

ESPEasy CO2-Node

zaterdag 2 november 2024 16:28



Intro

This device has a good photoacoustic-NDIR CO2 Sensor:
the SCD40
It costs less than 25 Euro's.
The auto calibration can be turned off.

Features:

ESPEasy based software
P2P Network
Web interface
5 .. 10 days Recording
MQTT broadcast
Software Calibration

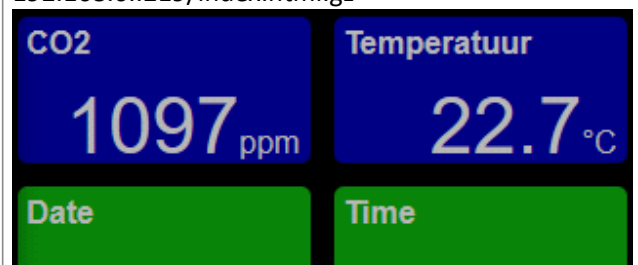
Missing:

If this device would also have a red-orange-green LED it would be perfect.

Parameter (condition)	Value
CO2 Range	0 .. 40,000 ppm
CO2 Accuracy (0..2000ppm)	+/- (50 ppm +5%)
CO2 Repeatability	+/- 10 ppm
CO2 Response Time	60 sec
Temperature	-10 .. 60 °C
Temperature Accuracy	+/- 1 °C
Temperature Repeatability	+/- 0.1 °C
Temperature Response Time	120 s
Temperature Drift	<0.03 °C / year
RH Range	0 .. 100 %
RH Accuracy	+/- 10%
RH Repeatability	+/- 0.4%
RH Drift	<0.25% / year
Total Power	<0.7 Watt

