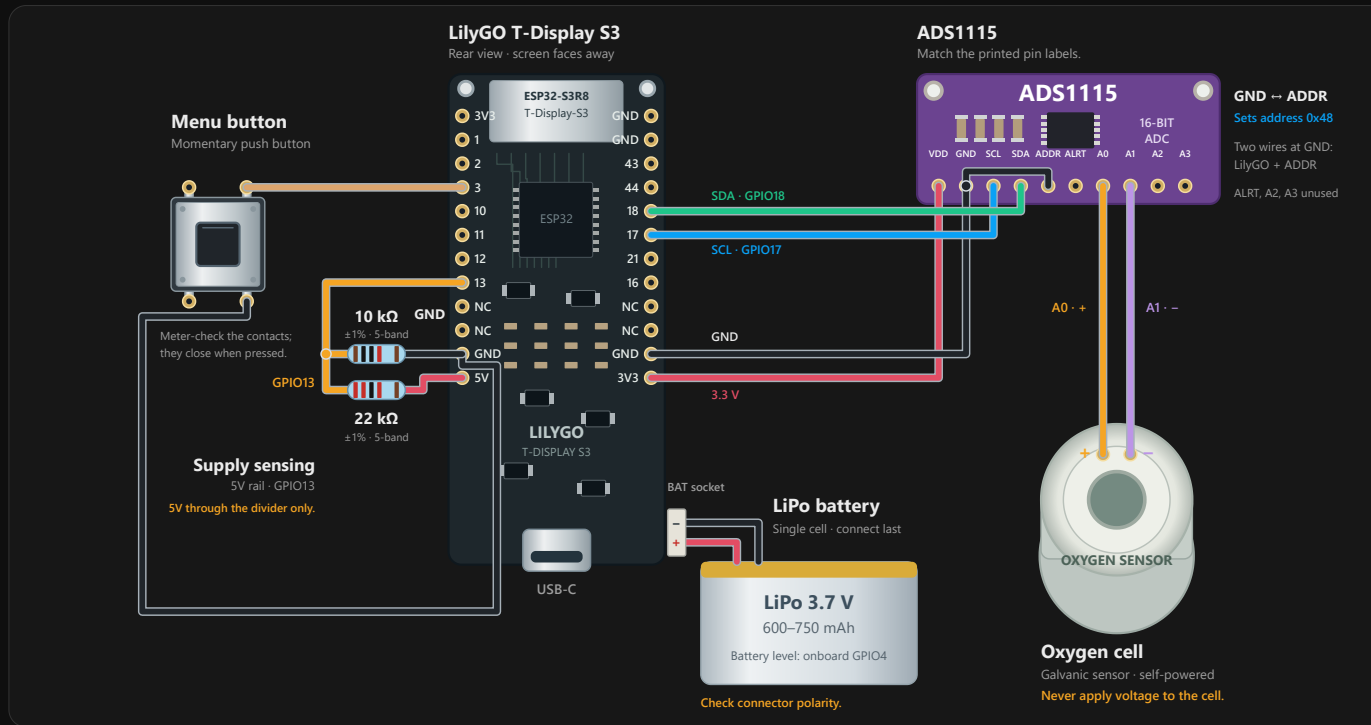


Complete wiring diagram

Nitrox Analyser with Bluetooth Label Printing www.nitroxanalyser.com

LilyGO T-Display S3 + ADS1115
Solder with USB and battery disconnected.



Dots mark joins - crossing without a dot = no connection - not to scale

The finished analyser



nitroxanalyser.com

Build guide, parts and firmware.

Install the firmware

1. Open nitroxanalyser.com/install in desktop Chrome or Edge.
2. Connect with a USB data cable.
3. Choose Full install (new board), then Connect and install.



Scan for firmware

Or type the website address above.

No coding needed.

DIY Nitrox Analyser - wiring overview

The full drawing is your quick reference. Enlarge it to read the pin labels. [Full-size diagram online](#)

Wiring at a glance

Read the pin names on your boards and keep USB and the battery disconnected while soldering. The numbered instructions below explain each connection and the first calibration.

BUILD IT, ONE CONNECTION AT A TIME

Nitrox Analyser with Bluetooth Label Printing

Step-by-step assembly manual



Follow the numbered steps in order. Each wiring stage uses the same board orientation and routes as the complete wiring drawing.

