Ranger Micro

RadioMaster · ExpressLRS 2.4 GHz transmitter module
User Manual



Read the entire manual before first use, especially the safety instructions in chapter 1. In the EU, operate the module only with EU_CE_2400 (LBT) firmware and a power of no more than 100 mW (chapter 3).

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1. Safety Instructions

1.1 General Guidelines

Read this entire manual carefully before first use and keep it for future reference.

- The module is intended for controlling radio-controlled models in combination with a compatible radio and an ExpressLRS 2.4 GHz receiver. Do not use it for any other purpose.
- Insert the module into the bay and remove it **only with the radio switched off** and the external power supply disconnected.
- Before every flight, check the link to the model and the receiver's failsafe function. Do not change module parameters while the model is in the Arm state (motors enabled).
- Do not disassemble or modify the module. Interfering with the electronics, antenna or firmware may result in loss of regulatory compliance.
- Protect the module from moisture, dust, drops and direct radiant heat. Do not cover the air vents or the fan.
- This product is not a toy. Keep it out of the reach of children.

1.2 Power Supply

- The module is powered from the radio's module bay or externally via the **XT30** connector. The input voltage on the XT30 connector is **6–16.8 V DC** – never exceed it.
- A fully charged 4S Li-Po battery has 16.8 V (4.20 V/cell). **A 4S LiHV battery** (17.4 V fully charged, 4.35 V/cell) **exceeds the permitted input voltage** – do not connect it to the module.
- Observe the correct polarity of the XT30 connector (+ / −). Use only undamaged batteries and cables.
- Do not leave the battery connected unattended and disconnect it after use. Follow the battery manufacturer's instructions for handling the battery.

1.3 Radio Transmission

- Never switch on the module without the antenna connected – transmitting without an antenna may damage the transmitter circuits.
- Use only the antenna specified by the manufacturer. Do not amplify it or replace it with a type that would exceed the permitted radiated power.
- Do not touch the antenna while transmitting and do not hold it in the immediate vicinity of your body.
- Set the transmitter power in accordance with the regulations of the country in which you operate the model – see chapter 3.

2. Product Description

2.1 Introduction

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 included T-shape antenna is designed for maximum signal coverage. An optional MOXON antenna is available for directional applications.

※ The Ranger Micro 2.4GHz ELRS Module fits JR style micro module bays, for Nano connectors, please consider the Ranger and the Ranger Nano modules.

- Built-in ExpressLRS Backpack
- High-efficiency cooling system
- Wifi and Bluetooth support
- Packet rates up to F-1000Hz
- T-antenna included
- Supports TX16S MKII and TX12 MKII radios

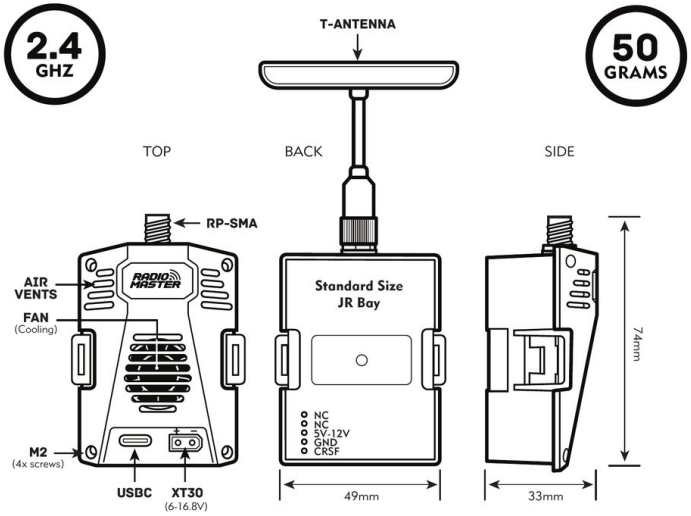
We wish to thank the ExpressLRS team for their support and testing during the development of the Ranger series. To learn more and support the ExpressLRS project visit: www.expresslrs.org

2.2 Package Contents

- 1× Ranger Micro Module
- 1× T-Antenna (RP-SMA connector)

Not included: radio, ExpressLRS receiver, battery for external power or USB-C cable.

