GSM-batcorder 1.0 4G

user manual

ecoObs GmbH

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About this instruction manual

This instruction manual for the GSM-batcorder contains important details concerning installation, operation and handling. Read this manual carefully and observe the following safety instructions. Especially if you hand on this product to a third person. Keep this manual for further reading!

This manual describes the GSM-batcorder “GSM1.0 - #1000-4G” with the firmware S3.18 or higher. There may be slight differences in usage with older devices or software versions.

Safety instructions

- Not all wind energy plants are equally suitable for using the GSM-batcorder. Some plants can exhibit extreme acoustic and/or electromagnetic emissions, e.g. drives, actuators, stall etc. . These no longer allow a reasonable acoustic capture of bats. Early planning and possibly a pilot survey could therefore be necessary.
- No liability can be accepted for material damages or physical injuries caused by improper handling or non-observance of the instruction manual, in such cases the warranty claims expire.
- Damages to the device and/or accessories caused by improper handling also lead to exclusion of all warranty claims. Please always observe the instruction manual exactly and solely use the original ecoObs parts and accessories or explicitly by ecoObs authorized parts.
- Only allow installation of the GSM- batcorder on the wind turbine generator (WTG) to be carried out by qualified personnel.
- Observe within the framework of the usage of this product effective regulations for installations and work in and on WTG`s.
- The installation recommended within this manual has to be modified due to the plants specific construction. Therefore we advise to consult the operator respectively the manufacturer of the plant at an early stage.
- Always make sure that the device and the accessories are fixed properly.
- Avoid strong mechanical stress on the GSM-batcorder and its components. In particular you have to secure that the bolted plug is not exceedingly strained. Strong vibrations, heavy shaking and dropping have to be avoided completely.
- Never leave children and pets alone with the device!
- Do not plug in the device directly to the mains supply, always use the provided ecoObs power supply unit!

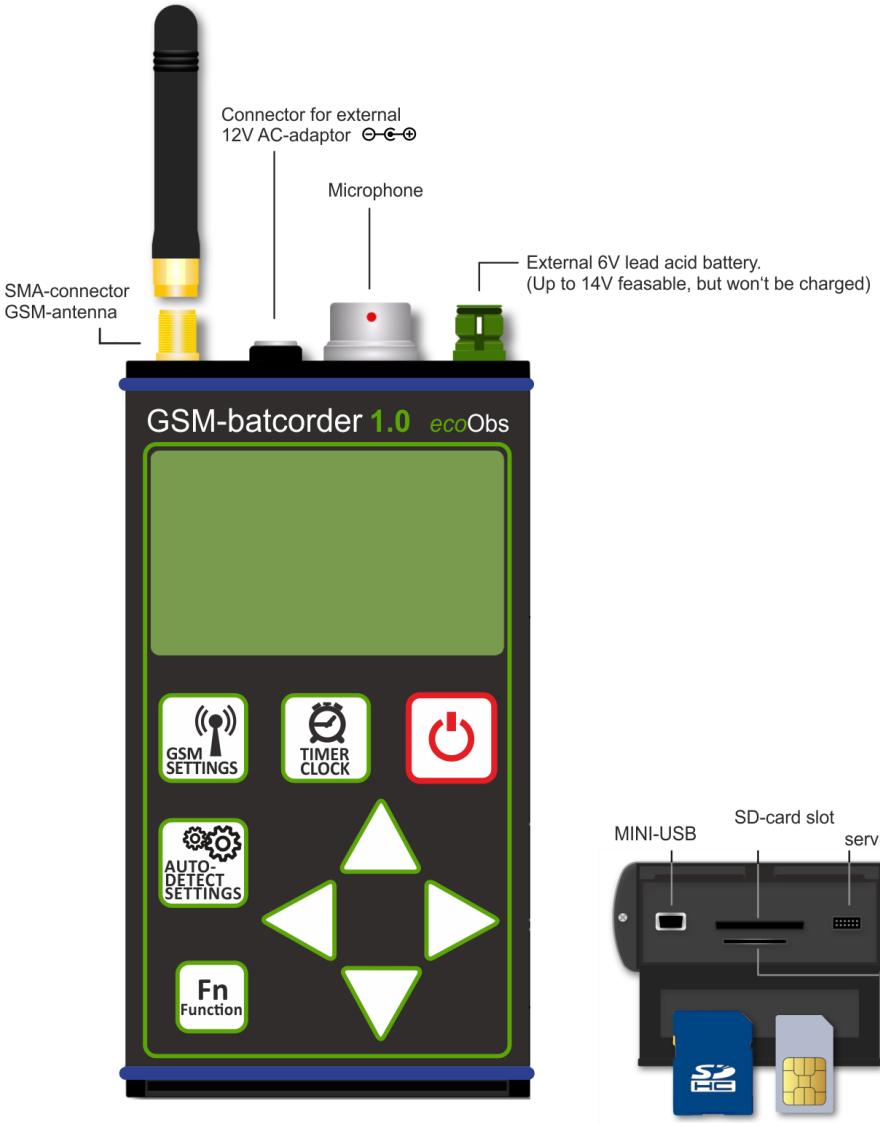
- In case of a visible damage or other problems contact our support immediately (see end of manual). Never try to repair damages by yourself our through unauthorized personnel. Do no longer use damaged or malfunctioning devices and accessories.
- You need a wireless connection to the mobile network system for using the GSM-batcorders GSM-unit via SMS-control and to have the possibility to receive a status report as text message. In particular plants with metal nacelles can inhibit the connection to the mobile network (shielding through the nacelles housing) respectively if there is no mobile service in the plants location. Therefore we recommend an early consultation of the plant's operator / manufacturer.
- The GSM-batcorder complies with the standards for electromagnetic compatibility, however it cannot be avoided that EM-fields couple in through the microphone and disturb the audio signal. Therefore try to keep away the device from electromagnetic and magnetic disturbance sources.
- The microphone capsule within the microphone disc is sensitive against mechanical force. Make sure that the microphone is not touched during installation and transport. Also the surface of the acrylic pane, in which it is inserted, must not be scratched.
- Never exchange the memory card while recording; this can lead to a complete loss of data.
- Avoid using the GSM-batcorder on a plant during wintertime. The extreme environmental conditions can damage the microphone severely.
- A mains connection (110-240V) is necessary for operating the GSM-batcorder. Therefore you have to make sure that there is an appropriate power supply (standard 230V socket) in the nacelle and that this carries power even if the plant is shut down. Contact the plant operator about this. If you operate the GSM batcorder in the box version, a solar panel can also be used as an option.
- To avoid damages caused by overvoltage the used 230V plug should be connected to a secured line.

Should there be any questions left, after reading this manual, you are welcome to contact our support (see end of manual).

Components

GSM-batcorder

Connectors



GSM-antenna

SMA-connector for the provided GSM-antenna

The antenna can be screwed easily into the plug. Tighten it manually (only with a little effort!) using the aerials metal base. Do not twist the aerials flexible section!

Connector for external 12V adaptor or ecoObs solar panel
Connect here the 12V power supply. The 12V power supply is provided for charging the 6V lead acid battery, if connected. It is not considered as a regular power supply for the GSM-batcorder. If you are using the GSM-batcorder in the box-version you can connect a ecoObs solar panel.

Connector for external 6V or 12V battery
Right hand of the microphone plug there is a green three pin plug for the external 6V battery pack. The connector for the lead-storage-battery at the GSM-batcorder´s top side is green with a white marking line. Be sure that the markings on plug and connector do match. To connect the battery to the GSM-batcorder the plug has to be slid into the connector easily, to separate again only pull the plug straight out of the connector. Do not twist the connector!

(Any power source up to 14V can be used to run the GSM-batcorder, but **only a 6V lead acid battery will be charged by the 12V AC-adaptor**.)

Caution: The battery connector has no reverse polarity protection. If connected in reverse an internal fuse will latch and you will have to send in your batcorder for maintenance.

Connector for microphone
Connect here your microphone disk. Both the connector and the plug have a red dot. They must be aligned. The plug is connected to the connector by simply putting it together. Do not use force to connect. Otherwise you might damage the plug or the connector.

This is a push-pull connector. Pull the plug at the knurled area to unlock it. You must not twist it!

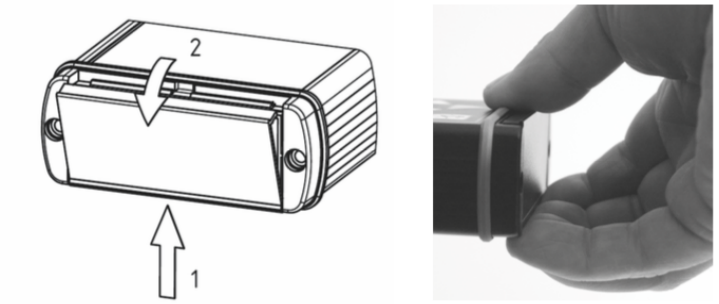
Mini USB port
To the left of the SD-memory-card slot there is a mini USB port (USB 2.0). You can use this port to connect the GSM-batcorder to an external host device (see “**USB mode**”), to energize the GSM-batcorder or to recharge the external 6-Volt-battery. For the charging process a minimum of 500mA power supply is required. The charging capability is set off by default. This can be changed in the AUTODETECT SETTINGS - ‘extended settings’ menu.

Please note: Charging the 6V battery via the USB port takes about twice as long as with the 12V power supply! Depending on the nightly activity, a charging period of up to 12 hours may be necessary.

Maintenance port
To the right of the SD-memory-card slot there is a maintenance port used only by ecoObs.

SD-memory card and SIM-card

The SD-memory card slot is at the bottom of the casing behind a lid. To open the lid you have to simultaneously push the lid up a bit (1) and swing it open (2) (see drawing).



This is done best by pressing the fingers of one hand from below the lid while pushing with the thumb from above. You have to be sure that the thumb lies on the blue ribbon which encircles the casing NOT on the lid! You can then easily slide the lid open with the thumb.

With a little practice the lid can be opened easily. There is no great force necessary! If you use too much force you might damage the lid.
Never use any tools to open the lid!

SIM-card function references

The GSM-batcorder is as well able to send periodic status reports to a listed telephone number as to receive SMS - control commands. For this functionality you need a Mini-SIM-card (not included!). You also have to make sure that you have got a good reception in the nacelle with your network operator´s SIM card.

SIM-card installation

The SIM-card slot is at the bottom of the casing below the SD-memory card slot (see picture above on *'Connectors'*). To insert the SIM-card you have to first open the lid at the bottom of the casing as described before (see above, '*SD-memory card and SIM-card*').

Push the SIM-card carefully as far as it will go into the slot. The SIM-card`s contacts have to face upwards, so that the gated edge lies at the right front. To remove the SIM-card, it has to be pushed lightly into the slot, it then pops out (push-in-push-out).

You should install the SIM-card before installing the SD-memory card (or remove the SD-memory card again if already inserted), as this makes access to the SIM-card-slot a lot easier.

SD-memory-card installation

The memory card slot is placed in centre of the cases bottom. You have to slide it in with the contactors faced down until it got caught.

To remove the memory-card, it has to be pushed lightly into the slot, it then pops out (push-in-push-out).

The GSM-batcorder supports SDHC-cards and/or SDXC-cards with a capacity up to 256 GB. The cards do not need a specific speed level.

Before the GSM batcorder can work with the inserted SD card, it has to be formatted. This usually happens the first time you insert the SD card.
If the GSM batcorder rejects the card with the message "No valid file system", please reformat the card on your computer with FAT32, exFAT or NTFS.

After each change that your computer makes on the SD card, the GSM batcorder must reformat the card.

Microphone disc

The microphone disc consists of the following technical units:

Microphone capsule, temperature sensor, ultrasonic transmitter and a foam ring.

The microphone capsule

The microphone capsule is embedded into a disc made of plastic, which serves as a boundary layer. This disc must not be damaged! The capsule is sensitive against mechanical strains and must never be touched directly during transport or installation! The microphone membrane is safeguarded against raindrops by a fine microphone mesh, but long term humidity inevitably leads to corrosion and therewith to an increasing loss of sensitivity. This however is part of the normal wear and tear, similarly to the fact that dust or sticky substances (dirt, gear oil from the plant etc.) can plug the microphone mesh more and more. Therefore we strongly recommend at least an annual checking of the microphone through the ecoObs GmbH (see below).

The ultrasonic transmitter

The ultrasonic transmitter sends a test signal daily at the beginning and at the end of the recording period to check the microphone sensitivity. The GSM batcorder calculates the TSL value (TSL = Test Signal Level) from the amplitude of this test signal and the reference value determined once it has been installed. This is specified as a deviation from the reference in dB and noted in the log file and is part of the status SMS.

The temperature sensor

The temperature sensor records the outside temperature on the microphone disc. The reproducibility of the measured value is <0.5 ° C. The deviation from the actual temperature is approx. ± 2 ° C. The measured temperature is noted in the log file every 15 minutes.

The foam ring

The foam ring serves as a weather safeguard and e.g. prevents the water coming down the nacelle´s casing from intruding.

In case of a reinstallation or a microphone change the correction factor of the applied microphone disc (MCF) has to be entered into the GSM-batcorder on time. (See '*Extended Settings - Microphone Correction Factor (MCF)*').

Annual Maintenance of Microphone Disc

The microphone sensitivity changes due to atmospheric influences, such as rain, snow, frost etc. or dust and dirt. Also the mechanical stress during mounting and dismounting can influence the microphone's sensitivity. To guarantee the simultaneous application and comparable recordings, we strongly recommend an annual inspection of the microphone capsule by the ecoObs GmbH. There the microphone disc will be tested and if a change in sensitivity has been detected the microphone will either be calibrated new or will be replaced.

Please send the complete microphone disc without the GSM-batcorder and battery, and always with a completely filled out return form (this you can download at our homepage 'www.ecoobs.com' under "downloads"). For the mailing address see at '*SUPPORT*' at the end of this manual.

