

Installation, use and maintenance

Safety, placement, measurements, the environmental log, Wi-Fi, settings, calibration, service and specifications of the Aura2 ambient sensor module.

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Version **1.3** (October 2026) · applies to Aura2 firmware **0.21.0**. Manufacturer: Qualimetric, Nijmegen, The Netherlands · info@qualimetric.eu · nexchrom.nl.

This manual describes how to install, use and maintain the Aura2. Read chapter 1 (Safety) before first use and keep this manual with the device. The Aura2 is read with a web browser over Wi-Fi, or by your own software over USB or Wi-Fi; the commands, JSON answers and HTTP endpoints for that are described in the separate **Aura2 API manual**, which this manual refers to as "the API manual".

1. Safety

- **Indoor use only.** Do not expose the device to rain, condensation or dripping water.
- **Not for safety-critical or life-support applications.** The Aura2 is a measuring instrument for laboratory use; it is not an alarm, a gas detector or a protective device.
- **Operating conditions:** 0 – 50 °C, 0 – 95 %RH, non-condensing.
- **Lithium-polymer battery.** The Aura2 contains a rechargeable Li-Po cell (3.7 V). Do not puncture, crush, short-circuit, heat or incinerate it. Charging takes place between 0 and 45 °C only. Stop using the device if the housing is swollen or hot, or smells of solvent, and contact Qualimetric.
- Use a USB power source that complies with the applicable safety standards (5 V DC).
- Open the housing only to replace the memory card (section 9.3), and never while it is connected to USB power.

CE marking. The Aura2 carries the CE marking. The EU declaration of conformity can be found through the QR code on the back label.

Disposal (WEEE). The crossed-out wheelie bin on the label means: do not dispose of the device with household waste. Hand it in at a collection point for electrical and electronic equipment, or return it to Qualimetric. The Li-Po cell is collected separately where required.

2. What the Aura2 is

The Aura2 measures the **ambient conditions** in a laboratory: air temperature, relative humidity and barometric pressure. It is designed for recording the environment next to a balance, where these three quantities feed the air-buoyancy correction and the uncertainty budget.

How a measurement works. When a measurement is requested, the Aura2 takes a number of individual readings in quick succession (16 by default, up to 200) and returns, for each quantity:

- the **mean** of those readings,
- the **standard deviation (SD)** of those readings, and
- the number of readings **n**.

The Aura2 reports the SD, **not** $SD/\sqrt{n}$; your software decides how to use it. A common approach is to use $SD/\sqrt{n}$ (the type A uncertainty of the mean) as a floor under the calibration uncertainty, so that a measurement can only ever increase the uncertainty, never reduce it.

Timestamps. A requested measurement carries **no time of its own**: the computer that asks for it stamps it at that moment. This keeps a single clock in charge of every value that matters for a calibration record.

What the Aura2 does not do:

- It does not filter or smooth the data. Each reading is independent; averaging is the only noise reduction.
- It does not archive requested measurements. It does keep a separate environmental log (chapter 6), and that log is **indicative only**.

3. In the box

- Aura2 module, with the Li-Po battery and a microSD card fitted
- USB-C cable
- Quick start sheet, with the network name of the device

The calibration certificate is included if calibration was ordered (chapter 10). This manual and the EU declaration of conformity are available through the QR code on the back label.

Prepared by Qualimetric. Before delivery, Qualimetric sets the device clock and the device label, and, if you supply the name and password of your network, connects the Aura2 to it (chapter 7). The device is then ready to use as soon as it is powered.

4. Installation

4.1 Placement

The reading is only as good as the air around the sensors.

- Mount the module **where you want to know the conditions**: close to the balance, at the height of the weighing pan, and in the same air.
- Mount it **upright**, with the ventilation slots of the front cover at the **bottom**. Air enters at the bottom past the sensors and leaves at the top. Mounted upside down, the warm electronics sit below the sensors and heat the air they measure.
- **Keep the ventilation slots free.** Do not cover the device or place it against a surface that blocks the slots.

- Keep it away from heat sources (lamps, computers, radiators, direct sunlight) and out of direct draughts from air-conditioning outlets.
- After moving the device, or after connecting it for the first time, allow **at least 30 minutes** for it to settle to the room before you rely on the readings.

