ecoObs GmbH

Box extension 3.0 for batcorder 2.0/3.0/3.1

Usage instructions
Version 1.1
February 2018

Safety / Usage instructions

This instruction manual is part of the product box extension for the batcorder. It contains important details for installation and operation. Read this manual carefully and observe the safety instructions, especially if you hand this product on to a third person. Keep this instruction manual for further reading!

Used symbols

This instruction manual uses the following symbols to indicate important details to the user.

Attention!
Paragraphs marked with this symbol are to be observed particularly. A disregard can endanger persons and material.

Important detail!
This symbol marks information, which is necessary for a correct function of the device. A disregard can affect the operability of the device or can lead to a complete failure.

How to dispose old devices

Of course we take back our old devices corresponding to the German ElektroG (take-back and disposal of electronic devices). Either we reuse them or the devices will be disposed by a recycling company as statutory. Please do not dispose defective devices into the domestic waste or communal collecting points, but send them (or even single components) back to us free of charge. Should you have any questions, contact us: info@ecoobs.com .

ecoObs GmbH, Hermann-Kolb-Str. 35b, 90475 Nürnberg

Usage instructions

- Keep away the device in operation from electromagnetic and magnetic interference fields! It complies with the standards for electromagnetic compatibility, however it cannot be avoided that EM-fields couple in at the microphone and cause a disturbance to the audio signal.
- The microphone is sensitive against mechanical force. Make sure, that the microphone is not touched during installation or transport. Also the surface of the acrylic pane in which it is inserted must not be scratched.
- The connection plug with knurled screw is only to be locked manually. A twist of the plugs can lead to fracture in the plug. Never use any tools (pliers etc.).
- Dust, sticky substances (dirt, gear oil of the plant,…) can choke the microphone mesh. See to it, that the microphone disc has a proper guard
- The microphone membrane is indeed safeguarded against raindrops, but long-term humidity effects can lead to corrosion and therewith to a loss of sensitivity. We recommend a periodic checking of the microphone through the ecoObs GmbH (at least annually).
- Temperatures below zero degreee may damage the microphone. We don‘t recommend usage of the box extension in winter.
- Due to the changed microphone connector of the batcorder 3.x disc microphones cannot be interchanged between batcorder 3 and batcorder 2. When using excisting boxes with batcorder 3 or vice versa please make sure you order the proper microphone discs.

- Also observe the usage instructions for the batcorder!
- If there are any questions, please contact our support per Email: info@ecoobs.de or by telephone: 0049 911 3768053

Important:

For usage with the box extension your batcorder 2.0 needs at least firmware S215. You can check the firmware at startup of the batcorder. It is shown on the bottom of the display while the batcorder starts-up.

Information on batcorder firmware updates:
http://www.ecoobs.com/cnt-bcupdate.html

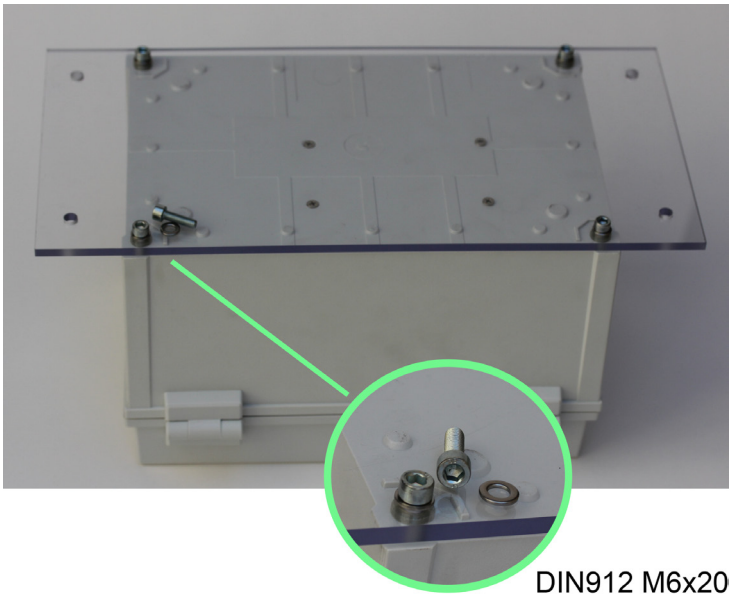
Note that later software versions may have different screens than shown in this manual.

The box extension is compatible to batcorder 2.0 and 3.x. Note the diffe-ence in the microphone connectors!

Contents

Box assembly

Assemble the plastic sheet onto the box back. Use the allen screw „DIN912 M6x20 VZ“ and the corresponding washer. There is no wrong assembly direction.