[Firmware installer](#) [Download PDF](#)

- | | |
|--|--|
| 01 Lay out the parts | 02 Start wiring the ADC |
| 03 Add the address and data wires | 04 Wire the momentary button |
| 05 Make the supply-sensing divider | 06 Connect the oxygen cell |
| 07 Inspect, then install the firmware | 08 Connect the battery last |
| 09 Fit the case and tidy the wiring | 10 Set up and check the first reading |
| 11 Set up Bluetooth label printing | |

For the LilyGO T-Display S3 and ADS1115 build shown here. Read the pin names on your actual boards. Disconnect USB and the battery before soldering. A DIY analyser must be calibrated and independently checked before use for diving.

STEP 1 OF 11

01 Lay out the parts

Get everything ready and check the fit before making permanent connections.

1. Lay out one **LilyGO T-Display S3** without fitted headers, one **ADS1115 analogue-to-digital converter (ADC)**, a galvanic oxygen cell with its matching connector, and a momentary push button (ideally 1.5 mm high).
2. Find one **22 k Ω** and one **10 k Ω** resistor, a single-cell **3.7 V LiPo** (600-750 mAh, e.g. LP852040) with the matching 1.25 mm plug, and thin insulated hookup wire. Check the exact parts in the [parts list](#).
3. Print the housing from the linked [housing files](#). Have the specified M2 screws/inserts and 12x 5 × 3 mm magnets (5 mm diameter, 3 mm thick) ready. Dry-fit the boards, cell, button and battery; leave everything unpowered.
4. Prepare a fine soldering iron, solder, cutters, heat-shrink, a multimeter and a USB data cable. Use wire long enough to reach comfortably, with a little slack for opening the case.
5. Use the [full wiring diagram](#) as your overview. The LilyGO is shown from the rear: the screen faces away. Board shapes and the battery socket position are illustrative; follow the printed pin names.

What the main parts do

The LilyGO runs the analyser and screen. The ADS1115 measures the tiny voltage made by the oxygen cell. The button operates the menu. The resistors let the analyser sense its supply rail. The battery makes it portable.

Check before continuing

The boards match this guide and the housing fits. Keep USB and battery disconnected throughout steps 1-6.



STEP 2 OF 11

02 Start wiring the ADC

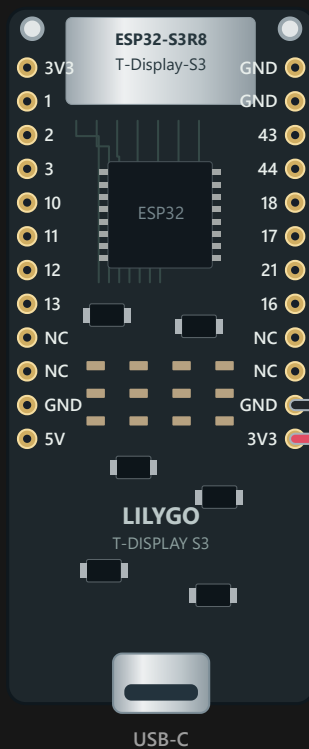
The ADS1115 analogue-to-digital converter (ADC) measures the oxygen cell's tiny voltage. Start by wiring its 3.3 V supply and ground connections to the LilyGO.

BEFORE YOU CONNECT

Make these connections with **USB and battery disconnected**; do not power the board yet. Use **3V3** for VDD. The LilyGO 5V pad is used later for the resistor network.

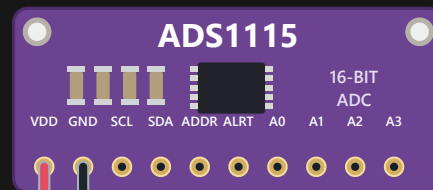
LilyGO T-Display S3

Rear view · screen faces away



ADS1115

Match the printed pin labels.



New wires are bright. Earlier connections are faded where shown. [Full-size diagram online](#)

Connections in this step

CONNECT FROM	CONNECT TO
LilyGO 3V3	ADS1115 VDD
LilyGO GND	ADS1115 GND

1. Cut, strip and tin the two wires. Solder one at a time, checking each pad name before soldering.
2. Leave room at the ADS1115 GND pad for the short address wire in the next step.

Check before continuing

VDD goes to 3V3, GND goes to GND, and no solder bridges touch adjacent pads.

