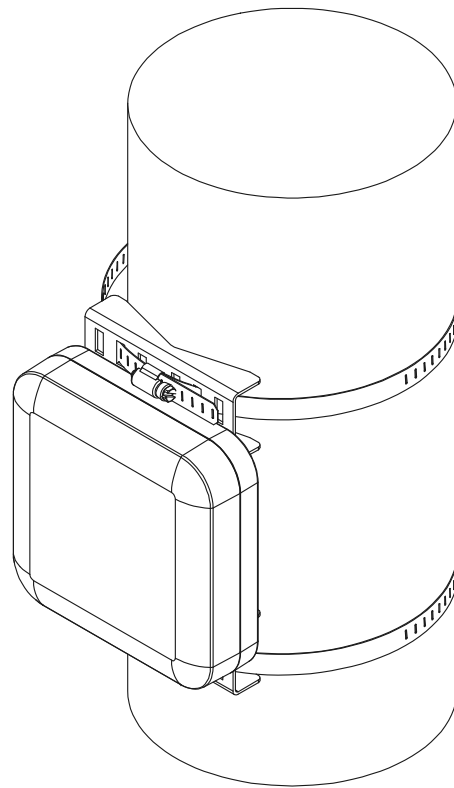




OWNER'S GUIDE

Noise and dust sensor

Mounting · first connection · reading your data ·
troubleshooting · API

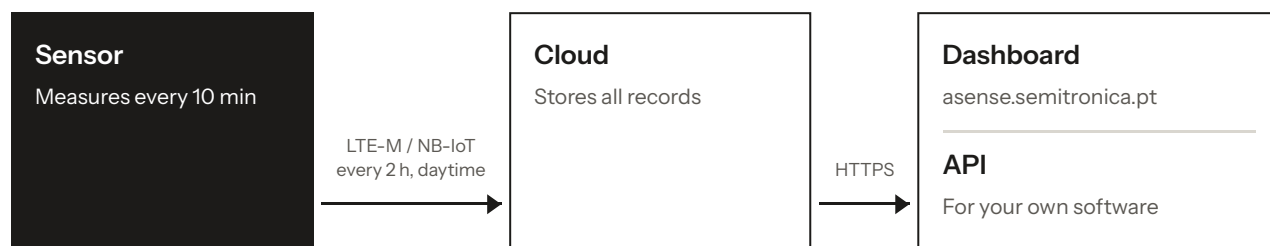
SERIAL NUMBER ASENSE21S _____

Contents

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2	Power and data	6
3	First connection	7
4	Cloud dashboard	9
5	Troubleshooting	14
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About the sensor

Continuous **noise** and **dust** measurement at urban works sites. Off-grid, pole-mounted, moved from site to site.



On site Phone or laptop ↔ sensor over Bluetooth, at central.semitronica.pt: checks it works.

What it measures

Noise	Sound level: average and peak of a 10 s capture. dB(A): A-weighted, like human hearing. dB(Z): unweighted.
Dust	PM1, PM2.5, PM10, in $\mu\text{g}/\text{m}^3$ and particles/ cm^3
Position	GPS

Why it is built this way

Solar panel + battery	No mains connection needed on site.
Sends in daylight only	Radio use matches the solar energy. Night records are kept and sent at 08:00.
LTE-M / NB-IoT	Low-power mobile network. No Wi-Fi or site network needed.
Fanless optical dust sensor	Laser measurement in open air: the Doppler shift of scattered light gives each particle's speed. No fan, no air channel, no filter.
Membrane over the microphone	ePTFE lets sound through and keeps water and dust out.
Obstruction detection	Records with a blocked optical window are flagged, not reported as clean air.
Bluetooth only while charging	Bluetooth uses energy only when energy is coming in.

1

Mounting on a pole

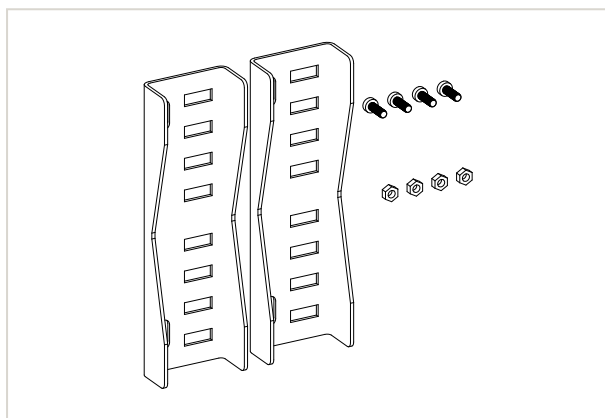
Round pole · 2 brackets · 2 clamps. Solar panel toward the sun.

YOU NEED

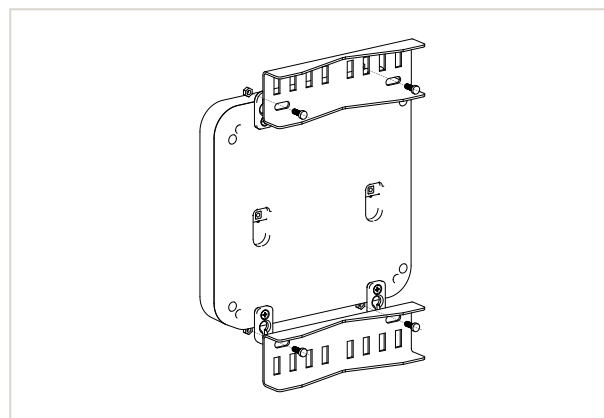
- Screwdriver, for the bracket screws
- 7 mm spanner, for the hex nuts
- 8 mm nut driver or socket, for the clamps

