
2-Kanalige Probenahmepumpe 2-Channel Sampling Pump



BiVOC2v2

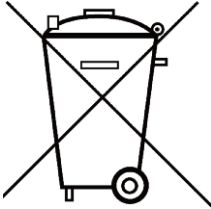
Bedienungsanleitung Operating Manual

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.

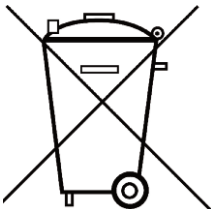
Die Batterien in diesem Gerät enthalten kein Blei, Cadmium oder Quecksilber.

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.

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Note: This operating manual uses the following differing unit designations:

Standard Liters as SL, Norm Liters as NL, Liters as L

This manual applies to **BiVOC2v2** with color display and touch operation.

Thank you very much for choosing our 2-channel sampling pump **BiVOC2v2**.

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

BiVOC2v2 is the 2-channel pump for simultaneous (double) sampling of gaseous and air-transported substances which deposit on sample media connected upstream of **BiVOC2v2**.

The **BiVOC2v2** system is only for sampling in non-corrosive atmospheres.

Please note the safety instructions in section 14 of this manual.

This manual has to be provided to all persons operating the device and must be kept easily accessible.

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



We recommended reading this paragraph very carefully.



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).

1. The Features of BiVOC2v2

1. The Features of BiVOC2v2



Figure 1 The 2-channel sampling pump **BiVOC2v2**

The features of **BiVOC2v2**

- ▶ 10 individual presets (description text, volume, volume flow, start delay, sampling duration, logging interval of the sampling process)
- ▶ Volume flow can be preset in the range from 0.05 to 2.0 l/min
- ▶ Sampling volume can be preset from 0.50 Liters up to 5,000 Liters
- ▶ Start delay from 1 second to 24 hours
- ▶ 3 volume types: Standard liters, Norm liters, volumetric Liters
- ▶ Filter, mass flow sensor and servo valve in every channel
- ▶ 4.3 inch (109 mm) color display with additional glass cover
- ▶ 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

2. Package Contents

2. Package Contents

The delivery of the **BiVOC2v2** contains the following:

- ▶ the robust **BiVOC2v2** 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 BiVOCControl for configuration, remote control and adjustment of **BiVOC2v2** on the included data medium
- ▶ a replacement 2A slow-blow fuse
- ▶ a hose nipple and an activated carbon cartridge (for plugging onto the air outlet to reduce operating noise)
- ▶ 1 m silicone hose, 4 mm inner diameter, 8 mm outer diameter
- ▶ a Y-piece to combine the two inputs

And optionally:

- ▶ Temperature/humidity sensor, rotronic, Type HC2A-S
- ▶ 1 m extension cable for temperature/humidity sensor
- ▶ Sample-media bracket
- ▶ Handling case

3. Operating Elements

3. Operating Elements

3.1 Overview of the Operating Elements

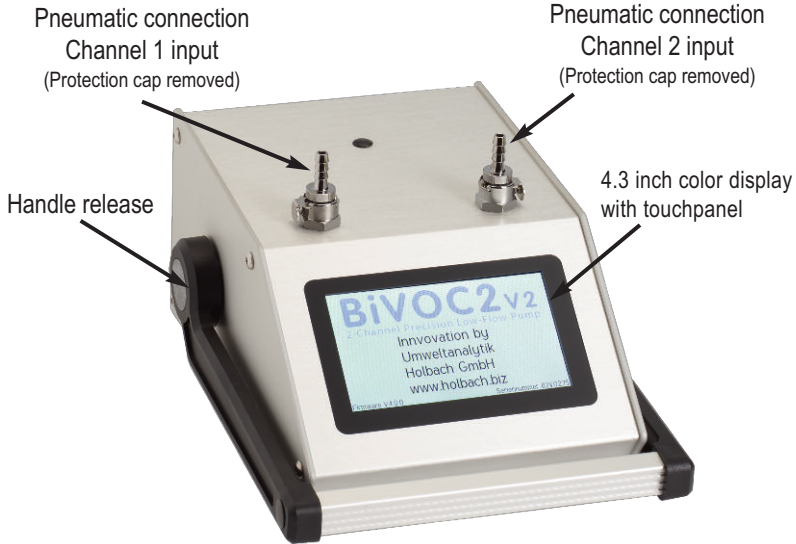


Figure 2 **BiVOC2v2** front view

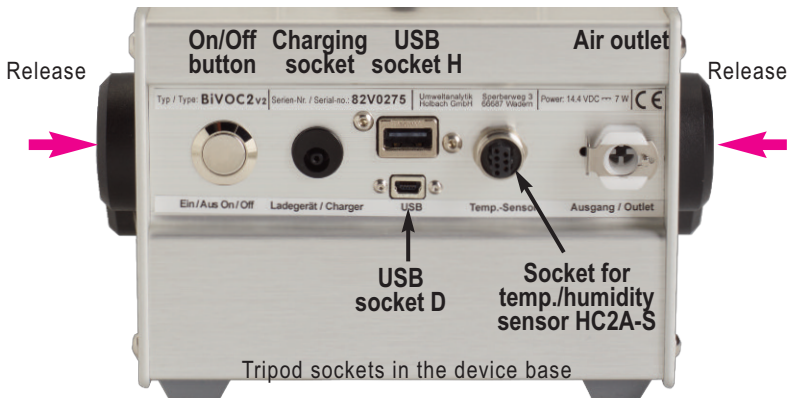


Figure 3 **BiVOC2v2** rear view

3. Operating Elements

3.2 The Carrying Handle

The handle for comfortable carrying of **BiVOC2v2** 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.

3.3 The 4.3 Inch Color Display with Touchpanel

BiVOC2v2 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.

3.4 The Acoustic Signaler

BiVOC2v2 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

3.5 The Tripod Sockets

There are two tripod sockets in the **BiVOC2v2** device base: UNC 1/4 inch (photo) and UNC 3/8 inch (microphone) (Figure 4).

Only use tripods that can support the weight of **BiVOC2v2** (approx. 3 kg) and ensure that they provide a secure standing.

3. Operating Elements, 4. Connectors

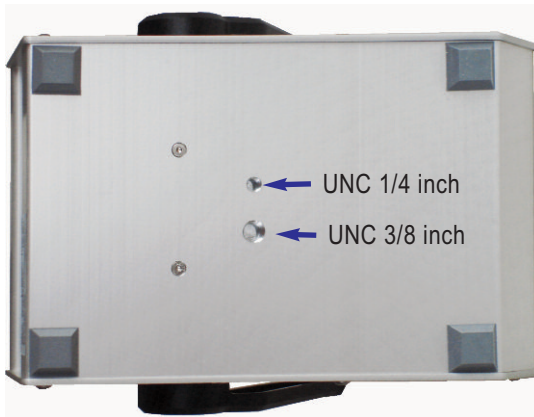


Figure 4 Tripod sockets in the device base

4. Connectors

4.1 Pneumatic Connectors

The connectors for the **sample-air inlets** are located at the top of **BiVOC2v2** with pluggable hose nipples made of metal for hoses with 4 mm inner diameter.

The hose nipples are plugged into self-locking metal couplings.

Info: The couplings for the sample-air inlets are equipped with valves. If no hose nipple is plugged in the connection is closed. There is a protection cap on the hose nipples that needs to be removed before use.