2.3 Parts Description



Top (TOP), back (BACK) and side (SIDE) views – manufacturer's drawing

Label in drawing	Meaning
T-ANTENNA	T-shape antenna
RP-SMA	RP-SMA antenna connector
AIR VENTS	air vents
FAN (Cooling)	cooling fan
M2 (4x screws)	4 M2 housing screws
USBC	USB-C connector (firmware update, power in WiFi mode)
XT30 (6-16.8V)	XT30 external power input, 6–16.8 V
Standard Size JR Bay	rear side for a standard size JR bay
NC / NC / 5V-12V / GND / CRSF	JR bay contacts: 2× not connected, 5–12 V power from the radio, ground, CRSF signal



USB-C and XT30 connectors on the bottom of the module with the type label

2.4 Specifications

Parameter	Value
Regulatory Domain	ISM2400 (FCC version), see chapter 2.5
MCU	ESP32 (main) ESP8285 (aux, as ESP 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
WiFi	Yes
Bluetooth	Yes
XT30 Power Supply Voltage	DC 6–16.8 V
Weight	50 g (with antenna) 40.5 g (w/o antenna)
Dimensions	136 × 49 × 33 mm (with T-antenna) 74 × 49 × 33 mm (without antenna)
Control Distance	Max 2 km (manufacturer's figure)
Default Firmware	ExpressLRS, target *RadioMaster Ranger Micro 2.4GHz TX*

2.5 FCC and LBT Versions

The module is manufactured in two versions that differ in the regulatory domain of the ExpressLRS firmware:

Version	Description
FCC	firmware with the ISM2400 domain; according to the ExpressLRS documentation, this module can be set to a power of up to 1000 mW. **Such operation is not permitted in the EU.**
LBT	firmware with the EU_CE_2400 domain – LBT (Listen Before Talk) function and power limited by the firmware to a maximum of 100 mW. The version intended for operation in the EU.

※ The regulatory domain of the module and the receiver must match (EU_CE_2400 with EU_CE_2400, ISM2400 with ISM2400), otherwise no link will be established. In the 2.4 GHz band, the domain can only be changed by flashing new firmware.

2.6 Manufacturer

Manufacturer	Shenzhen RadioMaster Co., Ltd
Address	3rd Floor, Yutian Building, Yangtian Road, District 72, Xin'an Street, Bao'an District, Shenzhen, Guangdong, China
Web	www.radiomasterrc.com

The responsible person in the EU is the importer listed in chapter 8.1.

3. Radio Frequencies and Operation in the EU and the Czech Republic

3.1 The Law of the Country of Operation Applies

Directive 2014/53/EU (RED) applies in all member states of the European Union, but national regulations on the use of frequencies differ from country to country – permitted frequency bands, maximum transmit power and operating conditions. The information in this chapter describes the situation in the Czech Republic. If you operate the module in another country, you must comply with the regulations of the country in which you use it.

3.2 Frequency Bands and Maximum Transmitted Power

The module contains three radio transmitters. Frequency bands and maximum transmitted power according to the annex of the CE certificate of conformity:

Transmitter	Frequency band	Max. power
ExpressLRS 2.4 GHz	2402.4–2479.4 MHz	19.31 dBm
WiFi 2.4 GHz	2412–2472 MHz	15.54 dBm
Bluetooth	2402–2480 MHz	3.44 dBm

3.3 Operation in the Czech Republic

- In the Czech Republic, the 2400–2483.5 MHz band may be used without an individual licence under the general authorisations of the Czech Telecommunication Office (ČTÚ). The limit for wideband data transmission (VO-R/12) is **100 mW e.i.r.p.**, and for non-specific short-range devices (VO-R/10) **25 mW e.i.r.p.**
- The e.i.r.p. limit includes the antenna gain. Use only the antenna specified by the manufacturer, without amplifiers or modifications.
- In the EU, use **only firmware with the EU_CE_2400 (LBT) domain**. Operation with ISM2400 (FCC) firmware and with a power above 100 mW is not permitted in the EU.
- The user is responsible for the power setting. General authorisations: ctu.gov.cz.

3.4 Simplified EU Declaration of Conformity

Hereby, Shenzhen RadioMaster Co., Ltd declares that the radio equipment type **Ranger Micro** is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: radiomasterrc.com/pages/certificatiion.

4. Installation

4.1 What Else You Need

- a radio with a standard size JR bay and EdgeTX or OpenTX firmware (e.g. TX16S, TX16S MkII, TX12, TX12 MkII),
- an ExpressLRS 2.4 GHz receiver with the same regulatory domain and the same major firmware version as the module,
- the ELRS Lua script on the radio's SD card (chapter 5.1).

