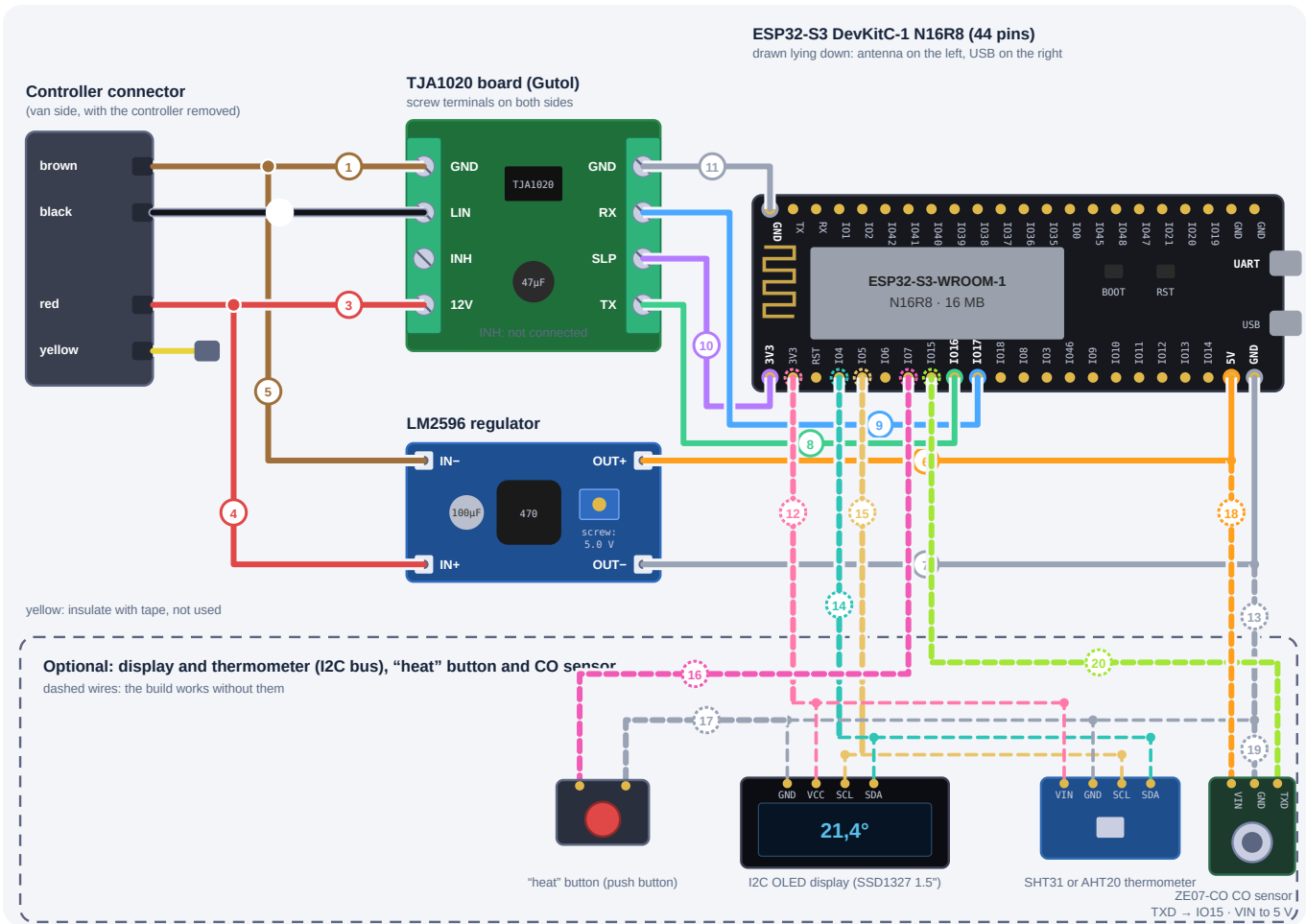




Boards may come with the terminals in other places: **go by what is printed next to each terminal or pin**, not by its position in the drawing. The drawing shows the **ESP32-S3 DevKitC-1**: all the pins WTTC uses are on the same side. Screw-terminal bases have them labelled (the 5 V one sometimes says "5Vin"). Since version 0.2.0 only the **ESP32-S3** is supported. What is inside the **dashed box** (display and thermometer, wires 12–15; "heat" button, 16–17, and CO sensor, 18–20) is **optional**: the build works without it. The colours of wires 6–11 are a suggestion (dupont wires). Those of the van's connector are **unconfirmed**: **measure them with a multimeter**.

