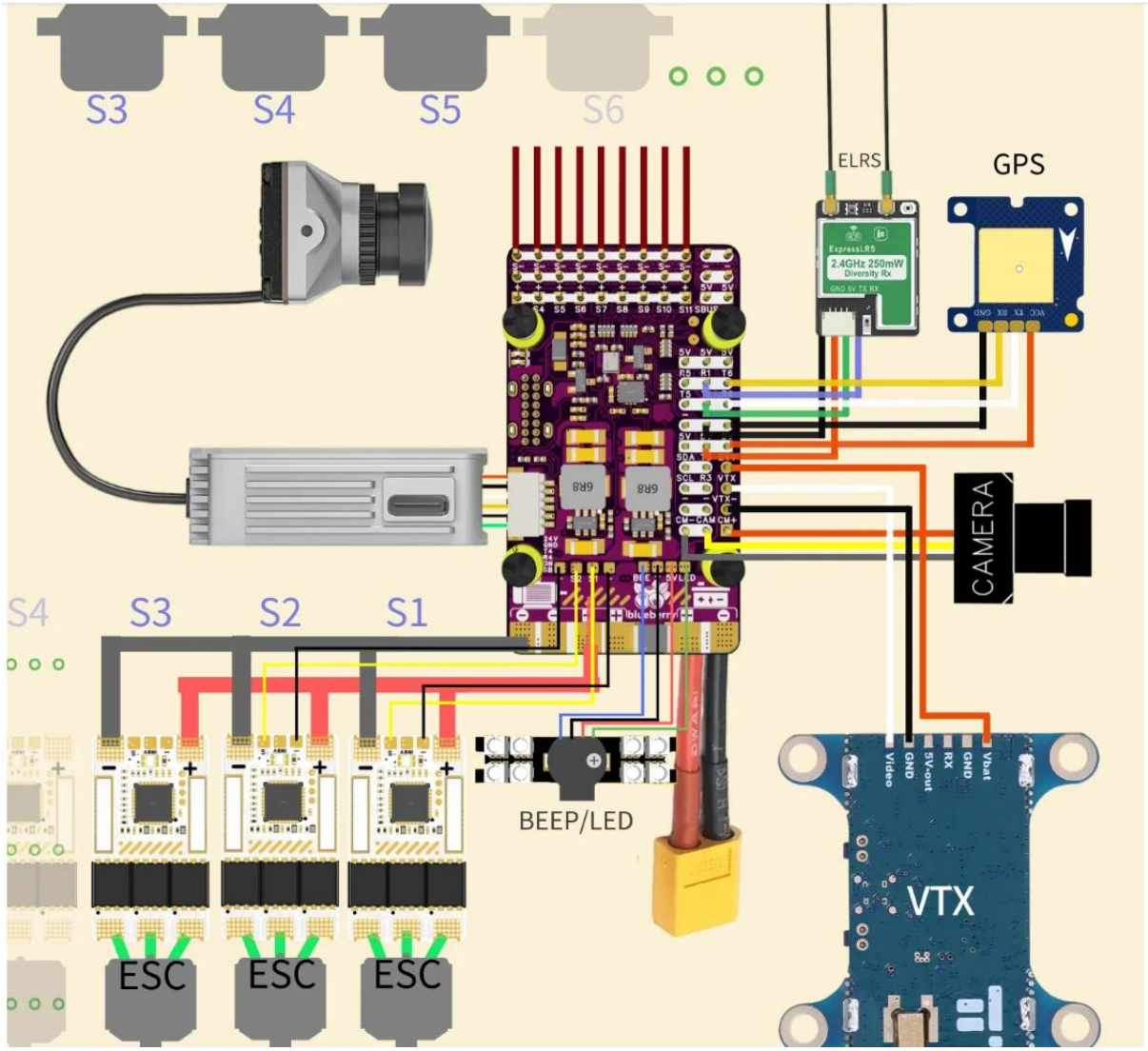
Blueberry F405 Flight Controller

Factory Provided Instructions



4.1. Power Connection

Connect your main battery (typically via an XT60 connector, not explicitly shown but standard for such setups) to the designated power input pads on the flight controller. Ensure correct polarity to avoid damage.