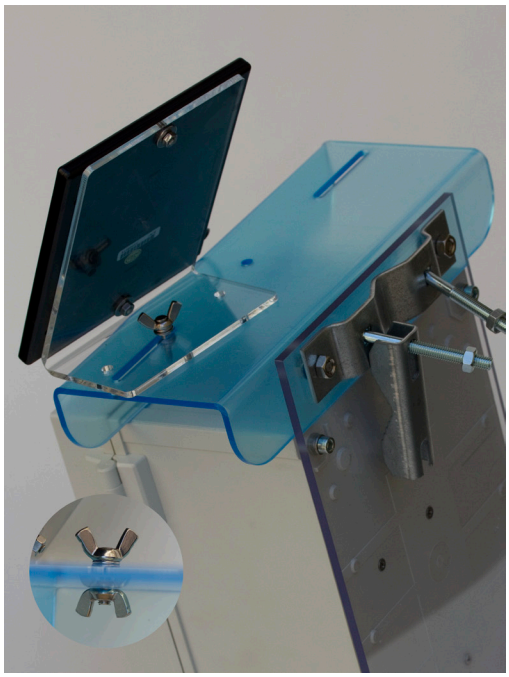


DIN912 M6x20

Solar panel assembly

Note: The solar panel is optional equipment.

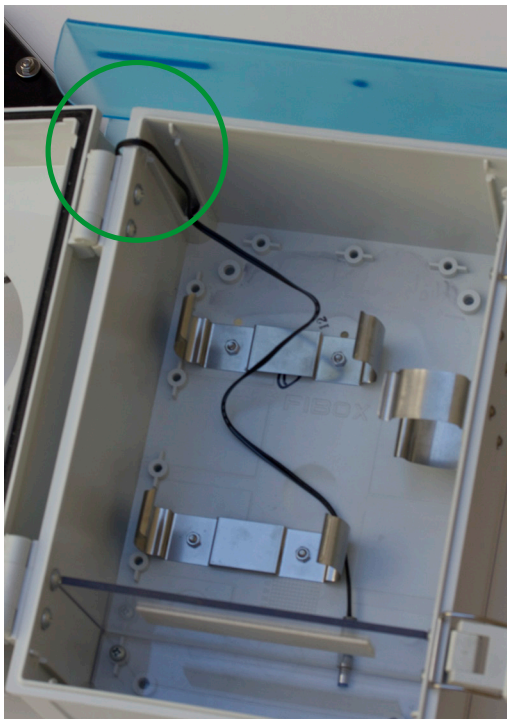
Attach the u-shaped plastic sheet using the clamp as shown.
Use:
2 x hex nut M8x25
2 x nut
4 x washer



Note: Remove the blue protection foil before assembly. In the image it was not removed for better visibility of the sheet. The solar panel itself can now be fixed to the sheet using the wing bolt and wing nut. That way you can orientate the panel in any wanted direction.

Note: The panel produces energy only if it is exposed directly to sun. Shadows by leafs etc. will render the panel useless.

Solar panel cable-passage



Above the upper hinge a small gap is available for passage of the solar panel cable. You may want to fix the cable there using tape, so it can‘t be damaged when closing the box.

With a runtime of ca. 12 hours per night and average acitvity the battery will be fully recharged after approximately 3 hours of full sun.

Note:
If it is not possible to use the solar panel at your intended recording location and if the runtime of approx. 4 weeks of the built-in 6V battery is not sufficient, the module can be powered by a 12V battery as an alternative. The module can change an input voltage of 12V to 6V with ca. 85% efficency. Batteries of larger size need to be stored separetly of the box, though.

The solar panell is designed for 6V batteries and can not be used to charge a 12V battery. Neverthless 12V batteries can be solar charged with extra panels.