4.2 Power

Connect the USB-C cable to a computer or to a USB power adapter (5 V DC). The Aura2 starts by itself; it has no on/off switch. The **ON/BAT** light shows that it is powered (section 9.1).

4.3 Ways to read the Aura2

Way	Connection	What you need
Web browser	Wi-Fi	nothing but a browser on the same network (chapter 7)
Aura2 Setup Tool	USB	the Windows program from nexchrom.nl/downloads (section 4.4)
Your own software	Wi-Fi (HTTP/JSON) or USB (serial line protocol)	the API manual; the Aura2 needs no driver on Windows 10/11

Over USB, the Aura2 appears as a serial (COM) port. **Only one program at a time** can use that port. Over Wi-Fi, several computers can read the Aura2 at the same time.

4.4 The Aura2 Setup Tool

The **Aura2 Setup Tool** is a free Windows program, available from nexchrom.nl/downloads. It talks to the Aura2 over USB and needs no programming and no further software. With it you can:

- take measurements and download log files;
- set the clock, the device label and the Wi-Fi connection;
- change the settings of section 8.1 and delete log files;
- install **firmware updates** (chapter 11).

Everything the tool does can also be done with the commands in the API manual; the tool simply saves you the typing.

5. Taking measurements

5.1 In a web browser

With the Aura2 on your network, open its address in a browser (section 7.2), for example:

<code>http://lab-balance-1.local/api/v1/avg</code>	one averaged measurement (16 readings)
<code>http://lab-balance-1.local/api/v1/avg?n=32</code>	average over 32 readings
<code>http://lab-balance-1.local/api/v1/read</code>	a single reading

The answer is a short JSON text with, per quantity, the mean (`m`) and the SD (`sd`), and the number of readings `n`. Temperature is in °C (`t_c`), relative humidity in %RH (`rh`) and pressure in **pascal** (`p_pa`): 101 325 Pa = 101.325 kPa. The page `http://<name>.local/api/v1/` lists all available pages.

5.2 From your own software

Your software requests a measurement over Wi-Fi (the same addresses as above) or over USB (the command `AVG`), as described in the API manual, which includes ready-to-use examples in Python. Timestamp each

measurement in your software when you request it, and record the identity of the unit with it (section 8.2).

6. The environmental log

6.1 What it does

The Aura2 takes a measurement by itself at a fixed interval (every **60 seconds** by default, adjustable from 5 s to 24 h) and writes it as one line to a CSV file on the microSD card. It does this whether or not a computer is connected, and it keeps doing it on battery. There is **one file per day**, named after the date in UTC, for example `2026-09-19.csv`.

The log is indicative. Use it to look back at trends, drift and disturbances, not as the basis for a calibration or a certificate. For that, use a measurement your software requests and stamps with its own clock (chapter 5).

6.2 The clock

Each log line records where its time came from, in the column `klok` (clock):

Value	Meaning
<code>host</code>	the clock was set from a computer over USB
<code>ntp</code>	the clock was set from a time server over Wi-Fi
<code>niet_gezet</code>	the clock has not been set: the line carries no date

If the clock has never been set, or its backup cell is empty, the Aura2 does **not** invent a date. The time column stays empty and the line goes to a separate file, `onbekend.csv` (unknown). The column `uptime_ms` is always filled in, so the order of the lines can still be reconstructed. All times are **UTC**; the Aura2 has no time zone.

The clock is set by Qualimetric before delivery. With Wi-Fi on, the Aura2 also sets its clock from a time server (`pool.ntp.org` by default) when it connects and every six hours after that, so it normally needs no attention. The page `http://<name>.local/api/v1/time` shows the clock and whether its time can be trusted. On a network without access to a time server, set the clock over USB with the Aura2 Setup Tool, which uses the time of your computer, or with the command `TIME=` (API manual).

6.3 Retrieving log files

- **In a web browser:** `http://<name>.local/api/v1/log/lijt` lists the files on the card;
`http://<name>.local/api/v1/log/bestand?naam=2026-09-19.csv` downloads one as a CSV file that opens in any spreadsheet program.
- **From your own software:** over Wi-Fi as above, or over USB with the commands `LOGLIJT` and `LOGLEES` (API manual).
- **From the card itself:** see section 9.3.

The Aura2 does **not** appear as a USB drive in Windows. This is deliberate: two systems writing to the same card would corrupt it.

