

Serial Hardware

Synerduino STM

VERSIONS: F405, F411, H743

For more Information:
www.synerflight.com

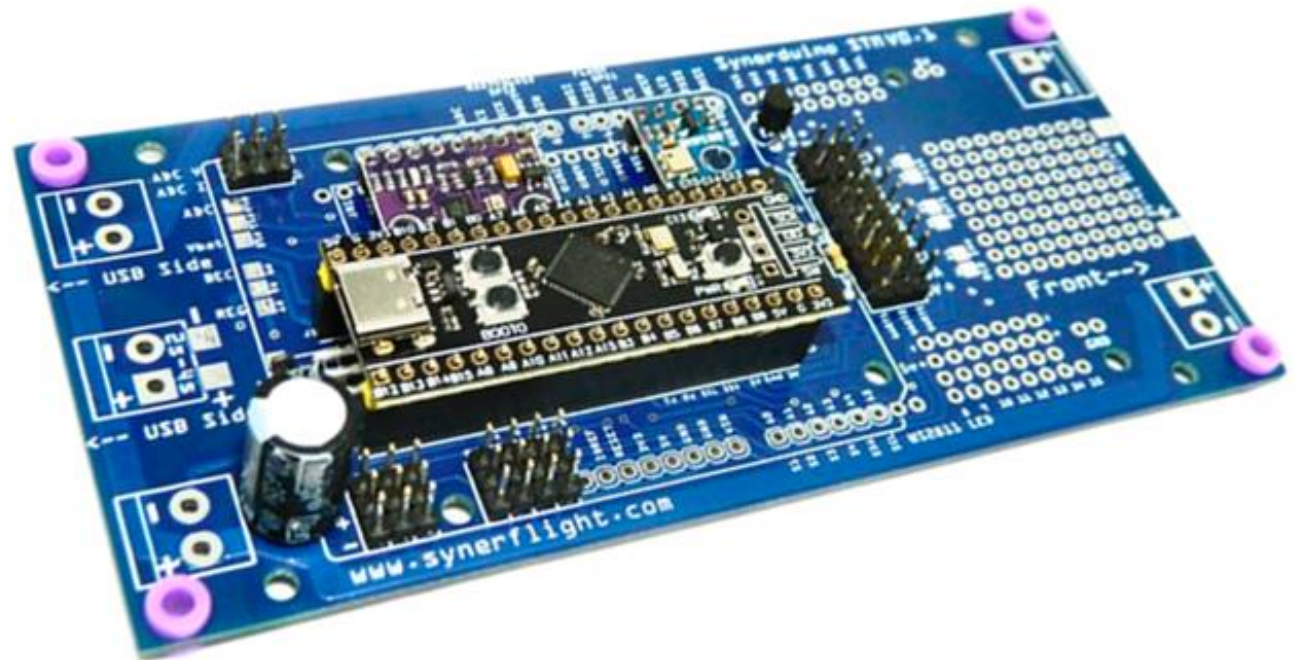


INTRODUCTION

This is where you install your

- Serial Devices
- RC Receivers

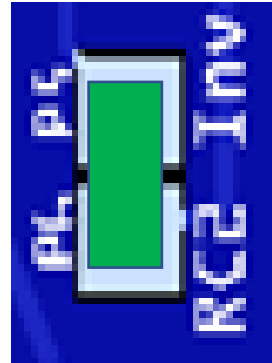
This guide shows the layout of installation process



RECEIVER TYPES

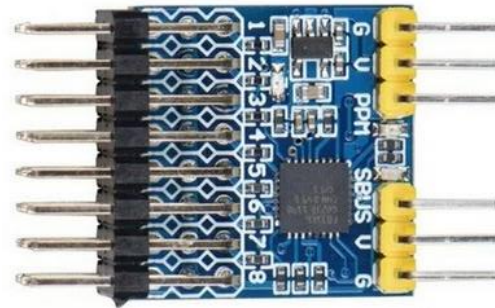


PPM AND PWM RECEIVER



The Invert Pads are only Present in the F411 boards .

F405 and H743 boards does a way with this by Connecting to RC2



PWM/PPM/SBUS CONVERTER

For those who Uses PWM or PPM Receiver Require to add an Additional PWM/PPM/SBUS Converter and connect it to RC2 to Reciver

SERIAL RECEIVER

SBUS RECEIVER



ELRS 2.4G Receiver



IBUS RECEIVER



GPS

Ensure the Pins are installed correctly according to the Layout Gnd, TX-RX, RX-TX, V+,

220 GPS modules

This model only outputs UART data



1 2 3 4

Pin Description:

| UART4 | UART4 | | | | |
|-------|----------|-----|--|--|--|
| | 3V / 5V | | | | |
| | Gnd | | | | |
| | RX | | | | |
| | TX | | | | |
| PIN | PIN Name | I/O | Description | | |
| 1 | GND | G | Ground | | |
| 2 | TX | O | Serial Data Output. | | |
| 3 | RX | I | Serial Data Input. | | |
| 4 | VCC | I | DC 3.6V - 5.5V supply input, Typical: 5.0V | | |

| UART4 | UART4 | | |
|-------|---------|--|--|
| | 3V / 5V | | |
| | Gnd | | |
| | RX | | |
| | TX | | |
| I2C | I2C | | |
| | SDA | | |
| | SCL | | |

| PIN | PIN Name | I/O | Description |
|-----|----------|-----|---|
| 1 | SDA | O | Compass SDA |
| 2 | GND | G | Ground |
| 3 | TX | O | Serial Data Output. |
| 4 | RX | I | Serial Data input. |
| 5 | VCC | I | DC 3.6V~ 5.5V supply input, Typical: 5.0V |
| 6 | SCL | I | Compass SCL |



123456

880 GPS modules

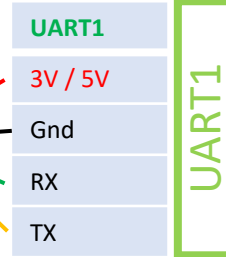
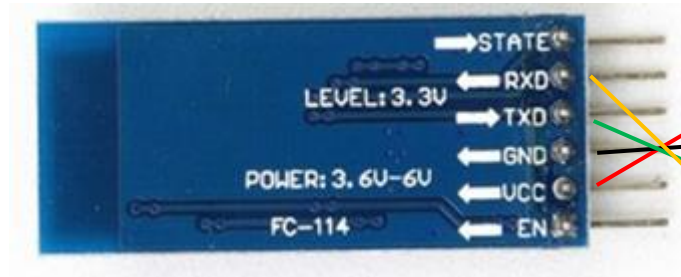
This usually comes with a Mag depending on the model pls refer to the GPS manual HMC5883 , QMC 5883 , QMC5883P . Check orientation of mag require alignment Onboard Mag need to be disconnected