You can find the current charges for testing and calibrating at our online price list on our homepage 'www.ecoobs.com'.

Please send in your microphones as soon as possible! Shortly before the start of the season, waiting times of 6-8 weeks are possible.

Entering the new MCF value after maintenance

The new MCF-Value is written on the microphone disc and you can also find it on the included information label.

1. Start the GSM-batcorder as usual.
2. Change into the **AUTODETECT SETTINGS** menu => **EXTENDED SETTINGS**
3. Change the value in the MCF line with the up/down arrow buttons

Therewith the new value is set and the GSM-batcorder is again ready for operation with the newly maintained microphone disc.

GSM-batcorder start-up

Additionally required and <u>not included</u> in the delivery:

- **SDHC-memory card** (up to 32 GB) or **SDXC-memory** card (up to 256 GB). Do not use adaptors! No special speed class is needed!
- **Mini – SIM card** (for surveillance of operation by SMS- messages). The SIM card is not necessarily needed for running the GSM batcorder. Without it no SMS messages will be sent and no remote control is possible.

Preparation of the SD memory card

The GSM batcorder supports SDHC memory cards or SDXC memory cards with a capacity up to 256 GB. No special speed class is needed. Faster doesn't mean more reliable.

Before the GSM batcorder is able to use the SD memory card it has to format it. Therefore after inserting the correctly formatted SD-memory-card (exFat or NTFS) into the GSM-batcorder you will be asked to carry out another internal formatting process. This measure is mandatory because otherwise no recordings with the GSM-batcorder are possible. You should execute the formatting step before installing and using the device in the plant.

If the GSM batcorder refuses to format the SD memory card with the message "*No valid file system*" you have to format the SD memory card again on your PC as "FAT32", "exFAT" or "NTFS".

Do not change the correctly formatted SD memory card with a new unformatted SD memory card after activating the timer. Otherwise no recordings will be possible.

Always enable **write protection** on your SD-card before you insert the card into your PC/Mac again for evaluating the calls.

Power supply of the GSM batcorder

The power supply of the GSM batcorder consists of two parts:

- 12V AC adapter
- external 6V lead gel storage battery

While the GSM batcorder is in SCANNING mode, it is exclusively supplied by the 6V lead gel storage battery. It is galvanically cut off from the USB port and the 12V AC adapter to protect the sensitive analog signal from EMI. Once the SCANNING mode has ended, the 6V lead gel storage battery is again loaded by the 12V AC adapter or the USB port.

The GSM-batcorder´s charging electronic is designed for the delivered 6V lead gel storage battery. You might as well connect batteries in a voltage range from 6V to 14V, **but those can not be charged by the 12V AC-adaptor**!

Pay attention to properly connect the cables to the battery!

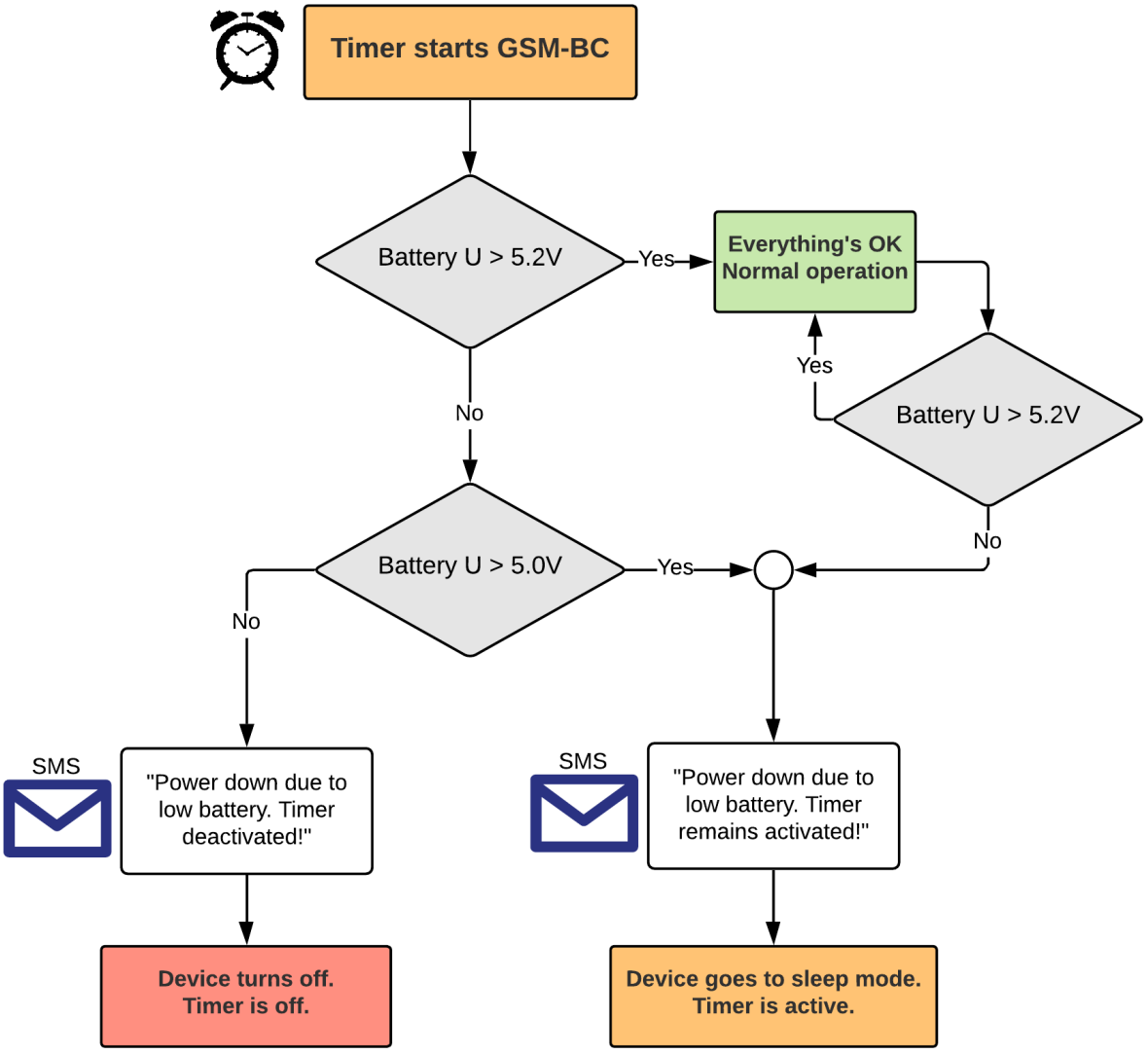
Black to black (negative pole) and **red to red (positive pole)** - reverse polarity, even for only a short time, triggers the internal fuse and the batcorder has to send it.

You can access the settings-mode without an external battery, but a regular operation without the external battery is not possible!

The GSM-batcorder is delivered with a 4.5Ah battery. If longer power-down periods of the 230V supply are expected you may use a 6V battery with higher capacity to bridge them. For example the 6V/12Ah battery we provide for the monitoring box.

Possible problems with the power supply

Low voltage at the beginning of a record session



Pic: behaviour with low battery during startup

If the voltage of the 6V lead gel battery is too low (U < 5,0V) or completely missing at the beginning of the preset TIMER starting time (start of SCANNING mode), the GSM batcorder switches off and deactivates the TIMER.

If the voltage is between 5,0V and 5,2V the GSM batcorder switches back to STANDBY mode and sends a SMS message. No recordings are made! But the TIMER remains active and checks the battery voltage again next time the preset TIMER starting time is reached.

This operating state occurs in a wind turbine if the 230V power supply to the power supply has failed for several days or the power supply is overvoltage, e.g. due to lightning strikes. A service team then has several days to remedy the problem without having to intervene on the GSM batcorder. Only when the device has completely deactivated (U <5.0V) the timer must be reactivated manually.

Low voltage during a record session

If the battery voltage drops below 5,2V while the GSM batcorder is in SCANNING mode, the GSM batcorder immediately switches back to STANDBY mode and sends in addition to the status SMS a message indicating "*Power down due to low battery. Timer remains activated*."

Battery failure

If the battery is removed from the Settings menu, this has no consequences. If the battery is disconnected during the recording period, the device is reset. Just like pulling the mains plug on your PC during operation. If the 12V power supply is working, the GSM batcorder restarts immediately after the reset and checks the file system. In the worst case, the file system of the SD card was damaged during the reset. Further operation is then no longer possible. The GSM batcorder can repair simple errors. The last recordings may then be missing and there is data garbage at this point in the log file. If the card check / repair was positive, the GSM batcorder goes into standby mode and waits for the next timer to start.

The batcorder creates the following Logfile-Entry:

```
Timer restart after unintentional hardware reset. 27.02.19    14:46:08
```

12V-Supply failure

If the 12V AC adaptor fails while the GSM batcorder is in SCANNING mode (i.e. due to power failure at the plant) it has no consequence till the end of the current SCANNING session.

When the GSM batcorder switches back to STANDBY mode the mains power supply is checked and the GSM batcorder sends the status SMS message with the added hint "External power: --V". In addition, the SMS message is sent after approx. 2 minutes: "*Attention: 12V supply is down. BC will switch to sleep mode in 10 minutes. In sleep mode no SMS will be received! But don't panic. Timer is still*

active!" After 10 minutes the GSM batcorder will switch to low-power mode and switches off the display. Furthermore, the GSM batcorder behaves as described in the previous point. If the power supply is restored during these 10 minutes, the countdown ends and the GSM batcorder switches to standby mode (yellow screen).

Running without 12V AC adaptor

The GSM-batcorder can be used without the external 12V AC adapter reloading the battery, i.e. for use in our BOX extension. The runtime of your GSM batcorder is then limited by the capacity of the external battery.

If you connect a 6V lead gel battery, you can also use our solar panel can for charging the battery. The solar panel is then connected to the connector for the 12V AC adaptor. We recommend in this case the larger 6V/12Ah lead gel battery as it is used in our BOX extension.

The operation with a 12V battery is possible.
Please consider that our solar panel can't charge a 12V battery.

If the timer is being activated without a 12V AC adaptor connected, the GSM batcorder sends after 2 min a SMS warning message "*AC adaptor down*" indicating that the 12V AC adaptor is missing and after 10 min the GSM batcorder switches to low-power mode. SMS commands can still be sent to the device during the 10 minute delay.

You may deactivate the SMS warning message in the EXTENDED SETTINGS menu (see '*AC Adaptor warning active ON/OFF*').

The fault message SMS can also be activated / deactivated via SMS:

"*GSM SET AC DOWN SMS OFF*"
Antwort des GSM-batcorders: "*AC-adapter-down SMS deactivated.*"

"*GSM SET AC DOWN SMS ON*"
Antwort des GSM-batcorders: "*AC-adapter-down SMS activate.*"
The fault message is activated in the delivery state.

Starting the GSM-batcorder and connecting to a USB-Host

There are 3 ways of turning on the GSM-batcorder :

- **Push the ON/OFF button.**

  If the timer isn't enabled you will get into the settings menu.

  While in SETTINGS mode no access to the SD memory card is possible via USB port.

  If the timer is enabled you will be asked whether you want to disable the timer or not. If you answer YES you will get to the SETTINGS mode. In addition, the GSM batcorder tries to send the warning "TIMER MANUALLY TURNED OFF" by SMS. This SMS shall make you aware of an unauthorized shut down.

  If you do not want to deactivate the timer, the GSM batcorder jumps into the timer active mode and waits there until the start time is reached.

  If a USB host is connected to the GSM batcorder, it releases the SD card for access by your computer. Otherwise, if a 12V power source is connected, the device will switch to STANDBY mode after 3 min. It stays in this mode until the preset timer starting time is reached and then switches to SCANNING mode.

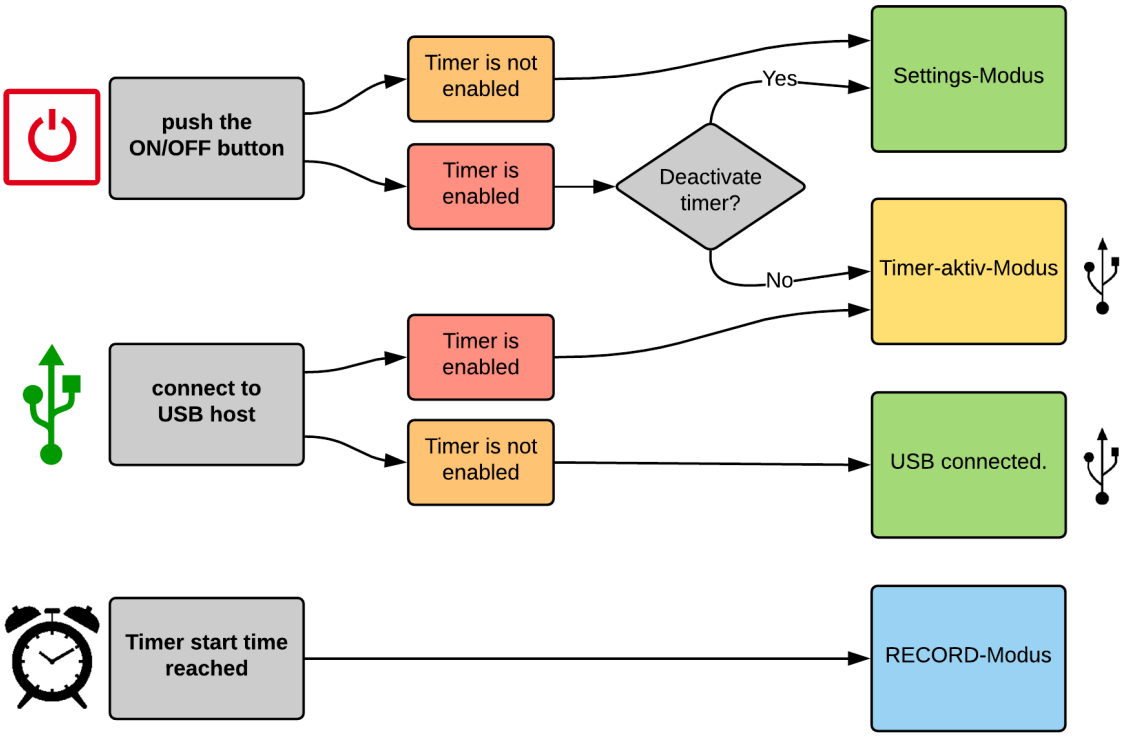
- **Connect to a USB host.**

  If the timer is enabled you will be asked whether you want to disable the timer or not. If you answer YES the GSM batcorder will deactivate the TIMER and enables access to the SD memory card by your computer.