6.4 Columns in a log file

Column	Content
<code>tijd_utc</code>	time (UTC); empty if the clock was not set
<code>klok</code>	source of that time: <code>host</code> , <code>ntp</code> or <code>niet_gezet</code>

Column	Content
<code>uptime_ms</code>	milliseconds since start-up
<code>seq</code> , <code>boot_id</code>	sequence number and start-up ID; a new <code>boot_id</code> means the module restarted
<code>t_c</code> , <code>t_c_sd</code>	air temperature and its SD, °C
<code>rh</code> , <code>rh_sd</code>	relative humidity and its SD, %RH
<code>p_pa</code> , <code>p_pa_sd</code>	barometric pressure and its SD, Pa
<code>t_c_intern</code>	internal temperature of the pressure sensor; diagnostic, not the air temperature
<code>n</code>	number of readings in the average
<code>chip_t_c</code>	temperature of the module's processor; diagnostic, not the air temperature
<code>accu_v</code> , <code>accu_pct</code>	battery voltage and battery gauge reading

An empty field means "no value". It is never written as 0, because 0 would be a measurement.

6.5 Free space and deleting log files

The Aura2 never deletes log files on its own. A day of log at the default interval takes well under 1 MB, so the card lasts for years. `http://<name>.local/api/v1/log` shows the free space. Files can only be deleted over USB, with the Aura2 Setup Tool or the command `LOGWIS` (API manual).

7. Wi-Fi

7.1 A second, read-only channel

USB-C is the primary connection. Wi-Fi is an additional way to **read** the same data, and it is **off** until it is configured. Over Wi-Fi you can read measurements, status, battery, clock and log files. **You cannot change anything over Wi-Fi:** settings, the device name, the clock and the Wi-Fi credentials themselves can only be changed over USB. Changing an instrument's settings requires physical access.

Security. The Wi-Fi interface has **no password and no encryption**. Anyone on the same network can read the measurements; nobody can change anything. Connect the Aura2 to a separate, shielded laboratory network, and leave Wi-Fi off if you do not use it.

The Aura2 supports 2.4 GHz networks only (2400 – 2483.5 MHz, max. 20 dBm).

7.2 Connecting to your network

The simplest way is to give Qualimetric the name (SSID) and password of your network when you order: the Aura2 is then delivered connected, and it reconnects by itself after every restart. The password can be entered but never read back.

You can also do it yourself, over USB: with the Aura2 Setup Tool (enter the network name and password and press connect), or with the command `WIFI=` from the API manual in any serial terminal program (115200 baud, DTR on), for example:

```
WIFI={"ssid":"Lab-2G","wachtwoord":"<password>","aan":true}
```

The answer shows whether the Aura2 is connected and at which address. `WIFI={"aan":false}` switches Wi-Fi off again.

7.3 Finding the device on the network

The network name of the Aura2 follows its **device label** (section 8.2), reduced to lower-case letters, digits and hyphens: label `lab-balance-1` gives `http://lab-balance-1.local/`. The name is on the quick start sheet. Software can also find every Aura2 on the network without knowing its name, as described in the API manual (service `_aura._tcp`).

Wi-Fi uses about **80 mA** extra and shortens the battery life.

8. Settings and identification

8.1 Settings

Settings are stored in the device and survive a restart. They can be read in a browser at `http://<name>.local/api/v1/config`. They can only be changed over USB, with the Aura2 Setup Tool or the command `CONFIG=` (API manual), and they are applied **all at once or not at all**.

Setting	Range	Default
Readings per measurement (n)	1 – 200	16
Interval between readings	0 – 10 000 ms	50 ms
Pressure oversampling	1, 2, 4, 8, 16, 32	16
Environmental log	on / off	on
Log interval	5 s – 24 h	60 s
Battery warning thresholds	0 – 100 %, descending; 0 = off	20 / 10 / 5 %
Processor speed on USB / on battery	80, 160, 240 MHz	240 / 80 MHz

Locked settings. Some settings are fixed because they determine whether measurements remain comparable: no filtering in the pressure sensor, minimal temperature oversampling in the pressure sensor, the humidity sensor's heater off, and high precision. The Aura2 **refuses** a request to change them and says why. It also refuses a setting name it does not know, so a typing error is reported instead of silently ignored.

