Shipping Container

The adhesively coated slide is delivered in a shipping container which is sealed in a film tubing.

After taking the shipping container out of the film tubing, it can be opened by lifting the cap on one side.

Figure 47 Opening the shipping container

The slide can be easily pulled out of the container after opening.

Figure 48 Taking the adhesively coated slide out of the container

Don't tilt the slide when taking it from or inserting it into the container. If it is tilted too much, the coating may be damaged.

Right: **Wrong:**

Figure 49 Position of the slide when taking or inserting it

13. Information

MBASS30v3 stores information on the operating time, the drawn volume, etc. This information is shown under the menu item Info in the settings menu.
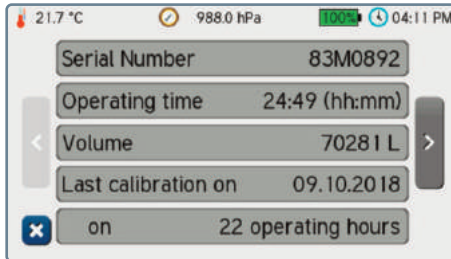
Figure 50   Example for the first information page
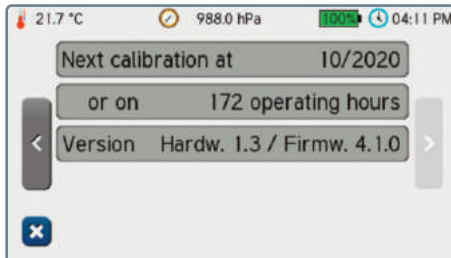
Figure 51   Example for the second information page

Tap the ✖ button to go back to the settings menu (Figure 34).

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14. Service Functions

Three service functions are implemented in **MBASS30v3**:

14.1 Fan

This service function allows to manually control the fan to test the function of the fan and the difference pressure sensor. Tap the Service button in the settings menu (Figure 34).

The service menu opens. Tap on the button Fan.
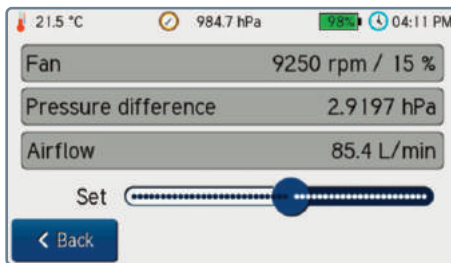
Figure 52   Service function for manual fan control

The slider Set can be used to manually control the fan. Along with the fan speed, the power is shown in percent. Additionally, the difference pressure and the calculated volume flow can be seen. By tapping the Back button, the fan is stopped and the function is left.

14.2 Tightness Test

This service function can detect leakages of the sampling head or **MBASS30v3**.
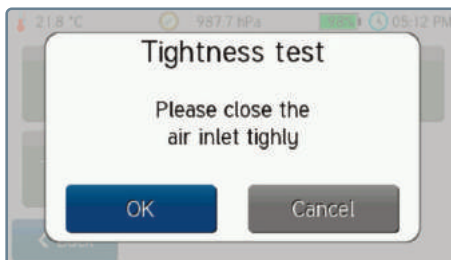
Figure 53   Tightness test before start

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To invoke the function, tap the Tightness Test button in the service menu.

Close the inlet of the sampling head and start the test with the OK button.

The fan will be run for 15 seconds. The maximum and the average of the difference pressure at the measuring orifice is measured. When leakages are present, a small difference pressure is measured. If a limit value is exceeded, the test is rated negatively.
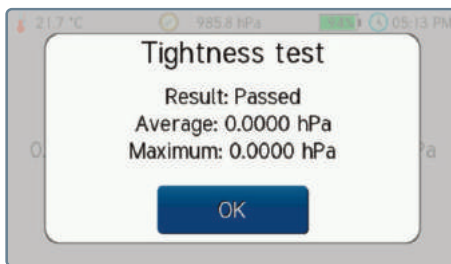
Figure 54   Result of tightness test

14.3 Touch Adjustment

To adjust the touchpanel, the touch adjustment service function is implemented. Three dots have to be tapped as precisely as possible. Afterwards, the result can be tested before saving. When touching the touchpanel, a crosshair is displayed. The crossing point represents the touching point. The adjustment data of the touchpanel can be saved or discarded.

