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# BG – Counter

(EN) Instruction Manual

Updates for the manual can be found on the website [www.bg-counter.com](http://www.bg-counter.com)

Status: July 2020

BG-Counter™

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## Description of the BG-Counter

The BG-Counter is an electronic device that counts mosquitoes as they fly through and wirelessly transmits the data to a cloud server. Differentiation of mosquitoes from smaller or larger insects, and from other objects such as dust or rain particles, is based on size and wing beat. Mosquitoes, small Diptera such as chironomid midges and fungus gnats, and other insects with a similar size cannot be reliably differentiated. Therefore, to improve classification accuracy, the BG-Counter utilizes carbon dioxide (CO<sub>2</sub>) to attract only blood sucking insects. By using CO<sub>2</sub> as an attractant the accuracy of correctly counted mosquitoes is in the range of 80-90 %. Accuracy may vary from location to location and should be verified from time to time (see accuracy of counts).

We recommended to use the BG-Counter in combination with a BG-Trap Station (with parts of the BG-Pro with a special 12 V fan) or a BG-Sentinel trap that remove the insects after they are sucked through to avoid multiple counts of the same insect. To ensure accurate counts, the trap must not allow collected mosquitoes to escape.

Equipped with basic sensors, the BG-Counter also samples local environmental data such as temperature, humidity and light. The system is supported by a web application for storage of mosquito counts as well as geospatial and environmental data. Via this web application you can remotely switch the trap and the BG-Counter on and off. It also allows you to set up varying time schedules to run the trap and control the application times of CO<sub>2</sub>.

## BG-Counter needs mobile reception

The BG-Counter needs mobile reception to transmit data to the web server. Therefore, place the BG-Counter with the trap only in areas with mobile reception. You can check the local reception with your mobile phone.

The BG-Counter will automatically select the mobile provider that is available at the chosen location.

## Registration

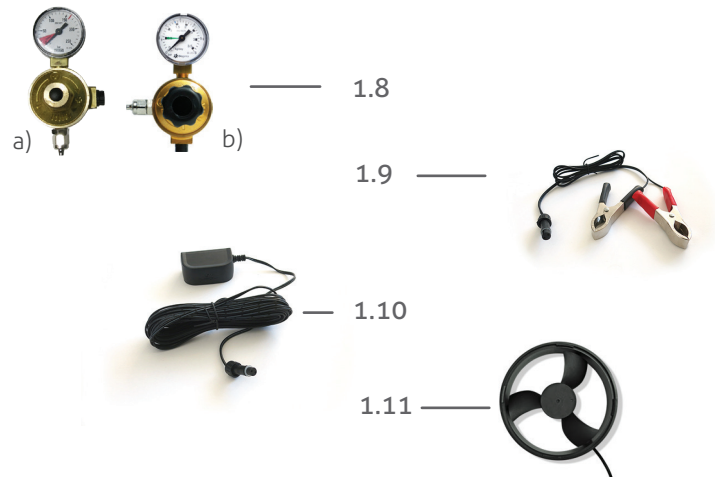
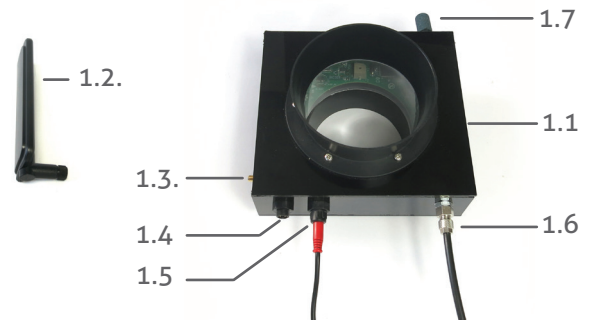
See page 11 for first-time user registration.



# Product Components

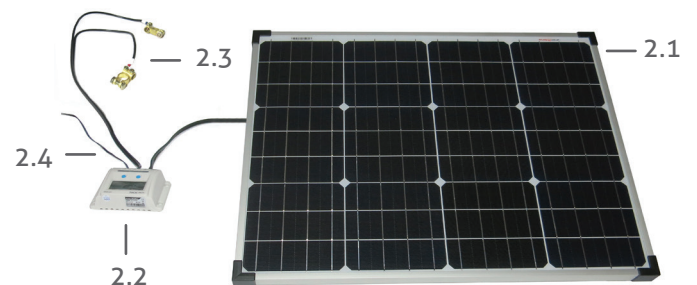
## 1. BG-Counter

- 1.1. Body
- 1.2. External antenna (female SMA connector)
- 1.3. Antenna connector
- 1.4. 12 V power connector
- 1.5. Fan connector (red) with attached fan adapter cable
- 1.6. CO<sub>2</sub> input port with attached CO<sub>2</sub> tube
- 1.7. CO<sub>2</sub> release port
- 1.8. Pressure regulator, two versions:
  - a) preset regulator
  - b) adjustable regulator
- 1.9. Battery adapter cable
- 1.10. AC power cord with transformer
- 1.11. BG-Counter fan: 3-blade, 12 V



## 2. Solar system

- 2.1. Solar panel with connectors
- 2.2. Solar controller with connectors
- 2.3. Battery cable, already connected to solar controller
- 2.4. Load adapter cable



## 3. BG-Trap Station

- 3.1. Parts of the BG-Pro trap (without fan)
- 3.2. Metal stand with bottom ring, lid, 2 beams, screws and nuts



## Info

The BG-Counter runs on 12 V.

When using the BG-Counter with a BG-Trap Station or BG-Pro, always use the 12 V BG-Counter fan included in the BG-Counter contents (see page 4, 1.11).

### How to Set-Up the BG-Counter with the BG-Trap Station (recommended)

#### 1. Assemble BG-Pro parts

Attach the enclosed BG-Counter 12 V fan (see page 4, 1.11) to the lower part of the inner cylinder of the BG-Pro [F1]. Turn it clockwise until it fits tight [F2].

Then, follow assembly instructions for the BG-Pro. See manual at [www.biogents.com](http://www.biogents.com), but do not place the funnel into the opening on top of the cover [F3]. The BG-Counter will be placed here later on.



## 2. Assemble stand

Assemble the stand by placing the beams on both sides in the clamps of the bottom ring and fixing them with the enclosed nuts [F4]. Place the lid clamps into the other ends of the beams and also fix them with nuts [F5].

