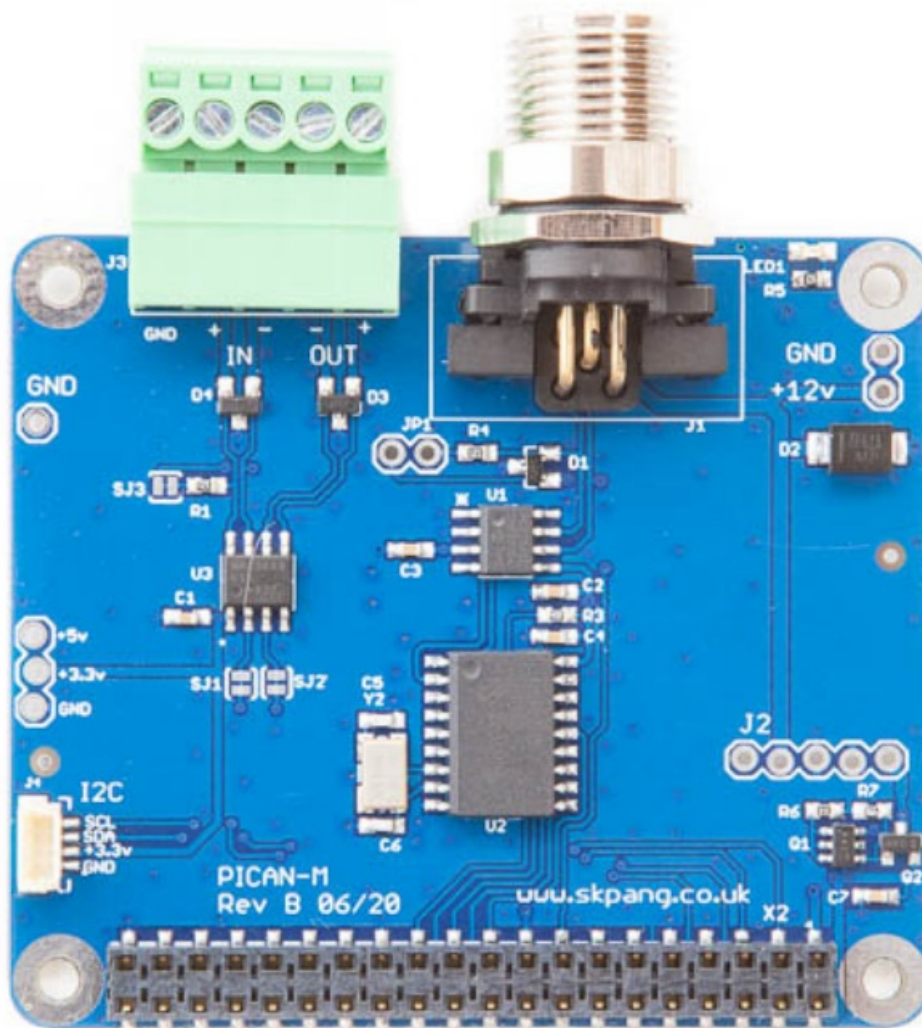


SK Pang electronics RSP-PICAN-M CAN-Bus Micro-C Connector User Guide

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SK Pang electronics RSP-PICAN-M CAN-Bus Micro-C Connector



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Important Information

Product name PiCAN-M with NMEA 0183 and NMEA 2000 Connection

Model number RSP-PICAN-M

Manufacturer SK Pang Electronics Ltd

Introduction

This is a PiCAN-M with NMEA 0183 and NMEA 2000 Connection. The NMEA 0183 (RS422) is via a 5 way screw terminal. The NMEA 2000 is via Micro-C connector.

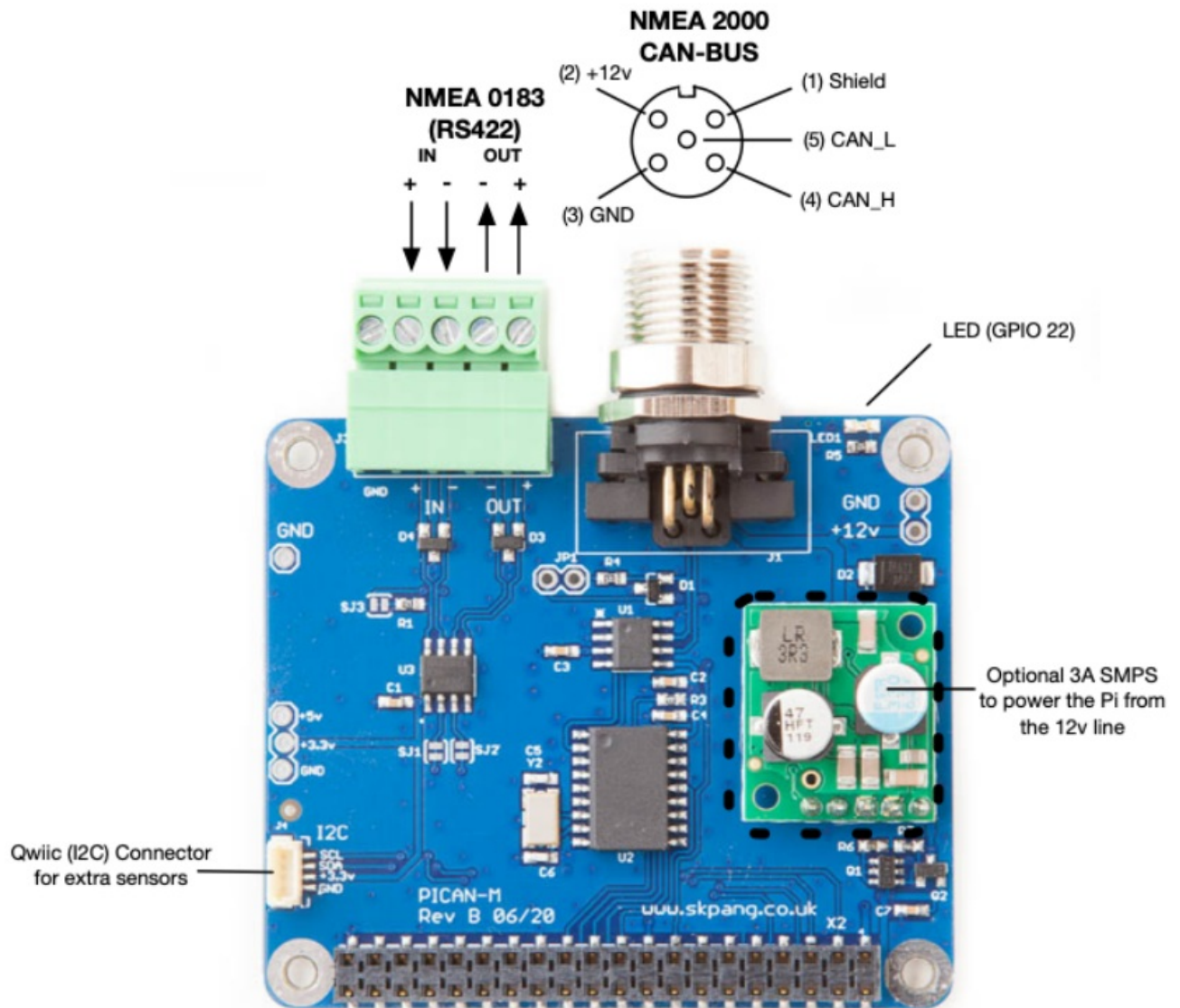
Extra sensors can be connected via the Qwiic (I2C) connector.

Optional 3A SMPS. The 12v from the NMEA 2000 network can be use to power the PiCAN-M and the Raspberry Pi.

Easy to install SocketCAN driver. Programming can be done in C or Python.

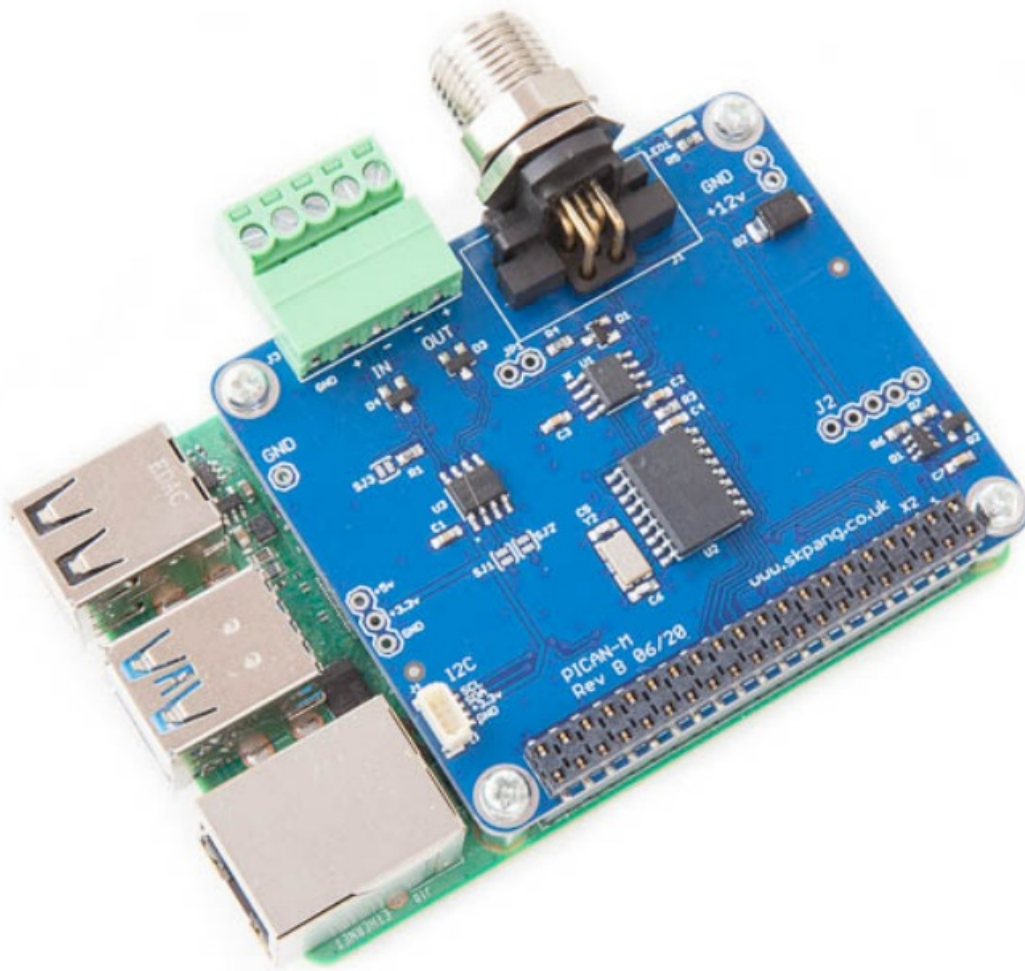
Features

- CAN connection via Micro-C connector
- 120Ω terminator ready
- SocketCAN driver
 - appears as can0 to application
- NMEA 0183 (RS422) via 5-way screw terminal
 - appears as ttyS0 to application
- LED indicator (GPIO22)
- Qwiic (I2C) connector for extra sensors
- Optional 3A SMPS.
- Compatible with OpenCPN and Signal K



Hardware Installation

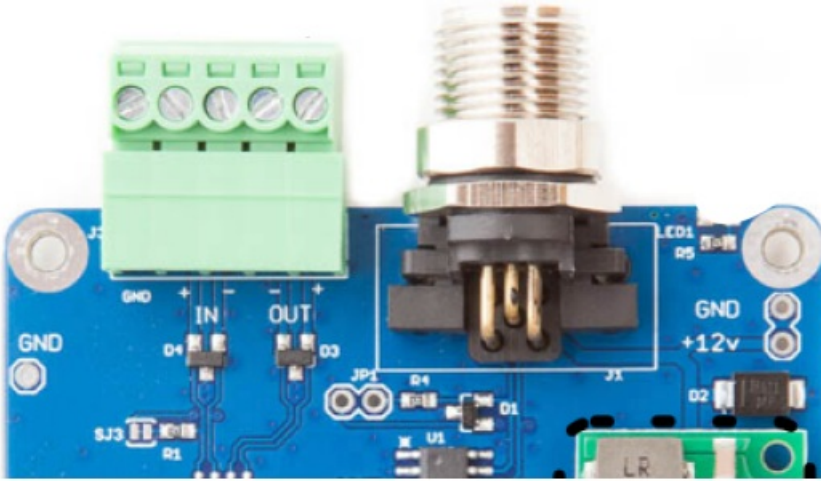
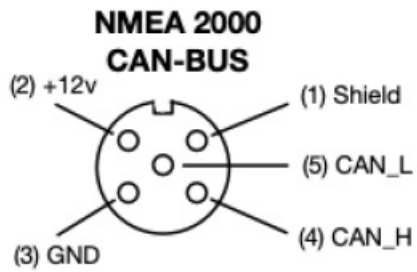
Before installing the board make sure the Raspberry is switched off. Carefully align the 40 way connector on top of the Pi. Use spacer and screw (optional items) to secure the board.



NMEA 2000 CAN-BUS Connection

The CAN-bus connections are made via J1 a 5 pin Micro-C connector.

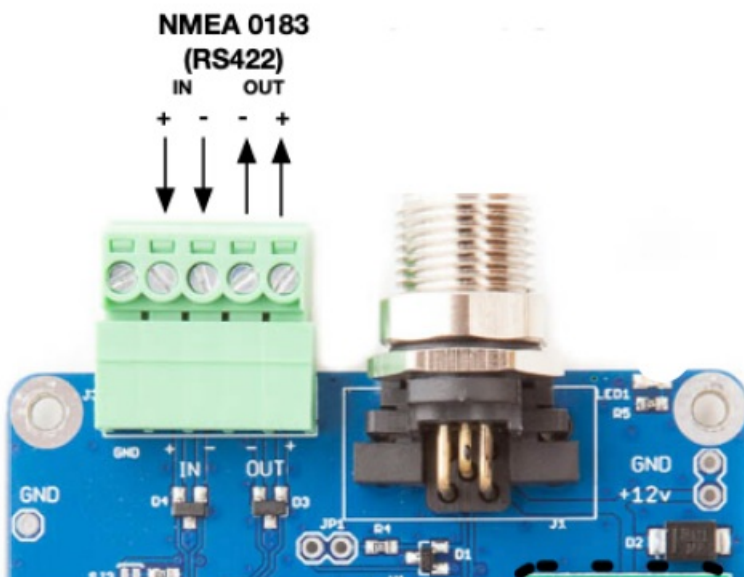
J1	Function
1	Shield
2	+12v
3	GND
4	CAN_H
5	CAN_L



NMEA 0183 (RS422) Connection

The NMEA 0183 (RS422) connection are made via J3 a 5way screw terminal.

J3	Function
1	GND
2	IN +
3	IN –
4	OUT –
5	OUT +



120Ω Terminator

There is a 120Ω resistor fitted to the board. To use the terminator solder a 2way header pin to JP1 then insert a jumper.

LED

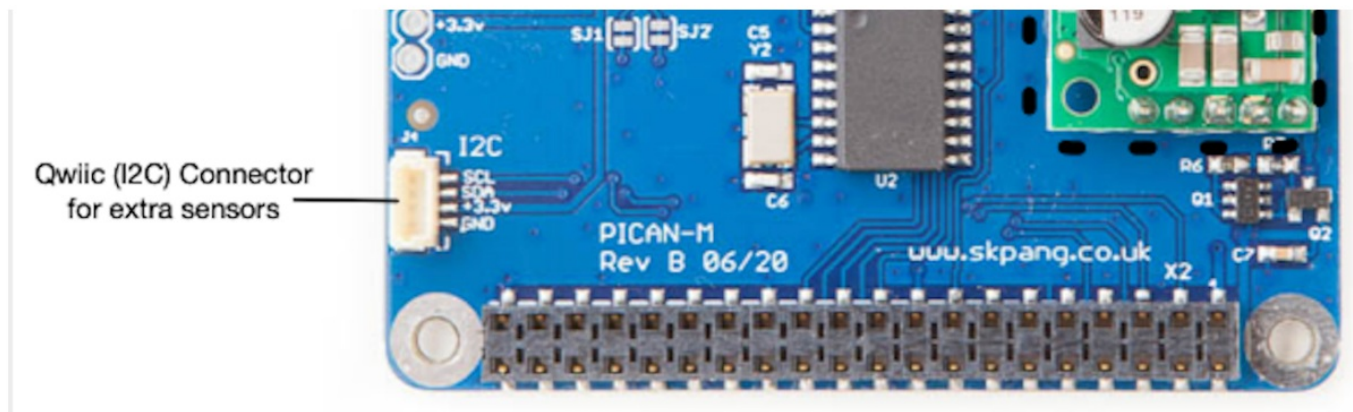
There is a red LED fitted to the board. This is connected to GPIO 22.

