

**BREEZE TECHNOLOGIES**

**WILDFIRE DETECTION SYSTEM**

Supported by DHS Science & Technology Directorate

## **INSTALLATION GUIDE**

Air quality sensor-based  
realtime wildfire monitoring system



**BREEZE**  
TECHNOLOGIES

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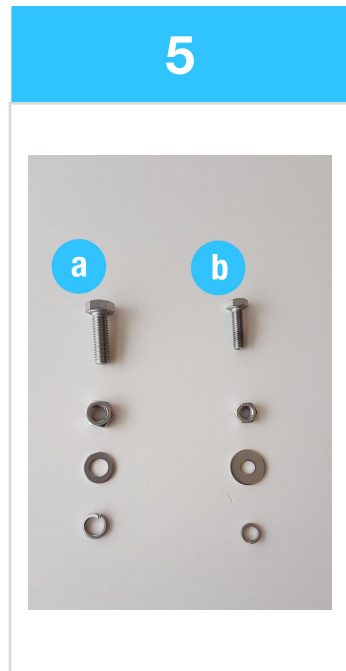
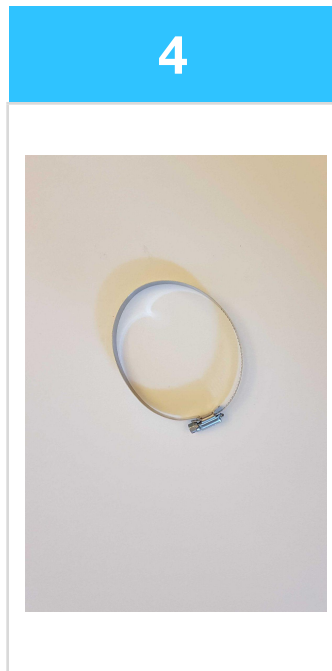
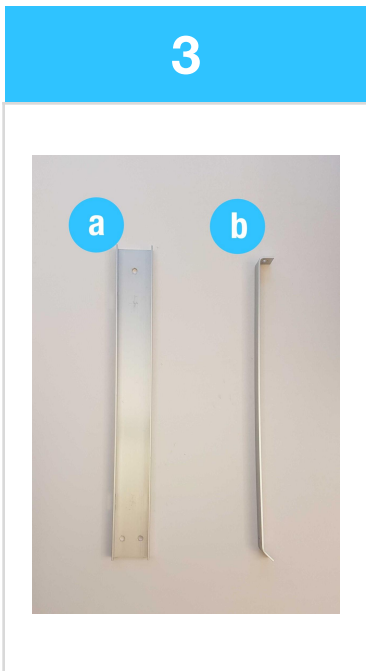
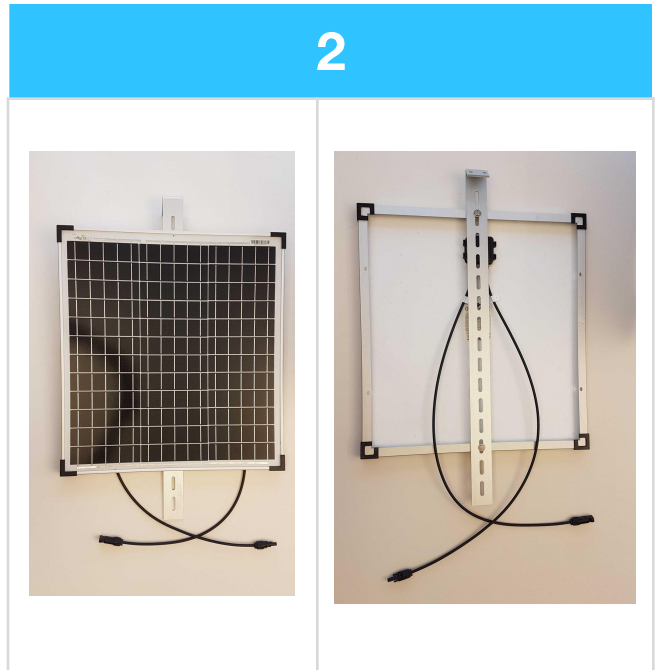
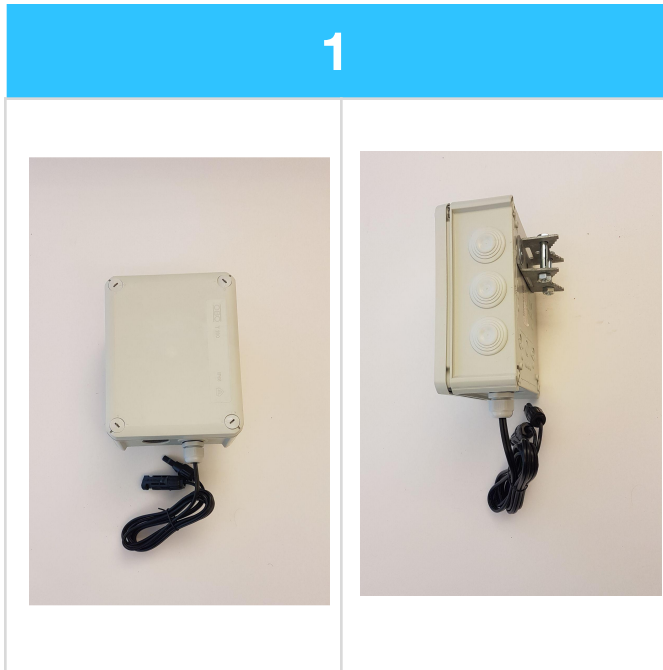
# BREEZE TECHNOLOGIES WILDFIRE DETECTION SYSTEM OVERVIEW