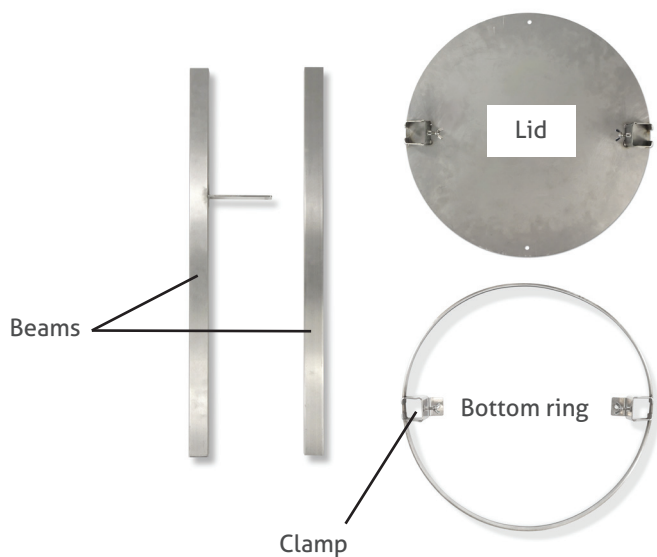
3. **Set up the BG-Pro in the stand:** Insert an enclosed screw through one of the holes on the central upper bracket of the BG-Pro. Continue to insert the screw through one of the holes of the trap holder of the BG-Trap station [F6] and fix it with a nut. Repeat this process with another screw and the second hole [F7]. The BG-Pro should now be firmly attached to the BG-Trap station [F8].



F4



F5



F6



F7



F8



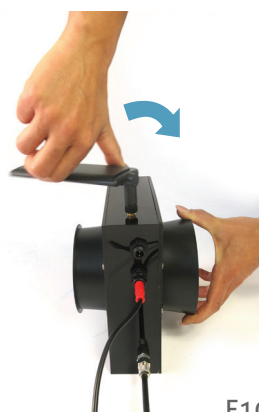
4. For routine operation of the counter, it is recommended **to not install a catch bag**.

A catch bag and funnel net can be installed when the trap and BG-Counter are run overnight or for a few hours, and the catch is to be preserved for inspection: **Attach funnel net and catch bag** to the bottom part of the BG-Counter (if desired) [F9]. The funnel net is important to avoid double counts of insects crawling out. For more information about this topic see chapter "Determination of Counting Accuracy".



F9, optional

5. **Fix the antenna on the BG-Counter:** Place the BG-Counter on a flat surface with the antenna connector facing up (see Fig F10). Screw on the antenna, turning in a clockwise motion until firmly attached. Do not overtighten the screw.



F10

6. **Place the BG-Counter into the opening** on top of the trap [F11] and turn it clockwise until it fits tight. Turn the antenna to an upright position [F12].



F11

7. **Connecting the fan to the counter:** Connect the red fan adapter cable with the fan cable of the trap. Please pay attention to always connect with the arrow in line with the black marking line [F13].



F12



F13

## Connect CO<sub>2</sub>

The CO<sub>2</sub> bottle is not included, and must be provided by the user.

There exist two different versions of the pressure regulator:

- The preset regulator is adjusted to 2.0 bar and the outlet pressure cannot be changed.
- The adjustable pressure regulator must be set at 1.5 kg/day (corresponding to 2.6 bar). Therefore, adjust pressure to mark "C" on the dial.

The fittings of the regulators are either US CGA-320 or Europe W21.8x1/14 RH standards.

1. Install the CO<sub>2</sub> pressure regulator on tank and make sure it is tight by using a wrench or pliers [F14].
2. Connect the free end of the CO<sub>2</sub> tubing to the regulator [F15]: unscrew the nut on the outlet, thread the end of the CO<sub>2</sub> tube through the nut, insert the end of the CO<sub>2</sub> tube firmly onto the outlet and re-screw the nut back onto the outlet.
3. Now open the valve on the top of the CO<sub>2</sub> bottle to start the release of CO<sub>2</sub>.



F14



F15



## Connecting the BG-Counter to Power: 3 Options

3 options to connect the BG-Counter to power via the 12 V power connection



### Option 1

#### Power cord with transformer

This is recommended if AC power is available at the counter location.

- Use only the provided AC adapter, and confirm local outlet style before ordering:
  - US: Nema 1-15
  - Europe: CEE 7







### Option 2

#### 12 V battery (provided by user)

This is recommended if the counter is operated in a location for a few days, before being serviced or moved. The minimum number of hours of operation possible with a full battery can be calculated as follows:

Operation hours = Battery capacity (Ah) x 2.

For example, with a battery capacity of 60 Ah (Ampere hours), the counter and fan can be operated for at least  $60 \times 2 = 120$  hours = 5 full days.

Use "deep cycle" lead-acid, or lithium-ion batteries. Normal car batteries are not designed for continuous charge/discharge cycling, and thus would have significantly reduced lifetime.

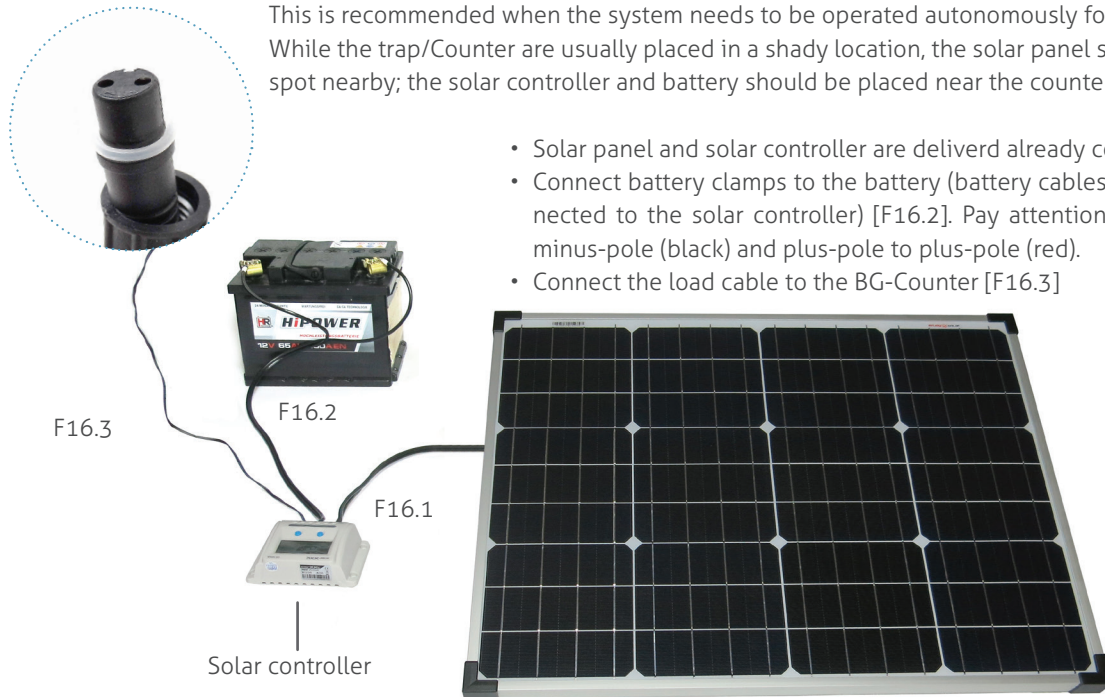
- Connect battery using battery cable

### Option 3

#### Solar panel with solar battery

This is recommended when the system needs to be operated autonomously for extended periods of time. While the trap/Counter are usually placed in a shady location, the solar panel should be placed in a sunny spot nearby; the solar controller and battery should be placed near the counter.