Switch Mode Power Supply (optional)

This is an optional 5v 3A module that can power the Pi. It has an input voltage range of 7v to 24v.

Qwiic (I2C) Connector J4

J4 is a Qwiic (I2C) connector. The I2C bus can be use for extra sensors.



Software Installation

If you want a simple installation of OpenPlotter / Signal K then use a pre-configure SD image instead.

Download the 2023-08-04-OpenPlotter-v3-Starting-stable-64bit.img from:

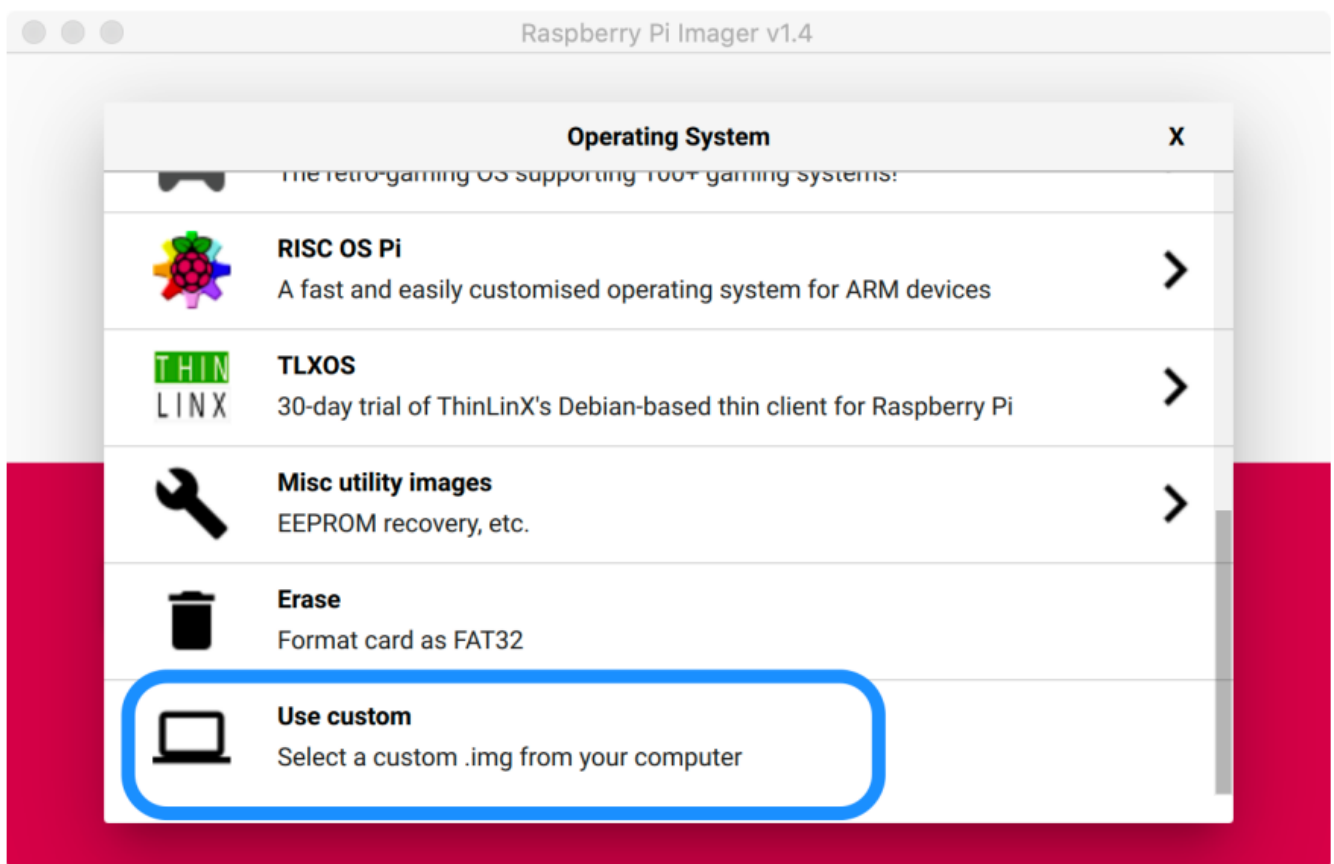
<https://cloud.openmarine.net/s/mxrBi5K7zRj2gDq>

Download and install Raspberry Pi Imager. <https://www.raspberrypi.org/software/>

Put a SD card in a reader and start Raspberry Pi Imager.
Click Choose OS.



Then click Use custom.

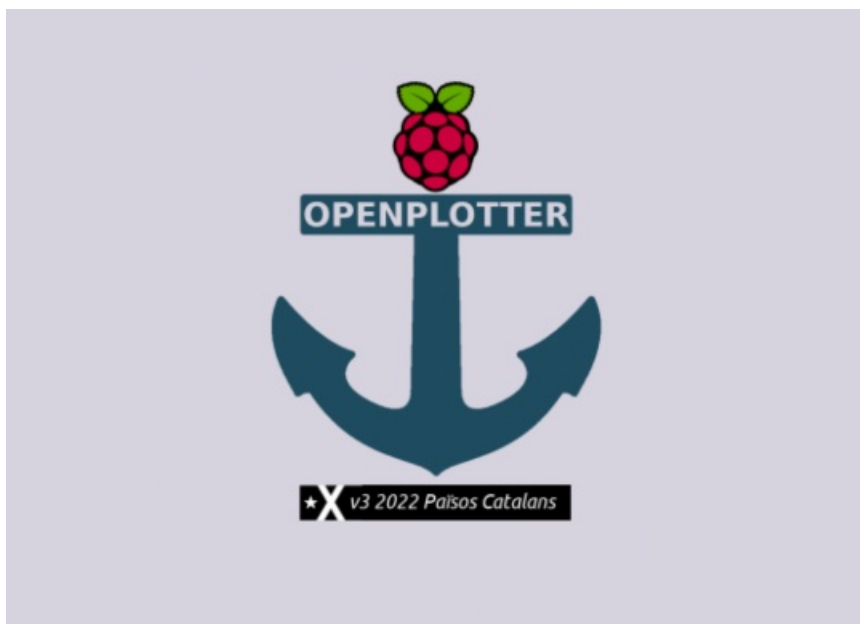


Select the zip file you have just downloaded and click CHOOSE SD CARD. Select your SD card and click WRITE.



Once the SD card write has finished remove it from your PC and insert into the Raspberry Pi and power up.

The first boot will take some time. You should then see a screen like this:



Start a Terminal and type in:

```
sudo apt-get update  
sudo apt-get upgrade  
sudo reboot
```

Next we need to add entries to config.txt
Start a new terminal and add the overlays by:

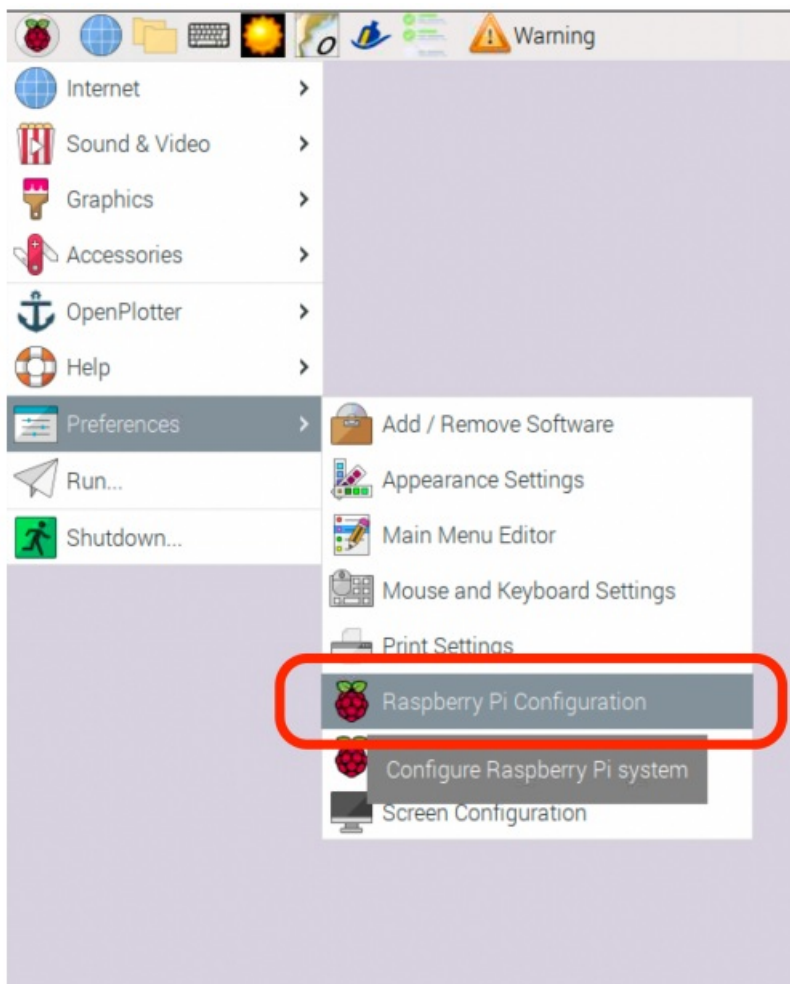
```
sudo nano /boot/config.txt
```

Add these lines to the end of file:

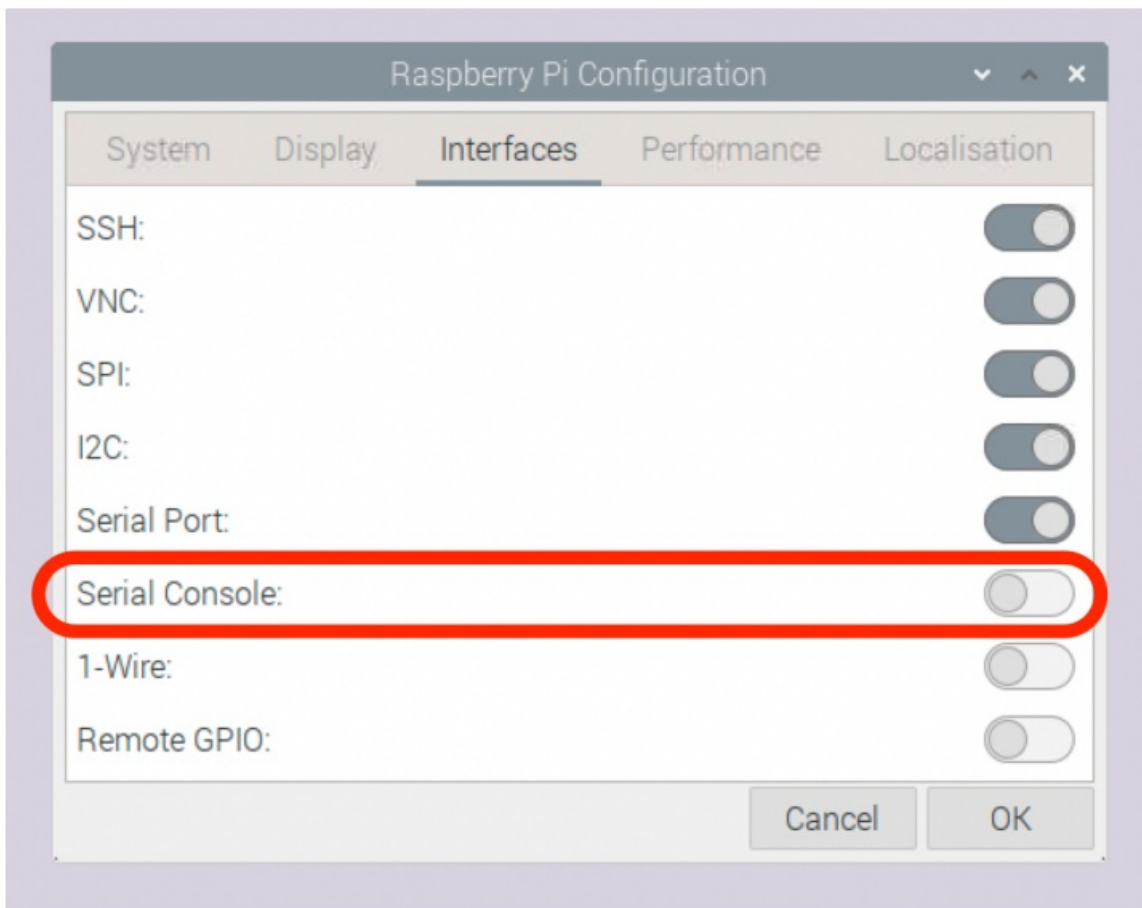
```
enable_uart=1  
dtparam=i2c_arm=on  
dtparam=spi=on  
dtoverlay=mcp2515-can0,oscillator=16000000,interrupt=25
```

Press CTRL-x to save and exit.

Next we need to configure the UART by starting Raspberry Pi Configuration:



Click Interfaces tab and slide Serial Console: to off



Click OK and reboot the Pi.

Installing CAN Utils

Start a new terminal and install the CAN utils by:

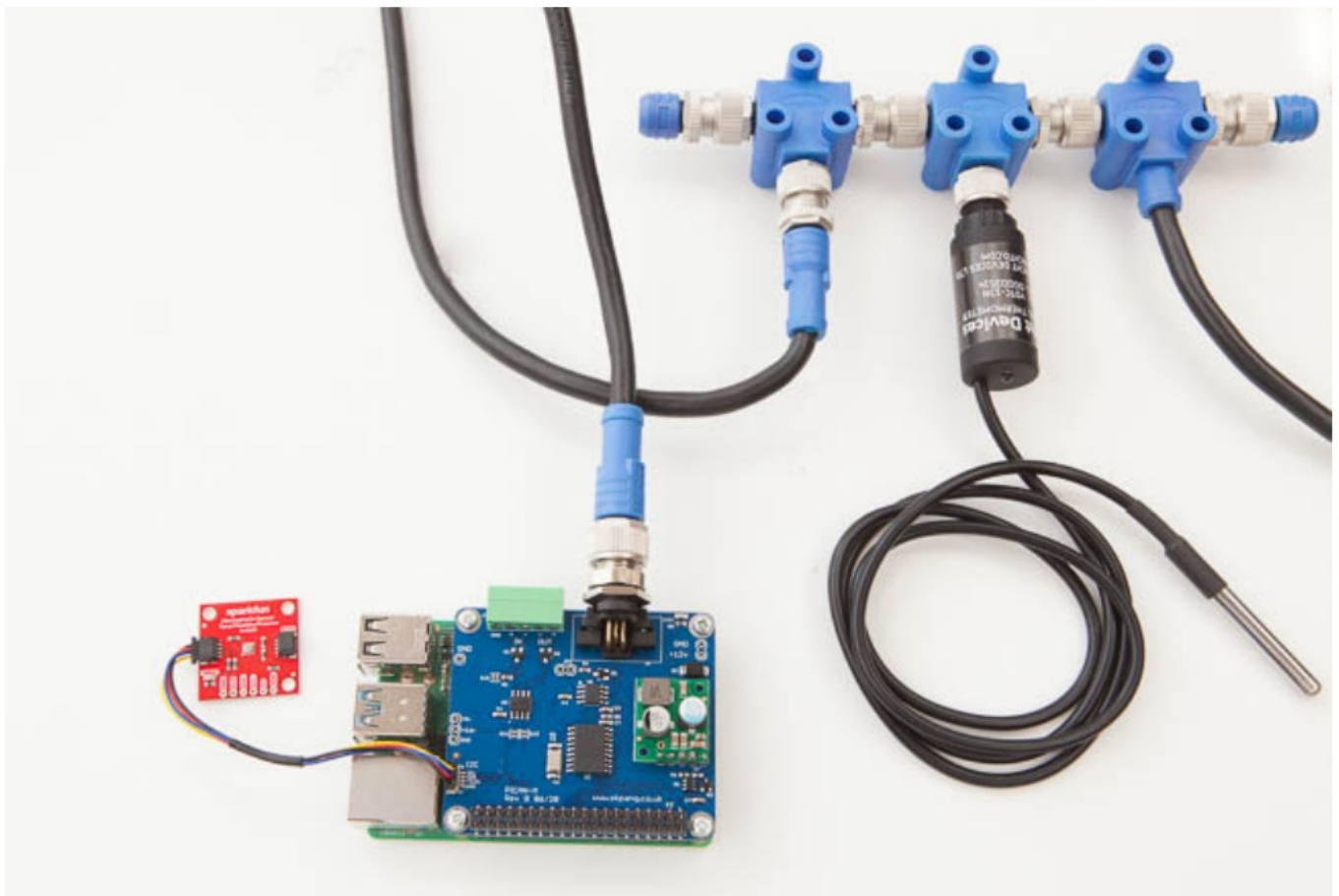
```
sudo apt-get install can-utils
```

Bring Up the Interface

You can now bring the CAN interface up with CAN 2.0B at 250kbps:

```
sudo /sbin/ip link set can0 up type can bitrate 250000
```

