H7Wlite V2

User manual
FlyingRC H7Wlite V2 (H743) flight controller for RC aeroplanes and flying wings

Read the whole manual before installation. Never connect the video signal to the serial port pads.

Version 1.0 · Rotorama, s.r.o.

Contents

1. Safety instructions

1.1 Before you start

This product is an **electronic component of an unmanned aircraft** – a flight controller – not a finished product ready for use. The board only becomes usable once it is built into an aircraft, connected to the other parts and configured.

- Read this whole manual before you start building and keep it.
- The flight controller works with the battery voltage. A wiring error can cause a **fire** or destroy the board.
- Building requires experience with soldering and with model building. If you are unsure, ask an experienced modeller for help.
- The product is not a toy. It is not intended for children or for people who are not familiar with this manual.
- Do not use a damaged board – after a crash, after overheating, with a cracked board or with a burnt component.

1.2 Handling the board

The board is sensitive to static electricity and to mechanical damage.

- Hold the board by its edges, do not touch the solder pads, the connectors or the components.
- Before handling it, discharge static electricity by touching a grounded metal object.
- Do not put the board on metal or conductive surfaces, including carbon parts of the airframe.
- The GH1.25 connectors are tiny. Hold the connector body with your fingers both when plugging it in and when pulling it out, otherwise you will tear it off the board.
- Never connect or disconnect cables while the battery is connected.

1.3 Li-Po and LiHV batteries

The flight controller is designed for **2–6S Li-Po** batteries. Connecting a battery with more cells will destroy the board immediately.

State	per cell	6S Li-Po	4S Li-Po
fully charged	4.20 V	25.2 V	16.8 V
end the flight	3.50 V	21.0 V	14.0 V
storage	3.80 V	22.8 V	15.2 V

- For LiHV cells a full charge is **4.35 V** per cell; the values for ending the flight and for storage stay the same as for Li-Po.
- Always fit a **fully charged** battery before a flight.

- Charge only with a charger intended for the given cell type and never leave it unattended.
- Do not use a battery with a swollen pouch, a damaged wire or after a hard crash any further.
- Never connect the battery with reversed polarity – reverse polarity destroys both the flight controller and the power board, and such damage is not a product defect.
- Charge and store batteries in a non-flammable container, away from flammable materials.

1.4 Spinning propellers and bench tests

Most of the setup can be done without propellers. Do not fit the propellers until the model is completely set up.

- **Always** remove the propellers before you connect the flight controller to a computer or before you test the motors.
- When testing the motors, secure the model mechanically and never reach into the plane of the propeller.
- Never stand, and never let anybody else stand, in line with the propeller.
- Servos move with great force during a test. Do not hold the control surfaces or the pushrods with your fingers.

1.5 Temperature and cooling

The flight controller heats up mainly around the BEC converters – especially when a video transmitter is powered from the 9 V output and powerful servos draw current from the servo BEC.

- The board must not touch carbon parts of the airframe, battery connectors or other boards – there is a risk of a short circuit.
- Do not wrap the board in heat-shrink tubing and do not pot it. Such modifications prevent heat from escaping and damage caused by them cannot be claimed under warranty.
- Make sure air can flow around the board inside the fuselage.
- Let the board cool down after a flight before you touch it.

2. Product description

FlyingRC H7Wlite V2 is a flight controller for RC aeroplanes and flying wings, built around the STM32H743 microcontroller. The pinout follows the Matek H743-WING board, so most builds can reuse the established wiring scheme. The board carries a pair of BMI270 gyroscopes, a barometer, a **built-in compass**, analogue OSD and a microSD card slot for flight data logging.

The product is an **assembly of two boards**: the upper one is the flight controller with the pads, the lower one is the power board with pads for the battery and for the ESCs. The boards are joined by a **sixteen-pin connector** (2 × 8) and four standoffs with screws. The connector carries the power for all rails as well as the voltage and current sensing signals; the current shunt resistor is on the power board.

The manufacturer also offers firmware for multirotors, ground vehicles and boats for the same board. The hardware is, however, put together for aeroplanes – twelve outputs for servos and ESCs, a strong servo BEC, an airspeed sensor input and a built-in compass.