- Solar panel and solar controller are delivered already connected [F16.1].
- Connect battery clamps to the battery (battery cables are delivered already connected to the solar controller) [F16.2]. Pay attention to connect minus-pole to minus-pole (black) and plus-pole to plus-pole (red).
- Connect the load cable to the BG-Counter [F16.3]



## Determination of Counting Accuracy

For routine operation, it is not recommended to use a catch bag as the catch bag might be filled up too quickly. In this way mosquitoes will be sucked through the ventilator and end up dead at the bottom of the trap.

However, a catch bag can be installed when the BG-Counter runs only for a few hours in order to check if the number of counted mosquitoes by the BG-Counter corresponds with the actual number of collected mosquitoes. In this way the accuracy of the BG-Counter can be determined. When comparing manual catch bag counts to electronic counts, it should be noted that mosquitoes can "disappear" from the catch bag:

Mosquitoes and other insects may be "stolen" by ants, spiders, or geckos. For all calibration experiments make sure that ants or other predators have no access to the catch bag.

You can protect the trap and catch bag by a water surface around the trap, or by adding glue or PTFE to all trap parts that might be accessible for predators.

If you make sure that mosquitoes do not leave the catch bag after they have been sucked in the accuracy of the BG-Counter for correctly counted mosquitoes is between 80% and 90% correctly counted mosquitoes. If desired, experiments can be performed from time to time to compare the catch bag results with the electronic results reported for the same time interval.

# Operating the BG-Counter

## 1. Automatic start-up

The BG-Counter has no on/off switch or other buttons. It automatically starts when connected to 12 V power.

## 2. Battery check

After the counter is connected to power, there will be from 1 to 4 beeps, depending on battery voltage.

- 4 beeps mean the battery is sufficiently charged
- If only 1-3 beeps are heard, this means the battery is low and needs charging, and counting function, fan, and CO<sub>2</sub> will be off until the voltage increases to >11.8V
- If there is no beep at all, see chapter Troubleshooting / Trap does not start up

## 3. Cellular connection check

Following the battery check, the device proceeds to check the strength of the cellular connection. This usually takes less than 30 seconds, but may take several minutes, for example, if the counter has been moved to a new location with a different cellular provider.

At the end of the check, the counter indicates signal strength as follows:

- 1-5 long beeps: corresponding to 1-5 bars of signal
- 2 short beeps: no signal, no cellular connection possible

If no cellular connection is available, the counter can still be operated. Data will be stored internally, and transmitted the next time a connection is available.

## 4. Fan and CO<sub>2</sub> flow check

After powering up, the fan and CO<sub>2</sub> valve are switched on until the next round 15-minute interval (for example, if powered up at 16:03 until 16:15). This provides time for the operator to confirm that the BG-Pro 12 V fan is, indeed, working, and the CO<sub>2</sub> flow is on.

Confirm fan operation visually by looking into the trap funnel, or by holding a piece of tissue paper above the funnel.

By default, the CO<sub>2</sub> flow is adjusted to 50 g/h. The CO<sub>2</sub> dosing valve is located inside the counter housing. It briefly turns on and off every 4 seconds.

### Check for the presence of CO<sub>2</sub> flow as follows:

- CO<sub>2</sub> tank valve open
- audible click from the valve
- hiss from the CO<sub>2</sub> release port

## 5. Counter check

If desired, the function of the counter can be verified at this time by throwing a small object (for example, a small piece of paper) into the trap funnel. A short beep is heard, indicating the counter has registered the object.

# First Cloud Connection

The first connection to the Cloud (<http://www.bg-counter.com>) takes place at the first round 15 minutes after the counter is started (for example, 16:15).

When connecting to the cloud, results are uploaded, and the schedule defined on the web site is downloaded and activated.

Depending on the schedule, fan, CO<sub>2</sub> and/or counting function may be turned off at this time.

If this is a new counter, the first connection also auto-registers the counter on the website.

# Reset

The BG-Counter is reset every time the power is disconnected and re-connected, and the start-up sequence commences as described above.

# Maintenance

Check the BG-Counter and trap bi-weekly or once a month for functionality, remove everything that deters mosquitoes from entering the trap such as spider webs, leaves and any dirt.

## BG-Counter Website Description

The web application allows you to remotely switch traps in the field on and off. It also allows you to set up varying time schedules to run the traps and to set up application times of attractants. Further you have access to all collected data including local environmental data such as temperature, humidity, or light.

On the website and in these instructions, the word “trap” refers to a complete system including a trap and a counter.

## Registration at live.bg-counter.com

The website address is live.bg-counter.com. Any modern web browser (PC, tablet, or mobile phone) can be used to access the website.

No registration is necessary to view the traps in the “Demo” account.

To take advantage of the full functionality of the website, you must first be registered.

**Registration for the Administrator (there is only one Administrator for each organization):**

- go to live.bg-counter.com and click on „Register“
- enter your e-mail address
- re-enter your e-mail address to make sure it's correct
- enter the serial number of the counter (IMEI, located on a sticker on the bottom of the counter): select from the left hand side (1) the number that fits to the first digits of your serial number. Then add the last 7 digits in the right field.

You will receive a confirmation e-mail (please have also a look for the e-mail in your spam folder) with a temporary password and a link to activate your account.