The Hamburg-based startup Breeze Technologies was founded in 2015 and supports cities and companies in making their environment more livable. To this end, we developed technologies that supplement professional air quality monitoring stations. Based on this, we have been working on a sensor-based early warning system for real-time wildfire recognition and localisation throughout an intelligent AI-based detection algorithm that is able to distinguish wildfires from other sources like e.g., traffic or industry. We successfully tested this system in the field and laboratory as part of a project with the U.S. Department of Homeland Security (DHS) and its Science and Technology Directorate (S&T) and the Smart Cities Internet of Things Innovation (SCITI) Labs since 2019.

## What Comes in Every Box

Each package includes the following components

1. Breeze Wildfire Detection Sensor with dangling MC4 wire
2. Solar panel with mounting plate and MC4 connector
3. Solar panel bracket
4. Hose clamps (3)
5. Screws, nuts and nut washer (4 each)



## Tools required

For the installation you also need the following tools (not included in the package):

- Wrench M8
- Wrench M6
- Cross screwdriver
- Flat-blade screwdriver
- Pliers

# SITE SELECTION GUIDELINES

The Breeze sensor is trained to differentiate between other emission events than wildfires. For this reason, it can be installed both in the forest and near other sources of pollution such as roads or settlements.

However, there may be rare and unusual exceptions, situations that the model is not aware of, that could cause it to misclassify as a wildfire. Campfires are one example. Especially if they were started with material from the forest. Or also burning of green cuttings and garden waste. But also rare events like volcanic eruptions are unknown to the model so far. These factors should be considered when choosing a location.

It is envisaged that the sensor and the solar panel are mounted on a pole, a rod. For this purpose, appropriate equipment is included.

## Site considerations and preparations

- **Accessible location**  
The sensor should be accessible both for initial installation but also for possible maintenance work.
- **Good cellular signal**  
The sensor transmits the data via LTE-M network. Network coverage should be checked before selecting a location.
- **Installed in direct sunlight so that it can operate continuously**  
Point the solar panel south (in northern hemisphere). Make sure that the solar panel is not shaded by vegetation or other structures.
- **Hight (vandalism)**  
The whole system (i.e. sensor and solar panel) should be placed at least 10 feet above the ground to prevent vandalism and theft by direct access.

# INSTALLATION INSTRUCTIONS – BREEZE TECHNOLOGIES WILDFIRE SENSOR

It is intended that the sensor and the solar panel are mounted on a pole, rod or post, as this is the simplest form of installation. For this purpose, the needed equipment is included.

## Step by step installation solar panel

1. Take the solar panel with mounting plate, solar panel bracket (a) and 2 of the screws, nuts and nut washer (a).
2. Connect the solar panel bracket (a) to the mounting plate on the solar panel using 2 of the screws, nuts and nut washer (a) provided.