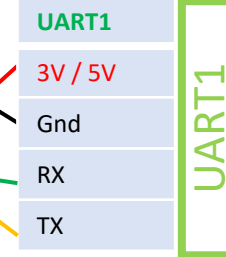
Antenna pad side up

More Details at GPS Doc

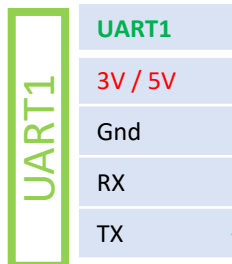
TELEMETRY



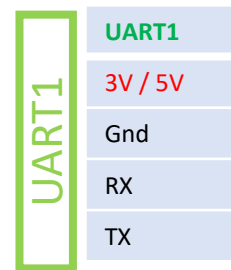
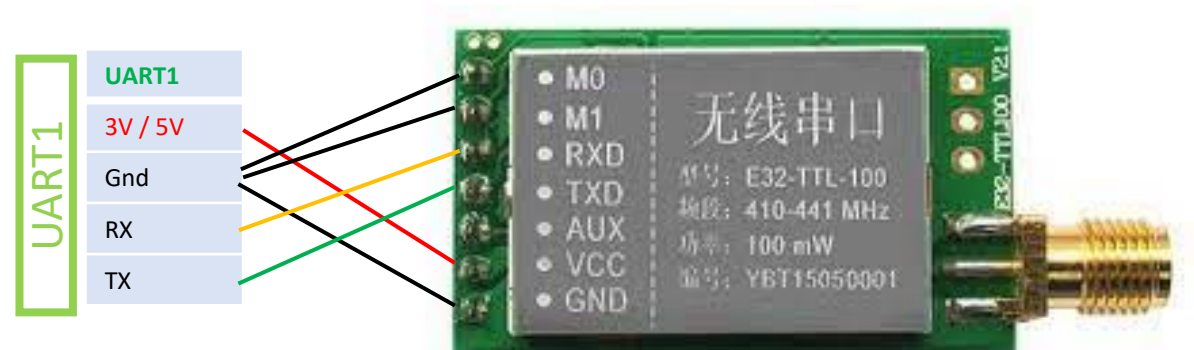
Bluetooth



SIK Serial Radio



WIFI / ESP32



LORA

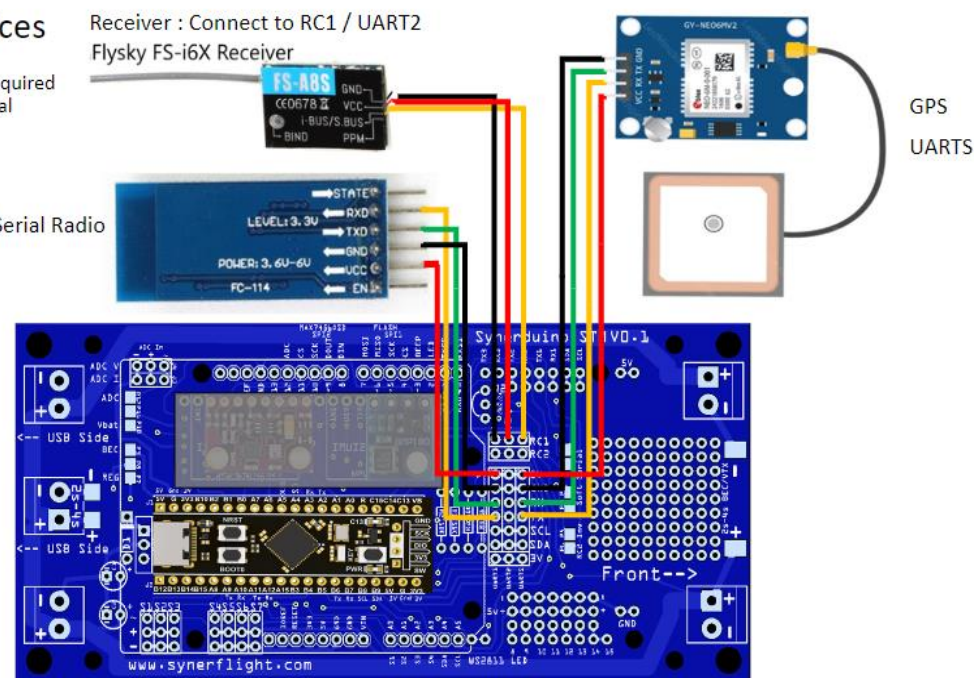
F411 RC RECEIVER & UARTS

UART Serial Devices

AS if INAV5 and INAV6 its Required Receiver supports SBUS Serial

Receiver : Connect to RC1 / UART2
Flysky FS-i6X Receiver

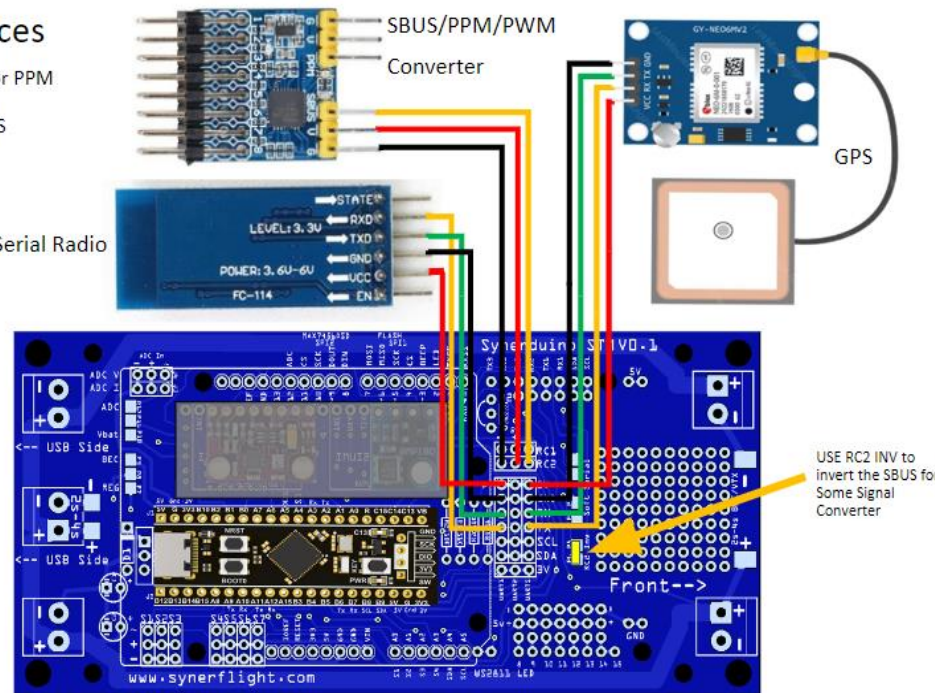
Bluetooth/Serial Radio
UART1



UART Serial Devices

For those who Uses PWM or PPM Receiver Require to add an Additional PWM/PPM/SBUS Converter to RC2/UART2