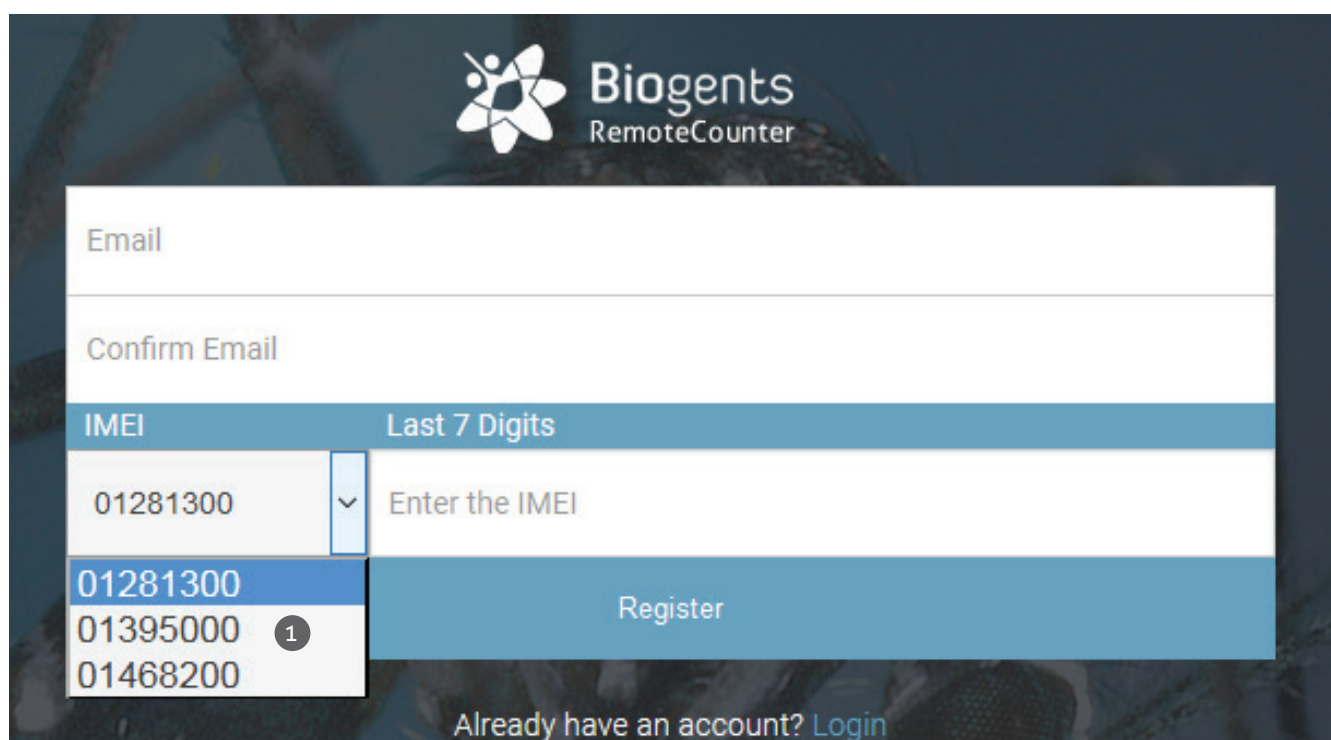
Now you are a registered Administrator.

### Log-in:

To check and control the counter, go to live.bg-counter.com:

- log-in with your e-mail address and your temporary password
- click on “Profile” to set a new password for your account
- set a checkmark in the box “Notify me about warnings” if you want to be notified via e-mail if warnings are registered
- click on “Trap Management” to set the counter name, schedule etc
- click on “User Management” to invite other users, such as operators and guests

If you have more than one counter, you can add them to your account in “Trap Management”.



The screenshot shows the registration interface for Biogents RemoteCounter. At the top, the Biogents RemoteCounter logo is displayed. Below it, there are input fields for 'Email' and 'Confirm Email'. Underneath these, there are two columns: 'IMEI' and 'Last 7 Digits'. The 'IMEI' column has a dropdown menu with three options: '01281300', '01395000' (marked with a circled '1'), and '01468200'. The 'Last 7 Digits' column has a text input field with the placeholder 'Enter the IMEI'. A large blue 'Register' button is positioned below these fields. At the bottom, there is a link that says 'Already have an account? Login'.

## Dashboard

Once logged-in, the dashboard shows an overview over your traps in a map (2). When managing multiple traps, the location display is convenient to confirm which trap is located where. That location is displayed using a label in Google Maps. You can zoom in and out, and switch between a map display and a satellite image (3).

Active traps are shown in green, and inactive traps are shown in red.

Any devices with warning status are displayed on top of the list. Warning indicate low fan current (5) or low and high supply voltage (6). More information on the dashboard warnings can be found on page 19 in the "Troubleshooting" section.

The traps are listed below the map in a short overview with daily captures (4).

**Trap Location**

**List of Traps**

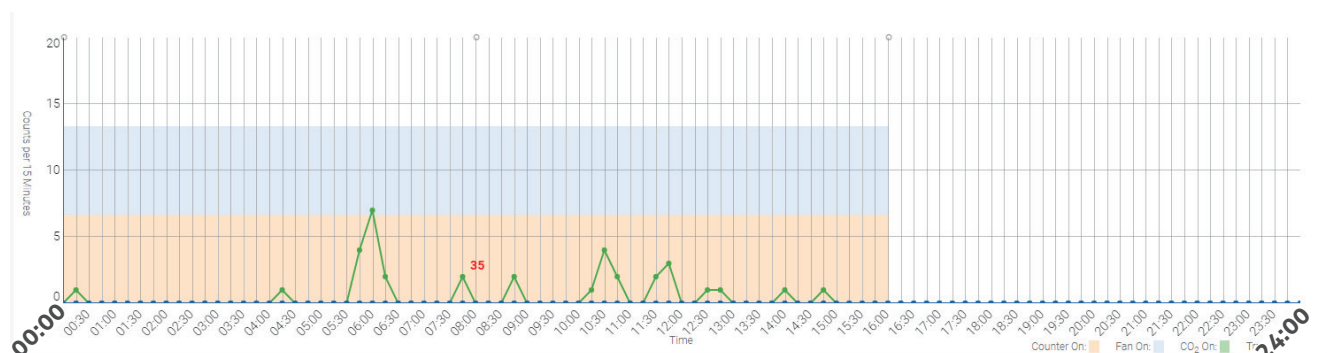
Trap Name	Fan	Voltage [V] (Low/High)	Administrator	CO <sub>2</sub> Cylinder	Capture Counts For Today			
					Small	Mosquitoes	Large	Active Time
● Demo Trap 1		▲ 11.4 / 11.7	john.doe@dumy.com	12	29	10	8.0 hours	
● Demo Trap 2	▲	5	john.doe@dumy.com	0	0	0	0 hours	

- Administrators can view all traps belonging to their organisation
- Guests and operators can only see assigned traps

### Viewing a trap and schedule CO<sub>2</sub>, fan and counter:

For each trap there is an own page with more details and the possibility to set a timer for CO<sub>2</sub> release and fan and counter operation. Before you select a trap, select how you would like to have the trap day displayed on the trap page:

In the field "Trap Day" (7) you can choose the range of the x-axis (time axis) for data visualization: either "00-00" or "12-12". In the first case, data are shown from midnight to midnight, in the second case, data are shown from mid-day to mid-day. The latter way of data exhibition might be more convenient, if you are interested in the dynamics of night-active mosquitoes. The chosen time window will apply to all traps of your list.



