Extension 4.0

for the batcorder 3.0 / 3.1
(requires firmware SW 3.23 or higher)

ecoObs
technology & service

User Manual

Version 1.01 / en Status Jan 2023

Table of contents

Instructions for use and safety

General instructions for use

This user manual belongs to the product *Extension* 4.0 for the *batcorder* 3.0 / 3.1.
It contains important information about installation and handling. Read these instructions carefully and follow the safety instructions, especially if you give this product to third parties. Keep the operating instructions for future reference!

Symbols used

The following symbols are used in this user manual. They are intended to draw the attention of the user to important information.

Caution! Sections marked with this symbol must be particularly observed. Disregarding them can endanger persons and material.

Important note! This symbol indicates notes that are important for the proper functioning of the device. Disregard can affect the functionality of the device or lead to complete failure.

How to dispose old devices

European Union:
According to the European WEEE Directive 2002/96/EC on Waste of Electronic and Electrical Equipment we take our devices back for recycling or proper disposal. Please send them to us. Do not dispose of the devices at public or community supplied disposal systems!
Other countries:
To reduce the environmental impact we take our devices back for recycling or proper disposal. We encourage you to send us back defective units or parts.

If you have any questions, you can reach us at info@ecoobs.de.
ecoObs GmbH, Hermann-Kolb-Str. 35b, 90475 Nürnberg

Safety instructions for use as BOX *extension*

- The installation of masts for the BOX *extension* may be required a permit.
- The installation on wind measuring masts or similar may only be possible by specially trained industrial climbers.
- Please also note the safety instructions for the *batcorder*.

Safety instructions for use as wind turbine *extension*

- The installation on the wind turbine should only be made by qualified persons.
- When using this product, observe the safety instructions in your country for working on and around wind turbines.
- The installation recommended in this user manual may have to be modified for safety or technical reasons depending on the type of wind turbine. In this case, we recommend early consultation with the operator or manufacturer of the wind turbine.
- Please also note the safety instructions for the *batcorder*!
- We cannot guarantee that all wind turbines are equally suitable for a *batcorder* deployment. Some wind turbines can have extreme acoustic and / or electromagnetic emissions (e.g. caused by gearboxes, servo motors, wind break), which do not allow a useful acoustic bat recording. Early planning and possibly pre-investigations are therefore advisable.
- The transmission of the status message via GSM module may be disturbed in wind turbines with metal nacelles. We recommend early consultation with the operator or manufacturer of the wind turbine.
- The *batcorder* and the *extension* are powered by a rechargeable battery at night. This is recharged during the day via the electricity grid (110-240 V AC). Without daily charging the *batcorder* can only run for a few days. Therefore, please make sure that the owner of the wind turbine provides a suitable mains connection (standard 230 V socket) in the plant nacelle and that this connection also supplies power when the plant is switched off.
- To avoid damage due to overvoltage, the 230V socket used should be connected to a fuse protected line.

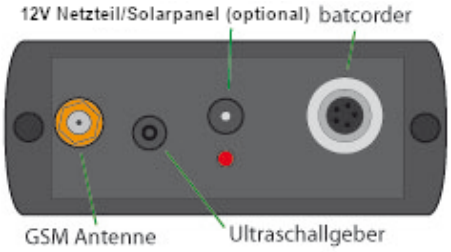
Extension 4.0 control module

The *Extension* 4.0 control module can be used both in the wind turbine with power supply and in the box extension without power supply and optionally with or without solar panel.

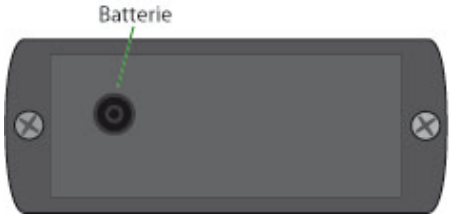
Switching the operating mode

To switch between wind turbine and BOX mode of the *Extension* 4.0, start the *batcorder* with the module connected and ready for operation while pressing and holding the "MODE" key. After a short time the menu appears with the possibility to choose between wind turbine or BOX mode. Use the arrow keys (Right / Left) to select the desired mode and save the setting with the REC key. The *batcorder* restarts and the module is addressed in the new mode.
The BOX mode is useful if the power supply cannot be used for a longer period of time. In addition, the message "AC Adapter down" in the status SMS and in the log file entry is not displayed in BOX mode.

Control module connections



All plugs and sockets are designed so that each plug fits only into the socket intended for it. The battery input is compatible for input voltages from 6V - 17V. Please note that the optional solar panel can only charge 6V batteries.



To charge the included 6V lead acid battery before the season starts, we recommend a commercially available charger for 6V lead / lead acid batteries.

GSM module

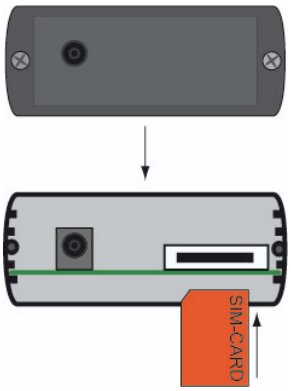
SIM card selection

The *Extension* 4.0 sends a daily status SMS to a selectable phone number. For this functionality you need a SIM card (not included). The following explanations mainly refer to the German mobile network, but are transferable to other countries. We recommend to use contract cards. Often, for example, there are offers from network operators that allow messages to be sent free of charge between so-called partner cards. When using prepaid cards, it can happen that the credit is used up in the middle of the survey period and thus no more status messages can be sent. Prepaid cards are also blocked by some providers if no phone calls are made over a certain period.

Possible problems concerning SMS transmission

The signal reception for a GSM network can be very good at the examination location (indicated by the reception bar in the *batcorder* menu; for details please refer to chapter **Enter SIM PIN & Phone Number** starting on page 28). Nevertheless, there may be problems sending the text message if there are no suitable time windows available for data transmission. Both the network load and the provider play a role here. At the moment, we have had the best experiences with the D-network and cards from Deutsche Telekom. However, this may vary regionally.

SIM card installation



To install the SIM card, open the control module on the side of the battery connection. To open the housing, the two screws (Phillips head) must be removed. Behind them is a circuit board on which the GSM modem is installed. The GSM modem has a slot on the right side, into which the SIM card must be inserted. To do this, carefully push the SIM card into the slot as far as it will go. The contacts of the SIM card must point downwards so that the cut corner is on the front left.

To remove the SIM card, press it lightly into the slot and it will pop out again (push-in-push-out).
When closing the housing cover, make sure that the cover is not canted and the screws are not tightened too much to avoid damage to the housing and the screws. Make sure that the rubber seal is seated correctly.

The Extension 4.0 can also be used without a SIM card. In this case, no SMS are sent.

Microphone

The microphone is embedded in the clear plastic disc, as well as the temperature sensor and the ultrasonic signal generator. The latter sends two test signals daily to check the sensitivity of the microphone. The foam ring serves as weather protection and reduces the ingress of water running down the nacelle shell or the outside of the box, for example. The microphone is connected directly to the *batcorder* as described in the *batcorder* manual.
The ultrasonic generator is connected to the control module. The installation is shown in the corresponding chapter for wind turbine or BOX mode. The gain factor of the microphone preamplifier of the *batcorder* has to be adapted to the microphone disc. For more information, please refer to the chapters **Entering the correction factor (MCF)** (page 26) and **Calibrating the test signal generator** (page 27).

Battery

The battery supplied by us is dimensioned in such a way that the *batcorder* will continue to work for several days even in case of power outages. The charging electronics in the module are designed for 6 V lead gel batteries. Operate the *Extension* 4.0 only with the supplied lead gel battery.

24 V lead batteries are not suitable. Other battery types (NiMH, Li-Ion, etc.) are not supported! Such batteries may start to burn or explode. Never connect them!

If a 12 V lead gel battery is used for operation, it will not be charged. We therefore recommend the use of a 6 V battery for regular operation, as supplied by us with the *Extension* 4.0. Only when operating as a box extension, a 12 V battery may be useful because of the higher capacity.

After a successful season **and** after the winter break, you should charge the 6 V battery using an external charger. All commercially available chargers for 6 V lead gel batteries are suitable. Avoid strong, short-term temperature fluctuations, direct sunlight and temperatures above 40°C or below 0°C. We don‘t recommend usage of the Extension in winter.

Use on a wind turbine

The *Extension* 4.0 in wind turbine mode allows the installation and operation of a *batcorder* 3.x in a wind turbine (nacelle) to record bat activity at hub height. The *Extension* 4.0 allows operation via the power grid of the wind turbine as well as monitoring the operation via a daily status SMS.
The wind turbine *Extension* 4.0 contains all necessary parts to operate the *batcorder* with a battery and special microphone in the nacelle. Besides mounting material the extension includes the control module to which the *batcorder*, microphone, power supply and the support battery are connected. In addition to voltage regulation and automatic charging of the battery, it also contains the electronics for monitoring the *batcorder* via SMS messages (sending of status reports).

The status of this user manual corresponds to the software version SW 3.26 of the *batcorder* 3.x. The software version of your *batcorder* can be found on the welcome screen when starting the device. Older versions than SW 3.23 and the *batcorder 2.0* cannot be operated with the WKA Extension 4.0.