3. Take the solar panel bracket (b) and 2 of the screws, nuts and nut washer (a).
4. Connect the right-angled end of the solar panel bracket (b) to the solar panel bracket (a) using 1 of the screws, nuts and nut washer (a) provided.



5. Connect the other curved end of the solar panel bracket (b) to the mounting plate on the solar panel using 1 of the screws, nuts and nut washer (a) provided.

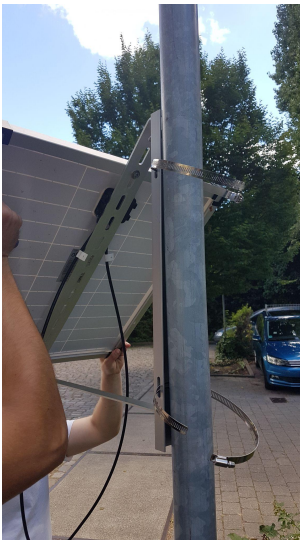




Loop the open end of the hose clamps horizontally through the 2 holes on the solar panel bracket (a) mounting plate.



6. Position the mounting plate against the pole, rod or post.



Wrap the clamps around the pole and secure the mounting plate to it by tightening the clamps with a screwdriver.



## Sensor installation

1. Take the Breeze Wildfire Detection Sensor, position the mounting plate against the pole, rod or post and wrap the clamps around the pole and secure the mounting plate to it by tightening the clamps with a screwdriver.

