| Features |
|---|
| Digital HD FPV experience |
| New CrazyF405 ELRS HD flight controller |
| Powerful and Smooth |
| UART ExpressLRS receiver |
| Built-in blackbox for Gyroflow and PID Tune |
| Battery tray size: Maximum support for batteries with a width of |
| approximately 17mm and a height of approximately 13mm |

| Specifications |
|---|
| Brand Name: Happymodel |
| Item Name: Mobula8 2S 85mm Digital HD Micro FPV whoop built-in Walksnail or HDZERO VTX |
| Wheelbase: 85mm |
| Size: 120mm*120mm*48mm |
| Weight: HDZERO version 46.5gram |
| Walksnail version 48gram |

Package includes	
Item Name	Qty
Mobula8 Frame	1
CrazyF4HD ELRS flight controller firmware target:BETAFLIGHTF4	1
EX1103 KV11000 brushless motor	4
Gemfan Hurricane 2023 tri-blade propellers(4cw+4ccw)	1
Option1: Walksnail avatar HD Mini 1S lite kit	1
Option2: HDZERO Whoop Lite bundle	
Canopy	1
Screw driver	1

Bind Procedure

1) Supply power to the flight controller by plug USB, wait until the Red LED on the FC is off, immediately turn off the power, and then repeat again the above steps. When the FC is powered on for the third time, the Red LED light will start to double-flash, which means that the RX enters the binding mode

2) Please make sure your ExpressLRS tx module firmware is v3.x.x. And go to ExpressLRS.lua from "TOOLS" menu of your radio transmitter. Then hit [Bind] to binding with the onboard ExpressLRS receiver. The Red LED should blinking slowly first then turn to solid, that means binding was successfully. If the red LED got triple blinking and no rx input from receiver tab ,please change Model Match tab value from "off" to "on" or from "on" to "off", then change back to "off", that would working normal.
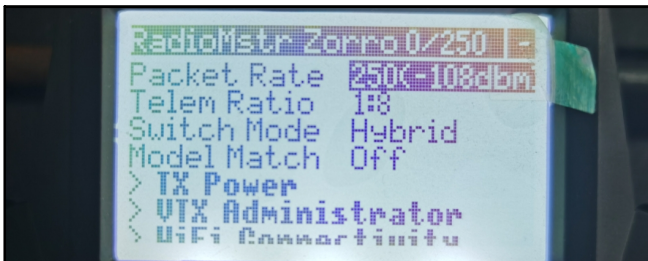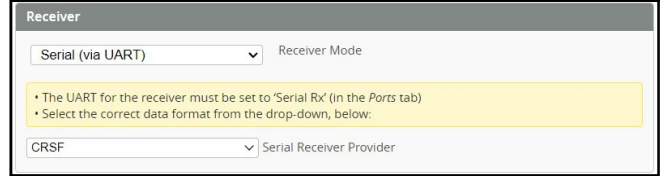

3) Check the receiver channel map and channel value is correct after bind successful.
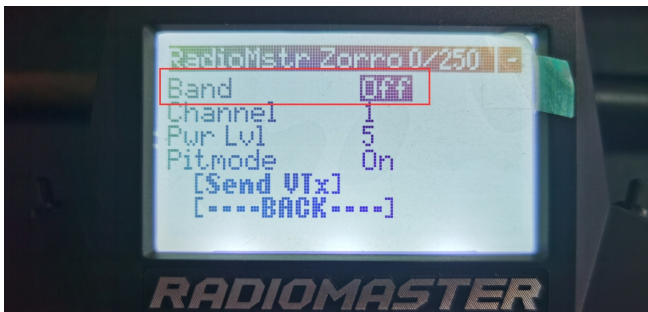
Make sure the VTX band is "OFF" from the vtx administrator, sometimes it would affect VTX .