4. Connectors

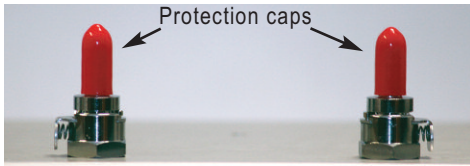


Figure 5 Protection caps on the hose nipples

The **sample-air outlet** is equipped with a self-locking coupling made out of plastic and is on the rear side (Figure 3).

The coupling in the sample-air outlet has no valve and is always open. Delivery includes a pre-assembled hose nipple with a short hose piece and an activated carbon cartridge. One side of the activated carbon cartridge is to be put into the end of the hose. The hose nipple with the connected cartridge is to be fitted into the sample-air outlet and is used as a sound suppressor.

The size of the pluggable coupling in the air inlets and air outlets is the same.

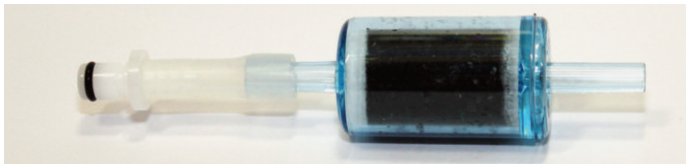


Figure 6 Hose nipple with filter cartridge as sound suppressor

Note: By attaching about 25 cm of hose to the free end of the active carbon cartridge the noise level of **BiVOC2v2** gets further reduced and the distance between the intake and the outlet increases by the length of the hose.



4. Connectors

Removing the hose nipples:

To remove the plug, first press on the latch (1) and then pull off the hose nipple (2).

Connecting the hose nipples:

To connect the hose nipple first press the latch (1) until it locks into position. Then insert the hose nipple (2) into the coupling until it locks into place.

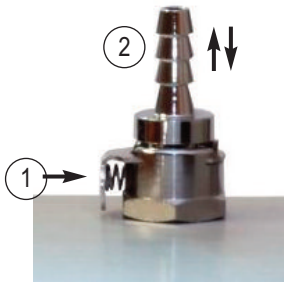


Figure 7 Inlet connection

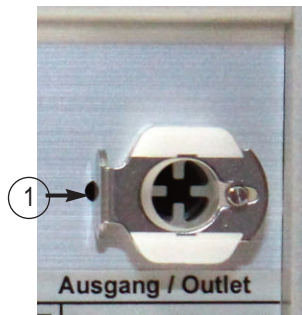


Figure 8 Outlet connection

4.2 Electrical Connectors

4.2.1 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".



4. Connectors

4.2.2 The 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 9 The USB Socket H

4.2.3 The USB Socket D

BiVOC2v2 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 10 The USB socket D

4.2.4 The Temperature and Humidity Sensor Socket

BiVOC2v2 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 **BiVOC2v2**. The temperature value is required for converting Standard Liters to volumetric liters. Apart from that, the average readings of the connected sensor are stored as average values in the sampling history.

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.

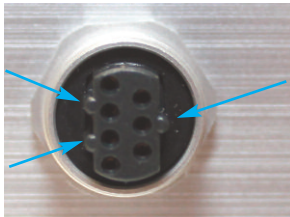


Figure 11 The socket for the temperature/humidity sensor

4. Connectors, 5. Charger

The length of the HC2A-S sensor is approx. 10.8 cm.



Figure 12 The temp./humidity sensor rotronic HC2A-S

5. Charger

A quick-charger for charging the integrated Lithium-Polymer battery pack (14.4 Volt / 3800 mAh) is part of the delivery of **BiVOC2v2**.

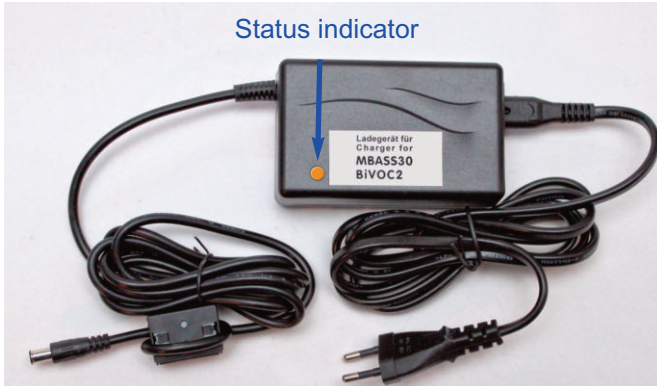


Figure 13 The quick-charger for **BiVOC2v2**

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

5.1 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 **BiVOC2v2**.

5. Charger

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.



Figure 14 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 **BiVOC2v2**.



Please note the safety instructions in section 14!

6. Sample-Media Bracket

6. The Optional Sample-Media Bracket

The optional media bracket can be used to fix the sample-media approx. 25 cm above the pump.

It is held by a clamp. The gooseneck allows the clamp to be tilted.

The media bracket can be removed from the socket on the top side of the pump for transport.

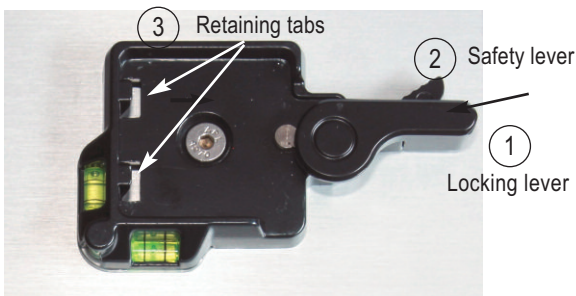


Figure 15 Media bracket socket on the top side of the device

Installation:

- Insert the media bracket such that its lower part locks with the retaining tabs (3) (Figure 15).
- Push down the media bracket until the locking lever (1) snaps in place by itself (Figure 16).



Figure 16 Media bracket being installed

If the media bracket cannot be inserted into the socket, it may help to push the locking lever backwards.

6. Sample-Media Bracket



Figure 17 Media bracket is installed

Removing:

- Push the safety lever (2) beneath the locking lever (1) and push them both backwards.
- Tilt the media bracket to the left and pull it upwards.



The media bracket is not a handle!

The media bracket quick release plate is not designed to be pulled on. Therefore, **never** lift the **BiVOC2v2** pump with the media bracket.