Displayed crosshair for testing
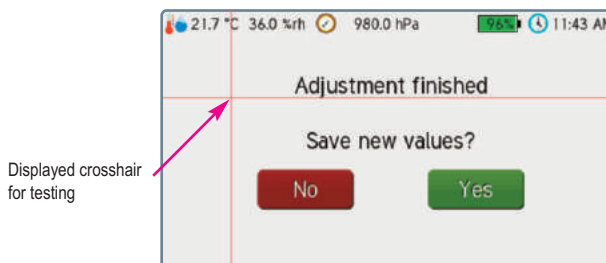
Figure 55   Touchpanel adjustment before saving

15. Cleaning and Maintenance Instructions

Only clean **MBASS30v3** with a damp and lint-free cloth.

Do not use abrasives.

Do not exert pressure on the display glass.

15.1 Calibration Interval
The recommended calibration and maintenance interval is at every 150 operating hours of the high-performance fan or at least every 2 years. The time until the next recommended calibration in shown in the information of **MBASS30v3** (Section 13, Figure 51).

Note:

Charge the battery pack of **MBASS30v3** at least every 12 months with the included battery charger even when not in use.

16. Safety Instructions

Non-compliance with these safety instructions may lead to damages of the device and even to dangerous personal injury!

▶ **MBASS30v3** may only be used for the intended purpose!

▶ **MBASS30v3** may only be used by qualified personnel!

▶ Prevent fluids from entering **MBASS30v3** and the charger!

▶ Prevent objects from entering **MBASS30v3**!

▶ Keep **MBASS30v3** and the charger away from children!

▶ Avoid touching the display with sharp or pointed objects!

▶ Do not use in areas with danger of explosion!

▶ Use the charger only in dry indoor areas!

▶ Do not use defective connection cables!

▶ Do not cover the charger during operation!

▶ Use the charger only to charge the integrated LiPo battery!

▶ The rechargeable battery pack and the battery must be disposed of properly!

▶ Warning! **MBASS30v3** is a Class A device. This device may cause radio interference in residential areas. In this case, the operator may be required to take appropriate measures.

▶ Observe the usage instructions and notes from the sample-media manufacturer / supplier!

17. Technical Data

Sampling heads:	Round jet impactor **LKS100**,
	Round jet impactor **LKS 30**,
	Slot jet impactor **PS 30**,
	filter adapter **FA 30**
	and allergen sampling head **AS100**
Volume flow:	30 l/min up to 100 l/min, controlled
Tolerance:	± 5 % of the set volume flow
	in the temperature range from 0 °C to 40 °C
Calibration interval:	After 150 hours of sampling time,
	or at least every 2 years
Sampling air volume:	can be set from 10 up to 10,000 liters
Sampling medium:	Standard petri dish 90 mm x 15 mm
	(diameter x height) or
	Slide mount for particle sampler and
	allergen sampler
Power supply:	LiPo battery pack 14.4 Volts, 3600 mAh
Buffer battery:	Lithium button cell CR2032
Dimensions:	180 mm x 160 mm x 255 mm (W x H x D)
Weight:	2350 g without sampling head
	2750 g with sampling head **LKS100** / **LKS 30**
	2950 g with sampling head **PS 30**
	2670 g with sampling head **FA 30**
	2860 g with sampling head **AS100**
Housing material:	Anodized aluminum profile housing
Tripod sockets:	UNC 1/4 Zoll (Photo) and
	UNC 3/8 Zoll (Microphone)
CE compliance:	Class A according to EN55011
Warranty:	24 months

Charger:

Input voltage:	100 to 240 Volt, 50 to 60 Hz
Charging current:	2 A when quick-charging
Compliance:	CE, UL 60601

Sampling Head Air Sampler **LKS 30**:

Sample air volume:	50 up to 400 l, depending on the task
Volume flow:	30 l/min
Validation:	according to EN ISO 14698-1:2003
Vacuum:	approx. 0.1 bar at 30 l/min volume flow
Operating position:	arbitrary during sampling
Sampling medium:	Standard petri dish 90 mm x 15 mm (diameter x height)
Cut-off value:	d_{ae50}: 0.9 µm (Aerodynamic diameter for a probability of 50% of separation)
Round jets:	324 jets, each 405 µm in diameter
Sample air connection:	can be extended with a hose of 5/4 inch (31 mm) inner diameter

Sampling Head Air Sampler **LKS100**:

Sample air volume:	50 up to 1000 l, depending on the task
Volume flow:	100 l/min
Validation:	according to EN ISO 14698-1:2003
Operating position:	arbitrary during sampling
Sampling medium:	Standard petri dish 90 mm x 15 mm (diameter x height)
Cut-off value:	Version 2: d_{ae50}: 1.1 µm (Aerodynamic diameter for a probability of 50% of separation)
Round jets:	500 jets Version 2: 500 µm in diameter
Sample air connection:	can be extended with a hose of 5/4 inch (31 mm) inner diameter

Sampling Head Particle Sampler PS 30:

Sample air volume:	200 l (recommended for usual contamination) Also note the recommendations in Section 11.2.3
Volume flow:	30 l/min
Slot jet dimensions:	16.0 mm x 1.1 mm
Operating position:	arbitrary during sampling
Method:	according to DIN ISO 16000-20
Sampling medium:	coated slides, 76 mm x 26 mm
Number of samples:	up to three samples per slide due to movable jet
Sample air connection:	can be extended with a hose of 1 inch (25 mm) inner diameter

Sampling Head Filter Adapter FA 30:

Mount:	filter mounts and single-use filter units with an inside diameter of 78 mm
Volume flow:	30 l/min up to 70 l/min possible with **MBASS30v3**
Filter type:	Sterile gelatine filter
Method:	BIA 9420
Operating position:	arbitrary during sampling

Note: **Subject to technical changes**

18. Conditions of Warranty

Umweltanalytik Holbach GmbH grants 24 months of warranty on this product after the date of purchase. In case of malfunctions of operation, please consult your dealer or supplier.

We reserve the right to repair or replace. The parts used for this are new or as good as new. Returned parts become property of Umweltanalytik Holbach GmbH. A repair under warranty does not extend the warranty of the parts or the products itself. Excluded from warranty are damages caused by improper treatment, operational errors, misuse, external influences, lightning/surge, alterations of the product as well as added parts. Furthermore, consumable parts (e.g. batteries, fuses) as well as damages caused by consumable parts (e.g. by the leaking of batteries). Also excluded is transport damage, subsequent damage, costs as a result of failure and travelling times. The warranty expires if repairs are done by non-authorized entities or if the serial number on the products is damaged or made illegible.

The warranty can only be claimed against presentation of an explicit receipt of purchase (invoice or sales receipt).

In case of warranty claim/repair, the device should be shipped carefully packed (if possible in its original packing and a shipping box) with a detailed description of the fault, sufficiently post paid to your dealer or to Umweltanalytik Holbach GmbH.

Shipments without freight prepaid will not be accepted.

Issued: 11/2018
Hardware version 1.3.0
Firmware version: 4.1.0

19. The MBASSControl Software

Delivery includes the MBASSControl software, compatible to Microsoft Windows 7 and above, on a data medium.

MBASS30v3 is connected with the USB socket.