Bluetooth/Serial Radio



F405 RC RECEIVER & UARTS

ELRS 2.4G Receiver FS-i6X Receiver



UART2



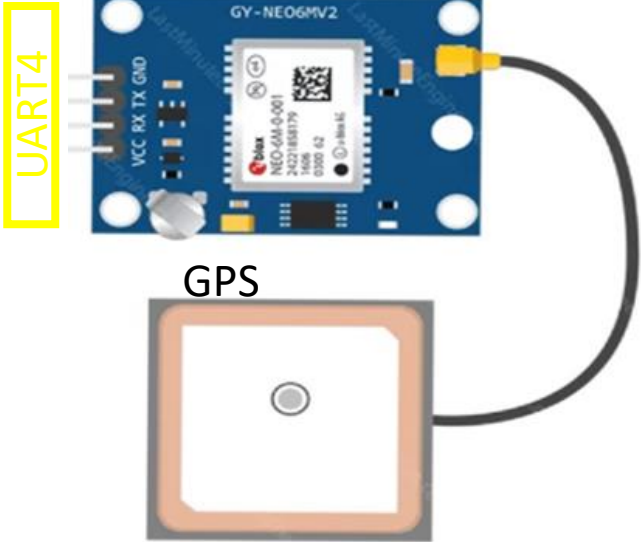
RC1

Receiver : Connect to RC1 / UART2



Bluetooth/Serial Radio

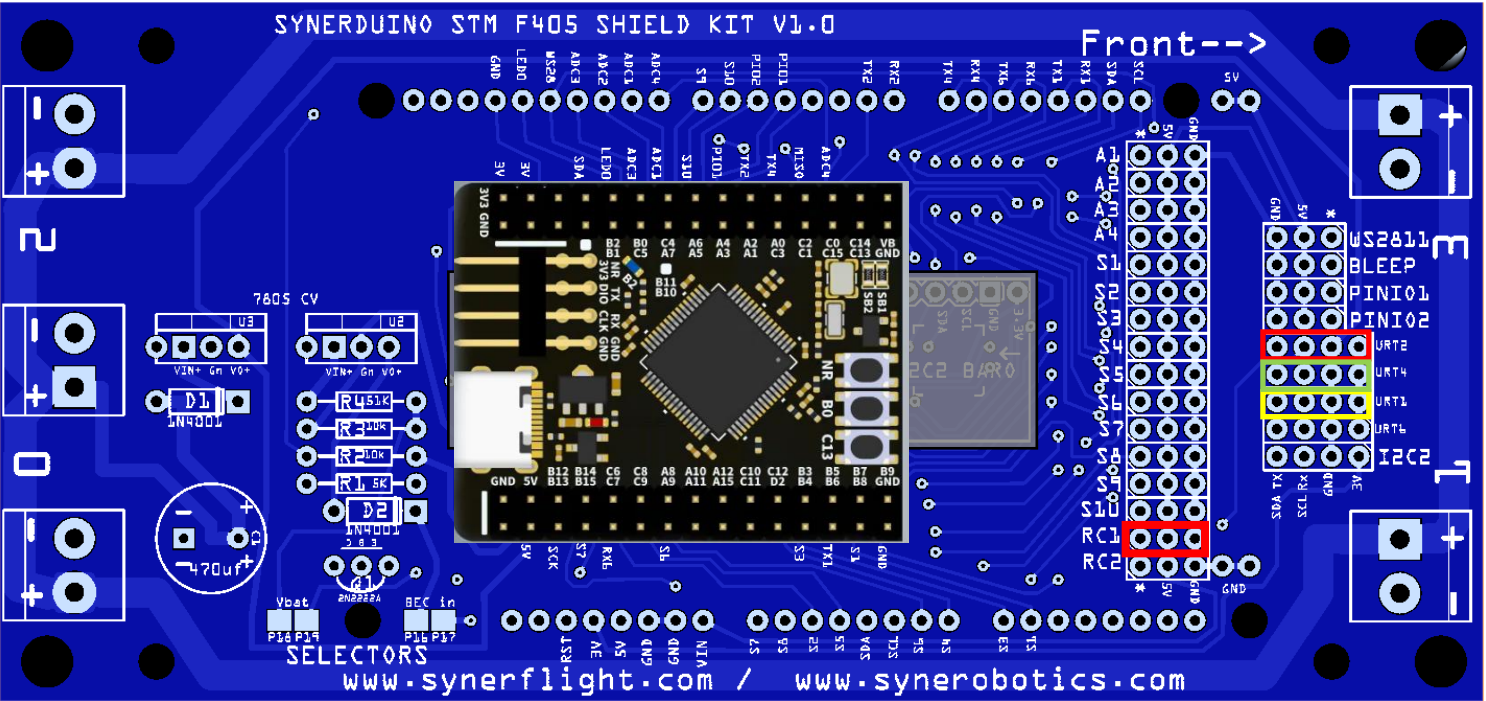
UART1



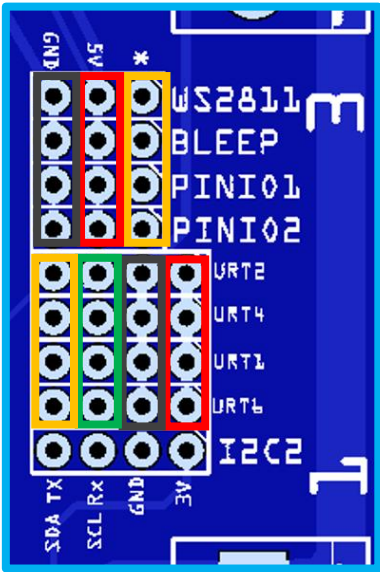
UART4

GPS

STMF405



V+ Gn Dat



TX RX Gn V+

Check connection Polarity