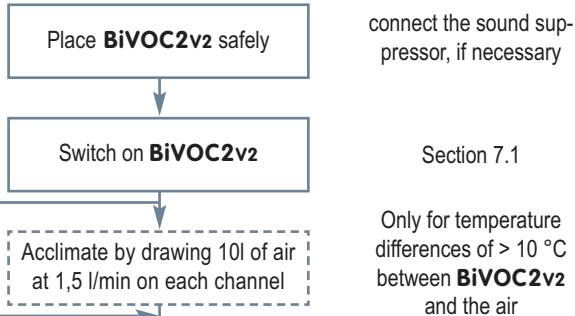
Figure 18 Media bracket

7. Operating BiVOC2V2

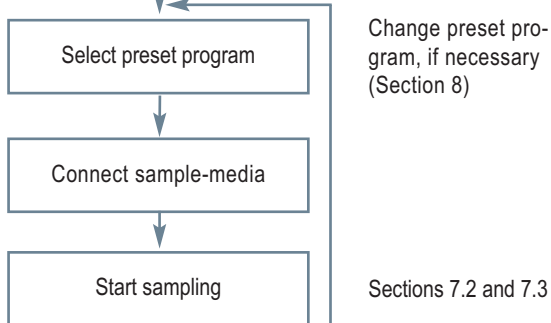
7. Operating BiVOC2v2

Operating **BiVOC2v2** is simple and consists of the following steps:

Prior to sampling



Sampling



After sampling



After the last sampling



7. Operating BiVOC2v2

7.1 Switching on BiVOC2v2

To switch on **BiVOC2v2**, 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:

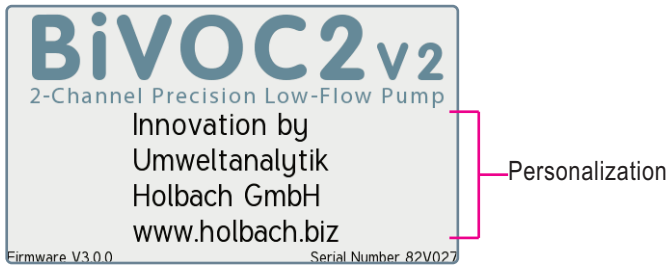


Figure 19 Display when switching on

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 **BiVOC2v2**.

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

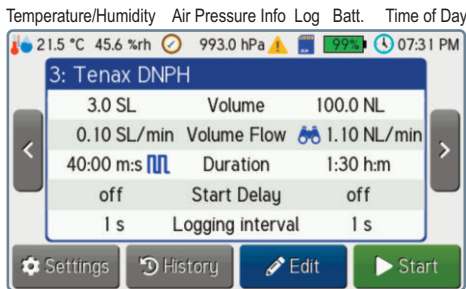


Figure 20 Main screen after switching on

The external temp./humidity sensor 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.

7. Operating BiVOC2V2

Each preset program contains:

- ▶ a description text (editable using the BiVOCControl software)
- for each channel:
- ▶ Toggle to activate / deactivate the channel
 - ▶ the sampling volume in liters, range: 0.5 up to 5,000 l
 - ▶ the volume flow, range: 0.05 up to 2.0 l/min
 - ▶ the volume type: SL, NL, L
 - ▶ the sampling duration (if interval mode is enabled)
 - ▶ the start delay, range: 1 second up to 24 hours
 - ▶ Toggles for flow monitoring and interval mode
- ▶ the logging interval in seconds, range: 0 up to 240 s

7.2 Mapping of the Displayed Data to the Channels

In the main screen (Figure 20), during sampling and in the history view, data for both channels is displayed. The data for channel 1 is shown on the left, highlighted in orange, and the data for channel 2 is shown on the right, highlighted in blue. This layout corresponds to the arrangement of the pneumatic connectors of the channels (Figure 2).

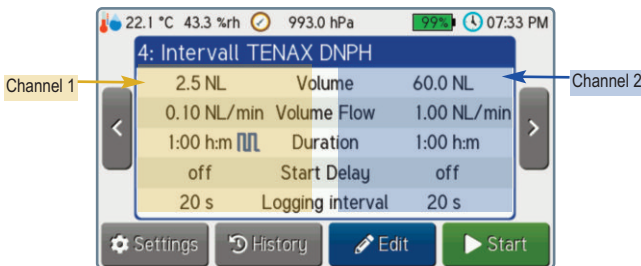


Figure 21 Mapping of the displayed data to the channels

7.3 Selecting a Preset Program

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

7. Operating BiVOC2v2

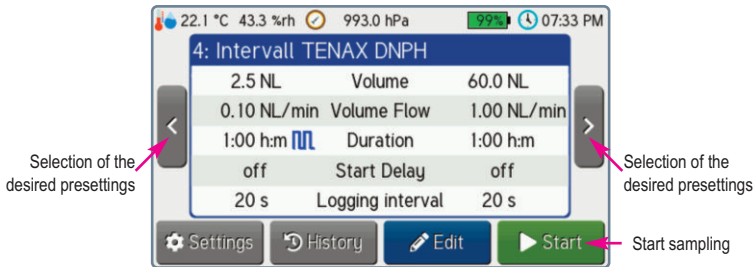


Figure 22 Selecting the desired presetsings

If the present preset programs are not as desired, the parameters (except for the description text) can be modified directly at **BiVOC2v2**. See section 8 for details on this.

Note: The number of shown preset programs can be limited in the “Sampling” settings.



7.3 Starting the Sampling

Prior to sampling, the appropriate sample-medium has to be prepared and connected to the pneumatic input of **BiVOC2v2**. The sampling is started by pressing the **Start** button (Figure 22).



The sampling number is increased at every start.



Figure 23 Sampling active

7. Operating BiVOC2V2

7.4 Pausing the Sampling

By tapping on one of the buttons  or , a dialog is shown in which the active sampling can be paused by tapping the **Pause** button and aborted by tapping the **Stop** button.


By tapping the  button, the dialog will be closed and no action is performed.



Figure 24 Dialog to pause and abort a sampling

While a channel is paused, the sampling of the selected channel can be aborted by tapping the **Stop** button.

By tapping the **Resume** button, the pause on the selected channel will be ended and the sampling will continue.

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.

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. Operating BiVOC2V2

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 volume is reached for all active channels, **BiVOC2v2** shows message box in the display, plays a 3 tone sequence and stops the sampling. (Figure 25).

The acoustic signalling can be deactivated in the device settings.

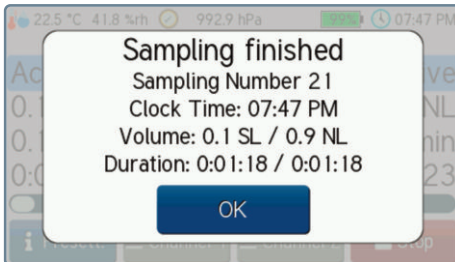


Figure 25 Dialog to acknowledge the end of the sampling

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, **BiVOC2v2** switches back to the main screen and is ready for the next sampling (Figure 20).

Disconnect the sample-media and prepare **BiVOC2v2** for the next sampling.

7.6 Aborting a Sampling

By tapping the **Stop** button (Figure 23) and subsequent confirmation (Figure 25), the sampling can be aborted.

Manual abortions are only signalled by a message (Figure 25). After acknowledging, **BiVOC2v2** switches back to the main screen (Figure 20).

7. Operating BiVOC2V2



Figure 26 Dialog to confirm the abortion of a sampling

7.7 Restarting a Sampling

When the sampling is finished on one channel and the other channel is still active, a new sampling can be prepared and started on the inactive channel.



First, the channel is selected by tapping one of the buttons  or  and then the **New** button has to be tapped.



Figure 27 Channel 1 is being restarted

Afterwards, a preset program can be selected and started as usual. However, only the parameters of the channel that can be started are visible.