Microphone assembly

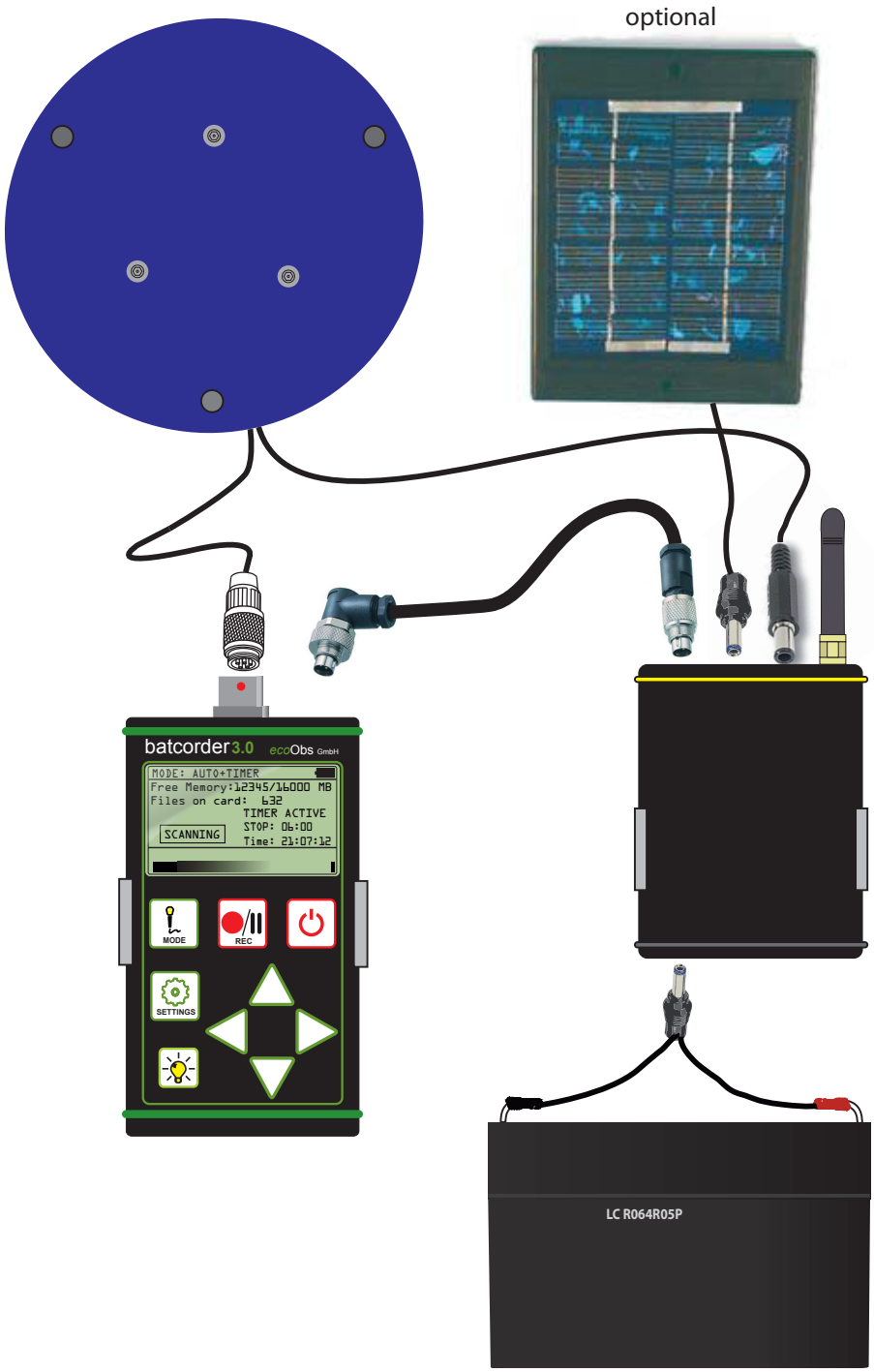
The microphone disc is assembled facin inwards for safer transport. For usage please disassemble and reassemble with the microphone facing outwards.

Battery assemblage

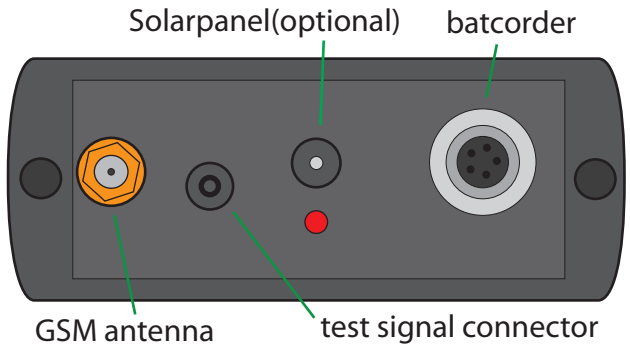
Push the battery inside the bottom drawer of the box.

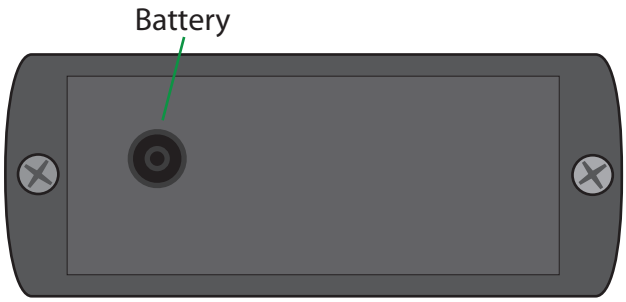
Connecting the components

Cabling overview



Control module connections





All connections are choosen so each plug only fits exactly in one connector. The battery input is compatible for 6V to 17V batteries. Note that the optional solar panel can only charge 6V batteries. If you are using a 12V battery a 12V panel can be connected as well.

Do not connect a 230V charger instead of the solarpanel. This will destroy the control module. If you need to recharge the 6 V leadgel battery we recommend to use an external standard 6V lead gel charger.

GSM-Modul

Choosing the SIM card

Optionally the batcorder is able to send a periodic status report to a listed telephone number. For this functionality you need a SIM card (not included!). The following information refers mainly to the German mobile networks. The empirical data for other countries are not yet provided.