Assembly of the flight controller and the power board

2.1 Package contents

1× FlyingRC H7Wlite V2 flight controller assembly with power board

1× sub-board with USB-C connector, passive buzzer and BOOT0 button

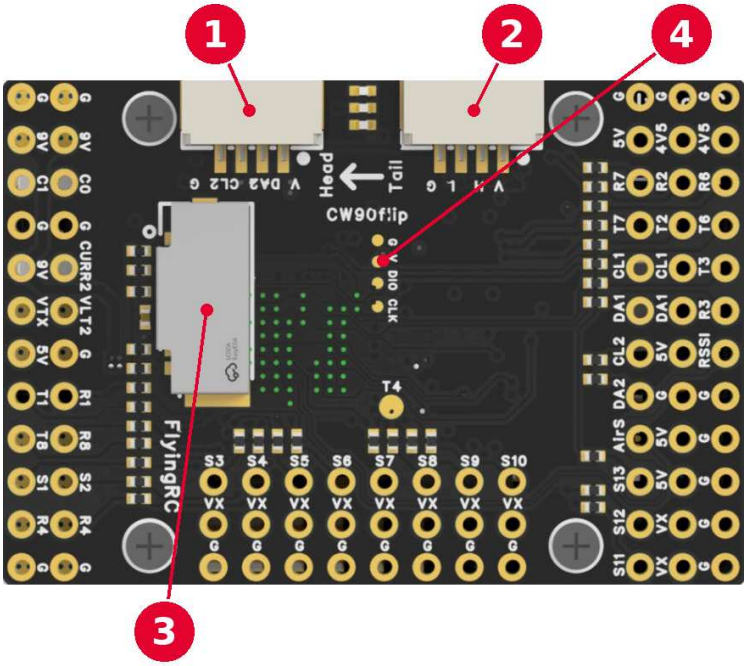
1× connecting cable

1× pin header

ESCs, servos, battery, receiver, GPS module, video transmitter and microSD card are not part of the package.

2.2 Board layout

All connections except the I2C2 bus and the CAN bus are brought out to solder pads around the edge of the board; the name of each one is printed next to the pad. **T** marks the transmit wire of a serial port, **R** the receive wire, **S** a PWM output and **G** ground.



① I2C2 connector · ② CAN connector · ③ microSD card slot · ④ SWD pads (manufacturer's drawing)

The white arrow between the **Head** and **Tail** labels shows the direction of flight. The position of the gyroscopes relative to the board is set in the firmware from the factory – you do not recalculate anything yourself as long as the assembly is mounted with the arrow pointing forward and the flight controller facing up.

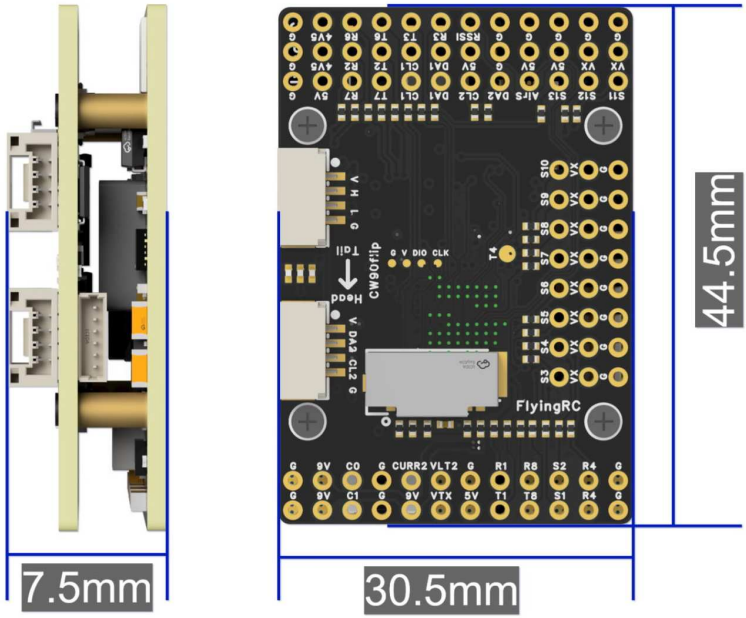
Pad groups on the edges of the board:

Silkscreen	Meaning
S1 – S12	PWM outputs for servos and ESCs
S13	output for a WS2812 addressable LED strip
T1 – T8 / R1 – R8	transmit and receive wires of the serial ports
CL1 · DA1	I2C1 bus – for external sensors
CL2 · DA2	I2C2 bus – also brought out to a connector, carries the on-board sensors
C0 · C1	analogue camera inputs
VTX	video output to the video transmitter
9V	BEC output for the video transmitter
5V	BEC output for electronics
4V5	output for powering the receiver and the GPS module
VX	servo BEC output at the individual PWM outputs
VLT2 · CURR2	second voltage and current sensing input
AirS	analogue airspeed sensor input
RSSI	analogue receiver signal strength input
DIO · CLK	SWD interface for service programming

2.3 Specifications

Model	FlyingRC H7Wlite V2 (H743)
Processor	STM32H743VIH6, 480 MHz, 2 MB Flash, 1 MB RAM
Gyroscope and accelerometer	2× BMI270 (SPI1 and SPI4 buses)
Barometer	SPA06-003, I2C2 bus, address 0x76
Compass	QMC5883P, built-in, I2C2 bus, address 0x2C
Analogue OSD	yes, MAX7456-compatible chip
Flight data logging	microSD card slot, SDIO interface
Serial ports	7× UART (1, 2, 3, 4, 6, 7, 8) and USB
PWM outputs	12 for servos and ESCs + 1 for an LED strip
I2C buses	2 (I2C1 on pads, I2C2 on pads and on a connector)
CAN bus	1, GH1.25 connector
Analogue inputs	6 – voltage, current, voltage 2, current 2, airspeed, RSSI
BEC for electronics	5 V / 5 A

BEC for the video transmitter	9 V / 3 A
BEC for servos	5 / 6 / 7 V, 12 A
On-board current sensor	100 A continuous
Power supply	2–6S Li-Po
USB interface	external USB-C sub-board with passive buzzer and BOOT0 button
Dimensions	30.5 × 44.5 × 7.5 mm
Weight	18.7 g
Factory firmware	ArduPilot (ArduPlane)