7. Operating BiVOC2v2

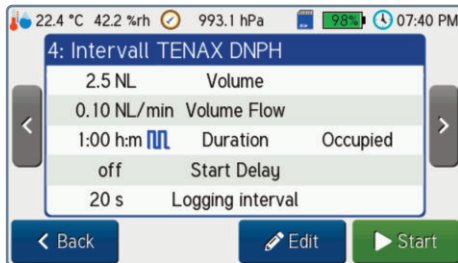


Figure 28 Preset selection when restarting, here for channel 1

7.8 Sampling Disruptions

The following errors are detected and displayed by **BiVOC2v2** during sampling:

- ▶ Low battery voltage
- ▶ A sensor fault (pressure or temperature) has occurred
- ▶ The pump motor is faulty

In these cases the sampling is terminated. The reason for the disruption is shown (Figure 29) and the alarm is signalled by a 2 tone sequence. The acoustic signalling can be deactivated.

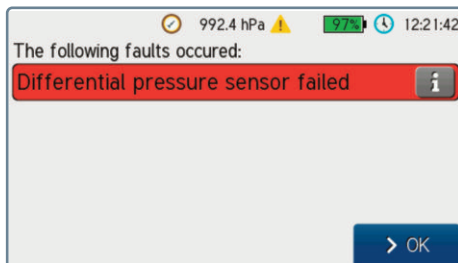



Figure 29 A disruption occurred

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.

7. Operating BiVOC2v2

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 30).

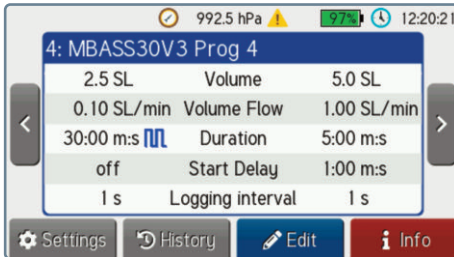


Figure 30 An error is present, sampling is not possible

7.9 Switching off BiVOC2v2

BiVOC2v2 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 **BiVOC2v2** during a sampling will abort the running sampling immediately.

The switching off is signalled by **BiVOC2v2** with two short tones.

Depending on the configuration, **BiVOC2v2** will automatically switch off when it is idle for a defined time.

For the automatic power-off, it is distinguished between **BiVOC2v2** 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 BiVOCControl 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. Operating BiVOC2V2

7.10 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 **BiVOC2v2** immediately (Section 5.1) or switch it off (Section 7.9).

BiVOC2v2 automatically turns off after 60 seconds in the low battery state.

Note: The charger can also be used as power supply. The available current is greater than the current required for the operation of **BiVOC2v2**.



7.11 Standby Mode

To save energy, **BiVOC2v2** 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 BiVOCControl software, the standby mode is also inactive.

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

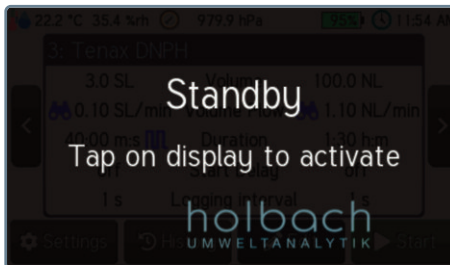


Figure 31 **BiVOC2v2** in standby mode

8. Configuring Presettings

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 22).

In the following example, the preset (program no. 2) will be modified such that the volume for channel 2 is set to 100 Standard Liters and the start delay to 30 seconds.

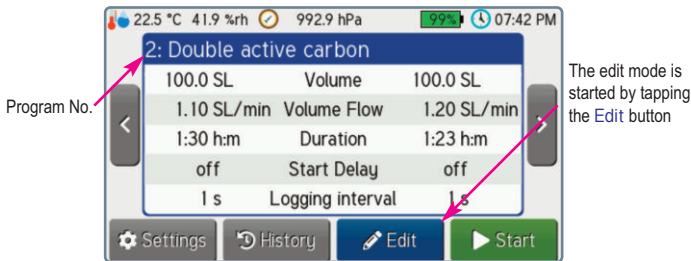


Figure 32 Channel 2 of these presets should be changed

The edit mode is started by tapping the Edit button. Initially, channel 1 is selected. Channel 2 is selected by tapping the button Chan2. The selected channel is indicated by a dot in the round white field and the respective button is colored blue.

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

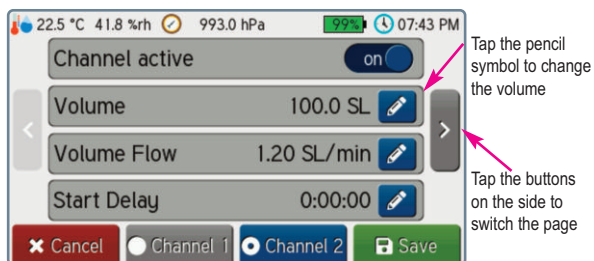


Figure 33 Channel 2 is selected to be changed

8. Configuring Presettings

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



8.2 Editing the Presettings

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



Figure 34 The editor shows the current value

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



Figure 35 The current value has been cleared

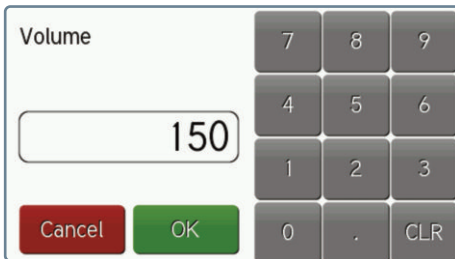
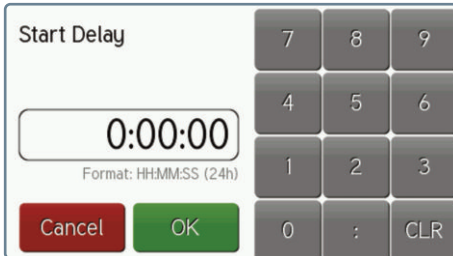


Figure 36 The editor shows the current value

The new value is accepted by tapping the **OK** button.

8. Configuring Presettings

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

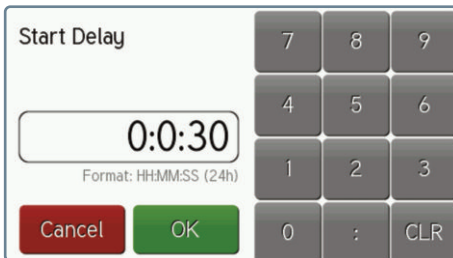


The screenshot shows a dialog box titled "Start Delay". It features a numeric keypad with buttons for digits 0-9, a colon separator, and a CLR button. The current value "0:00:00" is displayed in a text field, with the format "Format: HH:MM:SS (24h)" indicated below it. There are "Cancel" and "OK" buttons at the bottom left.

Figure 37 The editor shows the current value

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.



The screenshot shows the same "Start Delay" dialog box, but the text field now contains the value "0:0:30". The format "Format: HH:MM:SS (24h)" remains the same. The "Cancel" and "OK" buttons are still present at the bottom left.

Figure 38 The time value has been entered

8.3 Saving the Presettings

The changes to the presettings are saved by tapping the button



in the main edit mode screen (Figure 33). Tapping the button



discards the changes.

8. Configuring Presettings

8.4 Presettings in Detail

There are nine preset-parameters distributed over three pages. Switching the page is done by tapping the buttons on the sides (Figure 32).

The following parameters are available:

8.4.1 Description text (common for both channels)

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

8.4.2 Channel active (for each channel)

This toggle can be used to deactivate the channel.

8.4.3 Volume (for each channel)

The sampling volume can be set in the range from 0.5 liters up to 5,000 liters. The volume type is configured separately.