4.2. ESC and Servo Connections

- **ESCs:** Connect your Electronic Speed Controllers (ESCs) to the S1, S2, S3, S4, S5, S6 pads as indicated in the diagram. These are typically for motor control.
- **Servos:** The board supports up to 9 servos in addition to 2 motors. Connect your servos to the appropriate S-pads (S3, S4, S5, S6 are shown with servo connections in the diagram).

4.3. Peripheral Connections

- **Receiver (ELRS):** Connect your ELRS receiver to the designated RX and TX pads. The diagram shows an ELRS receiver connected to a UART.
- **GPS Module:** Connect your GPS module to the appropriate UART (TX/RX) and power pads. The diagram illustrates a GPS module connection.
- **Camera:** Connect your FPV camera to the CAM input pads.
- **Video Transmitter (VTX):** Connect your VTX to the VTX output pads, including Video, VTX_RX, and VTX_TX. The board provides a 24V output for VTX.
- **Beeper/LED:** Connect your beeper or LED strip to the BEEP/LED pads for audible alerts and visual indicators.
- **SBUS:** The SBUS receiver input is on UART2RX.
- **DJI:** The DJI digital FPV system can be connected via UART4.
- **PPORT:** Additional peripherals can utilize UART1, UART3, UART5, and UART6.
- **IIC:** An IIC port is available for compatible sensors.
- **Analog Airspeed:** An input for an analog airspeed sensor is provided.

Always double-check your wiring against the diagram and your component manuals before applying power.

5. Operating Instructions

The Blueberry F405 Flight Controller is designed to run open-source firmware like INAV and ArduPilot. The specific operating procedures will depend on the chosen firmware.

5.1. Firmware Flashing

1. Download the latest stable version of your preferred firmware (INAV or ArduPilot) for the F405 target.
2. Connect the flight controller to your computer via the USB-C port.

3. Use the respective configurator software (e.g., INAV Configurator, Mission Planner for ArduPilot) to flash the firmware. Follow the software's instructions carefully.

5.2. Initial Configuration

After flashing, perform the initial setup and calibration:

- **Sensor Calibration:** Calibrate the accelerometer, gyroscope, and magnetometer (if an external one is used).
- **Radio Setup:** Configure your radio receiver and ensure all channels respond correctly in the configurator.
- **Flight Modes:** Set up your desired flight modes (e.g., Manual, Acro, Stabilize, GPS Hold).
- **PID Tuning:** Adjust PID (Proportional-Integral-Derivative) values for optimal flight performance.
- **Failsafe:** Configure failsafe settings to ensure your aircraft behaves predictably in case of signal loss.

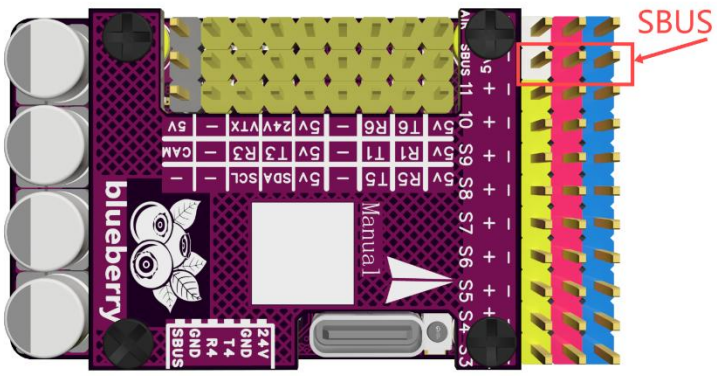
7. Troubleshooting

If you encounter issues with your F405 Flight Controller, consider the following troubleshooting steps:

- **No Power:** Check battery connection, power input polarity, and ensure the voltage is within the specified range (4.5V-25.2V).
- **No Connection to PC:** Try a different USB-C cable, ensure drivers are installed, and try a different USB port on your computer.
- **Sensors Not Working:** Re-calibrate sensors in the configurator. Check for physical damage to the IMU or barometer.
- **Motors Not Spinning:** Verify ESC connections, ensure ESCs are calibrated, and check motor output settings in the configurator.
- **Unstable Flight:** Review PID tuning, check for vibrations, and ensure the flight controller is securely mounted.
- **GPS Issues:** Ensure the GPS module has a clear view of the sky, check wiring, and verify GPS settings in the configurator.