H743 RC RECEIVER & UARTS

ELRS 2.4G Receiver FS-i6X Receiver



UART2



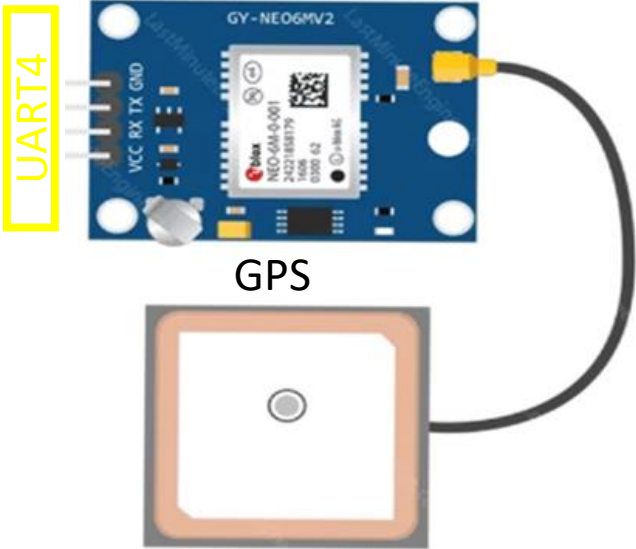
RC1

Receiver : Connect to RC1 / UART2

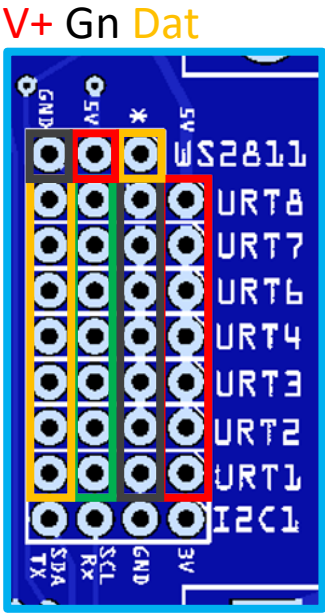
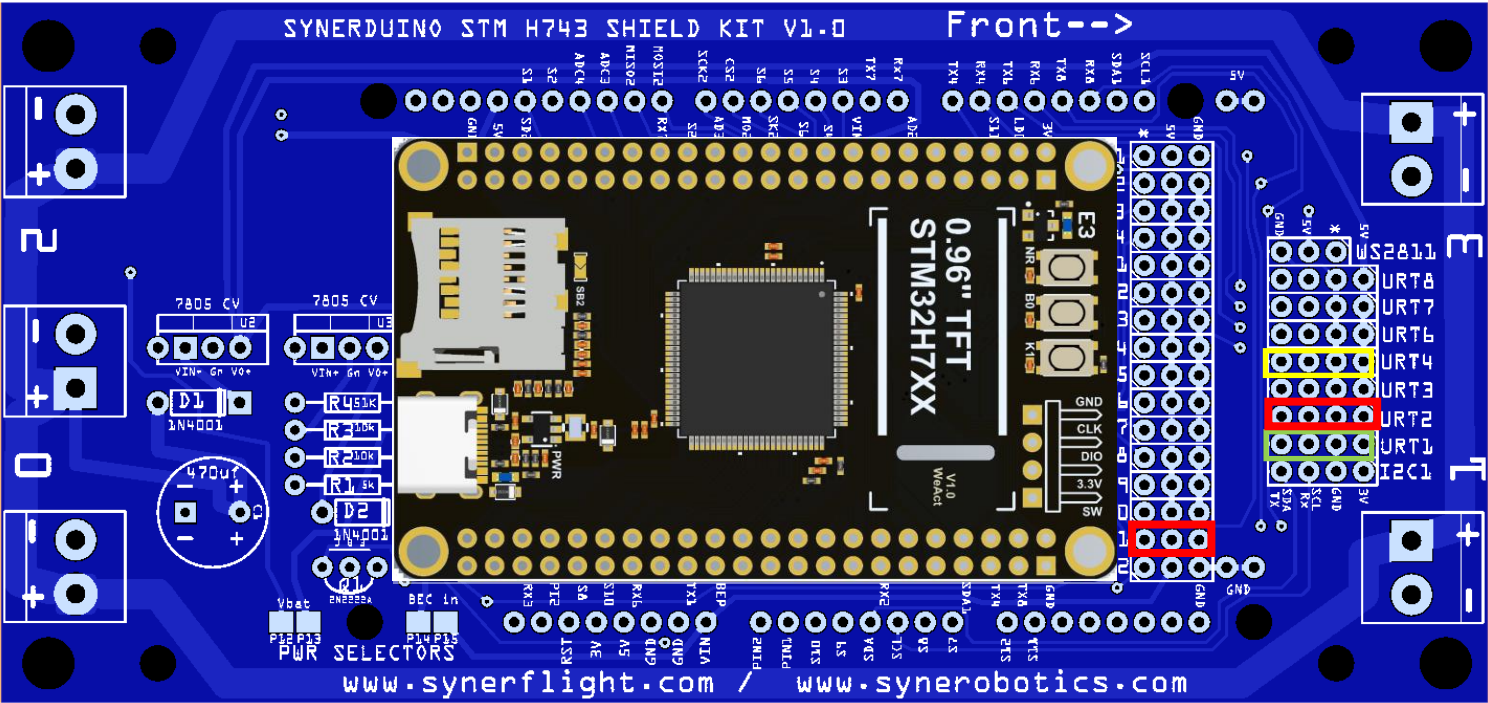


UART1

Bluetooth/Serial Radio



GPS

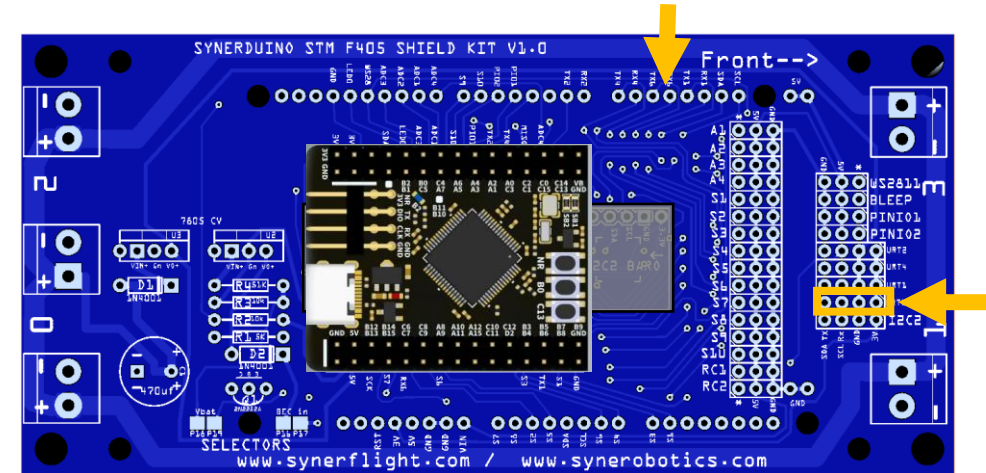
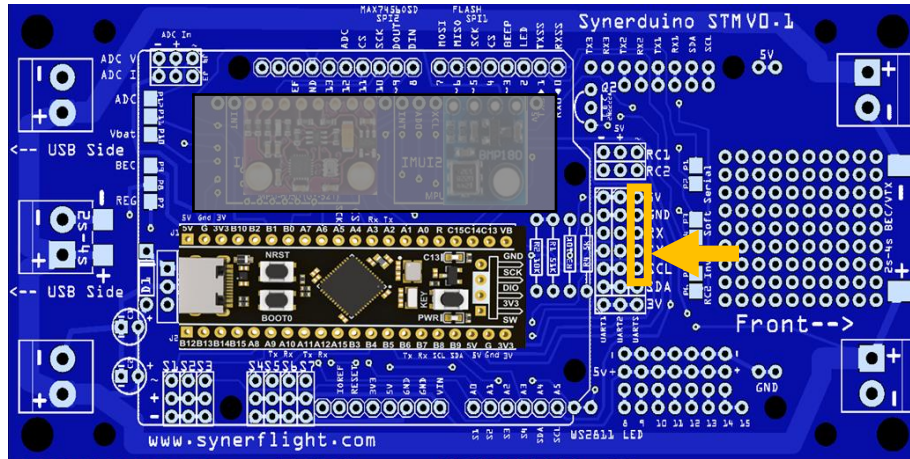