Information about the firmware update for the *batcorder* 3.x can be found on the internet under the address:
https://ecoobs.com/products/hardware/*batcorder*/updates-*batcorder*-3-x-only/

Important points when used on a wind turbine

Bat detectors are often installed to record bat activity at wind turbines. However, this actually elegant survey method has to be planned particularly carefully. Depending on the type of turbine and the way it is installed, problems may arise, e.g. due to electromagnetic and acoustic noise, mechanical stress, sound shadowing and reflections, and extreme climatic conditions (wind, temperature fluctuations, rain).
We would therefore be pleased to advise you before such a monitoring use. We are not liable for any damage or failure caused by improper installation or interference by the wind turbine.

Acoustic and electromagnetic influences

Increased noise in the audio signal can be caused by both acoustic and electromagnetic interference sources. If these interfering signals are in the frequency range of bat calls, they inevitably impair the signal analysis. In the worst case, recognition of calls is no longer possible because they are completely masked. In such a case, acoustic monitoring during the operation of the wind turbine cannot provide any results.
The call detection implemented in the *batcorder* is very robust, but known sources of interference should be avoided. The following list of disturbance sources has been compiled to the best of our knowledge. The *batcorder* will mostly run reliably even under these conditions. Under certain circumstances, however, not all bat calls will be detected or disturbing noises will trigger recordings. Also the later following measurement and determination of the recordings on the computer may be affected:

- Strong electromagnetic or magnetic fields (e.g. at large magnet coils, high-voltage lines, high-voltage switch cabinets, wind turbine nacelles, etc.) can lead to incorrect recordings and interference in the recordings.

- Alternating current (AC power) sources (e.g. also neon tubes, energy-saving lamps, etc.) can generate interference bands.

- Strong wind currents along irregularly shaped objects produce low-frequency noise or broadband noise signals. These can mask bat calls.

- Improper mounting of the microphone (not flush in the nacelle envelope, too close to reflecting structures outside the nacelle) may result in multipath sound propagation (echoes). If echoes and signals overlap, it may not be possible to meaningfully measure and determine calls during subsequent analysis steps. Also, the microphone should not be placed too close to the tower or the rotors, as these cause sound shadows.

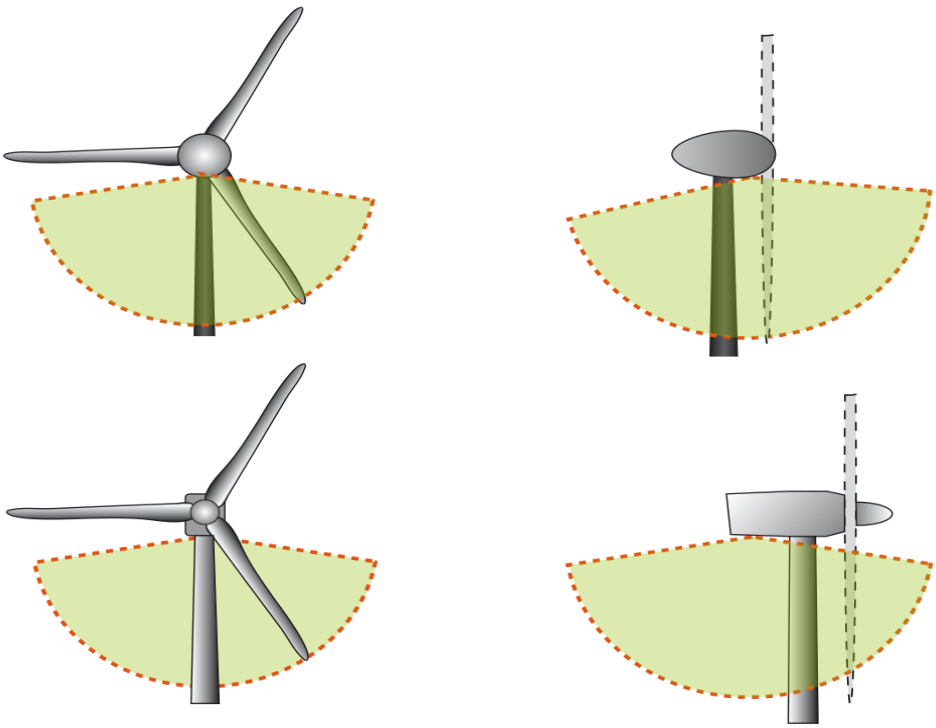
Noise filter (only *batcorder* 3.1)

For this purpose, we have evaluated numerous noise recordings and adjusted the call detection in such a way that short events, which can be reliably separated from bat calls, are detected and do not trigger a recording. The noise suppression can be found in the Settings menu of the *batcorder* 3.1 as *Noise Filter*. It can be switched on and off using "ON" or "OFF". Bat calls will not be filtered out, so you will get valid data.

Detection ranges of bats at wind turbines

Due to the special installation of the microphone disc, omnidirectional detection of bats is not possible in contrast to the normal *batcorder* pole microphone. The microphone disc is designed to cover a solid angle of 130°-150°. This is sufficient because the sound shadow of the nacelle prevents further acoustic monitoring.

The following figure shows the monitored spatial volume for our recommended installations of the microphone in nacelles. Examples for Enercon (figures above) and Vestas (figures below) wind turbines are shown.



Beispiele für den Einbau in WEA-Gondeln. Oben ist ein Einbau entsprechend des BMU Projektes gezeigt (Enercon E-72), unten der Einbau in eine Vestas Gondel. Dies sind nur Beispiele, der tatsächliche Einbauort muss an die Möglichkeiten in der Gondel angepasst werden.

A different attachment of the microphone to the nacelle leads to a changed monitoring area. The detection range and the resulting monitored spatial volume depends on the call volume and the call frequency of the bat species, as well as the threshold setting of the *batcorder*. At a threshold of -27 dB, noctule bat calls can be recorded about 25-30 m away and pipistrelle bats about 14-18 m away. At the setting -36 dB the range increases to approx. 45 m (max. 70m) for noctule bats and 30 m (max. 45 m) for pipistrelle bats. The specifications refer to typical call volumes. The actual range for detection depends on numerous factors. For example, the bat very much controls how far its calls can be heard. The maximum and minimum call volumes can differ by a factor of 10 or more. In addition, the location of the sonic beam (of the calling bat) in space plays a crucial role in the maximum possible range. Temperature, humidity and wind continue to have a partly large influence on the dispersion of sound.
Therefore, the specification of a detection range in the form of x meter is actually impossible and unreliable. A range must always be assumed with a minimum and maximum that can easily differ by 30 to 60 meters.

The choice of the threshold is therefore a trade-off between quality and quantity. Also, at lower threshold (higher sensitivity) the quantity of recordings of noise increases. In most cases, however, this is negligible.
For most of the federal states in Germany there are specifications for the settings of the *batcorder* within the scope of acquisition guidelines. As a rule, these are based on the BMU project and are as follows:

Threshold = -36 dB
Posttrigger = 200ms
Critical Frequency = 16
Quality = 20

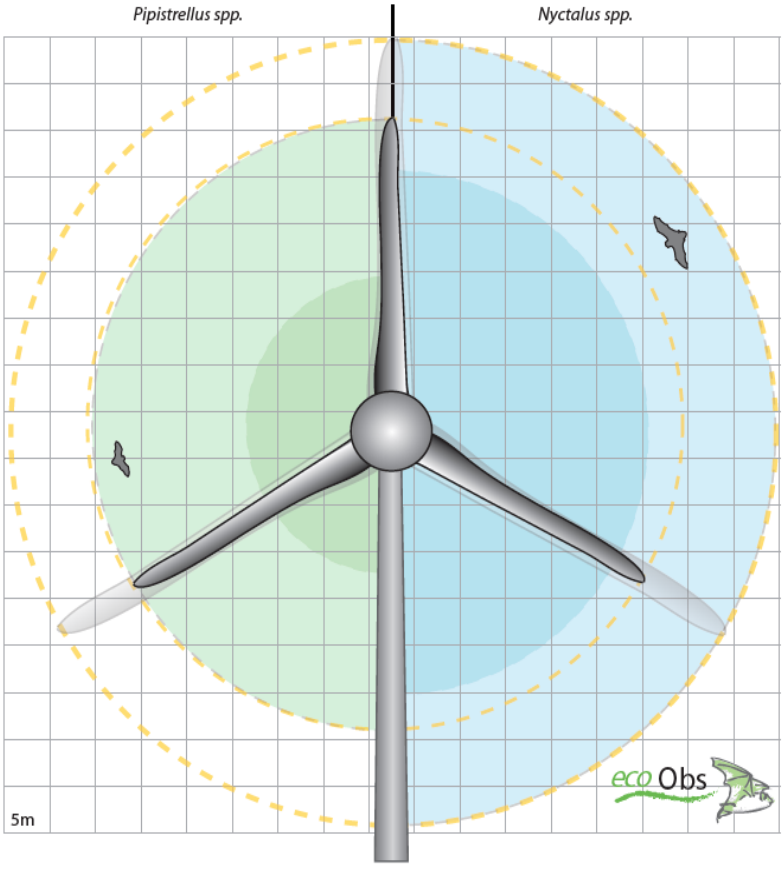


Abbildung oben:
Gezeigt sind typische minimale und maximale Reichweiten für die Gattungen Pipistrellus und Nyctalus, basierend auf Berechnungen für 20/40 kHz Signale. Zur Korrelation mit WKA-Rotordurchmessern sind beispielhaft eine 70m und eine 90m WKA dargestellt.