Port and Receiver settings

Identifier	Configuration/MSP		Serial Rx	Telemetry Output		Sensor Input		Peripherals	
USB VCP		115200		Disabled	AUTO	Disabled	AUTO	Disabled	AUTO
UART1		115200		Disabled	AUTO	Disabled	AUTO	Disabled	AUTO
UART2		115200		Disabled	AUTO	Disabled	AUTO	Disabled	AUTO
UART3		115200		Disabled	AUTO	Disabled	AUTO	Disabled	AUTO
UART6		115200		Disabled	AUTO	Disabled	AUTO	VTX (TBS Sm	AUTO

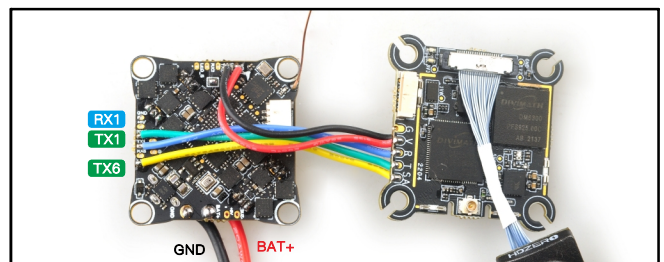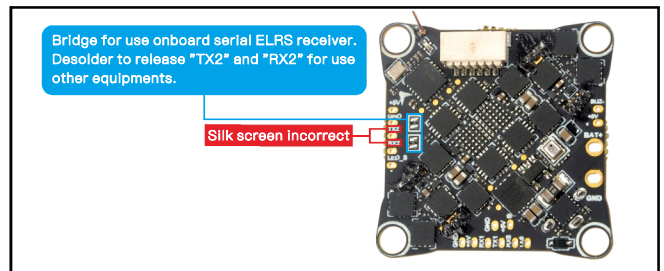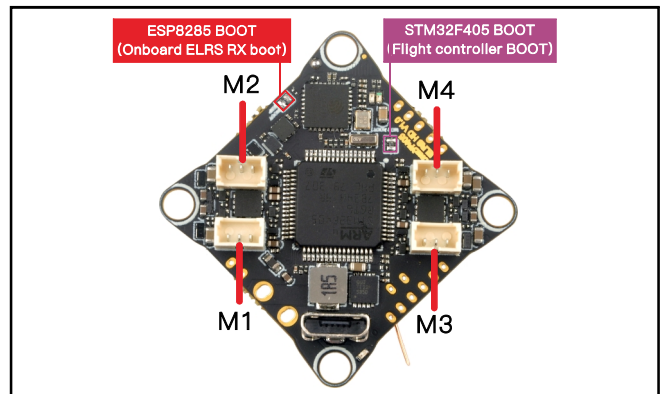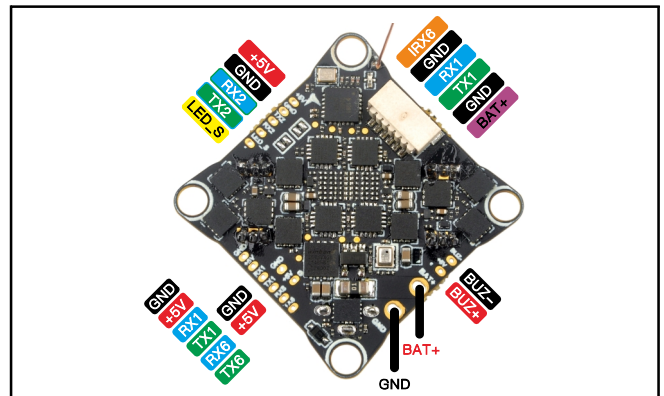| Receiver |
|---|
| Serial (via UART)   Receiver Mode |
| • The UART for the receiver must be set to 'Serial Rx' (in the *Ports* tab) |
| • Select the correct data format from the drop-down, below: |
| CRSF   Serial Receiver Provider |

***OSD display command for HDZERO UART ELRS version if you re-flashed firmware:

set osd_displayport_device = MSP
set displayport_msp_serial = 0
save

***If you upgrade firmware to 4.4.x , then you should enable MSP for uart1 and VTX(MSP+Displayport) from Port setting of the betaflight configurator

UART1	115200		Disabled	AUTO	Disabled	AUTO	VTX (MSP + D	AUTO

Flight controller connection diagram

Arm/Disarm the Motor

1)Turn on your radio transmitter and connect the battery to the Mobula8 HDZERO version .Then place Mobula8 HDZERO horizontally on the ground.