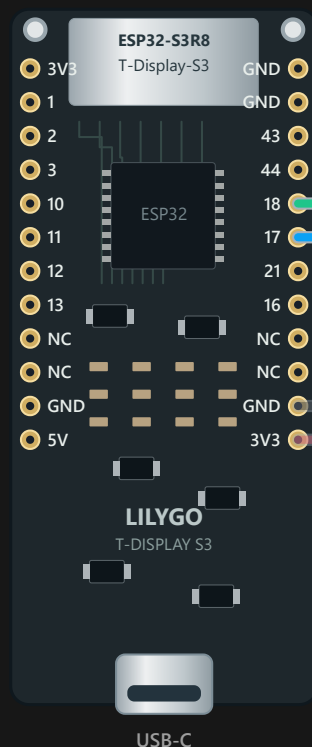
STEP 3 OF 11

03 Add the address and data wires

Two data wires let the LilyGO read the ADS1115. The short ground jumper selects address 0x48, which this firmware uses.

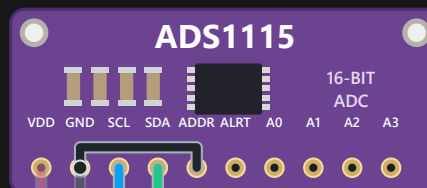
LilyGO T-Display S3

Rear view · screen faces away



ADS1115

Match the printed pin labels.



GND ↔ ADDR

Sets address 0x48

Two wires at GND:
LilyGO + ADDR

ALRT, A2, A3 unused

SDA · GPIO18

SCL · GPIO17

GND

3.3 V

New wires are bright. Earlier connections are faded where shown. [Full-size diagram online](#)

Connections in this step

CONNECT FROM	CONNECT TO
LilyGO GPIO17	ADS1115 SCL
LilyGO GPIO18	ADS1115 SDA
ADS1115 ADDR	ADS1115 GND

1. Solder the SCL and SDA wires. Use the pin numbers printed on the LilyGO, rather than counting holes.
2. Make a short jumper from ADDR to GND on the ADS1115. There are now **two wires on the ADS GND pad**: the LilyGO ground wire and this jumper.

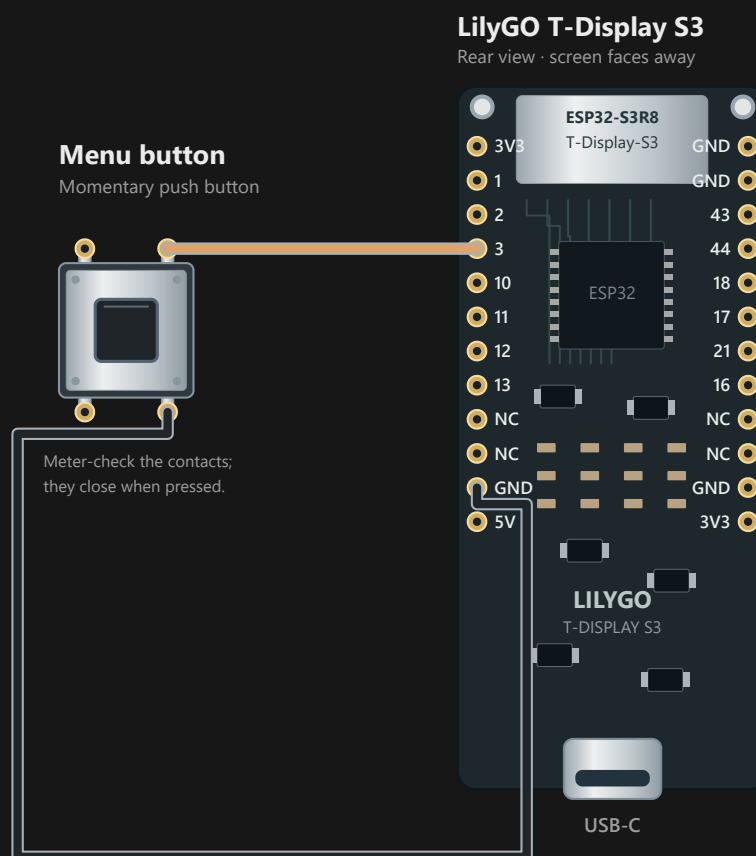
Check before continuing

SCL is on 17, SDA is on 18, and ADDR is joined to GND. Leave ALRT, A2 and A3 unconnected.