Installation on a wind turbine

The installation of the wind turbine *Extension* 4.0 should always be carried out by qualified technicians of the operator/manufacturer of the wind turbine or by specialist surveyors qualified for work at height. Since mechanical stresses can occur, the individual components of the wind turbine *Extension* 4.0 must be installed correctly in the nacelle.
We, ecoObs GmbH, cannot carry out the installation ourselves. Please contact the operator and the wind turbine manufacturer in advance, before using the system on a wind turbine.

Power supply unit / power supply

In order to avoid disturbing influence of the 230 Volt mains power on the *batcorder* recordings, the *batcorder* is operated with a 6V battery in recording mode. In recording mode the *batcorder* is galvanically isolated from the mains. The battery is charged via the available mains connection as long as the *batcorder* is switched off. The standard 12V power supply unit of the *batcorder* is used as a charger. The control module contains the charging control for the battery and is designed to be supplied by the 12V power supply unit of the *batcorder*. Do not use any other power supply unit!

Make sure that a suitable 230V power connection is available in the nacelle. This should be supplied continuously, i.e. even when the system is switched off. Shorter outages (approx. 60 to 100 hours - depending on the actual runtime of the *batcorder*) are bridged by the battery.

The length of the cable from the power supply unit to the control module is about 2 meters. Therefore it may be necessary to add an additional extension cable from the power outlet to the power supply.

If the battery is to be replaced, make sure that the cable is connected correctly. Blue to "-", red to "+". If the polarity is reversed, the control module and the batcorder will be destroyed!

Do not construct any trip hazards! Please make sure that the cable from the power supply to the control module is not stretched across the room and is not laid over steps (danger of damage). Fix the cable with adhesive tape or cable ties, depending on the position/attachment.

The power supply unit may have to be additionally fixed at its slot so that it is firmly seated even in the event of vibrations. Fabric tape or cable ties are suitable for this purpose.

Some wind turbine types do not have sufficient protection against voltage peaks on the supply line of the nacelle. In this case, it is advisable to connect an appropriate overvoltage protection between the socket and the power supply unit to prevent hardware damage.

After connecting the power supply unit and battery to the control module, the red LED indicates the status of the power supply. A steady red light means power is being received from the power supply unit, a flashing red light means power is being received from the battery only, no power from the power supply unit. If the lead gel battery is very full, the detection may take a few minutes. An existing connection to the power supply is then falsely indicated. However, this only occurs very rarely.

Required material

Parts list wind turbine *Extension* 4.0

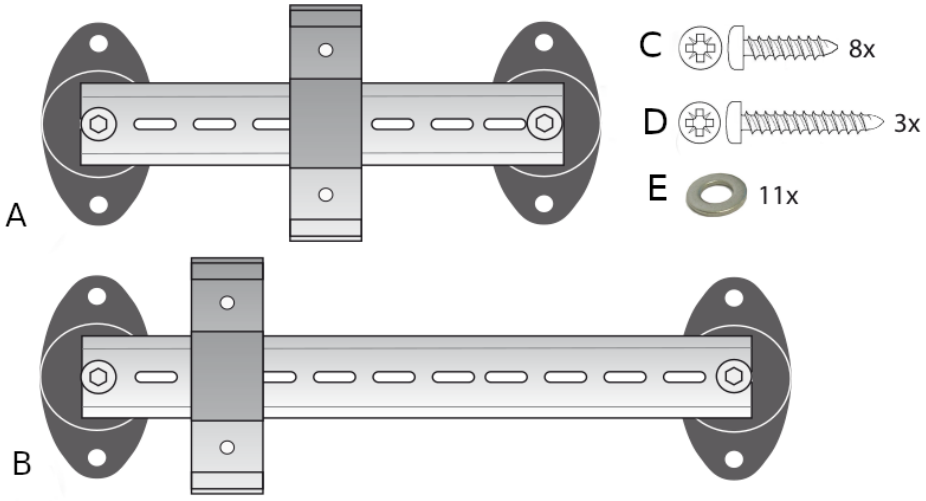
- Control module in black aluminum case with GSM antenna.
- Lead gel battery 6V 4.5Ah, with connector 4.8mm Faston.
- Connecting cable, approx. 15 cm long. Low voltage connector (control module) to Faston flat receptacles (battery).
- Plastic microphone disc with screws
- 12V power supply unit
- Mounting rails with screws

Additionally you need the following parts:

- *batcorder* 3.x with latest software.
- Power cable (connecting cable from batcorder to control module).
- SIM card (for monitoring the operation by SMS messages)
- SDHC memory card up to 32 GB or SDXC up to 128 GB
- If there is no power socket in the direct proximity of the mounting location, an extension cable is required.

Mounting parts for installation:

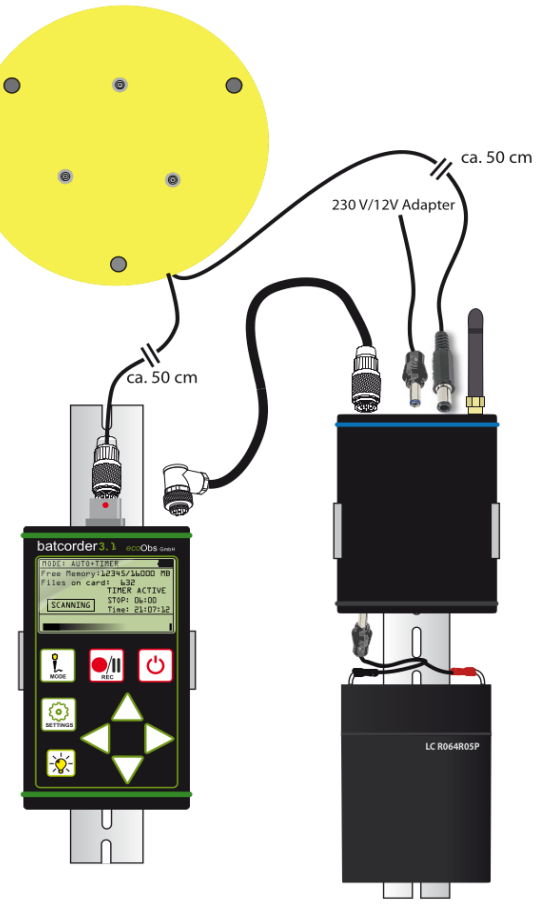
A. Short profile rail with pre-mounted vibration dampers and mounting clip(s) for the *batcorder* (optionally for bc2 or bc3).
B. Long profile rail with pre-mounted vibration dampers and narrow mounting clip(s) for the control module.
C. 8 x DIN7981 pan-head tapping screw C 5.5 x 13 H, for fastening the profile rails to the nacelle shell.
D. 3 x DIN7981 pan-head tapping screw C 5.5 x 25 H, for fastening the microphone disc to the nacelle shell.
E. 11 x washers DIN 9021 A2



For the installation you need the following equipment:

- Pencil or marker
- Power drill (note that you may need an extension cable).
- Hole saw for 100mm hole for the microphone disc
- 3.5mm or 4mm drill bit, depending on the material of the nacelle, to pre-drill the holes for the self-tapping screws.
- Cable ties to fix the battery on the profile rail
- Cable ties and adhesive tape to prevent tripping hazards caused by loosely laid cables.
- Phillips screwdriver size 2

Overview of the wiring



Position in the nacelle

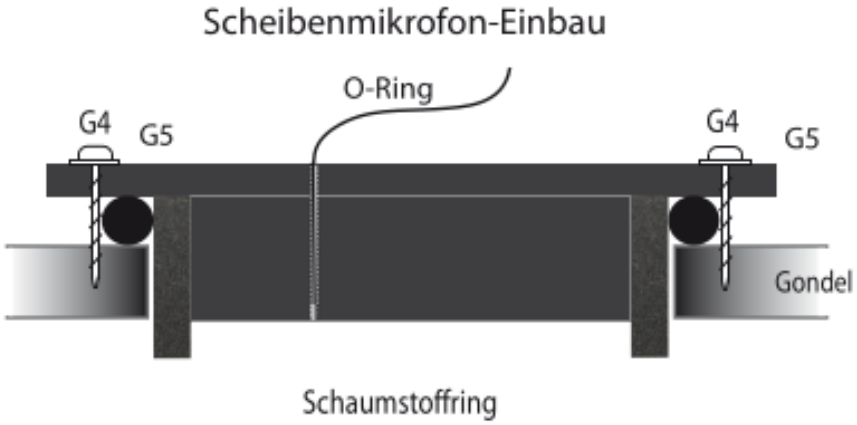
The microphone and the profile rails for the batcorder and the wind turbine *Extension* 4.0 are fixed on the nacelle bottom of the turbine. Thus, the microphone points downwards after installation. A good place for mounting has proven to be the rear area near the emergency exit hatch on Vestas and Enercon turbines.

Depending on the nacelle type and the available mounting options, a modification of the installation may be necessary. For example, the profile rails can also be mounted vertically on structures / struts inside the nacelle, also with magnets. The microphone

must not be mounted too exposed (e.g. on the side wall or top of the nacelle), as it is then too strongly exposed to the weather and also to rainwater running down and wears out prematurely. However, it is possible and advisable to install it at the bottom of the nacelle, on the side facing away from the rotor, as there is less turbulence here and therefore less noise and moisture or dirt are to be expected.

