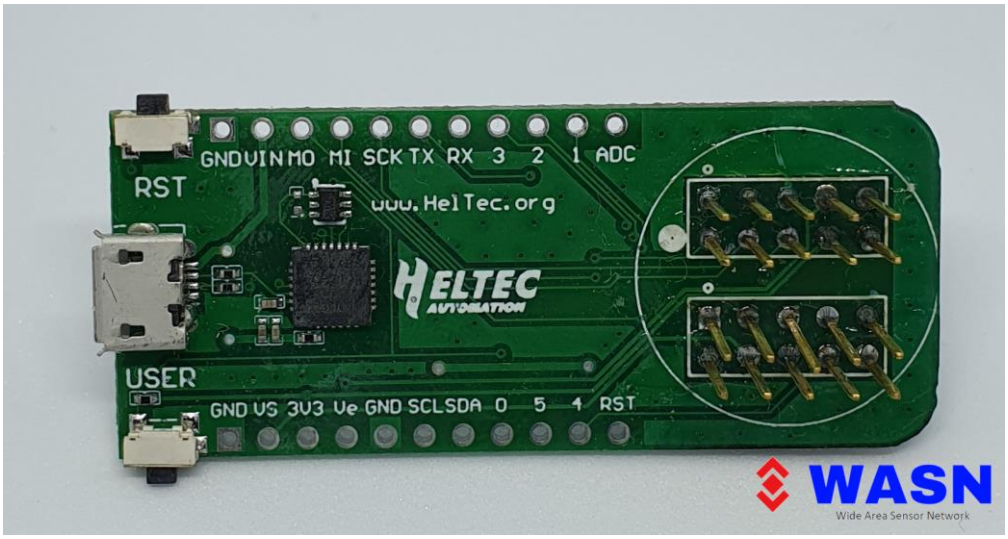
ModularNode & IndoorNode

Getting Started Guide

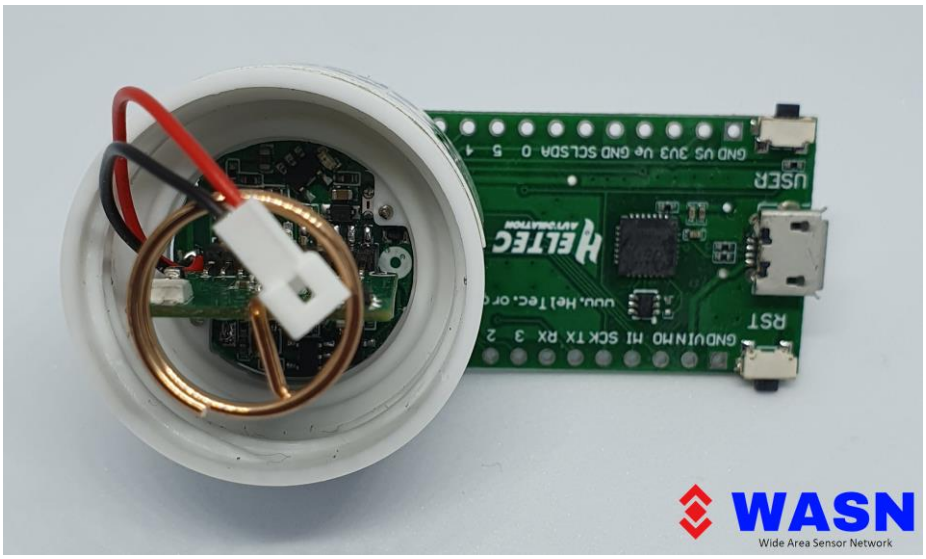
(c) by WASN

Connecting the Indoor/ModularNode or CubeCell to your Computer

- connect the USB board to the capsule



- the white dot on the USB board must align with the white dot on the capsule (beside the Reset button)