Above an example for data visualization from 00:00-00:00 (= 00:00-24:00)

There are several convenient ways to access a trap page:

- In the "Dashboard", click on a trap name either in the map or in the list below the map
- In "Your Traps" (main menu left side), click on a trap name
- In "Trap Management" (main menu left side), click on a trap name or click on "View"

## Main Menu

Beside the dashboard you find following topics in the main menu (8):

### Trap Management

- Provides a list of traps with serial number information and links for viewing and controlling traps

### Profile

- Allows a user to change passwords

### Users ("Administrator" and "Operator" only)

- Allows to invite and delete users

### Your Traps

- Provides shortcuts to the available traps (9)



## Administration Roles and Rights

We have four types of users:

### “Administrator”

- Registers BG-Counters
- Can view and control the registered BG-Counters
- Can appoint operators and/or guest
- Can delete operators and guests
- Can assign BG-Counters to operators and guests
- Can remove BG-Counters from operators and guests

### “Operator”

- Can view and control the BG-Counters assigned to him/her
- Can appoint operators and/or guest
- Can delete operators and guests
- Can assign his BG-Counters to operators and guests
- Can remove his BG-Counters from operators and guests

### “Monitor”

- Can view but not control all devices in an account; multiple accounts can share a monitor user

### “Guest”

- Can only view (but not control) assigned BG-Counters.

## Assignment and Adding Additional BG-Counters

How to assign BG-Counters to the different users:

### Assignment to a new “Operator” (“Administrator” and “Operator” only)

- Click on “Users”
- Fill out the form for inviting a new operator: Enter the e-mail address, choose „Operator” in the Role field, and write - if you wish - a comment for the new user.
- Choose the BG-Counters the operator can view and control
- Click the “Invite” button

### Assignment to a new “Monitor” (“Administrator” only)

- Click on “Users”
- Fill out the form for inviting a new monitor: Enter the e-mail address, choose „Monitor” in the Role field, and write - if you wish - a comment for the new user.
- Click the “Invite” button

### Assignment to a new “Guest” (“Administrator” and “Operator” only)

- Click on “Users”
- Fill out the form for inviting a new guest: Enter the e-mail address, choose „Guest” in the Role field, and write - if you wish - a comment for the new user.
- Choose the BG-Counters the guest can view
- Click the “Invite” button

### Assigning a BG-Counter to an existing “Operator” or “Guest” (“Administrator” and “Operator” only)

You have two possibilities to do this:

First possibility

- Click on “Trap Management”
- Find the BG-Counter to be assigned, and click on “Users”
- In the “Assign Trap to User” screen, select an operator or guest from the drop-down list
- Click “Assign”

Second possibility

- Click on “Users”
- Find the operator or guest to whom you want to assign a trap
- Click on the blue button “Traps”
- In the “Assign Trap to User” screen choose the trap in the drop-down list
- Click the “Assign” button

### How to add additional BG-Counters (“Administrator” only):

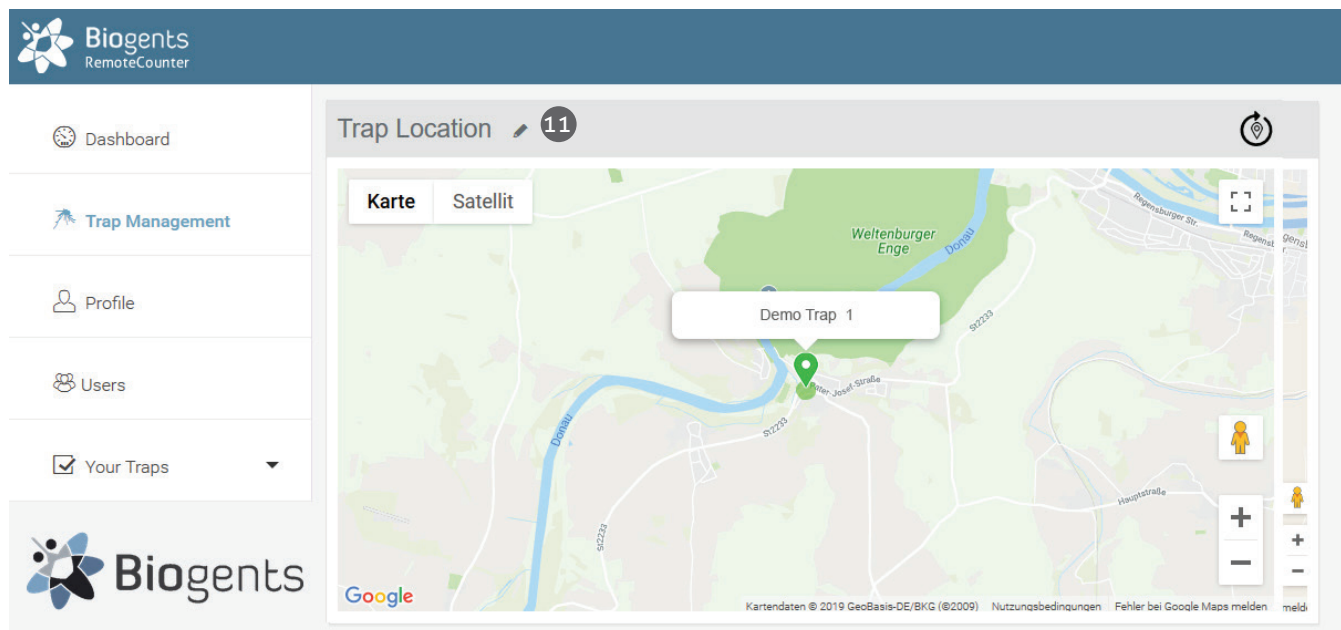
- In “Trap Management”, click on the “Add Trap” button.
- Enter a name for the BG-Counter
- Enter the IMEI (International Mobile Equipment Identity). The IMEI is printed on a sticker on the bottom of the counter module.
- Click on “Create”

## Trap Page

After selecting and clicking a trap, the trap page is shown. Here you find all of the data belonging to the trap inclusive capture data. Further you can set a timer for CO<sub>2</sub> release and fan and counter operation.

### Trap Location

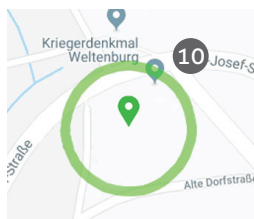
On top of the trap page the trap location is shown in a Google map. When rolling over the marker with the mouse, the name of the trap is shown:



### Types of coordinates

Location is normally determined using the build-in GPS. With "zoom in" the circle will get visible:

GPS Location: Green circle, accuracy about 50 m (10). The counter must be outdoors for GPS location to work.



### Setting "Exact" coordinates

Since mosquito counts are strongly correlated with exact trap location (down to the nearest bush perhaps), it is possible to use Google Maps to set the exact location of the trap. Click on the pencil icon next to "Trap Location" (11). Now, an arrow is shown below the trap label which points to the exact location. Click and drag the label to the desired location, zooming in and switching between map and satellite view as required. The location is saved when clicking on an item outside the map.

### Default location


If a newly registered trap has not yet transmitted a location signal, the location displayed will be either the last known location (which can be some distance away from the present location) or the location of the prime meridian in Greenwich, UK.

The location displayed is the last known location. For historic data, the best estimate of the location on the day selected in the main chart is shown.

## Trap Information

The trap information in the right box provides general data to your trap like name, IMEI (International Mobile Equipment Identity), last connection, and level of CO<sub>2</sub> cylinder.