Installing the microphone disc

For the installation of the disc microphone it is necessary to cut a hole with 10 cm diameter into the nacelle shell. This step is only possible by qualified technicians of the wind turbine operator or the manufacturer!
The microphone disc is then inserted into the hole to fit.
For the self-tapping screws to fix the microphone disc, holes have to be pre-drilled according to the nacelle material. The microphone disc can be used to mark the position of the holes. Make sure that the O-ring is seated correctly.

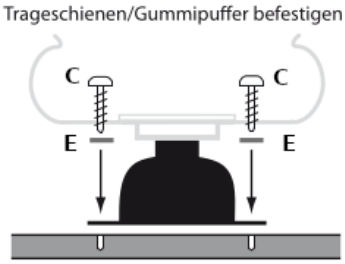


Note: The distance between the microphone disc and the *batcorder* must not exceed 50 cm (cable length of the microphone is approx. 50 cm). Before final drilling, check the positioning of all components to each other so that the connecting cable is not under tension.

Installation of the profile rails

The *batcorder* and the control module are fixed in the wind turbine nacelle using profile rails and a clip system. The profile rails are fixed with dampers to the nacelle shell (inside the nacelle). When doing so, make sure that there is a suitable distance to the microphone disc and to the power connection. According to the illustration the profile rails and the support clips are mounted and the *batcorder* is clicked into the holders.

The rubber dampers of the support rails are fixed with the supplied self-tapping screws (C). For this purpose, holes have to be pre-drilled accordingly. Then place the rails at the chosen position on the nacelle floor and mark the position of the pre-drilled holes for the screws. Also use the washers (E) supplied.



Installation of the *batcorder* and the *Extension* 4.0

We recommend to connect the cables to the devices before mounting the *batcorder* and the *Extension* 4.0 control module on the profile rails. The *batcorder* and the *Extension* 4.0 control module are inserted into the holding clips from above. In addition, the battery is mounted on the support rail of the control module using cable ties. The battery has a rubberized surface on the bottom side, with which it comes to rest on the profile rail. It is now fixed to the profile rail with two cable ties; the rubber prevents it from slipping.

When installing the equipment in the nacelle, always make sure that each part is firmly seated. Even by sudden acceleration forces, as they can occur in the nacelle due to wind and other events (emergency shutdown), they must not come loose!

Connecting the cables

Each plug fits only into the socket provided for it. This eliminates the possibility of mistakenly interchanging the connections.

batcorder - *Extension* 4.0 control module

Connect the *batcorder* and the *Extension* 4.0 control module with the appropriate cable (standard power cable of the *batcorder* with silver screw plugs). Socket and plug each have a groove so that the plugs can only be inserted into the socket in one position and screwed tight with the metal knurled nut. The angled plug is screwed to the *batcorder* and the straight one to the module. Be careful not to twist the cable. Make the locking only by turning the knurled screw. Do not use any tools.

Microphone disc - *batcorder*

Lock the microphone plug into the microphone jack of the *batcorder* by plugging it straight on without using force or tools. Pay attention to the correct alignment of plug and socket (red dot markings match). A twisted plugging will lead to loss of function.

To remove the plug, hold the plug by the grooved surface and pull. This will release the locking mechanism of the plug.
The plug must NOT be turned!

Microphone disc - *Extension* 4.0 control module

The second cable leading away from the microphone disc (connection of the ultrasonic transmitter) is connected to the *Extension* 4.0 control module. The plug-in socket is located between the GSM antenna and the socket for the power supply unit.

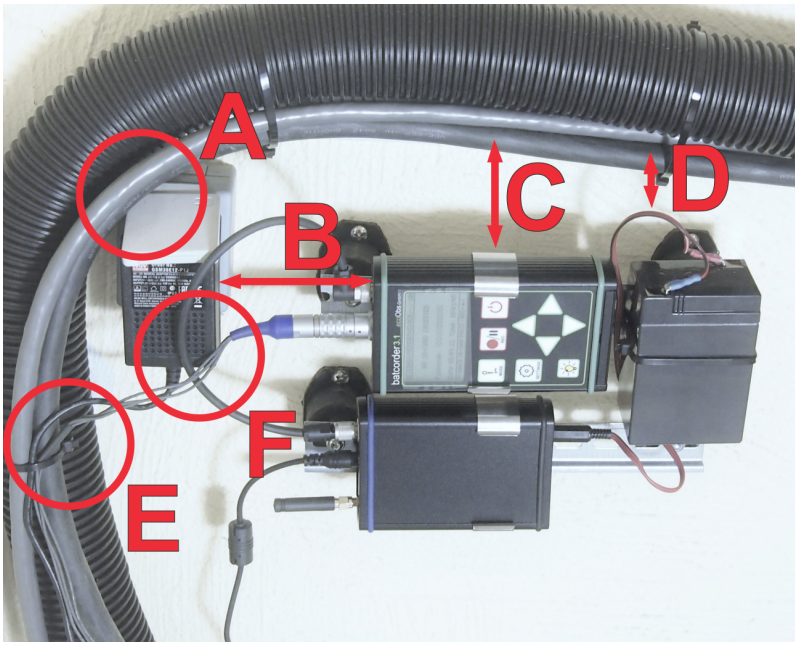
Power supply

The cable of the battery is connected to the back of the *Extension* 4.0 control module (side with only one socket). After connecting the low voltage plug of the power supply unit to the module, a red LED on the module indicates that the device is ready for operation.
Make sure that all cables are loose (without tension, drill or pull). The cables should not be able to move too much. To do this, they can be carefully fixed with tape or cable ties, depending on the situation.

Do not mount the 230V socket on the top-hat rail of the *batcorder* system.
Only use the power supply unit that we have supplied!

Installation errors that must be avoided at all costs:

The problem areas shown in the figure can lead to electromagnetic interference and thus endanger the safe operation of the device and/or lead to a significantly reduced recording quality.



A: The 230V socket and thus the power pack are too close to other live lines of the wind turbine.

B: The distance to the power supply should be longer

C: The *batcorder* is too close to other live wires.

D: The battery cable is too close to other live wires.

E: The 12V cable and the microphone cable of the *batcorder* were attached to an external line with cable ties. This must be avoided at all costs! Ensure maximum distance between the cables of the *batcorder* system and the lines of the wind turbine!

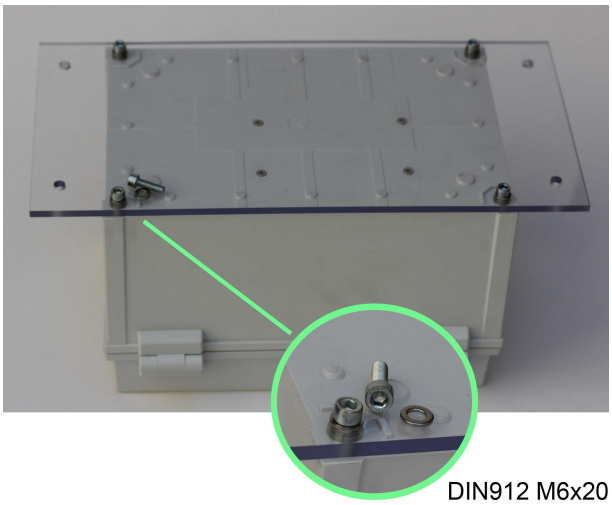
F: The power adapter is too close to the microphone cable. The connection cable to the extension lies on the power pack. Disturbances on the 230V network can thus be coupled into the *batcorder*.

Use in the BOX

Mounting the components

Mounting the back wall

Mount the plastic plate on the back wall of the box. Use the "DIN912 M6x20 VZ" Allen screws and the corresponding washers. The plastic plate is symmetrical in each axis, i.e. there is no preferred mounting direction.



DIN912 M6x20

Mounting the mast clamps

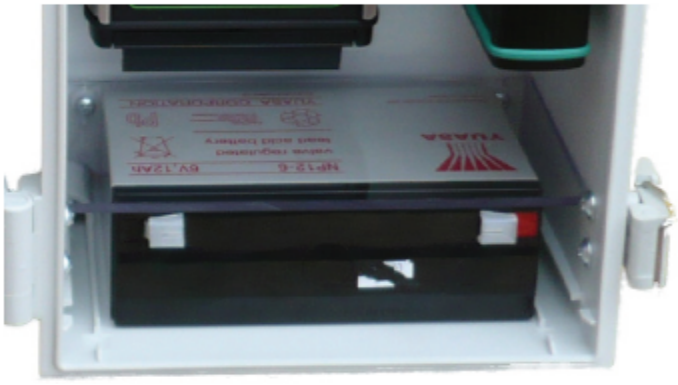
The two mast clamps are screwed to the back wall using the included screws. When using the solar panel, refer to the section **Mounting the solar panel holder**.

Mounting the microphone

The microphone is inserted into the prefabricated hole in the box lid and carefully screwed tight using the enclosed wing screws. On the one hand, make sure that the sealing ring fits and seals all around without any gaps, but on the other hand also make sure that the microphone disc is seated without tension. This must not be deformed towards the inside of the box lid due to overtightening of the wing screws.