  If you do not deactivate the TIMER the GSM batcorder will switch to STANDBY mode and waits until the TIMER starting time is reached. The GSM batcorder enables access to the SD memory card by your computer as well.

- **The TIMER starting time has been reached.**

  If the TIMER starting time has been reached the batcorder switches to SCANNING mode and scans for bat calls. In this mode no access is possible via USB port.



Picture: Turn on the GSM-batcorder

Settings

All settings should be carried out before installing the GSM-batcorder on the wind energy plant. Make yourself familiar with the GSM batcorder and its handling prior to installation. It is advised to test the complete setup for several nights in the office before installation.

After starting the GSM batcorder you will get to the main menu (MAIN). Here you make the settings for the memory card.

The other settings of the GSM batcorder are split into three further menus:

- **TIMER/CLOCK.** The time, date and the start and stop time of the timer are set here.
- **GSM SETTINGS.** Here you make all the entries that are necessary to operate the GSM module (SMS function).
- **AUTODETECT-SETTINGS**. Here you will find all settings relating to automatic call detection and advanced settings.
- **EXTENDED SETTINGS.**
  Can be reached via the AUTODETECT SETTINGS window.

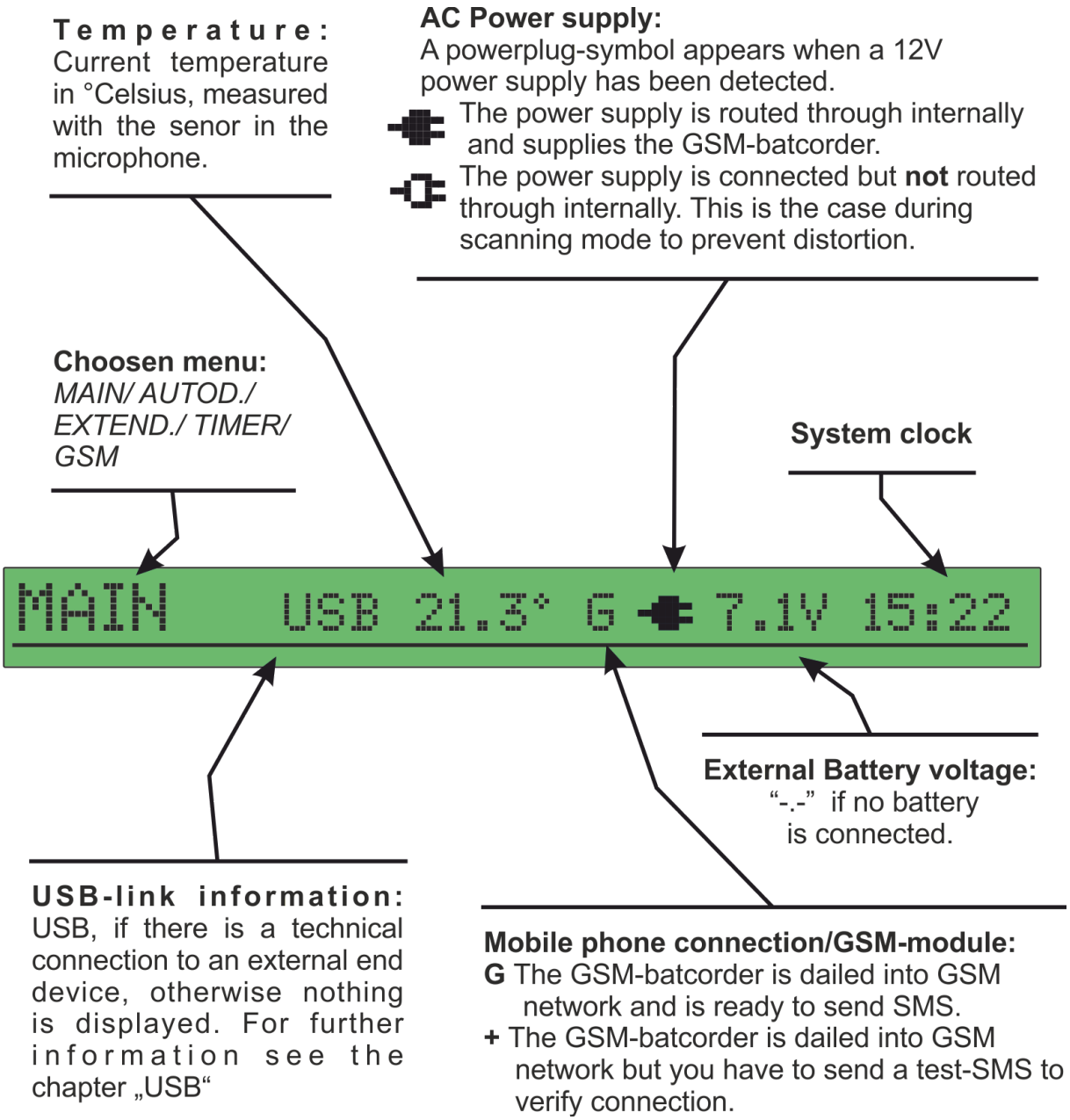
You can access a menu by pressing the corresponding button. Leave the menu by pressing the button again. You can also switch to a different menu directly by pressing the corresponding button. You don’t have to walk through the Main screen.

Menu navigation

For navigation between the input fields use the left/right arrow keys (◂/▸). Values and YES/No options can be changed with the up/down arrow keys (▴/▾).
For some calls, the combined pressing of the Fn key with an arrow key is necessary, e.g. "Fn +▸". To do this, first press the FN key, hold it down and then press the ‘▸’ key. The desired function is then carried out. Then release the ‘▸’ key first, then the Fn key.

Status Line

At the top of the settings-screens you will find the status line.



MAIN settings (MAIN)

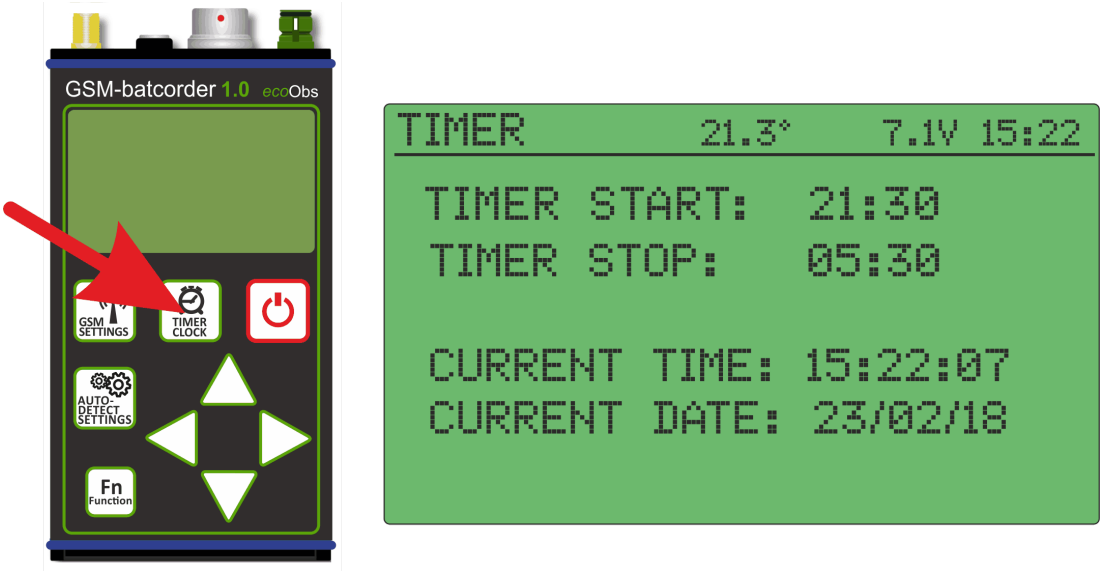
After starting the GSM-batcorder you get to the main menu (MAIN). Here you can set the memory card. The current timer setting is displayed, also the amount of free memory of the SD memory card and you can see how many files are already stored on the card.

The Filecode (filename) can have up to ten alphanumeric characters and the low line (_). This freely selectable filecode will be integrated in every filename and can be used for example to encode location or project to relate your data later.

With the “right arrow” button (▸) you can go to the next character, with the “left arrow” button (◂) you can go back to the previous character. Using the up/down arrow (◂/▸) you can change values.

With the delete function (deleting card) you can erase the data on the inserted memory-card. Push the “Fn”-button together with the “up” button to do this. After a security query the memory card`s data will be deleted. A new logfile will be created.

TIMER/CLOCK settings (TIMER)



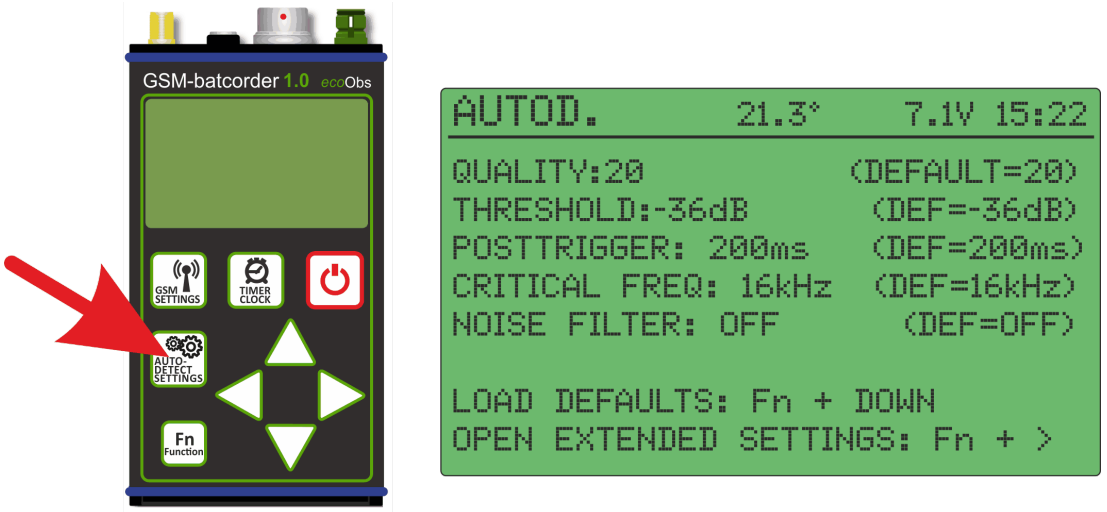
Via the button **TIMER/CLOCK** you get to the TIMER menu, where you can set the current date and time, as well as the timer start and stop time.
Note: The change between standard and daylight saving time has to be changed manually.

With the “right arrow” button (▸) you can go to the next character, with the “left arrow” button (◂) you can go back to the previous character. Using the up/down arrow (▴/▾) you can change values.

Please note that a minimum time of three hours (charging via 12V mains supply) or six hours (charging via USB connector) is needed for recharging the 6 V lead gel battery.

Pressing the **TIMER/CLOCK** button again brings you back to the MAIN menu. You can also switch directly to any other menu.

Auto Detect settings (AUTOD.)



With the button AUTODETECT SETTINGS you enter the detection settings screen. Here you can set the parameters for signal recognition (Quality, Threshold, Critical Frequency), the Posttrigger length, the Noise Filter).

On the left side you see the set values, on the right side the default values are displayed.

With the “right arrow” button (▸) you can go to the next line, with the “left arrow” button (◂) you can go back to the previous line.
Using the up/down arrow (▴/▾) you can change values.

In most German states there are specifications for the GSM-batcorder adjustments according to a guideline for survey. Normally these comply with the specifications from the BMU-project of the Universities of Hanover and Erlangen-Nuremberg. The needed adjustments for being concordant to this project are (as at April 2014):

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

Quality

The *Quality* value is for separating the valid bat calls from “interferences”. The default value is 20 which has proven best for most common recording situations. At higher values (>20), less ‘call like’ signals will be recognized, while lowering the *Quality* value (<20) tightens up the trigger algorithm.

Set to 0, a lot of bats calls wound not be recognized as such. Set to 40 almost every signal that passes the threshold will trigger a record.

Threshold

The threshold value refers to the recording range of the GSM batcorder. The microphone is set to a fixed sensitivity. This is chosen by means of a 40 kHz signal at full gain if played with 96 dB SPL at the microphone.

By setting the threshold value the sensitivity of the GSM batcorder in analysing the detected calls is determined. It is set to a threshold in relation to the full gain.

A change of the threshold value does not change the batcorders gain!

The threshold defines the minimum level a signal must surpass to get analyzed by the batcorder and may trigger a record. Signals below the threshold get skipped without getting analysed.

Possible values are: -18, -24, -27, -30, -36, -42 dB.

-18dB refers hereby to the least sensitive value. A difference of +/- 6dB leads to double/half sensitivity.

The default threshold value is -36dB.

Posttrigger

The posttrigger value is defined by the interval between two successive detected calls that are still written into the same sound file. After this interval a new recording is started if a call is recognized.

The default setting is 200ms.

Critical Frequency

The critical frequency is very important for bat call recognition. Calls below this frequency are ignored in the analysis. Values of 14kHz up to 110kHz are possible and adjustable in steps of 2kHz.

The default value is 16kHz.

Noise-Filter

With the GSM-batcorder you have the possibility of disturbance suppression. Therefore numerous recordings of disturbances have been analyzed and so it was possible to adjust the bat call detection, so that short events, which are surely no bat calls, are identified and not recorded. The NOISE-FILTER should only be used if massive interferences occur.