POLE DIAMETER

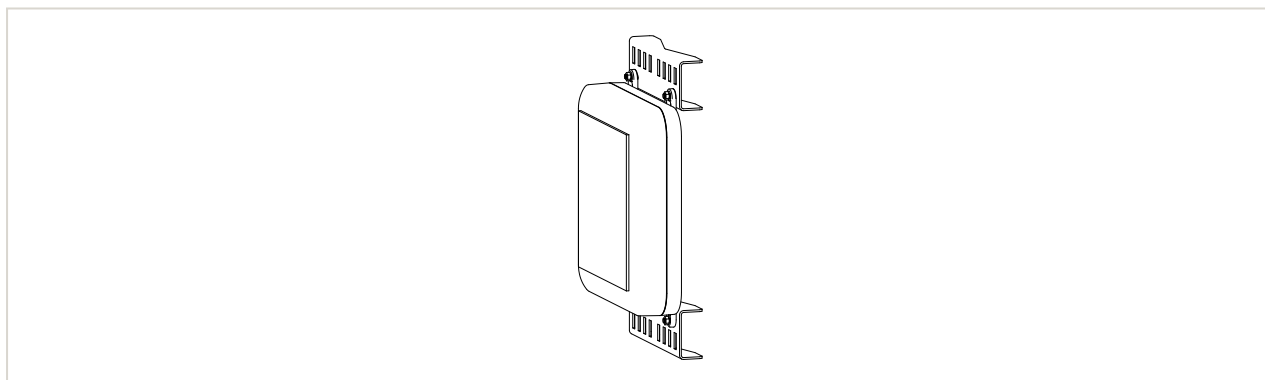
- 3.8 to 17.8 cm (1.5 to 7 in, supplied clamps)



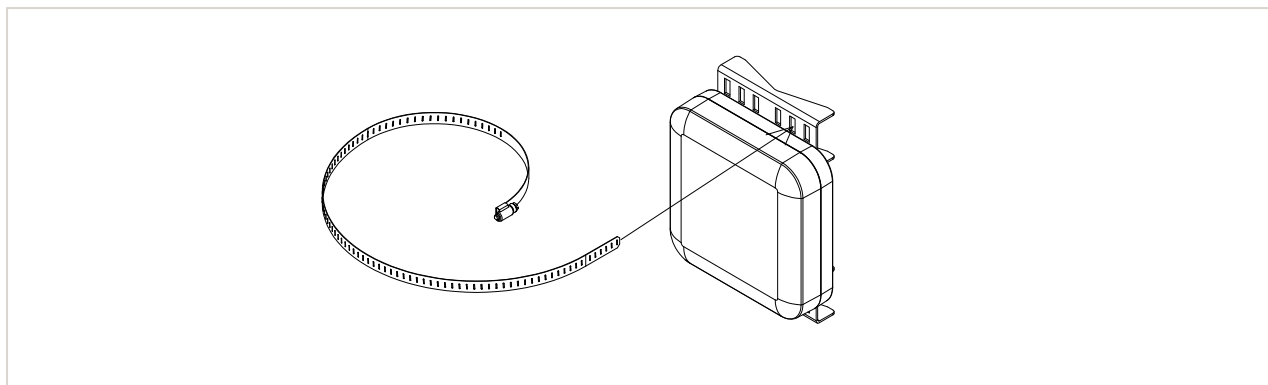
1 Check the kit: two brackets, four screws and four hex nuts.



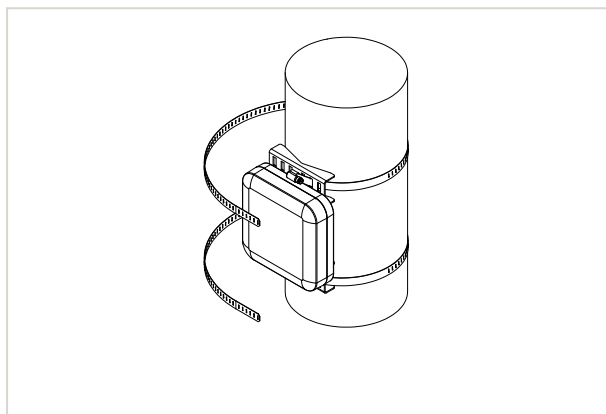
2 Place one bracket across the two top feet and one across the two bottom feet, open side away from the sensor.



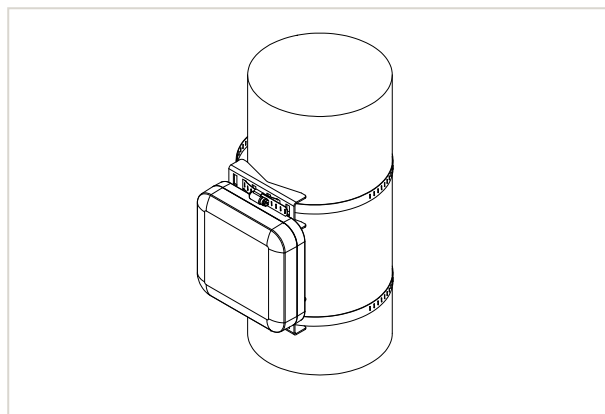
3 Push each screw through the bracket slot and the foot, then fit a hex nut on the front of the foot. Tighten the four nuts. Do not overtighten: the feet are plastic.