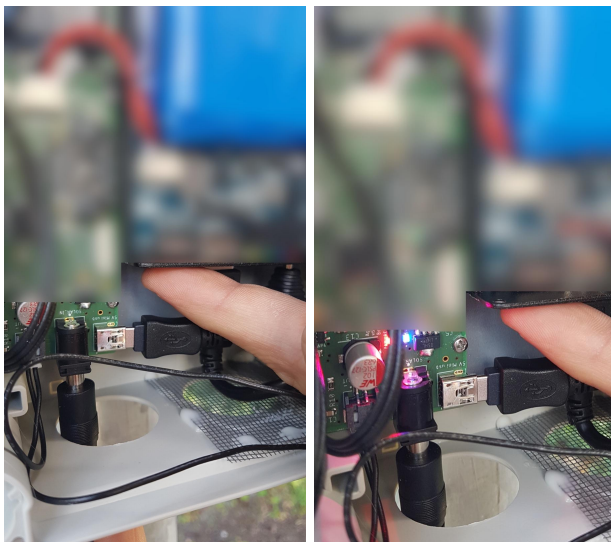


## Powering on / initialization sequence

1. Open the lid of the device by unscrewing the four screws located at the corners of the box.

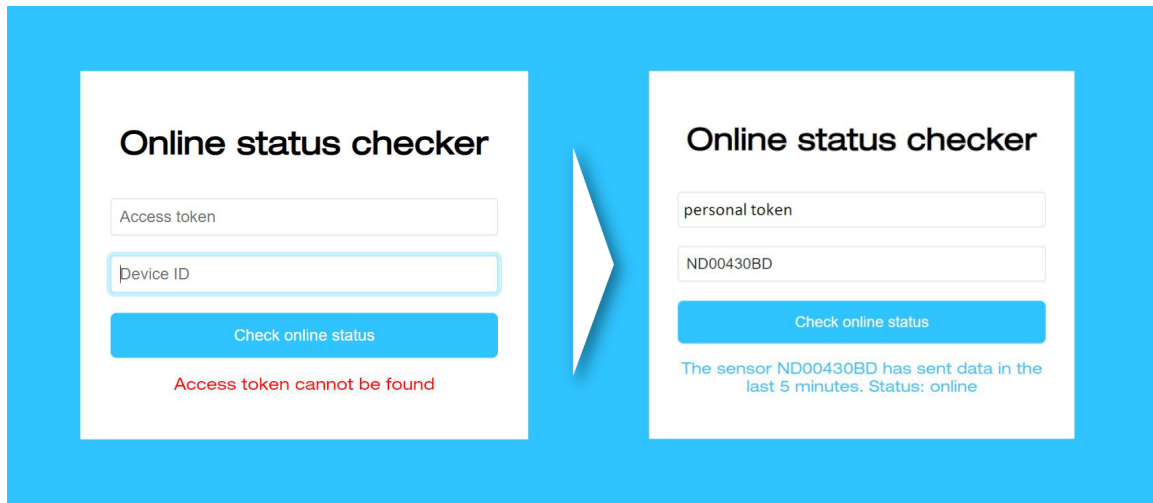


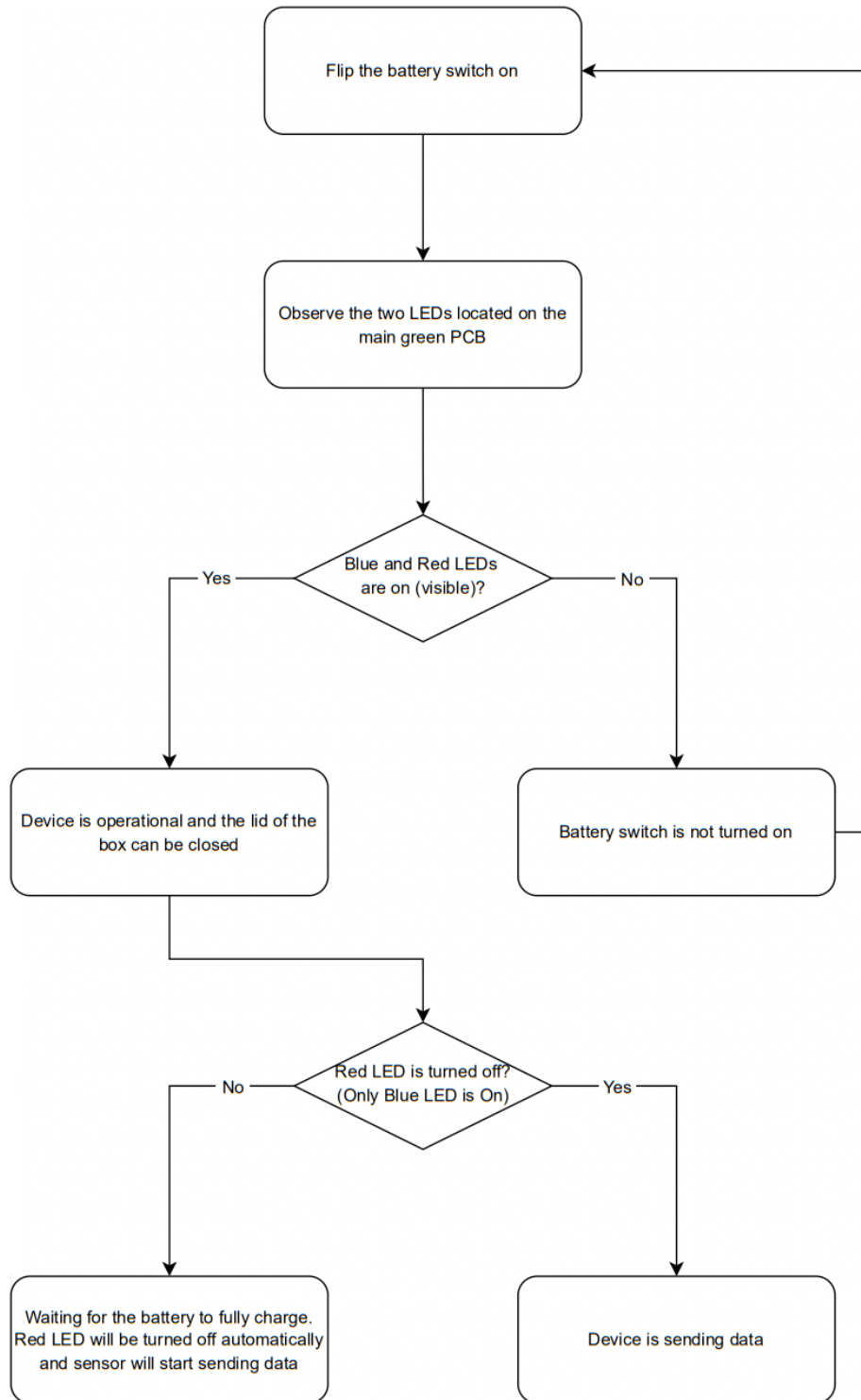
2. Flip the battery switch (switch ON). After that, blue and red LEDs will be noticed on the left side of the device (PCB). In case the switch is turned on but no visible LED is noticed, press on the boot button once and the LED should then be visible.