Connect a NMEA 2000 device to the network and start candump.



candump can0

You should see something like this:

```
pi@openplotter:~ $ sudo /sbin/ip link set can0 up type can bitrate 250000
pi@openplotter:~ $ candump can0
can0 15FD0634 [8] FF FF FF CE 73 FF FF FF
can0 15FD0734 [8] FF C1 CE 73 FF 7F FF FF
can0 15FD0634 [8] FF FF FF CE 73 FF FF FF
can0 15FD0734 [8] FF C1 CE 73 FF 7F FF FF
can0 15FD0834 [8] FF 00 01 CE 73 FF FF FF
can0 15FD0C34 [8] FF 00 01 0C 86 04 FF FF
can0 15FD0634 [8] FF FF FF CE 73 FF FF FF
can0 15FD0734 [8] FF C1 CE 73 FF 7F FF FF
can0 15FD0634 [8] FF FF FF CE 73 FF FF FF
can0 15FD0734 [8] FF C1 CE 73 FF 7F FF FF
can0 15FD0634 [8] FF FF FF CE 73 FF FF FF
can0 15FD0734 [8] FF C1 CE 73 FF 7F FF FF
can0 15FD0634 [8] FF FF FF CE 73 FF FF FF
can0 15FD0734 [8] FF C1 CE 73 FF 7F FF FF
can0 15FD0834 [8] FF 00 01 CE 73 FF FF FF
can0 15FD0C34 [8] FF 00 01 0C 86 04 FF FF
can0 15FD0634 [8] FF FF FF D4 73 FF FF FF
can0 15FD0734 [8] FF C1 D4 73 FF 7F FF FF
can0 15FD0634 [8] FF FF FF CE 73 FF FF FF
can0 15FD0734 [8] FF C1 CE 73 FF 7F FF FF
```

This capture is from a Yacht Devices Digital Thermometer NMEA 2000 YDTC-13N

To automatically bring up can0 at boot up we need to edit the interface by typing in:

```
sudo nano /etc/network/interfaces
```

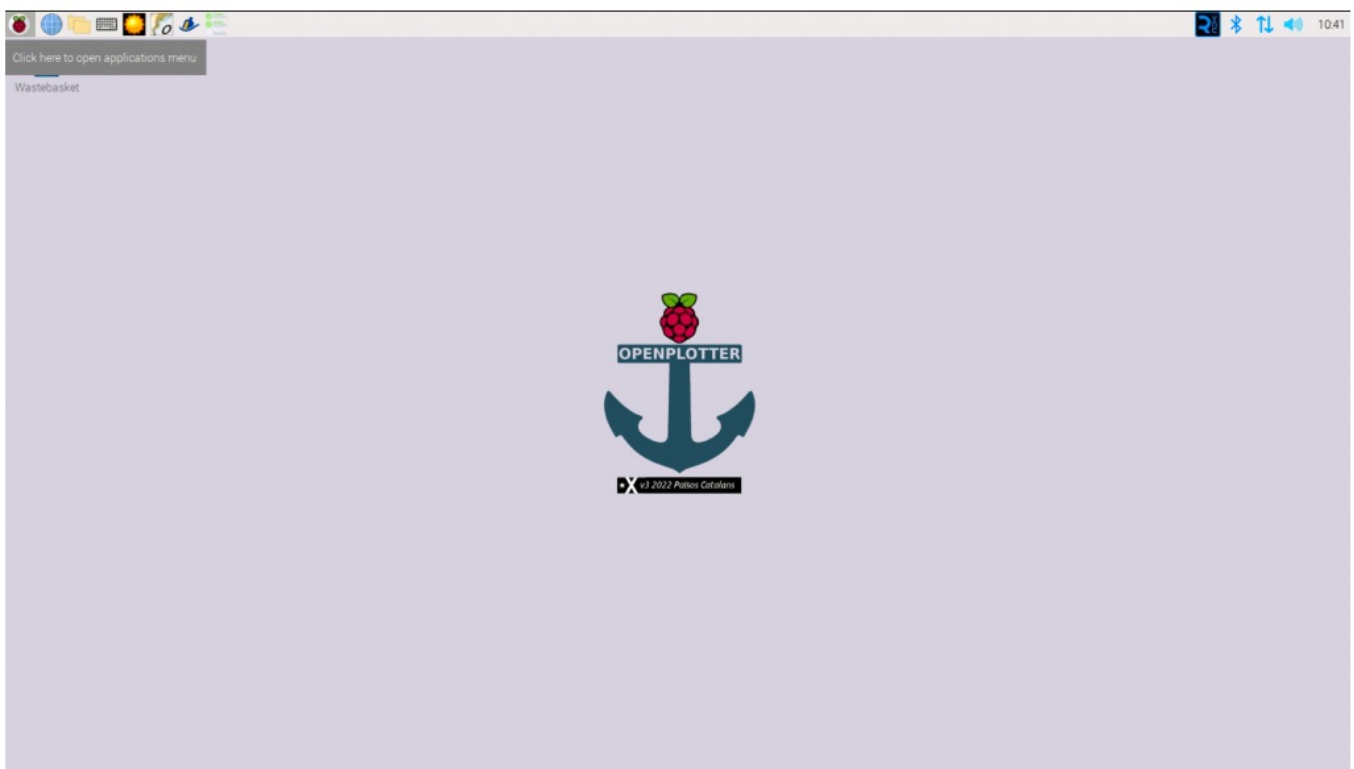
Add these lines to the end of file:

```
auto can0
iface can0 inet manual
pre-up /sbin/ip link set can0 type can bitrate 250000
up /sbin/ifconfig can0 up
down /sbin/ifconfig can0 down
```

Press CTRL-x to save then exit. Reboot Pi.

Starting OpenPlotter

Once the Raspberry Pi has booted up you should see a screen like this:

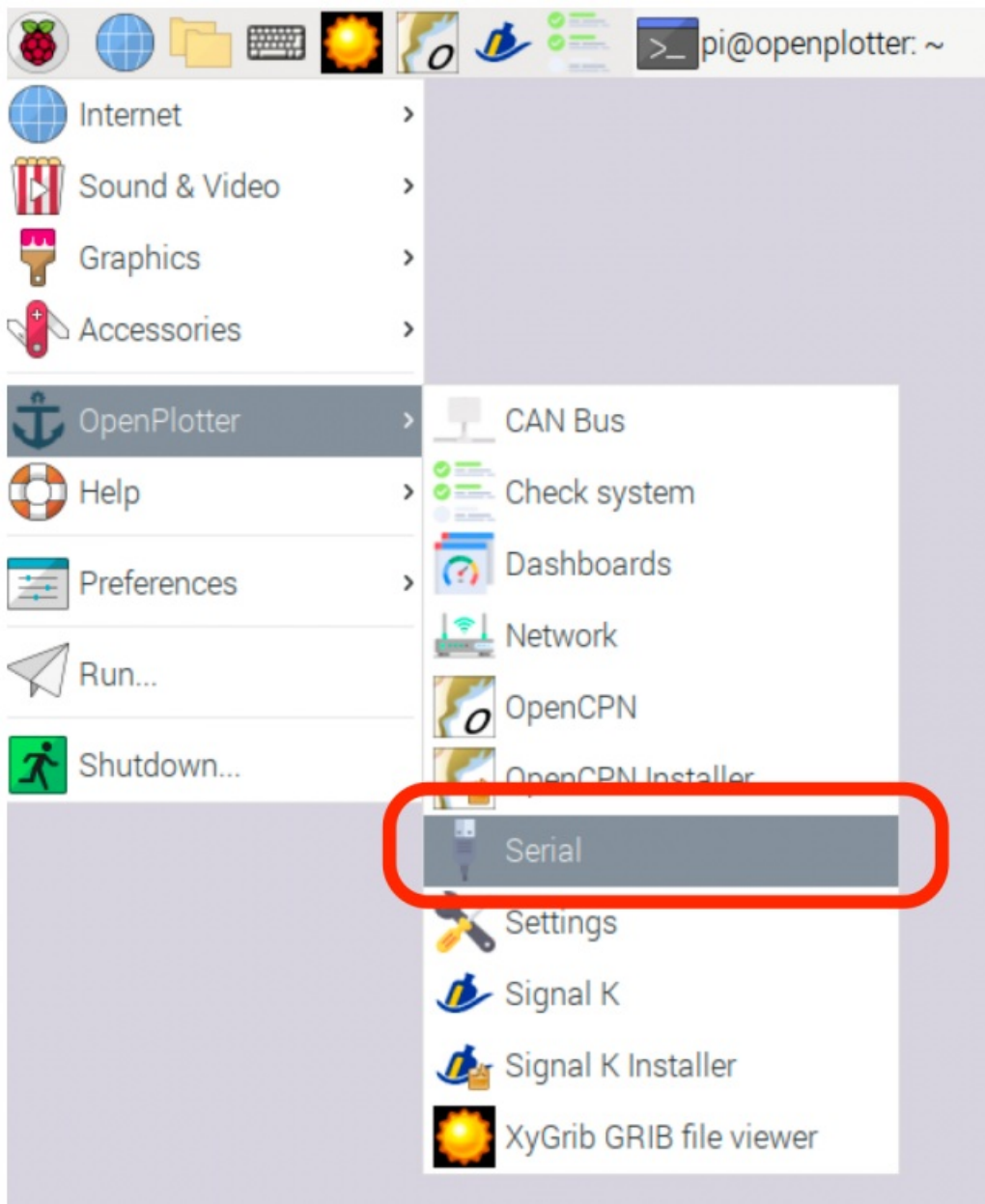


Configure GPS NMEA 0183 (RS422)

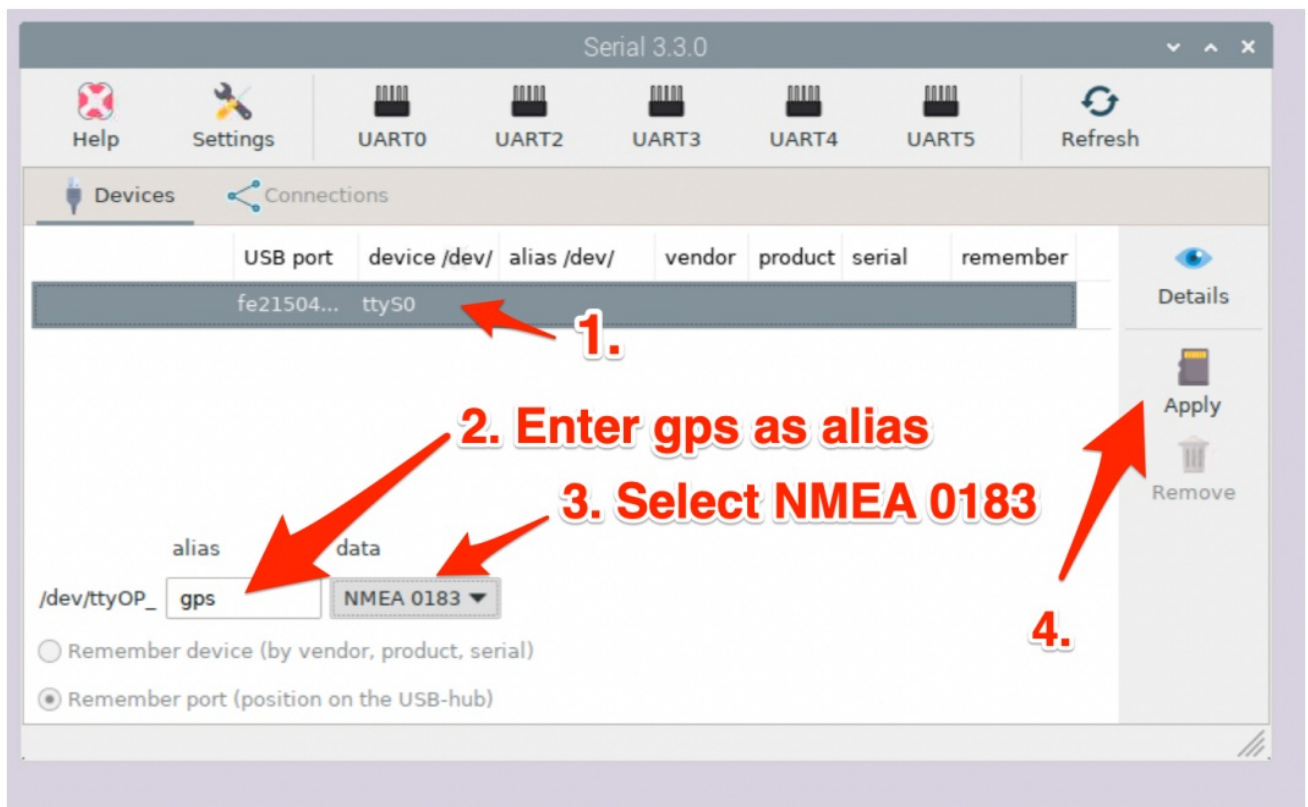
The NMEA 0183 (RS422) is connect to the Pi on UART port. This need to be enable first. Connect a NMEA 0183 GPS device to the 5 way green terminal plug like shown below:



On the Pi click OpenPlotter, Serial:

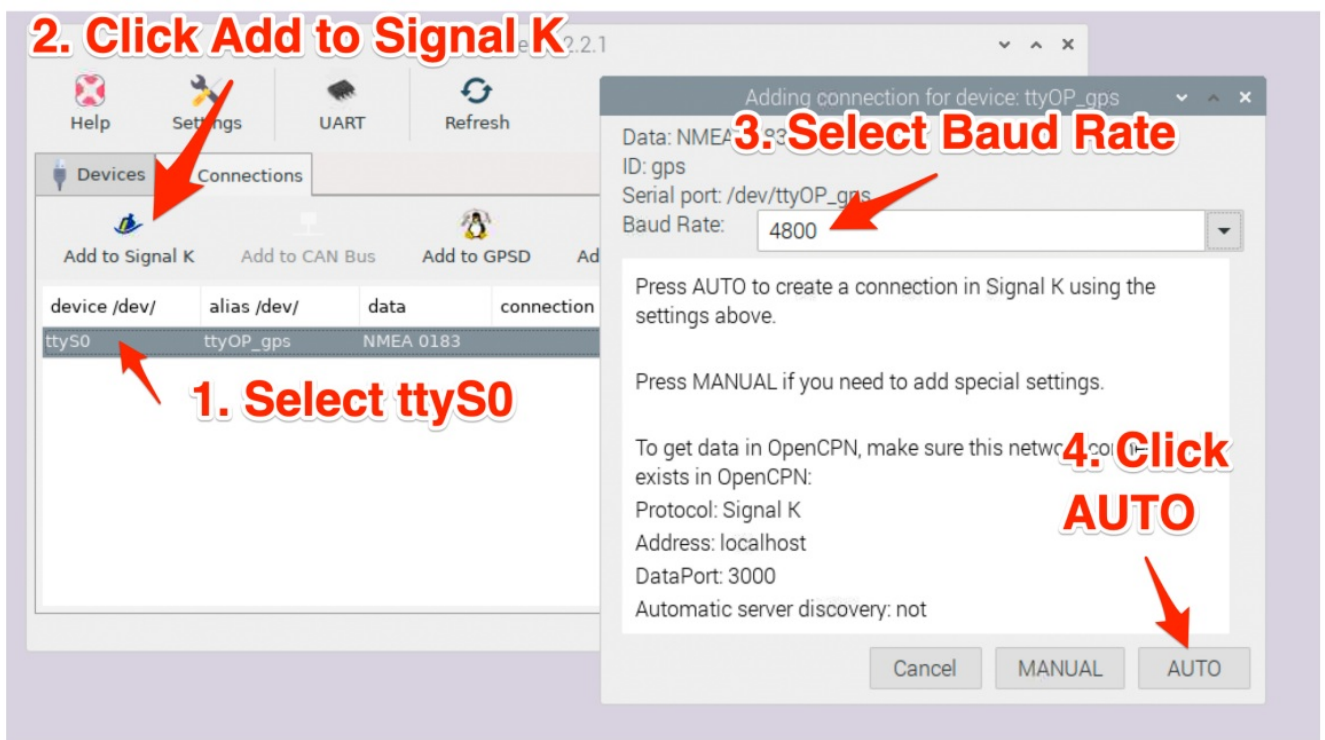


1. Select ttyS0
2. Enter gps as alias
3. Select NMEA 0183 as data
4. Click Apply

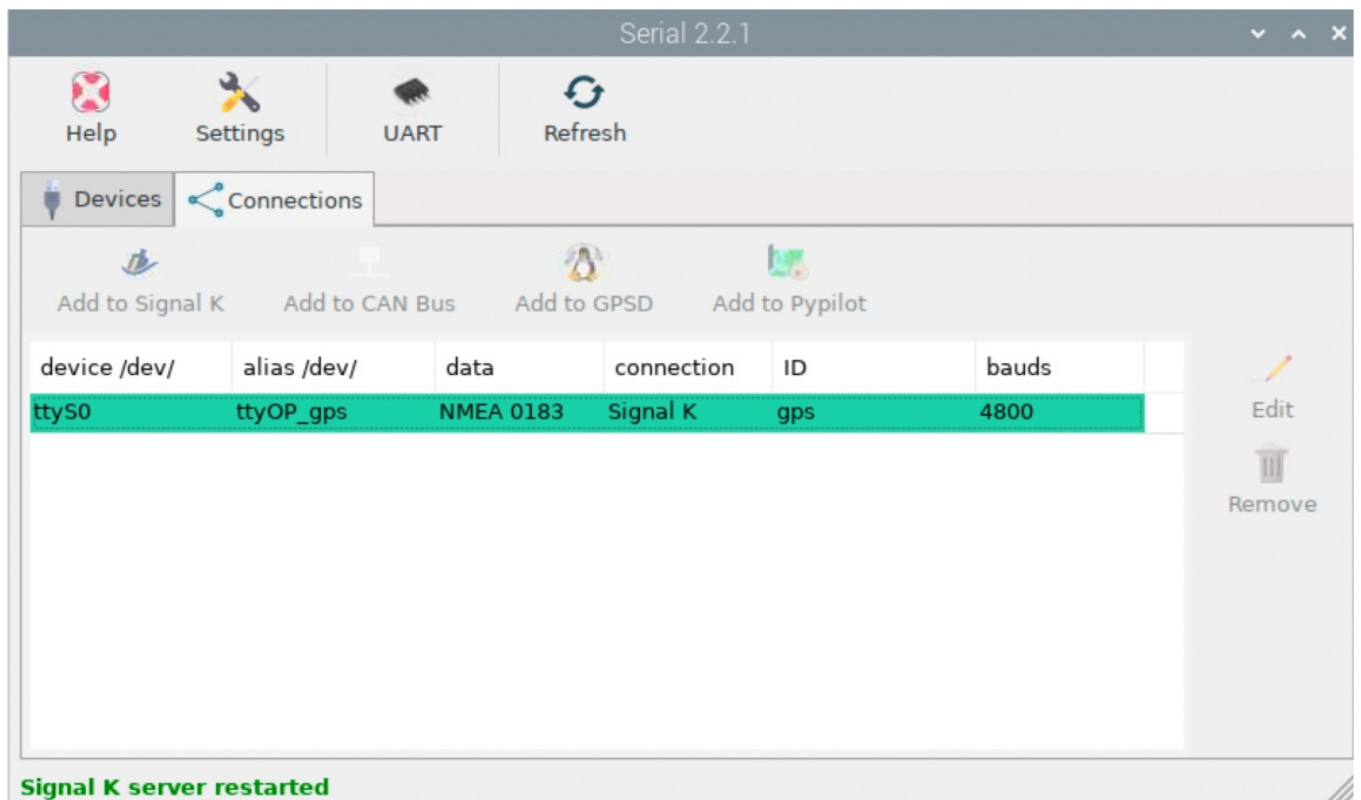


Wait until the changes has been applied. Then click Connections tab:

1. Select Connections
2. Click Add to Signal K
3. Select Baud Rate
4. Click AUTO.

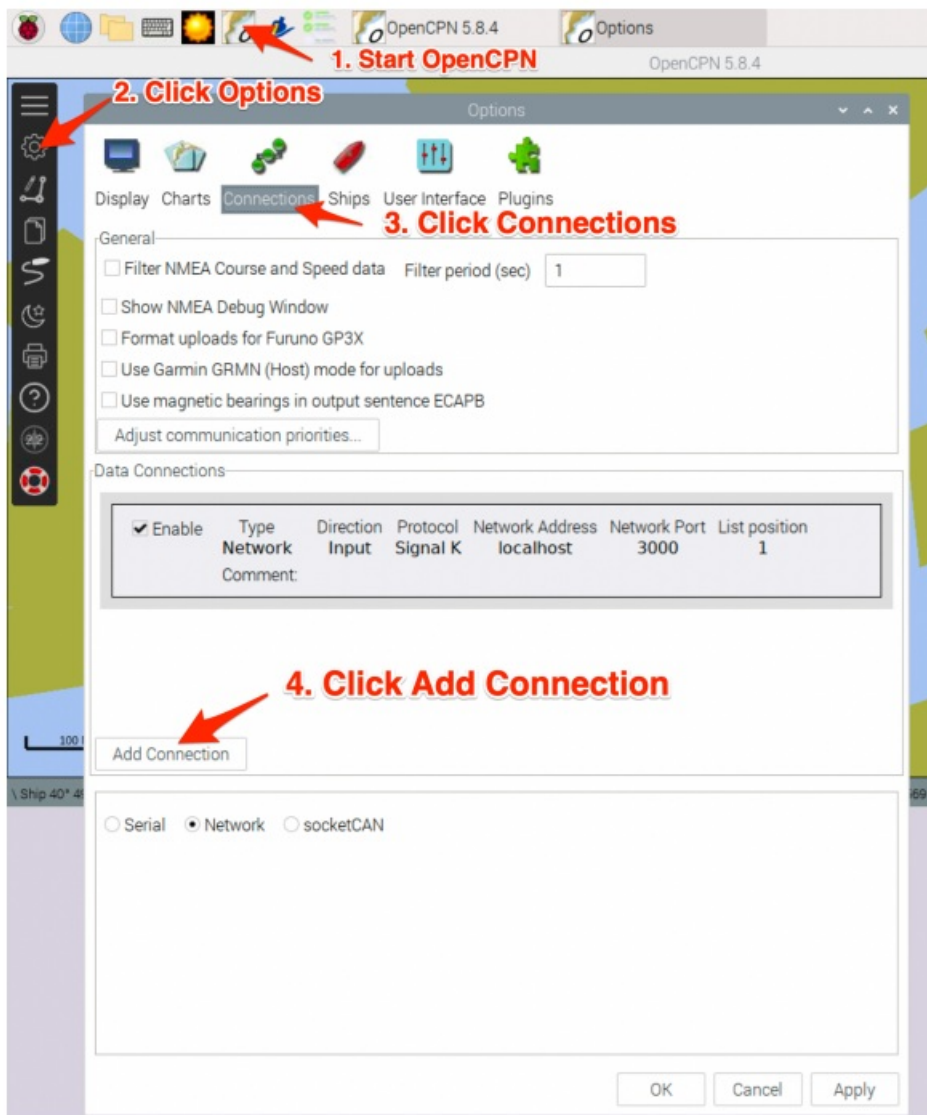


Wait until Signal K saver restart and it should look like this:



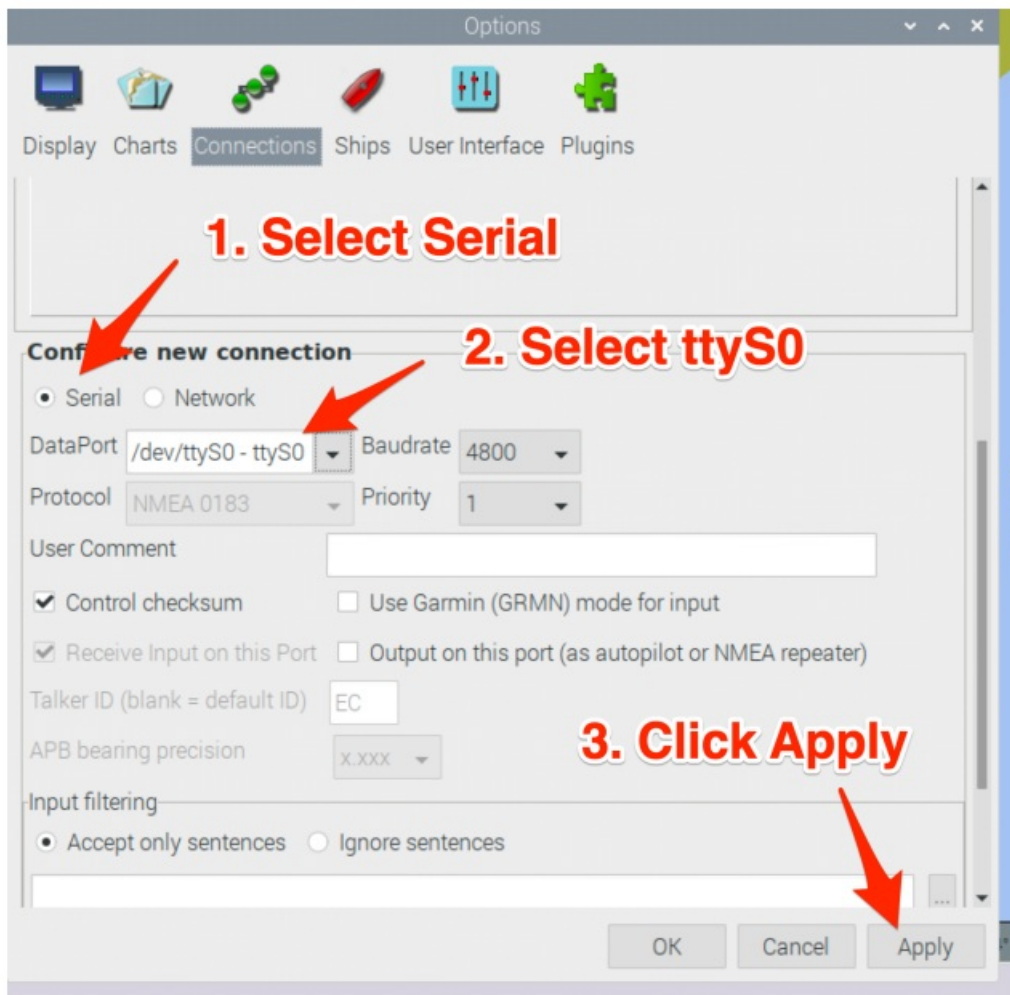
Now start OpenCPN:

1. Start OpenCPN
2. Click Options
3. Click Connections
4. Click Add Connections



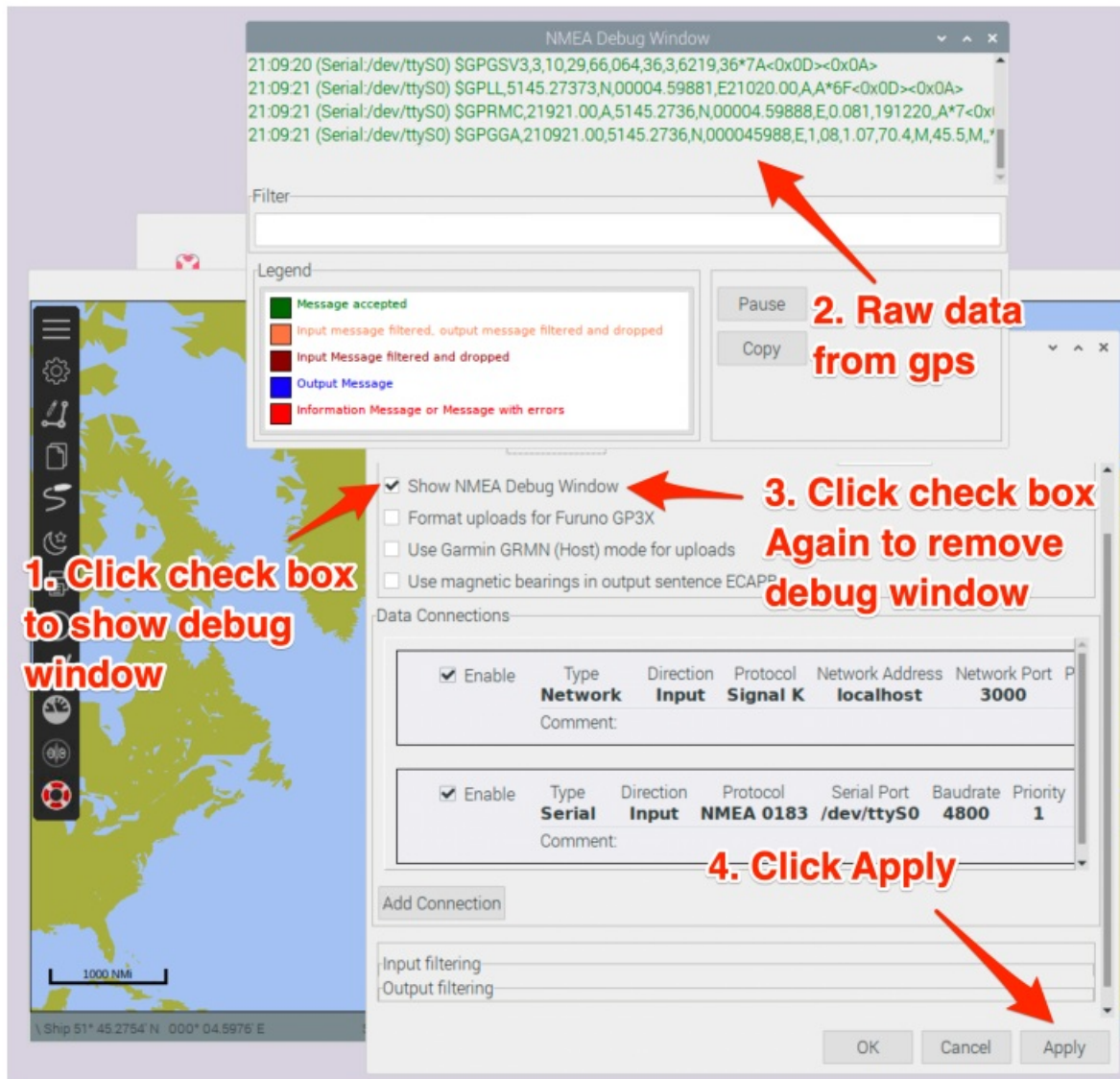
Next configure the new connections:

1. Select Serial
2. Select ttyS0
3. Click Apply



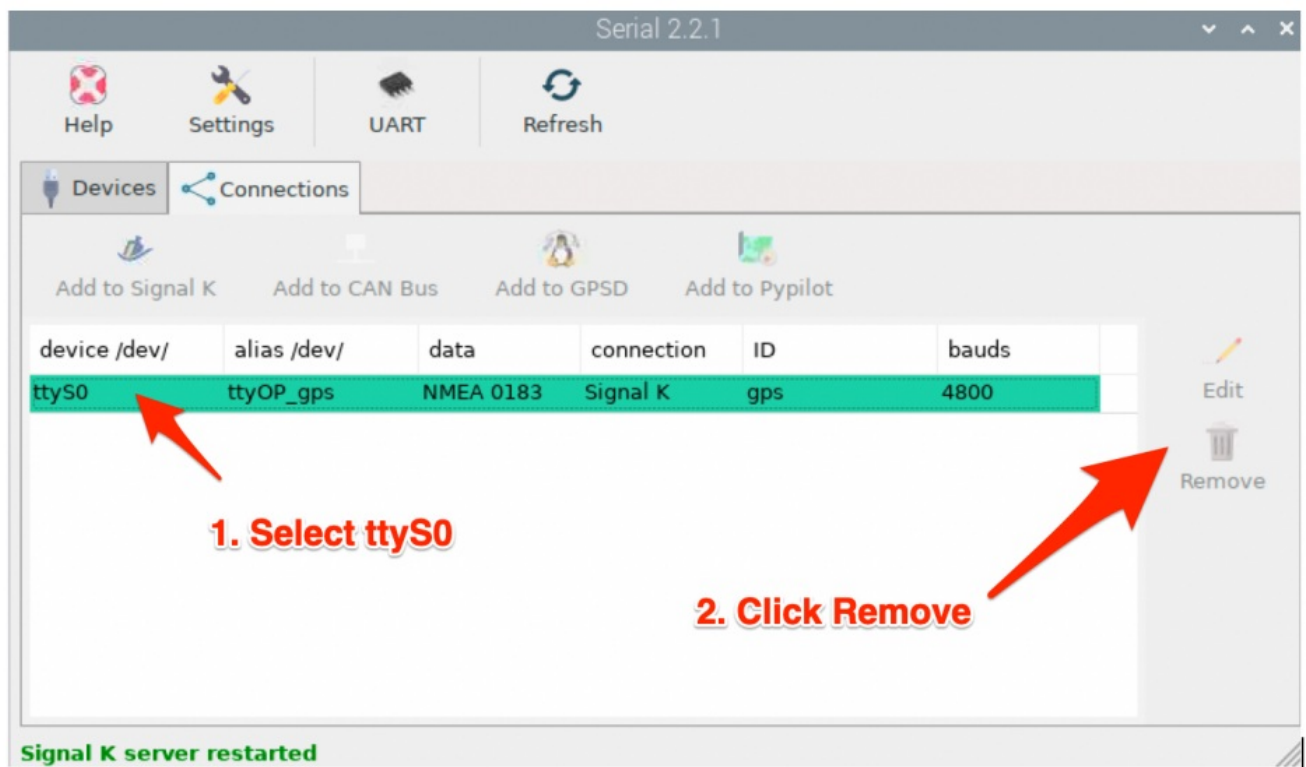
This will take you back to the main Options dialogue box:

1. Click check box to bring up debug window
2. This will show the raw gps data received
3. Click check box again to remove debug window
4. Click Apply

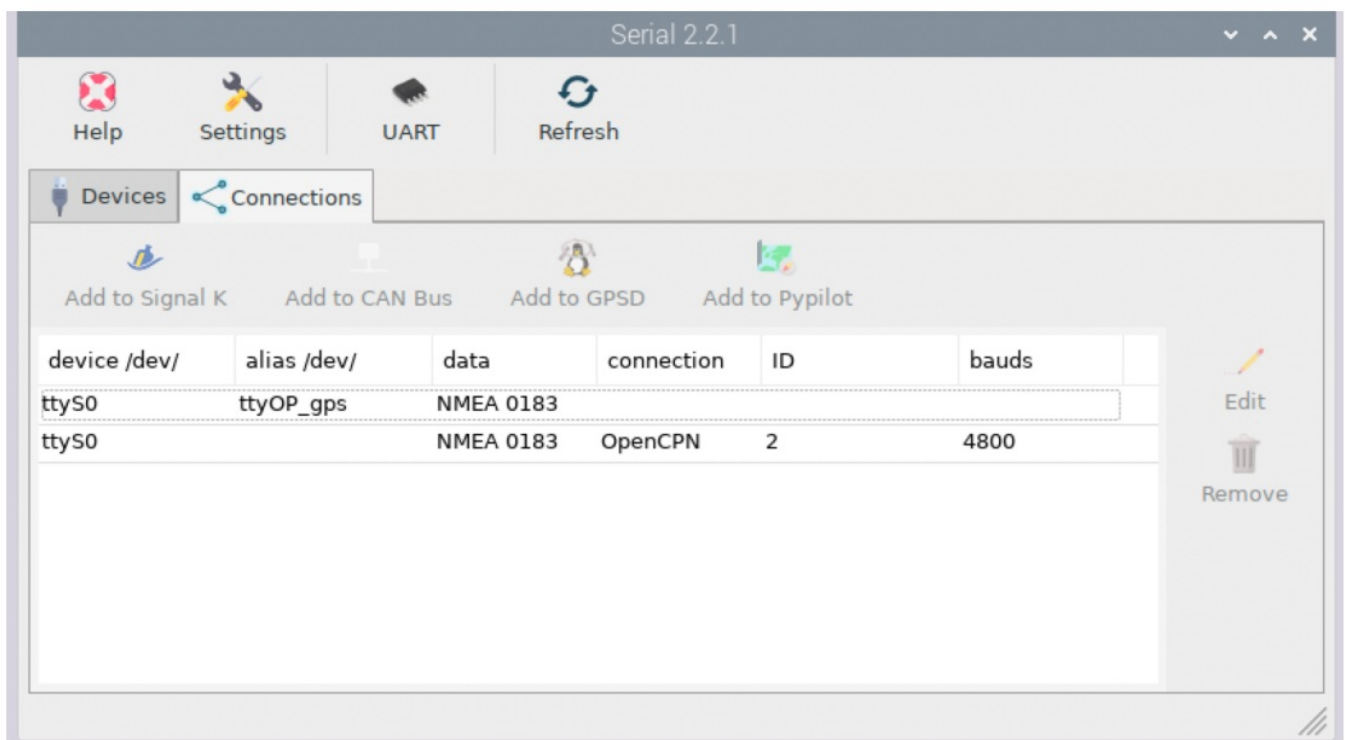


Sometimes this does not work. If this is the case close OpenCPN go back to the Serial dialogue box:

1. Select ttyS0
2. Click Remove



The close the Serial dialogue box and open it again. You should see:



Start OpenCPN again, you should then see:

1. GPS lock
2. Click Dashboard

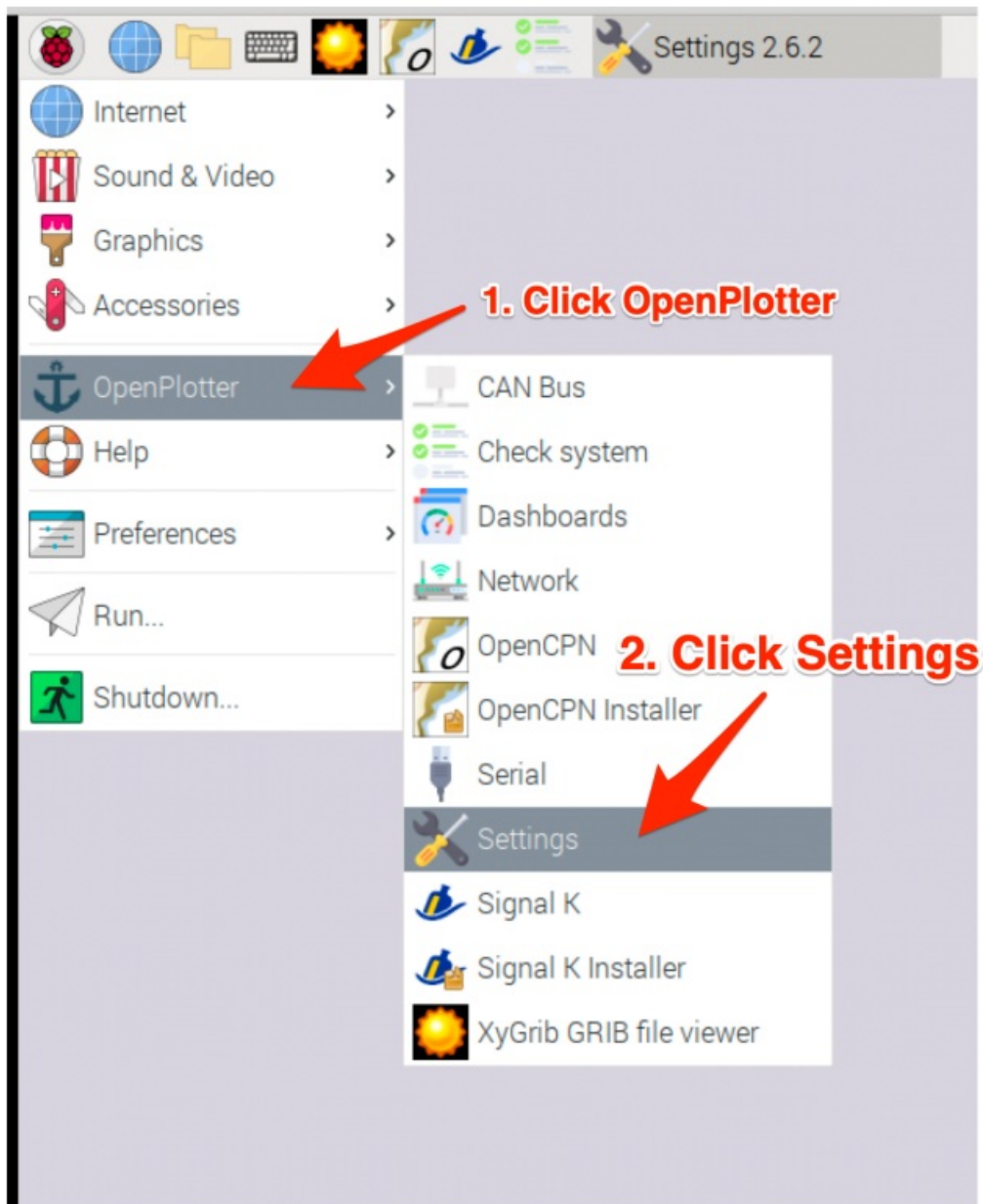


Configure I2C for BME280 Sensor

The Sparkfun BME280 sensor can provide barometric pressure, humidity, and temperature to the Raspberry Pi.

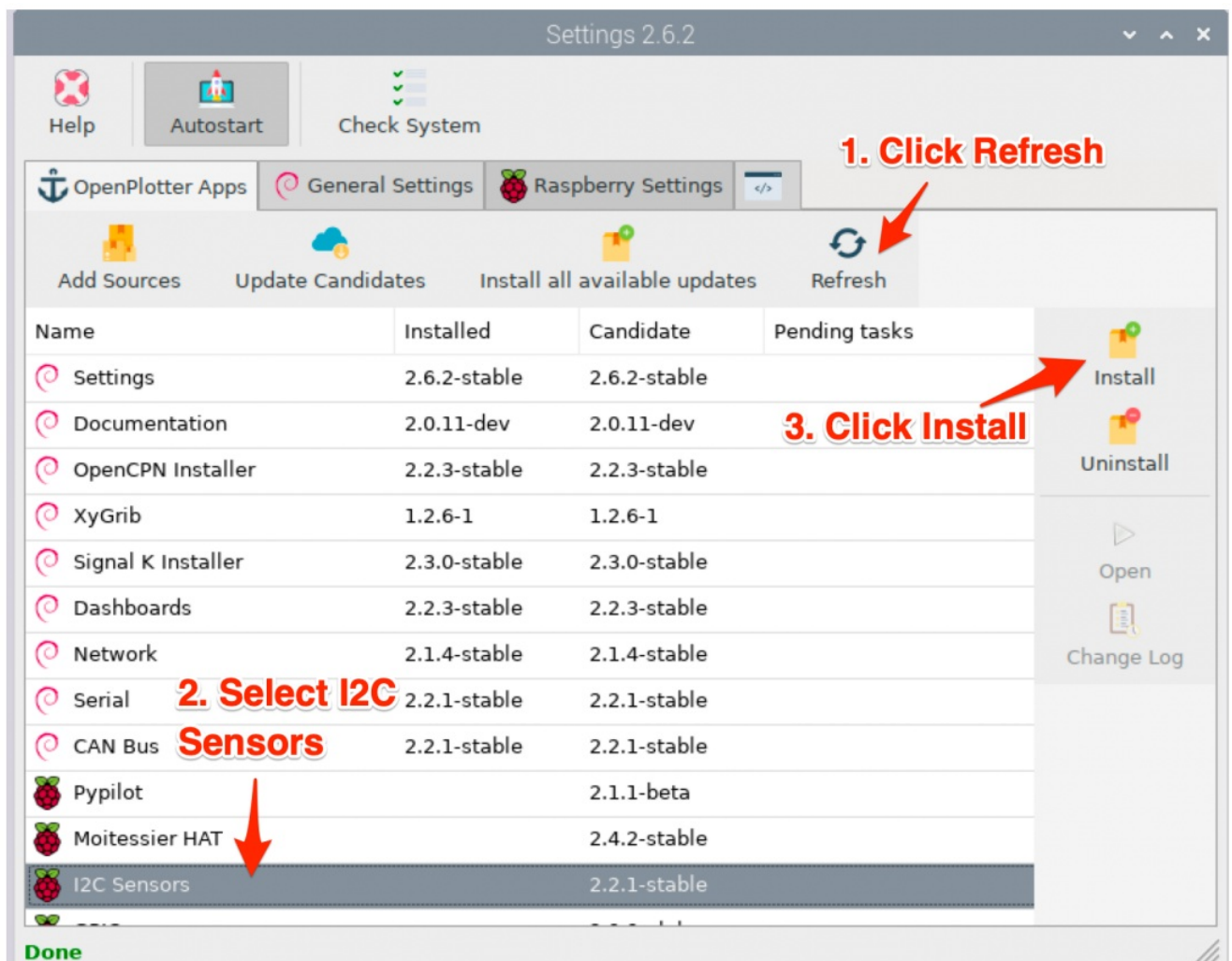
Now we need to install driver:

1. Click OpenPlotter
2. Click Settings

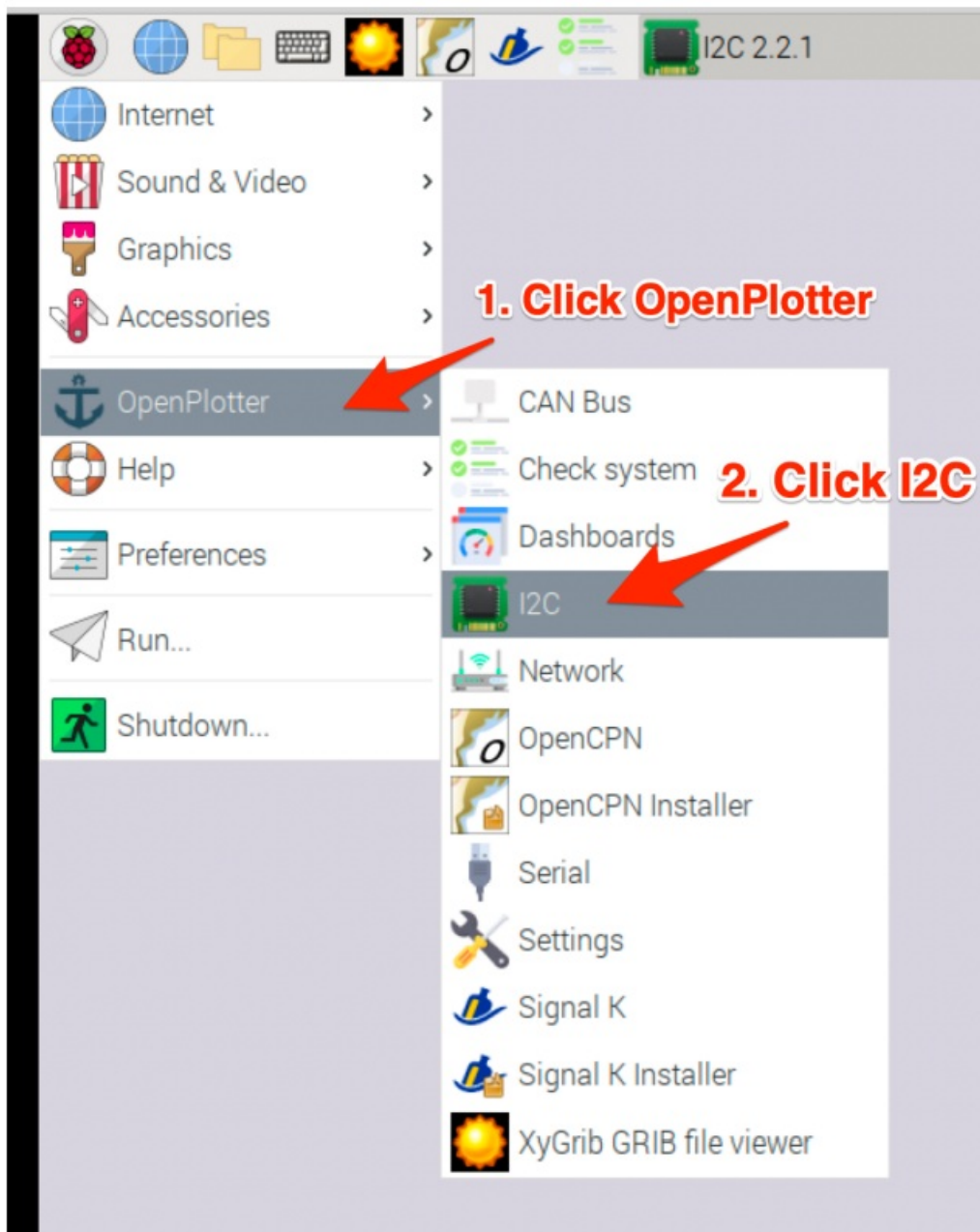


Now install the I2C Sensors:

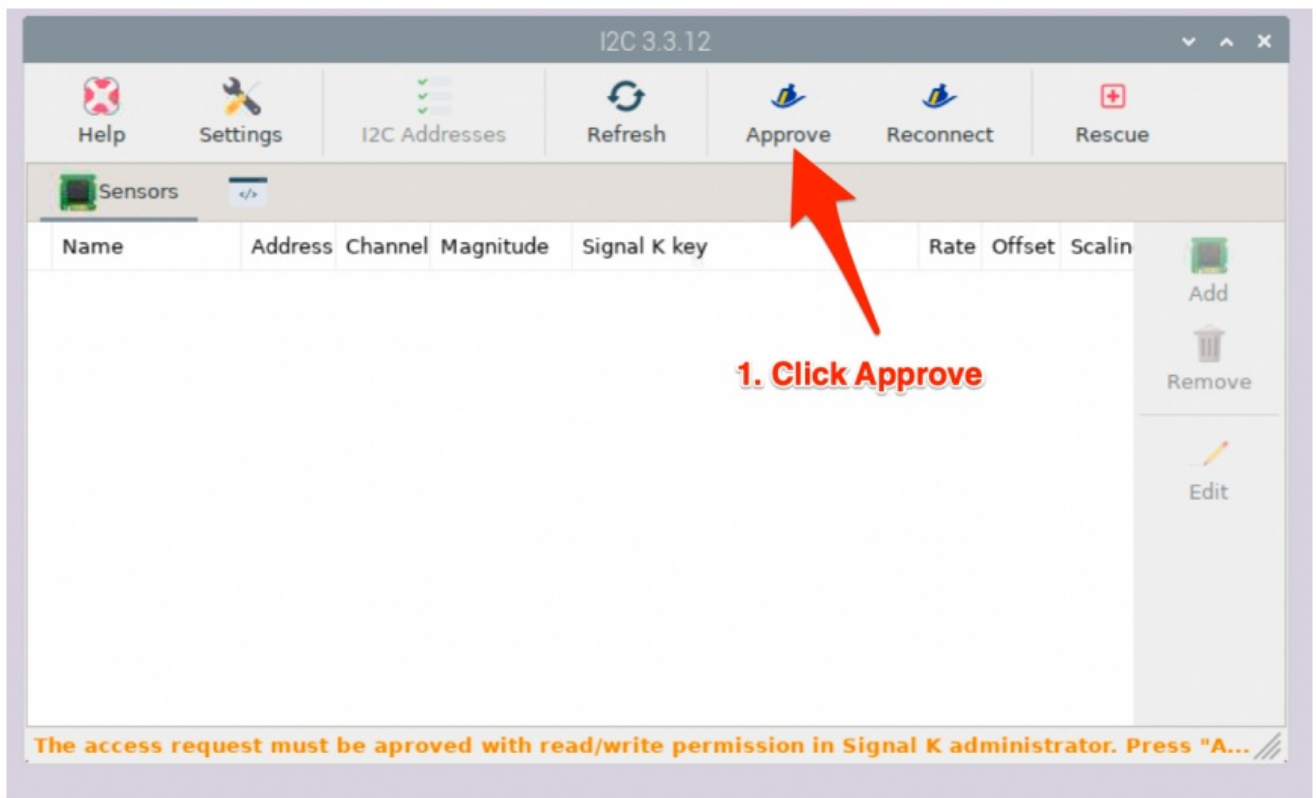
1. Click Refresh
2. Select I2C Sensors
3. Click Install, then yes. Wait until install is finished.



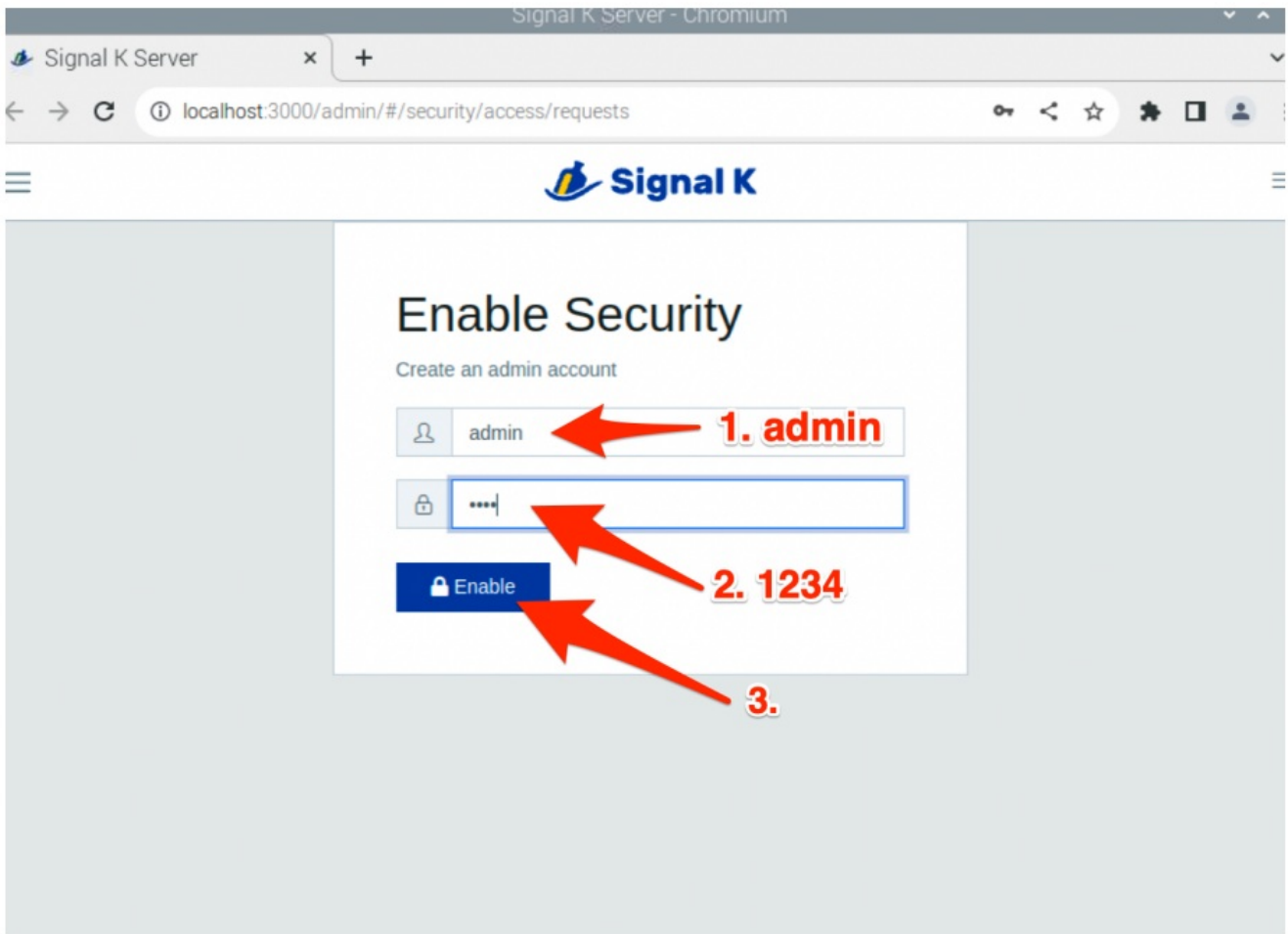
Now start the I2C dialogue box:



1. Click Approve. This will bring up Signal K.



1. Type in admin
2. Type in 1234
3. Click Enable



On the Signal K webpage:

1. Click and select OpenPlotter I2C.
2. Type in NEVER.
3. Select Read/Write.
4. Click Approve.

Signal K

Access Requests

Identifier	Description	Source IP
23a6a3f5-90f5-42eb-b4ca-a7c8e0df798e	OpenPlotter I2C	::1

1. Click

Request

Identifier: 23a6a3f5-90f5-42eb-b4ca-a7c8e0df798e

Description: OpenPlotter I2C

Authentication Timeout: NEVER

Exmaples: 60s, 1m, 1h, 1d, NEVER

Permissions: Read/Write

3. Select Read/Write

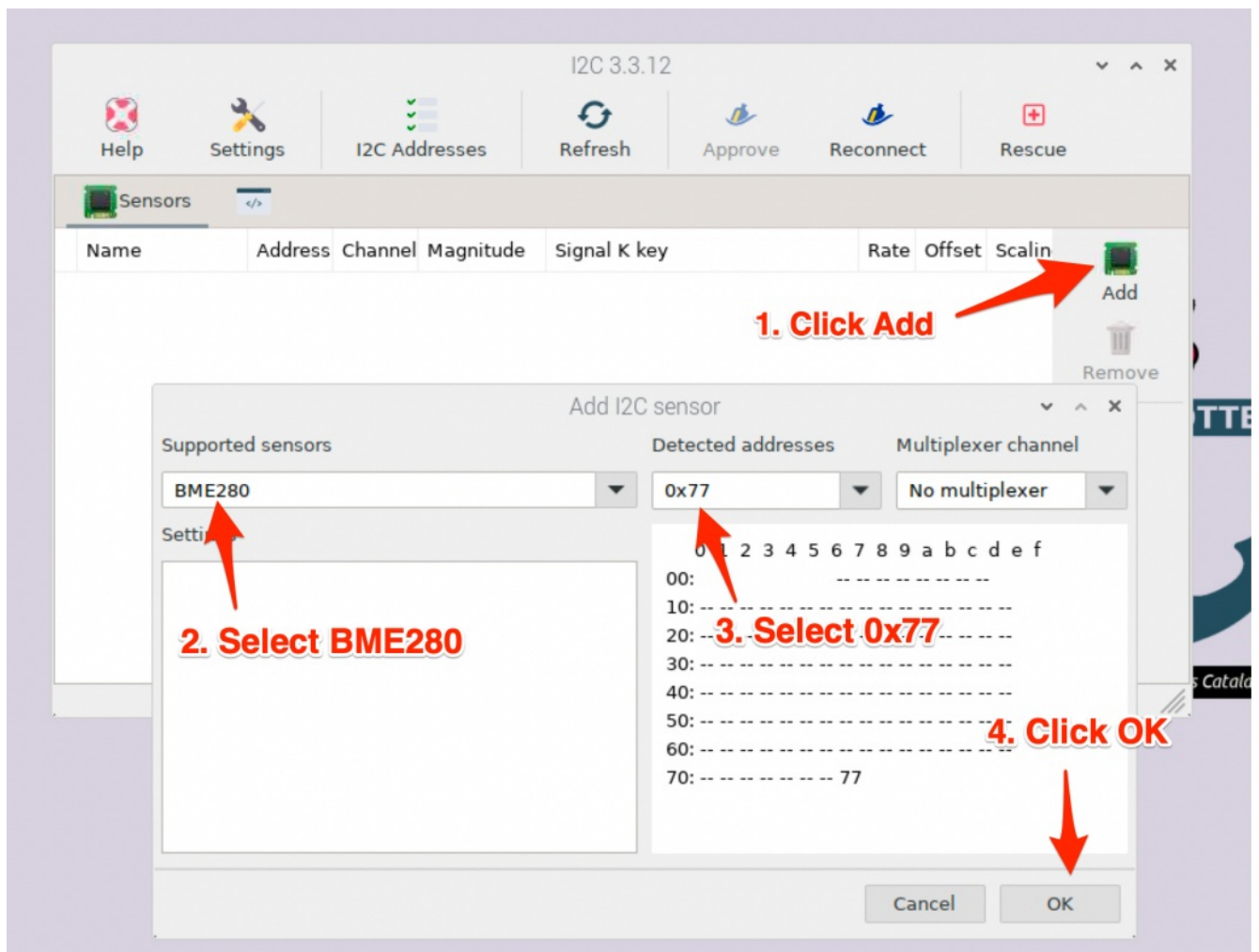
2. NEVER

4. Click

Approve Deny

Now configure the BME280 sensor:

1. Click Add
2. Select BME280
3. Select 0x77
4. Click OK



Now we need to add the missing temperature reading:

1. Select temperature
2. Click Edit
3. Click Edit

I2C 3.3.12

Help Settings I2C Addresses Refresh Approve Reconnect Rescue

Sensors

	Name	Address	Channel	Magnitude	Signal K key	Rate	Offset	Scalin
0	BME280	0x77		pressure	environment.outside.pressure	1.0	0.0	1
1	BME280	0x77		temperature		1.0	0.0	1
2	BME280	0x77		humidity	environment.inside.relativeHu...	1.0	0.0	1

Add Remove Edit

1. Select temperature

2. Click Edit

3. Click Edit

Edit BME280 - temperature

Signal K key

Edit

☐ Add raw values

Rate (seconds)