- 4 Thread a clamp through a slot in each bracket. Pick the slot that lines up with the pole.



- 5 Wrap both clamps around the pole and thread each one back through its bracket.



- 6 Turn the solar panel toward the sun. Hold the sensor against the pole and tighten both clamps with the 8 mm nut driver.

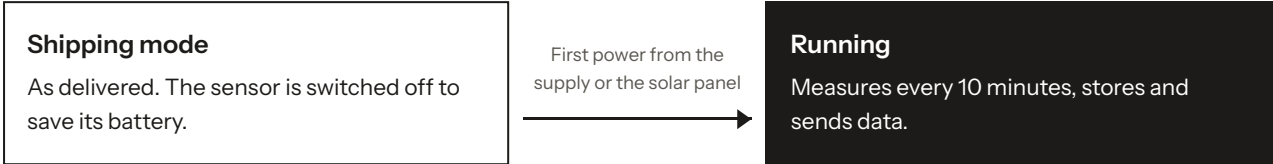
FACING THE SUN

Europe: face south. No shade from buildings, trees or signs.

2

Power and data

Shipping mode



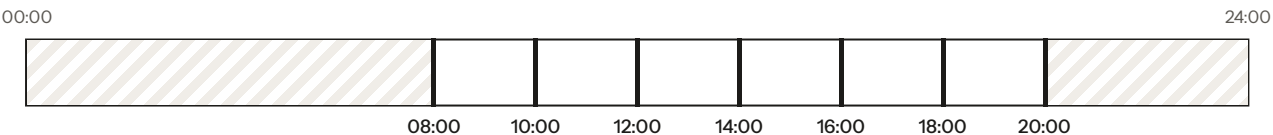
Leaves shipping mode at first power: supplied power supply, or solar panel in daylight.

Power supply

Supplied power supply	12 V DC output, 230 V AC mains input
Sensor input voltage	5 to 15 V DC
Normal operation	Solar panel and internal battery

When it sends data

Measures	1 record every 10 min, day and night, stored in memory
Sends	Every 2 h, 08:00 – 20:00 local time, all stored records
Network	LTE-M or NB-IoT
Night records	Sent at 08:00



Sending times, local time. Daylight only, to match the solar panel's energy.

Bluetooth

On	Only while charging: power supply or solar panel
At night	Plug in the power supply to connect

3

First connection

Use **central.semitronica.pt** on site, next to the sensor, to check it works.

1. **Phone or laptop** with Bluetooth and a supported browser (table below). An Android phone with Chrome is easiest on site.
2. **Sensor charging.** Bluetooth is on only while it charges: plug in the power supply, or check the solar panel is in daylight.
3. **Stand next to the sensor.** Bluetooth reaches a few metres.

	Windows	macOS	Linux	Android	iOS
Chromium browsers (Chrome, Edge)	✓	✓	✓ flag	✓	✗
Firefox, Safari	✗	✗	✗	✗	✗
Browsers with Web Bluetooth	-	-	-	-	✓

LINUX: TURN ON ONE FLAG

In Chrome, open `chrome://flags/#enable-experimental-web-platform-features`, set it to **Enabled** and restart Chrome. Without it, web pages cannot use Bluetooth on Linux.

PIN

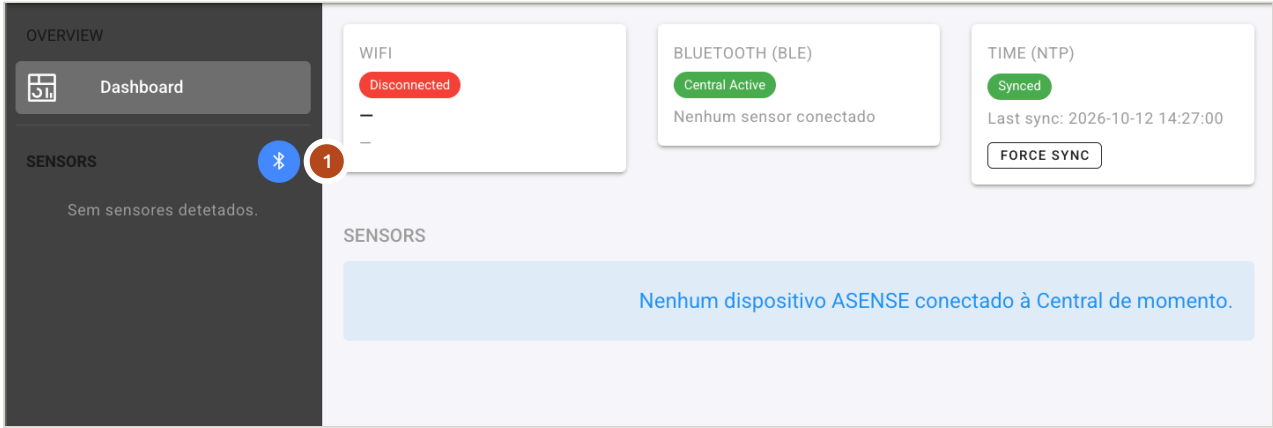
555555

Asked on **every** connection. This is normal, not a fault.