- connect the micro USB of the USB board to your computer

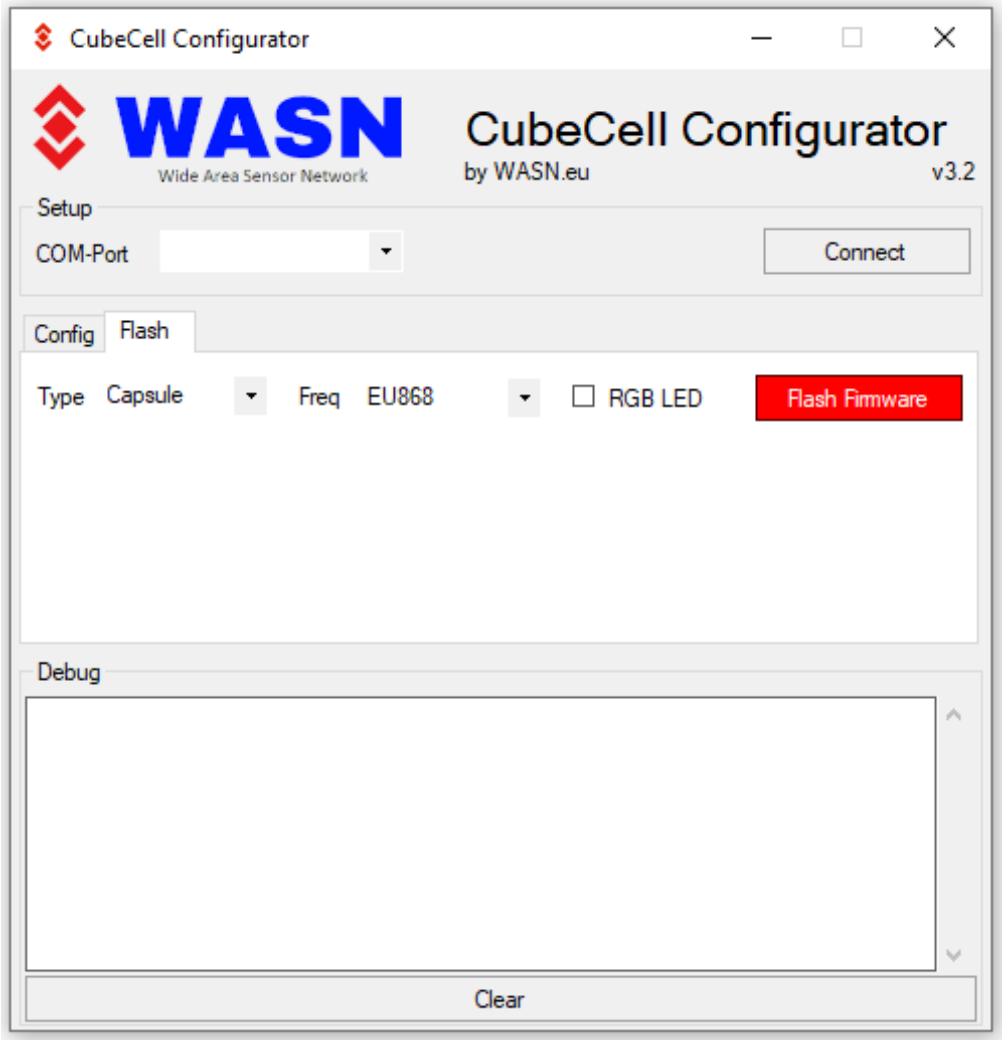
If you have a Indoor/ModularNode or CubeCell board just connect the micro USB to your computer

The drivers for the Silabs CP210x USB to serial adapter should be installed automatically via windows update. If not you can download it here.

Use CubeCell Configurator to upload firmware

The easy way to get the Capsule up and running is:

- Download the CubeCell Configurator from here download.
- Open the CubeCell Configurator



- Select the right COM port (don't click connect)
- Select the Flash Tab
    - Select the Node Type (IndoorNode, ModularNode, Board, Capsule)
    - Select the right frequency band (EU868, US915, AU915)
    - Select RGB LED Status (on, off)
    - click Flash Firmware
        - Firmware is now downloaded from github.
        - The firmware will be written to the capsule

        - The debug text box shows the state of the firmware download and flash.
    - If an error happens this will be in the debug text box too.

```
Downloading Firmware …
Downloading Firmware done
Flashing Firmware …
PROCESS PERCENTAGE
Flashing Firmware done
CleanUp Starting
CleanUp done
```

The firmware has the following config:

- REGION: (selectable)
    - EU868
    - US915
    - AU915
    - IN865
- CLASS_A
- OTAA
- ADR: ON
- Net_Reservation: ON
- AT_SUPPORT: ON
- RGB: (selectable)
    - ACTIVE
    - DEACTIVE
- unconfirmed uplink
- All Keys set to zero

The firmware auto detects the connected I2C sensor.
You can connect more than one sensor to the I2C bus.
The only limitation is, that you can connect only 1 sensor of each modell on each sensor socket.

If you have a TCA9548A I2C Switch conncted to the I2C Bus, Vext and GND you can connect up to 8 sensors of each model to each switch output. You need to flash the ModularNode firmware to activate the use of the TCA9548A I2C switch.