1.0

Settings

Offset

0.0

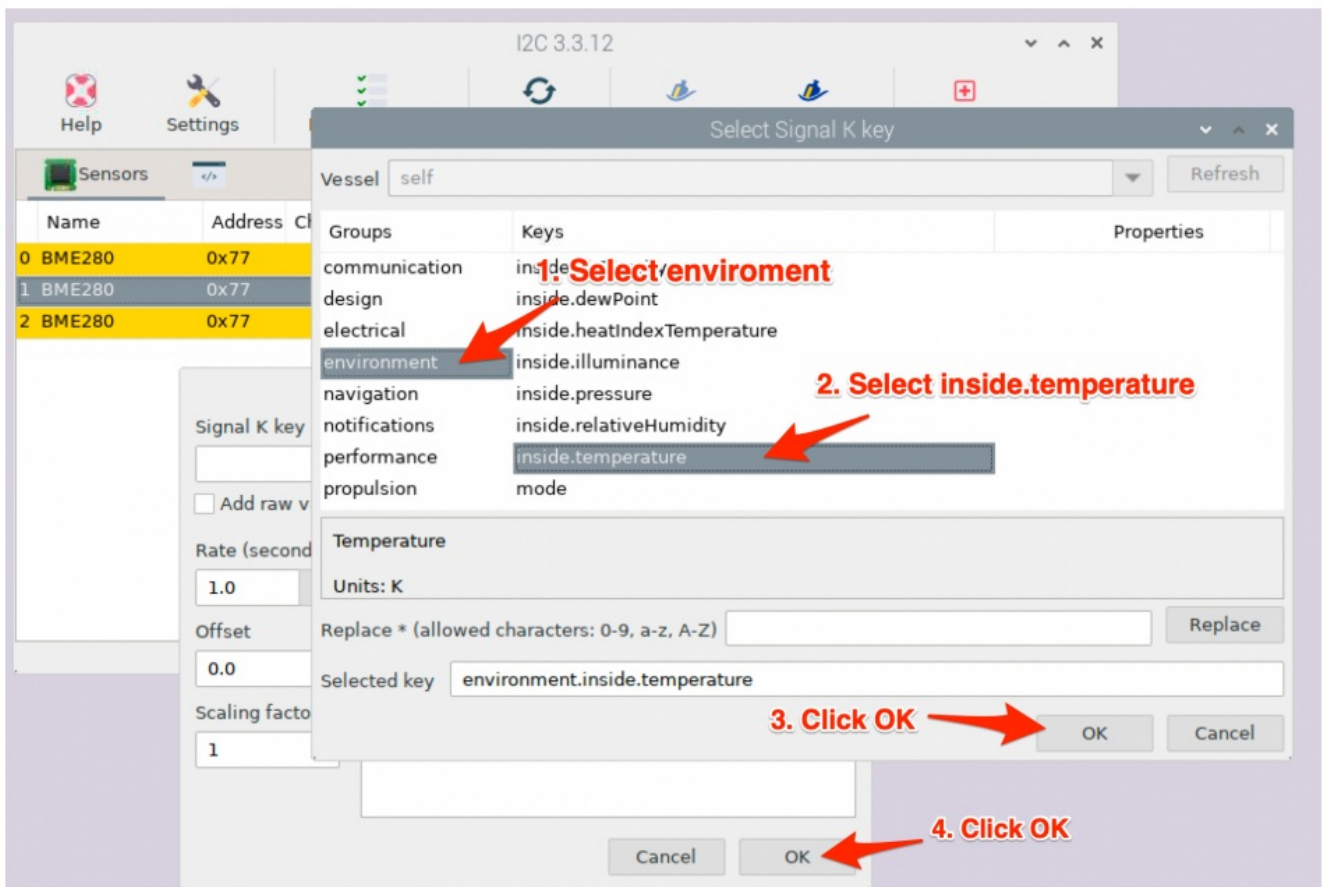
Scaling factor

1

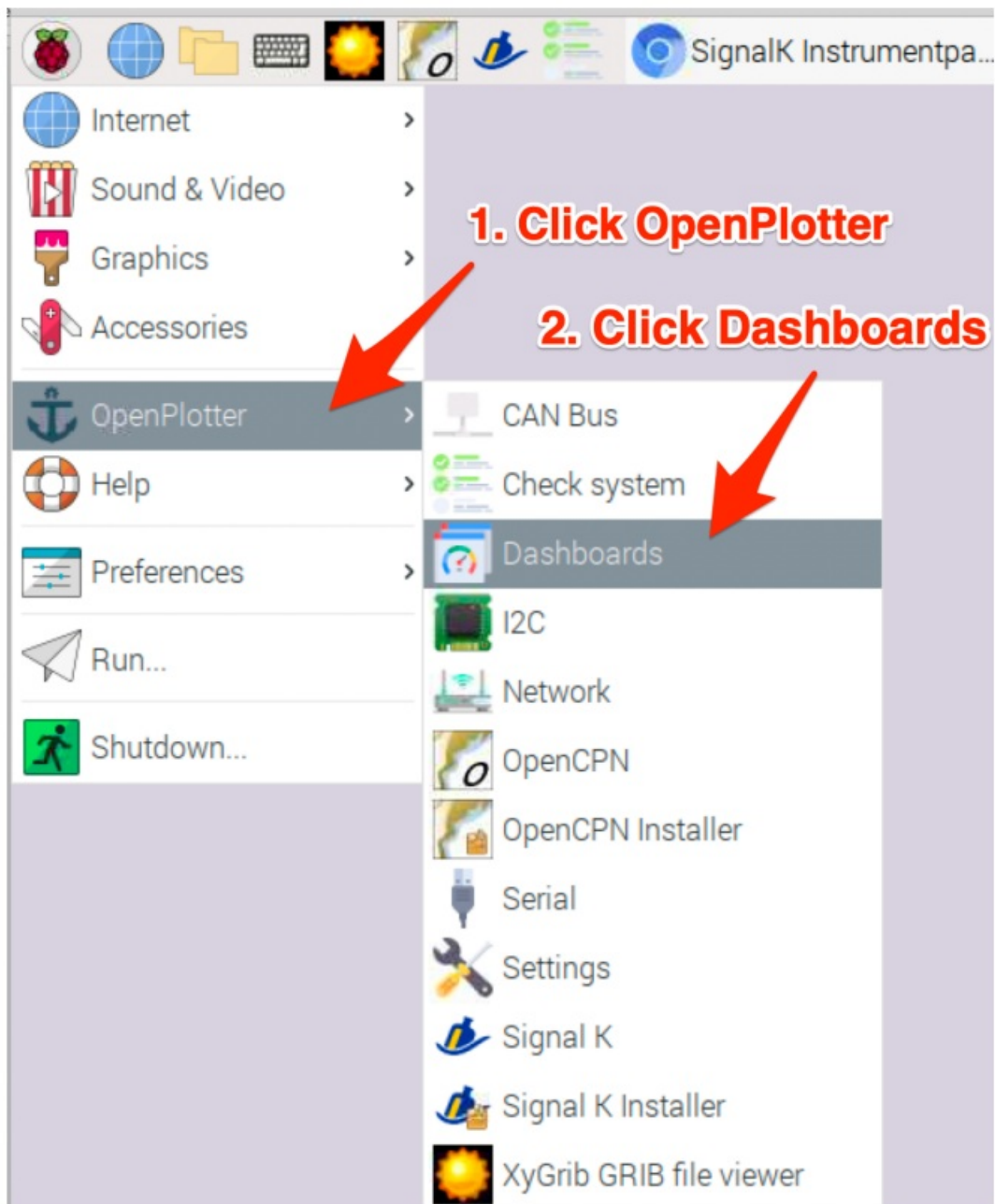
Cancel OK

Now add the temperature key:

1. Select environment
2. Select inside.temperature
3. Click OK
4. Click OK

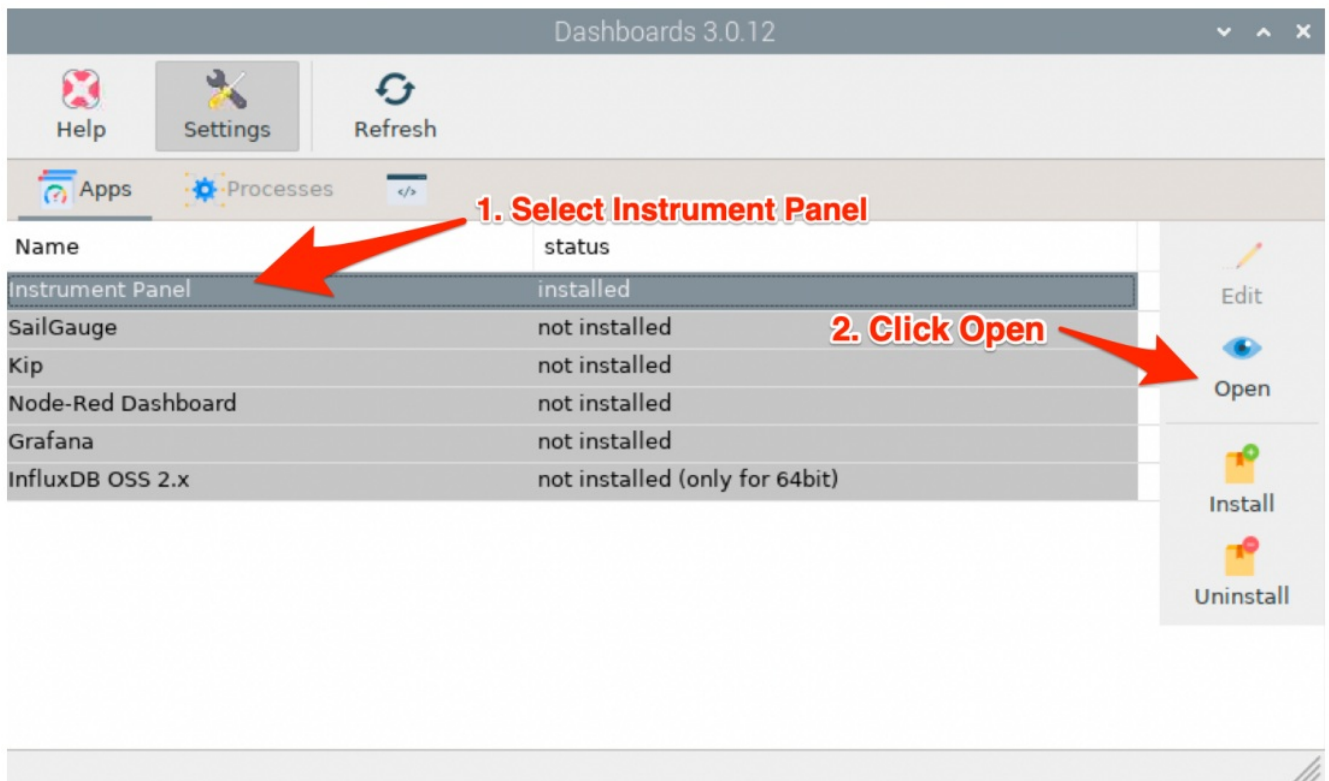


Now open Signal K Dashboards:



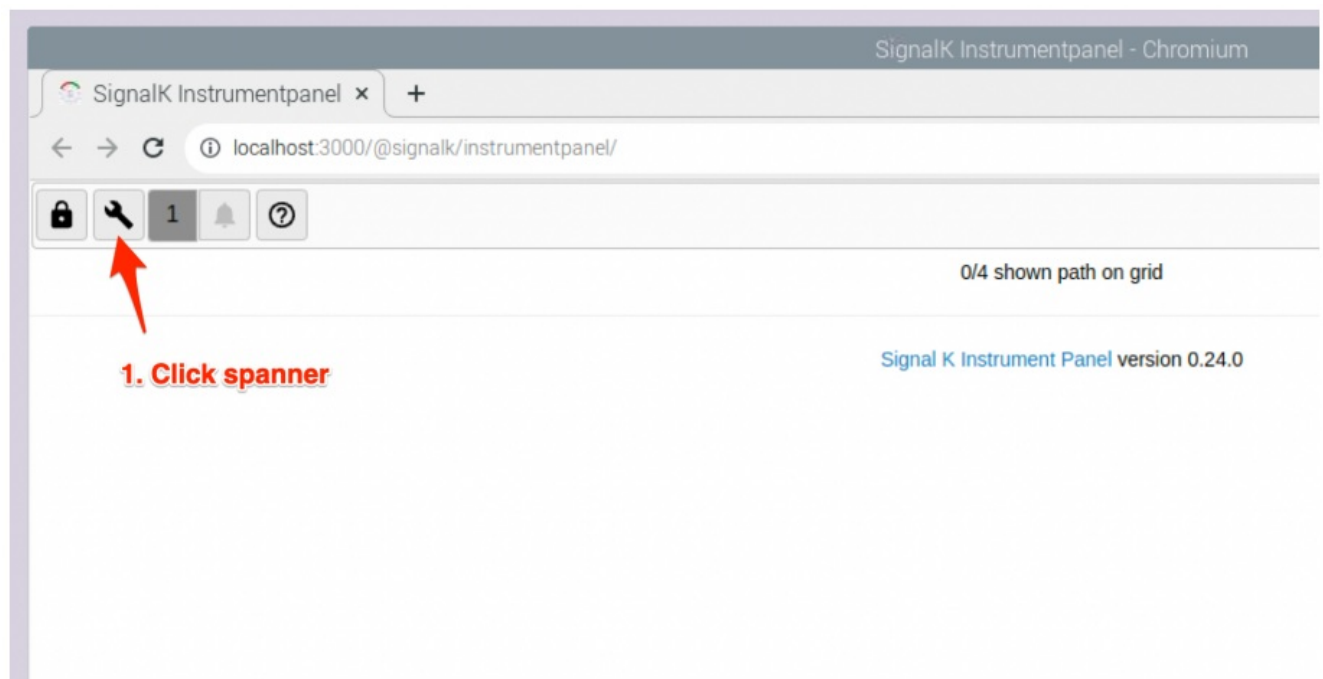
Now open Instrument Panel:

1. Select Instrument Panel
2. Click Open



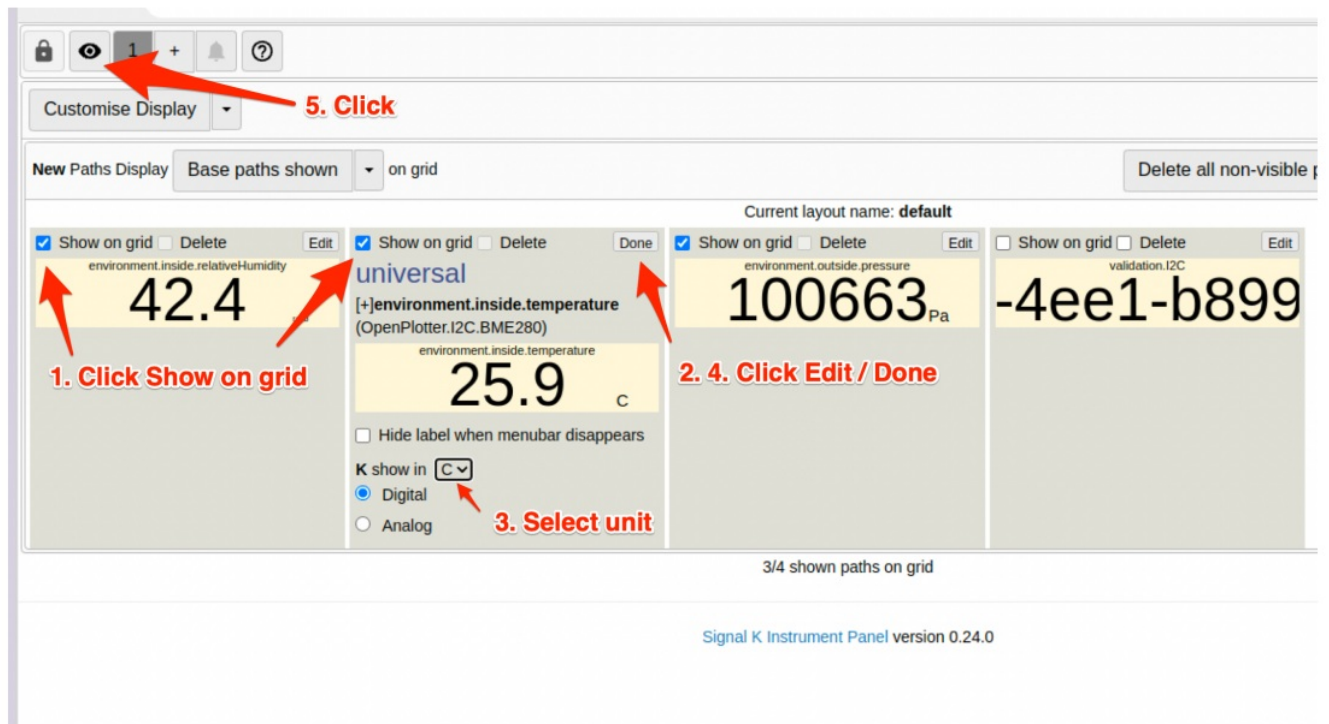
In Signal K open Customise Display (spanner symbol) :

1. Click Spanner

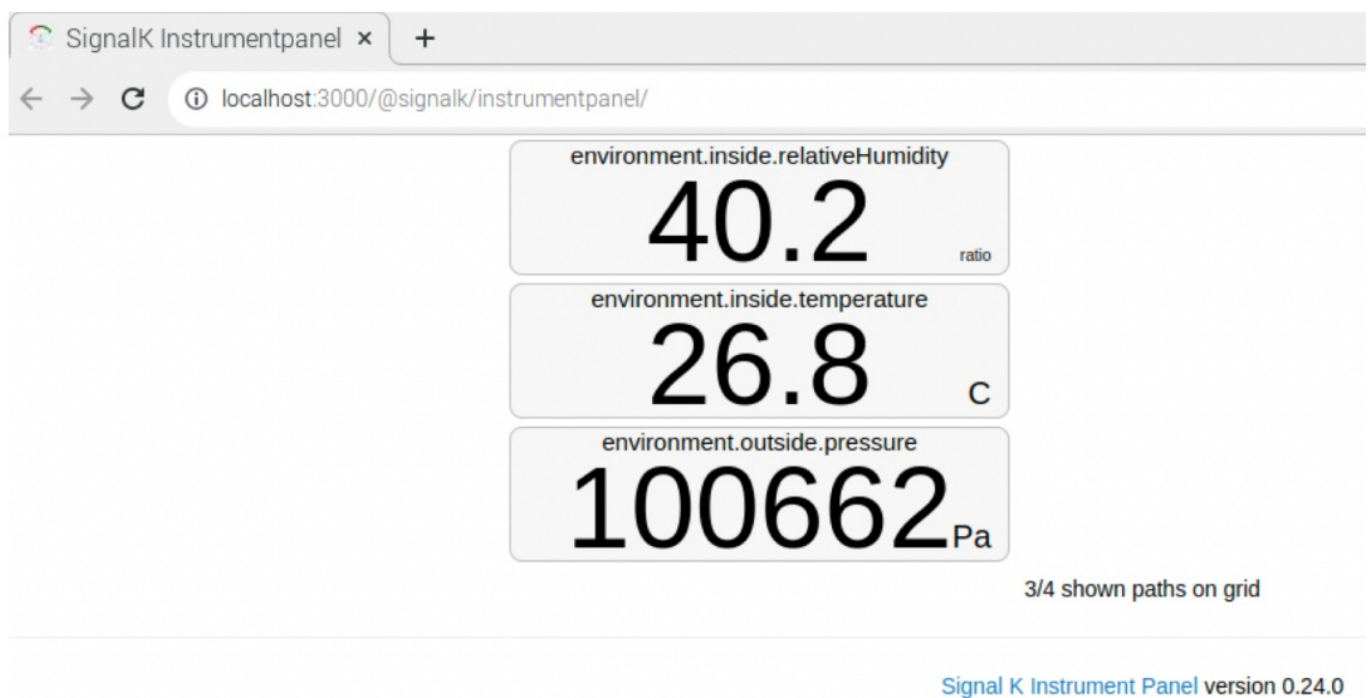


Now configure the signals:

1. Click Show on grid
2. Click Edit
3. Select unit to suit
4. Click Done. Repeat for all 3 readings
5. Click eye symbol



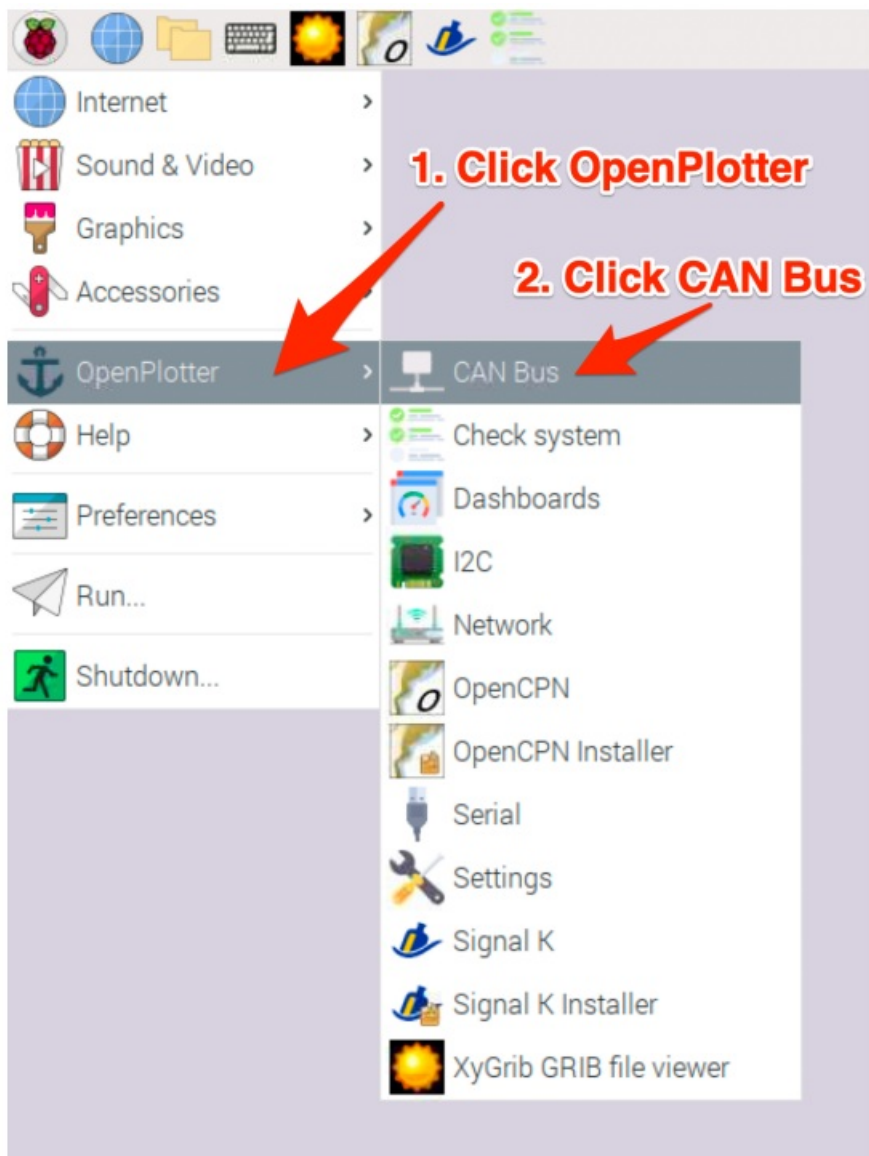
Now you should see all 3 readings on the panel:



Configure NEMA 2000

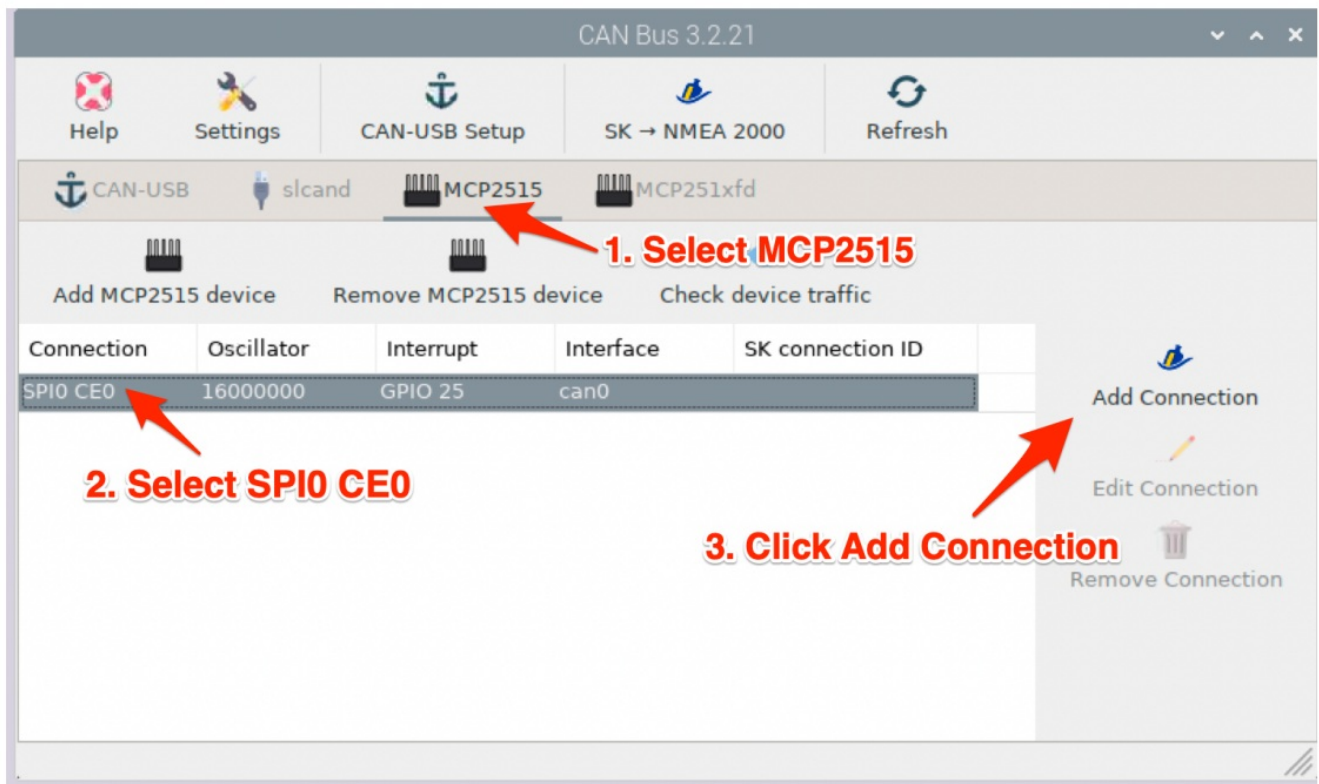
We will add a wind speed sensor and a temperature sensor from Yacht Devices Digital Thermometer NMEA 2000 YDTC-13N.

1. Click OpenPlotter
2. Click CAN Bus



Now configure CAN bus:

1. Click MCP2515
2. Select SPI0 CE0
3. Click Add Connection



Wait for Signal K to restart.

Check CAN-bus traffic:

1. Select SPI0 CE0
2. Click Check device traffic
3. Check there are CAN-bus traffic

The screenshot shows the CAN Bus 3.2.21 software interface. The top menu bar includes Help, Settings, CAN-USB Setup, SK → NMEA 2000, and Refresh. Below the menu bar, there are tabs for CAN-USB, slcand, MCP2515, and MCP2515xfd. The MCP2515 tab is selected. Under this tab, there are buttons for Add MCP2515 device, Remove MCP2515 device, and Check device traffic. The Check device traffic button is highlighted with a red arrow and labeled "2. Click Check device traffic".

Below the buttons, there is a table with the following columns: Connection, Oscillator, Interrupt, Interface, and SK connection ID. The first row is highlighted and labeled "1. Select SPI0 CE0":

Connection	Oscillator	Interrupt	Interface	SK connection ID
SPI0 CE0	16000000	GPIO 25	can0	can0

Below the table, there are buttons for Add Connection and Edit Connection. A red arrow points to the SPI0 CE0 connection, labeled "1. Select SPI0 CE0".

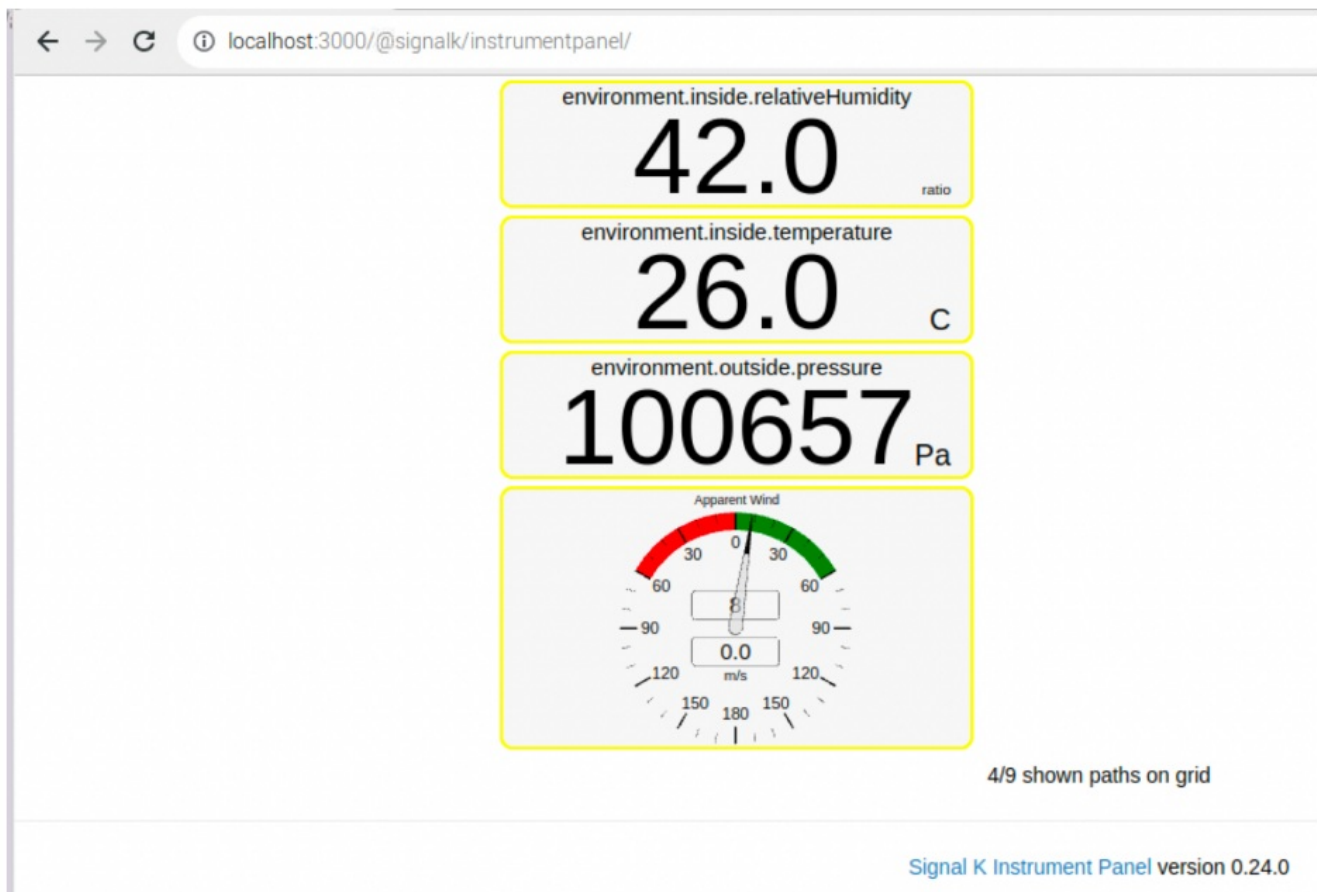
Below the main interface, there is a window titled "candump" showing CAN-bus traffic. The window has a menu bar with File, Edit, Tabs, and Help. The traffic is displayed as a list of hexadecimal values and their corresponding SK connection IDs. A red arrow points to the traffic, labeled "3. CAN-bus traffice".

```

can0 19FD0201 [8] CB 00 00 CB 05 02 FF FF
can0 15FD0634 [8] FF FF FF 89 74 FF FF FF
can0 15FD0734 [8] FF C1 89 74 FF 7F FF FF
can0 19FD0201 [8] CC 00 00 CB 05 02 FF FF
can0 19FD0201 [8] CD 00 00 CB 05 02 FF FF
can0 19FD0201 [8] CE 00 00 CB 05 02 FF FF
can0 19FD0201 [8] CF 00 00 CB 05 02 FF FF
can0 19FD0201 [8] D0 00 00 CB 05 02 FF FF
can0 15FD0634 [8] FF FF FF 89 74 FF FF FF
can0 15FD0734 [8] FF C1 89 74 FF 7F FF FF
can0 19FD0201 [8] D1 00 00 CB 05 02 FF FF
can0 19FD0201 [8] D2 00 00 CB 05 02 FF FF
can0 19FD0201 [8] D3 00 00 CB 05 02 FF FF
can0 19FD0201 [8] D4 00 00 CB 05 02 FF FF
can0 19FD0201 [8] D5 00 00 CB 05 02 FF FF
can0 15FD0634 [8] FF FF FF 89 74 FF FF FF
can0 15FD0734 [8] FF C1 89 74 FF 7F FF FF
can0 15FD0834 [8] FF 00 01 89 74 FF FF FF
can0 15FD0C34 [8] FF 00 01 5A 8D 04 FF FF
can0 19FD0201 [8] D6 00 00 CB 05 02 FF FF
can0 19FD0201 [8] D7 00 00 CB 05 02 FF FF
can0 19FD0201 [8] D8 00 00 CB 05 02 FF FF
can0 19FD0201 [8] D9 00 00 CB 05 02 FF FF
  
```

If you see CAN-bus traffic that means the board has been configured correctly.
Close candump.

Open Signal K Instrument Panel and you should see the NMEA 2000 devices. Configure the units as required.




Customer Support


SK Pang Electronics Ltd Ó 2023
www.skpang.co.uk

SK Pang electronics

Documents / Resources

 <p>PICAN-M User Guide Qualified for Signal K Installation Guide Version 1.0.0</p>	<p>SK Pang electronics RSP-PICAN-M CAN-Bus Micro-C Connector [pdf] User Guide RSP-PICAN-M, RSP-PICAN-M CAN-Bus Micro-C Connector, CAN-Bus Micro-C Connector, Micro-C Connector, Connector</p>
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References

-  [SK Pang Electronics Ltd - Electronic supply for engineer and hobbyist](#)
-  [Raspberry Pi OS – Raspberry Pi](#)

Manuals+.