STEP 4 OF 11

04 Wire the momentary button

Pressing the button joins GPIO3 to ground. Releasing it opens the connection again.



Button close-up. Keep its ground wire separate from the resistor network's ground wire. [Full-size diagram online](#)

Connections in this step

CONNECT FROM	CONNECT TO
LilyGO GPIO3	One button contact group
LilyGO GND	The other button contact group

1. Use the multimeter's continuity setting to find two legs that are **open when released** and **connected only while pressed**. On a four-leg switch, some legs are already connected internally.
2. Solder GPIO3 to one of those contacts. Solder a separate ground lead from the other contact to LilyGO GND, as shown.

Check before continuing

Across the two wires, the meter changes from open to continuity only when you press the button.



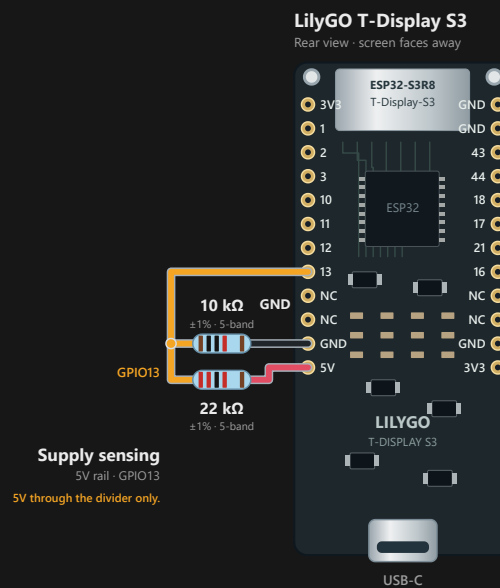
STEP 5 OF 11

05 Make the supply-sensing divider

The two resistors reduce the supply voltage to a level GPIO13 can measure. This helps the firmware recognise USB power.

BEFORE YOU CONNECT

5V reaches GPIO13 through the 22 k Ω resistor only. Battery level is measured separately by the LilyGO's built-in GPIO4 divider. Do not add a GPIO4 wire.



Keep the orange junction wire to the left of the resistors, clear of the 5V and GND leads. [Full-size diagram online](#)

Connections in this step

CONNECT FROM	CONNECT TO
LilyGO 5V	22 k Ω outer end
22 k Ω / 10 k Ω joined ends	LilyGO GPIO13
10 k Ω outer end	LilyGO GND

1. Identify the blue, five-band resistors: **22 k Ω = red · red · black · red · brown**; **10 k Ω = brown · black · black · red · brown**. The last brown band means $\pm 1\%$. Measure them before fitting if unsure.
2. Join one end of each resistor and attach the orange GPIO13 wire to that same joint. Connect the free 22 k Ω end to 5V and the free 10 k Ω end to GND. Insulate exposed joints.

Check before continuing

22 k Ω is on the 5V side, 10 k Ω is on the GND side, and GPIO13 goes to their shared junction.