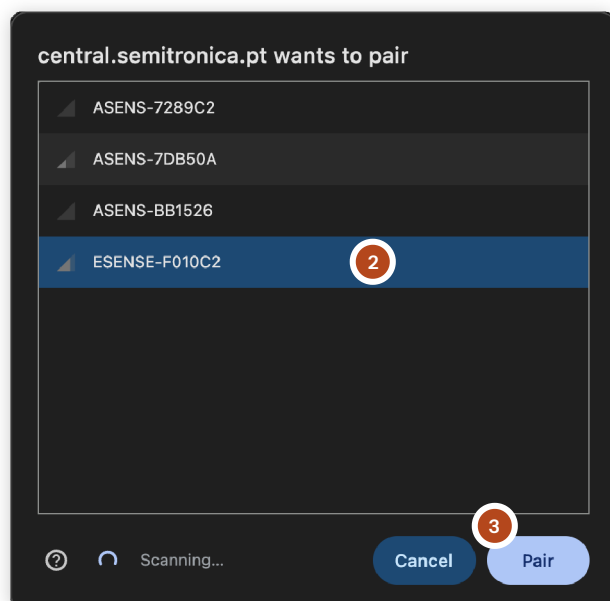
PAIRING TIME

a few min

On some phones and computers pairing takes a few minutes. Wait before retrying.



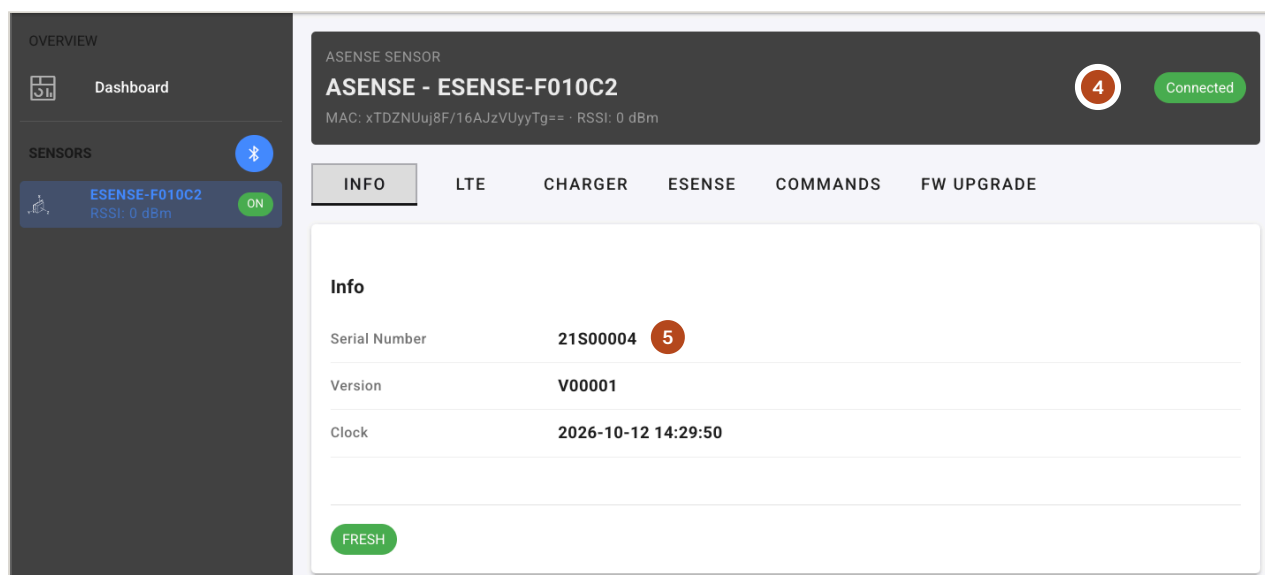
- 1
- Open **central.semitronica.pt**. Click the Bluetooth icon next to *SENSORS*.



2 Select **ESENSE-...** in the list.

3 Click **Pair**, then enter PIN **555555**.

No ESENSE in the list? Check the sensor is charging and you are next to it, then wait: on some devices this takes a few minutes.



4 **Connected** shown: the sensor works.

5 *Serial Number* matches the label (ASENSE**21S00004**).

YOUR DATA

Central is for checking the sensor on site. To read your measurements, use the cloud dashboard (chapter 4).

4

Cloud dashboard

ADDRESS asense.semitronica.pt/dashboard Any current browser, any device.	YOUR API KEY Also used for the API (chapter 6).
---	--



Welcome back

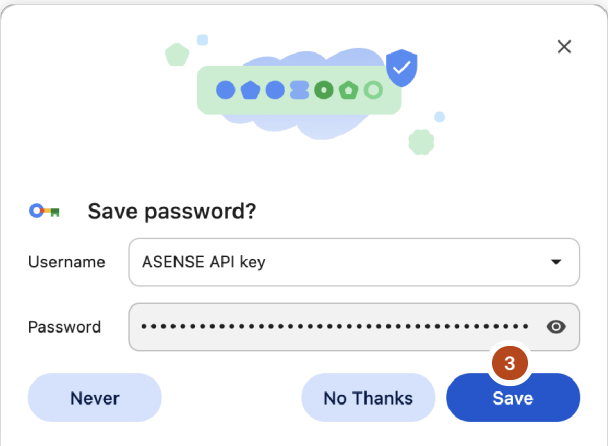
Enter your credentials to access the secure dashboard.

ACCESS KEY

1 

2 **Access Dashboard →**

- 1 Paste your API key in **ACCESS KEY**.
- 2 Click **Access Dashboard**.



- 3 Browser asks to save it: click **Save**. Next time the key is filled in.

Select a Monitoring Mode

Choose which family of Asense devices to monitor.