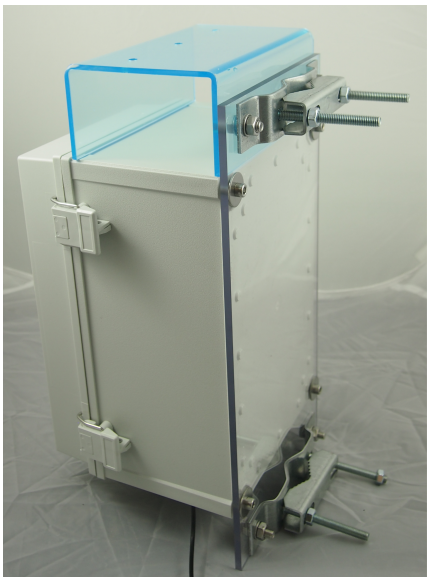
Mounting the battery

Slide the battery into the compartment provided at the bottom of the box. Make sure that the contact poles of the battery are on top as shown in the picture. This is important for an easy, tension-free connection of the power



cables to the *batcorder*, besides the contact poles are better protected against condensation collecting at the bottom of the box.

Mounting the solar panel holder



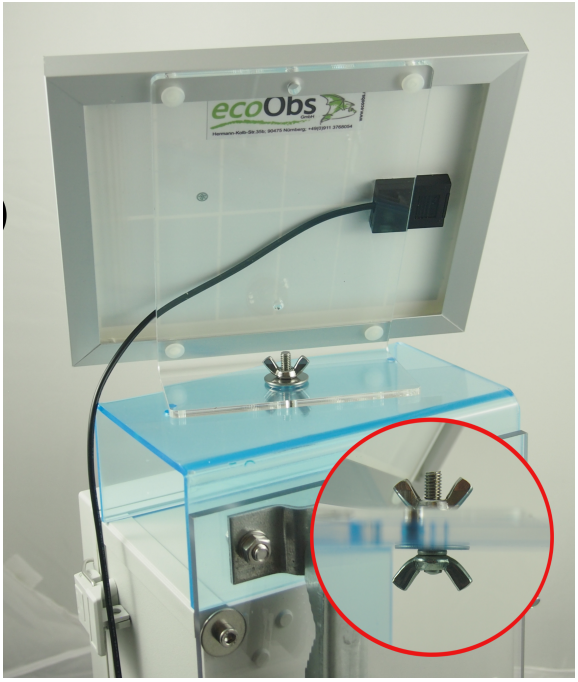
Note: The solar panel is optionally available for the box extension.
Attach the u-shaped plexiglass element as shown along with the top pole clamp if this is to be used.

Use:
2 x hexagon bolt M8x25
2 x nut
4 x washer

Note: Before mounting, remove the blue protective foil from the U-piece. In the photo, the protective film has not been removed only for better visibility of the element.

Mounting the solar panel

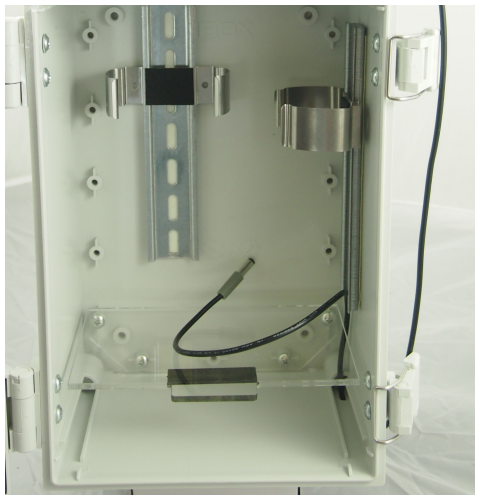
The solar panel is attached to the blue plexiglass element in the picture using a wing nut & wing screw.
It can be mounted on it at any position and oriented in any direction.



The solar panel will only provide energy when exposed to direct sunlight. In case of shadowing, e.g. by leaves, the solar panel will not function!

Passage of the panel cable

Above the upper hinge there is a cutout for passing through the flat, two-core solar panel cable. Make sure that the cable is not pinched and rests with the flat side on the edge of the housing. It may be necessary to fix the cable with adhesive tape.



This hole is also used for air exchange to avoid moisture caused by condensation. Do not close this hole!

Orientation of the solar panel

The panel must be oriented towards the sun. The panel will only generate sufficient power if the sun is shining directly on it. If it is shaded, e.g. by trees, then the panel has no function!

With a nightly runtime of e.g. 12 hours at medium activity (corresponds to approx. 3Wh), the battery is already fully charged again after approx. 3 hours in full sunlight. An orientation to the south is usually ideal, depending on the exposure of the box and the mounting location, you may have to find a compromise. Parameters such as morning fog in spring and autumn when facing east, but also the timer start when facing west should be taken into account. For locations with poor solar radiation, a second solar panel can also be used. Just contact us for such a solution.

Notice:

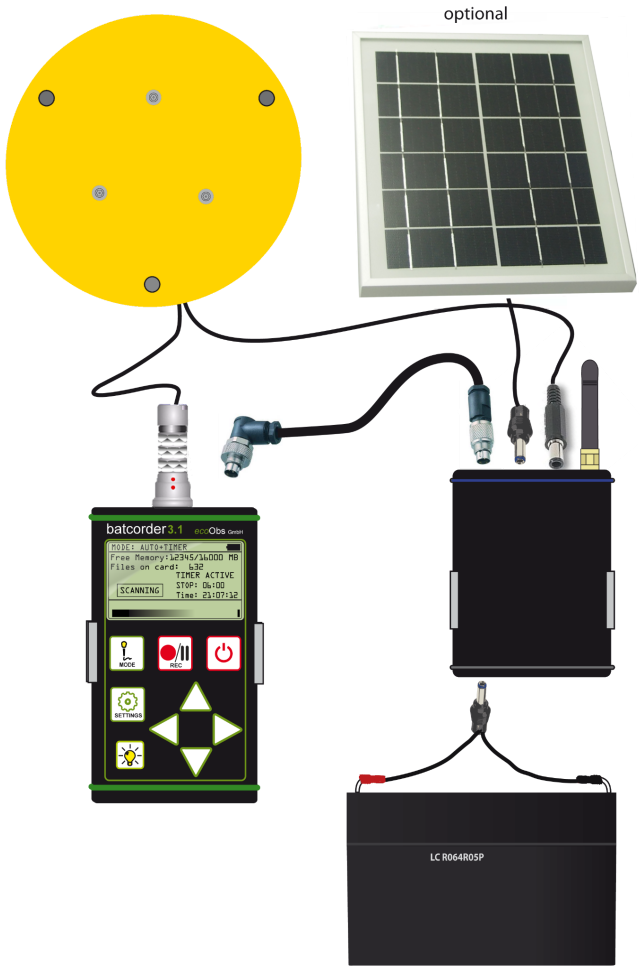
If operation with solar panel is not possible at your location and the runtime of the supplied 6V battery is not sufficient (approx. 4 weeks at 12h/day), then the control unit can also be operated with an external 12V battery. An active voltage converter is integrated into the control box, which converts a 12V battery voltage with an efficiency of > 85% into the required 6V operating voltage. Likewise a use of pasture fence batteries with 9V is possible. Larger batteries must then of course be housed outside the box.

The 6 volt solar module is not suitable for charging 9V / 12V batteries! However, it is possible to charge a 12V battery via a separate 12 volt solar panel.

Additional drain holes in the bottom

As standard, there is a drain hole in the rear right corner of the box base. This is usually sufficient to drain any condensation or moisture that may enter via the groove for the solar panel cable. However, in certain mounting locations, e.g. at treetop height, the orientation of the box may change over time. In such a case, it has proven useful to drill three additional holes in each corner of the box in advance. This ensures that water can drain away at any time, regardless of its position.

Overview of the cabling



Connection of the cables

Each plug fits only into the socket provided for it. This prevents the connections from being mixed up by mistake.

Please never try to force the plugs into the sockets. If it is the right plug for the right socket the connections can be made very easily!

batcorder - *Extension* 4.0 control module

Connect the *batcorder* and the *Extension* 4.0 control module with the appropriate cable (standard power cable of the *batcorder* with silver screw plugs). Socket and plug each have a groove, so that the plugs can only be inserted into the socket in one position and screwed tight with the metal knurled nut. The angled plug is screwed to the *batcorder* and the straight one to the module. Be careful not to twist the cable. Make the locking only by turning the knurled screw. Do not use any tools.

Microphone disc - *batcorder*

Lock the microphone plug into the microphone jack of the *batcorder* by plugging it straight on without using force or tools. Pay attention to the correct alignment of plug and socket (red dot markings match). A twisted plugging will lead to loss of function.

To remove the plug, hold the plug by the grooved surface and pull. This will release the locking mechanism of the plug.

The plug must NOT be turned!

Microphone disc - *Extension* 4.0 control module

The second cable leading away from the microphone disc (connection of the ultrasonic transmitter) leads to the *Extension* 4.0 control module. The slot is located between the GSM antenna and the socket for the power supply unit.

Power supply

The cable of the 6V battery is connected to the back of the *Extension* 4.0 control module (side with only one socket). Optionally this battery can be charged with our 6V solar panel. The battery input is 6V - 17V compatible.

BATCORDER SETTINGS

Settings of the *Extension* 4.0 control module

We recommend to do these steps early enough before the installation, e.g. in the office, and to test the settings there as well, preferably over a few nights.
Start the *batcorder* with connected *Extension* 4.0 and battery. The startup process takes a few seconds, because the *batcorder* has to establish a data connection to the *Extension* 4.0 control module. In the meantime you can read the current firmware of the *Extension* 4.0 on the *batcorder's* screen. After the start the *batcorder* is in the menu **Settings: SD-Card+Clock** as usual. Depending on the selected mode, you will see the note **"BOX"** for the BOX mode or the **plug symbol** on the right side of the status bar, which indicates that the *batcorder* is powered by the power supply unit in wind turbine mode.