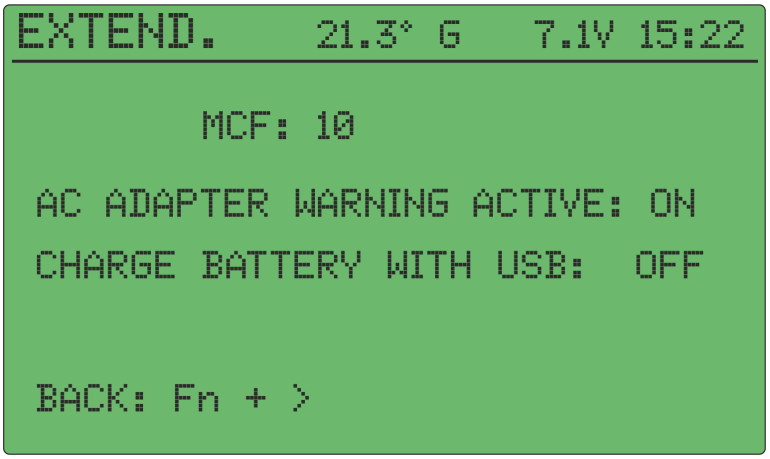
Default Settings

By pressing the Fn button + (▾) the default values for Quality=20, Threshold=-36dB, Posttrigger=200 ms, Critical Frequency = 16 kHz and Noise Filter = OFF can be set. These values are optimally aligned for analysis with our software programs bcAdmin and batIdent.

Open extended settings

By pressing the Fn button + (▸) you enter the extended settings menu.

Extended Settings (EXTEND.)



Microphone Correction Factor (MCF)

Using the up/down arrow (▲/▼) you can change values.
The MCF for your particular microphone is written on the backside of the mic.

To ensure the simultaneous use and a comparability of recordings between the GSM-batcorder and the microphone disc, both have been calibrated before delivery (40 kHz with 96 db SPL equates full-scale deflection). The Microphone Correction Factor is given on the microphone as “MCF: XX”. (For XX there is the real number on the label of your microphone disc.) You have to enter this Microphone-Correction-Factor in the Menu Extended Settings under MCF.

If the microphone has to be changed, because for example the previous microphone has lost sensitivity, an adjustment of the MCF with the new value of the new microphone is necessary. (See Annual Maintenance of Microphone Disk).

AC Adapter warning active ON/OFF

Enables/disables the warning-SMS “*Attention: 12V supply is down. BC will switch to sleep mode in 10 minutes. In sleep mode no SMS will be received! But don't panic. Timer is still active!”*

The SMS is enabled by default. Disable it if you run the GSM-batcorder on an external battery only without 12V power supply.

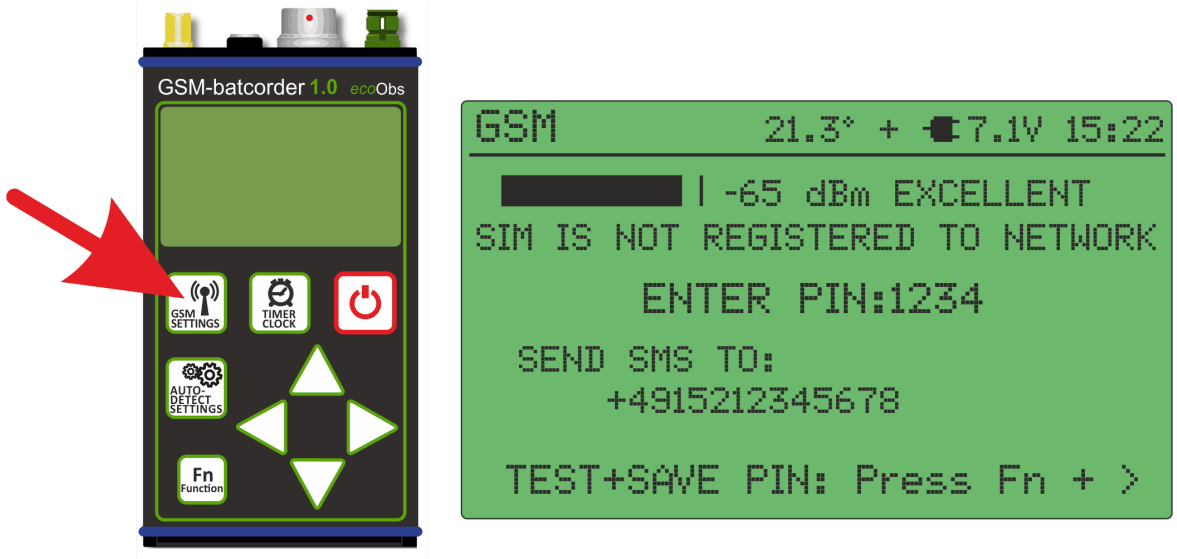
Charge battery with USB ON/OFF

You can enable the charging of the external battery via USB port. The external 6V battery can be charged with the power provided by an USB Host. The Host must be capable of delivering a minimum current of 0.5A.

This option is disabled by default.

Press **Fn + (▸)** to go back to **AUTODET. SETTINGS** or press the **AUTODETECT SETTINGS** button to go back to the main menu screen.

GSM Settings (GSM SETTINGS)



By pushing the **GSM SETTINGS** button you get to the **GSM** menu. Here you can enter the PIN of your SIM card and the telephone number for sending the status reports via SMS. You can as well send the test SMS to your chosen telephone number.

If no SIM-card has been detected “NO SIM INSERTED” will be displayed.

At the first line of the **GSM SETTINGS** menu the discovered signal strength is displayed. The signal strength detection can demand a couple of seconds.

Note that at first only a general signal strength is identified. If your operator`s network is received in sufficient quality can only be checked after you have entered the PIN.

Entering the PIN

Some SIM cards do not need a SIM PIN, the menu for entering the PIN will then automatically be skipped.

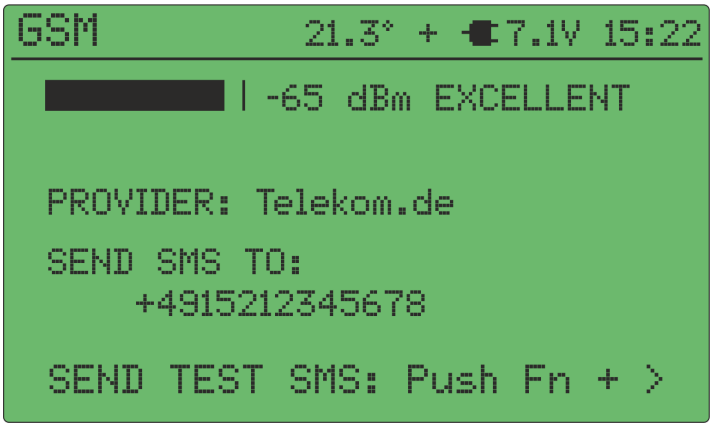
At the PIN line a 4-digit SIM PIN is displayed. You can change the PIN with the up/down arrow buttons (▲/▼), with the “right arrow button” (▸) you can go to the next digit. By pressing the “Fn” button together with the “right arrow” (▸) the PIN will be saved and tested. If the PIN is correct the GSM module will log in into your providers network. In case this fails or the PIN is invalid an error message is displayed.

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

The entry of the PIN will only be necessary again, when the SIM card has been changed.

By pressing the “right arrow” button (▸) now you reach the menu for entering the telephone number to which the GSM-batcorder shall send its SMS-status reports.

Telephone number for status SMS



With the up/down arrow buttons (▲/▼) the telephone number can be entered, with the “right arrow button” (▶) you can go to the next digit.

The telephone number always has to be entered as follows: country code + network code (without the first zero!) + call number. This means, in your own country you have to enter your country code as well. For example, for a fictitious mobile phone telephone number in Germany like “0151 12345678” you would have to enter, first the country code (“49” for Germany in this example) + network code without first zero (= 151) + phone number = “+4915112345678”.

To erase redundant digits at the end of your telephone number move the cursor with the “right arrow” button (▶) onto the redundant digit and scroll with the up/down arrow button (▲/▼) to the space character (“ ”). Repeat this step if necessary for further redundant digits.

Test SMS

After entering and saving the telephone number you can send a test SMS to the entered telephone number for checking the correct number and the transmission of the SMS. You can do this by pressing the “Fn”-button together with the “right arrow” button (▸). If the transmission of the test SMS has been successful, there is a message on the GSM-batcorder display. Afterwards the main menu (**MAIN**) is displayed automatically. In the next few minutes the SMS should have reached your SMS-compatible-end device (like a mobile phone). If not, recheck the correct entry of your telephone number into the GSM-batcorder.

It is mandatory to successfully send a test SMS for using the SMS-Status functionality! Without this step the GSM batcorder will not be able to send or receive SMS messages.

‘G’ is displayed in the status line, if the batcorder is connected to the GSM-network provider and ready to receive SMS. If only ‘+’ is displayed in the status line your batcorder is connected to the GSM-network provider but you still have to send a test-SMS to complete the network registration.

Activate TIMER

When all settings are done, a SD memory card is inserted and the test SMS has been successfully sent, you can activate the TIMER:

For activating the TIMER simply press the red ON/OFF button in any of the SETTINGS menus. You will then be asked if you want to activate the TIMER. By pressing the ‘right arrow button’ (▸) you confirm this query.

You will then be asked if you want to set the TSL reference value (see below).

TSL value

The sensitivity of the GSM batcorders microphone may be reduced if it is used over a longer time 'in the field'. Properly installed it is relatively robust, but long-time uninterrupted outdoor use let it age early. Especially humidity and frost tend to be negative on the microphones lifespan. Because the conditions on wind energy plants are especially extreme, the sensitivity might decrease significantly after one year of use. Because the collected data might then not be comparable any more, a recalibration or change of the microphone will be necessary.

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.

TSL reference value

The TSL reference value is used as a reference for the test signal at the beginning and the end of the **SCANNING** session.

It is advised to set the reference value once the GM batcorder is installed and the microphone disc is installed in its final position. The measurement of the reference value can be repeated any time.

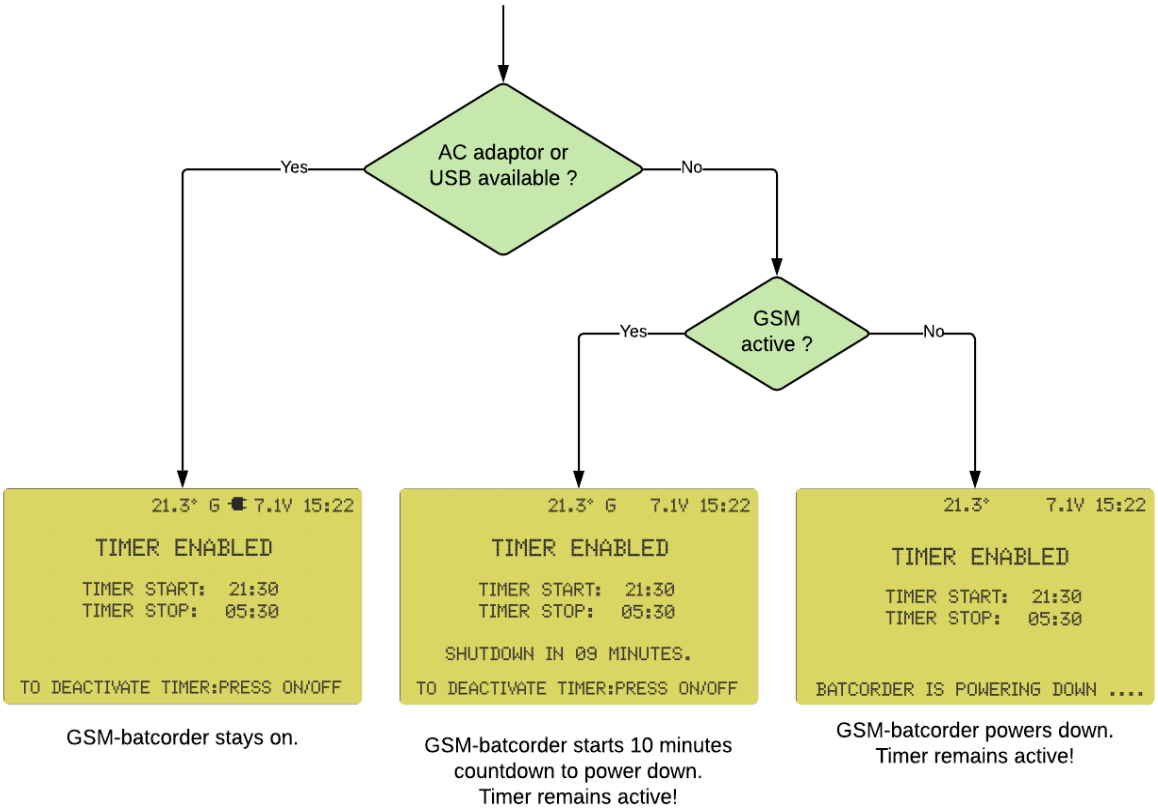
You will be asked to set the TSL reference value every time the TIMER is activated (see above). When you have decided to activate the timer you are asked to set the TSL reference value. By pressing the 'right arrow' button (▸) test signal is played and the value is set. By pressing the 'left arrow' button (◂) you skip the reference measurement.

STANDBY mode (TIMER ENABLED)

After activating the timer the GSM batcorder switches to STANDBY mode. If the 6V lead gel battery can be reloaded by the 12V AC adaptor or the USB port the Display stays active, shining yellow, indicating the STANDBY mode. If a USB host is connected, access to the SD memory card is now possible. The GSM batcorder can now receive remote commands via SMS (see “Remote control of the GSM batcorder by SMS”).