Board dimensions

2.4 Serial ports (UART)

The board has seven serial ports. In **ArduPilot** the ports are not identified by the UART number but by the SERIAL number – the numbers do not match and mixing them up is the most common mistake during commissioning. Follow this table:

Silkscreen	UART	ArduPilot	Note
USB	—	SERIAL0	console, MAVLink
T7 · R7	UART7	SERIAL1	

Silkscreen	UART	ArduPilot	Note
T1 · R1	USART1	SERIAL2	
T2 · R2	USART2	SERIAL3	
T3 · R3	USART3	SERIAL4	
T8 · R8	UART8	SERIAL5	
T4 · R4	UART4	SERIAL6	
T6 · R6	USART6	SERIAL7	port without DMA

❖ The **R6** pad has two functions in ArduPilot. By default it is the **RC input** for the receiver. It only starts working as the receive wire of the SERIAL7 port once the *BRD_ALT_CONFIG* parameter is set to 1. In INAV and in Betaflight the T6/R6 pair is, on the contrary, the default port for a serial receiver.

- In INAV and in Betaflight the ports are identified directly by the UART number printed on the board – T1/R1 is UART1, T6/R6 is UART6.
- The manufacturer does not supply a default parameter file with the board. Set the protocol of every port you use yourself with the *SERIALx_PROTOCOL* parameter, or in the *Ports* tab of the configurator.
- Each T/R pair also has a ground and a power pad; power receivers and GPS modules from the **4V5** or **5V** pads.

2.5 PWM outputs, servos and motors

Outputs **S1** to **S12** are used for servos and ESCs, output **S13** is reserved for an addressable LED strip. Next to every output there is a **VX** pad with the servo BEC voltage and a **G** pad with ground, so a servo is connected to the board directly with three wires.

The outputs are grouped by the processor timers. **ESCs with the DShot protocol and servos with classic 50 Hz PWM cannot be run in one group at the same time.** The grouping is the same in both firmwares, only the timer number differs:

Group	Outputs	ArduPilot	INAV
1	S1, S2	TIM8	TIM3
2	S3 – S6	TIM5	TIM5
3	S7 – S10	TIM4	TIM4
4	S11, S12	TIM15	TIM15
5	S13 (LED strip)	TIM1	TIM1

- Assign the function of each output in ArduPilot with the *SERVOx_FUNCTION* parameter, in INAV in the *Outputs* tab and in the mixer.
- In Betaflight, outputs S1 to S8 are treated as motors and S9 to S12 as servos.

- Servos draw current from the servo BEC. Before you connect them, check that the selected servo BEC voltage matches the permitted range of your servos – **7 V will destroy servos rated for 5 V only**.

2.6 I2C and CAN buses

The board has two I2C buses. The on-board sensors are connected to the **I2C2** bus – the barometer at address 0x76 and the compass at address 0x2C. Connect external sensors preferably to the **I2C1** bus, therefore, where there is no risk of an address conflict.

- **I2C2** – a GH1.25 connector on the edge of the board and the **CL2** and **DA2** pads. In ArduPilot this is logical bus **0**.
- **I2C1** – the **CL1** and **DA1** pads. In ArduPilot logical bus **1**, in INAV the default bus for an external compass and a rangefinder.
- **CAN** – a GH1.25 connector with G, L, H and V pins for modules on the CAN bus (DroneCAN GPS module, compass, ESCs).

Do not connect a device with address 0x76 or 0x2C to the I2C2 bus – it would conflict with the on-board barometer or compass.

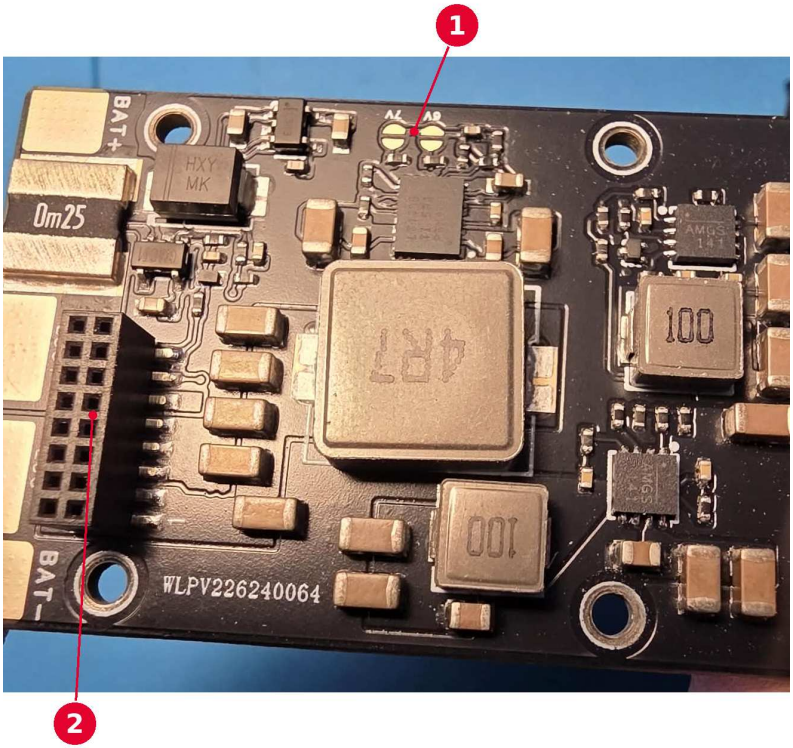
2.7 Power supply and BEC converters

The flight controller has no pads for connecting the battery directly. The power supply and the main voltage and current sensing are fed in **from the lower power board**, to which the flight controller is joined by a pin header; the battery is soldered to the power board.