8.4.4 Volume Flow (for each channel)

The volume flow can be preset in the range from 0.05 L/min up to 2.0 L/min. The volume type is configured separately.

Please note that the end of the sampling is determined by the **set volume**. If the preset volume flow cannot be reached, the sampling will last longer.

8.4.5 Start Delay (for each channel)

The start delay allows to prepare and start each channel of **BiVOC2v2**. When the delay time has elapsed, the actual sampling begins.

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 Volume Type (for each channel)

BiVOC2v2 supports the volume types Standard Liters (SL), Norm Liters (NL) and volumetric Liters (L). A detailed description can be found in Appendix A.


8.4.7 Flow monitoring (for each channel)

When the flow monitoring is active, it will be documented if the flow is too high or too low during the sampling. The monitoring begins 30 seconds after the start of the sampling. If the volume flow is out of the tolerance window for more than 30 seconds, a flag is set in the sampling

8. Configuring Presettings

data and the symbol  (for too low flow) is shown on the screen. The tolerance window depends on the volume flow and is

- up to 0.2 NL/min: $\pm 30\%$ of the preset volume flow
- up to 0.6 NL/min: $\pm 20\%$ of the preset volume flow
- up to 2.0 NL/min: $\pm 10\%$ of the preset volume flow.

The symbol  on the screen indicates that the flow monitoring is active.

8.4.8 Interval mode and Target duration (for each channel)

Note: Two time specifications with different meanings are used:

Sampling time is the time in which the channel is active and when air is drawn through the sample-medium.

Sampling duration is the complete time between sampling start and end (including pauses).

If not in interval mode, sampling time and sampling duration are identical unless manual pauses are done.

With the interval mode the sampling duration of a channel will be extended to a preset time. This can be used to match the duration of a shorter sampling to that of a longer one such that both will be finished at the same time.

In this mode, **BiVOC2v2** automatically switches between sampling and pause in certain intervals such that the target volume will be reached when the preset duration is over. The **maximum number** of intervals can be configured in the **Sampling** settings. The actual number as well as the duration of each interval and pause are calculated automatically and cannot be influenced.



The calculations take the following limit values into account:

Minimum runtime per interval: **10 minutes**

Minimum pause time: **5 minutes**

Minimum number of intervals: **2**


Maximum sampling duration: **1000 hours**

From this it follows that the sampling time may not be below **20 minutes** (2 intervals of 10 minutes each).

8. Configuring Presettings

Accordingly, the minimum sampling duration is **25 minutes** (2 intervals of 10 minutes each + 1 pause of 5 minutes).

If the sampling time for the set volume and the set volume flow is too short, the interval mode cannot be activated and a corresponding message is shown. The desired sampling duration can be set as "Target duration". When saving the presettings, a check is performed to ensure that all limit values can be met. If this is not the case, a message is shown and the parameters have to be adjusted.

The symbol  is shown on the screen, when the interval mode is activated.

For a channel in interval mode the remaining time for the current interval is shown as "Remaining time" during sampling. During a pause between two intervals, the remaining pause time is shown.

It is possible to continue from an automatic pause like from a manual pause. The times of the following intervals and pauses will be recalculated.

Manual pauses are possible but also have to be continued manually. In this case, the times are will be recalculated, too. If the (manual) pause lasted so long that it is no longer possible to complete the remaining intervals in the given sampling duration, the rest of the volume will be drawn in one interval.

It is possible that the preset sampling duration cannot be maintained correctly anymore in this case.

8.4.9 Logging interval (common for both channels)

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 BiVOCControl software.

8. Configuring Presettings

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

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 form 0 to 65535 is assigned to each sampling.

The history data contains:

- ▶ Sampling number
- ▶ Start operation (date and time)

for each channel:

- ▶ 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 (only with external sensor)
- ▶ 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 20) will open the history view. The data of the latest sampling is shown initially.

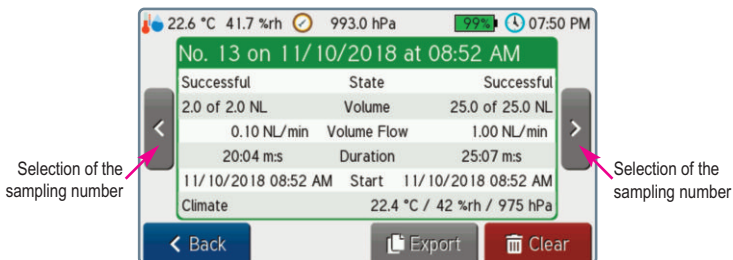


Figure 39 Sampling history view

The two buttons on the sides can be used to select the other entries.

9. Sampling History

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 BiVOCControl software.

EXCEL is a registered trademark by Microsoft Corp. EXCEL is not part of the delivery of **BiVOC2v2**.

9.3 Clear 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.

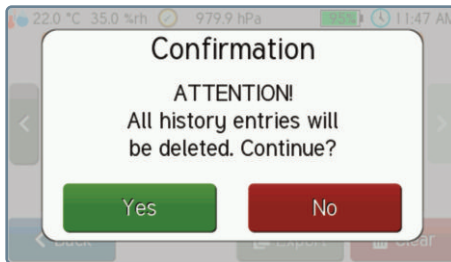


Figure 40 Dialog to confirm the deletion of all data

10. Configuring BiVOC2v2

10. Configuring BiVOC2v2

All configuration settings can be changed directly on **BiVOC2v2** and also using the BiVOCControl software.

By tapping the Settings button on the main screen, the settings menu is displayed:

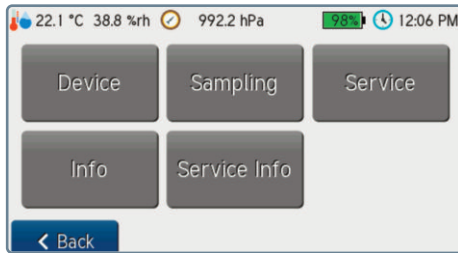


Figure 41 The settings menu

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

10.1 Device Settings

Tap the **Device** button to configure **BiVOC2v2**. The first configuration page is shown.

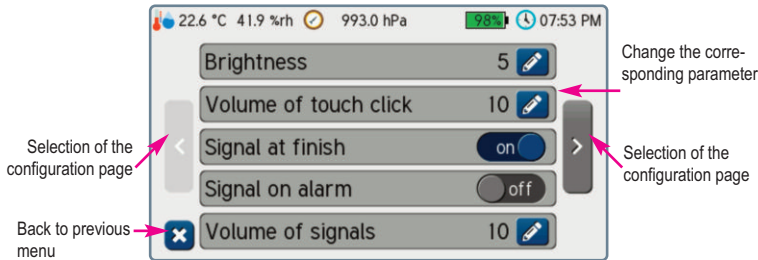





Figure 42 The first configuration page of the device settings

Tap the  button to go back to the settings menu. An on/off parameter can be directly changed by tapping the  toggle.

10. Configuring BiVOC2v2

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

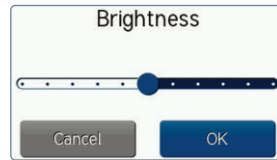


1. Slider

Tap and move the blue knob to change the value.

Save with button **OK**,

Discard with button **Cancel**.