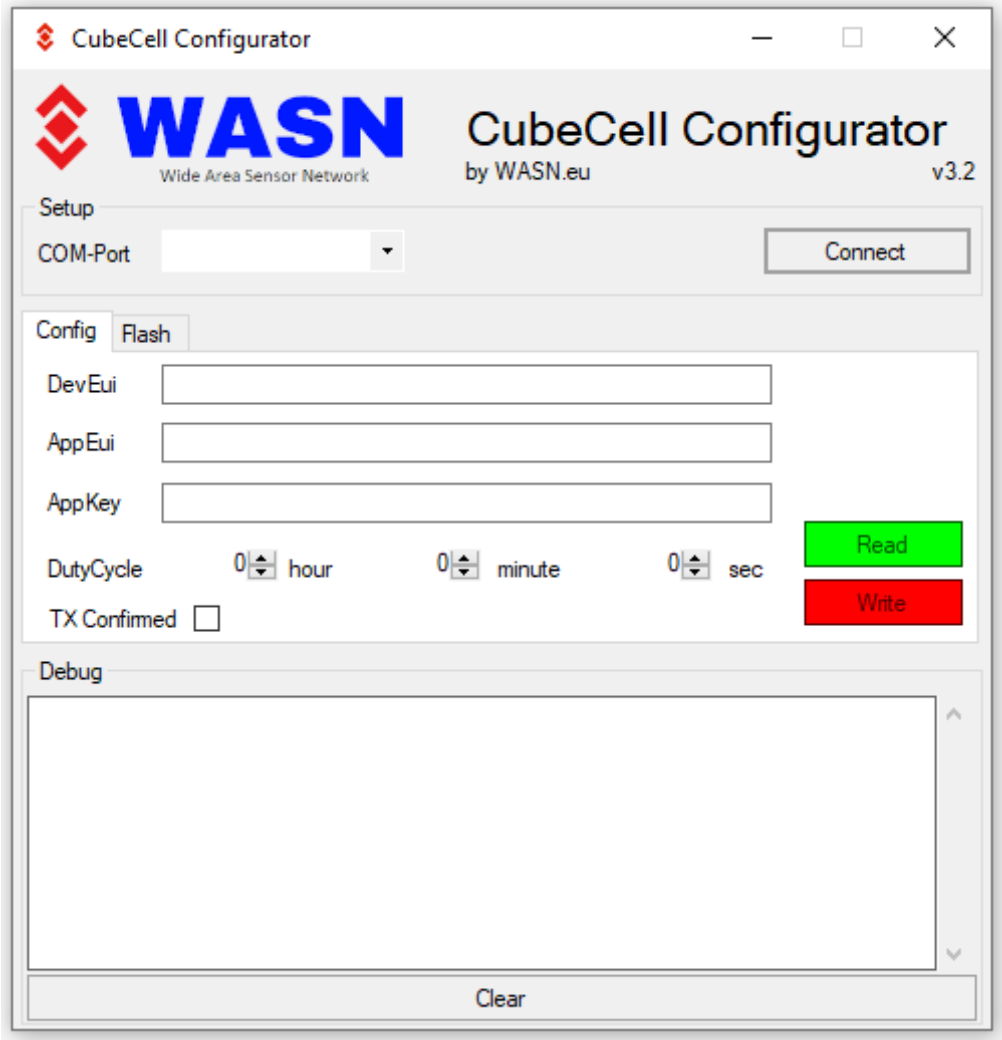
These sensors are supported:

- ADS1015/ADS1115
- BH1750
- BME680
- BME280
- BMP180
- BMP280
- CCS811
- HDC1080
- MPU9250
- SHT2x
- VL53L1X

OneWire Sensors will be supported on the OW connector (internal GPIO1). Right now the CubeCell hangs sometimes with activated OneWire.

Use CubeCell Configurator for configuration

- Login to TTN and create an application if you haven't already.
- Under your application create a device for the CubeCell device you are setting up
- Open the CubeCell Configurator



- Select your COM Port and click connect.
- Select the Config Tab
    - Device EUI, Application EUI, App Key and DutyCycle are read from the CubeCell device.
    - copy the keys: Device EUI, Application EUI and App Key

        - Please note that you should copy and paste only one key at a time. On TTN you will notice that there is a Copy icon at the end of each key field. Then back in the Configurator screen just paste each value you copied from the TTN device screen
    - by default all uplinks are unconfirmed, if you need confirmed uplinks please enable the TX confirmed checkbox
    - Click on Write.

- The keys will be saved in the CubeCell device and the device will reboot
- In the debug text box you should see the following:

```
AT+DevEui=YOURDEVEUI
AT+AppEui=YOURAPPEUI
AT+AppKey=YOURAPPKEY
AT+DutyCycle=YOURDUTYCYCLEINMS
AT+RESET=1
...
...
joining...
joined
```

- Now you should see the Join Requests in your TTN Application and short after that data comming in.