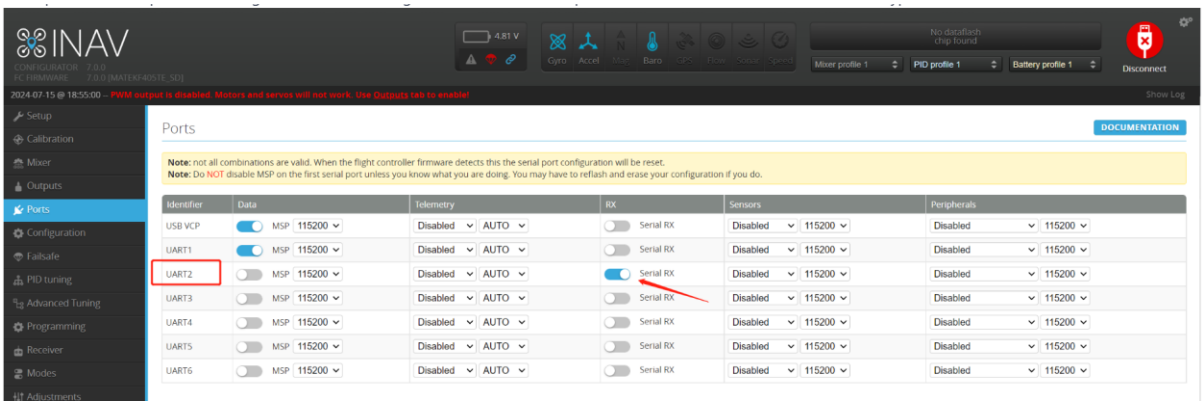
Feature	Specification
Voltage Input	4.5V - 25.2V
MCU	F405
IMU	ICM42605
Barometer	SPL06
SBUS Port	UART2RX
DJI Port	UART4
PPORT (Peripheral Ports)	UART1, UART3, UART5, UART6
Current Sensor	MAX100A@150mv/A
BEC Output	5V3A@server, 5V3A@flight control, 24V@VTX
Servo Outputs	2 motors + 9 servos
IIC Port	1
Analog Airspeed	1
Weight	19g
Dimensions (L x W x H)	48mm x 28mm x 13mm
Compatible Drone Brand	LYZRC

SBus Receiver Connection and Settings Illustrated

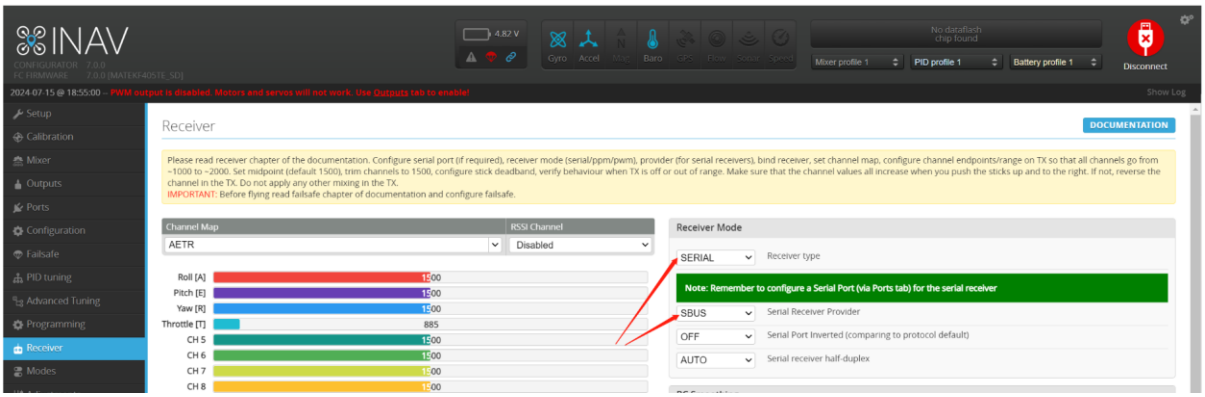


On the controller, use these pins for the SBus In, 5v and negative.