19.1 Overview

The MBASSControl software can be used to:

▶ remotely control **MBASS30v3**

▶ configure **MBASS30v3**

▶ change the presettings (programs)

▶ export and transfer the sampling data from **MBASS30v3** to an EXCEL worksheet

▶ perform a firmware upgrade on **MBASS30v3**

▶ modify the adjustment data in **MBASS30v3**

▶ manually control the fan in **MBASS30v3** for servicing purposes
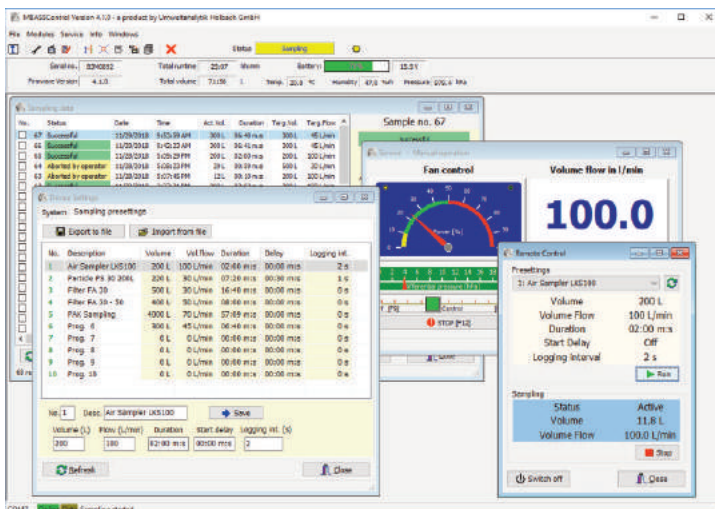
Figure 56   The MBASSControl software

19.2 Installation of MBASSControl

The installation of MBASSControl is done by executing the installation program MBASSControl_Setup.

Start MBASSControl_Setup by double-clicking and follow the installation instructions. When the software is installed for the first time on a system, please make sure that the USB drivers are installed as well. On subsequent installations on the same system, it is not required to install them again.

The manual for MBASSControl can be found in the program itself under the menu item Info → User Manual.

Note: The MBASSControl software is only compatible to **MBASS30v3** and not to earlier models. Likewise, the preceding software MBASS30.exe cannot communicate with **MBASS30v3**.

Why statistical correction of the colony forming units (CFU)?

With round jet impactors, the particles hit the so-called germination spot below the jet hole and germinate there. The visible colonies are counted and projected to a standard of 1 m³ of air and are stated as number of colonies per cubic meter of air.

The aforementioned evaluation corresponds exactly to the reality in the sampled air if:

1. during sampling only one spore is accelerated towards the sampling medium by a single jet hole,
2. this spore reaches the sampling medium and
3. this spore germinates and thus becomes visible as CFU.

Problems

In reality, these conditions are not always met because:

On 3: Whether a spore germinates depends on its ability to germinate. Reasons for the loss of this ability can be, for example, the age of the spores or damage by the use of fungicides prior to the sampling. But also the sampling medium must be suitable for the germination of a spore with regard to water activity, substratum etc. The germination of this spore can finally be hindered or even suppressed by the growth of other micro-organisms in the neighborhood (e.g. Trichoderma).

On 2: Whether every spore "impacts" on the sampling medium or is separated from the sampling air depends on the degree of separation of the air sampler in use. It is easily conceivable: the smaller a spore and the lower the mass of this spore is, the easier it will be carried away with the air drawn through the sampler. Thus, the efficiency of an air sampler is defined by its ability to separate even the smallest spores (particles) from the air onto the sampling medium. The degree of separation – also called cut-off value – of an air sampler, states the smallest diameter of spherical particles with a standard density of 1000 kg/m³ that are separated by the sampler from the sampling air with a probability of 50%. Naturally the given degree of separation (cut-off) only applies to the operation with nominal values, e.g. volume flow.

The degree of separation (cut-off) gets reduced with decreasing volume flow.

