Ranger Micro ELRS Combo

ExpressLRS 2.4 GHz transmitter module for JR micro module bays

User manual · Ranger Micro module and RP1 and RP2 receivers



Read the entire manual before first use. Never power on the module without an antenna attached.

Rotorama, s.r.o. · www.rotorama.com

Contents

1. Safety instructions

2. Product description

2.1 Package contents

2.2 Ranger Micro module overview

2.3 Module specifications

2.4 RP1 and RP2 receivers

3. Frequencies, output power and operating conditions

3.1 The law of the country of operation applies

3.2 Frequency bands and maximum output power

3.3 FCC and LBT versions, power setting

4. Installing the module and setting up the radio

4.1 Fitting the antenna and inserting the module

4.2 Model setup in EdgeTX

4.3 ExpressLRS Lua script

4.4 External power via XT30

5. Receivers – wiring and binding

5.1 Connecting to the flight controller (FC)

5.2 Betaflight setup

5.3 Binding the receiver to the module

5.4 Failsafe and pre-flight check

6. Firmware and further guides

7. Maintenance and troubleshooting

8. Information for the EU and Czech Market

9. Warranty and rights arising from defective performance

1. Safety instructions

1.1 General rules

- The Ranger Micro transmitter module and the RP1 and RP2 receivers are used for radio control of models (drones, aircraft, vehicles) using the **ExpressLRS** (ELRS) protocol. This product is not a toy.
- A model controlled by this system may cause injury or damage to property if the link is lost or settings are wrong. Check the link and the failsafe function before every flight (chapter 5.4).
- Do not expose the module or the receivers to moisture, dust, direct sunlight or impacts. Do not open the module housing unless following a procedure described by the manufacturer.
- Always work on the wiring of the radio, receiver or flight controller (FC) with the power off and the flight battery disconnected.

1.2 Antenna and radio transmission

- **Never power on the module without an antenna attached.** Transmitting without an antenna can damage the RF circuit of the module.
- On the RP1 receiver, connect the antenna to the u.FL connector before powering the receiver for the first time.
- Do not cover the module antenna with your hand or objects during operation and do not point its tip directly at the model – reception is weakest in that direction.
- Set the output power only within the limits permitted in the country of operation (chapter 3). The user is responsible for the power setting.

1.3 Power supply and cooling

- The module is powered from the module bay of the radio. Optionally, it can be powered externally via the **XT30** connector at **6–16.8 V DC**; do not exceed this range and observe the correct polarity (chapter 4.4).
- The module has a built-in fan. Do not cover the air vents or the fan and do not insert any objects into them.
- Power the RP1 and RP2 receivers with **5 V** only.

2. Product description

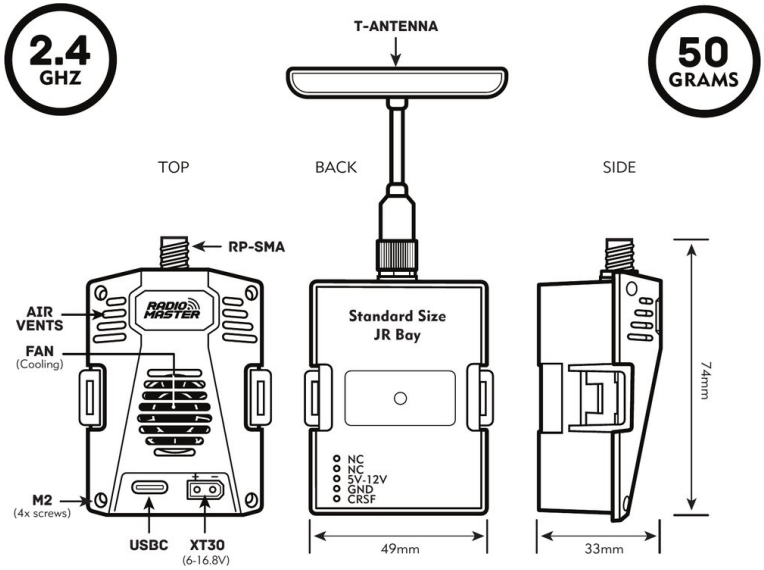
2.1 Package contents

Qty	Item
1×	RadioMaster Ranger Micro 2.4 GHz ELRS transmitter module
1×	T-antenna for the module (RP-SMA connector)
2×	RadioMaster RP1 ExpressLRS 2.4 GHz receiver with 65 mm T-antenna (u.FL connector)
1×	RadioMaster RP2 ExpressLRS 2.4 GHz receiver with on-board ceramic antenna