8.2 Identification and the device label

Every Aura2 is identified by two hardware facts that cannot be changed:

- the **chip ID** of the module, and
- the **serial number of the temperature and humidity sensor**.

Both are shown at `http://<name>.local/api/v1/id`. Record them in your equipment register and with every measurement you store: they link each value to the unit and its calibration certificate. The serial number on the back label (for example `2026-00012845`) is Qualimetric's product number for the unit.

The **device label** is a name for the module, up to 32 characters, for example `lab-balance-1`. It also determines the network name (section 7.3). Qualimetric sets it before delivery; it can be changed over USB with the Aura2 Setup Tool or the command `CONFIG=` (API manual). The label is convenient, but it is **not an identification**: two devices can carry the same label by accident.

9. Indicators, battery and memory card

9.1 Indicator lights

The front of the Aura2 has three indicator lights:

Light	State	Meaning
ON/BAT (red)	on	powered from USB; the battery is charged or charging
	slow blink	running on battery
	fast blink	battery low: connect USB power
COMM (yellow)	short flash	the Aura2 answered a request over USB or Wi-Fi, or wrote a line to the log
WIFI (blue)	off	Wi-Fi switched off
	blinking	Wi-Fi on, connecting to the network
	on	connected to the network

9.2 Battery

The internal Li-Po cell keeps the Aura2 running when USB power is disconnected, for **at least 6 hours** from a full charge. It recharges automatically whenever USB power is present (between 0 and 45 °C). The Aura2 runs whenever USB power is connected or the battery has charge.

The page <http://<name>.local/api/v1/accu> shows the battery voltage, the remaining charge and the estimated hours left. The estimate is based on the cell voltage and on how fast the charge fell over the last hour, so the hours left appear after about half an hour on battery. While charging, no remaining charge is shown.

A full battery and a missing battery look the same while USB is connected. The only way to tell is to disconnect the USB cable: if the device keeps running, the battery is in place.

A Li-Po cell ages, mostly with time and with being kept fully charged on USB: its capacity drops and, after several years, it may swell. The battery is therefore replaced at the **preventive service every two years** (chapter 11). Do not replace it yourself.

9.3 Replacing the memory card

The log can be read over Wi-Fi and USB, so opening the housing is rarely needed. If you do:

- Disconnect USB, remove the four screws at the back and lift off the front cover.
- Wait for a short flash of the **COMM** light (a log line has just been written), then take out the microSD card and insert the new one (FAT32-formatted).
- Refit the cover and the screws and connect USB.

The Aura2 keeps measuring on request without a card; only the log stops. The page <http://<name>.local/api/v1/log> shows whether a card is present.

9.4 Clock backup cell

The clock runs on a CR1220 coin cell only while the device has no power at all; with the Li-Po battery fitted that is rare, so the cell lasts for years. It is replaced as a precaution at the preventive service (chapter 11). If the clock page (<http://<name>.local/api/v1/time>) reports that the time is not valid, set the clock again (section 6.2); if that happens repeatedly, contact Qualimetric.

10. Calibration

The Aura2 is supplied **uncalibrated** as standard. Its accuracy and repeatability are therefore **not specified until the unit has been calibrated**: they are stated on the calibration certificate, per quantity and over the calibrated range. Calibration is available at additional cost, with a choice of two options:

- **Qualimetric calibration certificate.** Calibrated by comparison against reference standards calibrated by ISO/IEC 17025 accredited laboratories; results are metrologically traceable to the SI. This calibration is not covered by accreditation.
- **Accredited calibration certificate.** Calibrated by a laboratory accredited to ISO/IEC 17025 for this calibration; the Aura2 is delivered with that laboratory's certificate.

The calibration range of the Qualimetric calibration is 10 – 30 °C, 20 – 85 %RH and 80 – 120 kPa; the range of an accredited calibration is available on request.

Recalibration. The interval is set by your quality system; once a year is common. You can recalibrate on site against your own references, with our assistance if needed, or have us arrange calibration by an ISO/IEC 17025 accredited laboratory. After any repair, check the identification (section 8.2): a changed sensor serial number means the temperature and humidity sensor was replaced and the unit needs recalibration.

Calibration and service together. The preventive service every two years (chapter 11) is best combined with every second calibration. Qualimetric then calibrates the unit **as found** (as it arrived), carries out the service and calibrates it again **as left** (as it is returned). The two certificates keep your measurement history continuous, even though the service does not touch the sensors.