Set the microphone correction factor (MCF)

The *batcorder* is **not** calibrated to the disc microphone at delivery. Therefore the microphone correction factor (MCF) has to be entered manually for the use of the disc microphone.

The MCF is the calibration factor of the disc microphone. It controls the sensitivity of the input amplifier of the *batcorder*. You will find it on the back of the microphone as a white sticker.

Make sure that the flashing cursor is on a character of the file code. Now press the **REC key** and keep it pressed. Now press the **right arrow key** and release both keys again. The order in which you release the keys is irrelevant.
You are now in the menu "**Microphone correction factor**". Here you enter the correction factor (MCF) that is written on your microphone.
Press **REC** to save the entered value. You will now automatically be taken to the "**Testsignal calibration**" menu.

Calibration of the test signal transmitter

The *Extension* 4.0 generates a short test signal by means of the ultrasonic transmitter embedded in the microphone disc. The calibration of the test signal is performed automatically by the *batcorder* after each input of the calibration factor. It can also be repeated at any time.

The calibration should be performed when the microphone is installed in its final position in the wind turbine or box. There must be nothing within a radius of approx. 1.5 m in front of the microphone that could reflect the test signal. In case there is extremely bad weather with a lot of precipitation, fog and wind when the microphone is installed in the wind turbine nacelle or at the box location, it makes sense to have already calibrated the microphone outdoors or out of the window beforehand. This does not replace the final on-site calibration, but can be very useful as a temporary solution for bad weather situations.

These steps have to be done whenever you connect a new microphone to the *batcorder*.

We recommend the annual check of the microphone calibration by ecoObs GmbH. Please send the microphone to our company address to be found at www.ecoobs.com. We will then check the microphone correction factor (MCF) and inform you about the correct values and the procedure to adjust the *batcorder*.

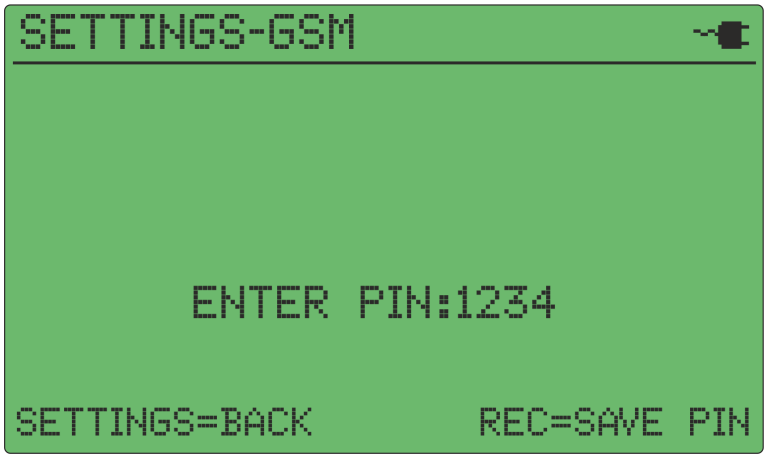
Enter SIM PIN & target phone number

You are now back in the Settings menu: SD-Card+Clock

Pressing the SETTINGS key twice takes you to the settings for GSM operation. These menu pages can only be accessed if the control module has been successfully detected. Here you can set the PIN of your SIM card (if the PIN of your card is activated) and then the target phone number for sending status messages via SMS. You can also send a test SMS to your target phone number from here. If no SIM card has been detected, a message is displayed and the menu screen is exited.

If a PIN is required for the SIM card, this is the next step in the *batcorder* preparation. Otherwise the following step is skipped. Entering the PIN is only necessary again when the SIM card has been changed. Some SIM cards do not require a PIN. The following menu will not appear then!

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

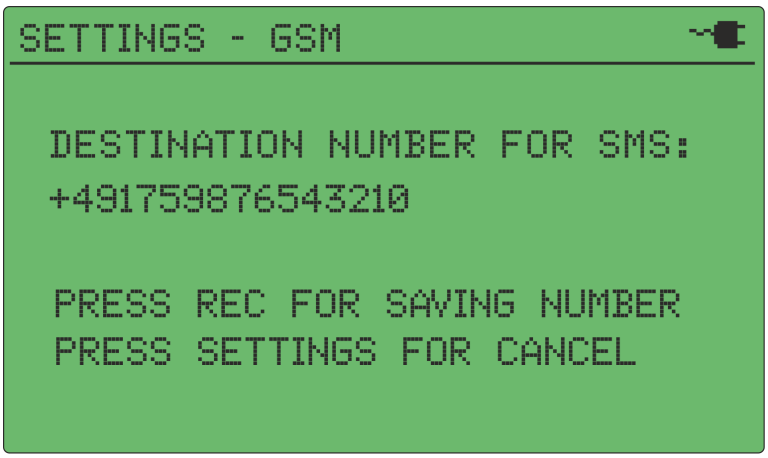


After pressing the REC key, the PIN is transferred to the SIM card and the response is requested. If the PIN is correct, the GSM modem attempts to log into the operator's network. If this does not succeed or if the PIN is invalid, a corresponding error message is output.

If the PIN is entered incorrectly three times, the SIM card is blocked and can only be unblocked by entering the PUK "Personal Unblocking Key number". The PUK cannot be entered via the *batcorder*. To do this, you must insert the card into a cell phone and use it to unblock the card.

If the PIN was correct, the next screen will show the signal strength and the name of the network in which the GSM module has logged in.

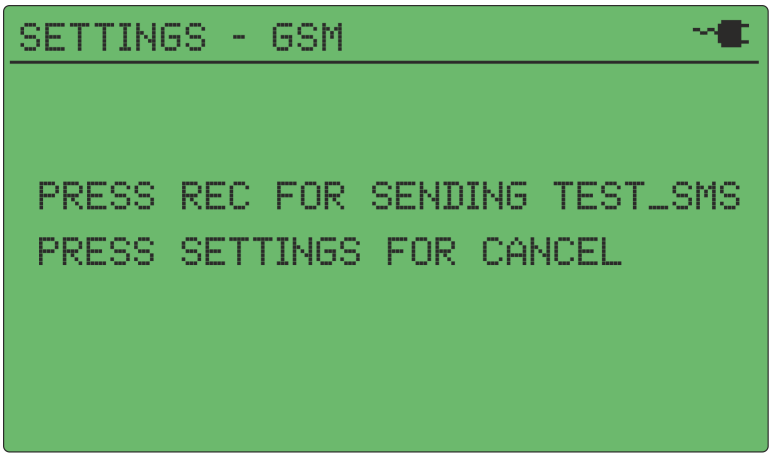
If the network dial-up was successful, press ">" to enter the next menu for entering the target phone number to which the SMS status report will be sent.



The destination number must always be entered in the form "country code + network code (without leading zero!) + phone number". This means that the country code (+49) must also be entered in Germany. For example, if your cell phone has the German phone number "0151 12926992", then you must enter: "+4915112926992".

To delete superfluous digits at the end of the phone number, move the cursor to the last digit and scroll to the space (" "). Repeat this step for other superfluous digits if necessary.

After entering and saving the target phone number, you have the option to send a test SMS to the designated number to check the function of the GSM modem and the settings.



The success of the test SMS will be displayed on the *batcorder* screen afterwards. If the sending was successful and all necessary entries were made, the *batcorder* is ready for operation with the *Extension* 4.0.
You should send a test SMS again after the installation on site of the *batcorder* and the *Extension* 4.0. To do this, follow the steps above and have an additional control of the set number. You can measure the signal strength again or change the target number by switching to the GSM menu.

Sending the status SMS

The *batcorder* automatically sends a status SMS to the entered target number every day when the scanning is finished (corresponds to the stop time of the timer). Precondition is that the mobile network of the respective network operator has been found. The message normally contains the following information:

- Filecode of the *batcorder*: batcorder: **XXXXXXXXX**
- Free memory on the SD card: free mem: **xx.x GB**
- Number of recordings: files total: **xxxxx**
- Number of recordings last night: last night: **xxxxx**
- Microphone signal level (in dB): **-x dB / -x dB**
- Display of current battery voltage
- Minimum temperature in °C

The two microphone signal levels resulting from an evening and morning test are transmitted as a deviation in dB (logarithmic) from the reference value. No deviation can be recognized as 0 dB. A deviation of -6 dB means a halving of the sensitivity. A value of -99 dB is indicated when no reception of the test signal was possible.

Due to weather conditions, the TSL value is often significantly lower in the morning than in the evening. This is nothing unusual and does not represent a defect.

Special SMS messages

If necessary, an error message is also issued with or instead of the status messages. If you are not sure whether it is a critical error, please contact us. Please make a note of the exact wording of the error message, this will make it easier for us to identify the possible cause of the error.

Possible messages:

„batcorder turned off because of low battery.“
Cause: The lead gel battery is empty or defective.

„Shutdown due to low battery. BC willrestart next day!“
Cause: The lead gel battery is empty. However, the voltage is still sufficient for the timer start on the next day. The battery must be replaced or charged.

„Not enough disk space. Replace SD-card!“
The SD-card is full and must be replaced.