Not included: RC radio (transmitter), battery for external power of the module, USB-C cable, or the directional MOXON antenna, which the manufacturer offers as an optional accessory.

2.2 Ranger Micro module overview

Featuring F-1000Hz refresh rates and a high-efficiency cooling system, the Ranger Micro 2.4GHz ELRS Module represents the cutting edge in ELRS technology. Attach the module to a compatible radio (TX16S, TX16S MKII, TX12, TX12 MKII and more) to enjoy all that ELRS has to offer. The Ranger Micro fits JR style **micro** module bays; for Nano connectors, please consider the Ranger and the Ranger Nano modules.



Ranger Micro module – TOP, BACK and SIDE views. Manufacturer's drawing.

Label on the drawing	Meaning
T-ANTENNA	T-antenna (included)
RP-SMA	RP-SMA antenna connector
AIR VENTS	Air vents
FAN (Cooling)	Fan (cooling)
M2 (4x screws)	Four M2 housing screws
USBC	USB-C connector
XT30 (6-16.8V)	XT30 connector for external power 6–16.8 V DC
Standard Size JR Bay	Side of the module inserted into the module bay of the radio
NC	Bay contact – not connected (2×)
5V-12V	Bay contact – module power supply from the radio
GND	Bay contact – ground
CRSF	Bay contact – CRSF data signal between the radio and the module

2.3 Module specifications

Parameter	Value
Regulatory domain	ISM2400
MCU	ESP32 (main) ESP8285 (aux, as ExpressLRS Backpack)
RF chip	SX1281IMLTRT
Frequency range	2400–2480 MHz
Max. packet rate	500 Hz / F-1000 Hz (F-1000 Hz mode requires EdgeTX 2.7.1 or later)
Min. receiver refresh rate	25 Hz
RF output power	default 100 mW (maximum values see chapter 3.2)
WiFi	yes
Bluetooth	yes
XT30 power supply voltage	6–16.8 V DC
Supply from the bay (5V-12V contact)	5–12 V
Weight	50 g (with antenna) 40.5 g (without antenna)

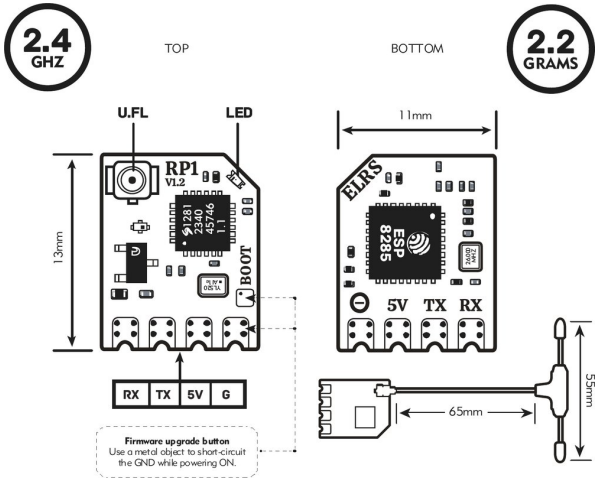
Parameter	Value
Dimensions	136 × 49 × 33 mm (with T-antenna) 74 × 49 × 33 mm (without antenna)
Control distance (manufacturer data)	max. 2 km
Default firmware (target)	RadioMaster Ranger Micro 2.4GHz TX

- built-in ExpressLRS Backpack (ESP8285),
- high-efficiency cooling system with fan,
- WiFi and Bluetooth support,
- packet rates up to F-1000 Hz,
- supports TX16S MKII and TX12 MKII radios.