BEC rail	Purpose
5 V / 5 A	flight controller, receiver, modules on the 5V pads
9 V / 3 A	video transmitter and analogue camera, the 9V pads
5 / 6 / 7 V, 12 A	servos, the VX pads at the PWM outputs
4V5	powering the receiver and the GPS module

- The on-board current sensor is rated for 100 A continuous. The shunt resistor is on the power board.
- The **VLT2** and **CURR2** pads are a second voltage and current sensing input – for example for a second battery or for measuring on a separate ESC.

The servo BEC voltage is selected with **solder jumpers** on the power board. If none of them is bridged, the output is **5 V**. Bridging the jumper marked **6V** or **7V** raises the output voltage to the corresponding value. Always bridge only one of them.



Power board: ① 6V and 7V solder jumpers for selecting the servo BEC voltage · ② connector to the flight controller. The BAT+ and BAT− battery pads are on the left edge.

Check the voltage on the VX pad with a multimeter after every change of the jumper, and only then connect the servos. A seven-volt output will destroy servos rated for 5 V only.

3. Legal conditions of operation in the Czech Republic and the EU

3.1 The law of the country you fly in applies

Regulations (EU) 2019/947 and 2019/945 apply in all Member States of the European Union, but the national implementing rules differ from state to state – registration portals, the minimum age of the pilot, geographical zones, compulsory insurance, permitted frequency bands and maximum transmitting powers. The information in this chapter describes the situation in the Czech Republic. If you operate the model in another country, you must follow the rules of the state in which you fly.

3.2 The flight controller is a component, not a complete aircraft

The flight controller in itself is not an unmanned aircraft system. The obligations under Regulation (EU) 2019/945 do not apply to it and it therefore does not carry a C0 to C6 class label either. The legal regime only arises with the aircraft you build from it.

- A model built from individual parts is a **privately built unmanned aircraft system**. Such a model does not have and cannot obtain a class label.
- It may be operated in the open category in subcategory **A1** only if its maximum take-off mass is **below 250 g** and its maximum operating speed is below 19 m/s, otherwise exclusively in subcategory **A3**.
- **Subcategory A2 is not available for a privately built model** – it requires a C2 class label.
- The transitional period for operating models without a class label ended on **31 December 2023**.
- Include everything the model takes off with in the maximum take-off mass – the battery, the camera and the payload. It is better to weigh the model.

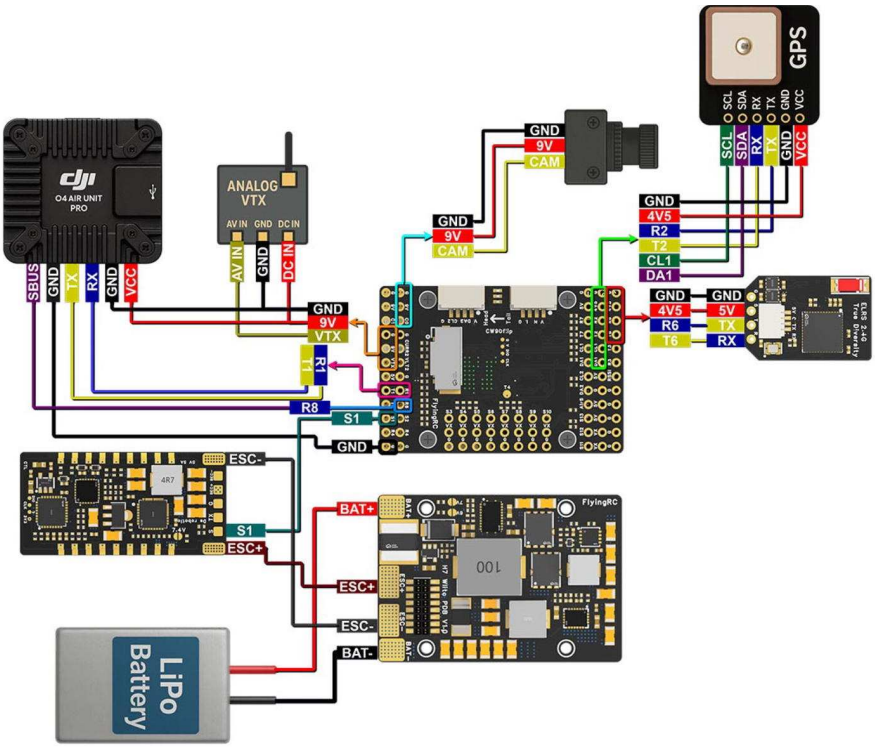
3.3 UAS operator registration and pilot competency

- The UAS operator must register if the model has a take-off mass of **250 g or more**, or if it is equipped with a **sensor capable of capturing personal data** – that is, a camera. For a model with a camera the registration obligation applies even below 250 g.
- In the Czech Republic you register on the portal of the Úřad pro civilní letectví dron.caa.gov.cz. The registration is valid throughout the European Union and is done only once.
- **Mark the registration number on the model**, for example with a sticker.
- For subcategory A3 you must complete online training and an online exam; the certificate is valid for five years.

