Vectrack™ flying insect sensor

User manual



Updates to the user manual may be found online at https://vectrack.irideon.es

These instructions are a summary of the important features, functions and safety information for the Vectrack™ flying insect sensor and contain all necessary information required for safe use of the device.

1. Safety instructions and warnings

- The instructions are aimed at persons that install, use and maintain the sensor.
- Read the manual carefully prior to installation or use.
- The sensor is not to be used in or around locations where flammable vapour or explosive dust is likely to exist.
- Do not use the sensor if the sensor or its cables are damaged.
- Do not attempt to disassemble or modify the sensor.
- Do not immerse the sensor in water or direct a hose at it. Injury due to electric shock may result.

2. Intended use

The Vectrack flying insect sensor is designed for indoor or outdoor use to record flying insects such as mosquitoes, flies, moths or phlebotomes which pass through the sensor, and to communicate the recordings to Irideon's Senscape™ server via the 2G / 4G (LTE-M) cellular network. Users with an account can access Irideon's server to obtain the results of the recordings, in accordance with the specific flying insect application.

The sensor is designed to be placed over the entrance of a compatible suction trap[1] and to be powered from the same 12 VDC 1A adaptor supplied with the trap, or from an equivalent Class II SELV power supply with a nominal 12 VDC 1A output and an IP rating which suits the operating environment (e.g. IP67 for an outdoor environment). The suction fan in the trap creates a downward flow of air through the sensor. Insects which fly close to the inlet funnel of the sensor may then be sucked into the inlet funnel and down through the sensor and into the catch bag in the trap.

[1] For example: a BG-Mosquitaire or BG-Sentinel trap from Biogents AG, Regensburg, Germany

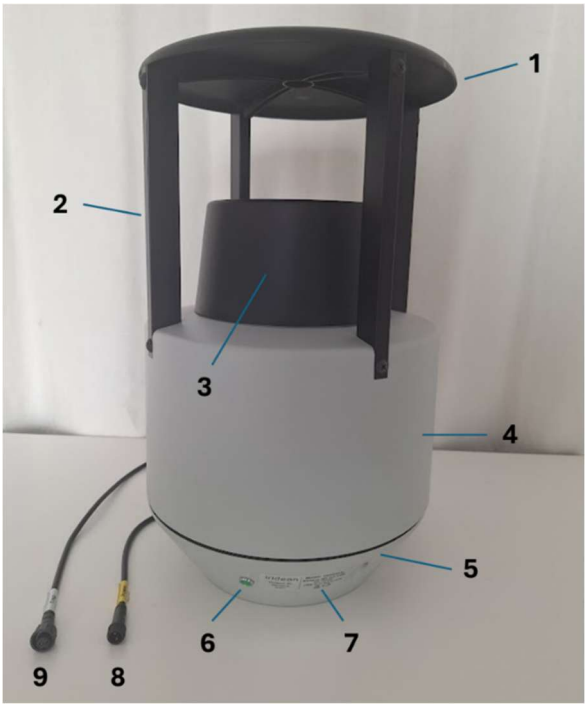
Please refer to the Instruction manual provided with the compatible trap for the safe and proper use of the trap and the AC/DC adaptor.

Please refer to the technical specifications for the limitations on the operating conditions.

2.1 Technical specifications

Enclosure	
Weight	1.86 kg
Dimensions (W x D x H)	190 x 210 x 380 mm
Degree of protection	IP55 according to IEC 60529
Impact rating code	IK08 according to IEC 62262
Electrical characteristics	
Rated voltage	12 VDC
Rated current	0.6 A
Rated power	7.3 W
Trap cable output for suction trap	12 VDC 0.3 A max
Climatic conditions during operation	
Permissible ambient temperature	5°C to 50°C
Maximum operating altitude	2000 m above sea level
Pollution degree	4 (electrical equipment for outdoor use)
Relative humidity	< 90% RH

3. Overview of the sensor



1. Hat
2. Hat leg
3. Inlet piece
4. Cover
5. Base
6. Status LED (green)
7. Marking plate
8. Power cable and connector
9. Trap cable and connector

Figure 1 – Vectrack flying insect sensor

3.1 Electrical connections

Two electrical cables extend from sensor. The short (0.2 m) cable is labelled **Powe**r and has a 2-pin male connector, shown in *Figure 2*. The long (0.5 m) cable is labelled **Trap** and has a 2-pin socket connector, shown in *Figure 3*.