„SD-card read or write error occurred. Replace SD-card!“
A card write error occurred. The card must be replaced.

„Maximum number (65535) of files reached! Please replace card!“
The *batcorder* (only up to version 2.0) can write a maximum of 65535 images to a memory card. The SD card must be replaced.

„AC Adapter down!”
The AC adapter is defective or has been removed.

„Battery missing, running on AC Adapter“
The lead gel battery is empty, defective or has been removed, the *batcorder* is running on AC power.

„ATTENTION: The timer has been manually deactivated.”
The timer has been manually deactivated.

Error detection based on the status SMS

No recordings

If no recordings are made over several days, there could be a technical problem, e.g. microphone defect. Due to the automatic daily microphone test, at least two recordings per day should be generated. However, there are also sites or periods without bat activity. It is particularly noticeable when existing bat activity suddenly stops completely and no further recordings are generated from then on. An on-site inspection of the setup and the *batcorder* is then necessary.
See also the section "Decrease of microphone sensitivity".

Very many or long recordings

At some sites, and especially at the beginning of fall, the number can increase to several hundred per night. However, this is usually only a few nights when activity is extremely high. If the *batcorder* constantly records very many sequences (several hundred to thousands), it may be a disturbance or improper settings of the *batcorder*. A check of the setup and the *batcorder* on site is then necessary.

1. Value for Quality too high: We recommend a value of 20 for the Quality parameter in the recording control settings. This parameter essentially determines whether signals are classified as bat calls or disturbances. With this value, a large part of the possible disturbance noises will be detected and thus not recorded. Only at higher wind speeds (from 8-9 m per second) are more disturbances recorded. If the value for Quality is set too high (> 20), however, an increased number of recordings can occur even at low wind speeds.
2. If a lot of and sometimes large (> 5 MB) files are written permanently, even at low wind speeds, there is probably a source of interference near the box / wind turbine *Extension* 4.0.
3. Possibly the *batcorder* itself has a defect (increased noise and interference bands), which leads to increased recordings. The device may then have to be sent in.

In most cases, we can already make a preliminary analysis on the basis of recordings. Therefore, please always send us recordings of the *batcorder* in case of potential technical errors.

Failure of the Status SMS

If the status SMS fail to appear, there are various sources of error that can prevent the message from being sent. It is assumed in the following that the test sending of the message also worked reliably at the location of the box / wind turbine *Extension* 4.0.

Dial-up to mobile network not possible

If there are disturbances in the mobile network of the card operator or if the credit of the SIM card is exhausted, status SMS cannot be sent. We therefore advise against using prepaid cards and recommend using contract cards. Even with good network reception, it may not be possible to send the message because no timeslots are provided for data transmission due to excessive network load.

A missing SMS message is not equivalent to a malfunction of the *batcorder*.

Before an on-site check is done, a few days should be waited. However, if messages were sent reliably at the beginning of the examination, but then no SMS were received for several days (3-6), this indicates a problem of the *batcorder* or the *Extension* 4.0 and an examination of the device should be done.

Decrease of microphone sensitivity

The microphone may lose sensitivity over time. It is relatively robust when properly mounted, but long-term, uninterrupted outdoor exposure will age it. Moisture and frost in particular have a negative effect. Since data can no longer be collected comparably as a result, it is then necessary to replace and recalibrate the replaced microphone at ecoObs.

The sensitivity of the microphone is determined by the built-in ultrasonic transmitter of the microphone. At the beginning and the end of each monitoring session a test signal in the form of a short 40kHz sine wave is played and compared with the reference value.

The result of this comparison is displayed as the ‘TSL value’ in the status SMS.

Measuring the sensitivity in this way can never be as reliable as measuring the sensitivity in a special sound laboratory. Many environmental factors such as heavy humidity or a raindrop covering the membrane of the microphone can lead to very low

TSL values even though the hardware is completely all right. If on the other hand an obvious decline (value -6dB) of the measured TSL value is observed over a couple of days, a significant loss of sensitivity can be assumed.

A decline of -6dB hereby corresponds to a signal loss of 50%. Fluctuations of 0dB to -12 dB are a result of the weather conditions and no reason to worry. Even -99dB is possible during an extremely high morning dew.

Please also note that depending on how the calibration of the signal transmitter was performed, the maximum TSL can also be less than 100% when set up in the field. This is the case if, for example, there were reflective objects in front of the box during the initial setup. Then the signal volume is increased by the overlay with echoes. During the final setup in the field, there are then no reflecting objects in the environment and an apparently quieter signal is recorded. This is then reflected in a (slightly) negative TSL value. As a rule, therefore, it is not the absolute value that is important, but how it changes when used in the field. Therefore, even a permanent TSL of e.g. -9 dB can be sufficiently good for a calibrated microphone. The apparent error may result from an unfavorable reference measurement that leads to an overly loud signal. However, if this value then drops again permanently (> 5 days) by more than 6 dB, then there is probably a defect in the microphone.

Checklist for commissioning

Check the settings and proper function of the *batcorder* with the *Extension* 4.0 carefully already before installation in the box or wind turbine. Otherwise a faulty installation or wrong settings will lead to the fact that no (usable) data are available for an examination period, and / or that a new on-site visit is necessary to correct errors.

The following procedure for commissioning should be carefully followed. This should also be observed, for example, when changing the SD card.

1. When using a SIM card, insert it into the *Extension* 4.0 with the *batcorder* switched off.
2. Insert a SD card into the *batcorder* when it is switched off. Make sure that this card is formatted correctly. Test the card with a device on the ground beforehand. Have spare cards ready in case of emergency.
3. Switch on the *batcorder* and let the *batcorder* check the SD card and format it if necessary. When changing the card, always switch on the *batcorder* again to test the card, otherwise it cannot start recording at the automatic start if the card is incorrectly formatted or defective.
4. Check the date and time as well as the filecode.
5. Check the recording settings: *Quality*, *Posttrigger*, *Threshold* and *Critical frequency*, (*Noise Filter*; only *batcorder* 3.1).
6. Check the start and stop time setting in Auto+Timer mode.
7. If necessary, also check the target phone number for receiving status messages and the entered MCF of the microphone.

If the check was successful, simulate a timer on / off cycle.

Simulation of a timer on / off cycle

For test purposes the *batcorder* can be started and stopped in timer mode without having to set the start & stop time. To do this, switch on the *batcorder* and simultaneously hold down the **REC key** of the device until you are prompted to release the key. The *batcorder* is now in auto timer mode and behaves as if it was switched on by the timer. If now the REC key is pressed again, the *batcorder* will stop the timer. The recording cycle stops as if it had been switched off by the timer. It generates the microphone test signal, then sends the status SMS and the message that the timer has been stopped manually. It then goes to the Settings menu.

The timer is not activated now! To activate the timer mode, go to the Auto+Timer mode and activate it by pressing the On/Off key.

Acoustic and electromagnetic influences

Increased noise in the audio signal can be caused by both acoustic and electromagnetic interference sources. If such interfering signals are in the frequency range of bat calls, they inevitably affect the signal analysis. Although the call detection implemented in the *batcorder* is very robust, known sources of interference should be avoided. The following list of interference sources has been compiled to the best of our knowledge. The *batcorder* will mostly run reliably even under these conditions. Under certain circumstances, however, not all bat calls will be detected or disturbing noises will trigger recordings. Also the later following measurement and determination of the recordings on the computer may be affected:

- Strong electromagnetic or magnetic fields (e.g. on high-voltage power lines, high-voltage switch cabinets, wind turbine nacelles, large solenoid coils, ...) can lead to incorrect recordings and interference in the recordings.
- Alternating current sources (e.g. also neon tubes, energy-saving lamps, ...) can generate interference bands.
- Strong wind currents along irregularly shaped objects (e.g. train, truck, car) generate low frequency noise or even broadband noise signals. These can mask bat calls.

SD card exchange rate

By using large memory cards (up to 256 GB for the *batcorder* 3.1), the site visits required for changing full SD cards can be reduced to a minimum. Under certain circumstances, even several months of operation with one card are possible. However, we advise to change the cards at least every four weeks.
Various factors, especially temperature fluctuations and electromagnetic radiation, increase the probability of card defects. In this respect, it is highly recommended to replace the card sufficiently often and to check the images afterwards. This is the only way to counteract any data loss in good time. It is then best to archive the cards and avoid reusing them in continuous monitoring. In general, we recommend regular replacement, as cards become more susceptible to errors with increasing age.

Manual recording control

After changing the cards, the actual recordings should be saved to hard disk. A brief manual check of sequences randomly selected over the recording period allows the detection of any device defects or failures that lead to recordings that cannot be evaluated. Indications of malfunctions are, for example, extremely long, several MB large recordings and / or extremely many recordings (hundreds to thousands per night). In normal recordings, the background noise, recognizable in the oscillogram or sonogram, is very low. If all recordings show a strongly increased noise or strong interference bands (in the sonagram), this indicates interference. These can occur temporarily due to increased acoustic or electromagnetic radiation (e.g. when there is a lot of wind) or they can be permanently pronounced. In the case of permanent disturbances, a device defect should be considered. It is also possible that the system / the installation location is not suitable for acoustic detection.