Choice of card

We recommend to use post-paid mobile phone cards. Typically the network

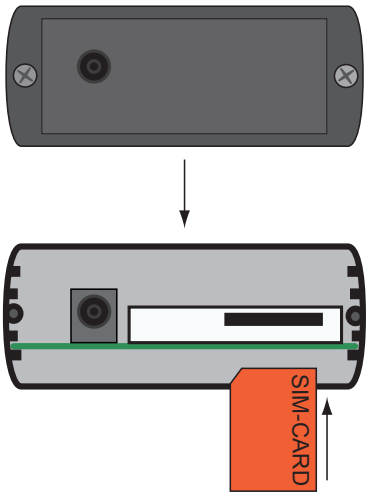
operators offer a free transmission of SMS between two so called partner cards. Some providers offer up to 20 partner card per contract. If prepaid cards are used, it can happen easily, that the account on the card is emptied during the period of observation, and then a transmission of status reports is no longer possible. Also some providers lock prepaid cards if no phone calls are registered for a certain amount of time.

SMS transmission

One problem with transmitting SMS via the control module is not only the reception but also the in-time allocation of time frames for data transfer. In general, using the D-net is preferable to using the E-net. It is most reliable to use cards from the same network operator both for the control module and the receiving mobile phone.

The reception for a GSM-network may be very good at the observation site (indicated by the reception bars in the batcorder menu; see following chapter), but nevertheless problems with the transmission of the text message can occur, if there is no appropriate time frame for data transfer available. This is due to the capacity utilization of the network, as well as to the chosen network operator. Therefore cards which automatically search for a network with the best reception are not reasonable.

At the moment we have made best experiences with the D-net and cards from the German Telekom. But this may differ from region to region. Please inform us about positive as well as negative experiences on your side.
Installation of the SIM-card



For installing the SIM-card you have to open the control module at the opposite side of the aerial connection. This face has only one socket at the left for connecting the module with the battery. To open the case both screws (cross recess) have to be removed. Behind it there is a circuit board, on which the GSM modem is installed. The GSM-modem has a slot on its right side, in which the SIM-card has to be inserted. Therefore you push the SIM-card carefully as far as it will go into the slot. The contactors of the SIM-card have to look down, so that the gated edge lies at the left front. To remove the SIM-card, it has to be pushed light-

ly into the slot, it then pops out (push-in–push-out).

When tightening the case cover again, you have to be careful not to overbolt. Otherwise you may cause damage to the cover and the screws. Be sure that the rubber seal is fitted in correctly.

The SIM-card must only be inserted or changed when the module is connected to the power supply. Otherwise the control module or the SIM-card may get damaged.

To remove the SIM card press it slightly into the card holder and it will pop out.

Batcorder settings

This chapter only covers the specific features concerning the batcorder settings, which result from an operation within the box extension. It is absolutely necessary that you acquaint yourself with the basic operating modes of the batcorder by reading its instructions manual carefully.

Settings for recording

As long as the device is switched on, it is possible to use also the “Manual” and “Auto” mode. The settings *Quality*, *Critical Frequency* and *Posttrigger* should be left at their default settings. To increase the range *Threshold* can be lowered down to -36 dB. However it is to be kept in mind that hereby the accuracy of the later analysis decreases, as more low and fragmentary calls are being recorded. In bcAdmin you may have to adjust the threshold during analysis also! Necessarily you should also follow the instruction manual of the batcorder.

Before installation acquaint yourself by all means with the operating modes of the batcorder. Be certain, that the person, who installs the batcorder, obtains all the necessary information for operating the batcorder. At best a person, who is already skilled in operating the device is present in the nacelle whilst installation.

Consider that an incorrect configuration and wrong settings during the installation as well as while changing the memory cards, can lead to a malfunction of the device or respectively that the data gathered during utilization time is waste.

Microfon calibration settings

When delivered the batcorder is not calibrated for the disc microphone. Thus, you will have to set the microphones correction factor.

Setting the correction factor (CF) / microphone calibration

Start thebatcorder with microphone and box extension connected. The batcorder will display the standard settings menu. Make sure the cursor is located on

the first letter of the filecode field. Now press and hold the REC key. Then while holding the **REC** key also press the **right arrow key**.Then release both keys. A new menu called **Microphone correction factor** is displayed. The correction factor can be set here. This value influences the signal gain of the batcorder. The correction results from addition of the microphone correction factor (MCF) and the batcorder correction factor (BCF; last page in your batcorder manual). Starting with the batcorder 3.0 the BCF is implemented in the device and is not needed for the calculation anymore:

batcorder 2.0: CF = MCF + BCF
batcorder 3.0 CF = MCF

Press **Rec** to save the correction factor. The menu **Testsignal calibration** is automatically openend after saving the factor.