11. Maintenance and service

- **Cleaning:** wipe the housing with a dry or slightly damp cloth. Do not spray cleaning agents into the ventilation slots.
- **Firmware updates are optional.** They are published on nexchrom.nl/downloads, with release notes that state what changed and whether the update affects the measurement, so you can decide whether and when to install it under your own change control. Install an update yourself over USB with the Aura2 Setup Tool, which checks the file and guides you through the steps; the housing stays closed. If an update does not start correctly, the Aura2 returns to the previous firmware by itself. The settings, the device label and the Wi-Fi connection are kept, and a firmware update does not change the calibration. Afterwards, <http://<name>.local/api/v1/id> shows the new firmware version. Alternatively, have the update carried out as part of the preventive service.
- **Preventive service, every two years (recommended, at additional cost).** Qualimetric:
 - replaces the Li-Po battery and the CR1220 clock cell;
 - installs the current firmware, if you wish;
 - cleans the unit and tests the sensors, indicator lights, log and Wi-Fi;
 - checks and records the identification (section 8.2);
 - returns the unit with a short service report.

Combine it with every second calibration (chapter 10). Where possible a replacement unit is provided in the meantime.

- **Support and repair:** contact info@qualimetric.eu with the serial number from the back label and a short description. Support is given by e-mail in English or Dutch. Units for service, repair or calibration are returned to Qualimetric after agreement on a return number.

Warranty. Qualimetric warrants the Aura2 against defects in materials and workmanship for **24 months** from delivery; the battery, as a wear part, for 12 months. Within the warranty period a defective unit is repaired or replaced free of charge. The warranty does not cover damage from misuse, liquids or condensation, operation outside the specified conditions, opening the housing other than to replace the memory card, or modifications. Calibration drift and recalibration are not covered by the warranty.

12. Troubleshooting

Symptom	Likely cause and remedy
No light on the front	No power: check the USB cable and the power source. On battery only, the battery may be empty.
The browser cannot find <a href="http://<name>.local/">http://<name>.local/	Is the WIFI light on? Is your computer on the same network? Only 2.4 GHz networks work. Try the IP address instead of the name; the Aura2 Setup Tool shows it.
Your software cannot open the COM port	Another program has the Aura2 open over USB. Only one at a time. Some USB-C cables carry power only.
Log lines go to onbekend.csv	The clock is not set: connect Wi-Fi with a time server, or set the clock with the Aura2 Setup Tool (section 6.2).
Log stopped	Check <a href="http://<name>.local/api/v1/log">http://<name>.local/api/v1/log : is a card present, is there a write error, is the log switched on?
Battery shows nearly full, but the device switches off without USB	The battery is missing or faulty (section 9.2). Contact Qualimetric.
A measurement fails with a read error	<a href="http://<name>.local/api/v1/status">http://<name>.local/api/v1/status shows which sensor does not respond. Contact Qualimetric.

13. Technical specifications

Aura2	
Temperature	0 – 50 °C
Relative humidity	0 – 95 %RH, non-condensing
Barometric pressure	30 – 125 kPa
Accuracy and repeatability	stated on the calibration certificate; not specified for an uncalibrated unit
Calibration range (optional)	10 – 30 °C · 20 – 85 %RH · 80 – 120 kPa (Qualimetric calibration)
Output	mean, SD and n per quantity; pressure in Pa
Averaging	1 – 200 readings per measurement
Interface	USB-C; Wi-Fi 2.4 GHz (2400 – 2483.5 MHz, max. 20 dBm, read-only HTTP/JSON)
Environmental log	microSD, CSV, one file per day (UTC), interval 5 s – 24 h
Real-time clock	with CR1220 backup cell; set from a computer or a time server
Power	5 V DC via USB-C; internal Li-Po 3.7 V
Battery life	at least 6 hours from a full charge

Aura2	
Enclosure	150 × 82 × 30 mm
Weight	400 g
Operating conditions	indoor, 0 – 50 °C, 0 – 95 %RH non-condensing; charging 0 – 45 °C
Software	Aura2 Setup Tool for Windows (setup, readout, firmware updates); browser access over Wi-Fi; documented API over USB and Wi-Fi
Conformity	CE; WEEE

14. Contact

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