If no power supply or USB host is connected, but the sim card is ready, a 10 minute countdown is started. During the countdown the GSM batcorder can receive and execute SMS remote commands. At the end of the countdown the GSM batcorder switches off to save energy. The timer remains active and switches to SCANNING mode if the timer starting time has been reached.

If no power supply or USB host is connected and the sim card is not ready, the GSM batcorder switches off for saving energy. In this case the timer stays active as well and the GSM batcorder switches to SCANNING mode if the timer starting time has been reached.



GSM-batcorder stays on.

GSM-batcorder starts 10 minutes countdown to power down. Timer remains active!

GSM-batcorder powers down. Timer remains active!

Even if the 6V lead gel battery is missing or depleted, but the 12V AC adaptor or USB host is connected, the timer can be activated. In this case a message is displayed, indicating that the battery is empty or

missing. You have to confirm separately that the timer is to be activated.

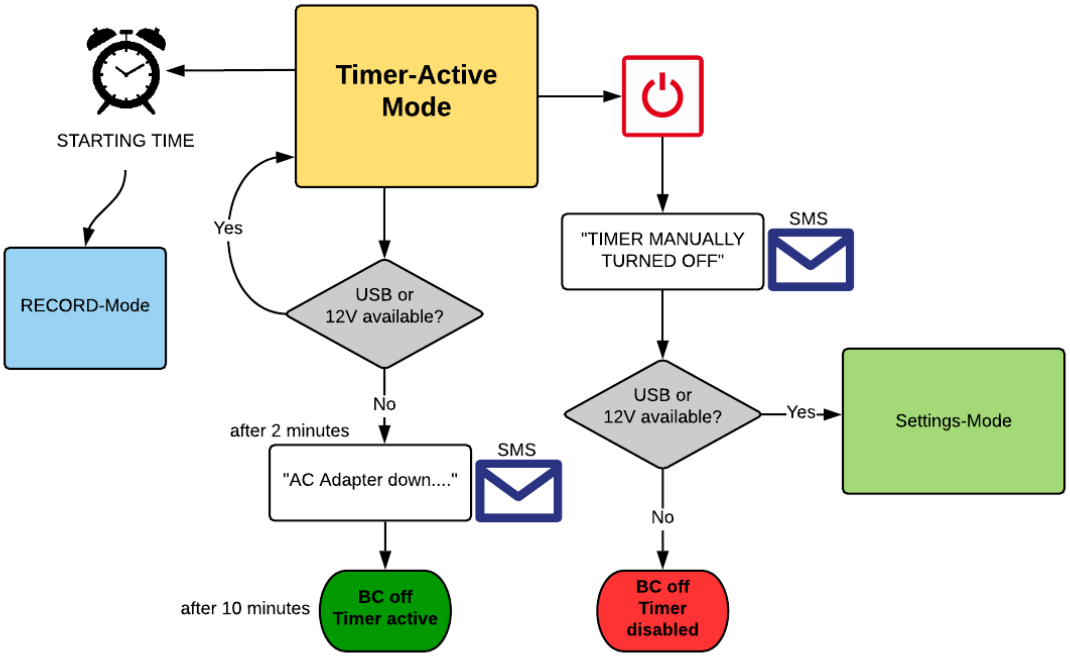
If no battery is connected in the meantime or the battery is not reloaded a message appears on the red shining display when the timer starting time has been reached. Furthermore a SMS message indicating the missing battery will be sent and a corresponding logfile entry is created.

The SCANNING mode will not be started. No bat calls will be recorded.

The GSM batcorder stays in the timer enabled mode anyway (timer stays active, Display shines yellow). If no 6V lead gel battery is connected in the meantime, the above described procedure is being repeated next time the timer starting time has been reached.

Deactivate the TIMER

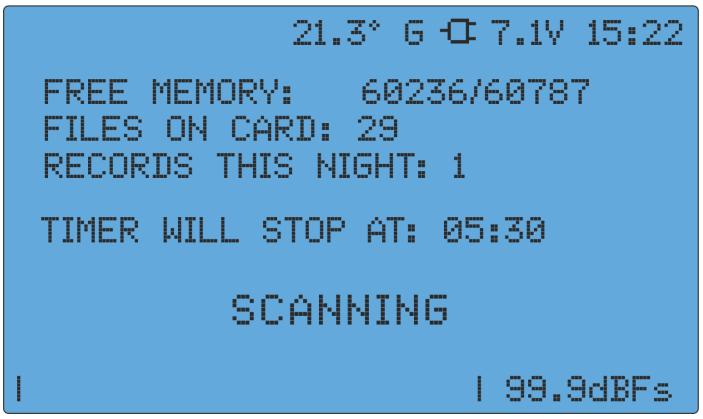
By pushing the ON/OFF button again the TIMER can be deactivated. After the disabling of the timer is confirmed the GSM batcorder will send a status SMS and create a corresponding logfile entry. Afterwards the GSM batcorder switches to Settings menu. An established connection to a USB host is disconnected.



Picture: End timer mode

SCANNING mode

At the preset TIMER starting time the GSM batcorder starts automatically and switches to **SCANNING** mode. The display illumination is blue in this mode.



The mains supply and the USB host are disconnected in the scanning mode to avoid EMI disturbances of the recordings. The GSM batcorder is supplied exclusively by the connected 6V lead gel battery.

The display shows under FREE MEMORY the remaining memory and the total memory of the inserted SD memory card in MB. One second of recordings occupies 1 MB of memory.

Furthermore it is displayed how many recordings are on the card (FILES ON CARD) and how many recordings were made this session (RECORDS THIS NIGHT).

There will always be one record (the microphone test signal) on the memory card at the start of the scanning mode.

At the bottom of the screen the current signal level is displayed.

Every time a bat call is detected the illumination of the display changes from blue to purple.

When the preset stopping time has been reached the GSM batcorder stops scanning and executes another microphone test.

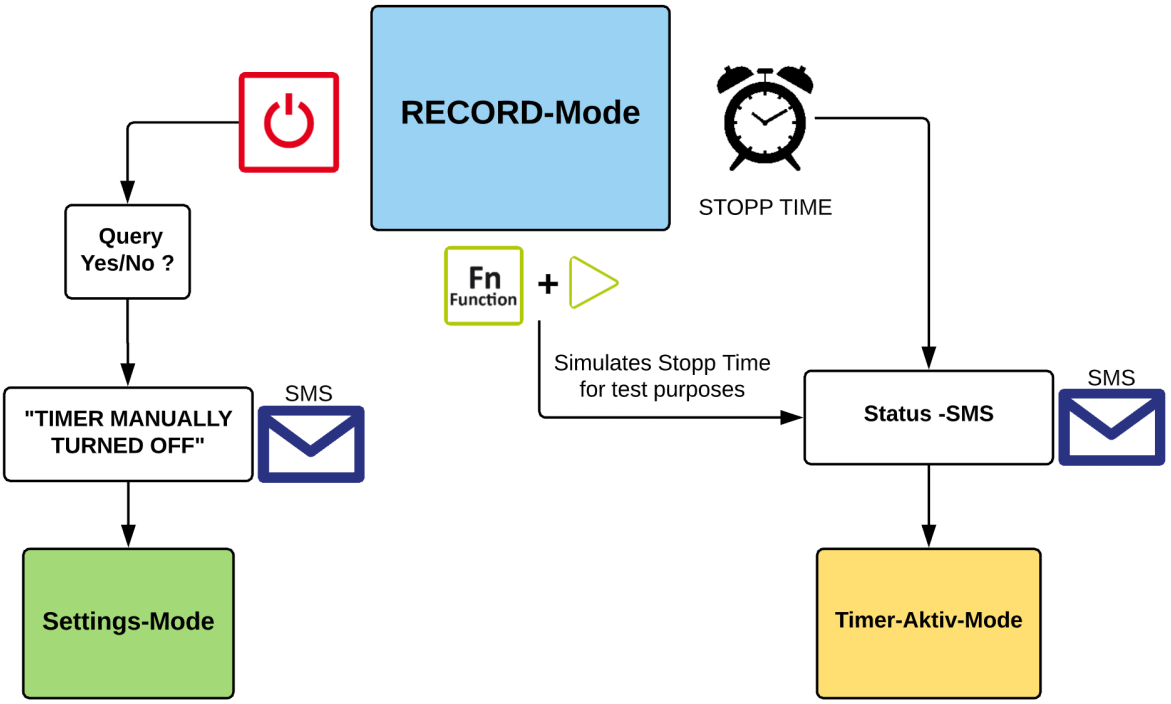
Then a status SMS is sent and the GSM batcorder switches to standby mode, indicated by the yellow illuminated display. The timer stays active and the GSM

batcorder switches to scanning mode again once the TIMER starting time has been reached.

You can always end the scanning mode manually by pressing the ON/OFF button.

If the ON/OFF button is pressed while the timer is active a message appears indicating that the timer is currently active. By pressing the “arrow left” button (◂) the GSM batcorder continues in standby mode with timer active. By pressing the “arrow right” button (▸) the TIMER is being deactivated.

If manually deactivated the GSM batcorder will try to send you the warning “TIMER MANUALLY TURNED OFF” by SMS. This SMS shall make you aware of an potential unauthorized shut down.



Picture: End Record Mode

Closing Status SMS

The GSM-batcorder automatically sends a status SMS after finishing the scanning (= at Timer Stopping Time) to the entered mobile phone number, if there is a connection available to the respective operator`s mobile network. The message normally contains the following information:

GSM-**BC: XXXXXXXXXX**	File code of the GSM-batcorder
free memory: xx.xGB	Free memory on the SDHC-Card
records total: xxxxxx	Total number of recordings
records last night: xxxxx	Number of recordings of the previous night
TSL Start: xxdB loss	Signal level at session start (in dB)
TSL Stop: xxdB loss	Signal level at session end (in dB)
Battery: x.xxV	Voltage at the green battery connector
External Power: xx.xxV	Voltage at mains supply / Solar panel connector
Temp now: xx.xC	Current temperature in °C, at the end of the recording time
lowest Temp: xx.xC	Minimum temperature in °C, during recording session
SMS sent at: dd.mm.yyyy/hh:mm:ss	Timestamp of this SMS

Remote Control of the GSM batcorder by SMS

Before you can use the SMS-function, all necessary steps from the GSM-setup to a successful transmission of a test-SMS must have been carried out. (See: SIM-card installation and GSM-TEST SMS).

When does the GSM-batcorder try to connect with the mobile network?

- After the device got started by keystroke if the device had already successfully dialed in in a previous session.
- As soon as the GSM-batcorder changes from “SETTINGS” mode (green display) to “TIMER ACTIVE” mode (yellow display).
- If the end of the “SCANNING” mode has been reached (blue display) and the GSM-batcorder changes into “TIMER ACTIVE” mode (yellow display) again.

When can the GSM batcorder be remotely controlled by SMS commands?

- In all settings menus (green display), with one exception: As long as the GSM-batcorder is in the GSM menu, no SMS can be received.
- If the Timer is activated (TIMER ACTIVE – yellow display).

If the connection setup to the mobile network has been successful, this is indicated with a “**G**” at the upper line of the menu. If the device is locked into a network but a test-SMS is still necessary to confirm the connection a ‘**+**’ is shown.

From the beginning of the scanning mode to its end, the GSM-module is deactivated! During that time no SMS can be received!

Important informations for the SMS control

- If the connection setup is not possible or fails, the attempt is not repeated. The GSM module stays offline until the GSM batcorder again tries to establish a connection to the mobile network.
- (See above: When does the GSM-batcorder try a connection setup to the mobile network?)

- Do not send a SMS shortly before the recording session starts. The SMS communication within the GSM network can take several minutes under unfavorable reception conditions respectively high network load. Thus the GSM-batcorder may miss the Timer`s wake up call and would not start at the scheduled time.

- SMS messages which the GSM batcorder could not receive (module has been offline, other disturbances led to a failure of reception), are forwarded afterwards by the some mobile network operators, as soon as it has logged into the network again. This can lead to a delayed or unwanted execution of orders (max. 10 SMS)!

- SMS commands are not case insensitive.

- Not recognized orders (i.e. typing errors) are acknowledged with "**COMMAND NOT RECOGNIZED**".

- All SMS have to start with "**GSM**", otherwise the device will execute them and your SMS will be ignored. Also the message "**COMMAND NOT RECOGNIZED**" will not be sent.

- If the changes, sent by your SMS, have been successfully executed the GSM batcorder will always reply by sending the complete current settings.
  (Answer: Filecode, Quality, Threshold, Posttrigger, Cut Off Frequency, Noisefilter, MCF, start/stop time)

- If the change command has been identified, but the chosen new value is not allowed, then a list with all permitted values is sent.
  For example with the QUALITY parameter it would send: "Invalid parameter. Quality can be set from 0 to 40 or 99."

SMS-Commands

- To request **Current Settings**:

  command format: "**GSM SEND SETTINGS**"

  Answer: Filecode, Quality, Threshold, Posttrigger, Cut Off Frequency, Noisefilter, MCF, start/stop time and current time, AC-Adapter-down-SMS active (yes/no)

- To request **Current Status**:

  command format: "**GSM SEND STATUS**"

  Answer: Filecode, HW/SW and PCB Version, free memory, total memory, total number of records, number of records of the previous night, battery voltage, external voltage (AC adaptor or solar power), current temperature, USB device connected (yes/no), Timer active (yes/no)

  This status SMS differs from the final SMS in the following points: The TSL values and the minimum temperature of the last recording period are missing. In contrast to the final SMS, the status SMS contains: firmware version, USB device yes/no, timer active yes/no.

  Note: If the GSM-batcorder is connected to a USB device, eg. Raspberry, no information concerning the SD-card is available to the batcorder. Therefore memory size, card size, number of records will be blank in the SMS.

- To set **all settings to default**:

  command format: "**GSM SET DEFAULTS**"
  Answer: All current settings are sent.

- To set the **Quality** value:

  command format: "**GSM SET QUALITY nn**"
  For example: "**GSM SET QUALITY 20**",
  allowed values: **0 – 40, 99**
  Answer: All current settings are sent.