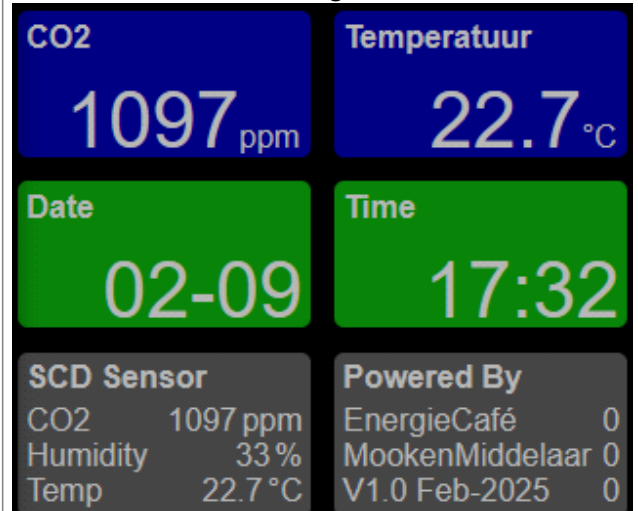


192.168.0..219/index.html.gz





192.168.0..219/index.html.gz

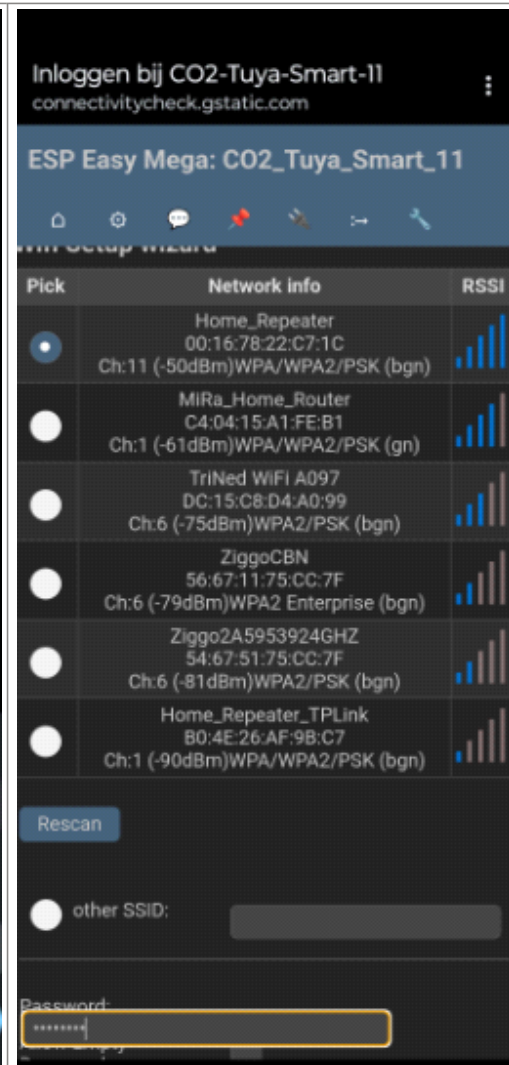
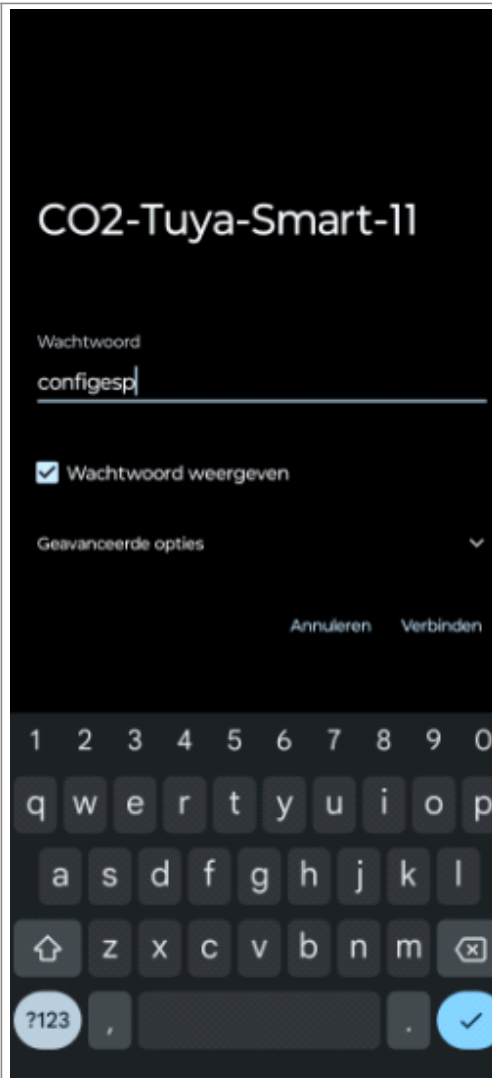


Connecting to Home WiFi

Every time the device is powered up, and it cannot contact to a home network, it will start a WIFI Access Point.

If the device is not connected to your home network yet: On your smartphone (most easy), connect to the Access Point, Log in, select the correct network and provide the network password.

If the connection didn't succeed, reconnect the power to get the device in the Access Point mode.