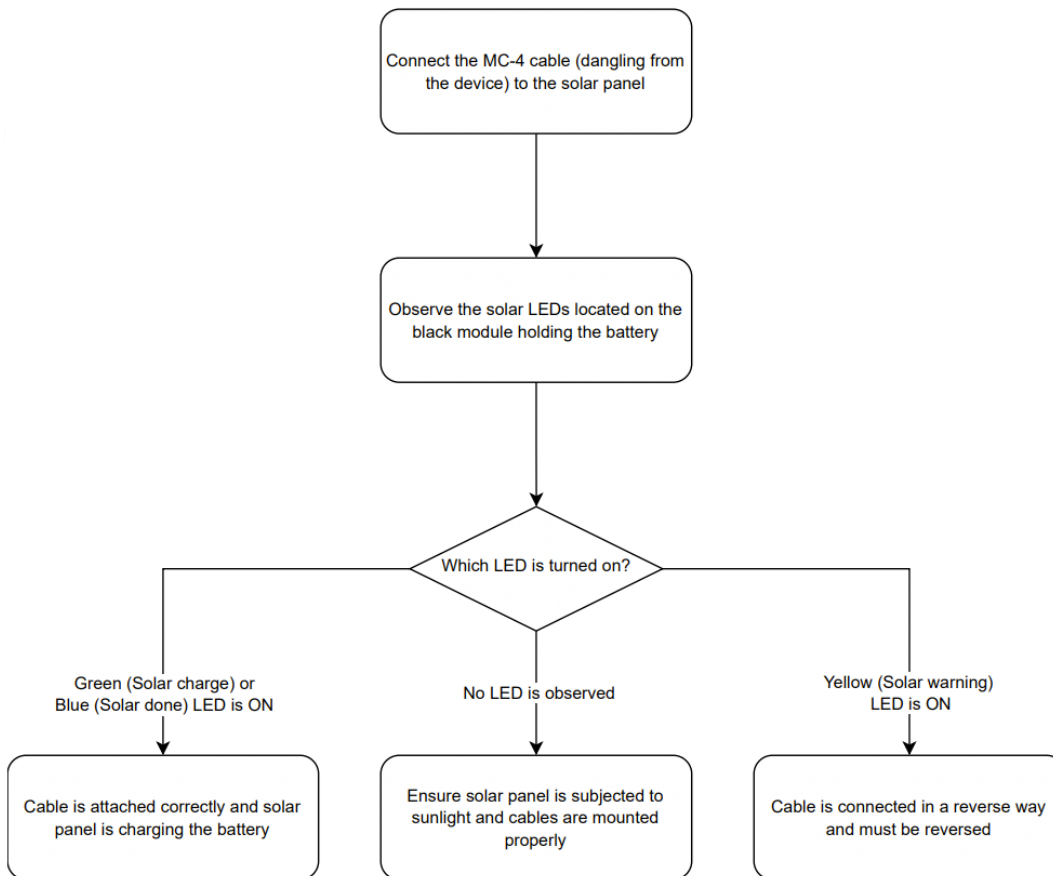
3. With the Breeze Online Status Checker you are able to check if the sensor is online. For this, our customers receive a personal token after signing the contract. Together with the sensor ID, the token can be used to easily check whether the sensor is online after installation. Find the Breeze Online Status Checker here:

<https://onlinestatus.breeze-technologies.de>





4. Connect the MC4 solar panel connector to the dangling wire of the Breeze Wildfire Detection Sensor.



5. Close the lid of the device and screw the four locks on the corner of the box while applying pressure on the lid to ensure a secure tight sealing of the lid.



6. Bundle and zip-tie the excess sensor cable to the pole.



## Congratulations!

Your Breeze Wildfire Detection Sensor is now installed and ready for use. Please inform your contact at Breeze technologies that the sensor has been installed and initialised. In the first 2 weeks the sensor will not report any detections. During this time, the sensor will collect data about its environment and adapt to the new conditions. After about 2 weeks the detection and localization of wildfires can be started.