- To set the **Threshold** value:
  command format: ”**GSM SET THRESHOLD nn**”
  For example: “**GSM SET THRESHOLD 27**”,
  allowed values: **18, 24, 27, 30, 36, 42**
  Answer: All current settings are sent.

- To set **Posttrigger** value:
  command format: ”**GSM SET POSTTRIGGER nn**”
  For example: ”**GSM SET POSTTRIGGER 200**”,
  allowed values: **0, 100, 200, 300, 400, 600, 800**
  Answer: All current settings are sent.

- To set **cut-off Frequency**:
  command format: ”**GSM SET FREQ nn**”
  For example: ”GSM SET FREQ 16”,
  allowed values: **14 to 110**
  Answer: All current settings are sent.

- To activate/deactivate **Noisefilter**:
  command format: “**GSM SET NOISEFILTER ON/OFF**”
  For example: ”**GSM SET NOISEFILTER OFF**”,
  allowed values: **ON/OFF**
  Answer: All current settings are sent.

- To set **MCF**:
  command format: ”**GSM SET MCF nn**”
  For example: ”**GSM SET MCF 07**”,
  allowed values: **00 – 64**
  Note: one-digit numbers have to be indicated with a leading zero.
  Answer: All current settings are sent.

- To set **Timer Starting-Time**:
  command format: “**GSM SET START 00:00**”
  For example: “**GSM SET START 20:08**”
  Answer: All current settings are sent.

- To set **Timer Stopping-Time**:
  command format: ”**GSM SET STOP 00:00**”
  For example: ”**GSM SET STOP 07:15**”
  Answer: All current settings are sent.

- To request **Current Time**:
  command format: “**GSM SEND CLOCK**”
  Answer: “Actual time: 00:00”

- To set **Time**:
  command format: ”**GSM SET CLOCK 00:00**”
  For example: ”**GSM SET CLOCK 07:05**”
  Note: one-digit numbers have to be indicated with a leading zero.
  Answer: “Actual time: 00:00”

- Disable SMS-Message when AC-adaptor is missing:
  command format: „**GSM SET AC DOWN SMS OFF**"
  Answer: „AC-adapter-down SMS deactivated."

- Enable SMS-Message when AC-adaptor is missing:
  command format: „**GSM SET AC DOWN SMS ON**"
  Answer: „AC-adapter-down SMS activated.”

- Change the **receiver of SMS:**
  command format: ”**GSM SEND ME SMS**”

  The following SMS messages will be sent to the sender of this SMS. The former ***and*** the new receiver will get the following SMS: "**Status-SMS receiver has been changed.**"

- Activate Timer**:**
  command format: ”**GSM ACTIVATE TIMER**”
  Answer: „Request received. Please wait a few minutes then…..”

  Note: This command is intended as a lifeline if your GSM batcorder has been deactivated on site by unauthorized operation. The timer cannot be reactivated via SMS from all operating states. The GSM batcorder switches from settings (green screens) to standby mode (yellow screen). Even if you send the command within the set recording time. Only after the next start time does the device follow the set recording times again.

This command is considered ‘experimental’!
Do not use this command as your regular way to activate the timer! This command is just a sheet anchor when your batcorder got unauthorized deactivated by someone who couldn't resist pressing some button on your installed GSM-batcorder.

LOGFILE

The GSM-batcorder creates a logfile on the SDHC card to control its proper function (LOGFILE.TXT). This file holds entries to all important events. It is your major source for problem solving. Activation and deactivation of each mode are stored, as well as each recording.

Logfile-entries overview:

Firmware-version, logfile-version und date of creation date of the logfile:

```
GSM-batcorder SW1.12 / logfile 4.0
created on 09.04.2021 09:27:23
```

Sum of records:

```
Files total: 000012
```

At start time a status-entry will be created:

```
S     09.04.21    09:28:37    Battery:6.34V / External:12.24V / USB:No /
Free disk space:60.9GB
```

Entry when turned off with activated timer:

```
TIMER ENABLED  09.04.21   10:55:58   TIMER START: 20:00   TIMER STOP: 12:26
```

Records during a record-session

The timer started your device:

```
Timer on     09.04.21     19:00:10     XXXXXXXXXX   "20;36;200;16;OFF"
```

The advanced settings ("20;36;200;16;OFF") are printed as a simple list of quality, threshold, posttrigger, critical frequency and whether or not the noisefilter is active.

The next line is a status-entry:

```
S     09.04.21    19:00:11    Battery:7.06V  /  External:11.94V  /  USB:No  /
Free disk space:59.2GB
```

It shows the current date and time, the battery voltage and the external voltage (12VDC wall adaptor or solar panel), whether or not an USB device is connected and the available memory of the SD-card. For example, if the power pack was not working because it was defective, not plugged in, or because there was no 230V at the socket, then you would find the entry / External:--V / here.

This and more information can requested via the SMS-command “GSM SEND STATUS”

At the beginning of a record session the GSM-batcorder creates a test-record.

```
Microphone-test-record:
T     09.04.21    19:00:11    20190227-XXXXXXXXXX-000001.raw  6336ms
TSL-Result:  0dB loss
```

Regular records:

```
T     09.04.21    22:42:14    20190227-3XXXXXXXXX-000002.raw    53ms
T     09.04.21    22:42:14    20190227-3XXXXXXXXX-000003.raw    69ms
T     09.04.21    22:42:15    20190227-3XXXXXXXXX-000004.raw    53ms
T     09.04.21    22:42:16    20190227-3XXXXXXXXX-000005.raw    53ms
```

Stopp time reached::

```
Timer off    10.04.21    07:00:02
```

A second test-record follows.
Here, for example, with a -6dB loss caused by rain or morning dew.

```
Microphone-test-record:
T    10.04.21     07:00:12    20190227-3XXXXXXXXX-000013.raw  6131ms
TSL-Result: -6dB loss
```

A status-entry will be created, similar to the status-entry at the beginning of the season:

```
S     10.04.21    07:00:14    Battery:6.21V / External:11.59V / USB:No /
Free disk space:58.3GB
```

The closing status SMS has been sent:

```
SMS sent at 1 attempt
```

Your GSM-batcorder successfully went through the night.

Other logfile-entries:

Temperature-entry:

```
C     28.02.21    22:15:00     20.2°C
```

Each quarter hour during a record session.

After the scanning period the GSM-batcorder switches into Standby-Mode (yellow screen). If no 12V supply is connected the GSM-batcorder switches into Sleepmode to save power and writes the following logfile entry:

```
No 12V supply found. BC switches into sleep mode with active timer due to
extend battery life.
```

Battery voltage drops below 5.2V during record session:

```
Power down due to low battery. Timer remains activated! 28.02.21    04:34:23
```

Battery voltage is very low or battery is missing when timer starts GSM-batcorder:

```
Battery empty or missing.
Timer has been deactivated!    28.02.21    19:00:01
```

Couldn't send SMS because GSM-module was not able or allowed to dial into network.

```
SMS sending failed       28.02.21    12:24:20
NOT REGISTERED!
```

Your GSM-provider refused to send the SMS.
Most likely your prepaid-SMS must be charged.

```
SMS sending failed       27.02.21    12:24:20
CALL BARRED!
```

The timer has been deactivated manually:

```
Timer manually turned off      06.03.21    13:29:06
```

No free memory on the SD-card:

```
Not enough disk space
```

A problem with your SD-card occurred (read or write error).

```
read/write errors on SD-card occurred!
```

If this message pops up more than once, replace the SD-card.

USB mode

Basics

With the GSM-batcorder you have the possibility to retrieve the data from the SD-card without having to remove it. This is possible through the USB-mode even while operating. Only during the scanning mode or while in a settings menu this access is locked. You can connect an external end device to the USB-port and can then retrieve the data from the SD-card. To connect the end device to the GSM-batcorder you need an USB-cable with a Mini-USB-Plug for the GSM-batcorder and the appropriate connector plug at the end device. (Not included in delivery!)

So with a Raspberry Pi and the appropriate add-on program, it is possible to secure the data from SD-card to an external data medium. On our homepage you can find all information concerning this saving procedure, other developments and all relevant downloads. (See: Support)

Access to the SD-CARD via USB-Port

The SD-card is either activated for internal access or for external access via an external end device. The access through the USB-port is as following:

As soon as a USB-connection has been established (cable connected, external device (computer or Raspberry Pi) activated), the GSM-batcorder builds up a connection. At the status line the “**USB**” mark is displayed. The real data connection can require a few seconds longer.

The external end device only gets access to the SD-Card if:

1. You are at the MAIN menu, you can establish an access to the SD-card via the USB-port by hand. More about that see below.
2. You are the TIMER-ENABLED mode, out of a recording session (yellow display). More to it also below.
3. The GSM-batcorder has been turned off and you connect an active external end device via USB with the GSM-batcorder. Also see further below.

First you have to connect an USB-cable. (At the status line the “USB” mark is displayed.)

To 1. :

By simultaneously pressing the "**Fn**"-button + (▾) the access to the SD-card for an external end device is cleared. As soon as the connection is established, the message "USB CONNECTED" appears on the display.

Back to the MAIN menu: Press the ON/OFF-button, at the display the message "**DISCONNECTING USB**" appears. The GSM-batcorder goes back to the main display (**MAIN**) and can now access the SD-card again.

The USB mark stays visible, even if the external end device has no access to the SD-card now.

You may also simply pull the USB-cable to disconnect.

If you use an Apple-computer it is mandatory to 'release' the batcorder first in the finder. Otherwise you will loss all data!!

The USB mark in status line stays visible, as long as a USB device is connected, no matter whether the external end device has access to the SD-card or not.

To 2. :

In the standby mode (yellow display) the external end device has full access to the SD-card via the USB connection.
If the USB-connection has been technically established beforehand (for example to a Raspberry Pi) the SD-card will be connected with the end device automatically.

Access to the SD-card can also be established while the GSM-batcorder is already in standby mode by connecting an external end device. In the display "-- >USB CONNECTED< --" appears continuously. As long as the starting time for the scanning mode has not been reached, the data from the SD-card can be read out by a connected Raspberry Pi or a Computer. The connection will be interrupted from starting time on during the whole recording session. After stopping time the USB connection is again clear, and the connected external device again has access to the SD-card and for example read out the data made during the recording session.

To 3. :

If the turned-off GSM-batcorder is connected to an active external end device via the USB-port, it starts automatically into the USB-mode (as described under point 1.). The data from the SD-card can so be read out comfortably without using any

buttons to operate the GSM-batcorder. To turn the GSM-batcorder off again, you only have to softly pull the USB-cable off and interrupt the USB-connection.

This possibility allows easy and fast access to the SD-card without further knowledge of the GSM-batcorder functions.

Each write or delete access via USB-port renders the SD-card unusable for the next record season!

Delete SD-card via USB port

If you want to delete all data change the device name to “DELETEME”

When the next timer start occurs the GSM-batcorder will format the SD-card and generate a new logfile without further warnings.

This can be very helpful when the serviceteam replaced the SD-card while the GSM-batcorder was in sleep mode and forgot to format the SD-card.

Firmware Update

The GSM-batcorder-firmware is continuously developed by ecoObs and of course the updates are free of charge. At our homepage www.ecoobs.de you can find all relevant data for a download. We recommend signing up for our newsletter to be informed about latest updates.

The software update for the GSM-batcorder can be installed with a SD card. The current software version of your GSM-batcorder is shown in the lower right corner of the screen when the device is started displayed as **Hxxx** for the hardware version and **Sxxx** for the software version. It takes only a few steps to update the software. But it is highly important to follow each step exactly, as an update failure can make the GSM-batcorder inoperative!

Only the software (**Sxxx**) can be updated via SD card. The hardware version (Hxxx) can only be updated by ecoObs.

Requirements

For the update you need a SD-card, which has already been accepted by the GSM-batcorder. (See: GSM-batcorder start-up, Preparation of SD memory card). This SD memory card has to be prepared as following. Please **read** each step thoroughly **first**, **before executing** the update!

Warning: Deactivate all kinds of programs, which could access the SD-card in your computer unwanted and without any user interaction, such as virus scanners etc.

Update

Step 1: Prepare the SD memory card with the GSM-batcorder

Insert the SD-card into the GSM-batcorder and erase all data either with the **erase function** in the **MAIN** menu (press **Fn + (▲)** or by choosing "**Continue**" at the start of the GSM-batcorder when a message is displayed that the SD card has to be erased. (This request is made, when the SD-card for the GSM-batcorder unknown data!)

Step 2: Load update file onto the SD-card

Remove the SD-card from the GSM-batcorder and insert it into your computer´s SD-card-slot. Copy the update file from the computer onto the SD-card. (Of course before you can do this, you have to download the file from our homepage onto your computer first. Be sure, that you copy the right file: **For the GSM-batcorder!**).

Do not change anything else on the card, that means do not erase, shift or copy any further files onto the SD-card! Also you have to make sure that no other programs try to have access to the SD-card while inserted in your computer as mentioned before! Remove the SD-memory-card as soon as you have copied all needed update files from your computer onto the SD-card.

Step 3: Firmware Update

Insert the SD-card into the batcorder. Start the GSM-batcorder and follow the instructions shown on the display. If the update has been successful, the new software number is now shown at the right bottom of the display (**SXXX**).

Note: With this SD-card you can now directly update other GSM batcorder - you do not have to follow step 1 and step 2 again!

Possible Errors

The GSM-batcorder has been updated, but the device will not start or behaves undefined:

The update has failed, possible reasons may have been for example: wrong download file, defective card or unnoticed access onto the SD-card while inserted into the computer.

If the update fails you will have to send your device in. Address see ‘Support’.

Installation on a wind turbine generator (WTG)

Generally

The installation of the microphone disc as well as the GSM batcorder`s mounting rail should always be carried out by qualified personnel of the operator or the manufacturer of the WTG. Please get in contact with those before using the GSM-batcorder on a plant.