Testsignal calibration

The box extension does produce an acoustic test signal each morning using the transducer located in the microphone disc. The initial calibration is done by the batcorder automatically after saving the correction factor (see above). It can be repeated anytime.

The test signal calibration should be done in such a way that the no objects can produces echos in front and around the microphone. Otherwise you will record a higher initial signal level. That will result in lower values in the daily test. It is not a real problem, ore a cosmtic one as long as the latter values stay around 40 to 60%.

Remember to follow the above instructions whenever you install a new microphone!

If your initial test calibration was done in an optimal way, the TSL reported each morning should be arund 70 to 100%. Fluctuations of up to 50% can be considered within normal range. Usually more than half of all mornigns you should receive a deviation of 30% or less. Note: The actual numbers are less important than the average. So, if you have calibrated in a suboptimal way, you will get values averaging around 50 to 60%. This is no need to worry. Only if the TSL values fall to 10% or 0% and stay there a microphone defect has to be assumed. We also recommend a test and recalibration of the microphone each year. For this please send the microphone to : ecoObs GmbH, Hermann-Kolb-Str. 35b, 90475 Nürnberg, Germany

GSM settings

For being able to use the GSM-functionality, you have to make some batcorder settings. We recommend to carry out these steps before installation e.g. at the office to exercise the handling of the full setup.

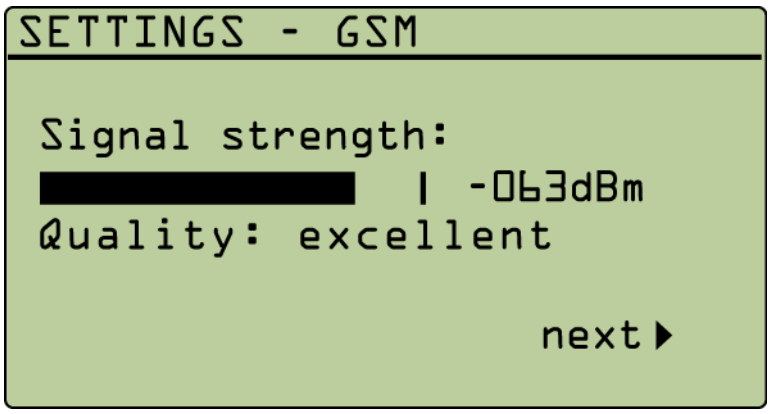
Insert the SIM-card into the module (see previous chapters). Then connect batcorder and control module and plug the battery. Now switch on the batcorder. The starting sequence takes a few seconds, as the batcorder has to build up a data link to the control module. After this the standard starting menu is displayed: Settings SDHC-Card+Clock.

A box symbol at the right upper corner indicates that the control module has been found.

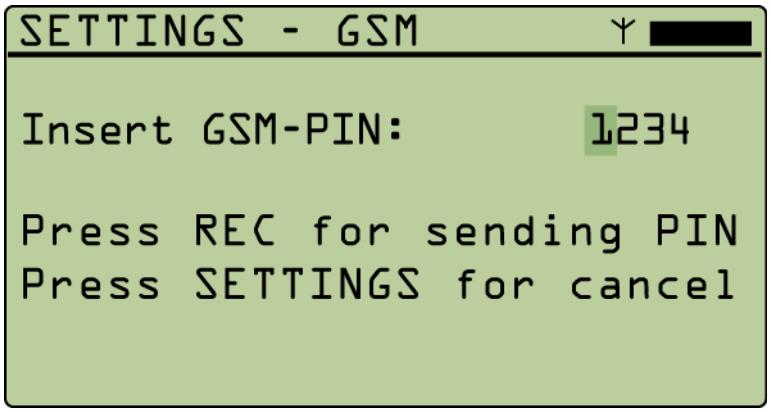
Setting SIM-PIN and target phone number

By pushing the set-button twice you reach the settings for the GSM-operation. You can only switch to this menu, when the control module has been detected successfully. There the PIN of your SIM-card and afterwards the call number for sending a status report via SMS can be set. If no SIM-card has been detected, a message is displayed and the menu is left.

The next menu displays the discovered signal strength. Note that at first a general reception strength will be identified. The evaluation of the signal strength can take a few seconds. It is regenerated every half minute cycle. If the network of your operator is available can only be checked after entering the PIN. Push **next** for the following display. If no PIN has been entered for the SIM-card yet this is the next step in the batcorder preparation. Otherwise the following step will be skipped. The entry of the PIN will only be necessary again when the SIM-card has been changed.