# TROUBLESHOOTING

## **Battery fully drained**

In the event of a fully drained battery, the sensor automatically shuts down to prevent potential damage to its components. Nonetheless, the sensor continues to replenish its battery's charge while the solar panel is exposed to sunlight. To reset the device from its emergency power mode and restore functionality to the device, it is necessary to manually power off the sensor by toggling its power switch, and subsequently power it back on. If the battery was sufficiently charged, the sensor will resume normal operations. However, if the sensor does not power on again, please allow for additional time for the battery to sufficiently charge.

# ADDITIONAL INFORMATION

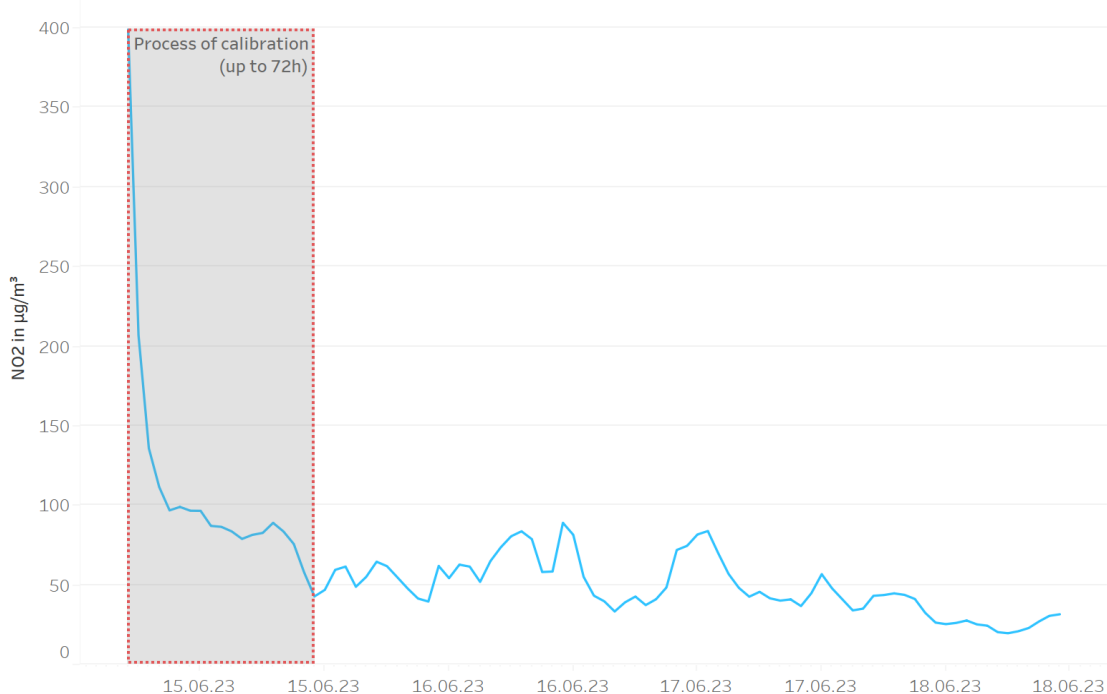
## Sensor Calibration Process

When the sensor has been turned off for a longer period of time, it requires some time to re-calibrate itself before the collected data is usable again: The individual sensing units must return to their required operating temperature and undergo a stabilization process.

This process can take up to 72 hours. During this time, the sensor does not provide accurate readings. The figure below illustrates how you can spot this recalibration period with the measurement parameter NO<sub>2</sub>.

For this reason, data from the first 72 hours after turning the sensor on again should be treated with caution and are not suitable for analytical purposes.