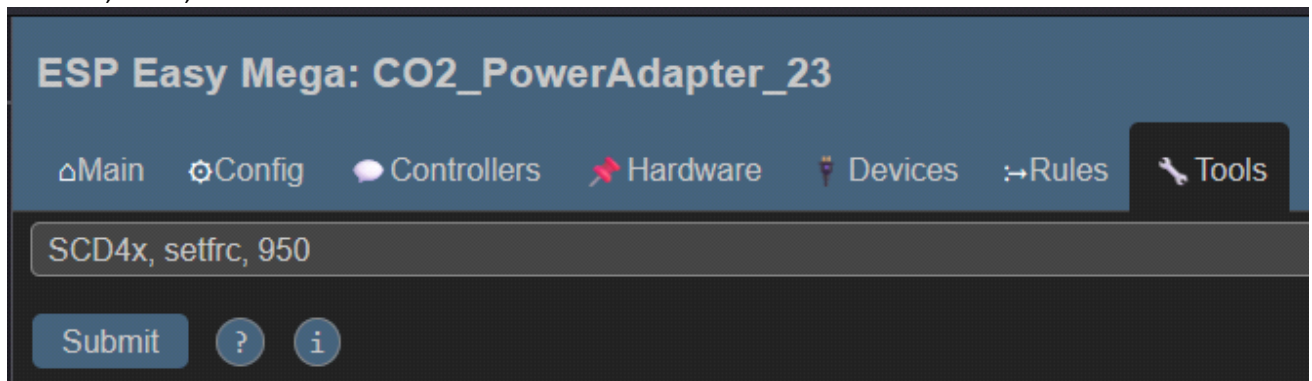
CO2 Calibration

Leave the device for at least 15 minutes in a room where the CO2 is stale and known.

Note: the relative humidity during calibration should be below 60%, otherwise the humidity will lead to a wrong calibration (a high humidity will also absorb the infrared light in the sensor)

Can be calibrated at any CO2 level, with the following command (on the Tools tab):

SCD4x, setfrc, 950



MQTT messaging

In line 7 of Rules the MQTT message is constructed.

The MQTT message will be sent every time a new value of the CO2 sensor is fetched.

The address of the MQTT broker is set through the Controller-tab | MQTT-Controller

```
1 // Copy the CO2 and Temperature Value to the large Tile
2 On SCD_Sensor#All Do
3   TaskValueSet,30,1,%eventvalue1%
4   TaskValueSet,30,2,%eventvalue3%
5   //Publish,"CO2-%sysname%", "{CO2:%eventvalue1%}"
6   //Publish,%sysname%/CO2/Test2, %eventvalue3%
7   Publish,huis/ergens/%sysname%/Sensors,{"CO2":%eventvalue1%, "RH":%eventvalue2%, "Temp":%eventvalue3%}
8   LogEntry,"====> Publish"
9 Endon
```

Version	Date	History
1.0	Feb-2025	Original Release Based on ESPEasy original ESP_Easy_mega_20231225 Custom ESP_Easy_mega_20240425_custom_ESP32c3_4M316k_CDC 25 apr 2014
1.1		<ul style="list-style-type: none">Custom ESP_Easy_mega_20250106_custom_ESP32c3_4M316k_CDCCache Reader added (can record about 4 days of data)
		TODO (ideas for future improvements) <ul style="list-style-type: none">Add 3-color LED

Poweradapter

This is real swindling, the maximum power I could retrieve from any of the ports of this device was about 7 Watt. So I guess the meant 6.5 Watt.



€1,79 ~~€5,26~~ 65% off
Price includes VAT

65W GaN Charger USB PD Type C Fast Charging 3 Ports
Phone Adapter QC3.0 For iPhone 15 Pro Max Samsung



65W
1U+2PD

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**65W GaN Charger USB PD Type C Fast Charging 3 Ports
Phone Adapter QC3.0 For iPhone 15 Pro Max Samsung
Galaxy S23 Xiaomi Huawei**

★★★★☆ **4.3** 5270 Reviews | 10,000+ sold

Plug Type: US Yellow



The two plastic parts of the housing are glued together and by sticking in a small screwdriver the glue on each of the 4 sides, the glue will crack and the device can be dismantled.



The SCD40 CO2-sensor (on a standard board) is shown in the middle.

As you can see, by removing all the USB connectors will room enough for the CO2 sensor.

The ESP32-C3 can be mounted on top of the transformer.

And to make it even more believable, they have weighted the device by a piece of metal. This metal has totally no functionality.

Of course you've to remove the piece of metal.