TX RX Gn V+

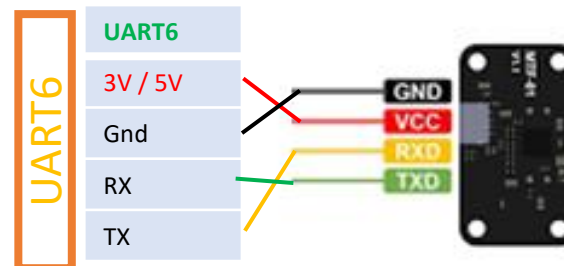
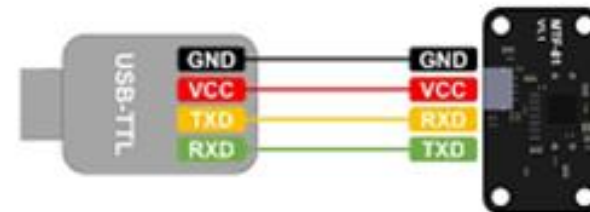
Check connection Polarity

SERIAL SENSORS

Optical sensors expansion allows position hold and basic navigation in GPS denied environments utilizing downward facing sensors. Not we will use the MTF 01 for sample

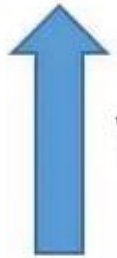


MTF-01



SERIAL SENSORS

INAV
FMT



Vehicle



MTF-01

MTF - 01 Guide

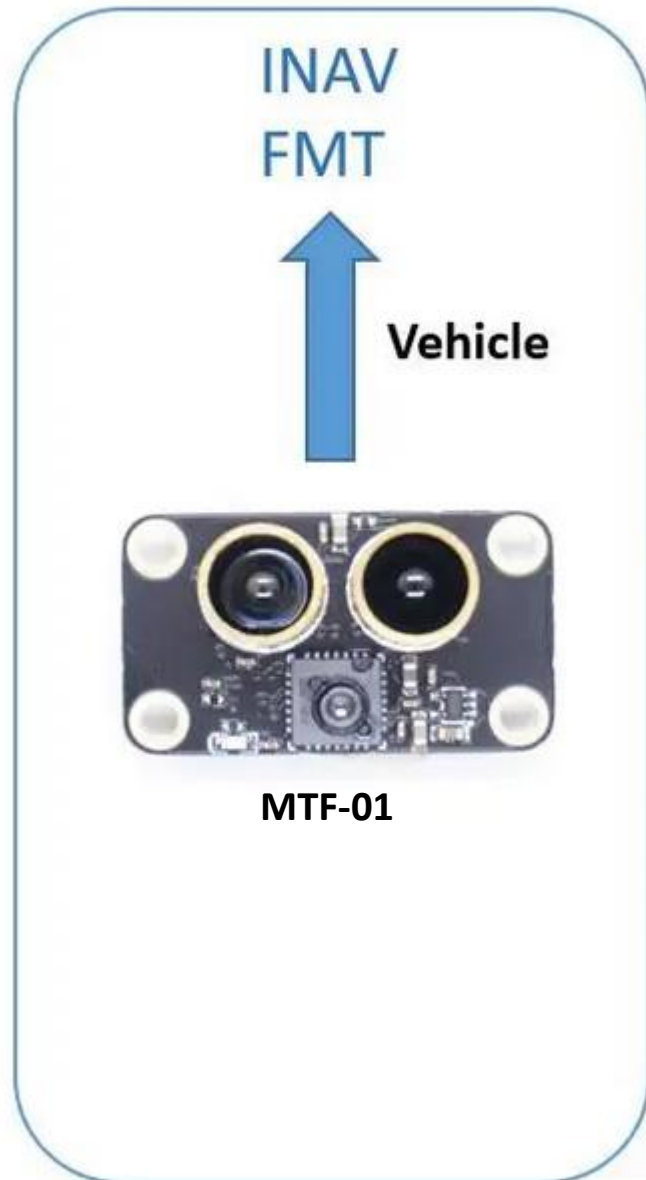
Down load the Guide and Programmer here

https://github.com/micoair/MTF-01_USER_MANUAL

Connect the MTF-01 to your PC using the USB to TTL module.



SERIAL SENSORS



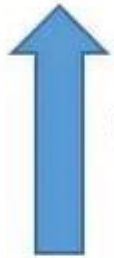
MTF - 01 Guide

Open the MicoAssistant software, select the correct COM port in the upper right corner, set the baud rate to 115200, and click on the connection icon.



SERIAL SENSORS

INAV
FMT



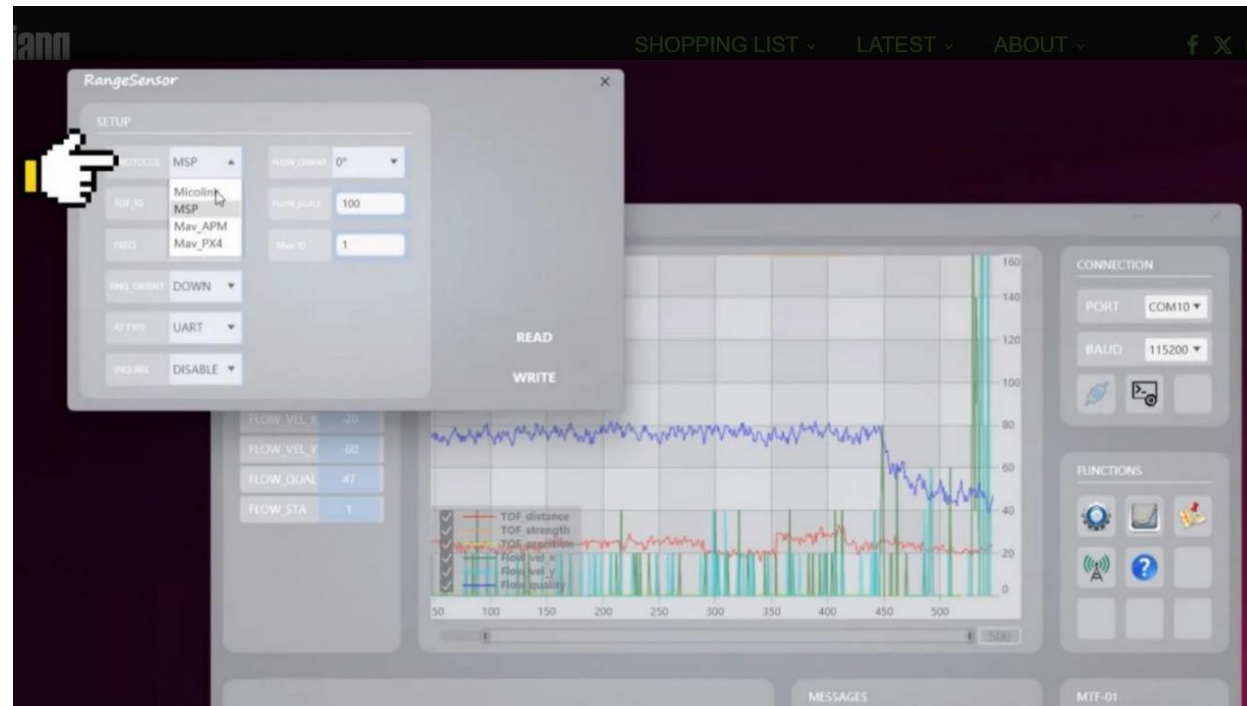
Vehicle



MTF-01

MTF - 01 Guide

Once connected, click on the Setup Menu (gear icon), select the protocol you want to use (in this case, MSP), and then click the WRITE button.