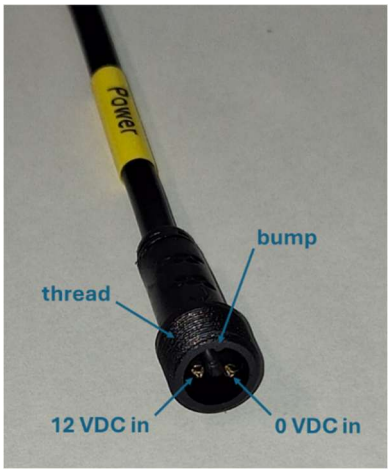


Figure 2. Sensor power cable, for connection to a compatible 12 VDC supply

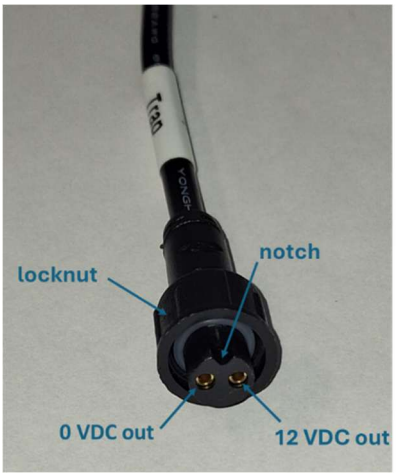


Figure 3. Trap cable, for connection to a compatible 12 VDC suction trap

4. Installation

4.1 Sensor placement



- To be effective, the sensor should be placed near likely mosquito resting sites, i.e. in a shady, cool, humid spot, protected from the wind, e.g. near leafy trees, bushes, hedges, etc.
- To allow the sensor to communicate with the server, a fair to strong 2G / 4G (LTE-M) cellular network signal must be available at the sensor site. The operator's mobile phone may be used to indicate signal strength at the site, and a strength of at least two bars is recommended.



- The sensor should not be placed within 20 meters of a mosquito breeding site, e.g. near standing or slow-moving water, to avoid over-sampling of male mosquitoes, and young adult mosquitoes whose wingbeat frequency has not yet stabilised.
- The sensor should not be used in very dusty surroundings, which would increase the need for more frequent cleaning (see Section 5.)
- The sensor must not be immersed in water or subjected to jets of water.

4.2 Installation steps

With reference to *Figure 4*:

1. Fit the funnel net[2] and the catch bag.
2. If after fitting, the funnel net and/or catch bag are scrunched up, the user must fully extend them[3], e.g. by opening the flap and blowing sharply down into the flap valve.
3. When inserting the *Figure 4* assembly into the trap, ensure that the draw string and toggle are tucked into the trap (i.e. that they do not protrude)[4].
4. Change the catch bag before it becomes more than one-third full of insects.
5. Periodically rinse clean the catch bag and funnel net (see Section 5).

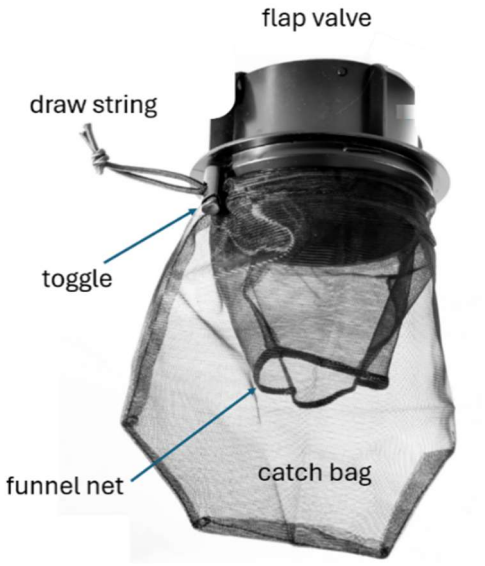


Figure 4 – Flap valve, funnel net and catch bag.

For long-term surveillance campaigns which do not require catch bag collection, it is recommended to fit only the funnel net, and not the catch bag. Insects will then be trapped inside the body of the trap, which may be emptied[5] out every few months, e.g. when the lure/attractant is replaced.

[2] The funnel net reduces the opportunity for insects to crawl out of the catch bag and up through the sensor which would result in a sensor "overcount" compared to the catch bag. Insects are recorded when flying down through the sensor but not when they crawl out of it, due to the lack of normal wingbeat activity when crawling.

[3] A scrunched-up funnel net or catch bag may enable insects to crawl out of the bag or prevent the flap valve from operating correctly, either of which will reduce sensor accuracy.

[4] Steps 3 to 5 prevent reduced air flow through the sensor, which would reduce its accuracy.

[5] Refer to the instructions for the trap on how to open it for cleaning.

6. The sensor should be lowered over the flap valve of the trap, such that the flap valve enters the circular opening in the base of the sensor, as shown in *Figure 5*. The base of the sensor then rests on the flange of the flap valve.