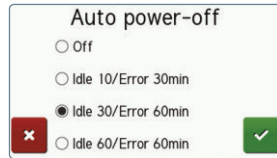


2. Selection Menu

To select the desired setting, tap the corresponding line.

Save with the green button.

Discard with the red button.

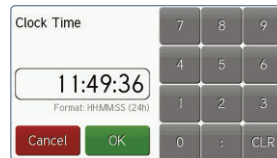


3. Time Input

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.

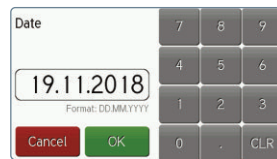


4. Date Input

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. Configuring BiVOC2v2

10.2 Sampling Settings

Parameters influencing the sampling can be changed here:

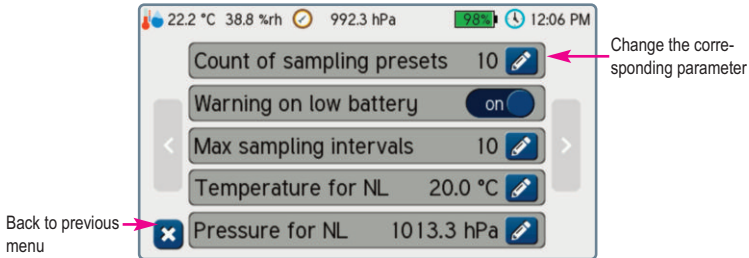


Figure 43 The sampling settings

Note on the parameter **Warning on low battery**: Based on the presettings (volume and volume flow), number of active channels and the battery voltage (~ remaining capacity), **BiVOC2v2** estimates if the capacity of the battery could be sufficient for the sampling. If this calculation is enabled, a warning is issued when starting a sampling and the expected capacity is too low.



The calculation constants were determined empirically. Battery aging and other influences can distort the results. When the pump is operated with the charger connected, the check is not performed.

Note on the settings **Temperature for NL** and **Pressure for NL**: The reference values for the volume type Norm Liters (NL) are shown here.

Usually, the volume type Norm Liters refers to a temperature of 20 °C (293 K) and a pressure of 1013.3 hPa. Changing these parameters allows to set different reference values for the volume type Norm Liters.



11. Information

BiVOC2v2 stores information on the operating time, the drawn volume, etc. This information is shown under the menu item Info in the settings menu (Figure 41).

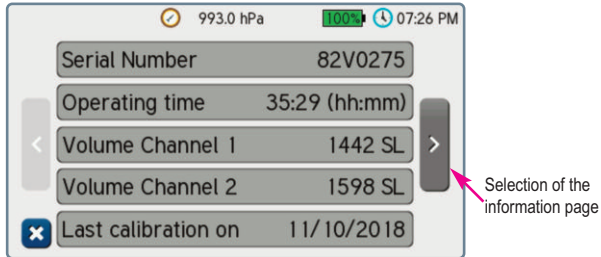


Figure 44 Example for the first information page

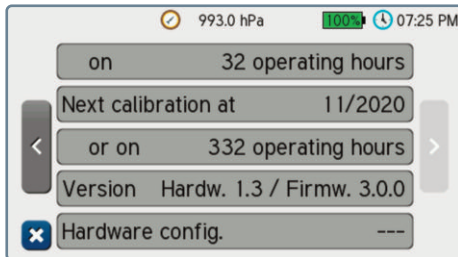



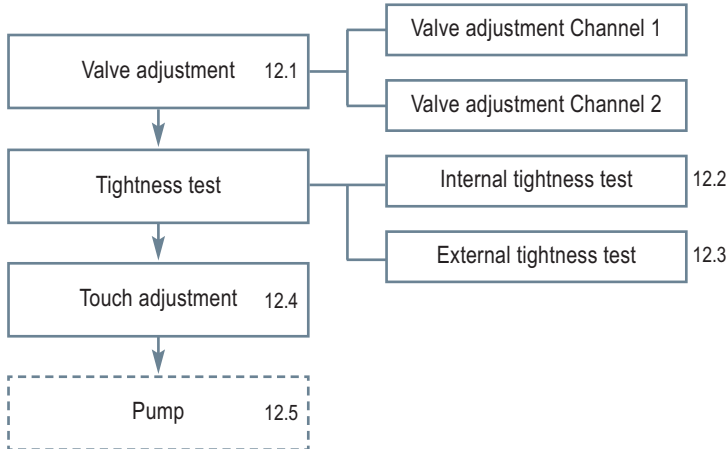
Figure 45 Example for the second information page

Tap the  button to go back to the settings menu (Figure 41).

12. Service Functions

12. Service Functions

For maintenance and service, corresponding functions are implemented in **BiVOC2v2**.



12.1 Valve Adjustment

The actuating device travel distance for the servo valves is larger than the required effective travel distance. The adjustment re-determines the point of actuation for the open and closed positions. Make sure that the air inlets are **open** by checking that hose nipples are inserted into the pluggable couplings before starting.



Figure 46 Valve adjustment - Channel selection for adjustment

12. Service Functions

The adjustment starts after the channel is selected by tapping the corresponding button. The column “Curr.” shows the current position values and the column “New” the newly determined ones. A running valve adjustment can be aborted by tapping the **Cancel** button.

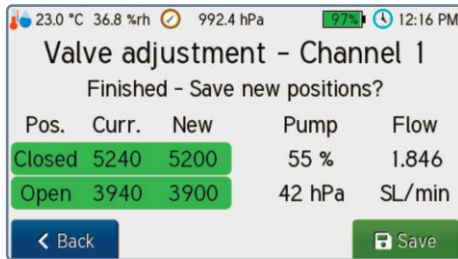


Figure 47 Valve adjustment has been performed on channel 1

The newly determined position values can be accepted by tapping the **Save** button.

Recommended interval: Annually

12.2 Internal Tightness Test

The internal tightness test checks the tightness of the internal servo valves. The test starts when the **Internal** button is tapped and it is confirmed that the inlets are open. The valves are then closed and a vacuum in the pressure storage is created. Afterwards, the volumes on both channels are measured. A running tightness test can be aborted by tapping the **Cancel** button.

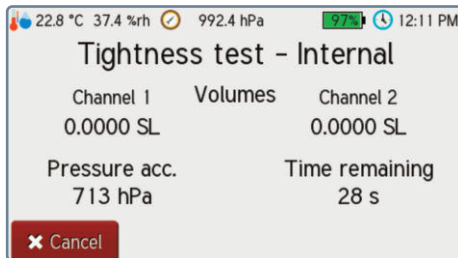


Figure 48 The internal tightness test

12. Service Functions

The result has to be acknowledged by tapping the **OK** button.
Recommended interval: Annually

12.3 External Tightness Test

The external tightness test checks the tightness of the internal pneumatic components and the components connected to the sample-air inlets. The inlets have to be closed. The test starts when the **External** button is tapped and it is confirmed that the inlets are closed. The pump creates a vacuum in the system. Afterwards, it is switched off and the pressure difference is measured for 60 seconds. The limit value is at 5% of the initial pressure. A running tightness test can be aborted by tapping the **Cancel** button.