SERIAL SENSORS

ArduPilot/PX4

MTF-01



Vehicle

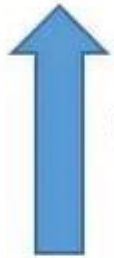
Ardupilot Guide

- Make sure the module is set to mav_apm
- Connect the Module to Synerduino UART 6
- Set SERIAL4_BAUD as 115
“SERIAL4_PROTOCOL” as 1
- Set “FLOW_TYPE” as 5;
- Set “RNGFND1” as 10
“RNGFND1_MAX_CM” as 800;
- Restart to save
- EK3 Setup
 - 1 set “EK3_SRC_OPTIONS” as 0;
 - 1 set “EK3_SRC_POSXY” as 0;
 - 1 set “EK3_SRC_VELXY” as 5;
- Flight mode to Loiter

| | | | | |
|------------------|---------|--------------|---------|--------------|
| ny2 | 0 | pose | 0 | satcountB |
| ny3 | 0 | posn | 0 | servovoltage |
| mz | 235 | press_abs | 1012.91 | sonarrange |
| mz2 | 0 | press_abs2 | 0 | sonarvoltage |
| mz3 | 0 | press_temp | 3557 | speedup |
| nav_bearing | -137 | press_temp2 | 0 | SSA |
| nav_pitch | 0 | QNH | 1010.87 | target_beari |
| nav_roll | 0 | radius | 0 | targetairspe |
| nav_yaw | 0 | rangefinder1 | 207 | targetalt |
| opt_n_x | -0.0011 | rangefinder2 | 0 | targetaltd10 |
| opt_n_y | -0.0001 | rangefinder3 | 0 | TargetLocati |
| opt_qua | 88 | rateattitude | 4 | ter_alt |
| opt_x | 0 | rateposition | 2 | ter_curalt |
| opt_y | 0 | raterec | 2 | ter_load |
| packetdropremote | 0 | ratesensors | 2 | ter_pend |
| parent | 1 | ratestatus | 2 | ter_space |

SERIAL SENSORS

INAV
FMT



Vehicle

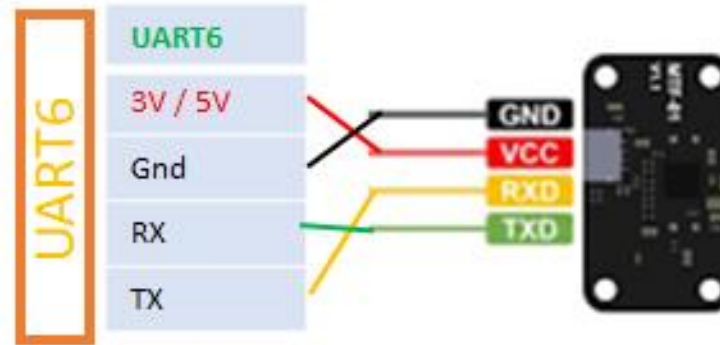


MTF-01

INAV Guide

Connect the four wires from the MicroAir MTF-01 sensor to any spare UART on your flight controller. I connected it to UART4 or UART6 on my FC.

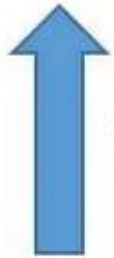
- 5V to 5V
- GND to GND
- TX to RX
- RX to TX



Mount the sensor on the bottom of the quad, ensuring there's nothing obstructing the view of the sensors. Use landing gears to ensure there's sufficient clearance between the ground and the sensors during takeoff, ideally a couple of centimeters or more.

SERIAL SENSORS

INAV
FMT



Vehicle



MTF-01

INAV Guide

Setup
Calibration
Mixer
Outputs
Ports
Configuration
Failsafe
Ez Tune
PID tuning
Advanced Tuning
Programming
Receiver
Modes

Ports [DOCUMENTATION](#)

Note: not all combinations are valid. When the flight controller firmware detects this the serial port configuration will be reset.
Note: Do **NOT** disable MSP on the first serial port unless you know what you are doing. You may have to reflash and erase your configuration if you do.

| Identifier | Data | Telemetry | RX | Sensors | Peripherals |
|------------|--|---------------|---|-----------------|------------------------|
| USB VCP | <input checked="" type="checkbox"/> MSP 115200 | Disabled AUTO | <input type="checkbox"/> Serial RX | Disabled 115200 | Disabled 115200 |
| UART1 | <input type="checkbox"/> MSP 115200 | Disabled AUTO | <input type="checkbox"/> Serial RX | Disabled 115200 | Disabled 115200 |
| UART2 | <input type="checkbox"/> MSP 115200 | Disabled AUTO | <input checked="" type="checkbox"/> Serial RX | Disabled 115200 | Disabled 115200 |
| UART3 | <input type="checkbox"/> MSP 115200 | Disabled AUTO | <input type="checkbox"/> Serial RX | Disabled 115200 | MSP DisplayPort 115200 |
| UART4 | <input checked="" type="checkbox"/> MSP 115200 | Disabled AUTO | <input type="checkbox"/> Serial RX | Disabled 115200 | Disabled 115200 |
| UART5 | <input type="checkbox"/> MSP 115200 | Disabled AUTO | <input type="checkbox"/> Serial RX | Disabled 115200 | Disabled 115200 |
| UART6 | <input type="checkbox"/> MSP 115200 | Disabled AUTO | <input type="checkbox"/> Serial RX | GPS 115200 | Disabled 115200 |
| UART7 | <input type="checkbox"/> MSP 115200 | Disabled AUTO | <input type="checkbox"/> Serial RX | Disabled 115200 | Disabled 115200 |

On Inav Configurator set the Port your sensor is on to MSP and 115200

Setup
Calibration
Mixer
Outputs
Ports
Configuration
Failsafe
Ez Tune
PID tuning
Advanced Tuning
Programming

Configuration [DOCUMENTATION](#)

Note: Not all combinations of features are valid. When the flight controller firmware detects invalid feature combinations conflicting features will be disabled.
Note: Configure serial ports **before** enabling the features that will use the ports.