4.2 Mounting the Antenna

Screw the T-antenna by hand (without tools) onto the RP-SMA connector on the top of the module. Never switch on the module without the antenna.

4.3 Inserting into the Radio's Module Bay

① Switch off the radio.

② Check that no pin in the bay is bent or missing (pins 5V-12V, GND and CRSF are used).

③ Slide the module into the JR bay so that the contacts seat properly, and secure it with the side latches.

④ When removing it, first switch off the radio and disconnect the external power supply.

4.4 External XT30 Power Supply

The module can be powered from a battery connected to the XT30 connector on the bottom (6–16.8 V DC, e.g. 2S–4S Li-Po). Follow the instructions in chapter 1.2.

4.5 Radio Setup (EdgeTX)

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

② Set the internal RF module (*Internal RF*) to **Off**.

③ Set the external RF module (*External RF*) to **CRSF** mode.

④ Optionally, set a unique receiver number (*Receiver ID*).

⑤ In *SYS → Hardware*, set the communication speed with the external module (baud rate). A packet rate of 333 Hz and higher requires more than 400K; if the radio does not offer this setting, the speed is fixed at 400K.

Baud rate	Packet rate
400K	250 Hz and lower
921K	500 Hz and lower
1.87M	F-1000 Hz and lower
3.75M	highest speed supported by the module

5. Configuration and Binding

5.1 ELRS Lua Script

The module is configured with the ELRS Lua script directly on the radio. Download the script from www.expresslrs.org and save it to the radio's SD card in the *SCRIPTS/TOOLS* folder. Run it from *SYS* → *Tools* → *ExpressLRS*.

The link status is shown in the top right corner of the script: a dash (-) means no receiver is connected, **C** means the module and the receiver are bound and communicating. If the script keeps showing "Loading..." or a syntax error, update EdgeTX and download the latest version of the Lua script.

5.2 Binding with a Receiver

Binding phrase (recommended): enter the same binding phrase in the module and the receiver – in the ExpressLRS Configurator when flashing, or in the WebUI on the *Options* tab (chapter 6.1). Devices with the same phrase connect automatically, without binding. Choose a unique phrase; at least 8 alphanumeric characters are recommended.

Traditional binding (bind):

① Switch the receiver on and off three times in a row; leave it on after the third power-up.

② The receiver LED blinks rapidly in double flashes – the receiver is in binding mode.

③ On the radio, run the ELRS Lua script and select **[Bind]**.

④ If the receiver LED is solid and **C** is shown in the Lua script, binding is complete.

※ The module and the receiver must have the same regulatory domain and the same first digit of the ExpressLRS firmware version.

5.3 Main Parameters

Parameter	Meaning
Packet Rate	packet transmission frequency. 50, 150, 250 and 500 Hz are LoRa modes; F500 and F1000 are pure FLRC with the lowest latency and shorter range; D250 and D500 are redundant FLRC; 100 Hz Full and 333 Hz Full are LoRa with full 10-bit resolution.
Telem Ratio	telemetry ratio (Off, 1:128 … 1:2, Std, Race). *Race* disables telemetry in the Arm state.
Max Power	maximum transmit power (see 5.4).
Dynamic	dynamic power control (Off, Dyn, AUX9–AUX12).
Fan Thresh	power level at which the fan switches on.

※ Never change the packet rate in flight – the change always interrupts the link to the receiver. Do not change parameters while the model is in

the Arm state.

5.4 Transmit Power and Cooling

- **Max Power** sets the maximum power of the module. If you select a power level the module does not support, the nearest supported level is used. The default power is 100 mW. In the LBT version, the firmware limits the power to a maximum of 100 mW.
- **Dynamic** – with *Dyn* selected, the module reduces power when full power is not needed; after power-up it starts at the lowest level. Dynamic control requires telemetry – *Telem Ratio* must not be *Off* or *Race*. If the module receives no telemetry in the Arm state, it raises the power to the set maximum. The AUX9–AUX12 options use a switch to toggle between dynamic power (switch up, above 1500 µs) and maximum power (switch down).
- **Fan Thresh** – the fan switches on after a short delay once the power reaches the set threshold (default 250 mW). After the power drops, it keeps running for the time set in the WebUI (*Fan Runtime*).