2)Check the FPV goggles could receive VTX footage signal.

3)Toggle Aux1 switch to arm the motors, the Green LED at the bottom of the flight controller would get solid once armed, happy flying.

Board and sensor alignment and frequency settings

Board and Sensor Alignment

| ↻ 0 | Roll Degrees | ⟳ 0 | Pitch Degrees | ↺ 0 | Yaw Degrees |

| First ∨ | GYRO/ACCEL | CW 0° ∨ | First GYRO |

| Default ∨ | MAG Alignment |

3.20 kHz | Gyro update frequency

| 3.20 kHz ∨ | PID loop frequency |

Motors and ESC settings

Mixer

Quad X ∨

PROP OUT :
Mount 2023 propeller
on #1 and 4# motors,
Mount 2023R propeller
on #2 and 3# motors

⬤ Motor direction is reversed

ESC/Motor Features

| DSHOT300 ∨ | ESC/Motor protocol |

⬤	MOTOR_STOP	Don't spin the motors when armed
⬤	ESC_SENSOR	Use KISS/BLHeli_32 ESC telemetry **over a separate wire**
⬤	Bidirectional DShot (requires supported ESC firmware)
12	Motor poles (number of magnets on the motor bell)
10	Motor Idle (%, static)

Default PID and Filter Settings

	Proportional	Integral	D Max	Derivative	Feedforward
Basic/Acro					
ROLL	59	95	46	34	0
PITCH	62	99	55	41	0
YAW	59	95	0	0	0

Mode:	RPY ∨		Low	Default	High	
Damping: D Gains	1					
Tracking: P & I Gains	1.15					
Stick Response: FF Gains	0					
Dynamic Damping: D Max	1					
Drift - Wobble: I Gains	0.9					
Pitch Damping: Pitch:Roll D	1.05					
Pitch Tracking: Pitch:Roll P, I & FF	1					
Master Multiplier:	1.15					

Throttle and Motor Settings

5	Throttle Boost
100	Motor Output Limit
0	Dynamic Idle Value [* 100 RPM]
⬤	Vbat Sag Compensation
	100	%
⬤	Thrust Linearization
	20	%

Miscellaneous Settings

Disable ∨	Cell Count - for auto Profile switching
20	Acro Trainer Angle Limit
⬤	Integrated Yaw
0	Absolute Control

Angle/Horizon

	Strength	Transition
Angle	50	
Horizon	50	75
	Angle Limit	
	55	

PID Controller Settings

Feed-forward	9	Jitter Reduction
	65	Smoothness
	2 Point ∨	Averaging
	15	Boost
	90	Max Rate Limit
	0.00	Transition
⬤	I Term Relax	
	RP ∨	Axes
	Setpoint ∨	Type
	15	Cutoff
⬤	Anti Gravity	
	⬤	Permanently enable
	Smooth ∨	Mode
	3.5	Gain
	250	Threshold
⬤	I Term Rotation	
Dynamic Damping	37	Gain
	20	Advance

Voltage and Currents meter settings

Voltage Meter

		110	Scale
Battery	0.6 V	10	Divider Value
		1	Multiplier Value

Amperage Meter

| | | 470 | Scale [1/10th mV/A] |
| Battery | 0.00 A | 0 | Offset [mA] |

ESC Settings

Flight controller firmware update

1.Install latest STM32 Virtual COM Port Driver

http://www.st.com/web/en/catalog/tools/PF257938

2.Install STM BOOTLOAD Driver (STM Device in DFU MODE)

3.Open Betaflight configurator and choose firmware target "BetaflightF4",then select the firmware version.

4.There are 2 ways to get in DFU Mode: 1). solder the boot pad and then plug USB to computer 2).loading betaflight firmware and hit "flash", then it will getting into DFU Mode automatically.

5.Open Zadig tools to replace the drivers from STM32 Bootloader to WINUSB Driver.

6.Reconnect the flight controller to the computer after replace driver done , and open Betaflight Configurator, loading firmware and flash.

Firmware and diff download