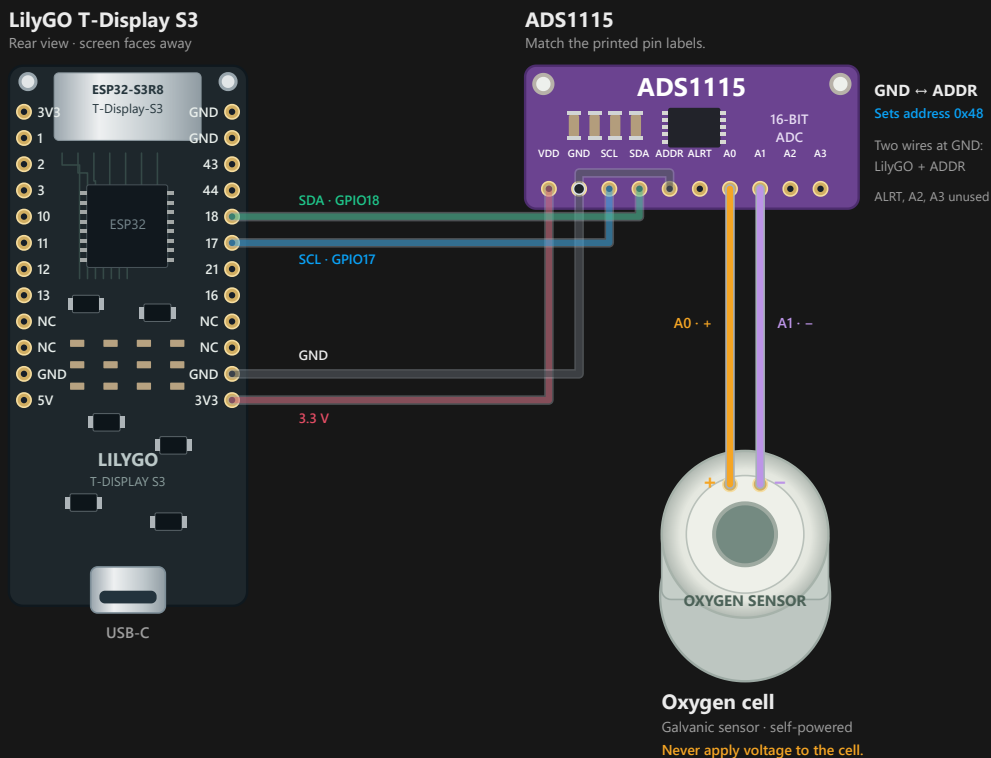
STEP 6 OF 11

06 Connect the oxygen cell

The cell makes a small voltage of its own. The ADS1115 measures the difference between its positive and negative terminals.

BEFORE YOU CONNECT

Never apply supply voltage to the oxygen cell. Connect cell negative to A1 as shown; do not join it to GND.



New wires are bright. Earlier connections are faded where shown. [Full-size diagram online](#)

Connections in this step

CONNECT FROM	CONNECT TO
Cell positive (+)	ADS1115 A0
Cell negative (-)	ADS1115 A1

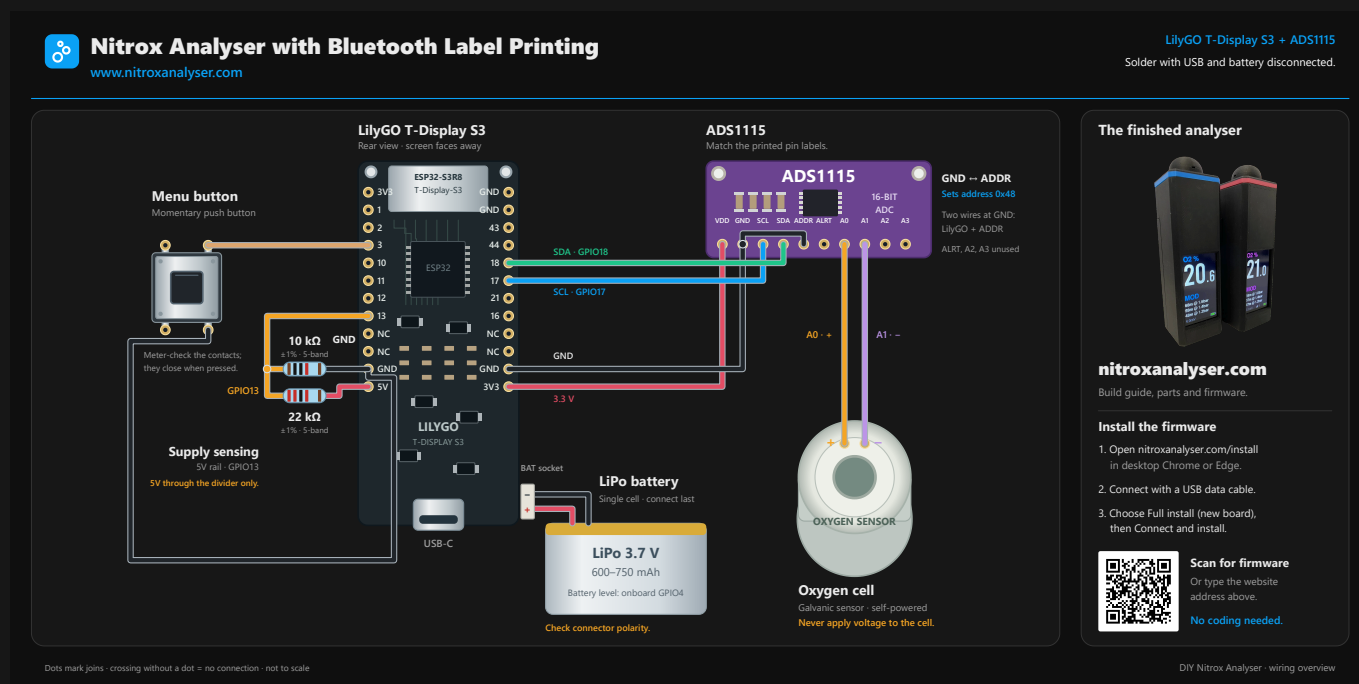
1. Identify the cell connector's positive and negative terminals using the cell maker's information. Connector colours and shapes can vary.
2. Wire the positive lead to A0 and the negative lead to A1. Keep the pair short, route it together, and provide strain relief so the connector cannot pull on the solder joints.