- The minimum age of a remote pilot is 16 years. An exception is a privately built model with a mass below 250 g and a flight under the direct supervision of a competent pilot.
- In subcategory A3 fly at least **150 m** from residential, commercial, industrial and recreational areas, no more than **120 m** above ground and always within sight.
- Do not fly over assemblies of people and do not fly over uninvolved persons.
- When flying with FPV goggles a **UA observer** is required next to the pilot, keeping the model in sight without optical aids the whole time.
- Check the geographical zones before the flight in the binding map dronemap.gov.cz.
- Both the receiver and the video transmitter must meet the conditions of the ČTÚ general authorisation for the given frequency band and transmitting power. The flight controller itself does not transmit.
- Liability insurance is not compulsory in the Czech Republic for a recreational model up to 20 kg; we recommend it nevertheless.

4. Installation and wiring

The following diagram shows the typical wiring of a complete model. It is the manufacturer's reference diagram for the H7Wlite series; the peripherals used in your build may differ, but the pad layout on the board is the same.



Reference wiring diagram: power board, ESC, receiver, GPS module, analogue camera and video transmitter, digital video transmitter

4.1 Installation in the airframe and board orientation

- Mount the assembly **with the flight controller facing up** and with the white **Head** arrow in the direction of flight. Any other placement has to be described to the firmware with the board orientation parameter.
- The mounting holes in the corners are occupied by the screws that join the two boards. Fix the assembly in the airframe with soft double-sided tape or a foam pad – that also damps the vibrations to which the gyroscopes are sensitive.
- Place the assembly as far as possible from the power wires and from the video transmitter; the built-in compass is sensitive to the magnetic field of the power wires.

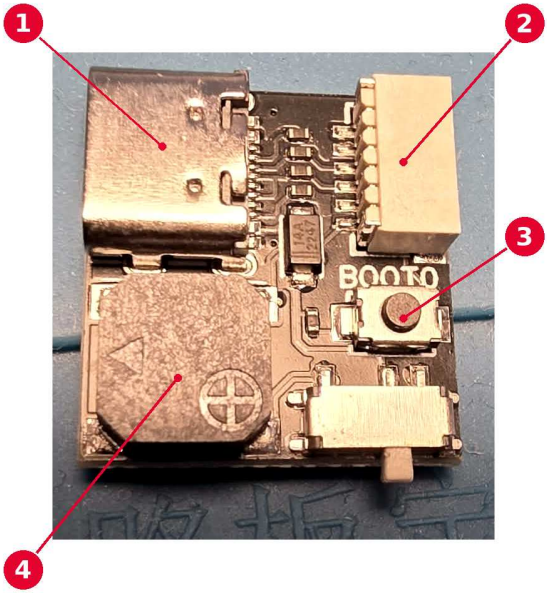
- Leave the microSD card slot and the pads you will need later accessible.

4.2 Power supply

- Use **14–18 AWG** silicone-insulated power wires for the battery and the ESCs, and **28–30 AWG** for the signals.
- The battery is soldered to the **BAT+** and **BAT−** pads of the power board, that is the lower board of the assembly. The flight controller has no battery input of its own – it receives both the power and the current sensing through the connector from the power board.
- Take the assembly apart before soldering – undo the four screws and pull out the connector. You will then reach the pads of the power board with plenty of room and will not overheat the components of the flight controller. When putting it back together, insert the connector straight and check that no pin has slipped beside its socket.
- Connect the ESCs to the **ESC+** and **ESC−** pads of the power board.
- We recommend soldering a **low-ESR capacitor** to the power input. It limits the voltage spikes from the ESCs, which are the most common cause of destroyed electronics.
- Never connect the battery with reversed polarity.
- Do not connect the battery and USB at the same time unless a procedure explicitly requires it.
- Make the first power-up without propellers and without the servos fitted to the pushrods.

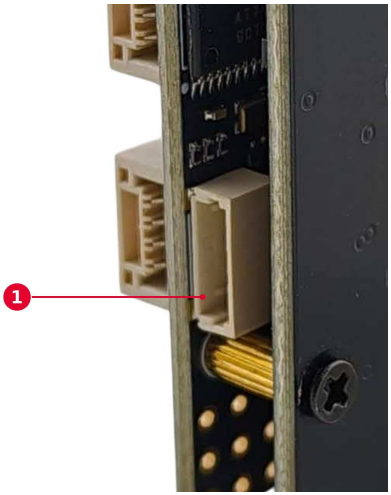
4.3 USB sub-board and buzzer

The USB-C connector, the passive buzzer and the **BOOT0** button are on a separate sub-board that is connected with the supplied eight-wire cable. Place it so that both the USB connector and the BOOT0 button are accessible without taking the model apart.



