

TENTASense User Guide

Battery: 3135 mV
01101000 S1 H:36.36 T: 22.57
01101000 S2 H:35.90 T: 22.60
01101000 S3 H:36.66 T: 22.67
Battery: 3135 mV
01101100 S1 H:38.61 T: 20.46
01101100 S2 H:38.95 T: 20.36
01101100 S3 H:38.67 T: 20.65
Battery: 3135 mV
01101200 S1 H:42.93 T: 19.06
01101200 S2 H:42.94 T: 19.03
01101200 S3 H:43.04 T: 19.16
Battery: 3135 mV
01101300 S1 H:51.44 T: 17.51
01101300 S2 H:51.85 T: 17.39
01101300 S3 H:51.22 T: 17.67
Battery: 3135 mV
01101400 S1 H:50.89 T: 17.65
01101400 S2 H:51.06 T: 17.54
01101400 S3 H:51.25 T: 17.57
Battery: 3135 mV
01101500 S1 H:53.44 T: 14.77
01101500 S2 H:53.82 T: 14.64
01101500 S3 H:53.04 T: 14.90
Battery: 3135 mV
01101600 S1 H:46.84 T: 16.24
01101600 S2 H:47.07 T: 16.14
01101600 S3 H:47.56 T: 16.05
Battery: 3135 mV
01101700 S1 H:45.89 T: 16.27
01101700 S2 H:46.07 T: 16.22
01101700 S3 H:46.63 T: 16.25
Battery: 3135 mV
01101800 S1 H:46.22 T: 16.29
01101800 S2 H:46.40 T: 16.29
01101800 S3 H:46.58 T: 16.29
Battery: 3135 mV
01101900 S1 H:46.52 T: 14.11
01102101 S2 H:46.77 T: 13.94
01102101 S3 H:46.25 T: 13.90
Battery: 3135 mV
01102201 S1 H:45.73 T: 13.63
01102201 S2 H:46.09 T: 13.46
01102201 S3 H:46.36 T: 13.41

01101300 S2 H:52.83 T: 17.25
01101300 S3 H:50.75 T: 18.62
Battery: 3139 mV
01101400 S1 H:51.00 T: 18.83
01101400 S2 H:50.90 T: 18.82
01101400 S3 H:43.72 T: 19.04
Battery: 3135 mV
01101500 S1 H:52.86 T: 17.35
01101500 S2 H:51.51 T: 17.26
01101500 S3 H:51.82 T: 17.60
Battery: 3135 mV
01101600 S1 H:51.79 T: 17.22
01101600 S2 H:50.44 T: 17.22
01101600 S3 H:51.33 T: 17.72
Battery: 3135 mV
01101600 S1 H:47.67 T: 16.30
01101600 S2 H:46.31 T: 16.21
01101600 S3 H:47.44 T: 16.26
Battery: 3135 mV
01101700 S1 H:46.67 T: 16.32
01101700 S2 H:45.35 T: 16.22
01101700 S3 H:46.55 T: 16.22
Battery: 3135 mV
01101800 S1 H:47.21 T: 15.90
01101800 S2 H:45.96 T: 15.77
01101800 S3 H:47.00 T: 15.83
Battery: 3135 mV
01101901 S1 H:46.13 T: 15.43
01101901 S2 H:44.90 T: 15.29
01101901 S3 H:45.88 T: 15.38
Battery: 3135 mV
01102001 S1 H:46.59 T: 14.76
01102001 S2 H:45.49 T: 14.58
01102001 S3 H:46.40 T: 14.68
Battery: 3135 mV
01102301 S2 H:47.7 T: 14.07
01102301 S3 H:47.8 T: 14.07
Battery: 3139 mV
02100001 S1 H:46.40 T: 13.70
02100001 S2 H:45.34 T: 13.52
02100001 S3 H:46.20 T: 13.62
Battery: 3135 mV
01102301 S1 H:46.45 T: 13.40
01102301 S2 H:45.27 T: 13.21
01102301 S3 H:46.14 T: 13.29
Battery: 3135 mV
02100001 S1 H:41.77 T: 15.48
02100001 S2 H:40.42 T: 15.39

Assembly and Setup

1. Connect the red microcontroller (Figure 1) to the rigid (Figure 2) or flexible sensor board (Figure 3). Be very careful connecting and disconnecting the microcontroller to the yellow flexible substrate – the flexible substrate is very fragile and can break easily.

NB: Do not insert the microcontroller with batteries connected.