Remove all the USB connectors

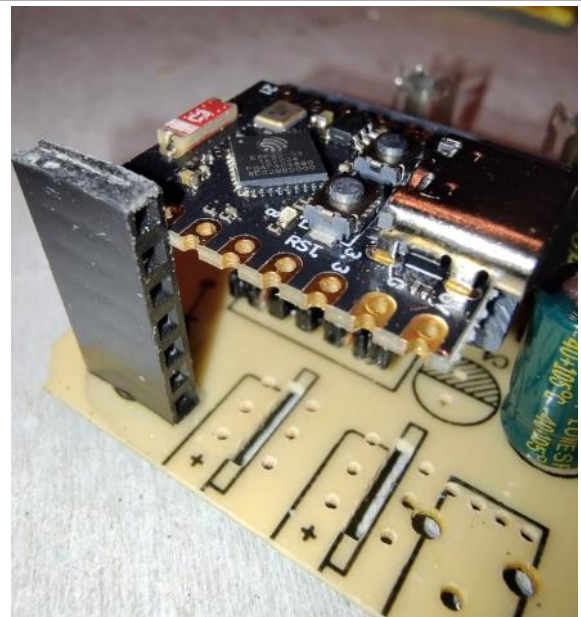
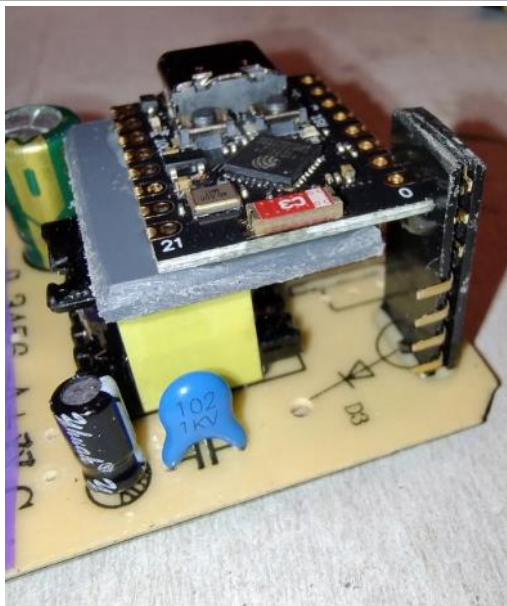
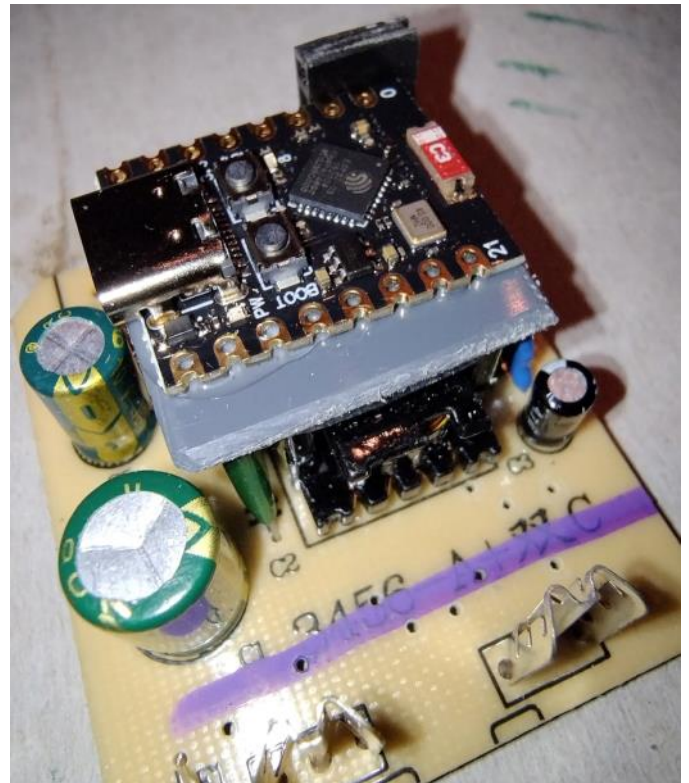
Remove all the USB connectors

First a 2 .. 3 mm PVC plate is glued to the transformer.

