Ranger ELRS Combo

ExpressLRS 2.4 GHz external transmitter module
with RP1 and RP2 receivers – user manual



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

Importer: Rotorama, s.r.o. · www.rotorama.com

Contents

1. Safety Instructions

1.1 Before you start

1.2 Radio transmission and antennas

1.3 Power supply and heat

2. Product Description

2.1 Package contents

2.2 Ranger module parts

2.3 Ranger module specifications

2.4 RP1 and RP2 receivers

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

3.1 The law of the country of use applies

3.2 Frequency bands

3.3 Output power and regulatory domain

4. Module Installation and Setup

4.1 Module bay adapter

4.2 Antenna

4.3 Power supply

4.4 Radio setup with EdgeTX

4.5 Module controls

5. Receiver Installation and Binding

5.1 Wiring

5.2 Betaflight Configurator setup

5.3 Binding (traditional method)

5.4 Receiver firmware update

6. Firmware and Further Guides

7. Maintenance and Troubleshooting

7.1 Maintenance

7.2 Troubleshooting

8. Information for the EU and Czech Market

8.1 Importer and responsible person in the EU

8.2 Product conformity

8.3 Disposal of electrical equipment

9. Warranty and rights arising from defective performance

1. Safety Instructions

1.1 Before you start

- Read this entire manual before first use and keep it for future reference.
- The product is intended for radio control of models (drones, aircraft, vehicles) and is not a toy. Keep it out of the reach of children.
- The module and the receivers have no declared protection against water and dust; the receivers have no housing at all. Protect them from moisture, dust, impacts and short circuits.
- Do not modify the product beyond the procedures described in this manual and in the ExpressLRS documentation.

1.2 Radio transmission and antennas

- **Never power on the module without an antenna attached.** Transmitting without an antenna can damage the module's RF circuitry.
- Attach and remove the antenna only while the module is switched off. Use only the antennas supplied by the manufacturer or 2.4 GHz antennas with an RP-SMA connector.
- While transmitting, do not hold the module antenna close to your body, especially your head.
- The output power and regulatory domain you set must comply with the regulations of the country in which you operate the product – see Chapter 3.
- Before every flight, check the link and the failsafe function (safe behaviour of the model on signal loss).

1.3 Power supply and heat

- Connect only a DC voltage in the range **6–16.8 V** to the XT30 connector and observe correct polarity.
- The module is cooled by a fan and its aluminium case. Do not cover the air vents or the fan grille; the case may become warm at higher output power.
- Power the receivers only with 5 V as described in Chapter 5.1. Check the wiring before applying power.

2. Product Description

2.1 Package contents

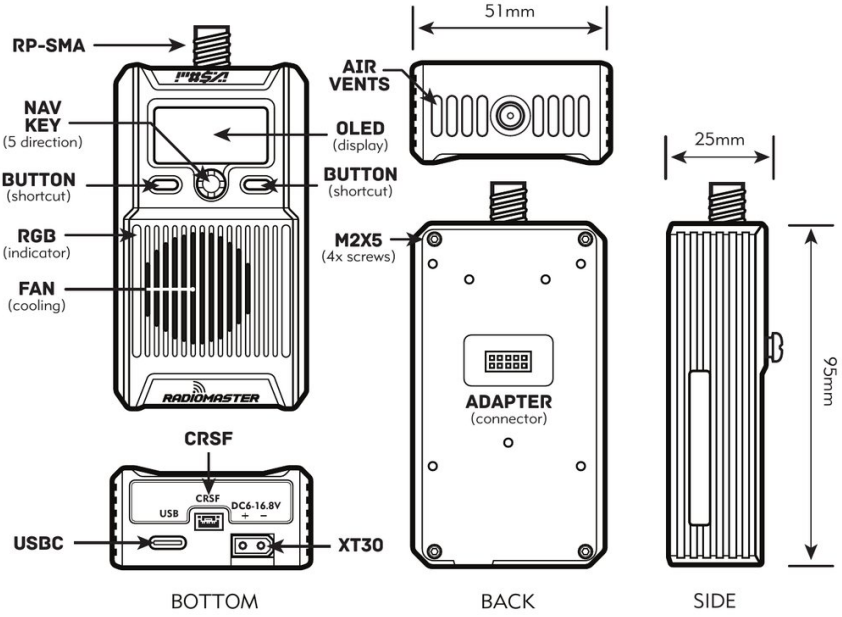
Featuring an OLED display, a directional menu key and two assignable shortcut keys, the RadioMaster Ranger is an ExpressLRS 2.4 GHz external transmitter module. It is built with a rugged CNC machined aluminium case that aids the high-efficiency cooling system as a heat sink. The Combo version additionally includes three ExpressLRS receivers.