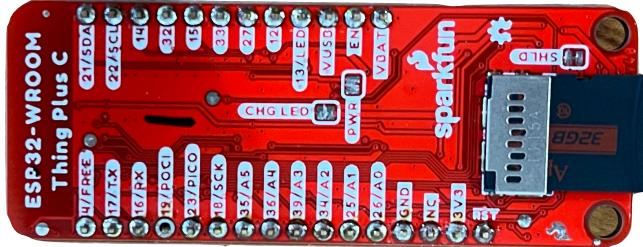


Figure 1: Microcontroller



Figure 2: Rigid sensor board



Figure 3: Flexible sensor board (with microcontroller connected).

2. Once the microcontroller is connected, insert 2 × AA batteries into the battery compartment on the sensor board.
3. Connect to the TENTASense using a bluetooth serial app: nRF Connect (Figure 4) works well, and is available for [Windows](#), [iOS](#) and [Android](#). Look for the **TENTASense-{XX}(-F)** device, where {XX} is a number between 01 and 12 that matches the number written on the back of the microcontroller. The **-F** suffix in the name indicates a flexible sensor board.
 - a. Once connected, you may need to enable logging of messages sent by the TENTASense module in nRF Connect. Select the Client screen and tap/click the down arrow under UART TX Characteristic (Figure 5).
 - b. Next, select the Log screen to see messages from the TENTASense (Figure 6).

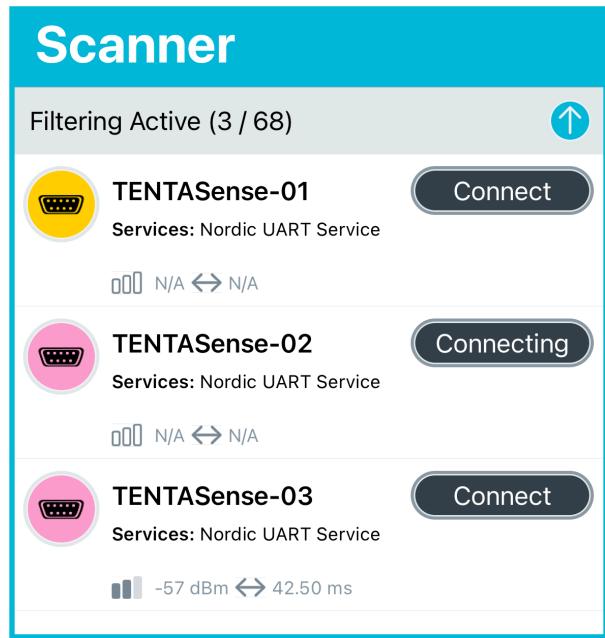


Figure 4: nRF Connect scanner screen.

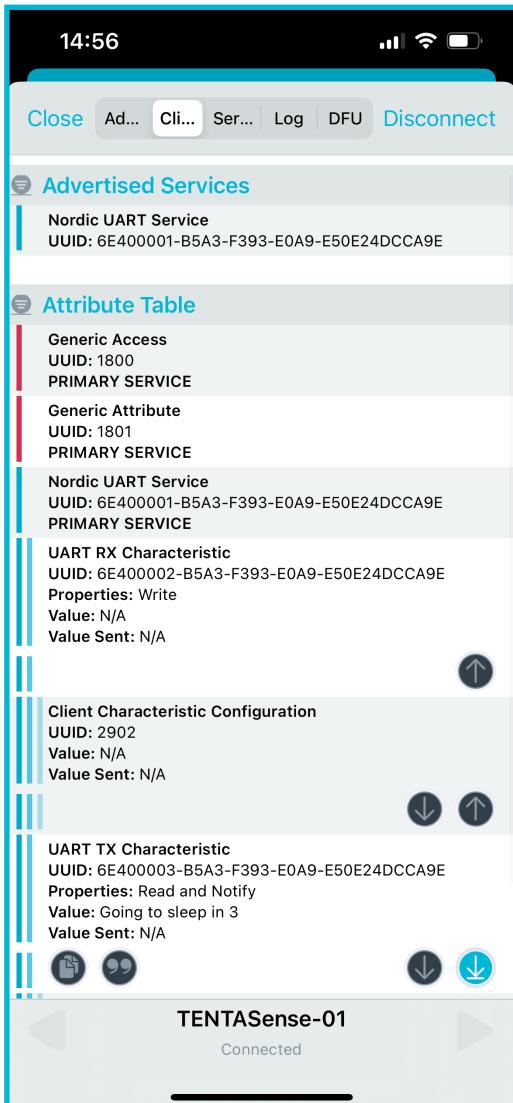


Figure 5: nRF Connect client screen, with UART TX Characteristic logging button shown in blue.