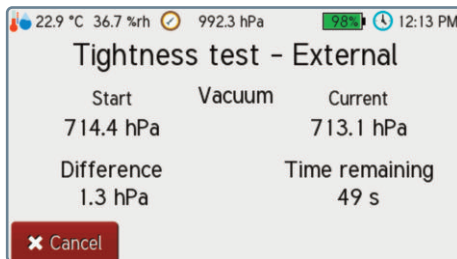


Figure 49 The external tightness test

The result has to be acknowledged by tapping the **OK** button.
Recommended interval: Annually and if necessary

12.4 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 (Figure 50). The adjustment data of the touchpanel can be saved or discarded.

Recommended interval: As necessary

12. Service Functions

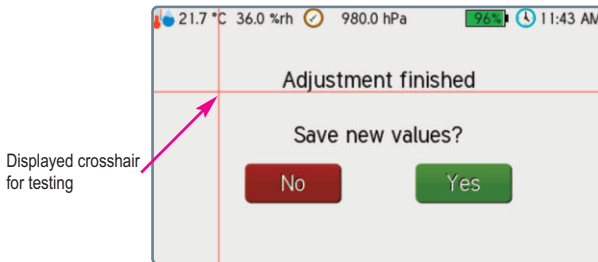


Figure 50 Touchpanel adjustment before saving

12.5 Pump

This service function allows to manually control the pump for testing purposes to test its function. The slider Set can be used to manually control the pump. The control value in percent and the pump speed are shown. Additionally, the volume flows on both channels can be seen. By tapping the **Back** button, the pump is stopped and the function is exited. The servo valves are half opened in this function such that a flow is possible.

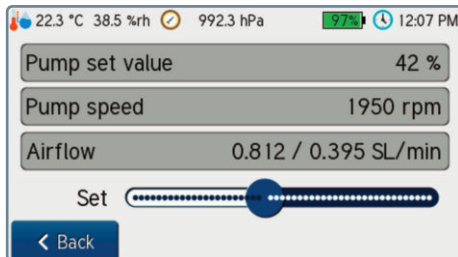


Figure 51 Pump service function

12.6 Service Info

The menu point Service Info contains further diagnostic tools:
 Analog Signals shows the values of the analog inputs
 Climate sensor outputs details on the external climate sensor HC2A-S
 Licenses shows the licenses of the used software components

13. Cleaning and Maintenance Instructions

13. Cleaning and Maintenance Instructions

Only clean **BiVOC2v2** with a damp and lint-free cloth.

Do not use abrasives.

Do not exert pressure on the display glass.

Do not insert any inappropriate objects into the pneumatic and electrical connectors.



13.1 Calibration Interval

The recommended calibration and maintenance interval is at every 300 operating hours of the integrated pump or at least every 2 years. The time until the next recommended calibration is shown in the information of **BiVOC2v2** (Section 11, Figure 45).



Note:

Charge the battery pack of **BiVOC2v2** at least every 12 months with the included battery charger even when not in use.



14. Safety Instructions

14. Safety Instructions

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

- ▶ **BiVOC2v2** may only be used for the intended purpose!
- ▶ Never block the air outlet when the pump is running!
- ▶ **BiVOC2v2** may only be used by qualified personnel!
- ▶ Prevent fluids from entering **BiVOC2v2** and the charger!
- ▶ Keep **BiVOC2v2** and the charger away from children!
- ▶ Avoid touching the display with sharp or pointed objects!
- ▶ Do not insert any inappropriate objects into the pneumatic and electrical connectors!
- ▶ 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!
- ▶ Do not use the optional media bracket as handle!
- ▶ **Warning!** **BiVOC2v2** 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!



15. Technical Data

15. Technical Data

Number of channels:	2 individually controlled channels, one mass flow sensor for each channel
Volume flow:	0.05 up to max. 2.0 SL/min per channel, sum of both channels max. 3.2 SL/min
Sample-air volume:	0.5 up to 5,000 SL, NL or l
Volume types:	Standard Liters (SL or l _S) Norm Liters (NL or l _N) Volumetric Liters (L or l) with temperature sensor
Start delay:	1 second up to 24 hours
Data storage:	100 sampling data entries (ring-buffer)
Presettings:	up to 10 presettings (volume, volume flow, volume type, flow monitoring, interval mode, start delay per channel, logging interval)
Operation:	Touchpanel
Display:	illuminated 4.3 inch (109 mm) color display
Flow measurement:	flow sensor for each channel with upstream 10 µm protection filter cartridge
Accuracy:	Volume flow: ± 2 % of the measured value plus ± 0.002 SL/min Volume: ± 2.5 % of the measured value Specified for medium air at 25 °C
Climate sensors:	Air pressure using the internal barometric sensor Temperature and humidity with optional external temp./humidity sensor HC2A-S
Operating temp.:	5 °C up to 30 °C
Air conveying mechanism:	maintenance-free membrane pump with controlled brushless drive
Power supply:	LiPo battery pack 14.4 Volts, 3600 mAh
Buffer battery:	Lithium button cell CR2032

15. Technical Data

15. Technical Data (continued)

Sample-air connection:	via lockable pluggable couplings made out of metal with valves and hose fittings for hoses with a 4 mm inner diameter
Data connection:	Mini-USB socket (Type B) on the rear side USB type A on the rear side for memory stick
Dimensions:	180 mm x 125 mm x 255 mm (W x H x D)
Weight:	2440 g
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

Optional accessories:

Temp. / humidity sensor:	rotronic HygroClip2 Advanced (HC2A-S), can be plugged into the socket on the rear side
Sample-media bracket:	for fixing the sample-media, approx. 25 cm, with quick-release plate
Handling case:	system with PE foam cut-outs, available in light gray, anthracite and sapphire blue

Note: **Subject to technical changes**

16. Conditions of Warranty

16. 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: 01/2019

Hardware version 1.30

Firmware version: 3.1.0

17. The BiVOCControl Software

17. The BiVOCControl Software

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

BiVOC2v2 is connected with the USB socket D (Figure 3).

19.1 Overview

The BiVOCControl software can be used to:

- ▶ remotely control **BiVOC2v2**
- ▶ configure **BiVOC2v2**
- ▶ change the presettings (programs)
- ▶ export and transfer the sampling data from **BiVOC2v2** to an EXCEL worksheet
- ▶ perform a firmware upgrade on **BiVOC2v2**
- ▶ modify the adjustment data in **BiVOC2v2**
- ▶ manually control the pump and the valves in **BiVOC2v2** for servicing purposes

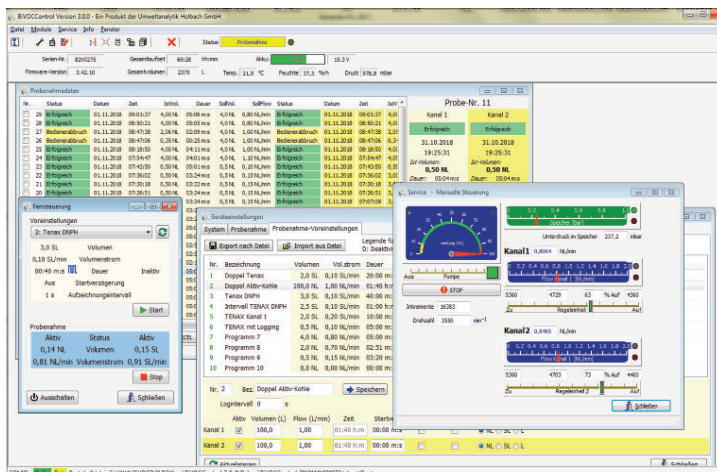


Figure 52 The BiVOCControl software for **BiVOC2v2**

17. The BiVOCControl Software

17.1 The Installation of BiVOCControl

The installation of BiVOCControl is done by executing the installation program BiVOCControl_Setup.