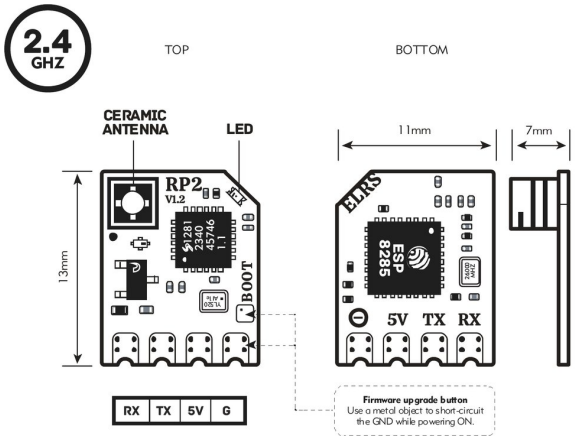
※ The control distance depends on the environment, output power and packet rate, antenna placement and interference. The manufacturer's figure is a maximum value, not a guaranteed range.

2.4 RP1 and RP2 receivers

The RP1 and RP2 are 2.4 GHz ExpressLRS nano receivers with the ESP8285 MCU and the SX1281 RF chip. The RP1 has a u.FL antenna socket for the external T-antenna; the RP2 has a built-in ceramic antenna, which is super light and small. Both receivers feature built-in WiFi, so you can upgrade the firmware and configure the receiver via the built-in WebUI with your PC or mobile phone.



RP1 receiver – TOP and BOTTOM side, 65 mm T-antenna. Manufacturer's drawing.



RP2 receiver – top and bottom side, side view. Manufacturer's drawing.

Label on the drawing	Meaning
U.FL / CERAMIC ANTENNA	u.FL connector for the T-antenna (RP1) / on-board ceramic antenna (RP2)
LED	Status LED
RX / TX / 5V / G	Solder pads: RX, TX, 5 V supply, ground (GND)
BOOT – Firmware upgrade button	Pad for forced update mode: use a metal object to short-circuit it to GND while powering on

Parameter	RP1	RP2
Antenna	external T 65 mm, u.FL connector	ceramic, on board
Size	13 × 11 × 3 mm	13 × 11 × 7 mm
MCU	ESP8285	ESP8285
RF chip	SX1281	SX1281
Frequency band	2400–2483 MHz	2400–2483 MHz
Max. packet rate	500 Hz / F-1000 Hz	500 Hz / F-1000 Hz
Telemetry RF power	10 mW	10 mW
Input voltage	5 V	5 V
Receiver protocol	CRSF	CRSF
Default firmware (target)	RadioMaster RP1/2 2400 RX	RadioMaster RP1/2 2400 RX

3. Frequencies, output power and operating conditions

3.1 The law of the country of operation applies

Radio equipment is subject to Directive 2014/53/EU (RED) throughout the European Union, but national implementing rules differ from country to country – in particular the permitted frequency bands, maximum output power and conditions for operating models. The information in this chapter describes the situation in the Czech Republic. If you operate the equipment in another country, you must follow the regulations of the country in which you operate it.

3.2 Frequency bands and maximum output power

Interface	Frequency band	Max. output power
ExpressLRS 2.4 GHz (module)	2402.4–2479.4 MHz	19.31 dBm
WiFi (module)	2412–2472 MHz	15.54 dBm
Bluetooth (module)	2402–2480 MHz	3.44 dBm
Telemetry of RP1 / RP2 receivers	2400–2483 MHz	10 mW

※ The module values are taken from the manufacturer's certificate under the RED directive (standard EN 300 328) for the version intended for the EU market. The receiver values are stated by the manufacturer on the product pages and in the receiver manuals.

3.3 FCC and LBT versions, power setting

- The manufacturer supplies the module and the receivers in **FCC** and **LBT** versions. The LBT (Listen Before Talk) version is intended for European conditions; in EU countries use the module and receivers with LBT firmware. The module and the receiver only connect to each other if they use the same regulatory domain.
- In the Czech Republic, the 2400–2483.5 MHz band may be used for wideband data transmission up to a radiated power of **100 mW e.i.r.p.** under the general authorisation of the Czech Telecommunication Office (ČTÚ) No. VO-R/12.
- The output power of the module is set in the ExpressLRS Lua script (item *TX Power*, chapter 4.3). Setting the power above the limit valid in the country of operation is not permitted; the user is responsible for the setting.