On 1: Depending on the spore concentration in the air, more than one spore per jet hole is will be accelerated and will hit the corresponding germination spot during a sampling. The more the germination spots are filled, the lower the probability for a spore to hit a spot that is not occupied and still "available". With an assignment of 90% of the possible germination spots, the chance for a spore to "find" a free spot is only 1 to 10. Multiple spores on a single germination spot only form a single CFU after germination and are not visible as several single colonies to the eye. Thus, the number of the CFU after cultivation will actually be lower than the "sampled" (impacted) spores.

But by how much?

An approach to the determination of the actually collected spores is provided by statistics. Under the assumption of a uniform distribution of the sampling air over the jet plate, the following statistical approach permits a calculation of the actually collected particles from the number of CFUs. The calculation is done on the basis of the distribution of the occupied spots at a given number of particles (n) and known jet hole number (N). Knowing the distribution of the occupied spots (n - 1) in relation to the number of jet holes (N), the distribution of n particles can be computed (conditional probability). The distribution for 1, 2, ..., n particles can be calculated recursively. The expectation values of this distribution can be calculated according to the following equation in which En equals the number of CFUs for n collected particles.

$$E_n = N * \left(1 - \left[\frac{N - 1}{N} \right]^n \right)$$

The function of the particle number determined statistically via the number of CFUs is represented in diagram on the following page.
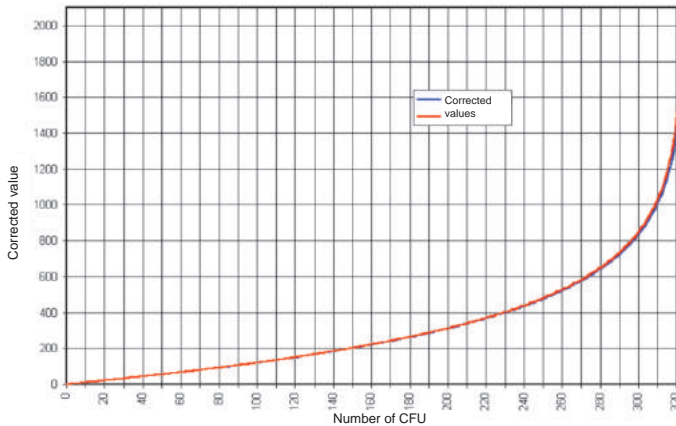
Limits of the statistical correction

A correction of the number of CFUs with the number of particles determined statistically is possible only on the total spore count. A projection of the CFU numbers with the individual identified species of the CFU is not possible with this statistical procedure.

The software "Korrektur" (which can be run under Microsoft Windows) for the calculation can be found on the included data medium in the directory Doku\Keimzahlkorrektur.