Check before continuing

Polarity is correct, A0/A1 are not swapped, and neither cell lead touches 3V3 or 5V.

07 STEP 7 OF 11 Inspect, then install the firmware

Check the complete circuit before powering it for the first time. Leave the battery unplugged for this USB test.



Complete wiring overview. Open the diagram to zoom; compare the pin names with the earlier close-ups. [Full-size diagram online](#)

1. With all power disconnected, compare every connection with the [complete wiring diagram](#). Inspect for stray strands, solder bridges and exposed joints. Check for an unintended short between a supply rail and GND with the multimeter.
2. Open www.nitroxanalyser.com/install in desktop Chrome or Edge. Select the **Nitrox** target and **Full install** for a new board.
3. Connect a USB **data** cable. Choose **Connect and install**, select the board's serial port and follow the installer. Keep the cable connected until it finishes.
4. Check that the analyser starts and the screen is readable. If anything becomes hot, smells unusual or repeatedly resets, unplug USB and inspect the wiring before trying again. If no port appears, try a known data cable and a direct computer USB port.

Ground connections

The button and resistor network have separate physical leads to LilyGO GND. The ADS1115 has its own ground lead plus the ADDR jumper. All GND pads on the LilyGO are electrically common.

Check before continuing

Firmware installation completes, the screen starts normally, and there is no abnormal heating. Do not close the housing yet.

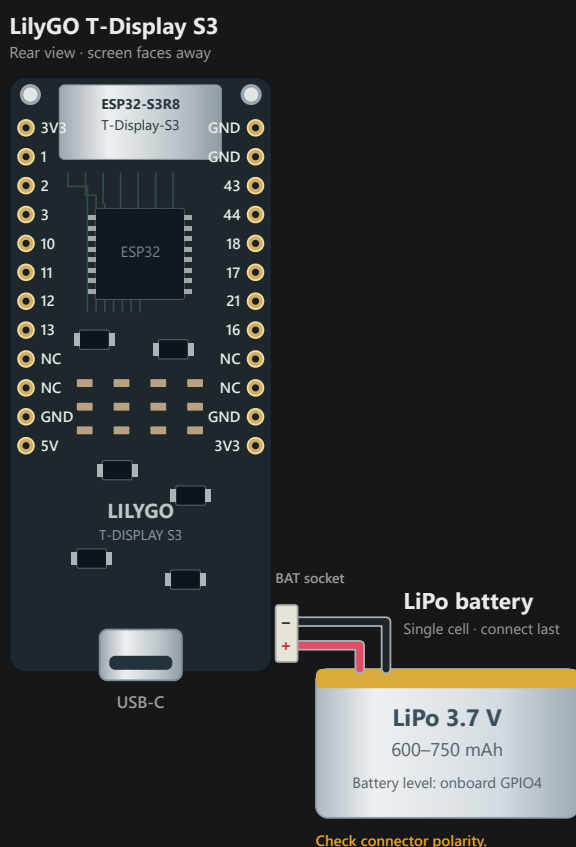
STEP 8 OF 11

08 Connect the battery last

The battery plugs into the LilyGO's battery socket. The board already contains the battery-voltage measuring circuit.

BEFORE YOU CONNECT

Use only a single-cell 3.7 V LiPo. Verify the plug polarity against the board before inserting it.