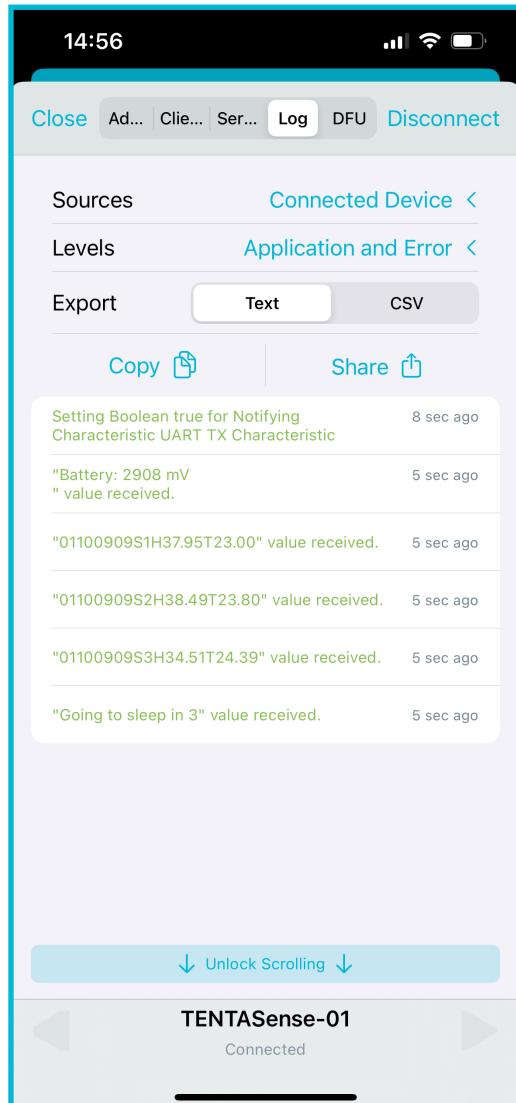


Figure 6: nRF Connect log screen, showing messages sent by the TENTASense.

- At start up, TENTASense will report battery level and three sensor readings every 10 seconds via bluetooth. During this time, use the buttons on the green sensor board to adjust the time and date on the microcontroller. Changes to the time and date will be reported via bluetooth and will be logged to the SD card on the microcontroller.

NB: The date and time will need to be updated whenever the TENTASense's batteries run flat or are replaced.

The format of the humidity and temperature bluetooth messages is as follows:

{DD}{MM}{HH}{mm}S{X}H{Hval}T{TVal}

and carries the following meaning:

{DD}	Date day
{MM}	Date month
{HH}	Time hour
{mm}	Time minute
{X}	Sensor number (1-3). Sensor 1 is furthest from the microcontroller, Sensor 3 is closest.
{Hval}	Relative humidity percentage.
{TVal}	Temperature in °C.

- After five readings the TENTASense will log battery and sensor readings to the SD card and go into sleep mode.

Normal Operation

- The TENTASense will log a reading (battery level, timestamp, temperature and humidity from all three sensors) to the SD card once every 60 minutes.

Note: The formatting of the hourly log messages is slightly different to that of the bluetooth messages: **{DD}{MM}{HH}{mm} S{X} H:{Hval} T: {Tval}**.

- Push the Min/Wake button on the sensor board at any time to wake the TENTASense and connect via bluetooth. This will allow you to check battery level and get an immediate set of temperature and humidity readings.
- After reporting five readings 30 seconds apart via Bluetooth, the TENTASense will log battery and sensor readings to the SD card and go into sleep mode. This will also reset the time to the next logged measurement to 60 minutes from the time the TENTASense goes to sleep.

Battery Life

- Two fresh AA batteries should be able to run the TENTASense for > 30 days.
- Consider replacing batteries if battery voltage falls below 2500 mV.

Retrieving Data

- Temperature and humidity readings are stored on the SD card in \TENTASense-{XX}(-F).txt, where {XX} is a number between 01 and 24 that matches the number written on the back of the microcontroller, and the -F suffix is included only for flexible sensors.
- The SD card can be removed from the TENTASense without removing the batteries, so that the log file can be inspected on a laptop or computer while the TENTASense remains running. Provided the SD card is returned to the TENTASense before the next scheduled measurement, no data will be lost.