Sensors & buses

| | |
|---------|---------------|
| MPU6000 | Accelerometer |
| QMC5883 | Magnetometer |
| SPL06 | Barometer |
| None | Pitot tube |
| MSP | Rangefinder |
| MSP | Optical flow |

Voltage and Current Sensors

☒ Battery voltage monitoring

ADC Voltage Meter Type

Raw Voltage source to use for alarms and telemetry

1100 Voltage Scale

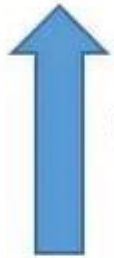
15.52 Battery Voltage

☐ Battery current monitoring

On Inav Configurator set the Configuration to active Rangefinder and optical flow to MSP

SERIAL SENSORS

INAV
FMT



Vehicle



MTF-01

INAV Guide

Copy and paste the following lines in the CLI (these are configurations suggested by the maker of MTF-01).

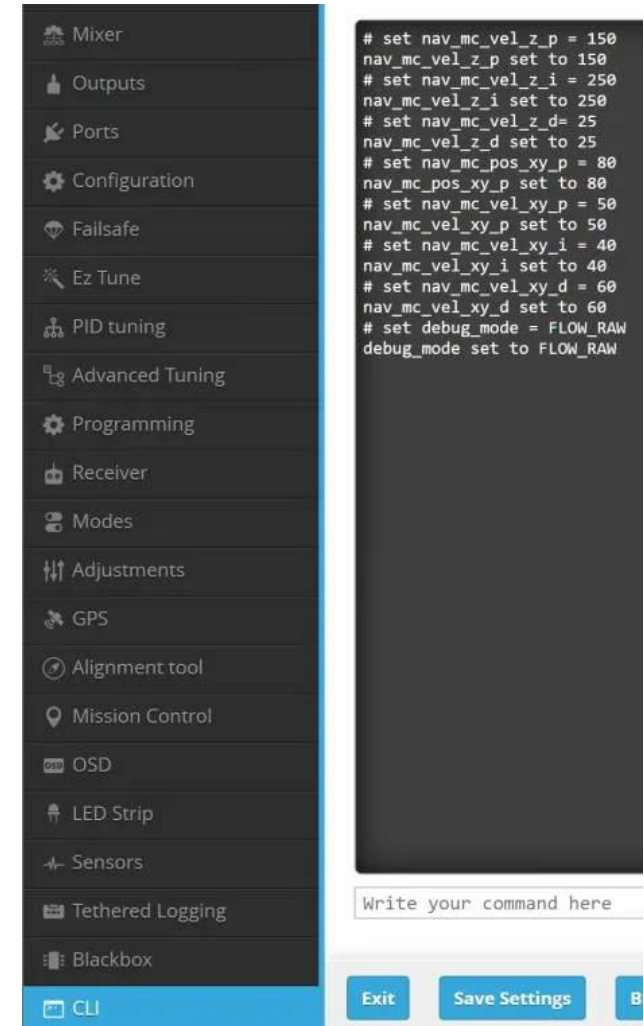
•Dead Reckoning: by enabling

iNav_allow_dead_reckoning in the CLI, it improve performance during brief GPS outages.

•Maximum Height Setting: by setting the

inav_max_surface_altitude in the CLI, it defines the maximum height at which the

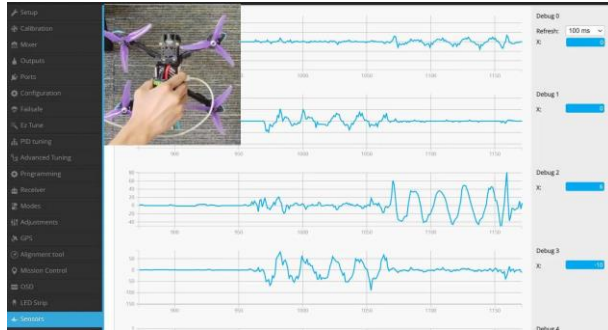
```
rangefinder is effective, in cm.  
set nav_mc_vel_z_p = 150  
set nav_mc_vel_z_i = 250  
set nav_mc_vel_z_d = 25  
set nav_mc_pos_xy_p = 80  
set nav_mc_vel_xy_p = 50  
set nav_mc_vel_xy_i = 40  
set nav_mc_vel_xy_d = 60  
set debug_mode = FLOW_RAW  
set inav_allow_dead_reckoning = ON  
set nav_max_terrain_follow_alt = 200  
set inav_max_surface_altitude = 200  
save
```



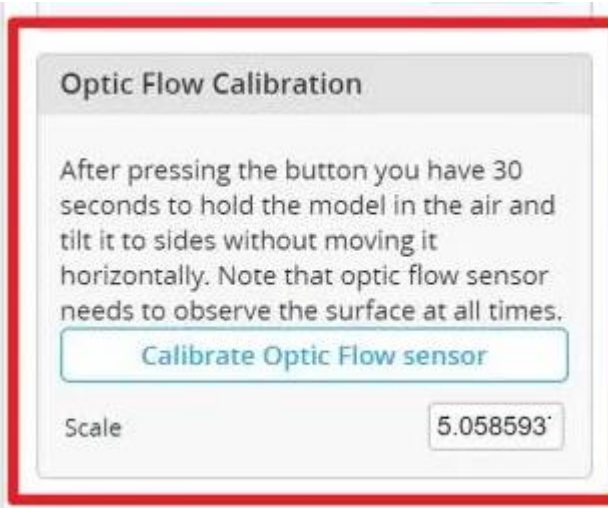
On Inav Configurator CLI copy and paste this then save . These are the recommended parameters