   When using the sensor with a BG-Sentinel trap, *do not* install the BG-Lure cartridge in the hole in the cover of the trap as shown in *Figure 6*, because the top of the lure will cause the sensor to sit on an angle, which will reduce the air flow through the sensor, and its accuracy. Instead place the BG lure inside the body of the trap.

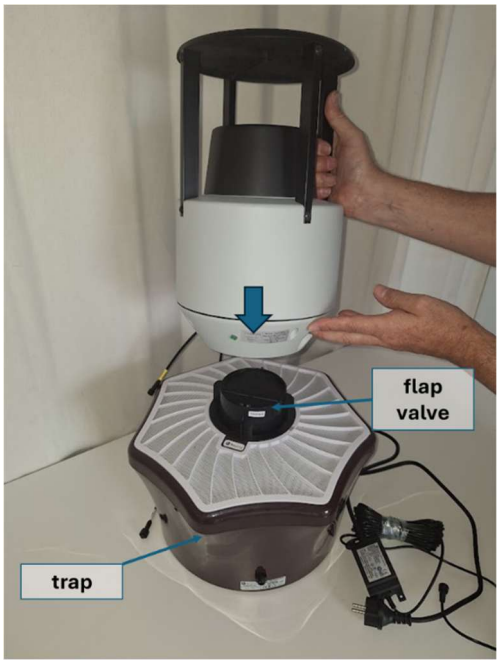


Figure 5 – Placement of the Vectrack sensor on a trap (BG-Mosquitaire)

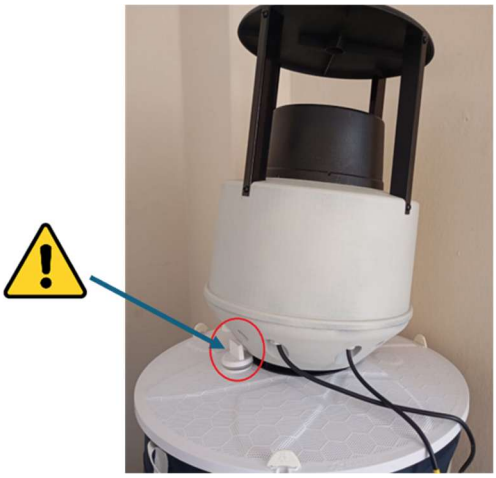


Figure 6 – Special consideration for use with a BG-Sentinel trap

7. The trap cable is connected to the trap as shown in *Figure 7*. Ensure by sight or by feel that the bump and notch on the connectors are aligned before pushing them together. The locknut on the cable connector should then be tightened by hand.

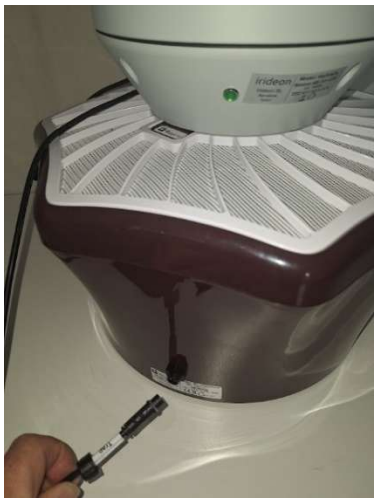


Figure 7 – Connecting the sensor trap cable to the trap



Figure 8 – Sensor trap cable fitted, with the locknut tightened

8. The power cable from the sensor is connected to the 12 VDC outdoor power supply supplied with the trap as shown in *Figure 9*. Ensure by sight or by feel that the notch and bump on the connectors are aligned before pushing them together. The lock nut on the 12 VDC connector should then be tightened by hand. The 12 VDC power supply must be plugged into a water-safe 100 – 240 VAC power outlet.



Figure 9 – Connecting the sensor power cable to the 12 VDC supply



Figure 10 – Sensor power cable connected to the 12 VDC supply, with the locknut tightened

Figure 11 shows the sensor mounted on a trap with the sensor's power cable connected to a 12 VDC power supply and the sensor's trap cable connected to the trap, to power the suction fan in the trap.

To inspect or replace the catch bag in the trap, the sensor should be lifted off the trap and placed on the ground (it is not necessary to disconnect the Power or Fan cables). When doing this, and with the fan running as normal, the operator should confirm that the flap is in the open position[6].



Figure 11 – Vectrack sensor mounted on a trap, with the Power and Trap cables connected

[6] If the flap it is closed or only partially open, then sensor accuracy will be affected due to reduced air flow. In that case the flap valve should be inspected and cleaned, or replaced.