WIRE LIST

No.	Wire	From	To
1	brown	van's brown (ground)	TJA1020 board, terminal GND (12V/LIN side)
2	black	van's black (W-Bus)	TJA1020 board, terminal LIN
3	red	van's red (+12 V)	TJA1020 board, terminal 12V
4	red	van's red (spliced from ③)	LM2596, IN+
5	brown	van's brown (spliced from ①)	LM2596, IN-
6	orange	LM2596 OUT+ (5.0 V)	ESP32, pin 5V
7	grey	LM2596 OUT-	ESP32, pin GND (any)
8	green	TJA1020 board, terminal TX	ESP32, pin IO16 (RX2)
9	blue	TJA1020 board, terminal RX	ESP32, pin IO17 (TX2)
10	violet	TJA1020 board, terminal SLP	ESP32, pin 3V3
11	grey	TJA1020 board, terminal GND (TX/RX side)	ESP32, pin GND (another one, or the same)
—	yellow	van's yellow	not used: insulate it with tape

No.	Wire	From	To
—	—	TJA1020 board, terminal INH	not connected
Optional: display and thermometer (dashed box in the diagram). All four go to the same I2C bus: each wire joins the ESP32 pin with the display's and the thermometer's.			
12	 pink	ESP32, pin 3V3 (the other one)	Display VCC and thermometer VIN
13	 grey	ESP32, pin GND (or splice from ⑦)	Display GND and thermometer GND
14	 teal	ESP32, pin IO4 (SDA)	Display SDA and thermometer SDA
15	 gold	ESP32, pin IO5 (SCL)	Display SCL and thermometer SCL
16	 magenta	ESP32, pin IO7	"Heat" button: one leg
17	 grey	"Heat" button: the other leg	Ground: splice of ⑬ (or a GND pin)
Optional: Winsen ZE07-CO carbon monoxide sensor (electrochemical, the kind that gives ppm over serial; an MQ-7 will not do). If CO rises, the board switches the Webasto off, sends a Telegram alert and blocks starting. It does not replace a certified CO detector with its own alarm: fit one too.			
18	 orange	Splice of ⑥ (5 V from the LM2596)	CO sensor, VIN (5 V)
19	 grey	Splice of ⑬ (ground)	CO sensor, GND
20	 lime	CO sensor, TXD	ESP32, pin IO15

STEPS, IN ORDER

1. **First of all, check that your heater speaks W-Bus.** The one in VW T5s with the factory timer (part no. 7H0 010 398 J) does, and someone has already switched it on with an ESP, but it is also said that some older Thermo Top C units use another protocol. The **first test** below (only status and errores) confirms it without switching anything on: if the Webasto answers with its temperature and voltage, go ahead; if you only get the echo and "sin respuesta" (no answer) with the wiring already checked, yours may not be a W-Bus unit.
2. **Measure the controller connector** with a multimeter, with the Webasto connected: one wire gives a constant +12 V (the "red"), another has continuity to the chassis (the "brown") and the idle W-Bus reads almost the same as the battery (the "black"). If the colours do not match, what you measure wins, not the drawing.
3. **Adjust the LM2596 before connecting anything to it:** fit only wires ④ and ⑤, measure between OUT+ and OUT- and turn the gold screw until it reads **5.0 V**. If you go too high, the ESP32 burns out.
4. Disconnect, and wire the TJA1020 board: ① ② ③ on the 12V/LIN side terminal (INH empty) and ⑧ ⑨ ⑩ ⑪ on the other side.
5. Finally, ⑥ and ⑦ to the ESP32. For the **first test** leave them off: power the ESP32 over USB from your laptop (on the ESP32-S3, through the USB port marked UART or COM) and type status in the console.
6. If the console does not even show the echo, **swap ⑧ and ⑨** (it often happens with the TX/RX labels on these boards). If there is an echo but "sin respuesta" (no answer), check ② and the ground.
7. **Optional, once the basics work:** the OLED display and the thermometer (SHT31 or AHT20) with ⑫–⑮, and the "heat" button with ⑯–⑰ (any push button; set it up in Settings). The board detects them by itself at boot (or 30 s after plugging them in). Keep the thermometer a hand's width away from the board and the regulator, which get warm. Without a thermometer everything works the same, except "heat up to X °C".
8. **Optional: CO sensor** (Winsen ZE07-CO) with ⑱–⑳: 5 V from the regulator, ground and its **TXD to IO15** (its RXD and other pins stay free). Its output is 3.3 V: it goes straight to the ESP32. The board detects it as soon as it sends data, and its first 3 minutes do not count (it is warming up). Place it inside, at head height where you sleep and away from the cooker; not next to the hot-air outlet. If it ever stops sending data, schedules will not start on their own until it is back (or until you choose «I no longer have a CO sensor» in Settings). **Also fit a certified CO detector (EN 50291) with its own alarm:** if the board fails, this sensor is useless.

Read the disclaimer first: <https://wttc.favala.es/en/#responsabilidad>. A CO sensor wired to the board does not replace a certified CO detector with its own alarm.