4. Installing the module and setting up the radio

4.1 Fitting the antenna and inserting the module

① Screw the T-antenna onto the RP-SMA connector of the module (by hand only, without tools).

② Switch off the radio.

③ Slide the module into the JR micro bay at the back of the radio until the contacts are seated and the module clicks into place. Remove the module only with the radio switched off.

④ Switch on the radio and set up the model (chapter 4.2).

4.2 Model setup in EdgeTX

① Open the model settings (*Model → Setup*).

② Switch off the internal RF module (*Internal RF: OFF*) if you are not using it.

③ For the external RF module (*External RF*), select the **CRSF** mode.

④ Set the other link parameters in the ExpressLRS Lua script.

※ F-1000 Hz mode requires EdgeTX 2.7.1 or later on the radio. For EdgeTX documentation see chapter 6.

4.3 ExpressLRS Lua script

Start the script from *SYS → Tools → ExpressLRS*. Main items (names may vary slightly depending on the firmware version):

Item	Meaning
Packet Rate	Refresh rate: higher = lower latency, lower = longer range
Telem Ratio	Ratio of telemetry packets from the receiver
TX Power	Output power of the module (observe the limits of the country of operation, chapter 3)
Bind	Sends the binding pulse (chapter 5.3)
WiFi Connectivity	Enables WiFi of the module, receiver or Backpack (updates and settings)

4.4 External power via XT30

- The XT30 connector on the bottom of the module allows the module to be powered from an external source at **6–16.8 V DC**.
- Check the voltage of the source when fully charged: a 4S LiPo has 16.8 V (4.20 V/cell) and is suitable, a 4S LiHV has 17.4 V (4.35 V/cell) and must not be used.
- Observe the polarity (+ and − are marked on the drawing in chapter 2.2). Disconnect the source after use.

5. Receivers – wiring and binding

5.1 Connecting to the flight controller (FC)

The receiver is connected to a free serial port (UART) of the flight controller (FC) with four wires:

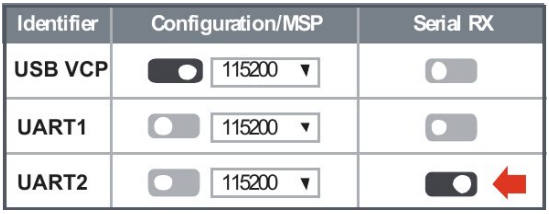
Receiver pad	Connect on the flight controller (FC)
5V	5 V supply
G	ground (GND)
TX	RX of the selected UART
RX	TX of the same UART

- TX and RX wires are crossed: the receiver TX goes to the FC RX and vice versa.
- Solder with the battery disconnected and quickly to avoid heat damage to the receiver. Insulate the joints so that they cannot touch the carbon frame.
- On the RP1, route the T-antenna as far as possible from carbon, metal parts and high-current wires; the antenna ends must not reach into the propellers.

5.2 Betaflight setup

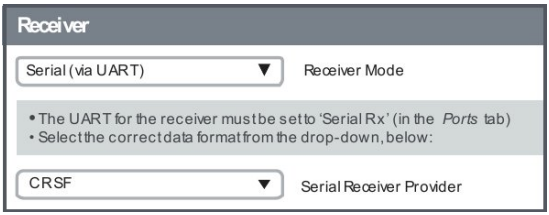
① Open Betaflight Configurator and go to the *Ports* tab.

② Enable *Serial RX* for the UART to which the receiver is connected (UART2 in the picture). *Save and Reboot*.



Ports tab – Serial RX enabled on UART2 (example).

③ On the *Configuration* tab (in newer Betaflight versions the *Receiver* tab), select *Serial-based receiver* in the *Receiver* panel and the **CRSF** protocol. Save the settings.