In INAV, that set of pins corresponds to UART2:

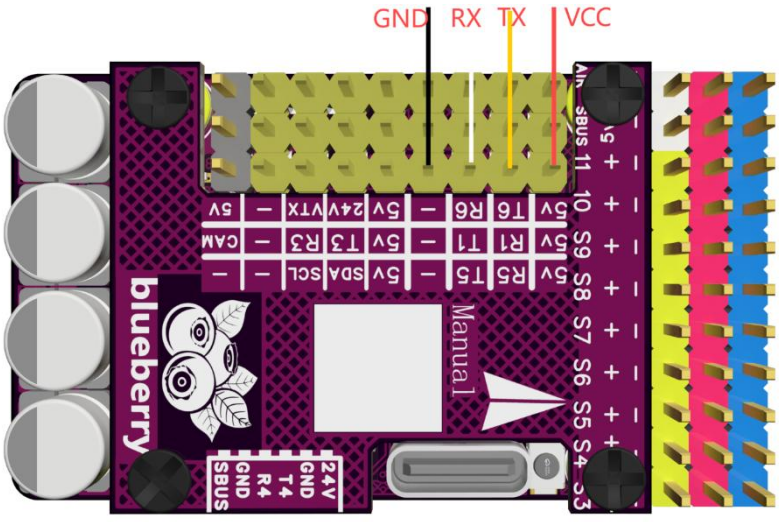


And, in the INAV "Receiver" section, select "Serial" and "SBUS":



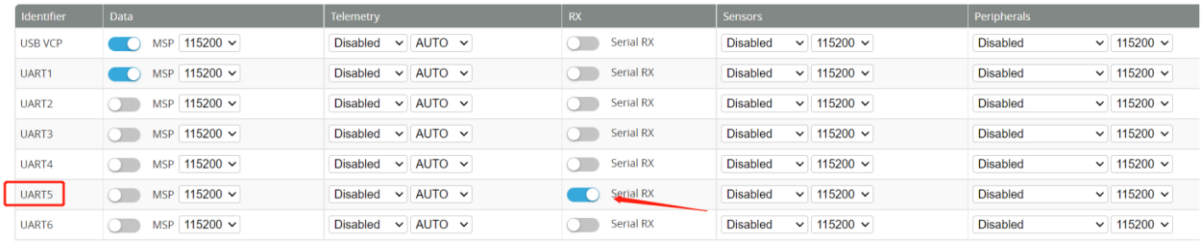
Express LRS Connections and Settings

If you have an ELRS receiver, the output from the receiver goes to any one set of UART pins. Here is an example using UART5. Note that TX from the receiver goes to R5 on the controller, and T5 on the controller goes to RX on the receiver. The "T" and "R" has to do with what function is being performed by the item that it's on. So TX on the receiver is transmitting, which naturally must go to what is receiving on the controller, R5, and vice versa.

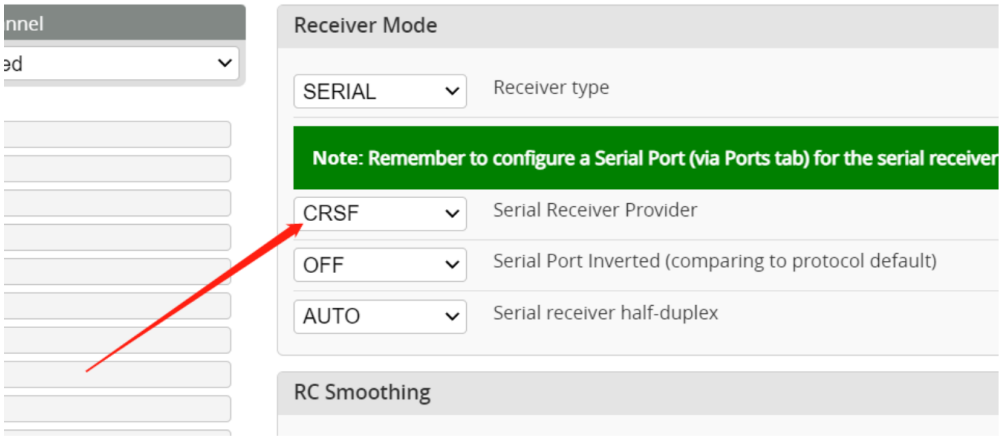


While this example shows UART5 being used, it would make sense to use either UART1 or UART6 so that UART5 can be used for the GPS with its compass connections then being on the same line of connectors. See the next section regarding that.

In INAV you again just tick the slider for Serial RX for the relevant UART.