Structural Monitoring
Accelerometer, gyroscope, spectroscopy and analog inputs

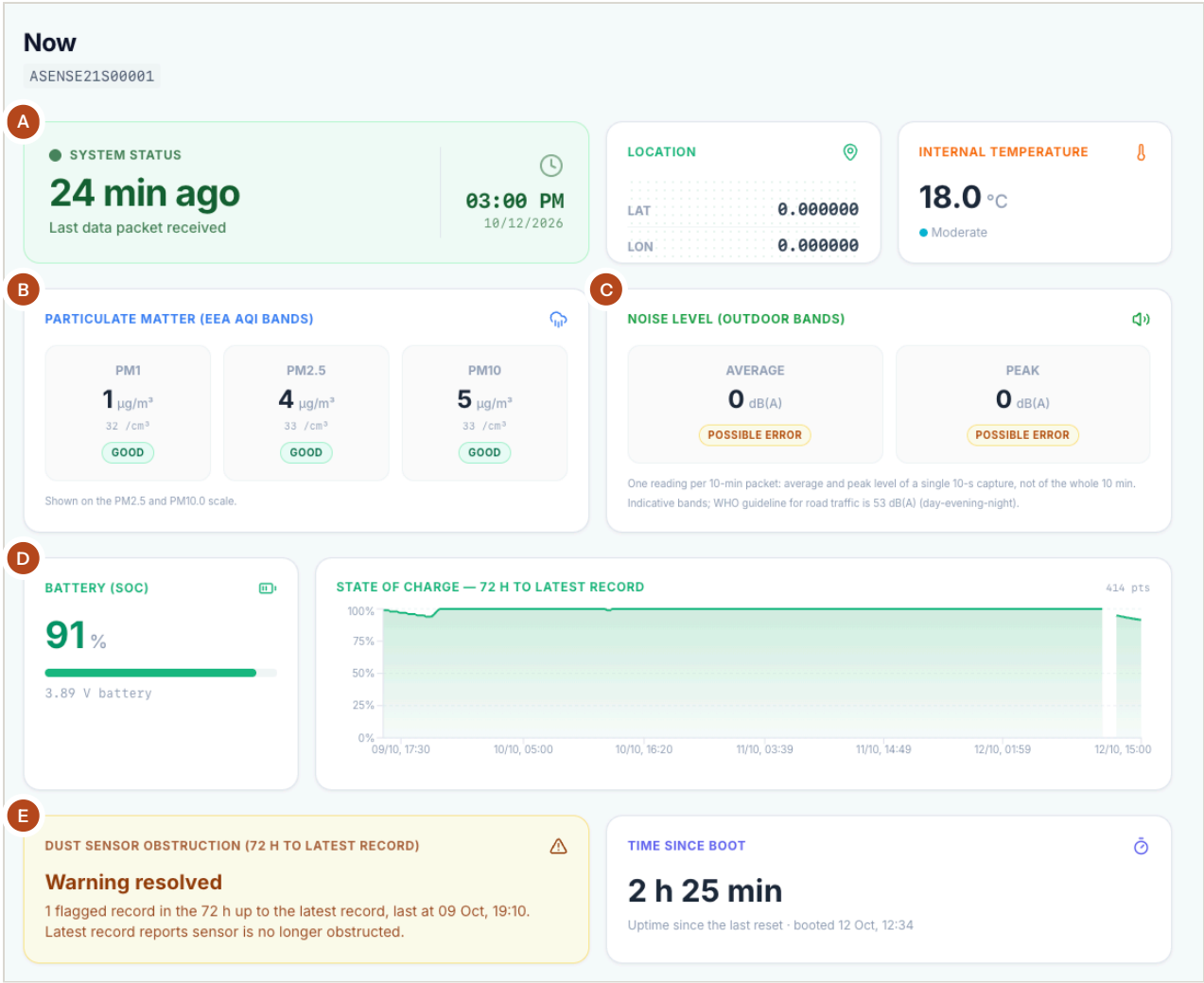
4 

Environmental Monitoring
Particulate matter and noise level

Cancel

- 4 Select **Environmental Monitoring**.

Now: latest record



- A System status**
Time since the last data packet. Daytime: under 2 h.
- C Noise level**
Average and peak of one 10 s capture per record.
- E Dust sensor obstruction**
Warning if the optical window is blocked.

- B Particulate matter**
PM1, PM2.5, PM10 in µg/m³ and particles/cm³, with air-quality band.
- D Battery**
State of charge, last 72 h.