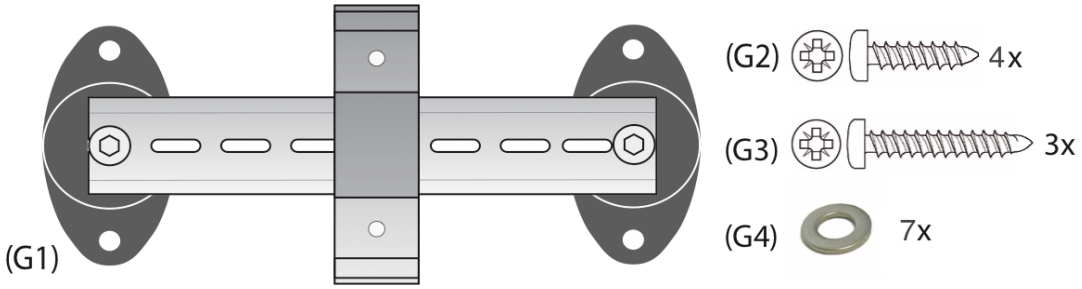
Assembly parts for installation

(G1) Profile rail with pre-assembled vibration damper and fastening clip(s) for the GSM-batcorder

(G2) 4 x tapping screws C 5,5 x 13 H, for fixation of profile rail to the nacelle

(G3) 3 x tapping screws C 5,5 x 25 H, for fixation of microphone disc to the nacelle

(G4) 7 x washer dishes



Additionally required material

- 230V extension cable, if there is no socket nearby
- Drilling machine
- Hole saw for a 100mm hole, for mounting the microphone disc to the nacelle
- Drill 3.5 mm or 4 mm depending on the nacelle material, to pre-drill the holes for the tapping screws
- Philips screwdriver
- Pencil or marker
- Long cable ties (included in delivery) to tighten the 6V- rechargeable battery to the profile rail (see: “Fox devices to the profile rail”)

- Cable ties and adhesive tape to tighten all loose laid cables and for all other attachments
- Knife or scissors to cut down the cable ties or the tape

Position in the nacelle

The microphone and the mounting rails for the GSM-batcorder are fixed at the bottom of the plant´s nacelle. So the microphone capsule looks down after installation.

On Vestas and on Enercon plants the location at the back ends of the plants, next to the emergency escape flap, has proven suitable for mounting the GSM-batcorder and its accessories.

Depending on the type of nacelle and available installation possibilities a modification of the construction may be necessary. The mounting rails can e.g. also be fixed vertically to structures/bars inside the nacelle. The microphone must not be installed too exposed (e.g. to a side panel or to the surface of the nacelle), because it then is too open to atmospheric conditions and also to draining rainwater and it will then wear out early. An installation at the bottom of the nacelle, at the side averted to the rotor, though is possible and reasonable, because there less turbulences do occur and therefore less noise and humidity resp. dirt are to be expected.

Installation of the microphone disc

The microphone capsule within the microphone disc is very sensitive against mechanical force. Make sure that the microphone capsule, embedded into the acrylic pane, is not touched during installation and transport. Also the surface of the acrylic pane must not be scratched!

For installation of the microphone disc it is necessary to cut a hole into the nacelle cover of a 100mm diameter. This measure can only be carried out by qualified personnel of the wind energy plant´s operator or the manufacturer (strictly observe regulations!). The microphone disc can then be attached fittingly into the cut hole. For the tapping screws, holes have to be pre-drilled. The microphone disc can be used for marking the position of the holes. Pay attention to a precise fit of the rubber o-ring needed for seal.

Note: The distance from disc to GSM-batcorder must not be more than 65 cm! (Cable length of the microphone is 70 cm).

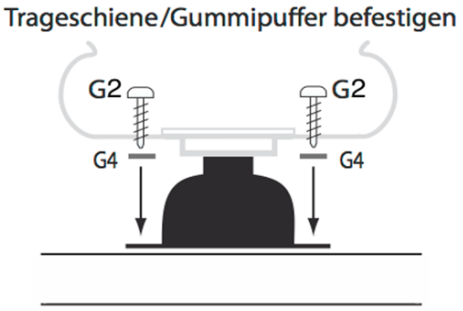
The microphone disc then is to be connected to the GSM-batcorder. Therefore you have to lock the microphone plug to the microphone jack on the GSM-batcorder without using any force or tools. Attention should be paid to a correct alignment of plug and jack (red marks have to match). A twisted connection leads to a loss of function.

This is a push-pull connector. Pull the plug at the knurled area to unlock it. You must not twist it!

Installation of profile rail

The GSM-batcorder is fixed at the WTG-nacelle via a profile rail with a clip system (top-hat rail). The profile rail is attached to the nacelle cover (from inside) with dampers.

Lay down the rail at the chosen position onto the nacelle bottom and sketch the position of the pilot holes for the screws (G2). Use the enclosed washers (G4). Observe the proper distance to the microphone disc.



Corresponding to the illustration the profile rail and the fastening clip are mounted and the GSM-batcorder can then be clicked into the fastener.

Fastening GSM-batcorder and rechargeable battery on the profile rail

The GSM-batcorder is inserted into the fastening clip. The battery will also be mounted onto the profile rail with two long cable ties (enclosed in delivery) right below the GSM-batcorder. The battery has got a rubberized surface at its bottom side, and with this side the battery has to lie on the profile rail. The rubber prevents the battery from getting out of place. Be sure that the battery poles are faced towards the GSM-batcorder.

Please leave enough space between GSM-batcorder and battery pack so that if necessary it is still possible to connect an USB-cable to the batcorder. You will need enough space to open the lid, to do so.

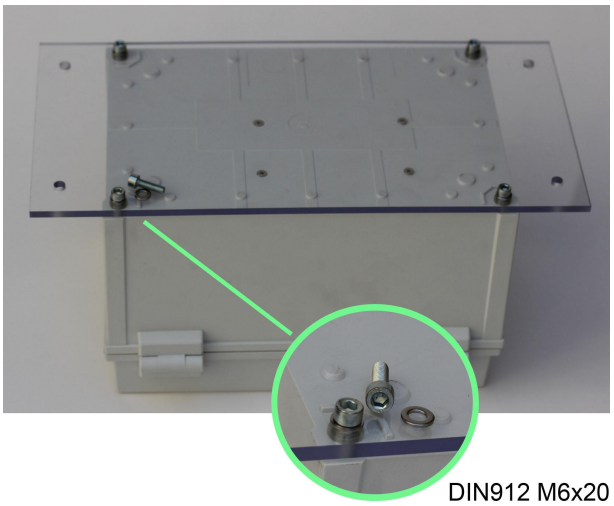
Pay attention to connect the cables properly to the battery! **Black to negative pole** and **red to positive pole** - reverse polarity, even for only a short time, might destroy the GSM-batcorder!

Use in the BOX

Assembly of the components

Assembly of the rear wall

Mount the plastic panel on the back wall of the box. To do this, use the "DIN912 M6x20 VZ" Allen screws and the corresponding washers. The plastic panel is symmetrical in every axis, i.e. there is no preferred mounting direction.



DIN912 M6x20

Installation of the mast clamps

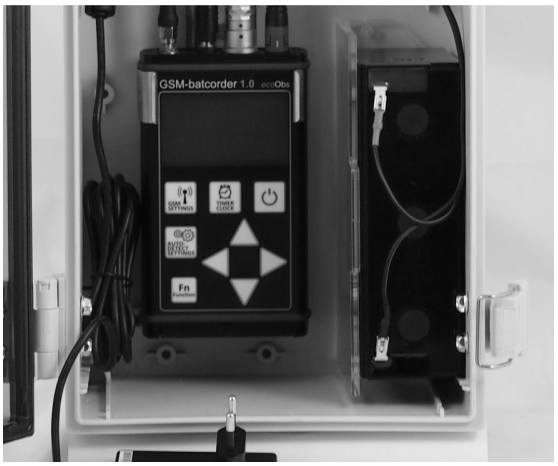
The two mast clamps are screwed to the rear panel by using the screws provided. When using the solar panel, refer to the paragraph
“**Installation of the solar panel holder**”

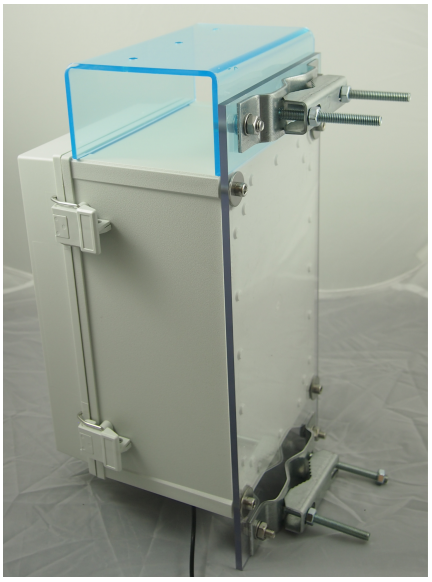
Mounting the microphone

The microphone has to place into the round opening in the cover and carefully screwed by using the wing screws provided. Make sure that the sealing ring fits and seals without any gaps , as well as the microphone disc is seated stress free. The microphone disc must not deformed in direction to the inside of the cover caused by excessive tightening of the wing screws

Assembly of the battery

Put the battery into the dedicated compartment on the right side of the box. Make sure that contact poles of the battery point to the front as shown in the picture. This ensures a simple, tension-free connection of the power cable to the GSM batcorder



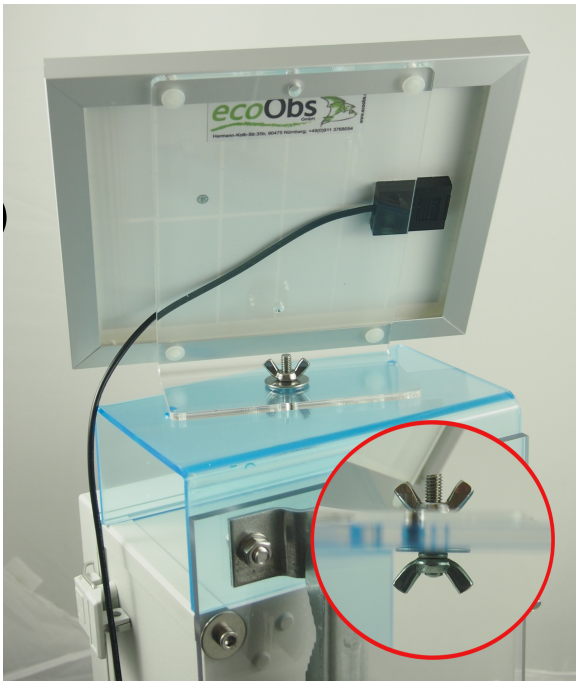


Installation of the solar panel mount

Note:
The solar panel is available as an option to the box extension.
Fasten the U-shaped acrylic glass element as shown together with the upper mast clamp if this is to be used in.

Use:
2 x M8x25 hex screws
2 x screw nut M8
4 x Washer

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



Installation of the solar panel

The acrylic glass angle on which the solar panel is mounted is attached to the blue acrylic glass element shown in the picture by using a wing nut and wing screw.
It can be mounted various and in any direction.

Feedthrough of the panel cable

At the bottom right corner of the case, there is a hole for passing through the solar panel cable.

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 solar panel only generates energy when exposed to direct sunlight. In the event of shadowing, e.g. by leaves, the solar panel is inoperative.

With e.g. 12 hours runtime per night and a medium activity (corresponds to approx. 3Wh), the battery is already fully charged again approx. 3 hours by full sun radiation. A southern orientation is usually ideal, but you may have to find an optimal compromise between exposure of the box and mounting location. Parameters such as morning fog in spring and autumn when facing east, but also at timerstart when facing west should be taken into account. A second solar panel can also be used for locations with poor solar radiation. Simply contact us for a solution like this.

Note:
If operation of a 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 in the control box, which converts 12V battery voltage into the required 6V operating voltage with an efficiency of > 85%. It is also possible to use a 9V electric fence battery. Larger batteries, of course, have to be installed outside of 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 12V solar panel. (Not in assortment of ecoObs)

Drainage holes in the bottom
By default, there are drainage holes in the corners of the box bottom. These are usually sufficient to drain off any condensation. However, at certain mounting locations, e.g. at treetop height, the orientation of the box may change over time. In this case, it has proved useful to drill additional holes in each corner of the box in advance. This means that water can be drained off at any time, regardless of the position.

How to dispose old devices

Of course we take back our old devices in conformity with the German ElektroG (German law, regulating take back and disposure of electric devices). Either we recycle it ourselves or we give the devices to a recycling company for disposure in accordance with the legal requirements. Do not dispose not working devices into the household garbage or the municipal waste, but send them back to us (even single components) free of charge! For further information or questions, please contact the Support.

Support

If problems or questions with the handling of the GSM-batcorder do arise which cannot be solved by yourself, please do not hesitate to contact our Support with a detailed error description.

Have the GSM-batcorders Hardware and Software version numbers at hand (Hxxx Sxxx at the right bottom of the start screen).

Never send in a device unrequested.

If you are asked to send in the device, please use our form for returns, which you can download from our homepage at the download area. Please fill in the form completely.

GSM batcorder serial number

Each device has a label with its serial number at its bottom side on the back . This allows a definite identification of every GSM batcorder. Please always quote this number when contacting the support.

Do not remove the label with the GSM batcorders serial number!