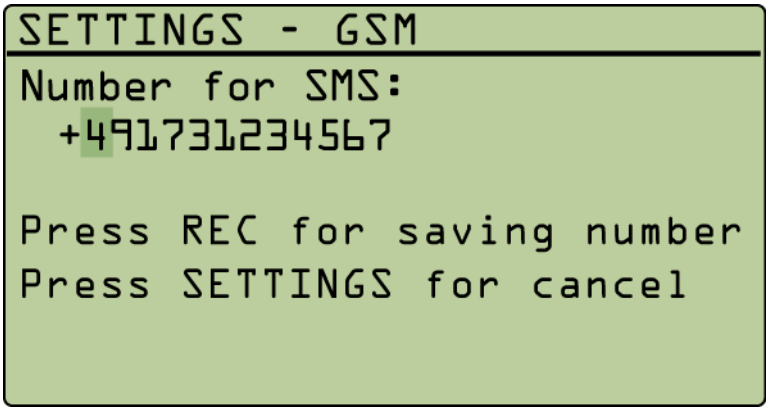
In the following menu please inter the PIN of your SIM-card and follow the instructions.



After pushing the **REC** button the PIN is transferred to the SIM-card and the return signal is retrieved. If PIN is correct the GSM-modem tries to dial into the operator´s network. If this does not succeed or the PIN is invalid, an error message will be displayed.

If the PIN has been entered wrong three times, the SIM-card is going to be locked and can only be unlocked by entering the PUK. The PUK cannot be entered via the batcorder. Therefore you have to insert the card into a mobile phone and to carry out the cancellation of the lock.

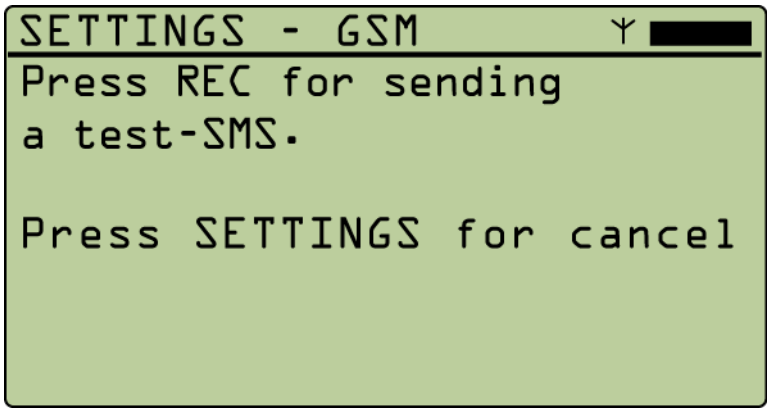
With both steps being successful, the next menu displayed is for entering the telephone number to which the SMS- status reports will be send.



The telephone number always has to be entered as following: country code + network code (without the first zero!) + call number. This means, in your own country a country code has to be entered as well. To erase redundant digits at the end of the call number please move the cursor onto the last digit and scroll

to the space-character(“ “). Repeat this step if necessary for further redundant digits.

After entering and saving the call number you have the possibility to send a test-SMS to the designated number to check the GSM-modem`s operation and settings.



Afterward the batcorder displays whether the test-SMS has been successful or not. If the transmission has been successful and all necessary entries have been made, the batcorder is ready for operating with the box-extension. Both components can then be installed in the nacelle.

After installation in the field you should again send a test-SMS, to make sure that the installation is correct and network coverage is available. Therefore you again follow the above mentioned steps and so you have an additional control over the selected number. By changing into the GSM-menu you can again measure the signal strength or you can adjust the call number.

Transimission of status SMS

The batcorder automatically sends a status SMS whilst finishing the scanning (this equals the stopping time of the timer) to the entered call number. Condition is, that the operator`s mobile network has been found. The message contains the following information:

- Filecode of the batcorder: batcorder: **XXXXXXXXX**
- Free memory on the SDHC-card: **free mem: xx.xGB**
- Number of recordings: **files total: xxxxx**
- Number of recordings previous night: **last night: xxxxx**

- Microphone-signal-level (in percent): **TSL: xxx%**

The case may arise that instead of a status report an error message is displayed. If you are not sure, whether this is a critical error, please contact us please also note down the exact text of the error message.

Special error messages

In some situations a more or less detailed error message is sent. Some of these are:

„*batcorder turned off because of low battery.*“
Battery needs to be replaced or charged.

„*Not enough disk space. Replace SD-card!*“
The SDHC card has no space left for recordings.

„*SD-card read or write error occurred. Replace SD-card!*“
The SDHC-card reported an error and needs to be replaced.

„*Maximum number (65535) of files reached! Please replace card!*“
The used FAT32 system is limited to roughly 65000 recordings. This number has been reached and the card needs to be replaced.

Error detection with the help of the status SMS

Too small number of recordings

If (over several days) no recordings at all or onyl very few have been made, a technical problem, e.g. a microphone failure, may exist. However, there are also often places or periods in which nearly no bat activity exists. It is very conspicuous though, if an existing bat activity suddenly stops entirely. Then an inspection on-site of the assembling as well as of the batcorder is necessary. Therefore also note the chapter “ Reduction of microphone sensitivity”.