Appendix B: Table for Statistical Corr. of LKS 30

CFU	Corr	CFU	Corr	CFU	Corr	CFU	Corr	CFU	Corr	CFU	Corr
1	1	55	60	109	133	163	227	217	359	271	588
2	2	56	61	110	134	164	229	218	362	272	594
3	3	57	63	111	136	165	231	219	366	273	601
4	4	58	64	112	137	166	233	220	369	274	607
5	5	59	65	113	139	167	235	221	372	275	614
6	6	60	66	114	141	168	237	222	375	276	621
7	7	61	68	115	142	169	239	223	378	277	628
8	8	62	69	116	144	170	241	224	381	278	635
9	9	63	70	117	145	171	243	225	385	279	642
10	10	64	71	118	147	172	245	226	388	280	649
11	11	65	73	119	148	173	248	227	391	281	657
12	12	66	74	120	150	174	250	228	395	282	664
13	13	67	75	121	152	175	252	229	398	283	672
14	14	68	76	122	153	176	254	230	402	284	680
15	15	69	78	123	155	177	256	231	405	285	689
16	16	70	79	124	156	178	258	232	409	286	697
17	17	71	80	125	158	179	261	233	412	287	706
18	19	72	81	126	160	180	263	234	416	288	715
19	20	73	83	127	161	181	265	235	419	289	724
20	21	74	84	128	163	182	268	236	423	290	734
21	22	75	85	129	165	183	270	237	427	291	743
22	23	76	87	130	166	184	272	238	430	292	753
23	24	77	88	131	168	185	274	239	434	293	764
24	25	78	89	132	170	186	277	240	438	294	775
25	26	79	91	133	171	187	279	241	442	295	786
26	27	80	92	134	173	188	282	242	446	296	797
27	28	81	93	135	175	189	284	243	450	297	809
28	29	82	95	136	176	190	286	244	454	298	822
29	30	83	96	137	178	191	289	245	458	299	835
30	31	84	97	138	180	192	291	246	462	300	848
31	33	85	99	139	182	193	294	247	466	301	862
32	34	86	100	140	183	194	296	248	471	302	877
33	35	87	101	141	185	195	299	249	475	303	892
34	36	88	103	142	187	196	301	250	479	304	909
35	37	89	104	143	189	197	304	251	484	305	926
36	38	90	105	144	191	198	306	252	488	306	944
37	39	91	107	145	192	199	309	253	493	307	963
38	40	92	108	146	194	200	312	254	498	308	983
39	42	93	110	147	196	201	314	255	502	309	1004
40	43	94	111	148	198	202	317	256	507	310	1028
41	44	95	112	149	200	203	319	257	512	311	1052
42	45	96	114	150	202	204	322	258	517	312	1079
43	46	97	115	151	203	205	325	259	522	313	1109
44	47	98	117	152	205	206	328	260	527	314	1141
45	48	99	118	153	207	207	330	261	532	315	1177
46	50	100	120	154	209	208	333	262	537	316	1218
47	51	101	121	155	211	209	336	263	542	317	1264
48	52	102	123	156	213	210	339	264	548	318	1318
49	53	103	124	157	215	211	342	265	553	319	1383
50	54	104	125	158	217	212	345	266	559	320	1464
51	55	105	127	159	219	213	347	267	564	321	1573
52	57	106	128	160	221	214	350	268	570	322	1738
53	58	107	130	161	223	215	353	269	576	323	2094
54	59	108	131	162	225	216	356	270	582		