USB sub-board: ① USB-C connector · ② connecting cable socket · ③ BOOT0 button · ④ passive buzzer

The other end of the cable belongs in the **separate connector on the edge of the flight controller**, next to the I2C2 and CAN bus connectors. It is taller than those and has more pins, so it cannot be confused with them.



① USB sub-board connector on the edge of the flight controller

- The buzzer is passive; in the firmware settings it corresponds to the passive buzzer option.
- Route the cable away from the power wires and from the video transmitter.
- You only need the BOOT0 button when restoring the firmware through the DFU bootloader – see chapter 5.1.

4.4 ESCs and servos

- Connect the signal wire of the ESC to one of the **S1** to **S12** outputs and the ground to the adjacent **G** pad.
- Connect servos to an **S** output, the power to the adjacent **VX** pad and the ground to **G**.
- When distributing the outputs, respect the grouping from chapter 2.5 – ESCs with DShot and servos with 50 Hz PWM must not be in the same group.
- Check the servo BEC voltage with a multimeter on the VX pad **before** you connect the servos. It is selected with solder jumpers on the power board – see chapter 2.7.

4.5 Receiver

- The inverter for **SBUS** is built directly into the processor, so the receiver is connected to a normal receive pad **R**, not to a separate input.
- **ExpressLRS** and **CRSF** receivers are connected with two wires, T and R, of one port.
- In INAV and in Betaflight the default pair for a serial receiver is **T6/R6**. In ArduPilot the R6 pad is the RC input by default – see the note in chapter 2.4.
- Power the receiver from the **4V5** or **5V** pad according to its permitted range.

4.6 GPS module and compass

- Connect the GPS module to any free serial port (T and R), the power from the **4V5** pad, the ground to **G**.
- Connect an external compass to the **I2C1** bus – the **CL1** and **DA1** pads.
- Put the GPS module on a mast as far as possible from the power wires and from the video transmitter.
- The on-board compass is usable, but for builds with higher currents we recommend an external compass in the GPS module. Which compass is used is determined by the compass order setting.

4.7 Analogue camera and video transmitter

- Connect the video wire of the camera to the **C0** or **C1** pad and the camera power to **9V** or **5V** according to its range.
- Take the video from the board to the video transmitter from the **VTX** pad; the board adds the OSD data to it.

- Power the video transmitter from the **9V** pad.
- Control of the video transmitter with the SmartAudio or Tramp protocol is a separate wire to the transmit pad **T** of any port.

The video signal is not a serial line. Never connect the C0, C1 and VTX pads to the T and R pads of a serial port – neither the camera nor the board may survive it.

4.8 Digital video transmitter

- A digital video transmitter is connected with two wires, T and R, of one serial port; set the protocol of the port to *MSP DisplayPort*.
- Take the power according to the permitted range of the transmitter – for units powered by 9 V from the **9V** pad.
- Connect the SBUS output of the video transmitter, if you use it, to one of the receive pads **R**.

4.9 Other inputs

- **AirS** – input for an analogue airspeed sensor. The sensor is part neither of the board nor of the package; a digital airspeed sensor is connected to the I2C1 bus instead.
- **RSSI** – analogue receiver signal strength input.
- **VLT2** and **CURR2** – second voltage and current sensing input.
- **S13** – output for a WS2812 LED strip; power the strip from the **5V** pad, the ground to **G**.

5. Commissioning

5.1 Firmware

The firmware for this board is not part of the official ArduPilot, INAV or Betaflight repositories. You will not find the board in the board list of the configurator – the firmware is downloaded from the manufacturer's website and loaded manually from a file.

You will find the files for download on the manufacturer's page flyingrc.cn/en/downloads in the *FlyingRC H7Wlite V2* section. Choose the file according to the firmware you want to use:

Firmware	Target name
ArduPilot	FlyingRC_H7WliteV2
INAV	FLYINGRCH7WLITEV2
Betaflight	FLYINGRCH7WLITEV2_BMI270

- **ArduPilot** (ArduPlane) is loaded in the board from the factory. After the first connection, check which firmware and which version is actually in the board.
- Always choose the file exactly for **V2**. Firmware for the older H7Wlite version has a different sensor fit and the board will not run correctly with it.
- The manufacturer itself describes the PX4 package as unofficial and unstable; we do not recommend it.
- In ArduPilot, load the .hex file using the custom firmware loading option in the ground station. To recover after a failed upload, use the STM32CubeProgrammer program: hold the **BOOT0** button on the USB sub-board, connect USB and load the file into the DFU bootloader.
- Use a data USB cable. Cables intended only for charging will not show the bootloader.

5.2 Connecting to a computer

- The propellers must be removed.
- Connect the board to the computer with a USB-C cable. The board enumerates as a serial device.
- For ArduPilot use the Mission Planner or QGroundControl ground station, for INAV and Betaflight their configurator.
- Before you start changing settings, save a backup of the parameters.

5.3 Basic setup

▶ Serial ports

Assign a protocol to every port you use according to the connected device – GPS module, telemetry, receiver, digital video transmitter, video transmitter control.