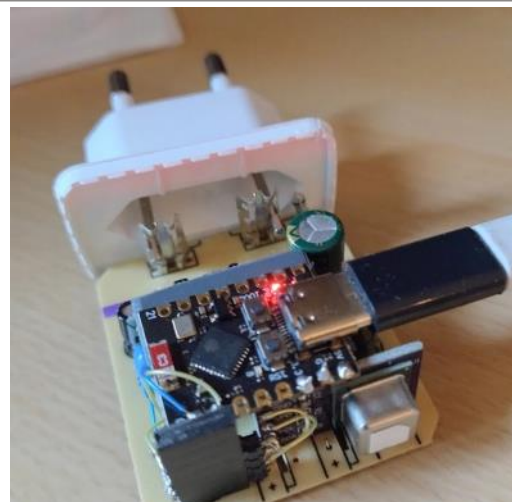
This is very important, because we've to maintain a high voltage separation between mains and the secondary electronics.

The ESP32-C3 (mini) is glued on the PVC plate.

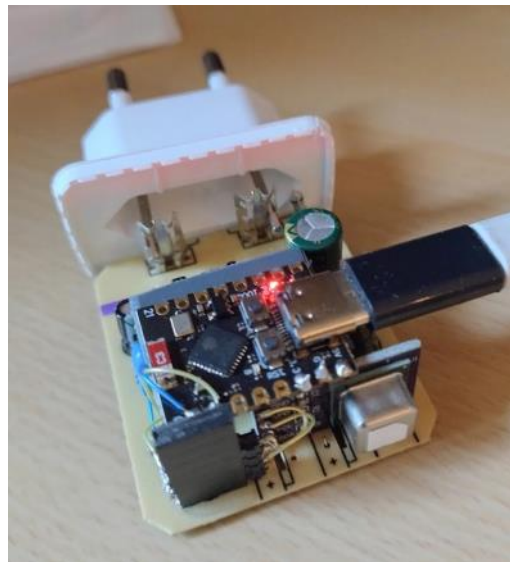
As can be seen on the next photos, the position is very critical, because a connector is glued on the main print and to the ESP32.



Here the ESP32-C3 is being programmed and tested. Changes and/or newer versions of the software can be uploaded over WIFI.



Here the ESP32-C3 is being programmed and tested. Changes and/or newer versions of the software can be uploaded over WIFI.



One of the USB openings should be enlarged, so the SCD40 sensor fits through the housing.

And both small sides of the housing a number of holes must be drilled to let air float freely through the device (see photo at the top).

And now it's ready to fit in the housing and sealing the housing with a good glue (we used Pattex Repair gel)



Devices

Edit	23	✓	Gases - CO2 SCD4x	SCD_Sensor	I2C 0x62	① ②	SDA: GPIO-1 SCL: GPIO-0	CO2?ppm: 1106 Humidity?%: 35 Temp?°C: 22.5
Add	24							
Add	25							
Add	26							
Add	27							
Add	28							
Add	29							
Edit	30	✓	Generic - Dummy Device	CO2_bigValC? 0000FF				CO2?ppm: 1106 Temperatuur?°C: 22.5
Edit	31	✓	Generic - Dummy Device	Dummy_bigValC? 0FFF0F				Date: 0 Time: 0
Edit	32	✓	Generic - Dummy Device	Powered_By		②		EnergieCafé: 0 MookenMiddelaar: 0

Edit	32	✓	Generic - Dummy Device	Powered_By	2	EnergieCare: 0 Mookemiddelaar: 0 V1.0 Feb-2025: 0
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Controllers

<div> <div>△Main</div> <div>⚙️Config</div> <div>💬Controllers</div> <div>🔌Hardware</div> <div>🏠Devices</div> <div>↔️Rules</div> <div>🔧Tools</div> </div>					
	Nr	Enabled	Protocol	Host	Port
Edit	1	✓	ESPEasy P2P Networking	-	8266
Edit	2	✓	Home Assistant (openHAB) MQTT	192.168.0.16	1883
Add	3				

SCD40 Device

ESP Easy Mega: CO2_PowerAdapter_23

△Main

⚙️Config

💬Controllers

🔌Hardware

🏠Devices

Name:

SCD_Sensor

Enabled:

☒

I2C options

Force Slow I2C speed:

☒

Note: This device is specified for max

Device Settings

Sensor model:

SCD40

Note: Page will reload on change.