Air Sampling System MBASS30V3

Appendix C: Table for Statistical Corr. of LKS100

CFU	Corr	CFU	Corr	CFU	Corr	CFU	Corr	CFU	Corr	CFU	Corr	CFU	Corr	CFU	Corr	CFU	Corr	CFU	Corr
1	1	51	54	101	113	151	180	201	257	251	349	301	461	351	606	401	811	451	1165
2	2	52	55	102	114	152	181	202	259	252	351	302	463	352	609	402	816	452	1175
3	3	53	56	103	115	153	183	203	261	253	353	303	466	353	613	403	821	453	1186
4	4	54	57	104	117	154	184	204	262	254	355	304	469	354	616	404	826	454	1197
5	5	55	58	105	118	155	186	205	264	255	357	305	471	355	620	405	832	455	1208
6	6	56	59	106	119	156	187	206	266	256	359	306	474	356	623	406	837	456	1219
7	7	57	61	107	120	157	188	207	267	257	361	307	476	357	627	407	842	457	1231
8	8	58	62	108	122	158	190	208	269	258	363	308	479	358	630	408	848	458	1243
9	9	59	63	109	123	159	191	209	271	259	365	309	481	359	634	409	853	459	1255
10	10	60	64	110	124	160	193	210	272	260	367	310	484	360	637	410	859	460	1267
11	11	61	65	111	126	161	194	211	274	261	369	311	487	361	641	411	864	461	1280
12	12	62	66	112	127	162	196	212	276	262	371	312	489	362	644	412	870	462	1293
13	13	63	67	113	128	163	197	213	278	263	373	313	492	363	648	413	876	463	1307
14	14	64	68	114	129	164	199	214	279	264	376	314	495	364	652	414	882	464	1321
15	15	65	70	115	131	165	200	215	281	265	378	315	497	365	655	415	888	465	1335
16	16	66	71	116	132	166	202	216	283	266	380	316	500	366	659	416	893	466	1350
17	17	67	72	117	133	167	203	217	285	267	382	317	503	367	663	417	900	467	1365
18	18	68	73	118	135	168	205	218	286	268	384	318	506	368	667	418	906	468	1380
19	19	69	74	119	136	169	206	219	288	269	386	319	508	369	670	419	912	469	1397
20	20	70	75	120	137	170	208	220	290	270	388	320	511	370	674	420	918	470	1413
21	21	71	77	121	139	171	209	221	292	271	391	321	514	371	678	421	924	471	1430
22	22	72	78	122	140	172	211	222	294	272	393	322	517	372	682	422	931	472	1448
23	24	73	79	123	141	173	212	223	295	273	395	323	520	373	686	423	937	473	1467
24	25	74	80	124	143	174	214	224	297	274	397	324	522	374	690	424	944	474	1486
25	26	75	81	125	144	175	215	225	299	275	399	325	525	375	694	425	950	475	1506
26	27	76	82	126	145	176	217	226	301	276	402	326	528	376	698	426	957	476	1527
27	28	77	84	127	147	177	219	227	303	277	404	327	531	377	702	427	964	477	1548
28	29	78	85	128	148	178	220	228	305	278	406	328	534	378	706	428	971	478	1571
29	30	79	86	129	149	179	222	229	306	279	408	329	537	379	710	429	978	479	1595
30	31	80	87	130	151	180	223	230	308	280	411	330	540	380	714	430	985	480	1620
31	32	81	88	131	152	181	225	231	310	281	413	331	543	381	719	431	992	481	1646
32	33	82	90	132	153	182	226	232	312	282	415	332	546	382	723	432	1000	482	1674
33	34	83	91	133	155	183	228	233	314	283	418	333	549	383	727	433	1007	483	1703
34	35	84	92	134	156	184	229	234	316	284	420	334	552	384	731	434	1015	484	1731
35	36	85	93	135	157	185	231	235	318	285	422	335	555	385	736	435	1022	485	1768
36	37	86	94	136	159	186	233	236	319	286	425	336	558	386	740	436	1030	486	1804
37	38	87	96	137	160	187	234	237	321	287	427	337	561	387	745	437	1038	487	1842
38	40	88	97	138	162	188	236	238	323	288	429	338	564	388	749	438	1046	488	1884
39	41	89	98	139	163	189	237	239	325	289	432	339	567	389	754	439	1054	489	1929
40	42	90	99	140	164	190	239	240	327	290	434	340	570	390	758	440	1063	490	1979
41	43	91	100	141	166	191	241	241	329	291	436	341	573	391	763	441	1071	491	2035
42	44	92	102	142	167	192	242	242	331	292	439	342	577	392	767	442	1080	492	2097
43	45	93	103	143	168	193	244	243	333	293	441	343	580	393	772	443	1089	493	2169
44	46	94	104	144	170	194	246	244	335	294	444	344	583	394	777	444	1098	494	2252
45	47	95	105	145	171	195	247	245	337	295	446	345	586	395	781	445	1107	495	2352
46	48	96	107	146	173	196	249	246	339	296	449	346	589	396	786	446	1116	496	2478
47	49	97	108	147	174	197	251	247	341	297	451	347	593	397	791	447	1125	497	2646
48	50	98	109	148	176	198	252	248	343	298	453	348	596	398	796	448	1135	498	2901
49	52	99	110	149	177	199	254	249	345	299	456	349	599	399	801	449	1145	499	3450
50	53	100	112	150	178	200	255	250	347	300	458	350	603	400	806	450	1155		

This appendix lists possible **MBASS30v3** faults along with corrective solutions.