Watch out for the SERIAL and UART mapping from chapter 2.4 and make sure that two devices do not have the same protocol set.

▶ Voltage and current sensing

The flight controller measures the voltage and the current from the power board. In ArduPilot the main measurement corresponds to these parameters:

Parameter	Value	Meaning
BATT_VOLT_PIN	10	voltage sensing input
BATT_CURR_PIN	11	current sensing input
BATT_VOLT_MULT	11.0	voltage divider ratio
BATT_AMP_PERVLT	40.0	current sensor conversion
BATT2_VOLT_PIN	18	second voltage sensing input
BATT2_CURR_PIN	7	second current sensing input
ARSPD_PIN	4	analogue airspeed sensor
RSSI_ANA_PIN	8	analogue RSSI input

- Compare the measured voltage with a multimeter and correct any difference by adjusting the *BATT_VOLT_MULT* parameter.
- Correct the current according to the charged capacity after a flight by adjusting the *BATT_AMP_PERVLT* parameter.
- The manufacturer does not state a conversion value for the **second** current input – set it by your own measurement.
- In INAV and in Betaflight the conversion values are preset in the target; check them with a multimeter anyway.

5.4 Sensor calibration

- Calibrate the **accelerometer** with the finished model following the procedure of the ground station – turn the model into all the required positions one after another and do not move it in between.
- Set the **level position** with the model placed in its flight attitude.
- Calibrate the **compass** outdoors, away from buildings, metal structures and cars, with the battery connected and with everything that will fly in the model.
- Repeat the calibration after every change in the layout of the parts or in the routing of the power wires.
- The barometer is not calibrated; before take-off leave the model still for a while so that the reference altitude settles.

5.5 Output setup and servo check

- Assign a function to every output you use – ailerons, elevator, rudder, flaps, motor.

- Check the **direction of deflection** of every control surface against the movement of the transmitter stick.
- Check the response of the stabilisation: tilting the model must deflect the control surfaces so that they **counteract** the tilt. The opposite response means a reversed output or a wrong board orientation.
- Set the centre positions and the end points so that the servos do not run into their stops.
- Test the motor last, without a propeller.

5.6 Arm, Disarm and failsafe

- Assign **Arm** (putting the model into the state ready for flight) and **Disarm** to a switch on the transmitter. Do not rely on a stick combination alone.
- Verify that the model cannot be armed until all the checks before take-off are met.
- Set up and **test the failsafe** – the behaviour on loss of the transmitter signal as well as on a drop of the battery voltage. Do the test without a propeller.
- Verify that after the transmitter is switched off the model goes into the configured mode and not into a free fall.

5.7 Flight data logging

- Insert a microSD card into the slot on the board; the board supports logging over the SDIO interface.
- Format the card as FAT32.
- In ArduPilot logging is enabled with the *LOG_BACKEND_TYPE* parameter, in INAV and in Betaflight by selecting the logging device in the blackbox settings.
- Only remove the card with the power disconnected.

5.8 Firmware-specific notes

- **ArduPilot** – the factory firmware, full support for both gyroscopes, the barometer and the built-in compass. Recommended for aeroplanes and flying wings.
- **INAV** – supports both gyroscopes, the barometer and the built-in compass. By default it looks for an external compass on the I2C1 bus.
- **Betaflight** – works only with the BMI270 gyroscopes.

The Betaflight configuration for this board contains drivers for the DPS310 barometer and the QMC5883L compass, that is for different components than those fitted on the V2 board. Under Betaflight, therefore, neither the built-in barometer nor the built-in compass will most likely work. If you need altitude and heading, use ArduPilot or INAV, or external sensors.

6. Operation

6.1 Pre-flight check

- The propeller is intact, fitted the right way round and firmly tightened.
- The battery is **fully charged**, firmly secured and its connector is undamaged.
- All connectors and soldered joints hold, no wire is in the path of the propeller or of the pushrods.
- The control surfaces move in the right direction and the stabilisation responds against the tilt.
- The model is registered and the registration number is marked on it.
- The flying site matches the operating subcategory and does not reach into a geographical zone.
- The GPS module has a fix and the number of satellites is stable, if you fly in navigation modes.

6.2 Monitoring the battery voltage

- End the flight at **3.5 V per cell** – at 14.0 V for a 4S, at 21.0 V for a 6S.
- Set up a low voltage warning in the OSD or in the telemetry.
- The voltage drops under load; what matters is the value after landing, not the peak at full throttle.
- A deeply discharged battery loses capacity and may catch fire during the next charge.

6.3 After the flight

- Disarm first, and only then disconnect the battery.
- Let the board and the ESCs cool down.
- Check whether anything has come loose and download the flight logs.

7. Maintenance and troubleshooting

7.1 After every flight

- Check the soldered joints and the connectors, especially after a hard landing.
- Blow out the dust and remove grass and dirt from around the board.
- Check that the insulation of the wires has not been chafed through.
- After a crash, inspect the board against the light – look for cracks, burnt spots and loose components. Do not use a damaged board any further.