For changing these data, click on the pencil icon next to the "Trap Information" (12).

**Trap Information**  **12**

Name	Demo Trap 1
IMEI	9
Location	48.890778, 11.825637 (GPS)
Last Connection	2016-10-06@01:15
CO <sub>2</sub> Cylinder	<div><div></div></div> 23% (2 Days)

**Edit Trap**

Name

Demo Trap 1 **13**

IMEI

9

ICCID

Automatic upon Successful Connection

Number of Transmissions

10018

Latitude

48,890778

Longitude

11,825637

CO<sub>2</sub> Cylinder

Cylinder Size (kg)

10 **14**

Flow Rate (g/h)

50

Last Refilled

2019-07-01@19:00:00

**Fill** **15**

Data Connection

15 minutes **16**

Temperature Calibration

Temperature difference between inside and outside of the counter case (°C; default: 2.5)

2,5

**Save** **17**

### Name

To change, click on the text field, and enter the new name (13).

### CO<sub>2</sub> cylinder

On the main trap page, an estimate is provided for the current fill status of the CO<sub>2</sub> cylinder, and the time left until empty. For the estimate to be correct, it is necessary to have a fixed schedule, and to indicate when the cylinder was last filled.

### Cylinder size (kg)

Click on "Please select" or the current size, and pick a size from the drop-down list (14).

### Fill

Click on the "Fill" button, and then select the date and time at which the cylinder was last filled (15).

### Flow rate

The flow rate is automatically set to 50 g/h. This is the optimum number for operation of the BG-Counter to attract mosquitoes while at the same time repelling other insects. This field cannot be edited.

### Data connection

Determines how often the counter will try to connect to the website, and transmit counts and other data (16). The default is every 15 minutes. Other choices are every 1, 2, 4, and 8 hours (Independent of this setting, count data are always stored with 15-minute resolution).

The 15-minute setting is useful for diagnostics when the counter is first set up. However, during each transmission, counting stops for 15-120 seconds, depending on the cellular signal strength. This can result in a small undercounting error. In order to minimize this error, a data connection period of 1 hour or longer is recommended for routine operation. A new setting is transmitted at the next data connection, i.e. if previously the interval was set to 4 hours, and now an interval of 1 hour is desired, it may take up to 4 hours until the new setting is transmitted.

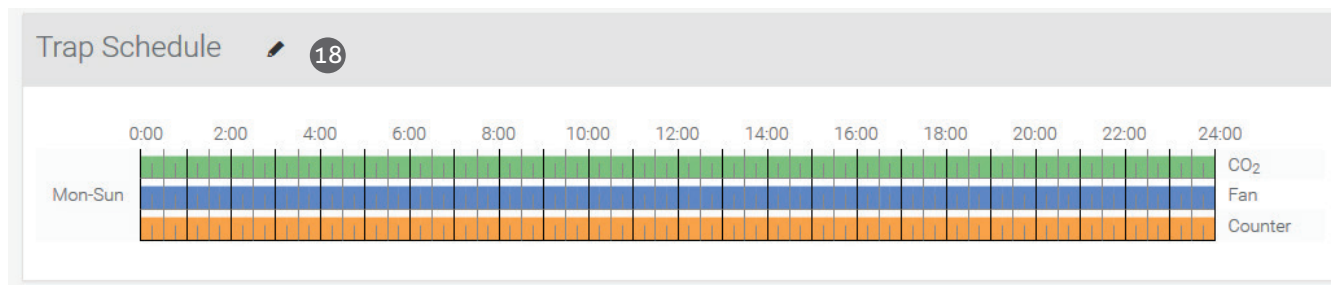
### Save

Click on "Save" to save any changes that were made (17), or click on your browser's back button to return to the previous page without saving the changes.

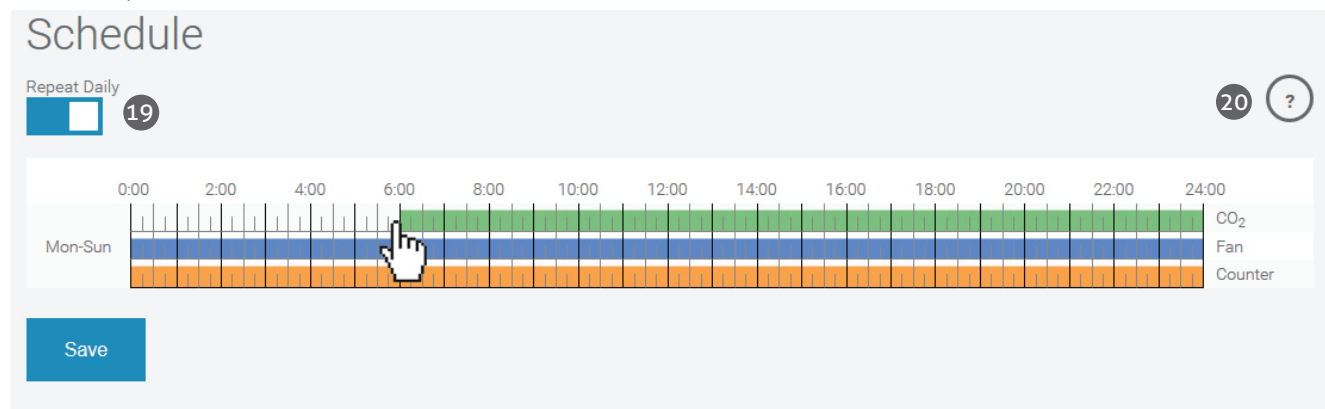
## Trap Schedule

The trap schedule is used to control the operation of the trap: Here you can set a timer for the CO<sub>2</sub> release and the operation of the fan and the counter. For each 15-minute interval during a day, the on/off status can be selected for the following:

- CO<sub>2</sub>: green = on, white = off.
- Fan: blue = on, white = off.
- Counter: orange = on, white = off.



Edit the trap schedule:



To change the schedule, click on the pencil icon next to "Trap Schedule" (18).

These fields can be set independently, although normally they are all on at the same time. However, if for example a catch bag is installed, and the catch is to be retained for collection, leave the fan on continuously.

Normally, the schedule is set to repeat daily; however, it can also be set differently for every day of the week (19).