Navigation

Asense Clarity

1

TARGET DEVICE

00001

2

CORE

Now

Month

3

ENVIRONMENTAL

Particulate Matter

Noise Level

4

TIME RANGE

Select Month

October 2026

2026

Jan Feb Mar Apr

May Jun Jul Aug

Sep **Oct** Nov Dec

Clear This month

Asense Clarity

TARGET DEVICE

✓ 00001

00002

00003

00004

00005

00006

Noise Level

TIME RANGE

- 1

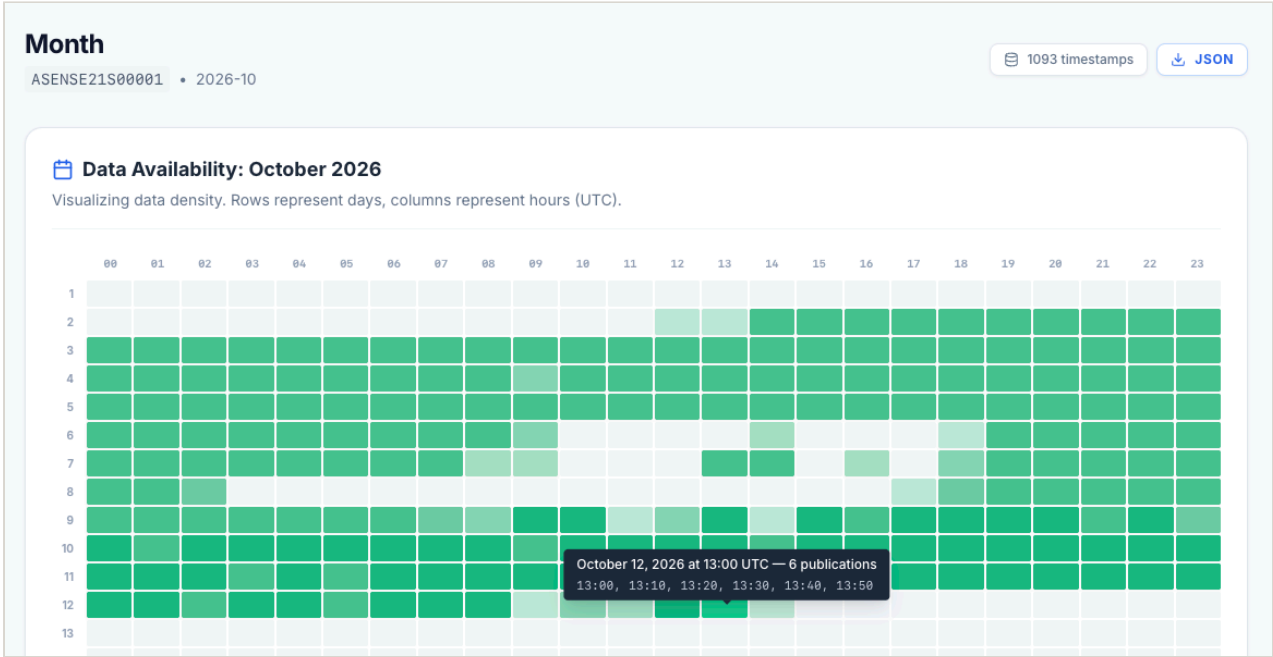
Target device
00001 = sensor ASENSE21S00001.
- 2

Core
Now: latest record. *Month*: data availability.
- 3

Environmental
Particulate Matter, *Noise Level*: charts and tables.
- 4

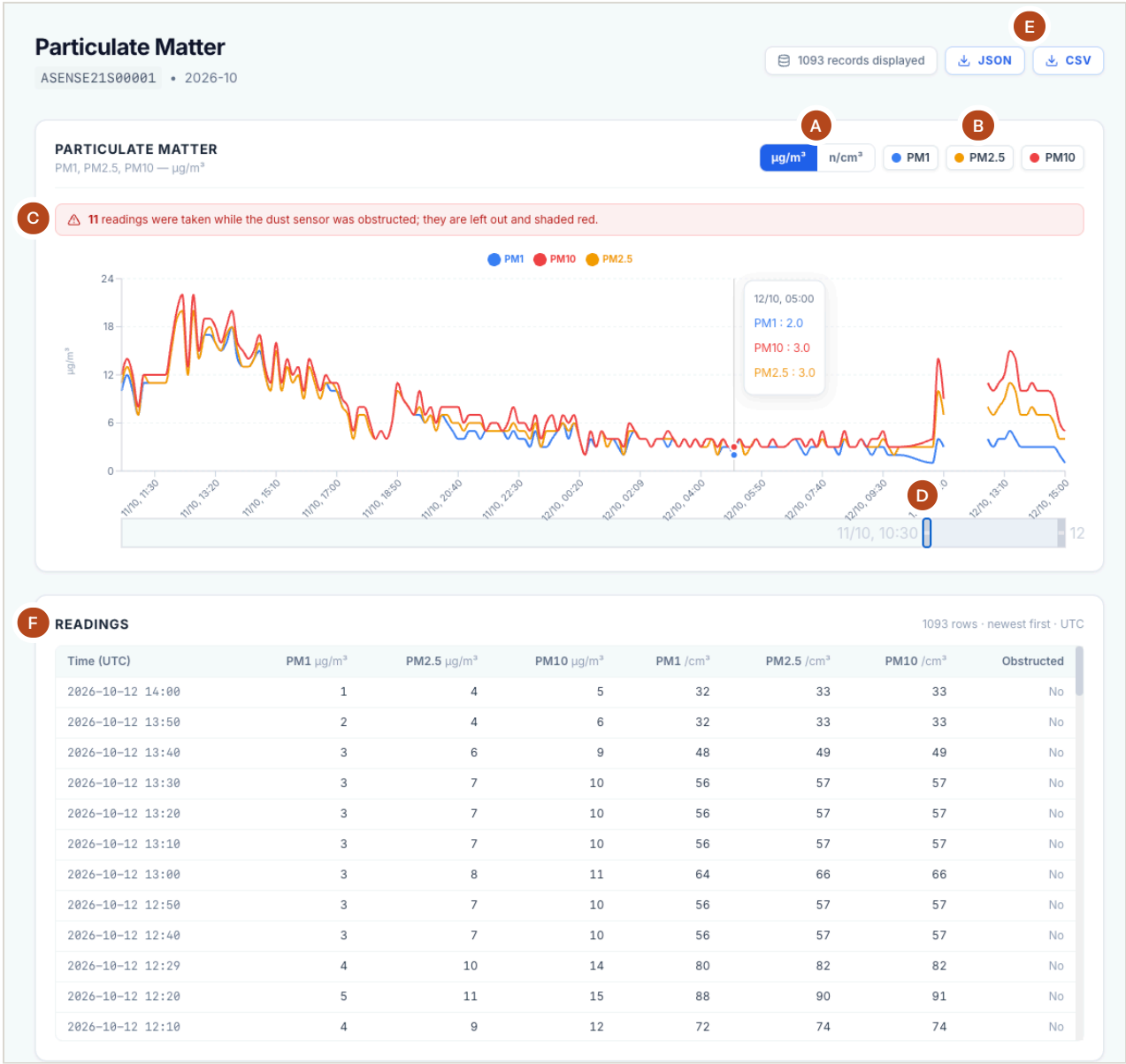
Time range
Month shown on every page. *This month* = current.