The socket is shown schematically. Find the actual battery connector on your board and verify its polarity. [Full-size diagram online](#)

1. Unplug USB. Use only a suitable **single-cell 3.7 V LiPo** and the matching connector; this is not a multi-cell battery input.
2. Check the battery plug's positive and negative pins with the multimeter and compare them with the board's battery connector markings/manufacturer schematic. A plug that fits can still be wired backwards.
3. Insert the plug gently, keeping metal tools away from the contacts. Confirm that the analyser starts on battery power. Never squeeze, puncture or trap the battery.

Check before continuing

Battery polarity matches the board, the unit runs without USB, and the battery has room without pressure from the case or screws.

STEP 9 OF 11

09 Fit the case and tidy the wiring

Secure the parts while keeping the sensor open to gas and the wiring clear of moving or sharp edges.

1. Disconnect USB and unplug the battery before fitting the electronics. Follow the housing model's fitting instructions for inserts, magnets and screws; trial-fit magnet polarity before fixing them.
2. Seat the screen, button and oxygen cell in their openings. Keep the cell's gas opening and the housing's gas path clear. Secure the boards so they cannot move or short against loose metal parts.
3. Route wires around the edges with gentle bends and a little service slack. Insulate bare resistor joints. Keep the cell leads together and give the connector strain relief.
4. Check screw lengths and cable clearance. No screw, insert or case edge should press on the battery or pinch a wire. Reconnect the battery only after this inspection.
5. Leave the lid accessible for the first checks on the next page. After successful checks, fit it carefully and confirm the button still moves freely.

The assembly drawing explains electrical connections. It is not a scale drawing of where every part must sit inside the housing.

Check before continuing

The battery is secure without pressure, wires are not pinched, the button clicks freely, and the sensor's gas path is clear.



The completed housing keeps the display, button and oxygen cell accessible.

STEP 10 OF 11

10 Set up and check the first reading

Calibration tells the analyser what clean air looks like. An independent check confirms that the finished build measures sensibly.

1. Prepare clean air

Turn the analyser on and let the cell and temperature settle in clean ambient air. Keep it away from breath and oxygen-enriched gas. See the [calibration guide](#) for altitude and unusual conditions.

2. Open the menu

Hold about **2.5 seconds** → release. Short presses move between items.

3. Select Calibrate

Only when the cell is ready, highlight **Calibrate** and make a **new hold of about 2 seconds**. This immediately stores the air calibration with a 21.0% target.

4. Verify the reading

Check for a stable air reading and sensible cell millivolts. Compare a known gas with a trusted, independently verified analyser before relying on the build for diving. If readings disagree or drift, stop and find the cause; repeated calibration is not a repair.

5. Open browser settings

Join **NitroxAnalyser-XXXX** Wi-Fi. Find its password in **Menu** → **WiFi** (default **12345678**). Open **http://192.168.4.1/** and stay connected even if your phone reports no internet.

Before every analysis

Follow your training, use the correct gas-sampling method, calibrate and verify the analyser, and label the cylinder from your checked result. Assembly alone does not establish measurement accuracy.

Check before continuing

The reading is stable, calibration succeeds, and the known-gas comparison agrees within your accepted procedure. Only then finish closing the case.

STEP 11 OF 11

11 Set up Bluetooth label printing

The optional printing feature transfers a checked reading to a cylinder label. It needs a supported printer and an activated printing licence.

1. Prepare the printer

Charge and switch on a supported printer, such as the **Niimbot B1**, and load the correct labels. Check the website for current printer and label support.

2. Save the printer

Open the analyser web interface. Under **Print**, scan, select the printer and save it. Activate your printing licence there if needed.

3. Check label settings

Check name, date/time and oxygen/ppO₂ settings. Check the date again after restarting.

4. Print and compare

With a stable, checked gas reading on the main screen, **double-press the button**. Compare the first label with the displayed reading before putting it on a cylinder.

Quick fault checks

No ADS1115: check 3V3/GND, SCL 17, SDA 18 and ADDR-to-GND (0x48).

Button always active: meter-check the switch contact groups.

Wrong/unstable oxygen: inspect A0/A1 polarity, connections, cell condition and sampling.

No print: check printer power, saved Bluetooth selection, labels and printing licence.

Reference: [Operating manual](#) | [Calibration guide](#) | [LilyGO schematic](#) | [TI ADS1115 datasheet](#).

Check before continuing

The displayed reading and printed label agree. Keep this manual with the analyser for future maintenance.