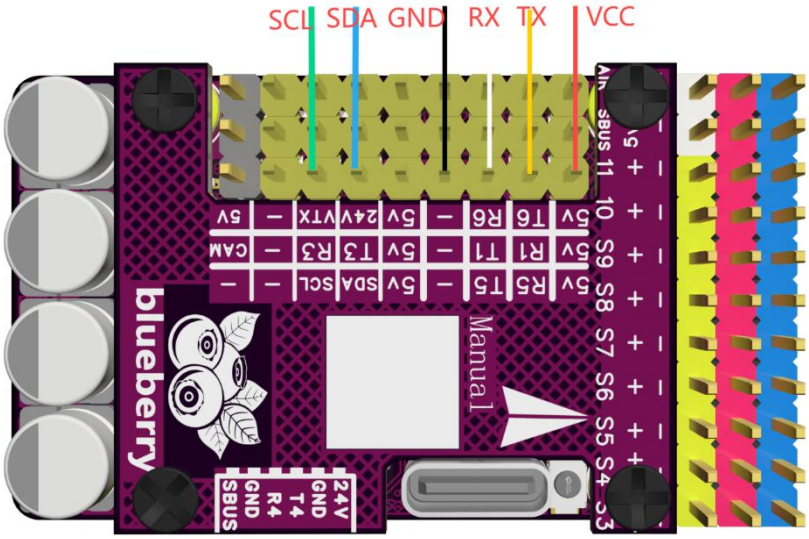


And, on the receiver page, select “Serial” and “CRSF.” While ELRS is not the same as Crossfire, it uses the Crossfire protocols for communication.



GPS Connections and Settings

A GPS unit will have outputs for Ground, RX, TX and positive voltage. If it is also equipped with a compass, it will also have SCL and SDA. The four GPS connections can be to any of the UARTs, but it's nice to have them straight across from the compass ones, using UART5.



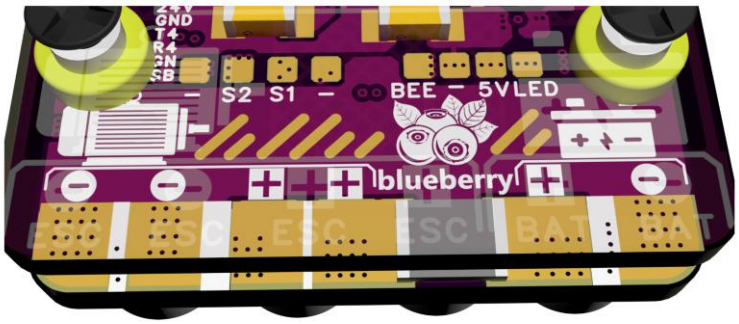
Again, TX on the GPS will go to R5 on the controller, and RX on the GPS will connect to T5 on the controller.

In the INAV Ports section, select "GPS" in the "Sensors" column for the appropriate UART:

Identifier	Data	Telemetry	RX	Sensors	Peripherals
USB VCP	MSP 115200	Disabled AUTO	Serial RX	Disabled 115200	Disabled 115200
UART1	MSP 115200	Disabled AUTO	Serial RX	Disabled 115200	Disabled 115200
UART2	MSP 115200	Disabled AUTO	Serial RX	Disabled 115200	Disabled 115200
UART3	MSP 115200	Disabled AUTO	Serial RX	Disabled 115200	Disabled 115200
UART4	MSP 115200	Disabled AUTO	Serial RX	Disabled 115200	Disabled 115200
UART5	MSP 115200	Disabled AUTO	Serial RX	GPS 115200	Disabled 115200
UART6	MSP 115200	Disabled AUTO	Serial RX	Disabled 115200	Disabled 115200

Power and ESC Connections

Remove the four screws securing the bottom panel of the controller board. Be careful not to lose the plastic spacers. Solder wires for power coming from your battery to the plus and minus pads on the right side of the board. Naturally you want to tin the end of the wires and the pads individually before soldering the wires on.



If you have a single motor, solder wires for the ESCs throttle control to the small S1 and minus pads. If you have a second motor, it's throttle signal is coming from S2. If you are

going to use a beeper – typically used for finding a lost aircraft, it would be connected to "BEE" and "-." Power going to the ESC(s) comes from the minus and plus pads on the left side of the board. It doesn't make any difference which positives or negatives you use – they are simply connected to the power coming in.

Servo Connections

Servos are simply plugged in to the S3, S4, S5 and upwards. The signal lead naturally goes to the S pin, and ground to the negative with positive 5v being provided to the middle.

The picture of the plane in INAV on the Mixer tab shows you which control is being used by which S pin.