4.3 Confirmation of correct operation

After connecting 12 VDC power to the senor, the sensor will progress through a series of operating modes (1 to 4), each indicated by the green status LED, as shown in Table 1.

Mode	Duration	Status LED	Fan	Notes
1	~10 s	Fully ON	OFF	The LED will turn on ~3 s after power is applied.
2	~30 s	Fully ON	ON[7]	The sensor will try to register with the available 2G/4G(LTE-M) cellular network, and if it can't, it will return to Mode 1.
3	~1 min typ.[8]	"Fast-flash"[9]	ON	The sensor will try to connect to the server via the available 2G/4G(LTE-M) cellular network, and if it can't, it will return to Mode 1.
4	Ongoing	"Slow-flash"[10]	ON	The sensor and trap are now ready to detect insect events. The LED will fast flash: ○ every 30 mins, when the sensor sends recordings to the server, ○ when the sensor receives a firmware update from the server. If an error occurs, the sensor will return to Mode 1.

Table 1 – Sensor operating modes and status LED indication

After installation, the installer should listen for the fan noise, to ensure that the trap cable has been connected, and to observe the status LED to ensure that the sensor reaches Mode 4, before leaving the site. On subsequent visits to the site, the user should check that the fan is operating and that the sensor is in the slow-flash state (Mode 4).

[7] In a quiet environment, one should hear the fan noise, when it is powered by the sensor. The operation of the fan can be checked by lifting the sensor off the trap. If the fan is running, the flap valve should be open.

[8] Step 3 can last up to 5 minutes if the sensor performs a firmware update after power-up

[9] "Fast-flash" refers to a flash rate of one flash every second

[10] "Slow-flash" refers to a flash rate of one flash every 6 seconds

5. Cleaning and maintenance

Due to the flow of air through the sensor, dust and pollen may accumulate on the surface of the flight tube in the sensor, which will reduce its sensitivity. Therefore, the flight tube should be cleaned every three months, and more often in dusty environments.

To clean: disconnect the power from the sensor, upturn it, and rest it on the sun hat as shown in *Figure 12*. In good light, or using a torch, observe each face of the flight tube while squirting jets of a compatible cleaning fluid[11] onto each face to remove the dust.



Figure 12 – Spray the solution onto the walls of the flight tube

Tilt and hold the sensor as shown in *Figure 13* to drain the excess cleaning fluid from the sun hat, and with a clean dry cloth, pat dry the inside of the hat and the inlet piece. Re-fit the sensor to the trap and apply power. The fan will dry the flight tube and avoid blemishes on it due to slow drying soap bubbles.



Figure 13 – Drain excess solution from the inside of the sun hat

The funnel net and catch bag should be cleaned at least every 3 months by rinsing them with warm water to remove dust and debris which can reduce air flow and sensor accuracy.

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[11] Any of the following liquid solutions are recommended, in a spray bottle with an adjustable spray nozzle (adjusted as a jet to remove stubborn dirt):

- A soapy solution made by adding a teaspoon of washing-up liquid (Fairy, etc.) per 1 litre of clean water.
- A stated acrylic/plexiglass window cleaning solution such as: Ambiti Acrylic cleaner; Nigrin caravan acrylic windscreen cleaner; S-Polybond acrylic and plexiglass cleaner, etc. following the manufacturer's instructions in each case.

DO NOT USE domestic glass or multi-purpose cleaning solutions containing, alcohol, ammonia, ketones, aromatics, esters, halogens, or solvents (acetone, benzene, gasoline, carbon tetrachloride, thinners, etc) or kitchen scouring compounds, which could cause crazing or clouding of the acrylic flight tube.

6. Troubleshooting guide

Problem	Probable causes	Solution
Status LED permanently OFF	12 V power supply not plugged into the power outlet. Sensor power cable not connected to the 12 V power supply. Possible failure of the 12 V power supply.	Check that the 12 V power supply is connected to the Power cable of the sensor, and that the 12 V power supply is plugged into the power outlet. One can test the power supply by connecting the 12 V supply cable directly to the trap. If the power supply is working, then the fan should turn on, and the flap valve should open.
Status LED on or flashing, but noise from the fan in the trap cannot be heard.	Sensor Trap cable not connected to the trap. Possible failure of the fan in the trap.	Check that the Sensor Trap cable is plugged into the trap. The fan can be tested by connecting a working 12 V power supply directly to the trap. If the fan is working, then it should turn on, and the flap valve should open.
Status LED fully on most of the time	Weak or non-existent cellular network signal.	Check the cellular signal strength using the display on a mobile phone, 2 or more bars are recommended. Locate the sensor at a location with a stronger signal.

There are no user serviceable parts in the sensor. If a problem persists, please contact Irideon for advice.

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