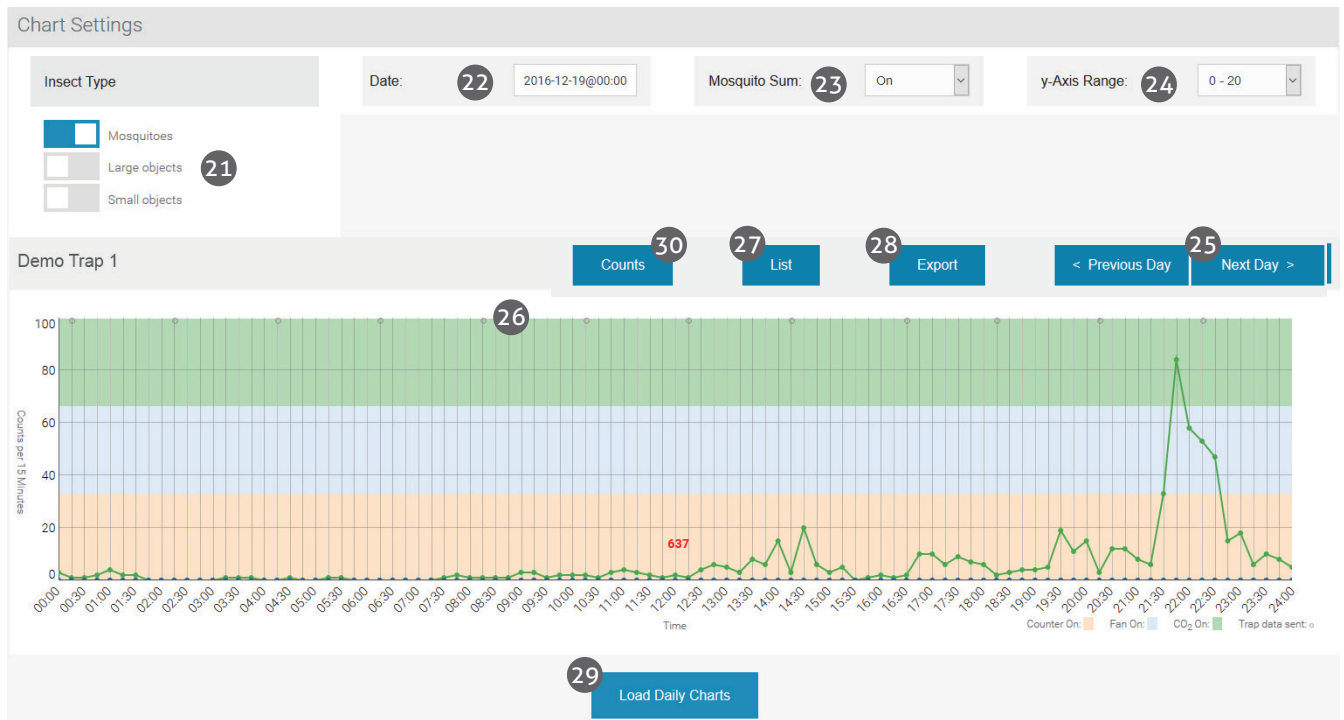
Clicking and dragging changes the status (click on the circle with a question mark for a short demo (20)).

Click on "Save" to save the new schedule, or click on your browser's back button to return to the previous page without changing the schedule.

A new schedule is downloaded to the trap, and becomes effective at the time of the next data connection (see Data Connection in the "Trap Information").

## Chart settings

Here you can view the captures of your trap.



### Accessing historical data

Data are stored and presented for 15-minute intervals. All times are local time at the last known location of the trap.

### Chart settings

In Chart Settings, you can select for display:

- Insect Types (Mosquitoes, Large Objects, Small Objects) (21): Press the „Insect Types“ button to see and select your choice of insect types that will be shown in the chart.
- Date (22)
- Mosquito Sum (sum of counts for periods during which the counter is on) (23)
- y-Axis range (24)

### Main chart

When a trap is called up, today's data are shown in the main chart. Click on "< Previous Day" or "> Next Day >" to navigate day-by-day (25).

Color bars across the chart indicate the times during which CO<sub>2</sub>, fan and counter, respectively, were turned on.

Small grey circles on top of the chart indicate the times at which data connections took place (26).

Clicking on the chart displays the counts for the nearest 15-minute interval.

### List

Click on "List" to see trap counts as well as status data displayed below the main chart (27). If the battery voltage is getting low, it can be seen here. Also, the cellular reception level is indicated; numbers of -113...-100 dB indicate a weak signal, and data transmissions may become irregular.

### Exporting data into Excel

Clicking on the Export button brings up the "Export Data" window (28). Here you can select a date range for export, whether data are exported from 0-24 hours or 12-12 hours, and the format of the export file (EXCEL or CSV, comma-separated values.)

### Daily charts

Scroll down below today's chart, and click on "Load Daily Charts" to display small charts for the last 30 days (29). This is a convenient way to spot trends.

Note: Since a large amount of data is searched, it may take up to 20 seconds or more to update the display.

### Insect counts

Clicking on the "Counts" button (30) opens the "Insect Counts" window (31) under the main chart. Here you can specify a time frame (with start and end date and time), during which the numbers of collected mosquitoes, large objects, and small objects will be listed. This selection does not affect the main chart.

Insect Counts 31		
Insect Type	Count Start	Count End
	2020-07-10@15:45	2020-07-13@16:1
Mosquitoes	1164	
Large objects	15	
Small objects	1969	




# Troubleshooting

## Dashboard Warnings

When you log in, you will be presented with a dashboard with a list showing the status of all BG-Counters in your account. Any devices with warning status are displayed on top of the list. The following warnings are indicated with a red triangle:

### Fan column:


 A triangle here means one of two conditions have been detected:

- 1.) The fan current is low, indicating the fan is not running even though it is turned on
- 2.) The fan current is high, indicating a stall (i.e. something is blocking the fan blades)

Corrective action: Check the fan for proper operation.

### Voltage Column:

The low and high supply voltage for the last 24 hours are displayed.

 A triangle here means that the lowest voltage is less than 11.5V, indicating a discharged battery or a solar system that is not charging properly. The counter will be turned off when the voltage drops to less than 11.2V in order to protect the electronics. Once turned off, the counter remains turned off until the voltage builds up again to 11.8V.

Corrective action may include one or more of the following:

- Charge the battery
- Use a battery with higher capacity
- Make sure solar panels are in full sun
- Check connections on solar controller
- Check solar controller for proper function

You can choose to be notified with an e-mail if warnings are present. In order to turn on Notifications, click on Profile, then click on Notify me about warnings and click Save.

## Trap does not start up

### Symptoms:

- No beeps after connecting power
- Fan not working
- CO<sub>2</sub> valve not clicking
- A blue glow may be visible when looking into the counter funnel

**Cause:** No power or wrong polarity

**Solution:** Check voltage, continuity, and polarity on the power connection.

### Only one or two beeps upon start-up

**Symptoms:** Counter, fan and CO<sub>2</sub> valve are off. No data transmission.

**Cause:** Battery is too low.

**Solution:** Recharge battery, or replace with full battery.

## SOS beep during start-up

**Symptom:** 3 short, 3 long, 3 short beeps

**Cause:** SD card failure

**Solution:** Contact support

## Checking cellular connectivity

If the counter is in a location with weak cellular signal, the cellular data connection to the server may be unreliable. The signal strength at the deployment site can be checked as follows:

### Connect counter to power, then listen for beeps

**1.) Immediately:** One to four beeps indicating battery voltage

4 beeps: fully charged

3 beeps: partially charged

2 or 1 beep: discharged, counter and trap will not run

**2.) After 10-90 seconds,** 1-5 long beeps indicating cellular signal strength (like the bars on a cell phone)

3-5 beeps: strong signal

2 beeps: marginal signal

1 beep: weak signal

Two short beeps: no connection

## Cellular signal too low

**Symptoms:** Two short beeps about 1-2 minutes after connecting the trap to power.

**Cause:** Weak or no cellular reception at the present location of trap.

### Solutions:

- Move trap to a location which has stronger reception
- Continue using the trap: data will be saved and uploaded upon the next time there is reception
- If the cellular signal is very small in a remote location, the **following antennas may provide improvement.** They can be ordered directly from the suppliers listed.