The Things Network decoder

- Login to TTN and go to your application you have previously defined the device in.
- Now you can define the decoder for this application.
- The decoder can be downloaded from here download.

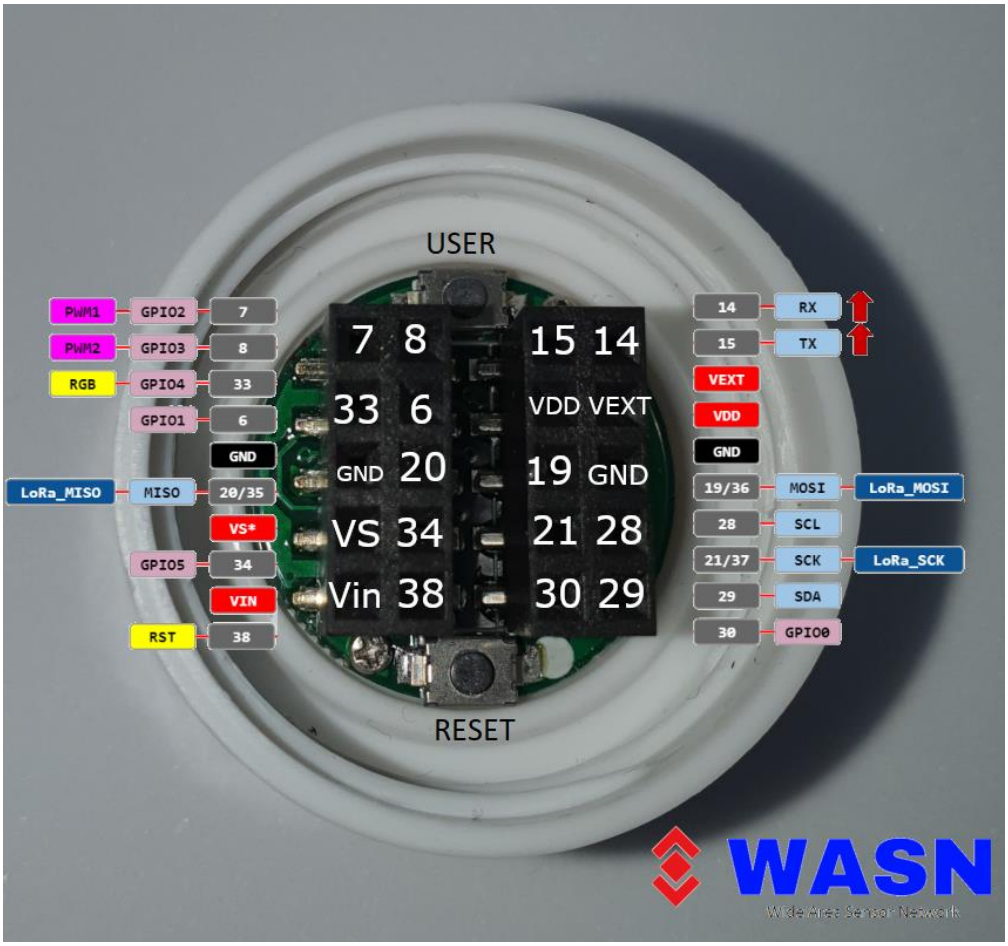
Connecting a sensor

If you have bought the IndoorNode (buy) there is a BME680 sensor fitted in the case.

If you have bought the ModularNode (buy) you can connect the sensor to one of the 8 sockets or the OneWire Sensors to the OW socket.

If you have bought a sensor from our Website (buy) or from Heltec then you can just plug it in the capsule./p>

If not here is the pinout for connecting your sensor:



- Vext is used for powering the sensors. This pin only delivers power to the sensor when taking the measurement.
- use VS and GND to connect a solar panel (5.5 - 7V).

You can connect more than one sensor to the I2C bus.
The only limitation is, that you can connect only 1 sensor of each modell on each sensor socket.

If you have a TCA9548A I2C Switch conncted to the I2C Bus, Vext and GND you can connect up to 8 sensors of each model to each switch output. You need to flash the ModularNode firmware to activate the use of the TCA9548A I2C switch.