7.2 Soldering and repairs

- Use a temperature-controlled soldering iron and a tip of a suitable size; the pads only tolerate a brief touch.
- Tin the wire first, then briefly solder it to the tinned pad.
- After soldering, check that the solder has not run onto a neighbouring pad.
- A torn-off pad or an overheated joint is not a product defect.

7.3 Storage

- Store the board dry, in an antistatic bag, disconnected from the battery.
- Store batteries at **3.8 V per cell**, disconnected from the model.
- Before a longer break, download the flight logs and remove the microSD card.

7.4 Troubleshooting

Problem	Possible cause and solution
The computer does not see the board	A USB cable intended only for charging; try a data cable and another port. Check the cable to the USB sub-board.
The board enumerates as a DFU device	The firmware is not loaded or is corrupted. Load it again with the STM32CubeProgrammer program as described in chapter 5.1.
The barometer or the compass are not detected	You are using Betaflight – see the warning in chapter 5.8. In ArduPilot and INAV check that there is no device with the same address on the I2C2 bus.
A servo does not move	No function is assigned to the output; there is no voltage on the VX pad; the output is in a group where DShot is already running.
The motor does not respond to DShot	There is a servo with 50 Hz PWM in the same timer group. Move the outputs according to the table in chapter 2.5.
The voltage or the current readings make no sense	Correct the BATT_VOLT_MULT and BATT_AMP_PERVLT parameters against a multimeter. Check the seating of the board on the power board.

Problem	Possible cause and solution
The receiver gives no signal	The signal is on a different pad than the one configured; in ArduPilot R6 is the RC input by default, not SERIAL7. Check the protocol of the port.
Video without OSD or OSD without video	Check the connection of C0 and VTX and the common ground. Never connect the video to a serial port pad.
The GPS module has no fix	Check the power from the 4V5 pad, the protocol of the port and the placement of the module away from the power wires.
The heading spins or drifts	The power wires disturb the built-in compass. Calibrate the compass again, or use an external compass on the I2C1 bus.
The model rolls over after take-off	A reversed direction of deflection or a wrong board orientation. Check the response of the stabilisation as described in chapter 5.5.

8. Information for the EU and Czech Market

8.1 Importer and responsible person in the EU

The product is placed on the European Union market by the importer named below. The importer is also the economic operator responsible for the product under Article 4 of Regulation (EU) 2019/1020 on market surveillance and the responsible person for the purposes of Regulation (EU) 2023/988 on general product safety (GPSR).

Importer / responsible person in the EU	Rotorama, s.r.o.
Company ID (IČO)	051 57 692
VAT ID (DIČ)	CZ05157692
Registered office	Okrajová 1351, 674 01 Třebíč, Czech Republic
E-mail	info@rotorama.cz
Phone	+420 252 252 098
Website	www.rotorama.cz

8.2 Product conformity

CE

- The product bears the **CE** marking and complies with the requirements of the applicable European Union harmonisation legislation.
- A copy of the **EU Declaration of Conformity** is available from the importer at the address stated above or at the e-mail address info@rotorama.cz.
- **Product identification:** the type designation (H7WING MK2-BMI270) and the serial number are printed directly on the flight controller board.

8.3 Disposal of electrical equipment

- The crossed-out wheeled bin symbol on the product, its packaging or in the documentation means that at the end of its service life the product **must not be disposed of together with mixed municipal waste**.
- Hand it over at a take-back point for electrical equipment – at a collection yard, at a take-back point of a collective system, or at the retailer when purchasing a new equivalent product. Take-back is free of charge for the end user.
- The obligations under Act No. 542/2020 Coll., on end-of-life products, are fulfilled by the importer through a collective take-back system.
- Proper disposal helps prevent negative impacts on the environment and human health and contributes to the reuse of secondary raw materials.

Through its contractual partner **ASEKOL a.s.**, the company ensures the take-back of waste electrical equipment from households and the separate collection of waste electrical equipment, batteries and accumulators in accordance with the applicable legislation. The customer is entitled to hand over old electrical equipment or a battery or accumulator at any collection point of the above contractual partner. The addresses of these take-back points are listed at www.asekol.cz, www.ecobat.cz and also https://visoh2.mzp.cz/RegistrMistZO/RegistrMistZOPublic/MapaMistZpetOdberu.

9. Warranty and rights arising from defective performance

The rights and obligations of the parties are governed by Czech law, in particular Act No. 89/2012 Coll., the Civil Code, and Act No. 634/1992 Coll., on Consumer Protection. The manufacturer does not issue its own warranty terms for this product.

- The seller is liable to the buyer for the product being free of defects on receipt. If the buyer is a consumer, a defect may be notified **within two years of receipt** of the product (Section 2165 of the Civil Code).
- If a defect appears within **one year** of receipt, the product is deemed to have been defective already at the time of receipt (Section 2161(5) of the Civil Code).
- When purchasing online, a consumer has the right to **withdraw from the contract within 14 days** of receiving the goods without giving a reason (Section 1829 of the Civil Code).
- Claims should be made with the retailer from whom you purchased the product. The importer's contact details are given in Chapter 8.1.
- The competent body for out-of-court settlement of consumer disputes is the **Czech Trade Inspection Authority**, Štěpánská 796/44, 110 00 Prague 1, www.coi.cz.