Altitude:

0

⬆️⬆️

[0..2000 m]

Temp offset:

13.00

Low-power measurement:

☐

Note: Unchecked= 5 sec. Checked= 3

Automatic Self Calibration:

☐

Data Acquisition

Single event with all values:

☒

Note: Unchecked: Send event per val containing all values

Note: Unchecked: Send event per value containing all values

Send to Controller ①
(ESPEasy P2P Networking, enabled) ☒

Send to Controller ②
(Home Assistant (openHAB) MQTT, enabled) ☒

Interval: [sec]

Values

#	Name	Formula ?	Decimals	Status
1	<input type="text" value="CO2?ppm"/>	<input type="text"/>	<input type="text" value="0"/>	<input type="checkbox"/>
2	<input type="text" value="Humidity?%"/>	<input type="text"/>	<input type="text" value="0"/>	<input type="checkbox"/>
3	<input type="text" value="Temp?°C"/>	<input type="text"/>	<input type="text" value="1"/>	<input type="checkbox"/>

Rules

ESP Easy Mega: CO2_PowerAdapter_22

△Main ⚙️Config 🗨️Controllers 🔧Hardware 📶Devices ➡️Rules 🛠️Tools

Rules

Rules Set 1 ? i

```

1 // Copy the CO2 and Temperature Value to the large Tile
2 On SCD_Sensor#All Do
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4   TaskValueSet,30,2,%eventvalue3%
5   //Publish,"CO2-%sysname%", "{CO2:%eventvalue1%}"
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7   Publish,huis/ergens/%sysname%/Sensors,{"CO2":%eventvalue1%, "RH":%eventvalue2%, "Temp":%eventvalue3%}'
8   LogEntry,"====> Publish"
9 Endon
10
11 On System#Boot Do
12   timerSet,8,20 //Set Timer 8 for ... seconds
13 Endon
14
15 // Switch AP-mode off, when connected to an existing network
16 On WiFi#Connected Do
17   LogEntry "+++++++ + %ssid%"
18   WiFiMode Sta
19   TimerSet,8,0 // Disable Timer
20 Endon
21
22 // When connection to the network gets lost, start a Timer which will switch to AP-mode
23 On WiFi#Disconnected Do
24   LogEntry,"-----"
25   timerSet,8,600
  
```



```

22 // When connection to the network gets lost, start a timer which will switch to AP-mode
23 On WiFi#Disconnected Do
24   LogEntry,"-----"
25   timerSet,8,600
26 Endon
27
28 // Timer test if wifi is connected, and if not wil enter AP+STA mode
29 On Rules#Timer=8 Do
30   //LogEntry "WIFI Status [0,1,3,7]: %iswifi%"
31   If %iswifi% < 3
32     LogEntry "LOST"
33     WiFiMode AP+STA
34   Endif
35 Endon
36
37

```

Current size: 1056 characters (Max 2048)

Save

Download to file

Powered by Let's Control It community

Build: ESP_Easy_mega_20240425_custom_ESP32c3_4M316k_CDC Apr 25 2024

// Copy the CO2 and Temperature Value to the large Tile

On SCD_Sensor#All Do

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TaskValueSet,30,2,%eventvalue3%

//Publish,"CO2-%sysname%", "{"CO2":%eventvalue1%}"

//Publish,%sysname%/CO2/Test2, %eventvalue3%

Publish,huis/ergens/%sysname%/Sensors,{"CO2":%eventvalue1%, "RH":%eventvalue2%, "Temp":%eventvalue3%}'

LogEntry,"""====> Publish"

Endon

On System#Boot Do

timerSet,8,20 //Set Timer 8 for ... seconds

Endon

// Switch AP-mode off, when connected to an existing network

On WiFi#Connected Do

LogEntry "+++++++ + %ssid%"

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If %iswifi% < 3

LogEntry "LOST"

WiFiMode AP+STA

Endif

Endon

.....
Endon

Feb 2025, Stef Mientki