#### 1.) Advantech AO-AGSM-MG9S

Magnetic Mount

Includes 3.5m cable with SMA connector (directly fits BG-Counter antenna connection)

<https://www.mouser.com/ProductDetail/Advantech/AO-AGSM-MG9S?qs=sGAEpiMZZMuBTKBKvsBmlN73K%2F2BcYXlxNBf4MnSdn03UqYJSeMj4A%3D%3D>

#### 2.) Taoglas OMB.8912.03F21

Wall/Pole Mount

Female N-type connector

<https://www.mouser.com/ProductDetail/Taoglas/OMB891203F21?qs=sGAEpiMZZMuBTKBKvsBmlN73K%2F2BcYXlxNBf4MnSdn03UqYJSeMj4A%3D%3D>

Requires separate adapter cable (N-type plug to SMA male), to be ordered in the needed length, for example:

[https://www.amazon.com/Low-Loss-Extension-Connector-GEMEK-Arrester/dp/B07P12XW3J/ref=sr\\_1\\_4?keywords=n-type+to+sma+cable&qid=1562655621&s=gateway&sr=8-4](https://www.amazon.com/Low-Loss-Extension-Connector-GEMEK-Arrester/dp/B07P12XW3J/ref=sr_1_4?keywords=n-type+to+sma+cable&qid=1562655621&s=gateway&sr=8-4)

# Troubleshooting

## Cellular transmission stops

**Symptom:** Counter stops transmitting data even though cellular signal strength is good.

**Cause 1:** Extremely low battery (<11.2 V). To protect the counter from damage, the electronics, fan and CO<sub>2</sub> are shut down. In order to view the last transmitted battery voltage, go to the trap page and press the "List" button.

Note: A 12 V battery is considered 0 % charged when the voltage is below 11.8 V.

**Solution:** Replace or charge battery.

**Cause 2:** Counter needs reset

**Solution:**

- Disconnect power
- Wait 30 seconds
- Reconnect power
- Insert hand into funnel to block insect sensor
- Verify 4 beeps for power
- After 15-90 seconds, verify cellular signal strength (3-5 long beeps)
- After verifying cellular signal strength, there will be about 5 additional short beeps followed by a long beep.
- After 30 minutes, go to the web site and see if there are new transmission

## Irregular transmission times

**Symptoms:**

- Trap doesn't transmit data when scheduled
- Irregular spacing of connection circles in main chart

**Cause:** Weak cellular connection or cellular network busy.

**Solution:** See „Cellular signal too low“

## Solar battery voltage gradually drops

**Symptom:** When viewing "List" data, it is observed that the solar battery is not maintaining voltage. Eventually, counting and transmission of data stops.

**Cause:** Not enough sunlight to keep solar battery charged.

**Solutions:**

- Modify schedule to only measure during peak hours of mosquito activity
- Move solar panel to a sunnier position
- In rare cases, a larger solar panel may be needed. Contact Biogents

# Troubleshooting

## Counting errors (fan failure)

### Symptoms:

- Mosquito counts may appear low
- Small counts may appear high
- Catch bag (if used) may be empty
- When viewing "List" data, Power Draw is near 0, even when fan is supposed to be on

**Cause:** Fan has failed.

**Solution:** Check fan wiring; if necessary replace fan.

## Counting errors (overcounting)

**Symptom:** Fewer mosquitos in catch bag than counts on website.

1. **Cause:** Mosquitos might be able to escape if the catch bag is full or due to a reduced air flow. When leaving the trap, the mosquitoes sometimes cross the infrared barrier several times (32) and are therefore also counted several times (33).

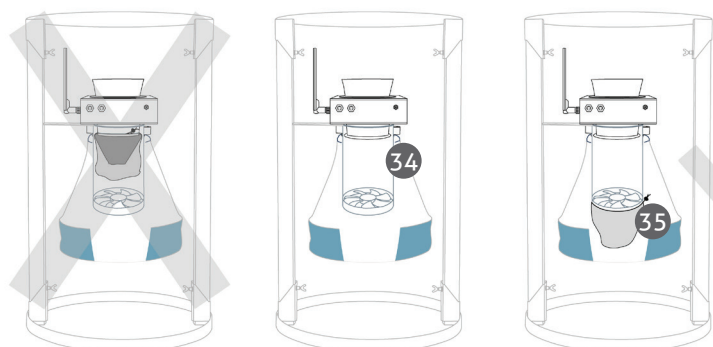
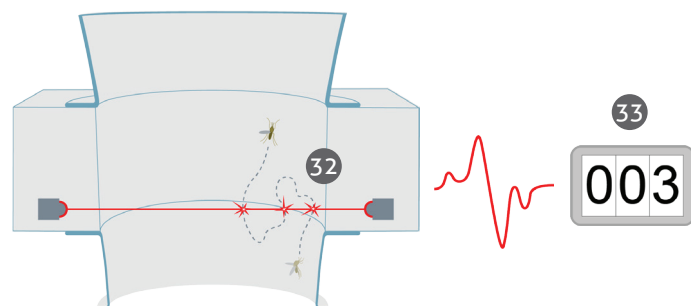
### Solution:

- A) Remove the funnel net and catch bag (34).
- B) In case you need to analyze the mosquitoes, install a catch bag below the fan (35).

2. **Cause:** Mosquitoes were "stolen" by other insects (e.g. ants)

### Solution:

Place the trap ant-protected, e.g. in a water bath or grease the basement with petroleum jelly.



## Counting errors (undercounting)

**Symptom:** More mosquitos in catch bag than counts on website.

**Cause:** Some mosquitoes were misclassified as large.

**Solution:** An 80% or higher accuracy is normal. If there are no other large objects in the catch bag, use the sum of mosquito and large object counts (activate under "Chart settings"/"Insect types" "Large objects"). Add both together, accuracy may increase.

## Technical Data for BG-Counter

Weight (Body): 730 g

Dimension (Body): 23 x 23 x 14 cm

BG-Counter including ventilator: 12V DC, 7 Watt

Switching power supply: AC Input 100 – 230V,  
Frequency 60Hz/50Hz,  
DC Output 12V 1A

## Contact

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