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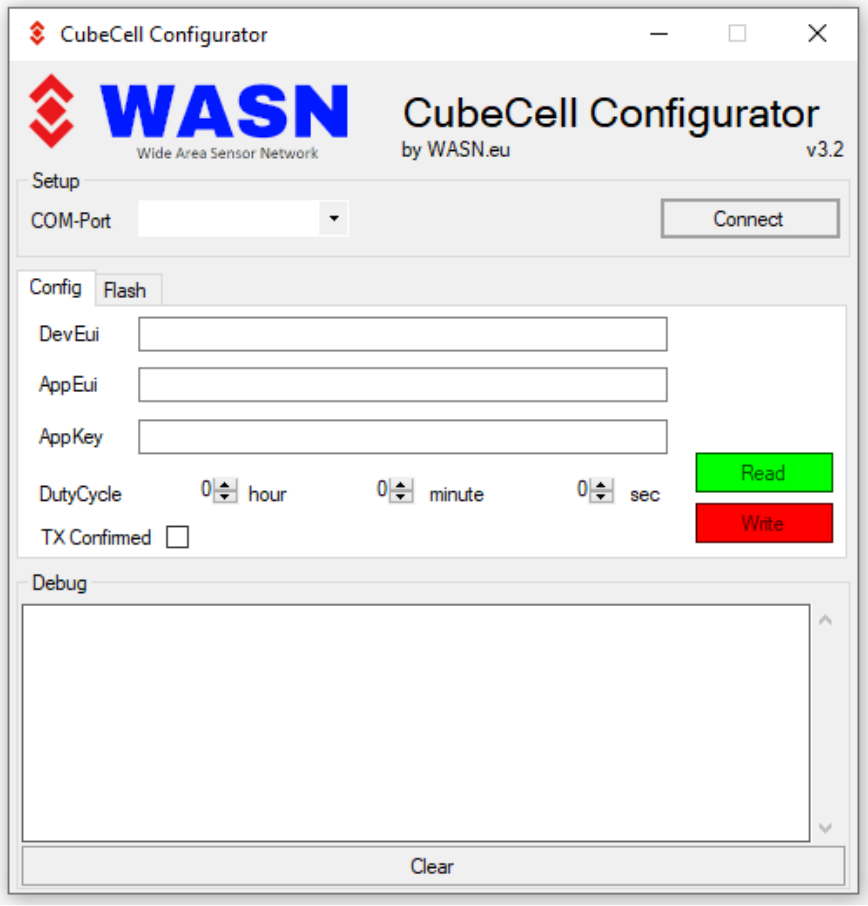
OneWire Sensors will be supported on the OW connector (internal GPIO1). Right now the CubeCell hangs sometimes with activated OneWire.

You can check which sensor the CubeCell device has found:

- Open the CubeCell Configurator



- Select your COM Port and click connect.
- Press the Reset (RST) button on you CubeCell device.
- you should see a message with the name of your sensor

```
Copyright @ 2019 Heltec Automation.All rights reserved.
Sensor Port Scanning...
  Found BME680
  Found MPU9250
...
```

- Or if you have the I2C Switch installed you will see the Port number and name of the sensor:

```
Copyright @ 2019 Heltec Automation.All rights reserved.
Sensor Port Scanning...
  Port 0
    Found BME680
  Port 1
    Found MPU9250
...
```

Connecting a battery to the CubeCell Capsule

This battery fits nicely in the capsule (buy)

If you have bought the Capsule from us (buy) there is a battery connector installed.

RGB LED

- RGB red means sending;
- RGB purple means joined done;
- RGB blue means RxWindow1;
- RGB yellow means RxWindow2;
- RGB green means received done;

Known AT Commands

This are the common AT commands. A full list can be found in this PDF

```
AT Command               | Value
-------------------------+-------------------------------------------------------------
---------------
+LORAWAN=1               | LoRaWAN  1, LoRa 0
+OTAA=1                  | OTAA -1, ABP-0
+Class=A                 | Class A or C
+ADR=1                   | 1 on 0 for off
+IsTxConfirmed=1         | LoRaWAN ACK Message 1 on, 0 off.
+AppPort=2               | The Application Port 2 for general APPs and 10 for TTN
MAPPER.
+DutyCycle=60000         | The time between transmission in mS. Typically, 15000 to
3600000
+ConfirmedNbTrials=8     | The number of adaptive rate changes allowed.
+DevEui=???              | Unique (OTAA Mode)
+AppEui=???              | Unique (OTAA Mode)
+AppKey=???              | Unique (OTAA Mode)
+NwkSKey=???             | Unique (ABP Mode)
+Passkey=???             | Unique (ABP Mode)
+DevAddr=???             | Unique (ABP Mode)
+LPM=1           | Low Power Mode
+ChipID=?                | get ChipID
+JOIN=1                  | start join
+DelCDKEY=1              | to delete the CDKEY
+DefaultSet=1            | to reset parameter to Default setting
```