Our contact data:

Mail: info@ecoobs.de

By phone: 0049 (0)911 – 376 80 53

In writing: ecoObs GmbH, Hermann-Kolb-Str. 35b, 90475 Nuremberg, Germany

Technical Details

Product	*GSM-batcorder Modell 1.0 4G*
Description	Call triggered, automatically working bat recorder

Recording-/ File storage method

Type of recording	Real Time
Sampling Rate	500 kHz
Amplitude-resolution	16 bit
Sensitivity range	16 – 150 kHz (ca 32 dB loss at 150 kHz)
Storage procedure	Little Endian, PCM, without Header
Storage medium	SDHC-memory-card up to 32 GB SDXC-memory-card up to 256 GB

Recording Characteristics

Type of microphone	FG series, Electret, power supply 1.3 V
Signal-Noise-Ratio (SNR)	> 80 dB
Directionality	0 to – 9 dB loss at 0 – 180° incidence

Analog circuit

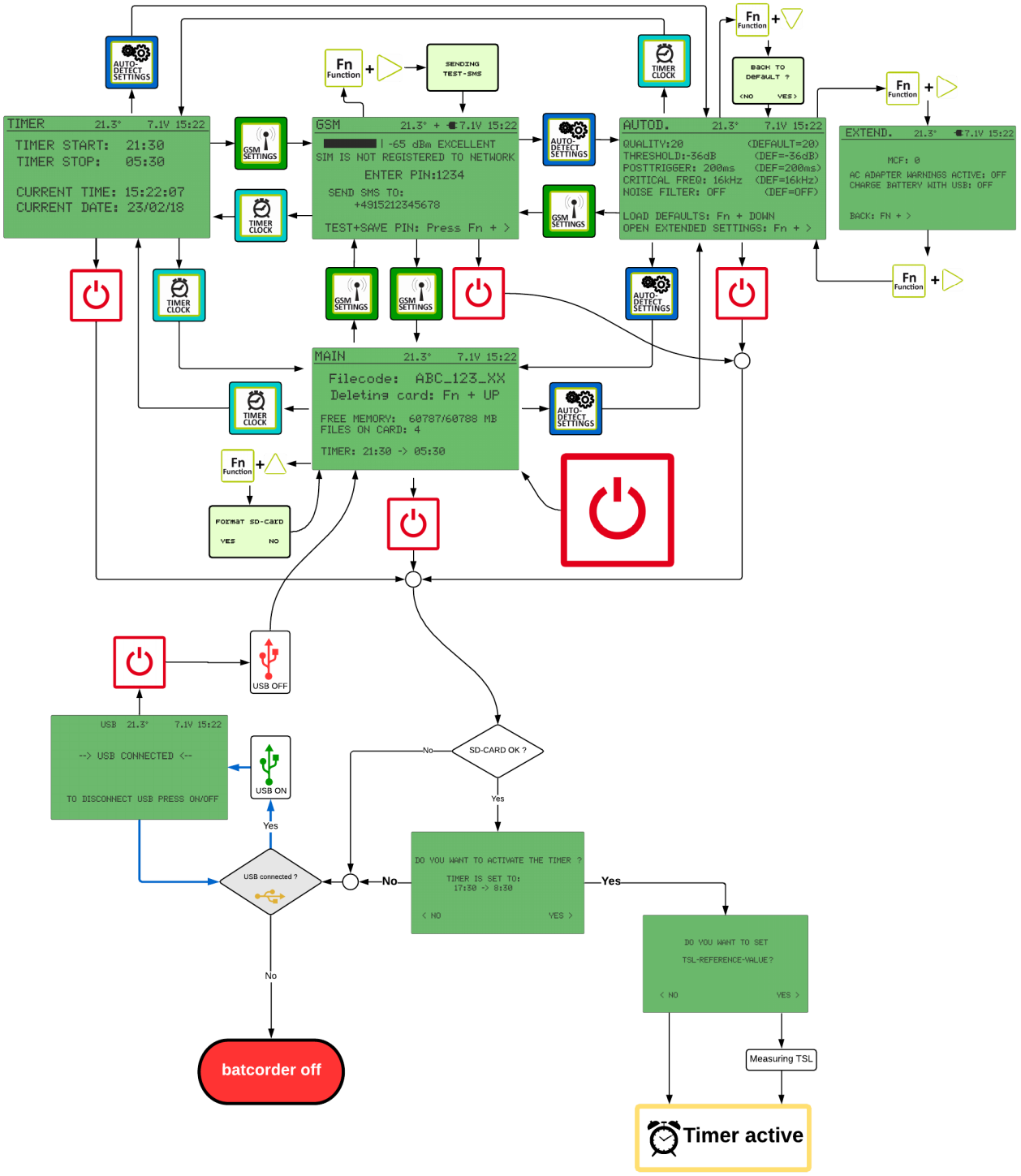
High-pass filter	16 kHz, Butterworth, 10^{th} order
Low-pass filter	150 kHz, Butterworth, 10^{th} order
Overall-gain	full scale deflection, calibrated to 96 dB SPL at 1 meter with 40 kHz

Power supply / Power consumption

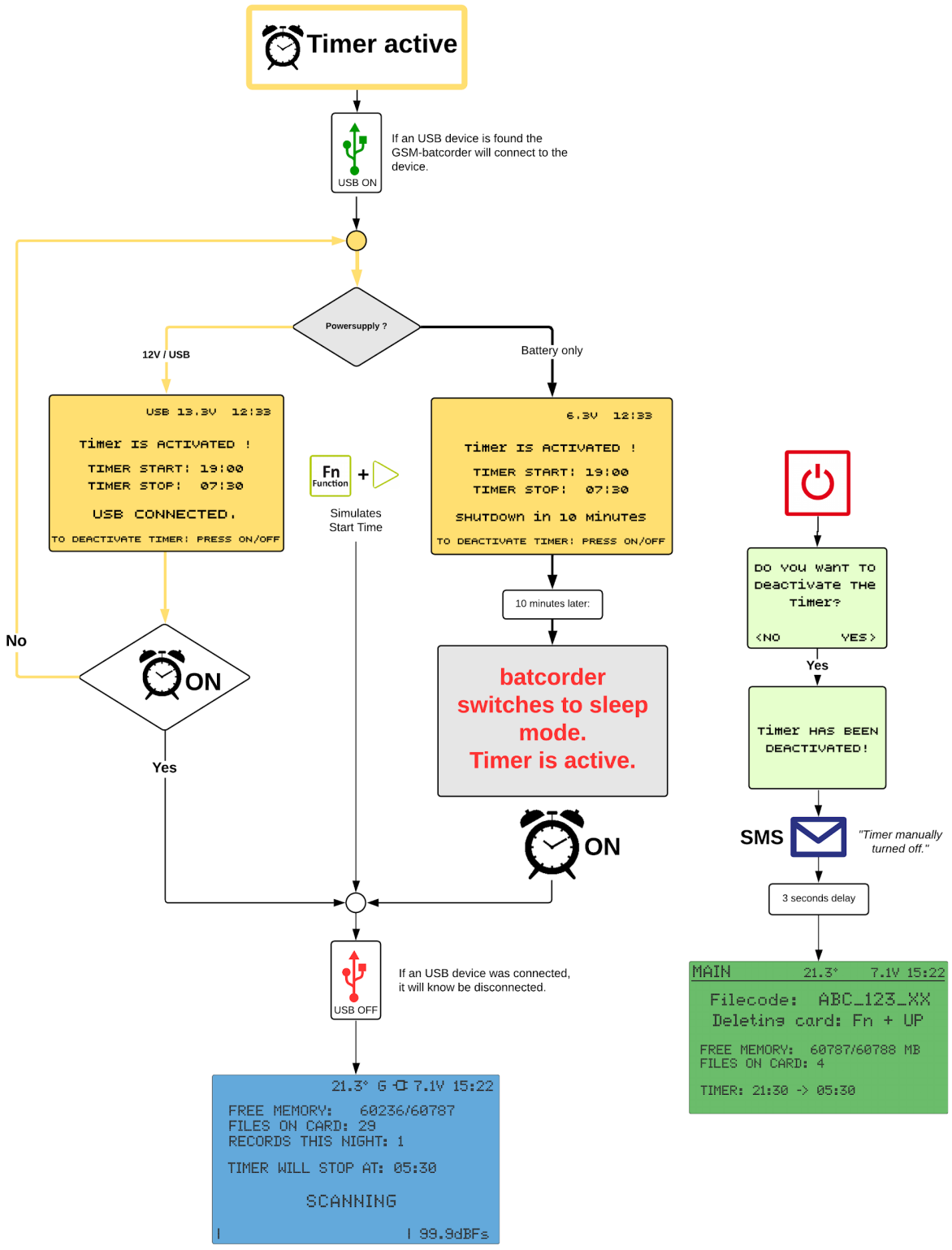
Battery	Allowed voltage range 5.5V-15V. Recommended: lead gel battery 6V, 4.5Ah or higher. Input not reverse polarity protected!
AC-adaptor	Input 100V- 240V 1A max, Output 12V 2.08A Typ: GSM36E12-P1J Manufacturer: Meanwell certificate: *EU-Guidelines MMD 93/42/EU* ESD air: EN61000-4-2:2009 Level 4 15kV ESD contact: EN61000-4-2:2009 Level 4 8kV
Battery charging circuit	Charge controller for 6V lead gel battery only! 12V batteries cannot be charged! Max. Charging current 0.5A. End-of-charge voltage 7.2V. Input from 0V to 8.5V transparent to battery input for ecoObs solar panel.
Power Consumption 12V-230AC adaptor: 6V lead acid battery:	 ø 6W, max. 12W Settings-Modus (green screen): ø 180mW Standby-Modus (yellow screen): 0mW, powered by 12V/USB. Aktiv-Modus (blue screen): Scanning: ø130mW, Record: ø 200mW Peak(bei SMS) < 300ms: 10W
Temperature Range	0°C – 40°C
GSM-Module:	Typ: ML865C1-EA E-GSM 900, DCS 1800, LTE Cat M1INB-IoT Manufacturer: Telit Communications S.p.A. ITALY certificate: EU-Guideline RED 2014/53/EU from 16. April 2014

Technical details are subject to change.

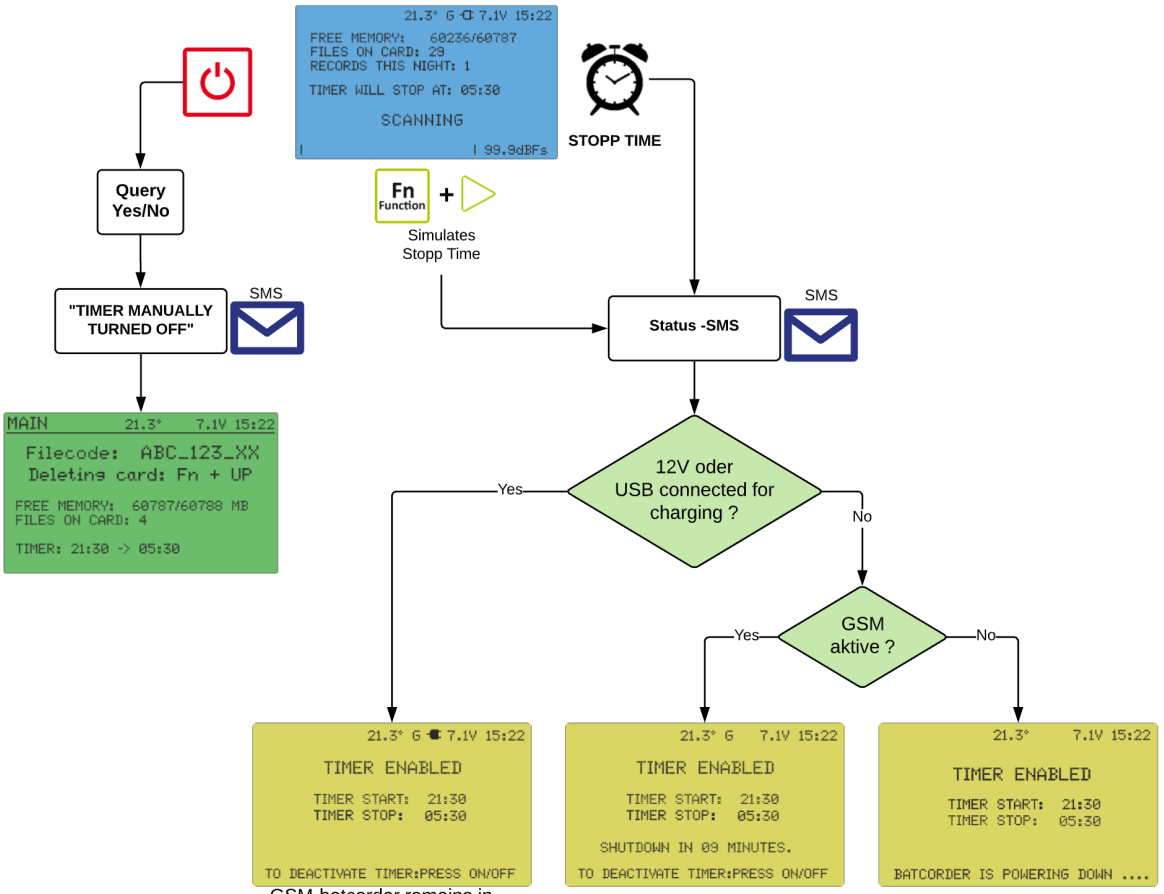
Summery Status “Settings:”



Summery Status “Timer active”:



Summery Status “Scanning”:



Attachments:

- Declaration of EU Conformity GSM-batcorder
- Telit-ML865C1-EA-Declaration-of-Conformity
- Meanwell Declaration of Conformity

Declaration of EU Conformity

Déclaration UE de conformité

Productname: ***GSM batcorder 1.0 4G***

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

We declare under our sole responsibility that the product to which this declaration relates is in conformity with the following standard(s) or other normative document(s):

EU-Guideline EMC 2014/30/EU from February 26th 2014
Electromagnetic Compatibility (EMC)

EU-Guideline RED 2014/53/EU from April 16th 2014
Radio Equipment Directive (RED)

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

EU-Guideline LVD 2014/35/EU from February 26th 2014
The Low Voltage Directive (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

www.Telit.com/RED

Telit Communications S.p.A.
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34010 Sgonico (TS) - ITALY
Phone +39 040 4192 111
Fax +39 040 4192 333

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).

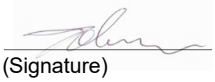
This Declaration is effective from serial number EB6xxxxxxx

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