SERIAL SENSORS

INAV Guide



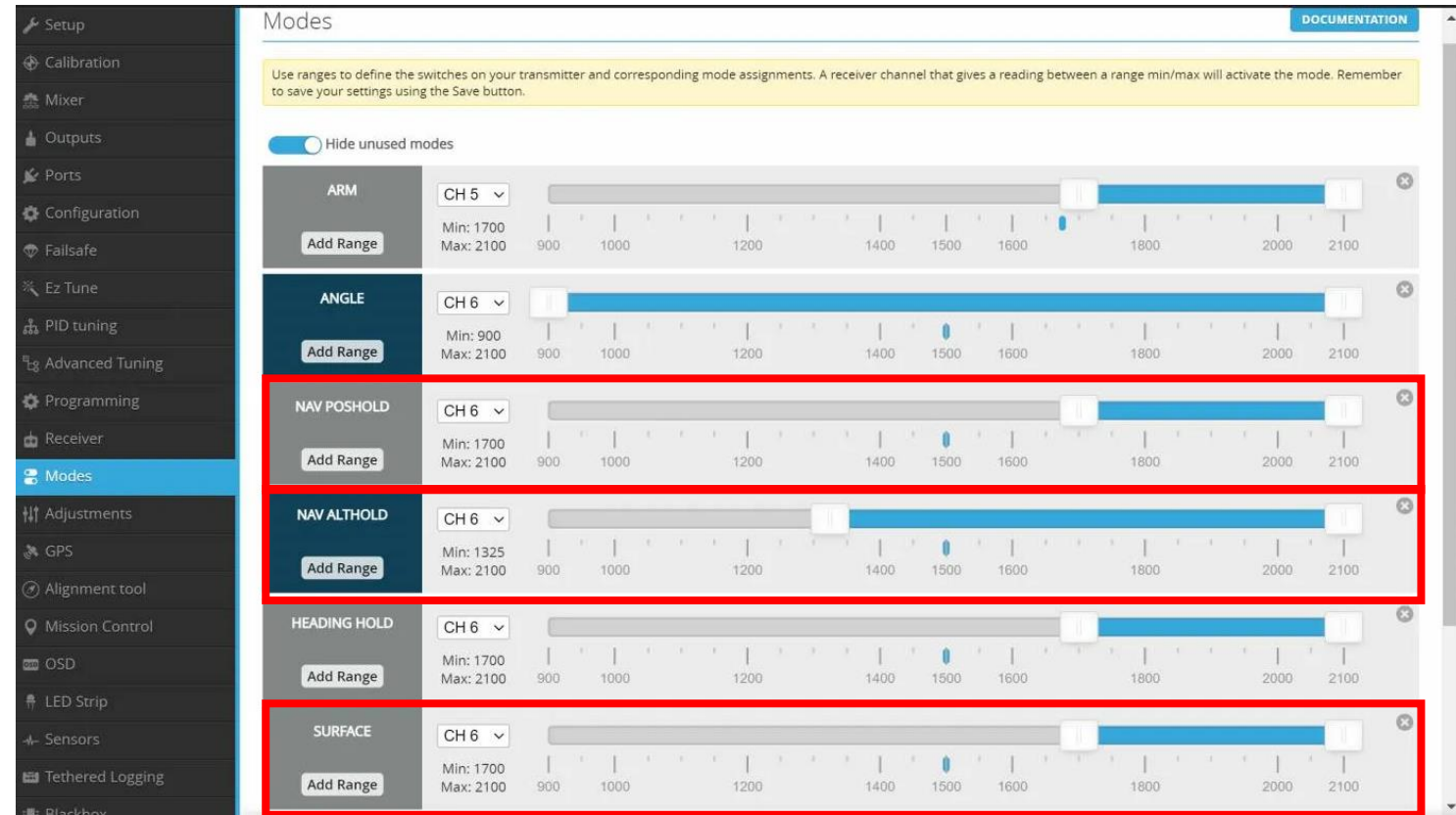
Check sensors tab



Calibration tab

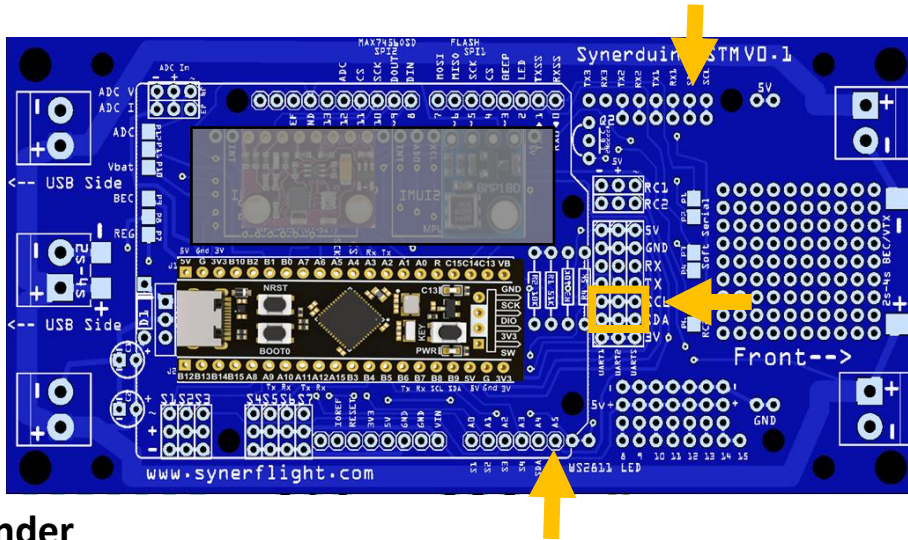
Modes Tab

Assign a switch that can enable ANGLE, NAV POSHOLD (position hold), NAV ALTHOLD (altitude hold), HEADING HOLD, and SURFACE at the same time.



I2C SENSORS

I2C digital sensors expansion allows you to add a host of external sensors to the current board via i2C pin (SLC SDA)



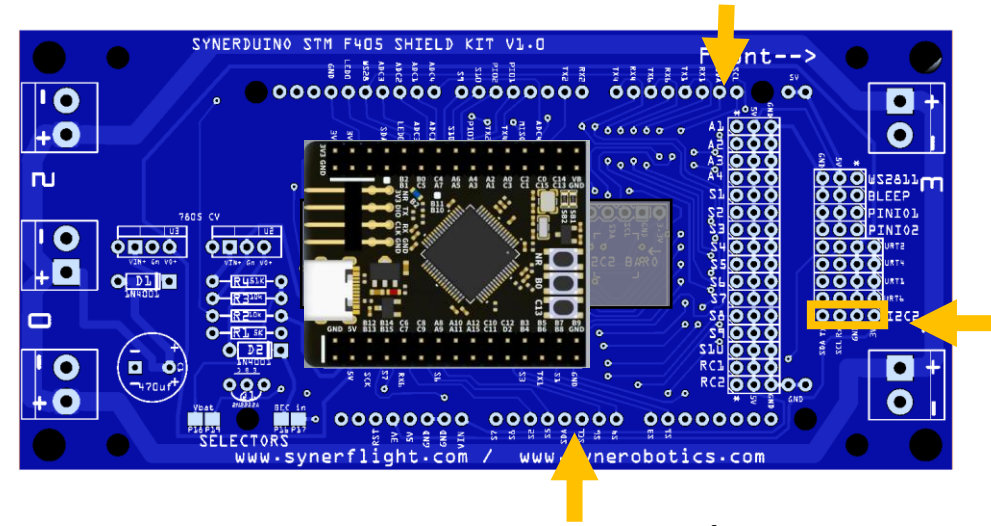
Range Finder

- VL53L0X
- VL53L1X
- TOF10120



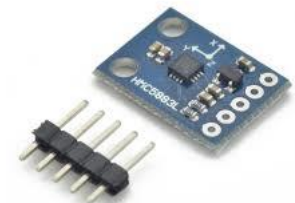
Airspeed sensor

- MS4525
- ASPD-DLVR L10D



Magnetometer (you can disconnect the Mag onboard should you need to connect an external mag)

- HMC5883
- QMC5883
- IST8310
- MAG3110
- LIS3MDL
- MPU9250



WS2811 LED

LED in drones serves as Nav Lights and visual indicator of flight status in LOS



There are 2 ways of installing this hardware

INAV - WS2811 Dedicated Pin Assign in the LED Tab

<https://www.youtube.com/watch?v=kjHruLW8KT0>

Ardupilot – Assign any unoccupied PWM as SERVOx_FUNCTION in parameters

<https://ardupilot.org/copter/docs/common-serial-led-neopixel.html>