Very many or long recordings

Normally at many locations there are only a few recordings per night to be expected (approx. 0-50). At some locations and especially at the beginning of autumn the number can raise up to several hundreds. Mostly this concerns only a few nights, in which the activity is extremely high. If the batcorder permanently

records a lot of sequences (several hundred up to thousand), this may be due to a malfunction or wrong settings of the batcorder. An inspection on-site of the assembling as well as of the batcorder is necessary.

(a) Quality value is too high: We recommend for the settings of the recording control a value of 20 for the quality parameter. This parameter is crucial to whether the signals are classified as bat call or as disturbances. To also record low amplitude calls this value shouldn‘t be changed, even if birds or noise sometimes triggers a recording. Still acceptable and maybe reducing the number of recording s is a Quality value of 16 to 18.
(b) Possibly the batcorder itself has a malfunction (increased noise an disturbance bands) which leads to increased recordings. Then the device possibly has to be send in.

Often we are able to conduct a pre-analyses with the help of the recordings from the nacelle. Therefore, in case of potential failures, please always send us also the recordings of the batcorder.

Absence of status SMS

If the status SMS fails to appear, there are several sources of error possible, which can prevent a transmission. In the following it is assumed, that the test transmission of a message has worked also when installed on the wind turbine.

Timer deactivated

If the batcorder failed because of a power failure which could not be bridged, then possibly the timer-mode is malfunctioning. Hence the batcorder is no longer switching-on at the set start time and thus also does not send any SMS.

Dialing in to the mobile network not possible

If there exist disturbances in the cellular network of the network operator or should the account of the SIM-card be consumed, then it is not possible to send status SMS. Therefore we do not recommend to use pre-paid cards, rather use post-paid cards. Even with a good reception, at can occur that it is not possible to transmit a message, as due to a high capacity utilization of the network no time slots for transmitting the data are provided. Also the operation of the WTG can lead to disturbances in the SMS transmission.

An absent message is therefore not equivalent to a malfunction of the batcor-

der. Before checking on-site, some days should be waited. If , however, at the beginning of the analysis messages had been sent reliably, but then no SMS has been received for **a couple of days (3-6)**, this indicates a problem of the batcorder, and a checking of the device should be carried out.

Reduction of microphone sensitivity

By and by the microphone can lose sensitivity. If installed correctly it is indeed relatively robust, but long-term, non-stop outdoor use can lead to fatigue. In particular humidity and frost have negative effects.
The microphone sensitivity is determined by using an ultrasonic transmitter, which is embedded in the microphone disc. When the device is switched off in the morning a short sine sound will be played and compared with a reference value. If a reduction of sensitivity in reagrds to the initial calibration signal has been detected, this will be displayed with the message: TSL: xxx% .
A measurement of sensitivity, not carried out in a sound room, however, is never absolutely reliable and can vary e.g. depending on the weather conditions. If it rains, a waterdrop can cover the mesh over the microphone membrane as well. Depending on how good the initial calibration has been done, the signal may start already with only 50% or 60%. This doesn‘t mean the microphone lost 50% already, but only that the reference signal was 50% louder. If this is the case, you should get values of 30 to 70% with once in a while 90% or 10%. As long as the TSL fluctuates around an average, there is no problem. Only if it drops to 10% or 0% in such a case, you should consider replacing the microphone.

Putting into operation

Painstakingly check the settings and faultless operation of the batcorder already before installation in the field. An incorrect configuration or wrong settings otherwise lead to no (usable) data for an analysis period, and/or it makes a new date on location necessary to clear faults.

The following proceedings for initiation should conscientiously be observed. These are also to be observed when e.g. changing the SDHC-card:

1. Insert a SDHC-card into the batcorder. Ensure, that this card is formatted correctly. Check the card beforehand with a device on the ground. In case of need have a card for substitution ready.
2. Switch on the batcorder and let the batcorder check the SDHC-card and if necessary it has to be formatted by the batcorder. If the card is changed the batcorder always has to be switched on again to check the card, because in case of a wrong formatted or faulty card it may not be possible to initiate the recording at the automatic start.
3. Check date and time as well as the filecode
4. Check the settings for recording (*quality*, *posttrigger*, *threshold* und *critical frequency*)
5. Make a test recording at manual mode.
6. Send a test SMS.
7. Check the setting of start and stop time in the Auto-Timer-Mode.

If all checks were successful, you can simulate a Timer on/off cycle..

Timer on/off cycle simulation

For testing purposes the batcorder can be started in Timer-mode manually and also be stopped manually. To do so, start the batcorder while holding down the REC key. Follow screen isntructions and Timer mode starts. By pressing Rec you can stop timer mode again. You then should receive a status SMS.