Analysis with *bcAdmin*

If you use our program *bcAdmin* for storing and analyzing the recordings, you may have to adapt the settings of the analysis algorithm to the *batcorder* settings. By default *bcAdmin* uses the *batcorder* settings stored in the sessions when importing the recordings. However, these values stored in the session settings can be replaced by a globally valid *threshold* value in the *bcAdmin* preferences (see also the documentation in the *bcAdmin4* manual). Therefore, when analyzing new recordings, check that you have selected the correct settings and that the data are measured with the same *threshold* value with which they were also recorded. Always evaluate recording slots that you want to compare with each other with the same settings.

Species analysis with *batIdent*

If you use the program *batIdent* for automatic species analysis, the quality of the results will depend on the selected settings on the *batcorder* and *bcAdmin*. For best results we recommend to use the default settings of the *batcorder* and *bcAdmin*. If the recording threshold is lowered to increase the range, the determination results will be on average poorer. This means that more sequences will be discriminated only at low level (e.g. "Nyctaloid") and that more false determinations will occur.

Activity analyses of different locations or within a time series are only comparable regarding quantity and quality, if the same settings have been chosen for the *batcorder* as well as for *bcAdmin*.

If the recording *threshold* on the *batcorder* has been changed, the *threshold* for the analysis on the computer has to be adjusted accordingly. Please also read the manual of the *bcAdmin4* program.

The call detection of the *batcorder* ensures that disturbing sounds are essentially not recorded at all. In summer, however, grasshoppers may be recorded. Usually these are ignored if they are 2 or more meters away from the microphone. However, it can happen that grasshoppers sit on top of the box to sing or that tall corn under the box serves as a singing base. In this case, grasshopper recordings cannot be completely avoided. A possible solution is the clearing of higher vegetation directly around the box location.

Technical data

Input battery:
Allowed input voltage 5.5V - 17V

Current / power consumption:
***batcorder* off:**
6V battery: < 2.9mA; <17.4mW
12V battery: < 6mA; < 72mW

***batcorder* on / timer mode scanning:**
6V battery: approx. 15mA; 90mW depending on SD card
12V battery: approx. 9mA; 108mW depending on SD card

***batcorder* on / timer mode while recording:**
6V battery: approx. 35mA - 55mA; 210mW - 330mW depending on SD card
12V battery: approx. 20mA - 35mA; 240mW - 420mW depending on SD card

Input solar cell / 12V power supply - input:
Max. continuous current (with 12V power supply): 0.5A

Solar cell power : (accessory for use in BOX mode)
7.5V / 150mA; Idle 10.3V

GSM modem:
Type: ML865C1-EA
E-GSM 900, DCS 1800, LTE Cat M1INB-IoT
Manufacturer: Telit Communications S.p.A. ITALY
Certified according to:
EU Directive RED 2014/53/EU of April 16, 2014

Problems / Support

Error description and contact

Like any other device, the *batcorder Extension* 4.0 can cause problems during operation. As these are often easy to fix causes, we ask you to contact us with a detailed error description before sending us the device. The error description should always include the serial numbers of the *batcorder* and the *Extension* 4.0, as well as the respective software versions (Hxxx Sxxx). Furthermore it is helpful to give us a detailed description of the error.

Error messages can be sent to info@ecoobs.de or to ecoObs GmbH, Hermann-Kolb-Str. 35b, 90475 Nuremberg.

For technical questions please contact: +49 (0)911 3768053

Attachments:

- Declaration of EU Conformity *Extension 4.0*
- Telit-ML865C1-EA-Declaration-of-Conformity
- Meanwell Declaration of Conformity

EG-Konformitätserklärung

Declaration of EU Conformity
Déclaration UE de conformité

Device type
Product name: ***Extension 4.0***

Manufacturer: ecoObs GmbH
Hermann-Kolb-Str. 35b
90475 Nuremberg

We declare under our sole responsibility that the product of the product line to which this declaration refers is in conformity with the requirements of the directives:

EU-Guideline EMC 2014/30/EU from February 26th 2014
EU Directive on the harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC)

EU-Guideline RED 2014/53/EU from April 16th 2014
EU Directive on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (RED)

EU-Guideline RoHS 2011/65/EU from June 8th 2011
EU Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

EU-Guideline LVD 2014/35/EU from February 26th 2014
EU Directive on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits (LVD)

Nuremberg, 31.05.2017

(Claus Schuster)
CEO, Hardware development

(Dr. Volker Runkel)
CEO, Software

EU DECLARATION OF CONFORMITY [20575DOC00168A Rev.0]

1 ML865C1-EA (product name)

2 Telit Communications S.p.A. – Via Stazione di Prosecco, 5/B – 34010 Sgonico TRIESTE – ITALY (manufacturer)

3 This declaration of conformity is issued under the sole responsibility of the manufacturer

4 E-GSM 900, DCS 1800, LTE Cat M1/NB-IoT FDD B3, B8, B20, B28 with GNSS Wireless radio module.
SW Version(s) M0B.220004

Operating frequency bands and related max radio-frequency power transmitted:
E-GSM 900: 33.5 dBm, DCS 1800: 30.5dBm
LTE FDD 3 / 8 / 20 / 28: 24 dBm

5 The object of the declaration described above is in conformity with the relevant Community harmonisation: European Directive 2014/53/EU (RED)

6 The conformity with the essential requirements set out in Art.3 of the 2014/53/EU has been demonstrated against the following harmonized standards:

Harmonized Standard reference	Article of Directive 2014/53/EU
EN 62311:2009 / EN 62368-1:2014+A11:2017	3.1 (a): Health and Safety of the User
Draft EN 301 489-1 V2.2.0 / Draft EN 301 489-19 V2.1.0 Draft EN 301 489-52 V1.1.0	3.1 (b): Electromagnetic Compatibility
EN 301 511 V12.5.1 / EN 301 908-1 V11.1.2 EN 301 908-13 V11.1.2 / EN 303 413 V1.1.1	3.2: Effective use of spectrum allocated

7 The conformity assessment procedure referred to in Article 17 and detailed in Annex III of Directive 2014/53/EU has been followed with the involvement of the following Notified Body:

Dekra Testing and Certification, S.A.U., Parque Tecnológico de Andalucía, C/ Severo Ochoa 2, 29590 Campanillas – Málaga – SPAIN, Notified Body No: 1909

Thus, CE is placed on the product

8 The product can be considered compliant to the essential requirements set out in Art.3 of 2014/53/EU only in combination with the above-mentioned SW version(s).

9 The Technical Documentation (TD) relevant to the product described above and which supports this Declaration of Conformity, is held at: Telit Communications S.p.A., Via Stazione di Prosecco, 5/b - 34010 Sgonico – TRIESTE – ITALY

Trieste, 2019-09-09

VP Global Certification, R&D
Paolomaria Schiratti

EU-Type Examination Certificate No. 59644RNB.001A1 Technical Documentation: 30575TCF00138A

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Cap. Soc. € 3.000.000
Partita IVA 03711600266
Cod.Fisc. 03711600266
Nr. R.E.A. TS-120027

Società soggetta all'attività di direzione e coordinamento da parte di Telit Communications PLC con sede in Londra (art.2497 bis C.C.)

Società con socio unico (Telit Communications PLC)

Declaration of Conformity

For the following equipment：

Product Name: AC/DC Switching Adaptor

Model Designation: GSMwxy (w=18,25,36；x=B,E；y=05,07,09,12,15,18,24,48)

is herewith confirmed to comply with the requirements set out in the Council Directive, the following standards were applied：

RoHS Directive (2011/65/EU)

MDD Directive (93/42/EEC)

EN60601-1:2006+A11+A1+A12; EN60601-1-11:2010 TUV certificate No：TA50266669

EMI (Electro-Magnetic Interference)

Conducted emission / Radiated emission

	EN55011:2009+A1:2010	Class B
Harmonic current	EN61000-3-2:2014	
Voltage flicker	EN61000-3-3:2013	

EMS (Electro-Magnetic Susceptibility)

EN60601-1-2:2007

ESD air	EN61000-4-2:2009	Level 4	15KV
ESD contact	EN61000-4-2:2009	Level 4	8KV
RF field susceptibility	EN61000-4-3:2006+A1:2008+A2:2010	Level 3	10V/m
EFT bursts	EN61000-4-4:2012	Level 3	2KV/5KHz
Surge susceptibility	EN61000-4-5:2014	Level 3	1KV/Line-Line
Conducted susceptibility	EN61000-4-6:2014	Level 3	10V
Magnetic field immunity	EN61000-4-8:2010	Level 4	30A/m
Voltage dip, interruption	EN61000-4-11:2004	>95% dip 0.5 periods	30% dip 25 periods >95% interruptions 250 periods

Note:

The power supply is considered as a component that will be operated in combination with final equipment. Since EMC performance will be affected by the complete system, the final equipment manufacturers must re-qualify EMC Directive on the complete system again.

For guidance on how to perform these EMC tests, please refer to TDF (Technical Documentation File).

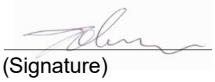
This Declaration is effective from serial number EB6xxxxxxx

Person responsible for marking this declaration：

MEAN WELL Enterprises Co., Ltd.
(Manufacturer Name)

No.28, Wuquan 3rd Rd., Wugu Dist., New Taipei City 248, Taiwan
(Manufacturer Address)

Johnny Huang/ Manager, Certification Center：
(Name / Position)


(Signature)

Ted Cheng/ Director, Sales Dept.：
(Name / Position)


(Signature)

Taiwan
(Place)

Apr. 20th, 2016
(Date)

Version：5