Month: data availability

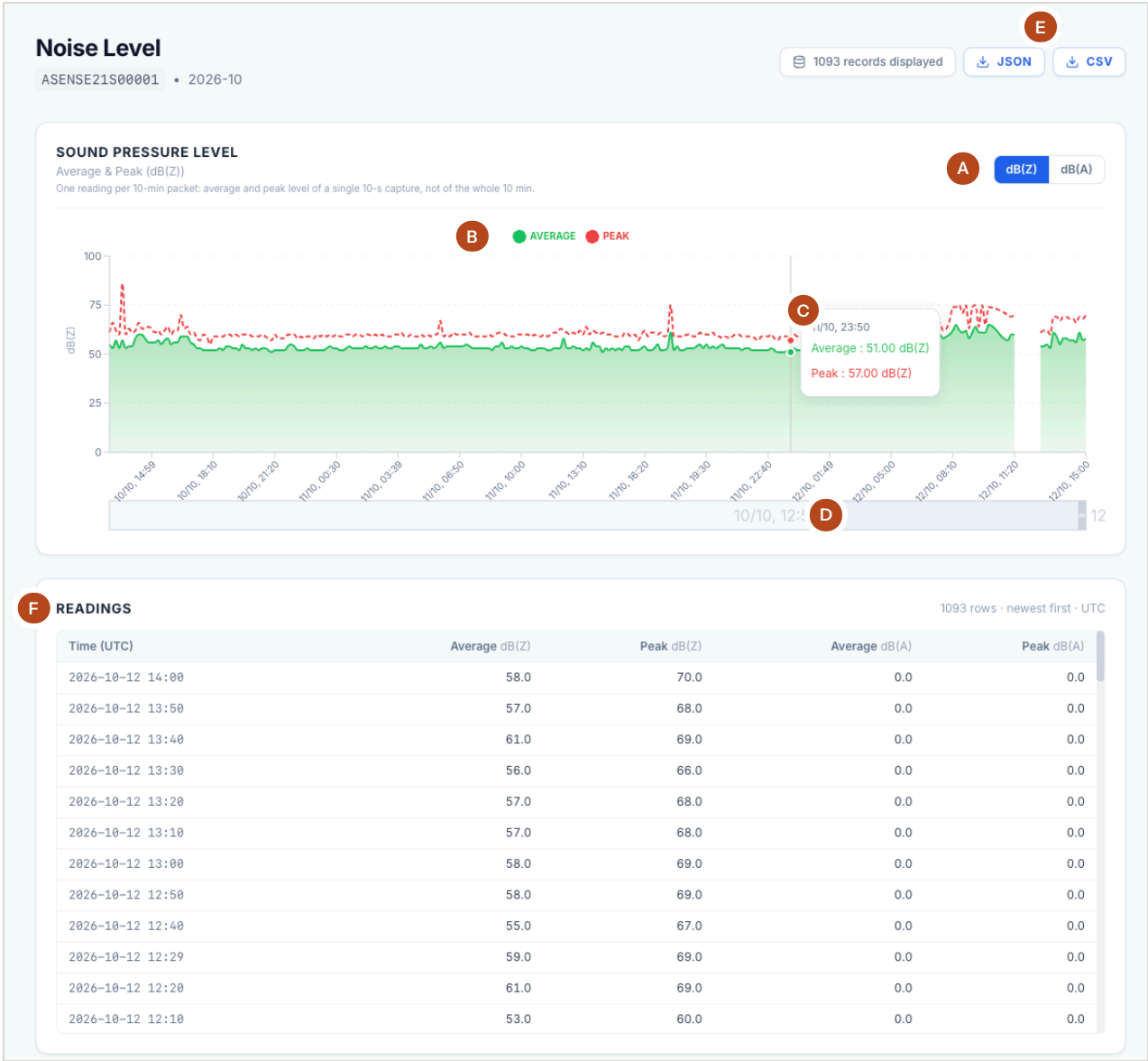


Rows = days, columns = hours (UTC). Green = records received; darker = more (6 per hour = complete). Hover a cell for its times.

Particulate Matter



Noise Level



- A

Weighting
dB(Z): unweighted, all frequencies. dB(A): weighted like human hearing.
- B

Average · Peak
Green: average level. Red dashed: peak level. Both from one 10 s capture.
- C

Values
Hover the chart: time and both levels of that record.
- D

Zoom
Drag the handles to pick a time window.
- E

Export
Month data as JSON or CSV.
- F

Readings
One row per 10 min record: average and peak in dB(Z) and dB(A).

Gaps in the chart = no records for that time.

TIME ZONE

All dashboard times are UTC. Portugal: UTC + 0 h in winter, + 1 h in summer. Spain: UTC + 1 h in winter, + 2 h in summer.