Fault	Possible solution
MBASS30v3 cannot be switched on.	Charge battery, press the on/off button for more than 10 seconds (reset will be performed), have the fuses in the device checked
MBASS30v3 does not switch off automatically when idle	Check the settings whether the automatic power-off is enabled

Error messages after power-on and when idle

Error message	Possible solution
Settings error!	Check the **MBASS30v3** configuration and correct if necessary
Adjustment data error!	Re-enter the adjustment data stated in the factory calibration certificate using the MBASSControl software
Battery low! Please charge battery	Connect charger (Section 6.1) or switch off **MBASS30v3** (Section 7.8)
Difference pressure sensor faulty	The controller in **MBASS30v3** cannot communicate with the difference pressure sensor. Turn the device off and on again. Return the device for repair if necessary.
Absolute pressure sensor faulty	The controller in **MBASS30v3** cannot communicate with the absolute pressure sensor. Turn the device off and on again. Return the device for repair if necessary.

Error messages after power-on and when idle (continued)

Error message	Possible solution
Temperature sensor faulty	The integrated temperature sensor is faulty. Use an external temperature sensor. Send in for repair.

Error messages during a sampling

Error message	Possible solution
Motor failure!	The fan motor is faulty. If a start-up sound was audible, restart sampling. Otherwise return **MBASS30v3** for repair.
Battery low! Please charge battery	Connect charger (Section 6.1) or switch off **MBASS30v3** (Section 7.8)
Air flow blocked	Check that the air inlet of the sampling head is free of obstacles. Check whether the battery voltage is sufficient (> 20 %), recharge battery if necessary. This error message is also displayed, if a sampling head (**LKS 30**, **PS 30**, **FA 30**) is operated at 100 l/min instead of the nominal volume flow of 30 l/min.

holbach
UMWELTANALYTIK

EG – Konformitätserklärung
DECLARATION OF CONFORMITY (DoC)

Name und Anschrift des Herstellers   Umweltanalytik Holbach GmbH
Name and address of the manufacturer   Sperberweg 3
66687 Wadern
Germany
Telefon *Phone*   +49 (0)6874/182277
E-Mail   info@holbach.biz

Gegenstand der Erklärung   Mikrobiologisches Probenahmesystem **MBASS30v3**
Object of the declaration   *Microbiological air sampling system* **MBASS30v3**

Das oben genannte Produkt erfüllt die wesentlichen Anforderungen, die in der Richtlinie 2014/30/EU zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit festgelegt sind.
The above mentioned product complies with the essential requirements, which are specified in the directive 2014/30/EU on the approximation of the laws of the Member States relating to electromagnetic compatibility.

Das Produkt aus der oben beschriebenen Erklärung stimmt mit den Anforderungen der folgenden Spezifikationen überein:
The product of the declaration described above is in conformity with the requirements of the following specifications:

Dokument : Ausgabe *Documents-No: Date of issue*	Titel *Title*
EN 55011: 2009 + A1: 2010 Klasse A	Industrielle, wissenschaftliche und medizinische Geräte - Funkstörungen - Grenzwerte und Messverfahren *Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement*
EN 61326-1:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen *Electrical equipment for measurement, control and laboratory use - EMC requirements*
EN 61000-3-2: 2006 + A1: 2009 + A2: 2009 EN 61000-3-3: 2008 EN 61000-4-2: 2009 EN 61000-4-3: 2006 + A1: 2008 + A2: 2010 EN 61000-4-4: 2004 + A1: 2010 EN 61000-4-5: 2006 EN 61000-4-6: 2009 EN 61000-4-8: 2010 EN 61000-4-11: 2004	Elektromagnetische Verträglichkeit (EMV) *Electromagnetic compatibility (EMC)*
DIN EN 61010-1: 2011	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte *Safety requirements for electrical equipment for measurement, control and laboratory use*

Verantwortlicher: Helmut Holbach,
Identity of responsible person: Geschäftsführer, *General Manager*

Unterschrift:
Signature

Datum: 16.10.2018
(Date of issue of the DoC)