Start BiVOCControl_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 not required to install them again.

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

Note: The BiVOCControl software is only compatible to **BiVOC2v2** and not to earlier models. Likewise, the preceding software BiVOC2.exe cannot communicate with **BiVOC2v2**.



Appendix A: Volume Types

Appendix A: Volume Types

The volume flow in **BiVOC2v2** is measured for each channel using a mass flow sensor. The level of the electrical output signal from the flow sensors depends on the mass of the flowing air.

The measured value is scaled to Standard Liters / min (SL/min) and corresponds to the volume flow with a temperature of 0 °C and air pressure of 1013.25 hPa.

It is customary also to use Norm Liters / min (NL/min) relating to 20 °C and 1013,25 hPa.

Note:

The reference temperature and the reference pressure for Norm Liters can be freely defined in the device settings.



To calculate the actual volume flow from the Standard Liters (SL) the air pressure and the temperature has to be known.

The conversion is done with the following equation:

$$\text{Volume in L} = \text{Volume in SL} * \frac{T_x * 1013.25}{273.15 * P_x}$$

T_x = current temperature in K

P_x = current air pressure in hPa

Appendix A: Volume Types

Appendix A: Volume Types (continued)

BiVOC2v2 converts the desired volume types on its own. For calculating the actual volume, the optional external temperature/humidity sensor is required.

Volume type	Reference temperature	Reference pressure	Units	Remark
Standard-Liters	0 °C	1013.25 hPa	SL, l _s	
NormLiters	20 °C	1013.25 hPa	NL, l _n	Reference values can be changed
actual liters	current temperature	current air pressure	L, l	

Appendix B: Troubleshooting

This appendix lists possible **BiVOC2v2** faults along with corrective solutions.

Fault	Possible solution
BiVOC2v2 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
BiVOC2v2 does not switch off automatically when idle	Check the settings whether the automatic power-off is enabled

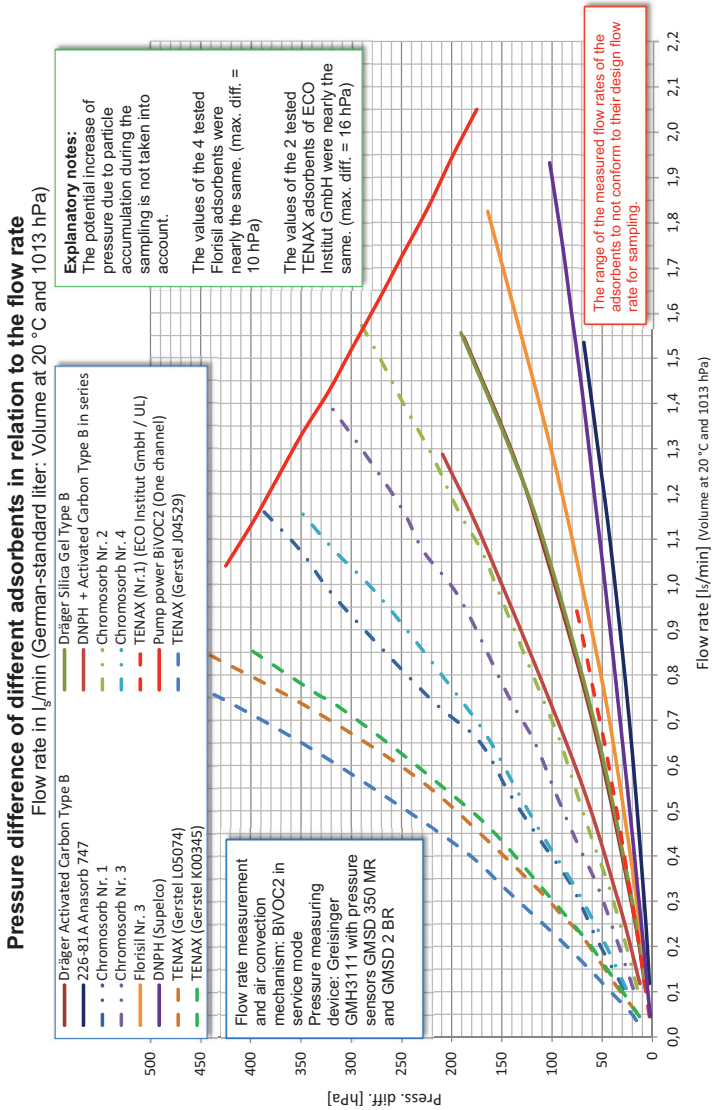
BiVOC2v2 error messages **after** power-on and **before** a sampling

Error message	Possible solution
Settings error	Check the BiVOC2v2 configuration and correct if necessary
Adjustment error sensor 1 / 2	Re-enter the adjustment data stated in the factory calibration certificate using the BiVOCControl software
Difference sensor / Absolute pressure sensor faulty	The controller in BiVOC2v2 cannot communicate with the sensor. Turn the device off and on again. Return the device for repair if necessary.
Backup battery voltage low	Send the device to the manufacturer to replace the battery.
No SD card detected	Sampling is possible, however, only without process logging. Return the device for repair if necessary.
Battery low! Please charge battery	Connect charger (Section 5.1) or switch off BiVOC2v2 (Section 7.9)
Zero offset drift on channel 1/2	If no external volume flow is connected to the channel, contact the manufacturer

Appendix B: Troubleshooting**BiVOC2v2** error messages during sampling

Error message	Possible solution
Battery low! Please charge battery	Connect charger (Section 5.1) or switch off BiVOC2v2 (Section 7.9)
Motor failure	The pump motor is faulty. If a start-up sound was audible, restart sampling. Otherwise return BiVOC2v2 for repair (manufacturer service!).

Appendix C: Difference Pressures of Adsorbents



Appendix D: Declaration of Conformity



EG – Konformitätserklärung DECLARATION OF CONFORMITY (DoC)

Name und Anschrift des Herstellers <i>Name and address of the manufacturer</i>	Umweltanalytik Holbach GmbH Sperberweg 3 66687 Wadern Germany +49 (0)6874/182277 info@holbach.biz
Telefon <i>Phone</i>	
E-Mail	
Gegenstand der Erklärung <i>Object of the declaration</i>	2-kanalige Luftprobenahmepumpe BiVOC2v2 <i>2-channel air sampling pump BiVOC2v2</i>

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 <i>Documents-No: Date of issue</i>	Titel <i>Title</i>
EN 55011: 2009 + A1: 2010 Klasse A	Industrielle, wissenschaftliche und medizinische Geräte - Funktstörungen - Grenzwerte und Messverfahren <i>Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement</i>
EN 61326-1:2013	Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV- Anforderungen <i>Electrical equipment for measurement, control and laboratory use - EMC requirements</i>
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) <i>Electromagnetic compatibility (EMC)</i>
DIN EN 61010-1: 2011	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte <i>Safety requirements for electrical equipment for measurement, control and laboratory use</i>

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

Unterschrift:
Signature

Datum: 16.10.2018
(Date of issue of the DoC)