Processing of recordings

Frequency of changes of the SDHC-cards

By using memory card with 16 or 32 GB, the necessary dates on location for changing filled-up SDHC-cards are reduced to a minimum. Possibly operations with one card are even feasible over several month. However, we recommend to change the card every four to six weeks. Several criteria increase the possi-

bility of faulty cards, especially temperature fluctuation and electromagnetic radiation. Therefore a sufficiently often replacement of the cards with a following check up of the recordings is highly recommendable. Only this can counter a possible loss of data in time.

Manual recordings check

After changing the cards, the up to date recordings should be saved on a hard dis. A short manual check-up of randomly chosen sequences out of the recording period enables to discover possible malfunctions of the device or failures, which lead to non analyzable recordings. Leads to faults are e.g. extremely long, several MB big recordings and/or extremely many recordings (hundreds to thousands per night). Ordinary recordings have a very low background emission, which is observable in a oscillogram or a sonagram. If all recordings show a highly increased noise or strong noise bands (in the sonagram), this is an indication for a disturbance. These can occur temporarily by increased acoustic or electromagnetic radiation (e.g. by much wind) or they can exist permanently. With permanent disturbances one should think about a malfunction of the device. But it also can be that the plant / the place of installation are generally not suitable for acoustic observation.

Analysis with bcAdmin

If you use our program bcAdmin for storage and analysis of your recordings, you have to adjust the settings of the analysis-algorithm to the batcorder settings as necessary. Should you have decreased the Threshold for recordings to a value below -27, you have to decrease the analysis threshold also in bcAdmin. Do analyze the nights of recordings, which you want to compare with each other, always with the same settings.

Species analysis with batIdent (former bcDicriminator)

If you use the program batIdent for an automatic species analysis the quality of the results depend on the chosen settings on the batcorder and at bcAdmin. For optimum results we recommend to use the default settings of the batcorder and bcAdmin. If the threshold for recording is decreased to increase the range on the wind turbine, the identification results will be worse on average. This means, that more sequences will be discriminated only on a low level (e.g. “Nyctaloid”) and that an increased number of wrong identifications will occur.

Activity analysis of various locations or within one time-series are only comparable concerning quantity and quality, if the chosen set-

tings for the batcorder as well as for bcAdmin are alike.

If the threshold for recording has been changed at the batcorder, the threshold for analysis on the computer has to be adjusted accordingly. On this, please also read the manual for the program bcAdmin.

The call recognition of the batcorder sees to it that disturbance signals are basically not recorded. At high wind speeds (from about 8-9 m per second) recordings of disturbances occur increasingly even on the batcorder. These, however, will be recognized as outlier for the most part through the measurement of bcAdmin and the identification by batIdent. Respective call sequences are then marked in the identification entry either as “No Calls” or “Spec”. These recordings should not be included in the evaluation. On some sites disturbance signals can occur, which very much resemble bat-signals and therefore lead to wrong identifications. So can birds singing at frequencies around 20 kHz be identified as an evening bat. If such identifications occur cumulatively at high wind speeds, here also should be checked again manually.

Technical specs

Input Battery:

5.5V - 17V

Power usage:

batcorder off:
6V Akku: < 0.5mA ; < 3mW
12V Akku: < 1mA ; < 12mW

batcorder on / Timer mode scanning:
batcorder 2:
6V Akku: ca. 32mA ; 192mW depending on SDHC card
12V Akku: ca. 18mA ; 216mW depending on SDHC card

batcorder 3:
6V Akku: ca. 15mA ; 90mW depending on SDHC card
12V Akku: ca. 9mA ; 108mW depending on SDHC card

batcorder on / Timer mode recording a file:
batcorder 2:
6V Akku: ca. 42mA - 60mA; 252mW - 360mW
12V Akku: ca. 23mA - 40mA ; 276mW - 480mW

batcorder 3:
6V Akku: ca. 35mA - 55mA; 210mW - 330mW
12V Akku: ca. 20mA - 35mA ; 240mW- 420mW

Input solar panel: max. allowed current flow: 0.5A

Solar panel : 7.5V/150mA. idle 10.3V

GSM-Modem

A GL865-DUAL (Telit) is used.

Dual-Band EGSM 900/1800 MHz
Output-Power:
-Class 4 (2W) @ 900 MHz
-Class 1 (1W) @ 1800 MHz

Problems / Support

Description of failures and contact

Like every other device the box extension of the batcorder can cause problems in operation. As in most cases these occur from easily to resolve reasons, we ask you to always contact us with a precise description of the failure, before sending us the device. The failure description should always include the serial number of the batcorder and the software version (Hxxx Sxxx). It is very helpful, to disclose a precise description of the failure.

For online reports of a failure send a report directly to: info@ecoobs.com or respectively to: ecoObs GmbH, Hermann-Kolb-Str. 35b, 90475 Nuernberg, Germany

For technical questions we are available at : +49 (0) 911 3768054

Problems regarding the software and bats:
+49 (0) 251 96195095 (Volker Runkel)