5

Troubleshooting

Find the symptom. Try the fixes in order, top to bottom.

No ESENSE in the Bluetooth list

- 1  Sensor charging? Plug in the power supply, or wait for daylight on the solar panel.
- 2  Wait. On some devices pairing takes a few minutes.
- 3  Turn Bluetooth off and on again.
- 4  Refresh the page and click the Bluetooth icon again.

Pairing fails or keeps disconnecting

- 1  Forget the ESENSE device in your phone's or computer's Bluetooth settings. Pair again, PIN **555555**.
- 2  Close the browser or app completely and open it again.
- 3  Reset the Bluetooth adapter: Bluetooth off, wait 10 s, on.

Central shows an error or stops responding

- 1  Refresh the page and go to *Dashboard*.
- 2  Close the browser or app and open it again.
- 3  Forget the ESENSE device in Bluetooth settings, then connect again.

No Bluetooth icon, or nothing happens on click

- 1  Use a supported browser: Chrome or Edge on Windows, macOS, Android, or Linux with the flag on. iOS: a browser with Web Bluetooth (chapter 3).
- 2  Allow the browser to use Bluetooth when it asks.

Dust sensor obstruction warning

- 1  Clear the space in front of the optical window: up to **35 cm**. Walls, signs, branches, cobwebs and insects all count.
- 2  Clean the window: soft, lint-free cloth, lightly dampened with water. No abrasives, no scraping, no fingerprints.
- 3  Wait for the next sending time, then check *Now*: the warning shows *Warning resolved*.

Dashboard shows no new data

- 1  Normal: data arrives every 2 h, 08:00–20:00 local time. Nothing arrives at night until 08:00.
- 2  Check the solar panel faces the sun and is not shaded or dirty.
- 3  Low battery: connect the power supply for a few hours, then check *Now* again.

6

Data API

ENDPOINT https://api.semitronica.pt/asense/v2/ HTTPS GET, JSON response.	HEADER x-api-key Your API key (same as the dashboard).
--	--

Query parameters

table_name	env	Noise and dust records.
id	ASENSE21S00002	Serial number of the sensor.
start_time	1791364200873	Start, Unix time in milliseconds (UTC).
end_time	2000000000000	End, Unix time in milliseconds (UTC).
timestamps_only	true	Optional. Times only: {"timestamps": [...], "count": N}

Request

```
curl -sG "https://api.semitronica.pt/asense/v2/" \
-d "table_name=env" \
-d "id=ASENSE21S00002" \
-d "start_time=1791364200873" \
-d "end_time=2000000000000" \
-H "x-api-key: YOUR_API_KEY"
```

Response

```
{
  "data": [
    {
      "id": "ASENSE21S00001",
      "time": 1791364200873,
      "datetime": "2026-10-07T09:10:00.873000Z",
      "pm1_ug/m3": 8.0, "pm1_/cm3": 64.0,
      "pm2_5_ug/m3": 8.0, "pm2_5_/cm3": 66.0,
      "pm10_ug/m3": 8.0, "pm10_/cm3": 66.0,
      "spl_avg_db": 60.0,
      "spl_pk_db": 69.0,
      "is_ob_ov": 0,
    },
    ...
  ],
  "next_timestamp": 1791620399612
}
```

Fields

time	Record time, ms, UTC
datetime	Same, ISO 8601, UTC
pm1_ug/m3 ...	PM1 / PM2.5 / PM10, µg/m³
pm1_/cm3 ...	PM1 / PM2.5 / PM10, particles/cm³
spl_avg_db	Sound level, average of the 10 s capture, dB(Z)
spl_pk_db	Sound level, peak of the 10 s capture, dB(Z)
is_ob_ov	1 = dust sensor obstructed
lat, long	GPS position, degrees

Other fields are device diagnostics.

MORE THAN ONE PAGE

Response has next_timestamp? Repeat with start_time = that value. None: you have everything.

7

Specifications

Measurements

Record interval	1 record every 10 min
Sound level	Microphone behind an ePTFE membrane. Average and peak of a 10 s capture per record. dB(A) (A-weighted) and dB(Z) (unweighted)
Particulate matter	Laser, in open air above the window; Doppler shift measures particle speed. No fan. PM1, PM2.5, PM10 in $\mu\text{g}/\text{m}^3$ and particles/ cm^3
PM2.5 range · resolution	0 – 1000 $\mu\text{g}/\text{m}^3$ · 1 $\mu\text{g}/\text{m}^3$
PM2.5 precision	$\pm 10 \mu\text{g}/\text{m}^3$ (0 – 100 $\mu\text{g}/\text{m}^3$) · $\pm 10 \%$ (101 – 1000 $\mu\text{g}/\text{m}^3$)
Smallest particle	0.5 μm
Obstruction detection	Static objects in front of the optical window are detected and flagged
Position	GPS

Hardware

Enclosure	Black polycarbonate, UV-stabilised · IP6X
Optical window	Aluminosilicate display glass, uncoated, 0.7 mm · 350 – 2000 nm
Laser	Class 1 (IEC 60825-1), eye-safe
Mounting	Pole, 3.8 – 17.8 cm (1.5 – 7 in) diameter, 2 brackets + 2 clamps

Power and communication

Power	Solar panel + internal battery
Input voltage	5 – 15 V DC
Supplied power supply	230 V AC → 12 V DC
Mobile network	LTE-M, NB-IoT
Sending times	08:00 – 20:00 local time, every 2 h
Bluetooth	Only while charging · PIN 555555
As delivered	Shipping mode, until first power