Receiver panel – Serial (via UART) mode and CRSF protocol.

5.3 Binding the receiver to the module

The receiver and the module bind either automatically using an identical **binding phrase** (set when flashing the firmware in ExpressLRS Configurator or in the web interface), or by the traditional procedure using the *Bind* button.

▶ Traditional binding

Traditional binding can only be used if no custom binding phrase is set on the receiver (*Device options*).

① Power OFF your transmitter/radio.

② Plug in and unplug your receiver 3 times.

③ Make sure the LED is doing a quick double blink, which indicates the receiver is in bind mode.

④ Power ON your transmitter/radio and use the **[BIND]** button on the ExpressLRS Lua script, which sends out a binding pulse.

⑤ If the receiver has a solid light, it's bound!

※ The module and the receiver must have a compatible ExpressLRS firmware version and the same regulatory domain (FCC or LBT), otherwise they will not connect.

5.4 Failsafe and pre-flight check

- Set up the failsafe (model behaviour on signal loss) in the flight controller (in Betaflight the *Failsafe* tab) and test it with the propellers removed: after switching off the radio, the model must enter failsafe and the motors must stop.
- Before every flight, check on the *Receiver* tab or on the radio display that all channels respond in the correct direction and that Arm and Disarm work.
- After changing the packet rate or output power, check the link at a safe place before flying at a longer distance.

6. Firmware and further guides

6.1 Firmware update

- The module comes with ExpressLRS firmware installed. Update it with **ExpressLRS Configurator** via the USB-C connector or via WiFi; the module target is **RadioMaster Ranger Micro 2.4GHz TX**.
- The RP1 and RP2 receivers are updated via WiFi; the target is **RadioMaster RP1/2 2400 RX**. The receiver settings can also be changed in its web interface.
- If the receiver does not respond after a failed update, put it into forced update mode: use a metal object to short-circuit the **BOOT** pad to GND while powering on.
- The built-in ExpressLRS Backpack (ESP8285) communicates with other devices (e.g. the video receiver in goggles) and is updated separately.
- After an update, always check that the module and all receivers have a compatible firmware version and the same regulatory domain.

6.2 EdgeTX and ExpressLRS documentation

Detailed official documentation for EdgeTX and ExpressLRS is available on the project websites. Scan the QR code with your phone or click the link:

EdgeTX – official website
Radio, model and external module setup.
edgetx.org

ExpressLRS – official website
Binding, link settings, firmware updates.
www.expresslrs.org

We wish to thank the ExpressLRS team for their support and testing during the development of the Ranger series. To learn more and support the ExpressLRS project visit: www.expresslrs.org.

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- Keep the air vents and the fan clean; remove dust with a dry brush or compressed air.
- Regularly check the antenna and the RP-SMA connector of the module as well as the cable and u.FL connector of the RP1 receiver antenna. Replace a damaged antenna.
- During transport, unscrew the module antenna or protect it against bending and impact.
- Store in a dry place at room temperature, out of the reach of children.

7.2 Troubleshooting

Problem	Possible cause and solution
The Lua script does not load the module parameters	Check that the module is inserted correctly, *External RF* is set to CRSF and *Internal RF* is off.
The receiver does not bind	Check for an identical binding phrase or use traditional binding (chapter 5.3). Check for compatible firmware and the same FCC / LBT domain.
The flight controller does not respond to the channels	Check that *Serial RX* is enabled on the correct UART, the CRSF protocol and that TX and RX are crossed.
Short range, link dropouts	Check the antennas and their placement, the output power and packet rate; route the receiver antenna away from carbon and metal.
The module gets excessively hot	Check that the fan is running and the air vents are not covered.

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 stated below, who is at the same time the responsible person within the meaning of Article 16 of Regulation (EU) 2023/988 of the European Parliament and of the Council 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.com

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 (Ranger Micro, receivers RP1 and RP2) is given on the product and on its packaging.

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 contracting parties are governed by Czech law, in particular by Act No. 89/2012 Coll., the Civil Code, and Act No. 634/1992 Coll., on consumer protection.

- 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.