5.5 Status LED

The module has an RGB status LED. Meaning according to the ExpressLRS documentation:

LED	Status
rainbow fade	module starting up
green "breathing"	WiFi mode (update)
blue "breathing"	Bluetooth joystick enabled
red blinking (100 ms)	radio chip not detected
1 orange blink per second	no connection to the radio
solid single colour	connected to the receiver; colour = packet rate
slowly pulsing single colour	no connection to the receiver; colour = packet rate

Colour	Packet rate
red / yellow	F1000 / F500
yellow-green / green	D500 / D250
cyan / light blue	333 Full / 500
blue / violet	250 / 150
purple / magenta	100 Full / 50

6. Firmware and Other Features

6.1 WiFi and WebUI

The module is supplied with ExpressLRS firmware pre-installed and normally does not need to be reflashed. The binding phrase and other firmware options can be changed in the WebUI.

① In the ELRS Lua script, select *WiFi Connectivity → Enable WiFi*. The *WiFi Running* screen appears.

② Alternatively: power the module outside the radio via USB-C or externally (2S) and wait 60 s until the LED starts "breathing" green.

③ Using a phone or computer, connect to the WiFi network **ExpressLRS TX**, password **expresslrs**.

④ Open **http://10.0.0.1** in your browser.

※ If your router's interface opens instead of the WebUI, disconnect from your home network or use another device, e.g. a phone.

6.2 Firmware Update

- Build the firmware in **ExpressLRS Configurator** for the target *RadioMaster Ranger Micro 2.4GHz TX*. Always select the regulatory domain corresponding to the country of operation – in the EU, **EU_CE_2400 (LBT)**.
- **Via WiFi:** in the WebUI, open the *Update* tab, upload the *firmware.bin* file and confirm with *Update*. The update takes one to two minutes.
- **Via USB (UART):** remove the module from the radio, connect it to a computer with a USB-C data cable (install the CP210x driver if needed) and select the *UART* method in the Configurator.
- After the update, check that the receiver has the same domain and major firmware version.

6.3 ExpressLRS Backpack

The module contains a TX Backpack – an auxiliary microcontroller with WiFi (ESP8285) that communicates wirelessly with other devices, e.g. goggles (switching the video receiver channel), a lap timer or an antenna tracker. Enable or disable this function in the Lua script with the *Backpack* option. The Backpack firmware is updated via USB-C using the *Passthrough* method, or via WiFi using the *Enable Backpack WiFi* option (network *ExpressLRS TX Backpack*, password *expresslrs*, address http://10.0.0.1).

6.4 Bluetooth Joystick

The **[BLE Joystick]** option in the Lua script enables Bluetooth joystick mode – the radio can be connected wirelessly to a computer to fly in a simulator. To exit this mode, restart or change the model.

6.5 Further Guides

Up-to-date official documentation for ExpressLRS and EdgeTX can be found on the project websites.

Official ExpressLRS documentation
www.expresslrs.org

Official EdgeTX website
edgetx.org

7. Maintenance and Troubleshooting

7.1 Maintenance and Storage

- Keep the air vents and the fan clean and unobstructed. Remove dust with a dry brush or compressed air.
- Check the antenna connector and the antenna; replace a damaged antenna.
- Keep the bay contacts clean and straight.
- Store in a dry place, out of direct sunlight, with the battery disconnected. It is advisable to remove the module from the radio for transport.

7.2 Troubleshooting

Problem	Cause and solution
Module does not connect to the receiver	check for the same regulatory domain (EU_CE_2400 / ISM2400), the same first digit of the firmware version and the same binding phrase; alternatively, perform traditional binding (5.2).
Module does not respond, Lua script does not load	check that *External RF* is in CRSF mode and *Internal RF* is off; update EdgeTX and the Lua script.
Higher packet rate cannot be selected	increase the baud rate in *SYS* → *Hardware* (4.5).
LED blinks orange	the module is not communicating with the radio – check the External RF setting and the bay contacts.
Address 10.0.0.1 opens the router	disconnect from your home network or use a phone (6.1).
Fan runs even at low power	fan run-on after the power drops is normal; see the *Fan Thresh* and *Fan Runtime* settings.

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) is printed on the bottom of the module housing next to the connectors; the ExpressLRS firmware version is shown in the ELRS Lua script.

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.