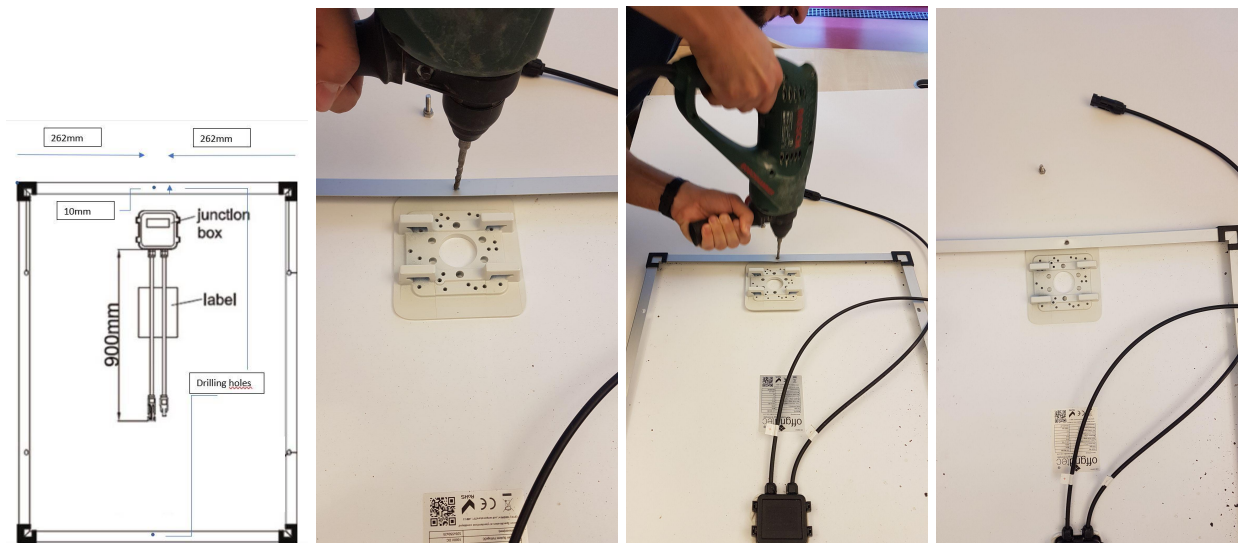
Illustration of the internal calibration process of the sensor exemplified by NO<sub>2</sub>



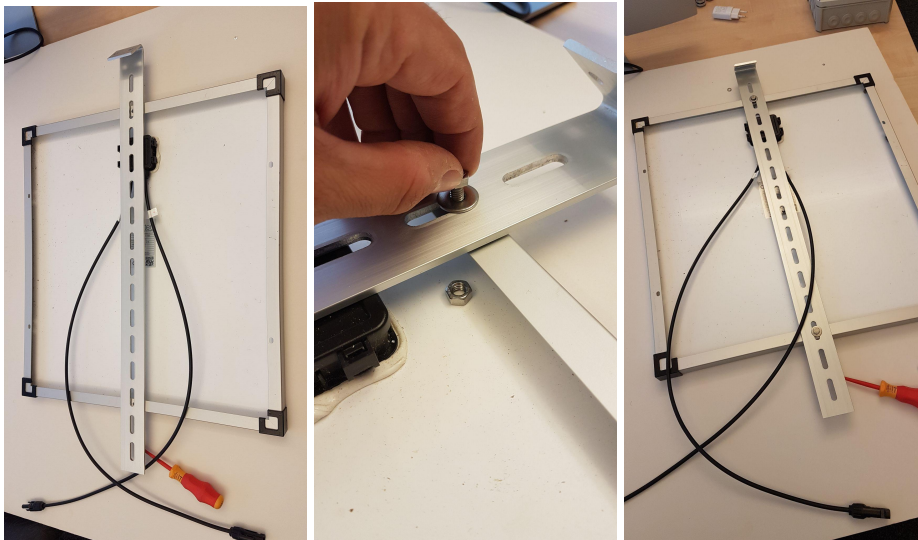
## OPTIONAL: Solar panel modifications for quick start projects

Usually you will receive the solar panel already with the attached mounting plate from us. In rare cases it can happen that projects must start very quickly. In this case, it may happen that we order the solar panel and the mounting bracket directly to you. Then the following steps need to be done to attach the base mounting plate to the solar panel:

1. Take the solar panel, a drilling machine with a 6 drill bit and the 2 screws, nuts and nut washer (b). Turn the solar panel over. Drill the holes in the appropriate place (see dimension). ATTENTION: Put something between frame and panel to protect the panel.



2. Drill the 2 holes. Fix the base mounting plate (curved end on top) with the enclosed screws, nuts and nut washer (b).



## CONTACT INFORMATION

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