Item	Qty
Ranger 2.4GHz ELRS Module	1
2.4GHz Moxon Antenna (directional)	1
2.4GHz T-Antenna	1
Futaba CRSF socket cable	1
Micro Adapter (JR bay, standard 5-pin socket)	1
Nano Adapter (standard 8-pin socket)	1
Hexagon socket screwdriver	1
M2×5 screws	3
Manufacturer's manual	1
RP1 ExpressLRS 2.4GHz Nano Receiver	2
RP2 ExpressLRS 2.4GHz Nano Receiver	1

According to the manufacturer's receiver manuals, the RP1 package also contains a 65 mm UFL 2.4 GHz T-antenna, a user manual card and 4 silicone wires; the RP2 package contains a user manual card and 4 silicone wires.

❊ Not included: radio transmitter, battery for the XT30 power input, USB cable.

2.2 Ranger module parts



Ranger module – FRONT, TOP, BOTTOM, BACK and SIDE views

Label	Description
RP-SMA	antenna connector
NAV KEY	navigation key (5 directions)
BUTTON	2 assignable shortcut buttons
RGB	indicator (RGB light strip)
FAN	fan (cooling)
AIR VENTS	air vents
OLED	display
M2X5	4 × M2×5 screws
ADAPTER	connector for the module bay adapter
CRSF	CRSF socket (e.g. for the Futaba CRSF cable)
USBC	USB-C connector
XT30	external power input DC 6–16.8 V

※ Includes removable clear plastic cover.

2.3 Ranger module specifications

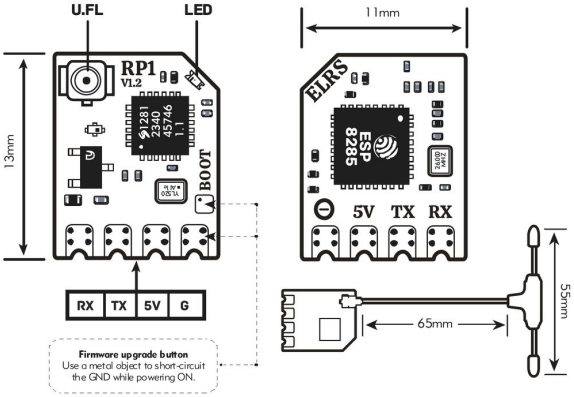
Parameter	Value
Regulatory domain	ISM2400
MCU	ESP32 (main), ESP8285 (aux, as ESP backpack)
RF chip	SX1281IMLTRT
Frequency range	2400–2480 MHz
Maximum packet rate	500 Hz / F-1000 Hz (F-1000 Hz mode requires EdgeTX 2.7.1 or later)
Min. receiver refresh rate	25 Hz
Control distance	max. 2 km
Module bay adapters	JR standard 5-pin socket; Nano standard 8-pin socket
Futaba CRSF socket cable	included
OLED screen	64 × 128 px
Wi-Fi / Bluetooth	yes / yes
3-axis accelerometer	yes (STK8BA58 MEMS)
Built-in RGB light strip	yes
XT30 power supply voltage	DC 6–16.8 V
Weight	138 g (with Moxon antenna), 135 g (with T-antenna), 126 g (without antenna)
Dimensions	95 × 51 × 25 mm (without antenna)
Default firmware (target)	RadioMaster Ranger 2.4GHz TX

※ The control distance is the manufacturer's figure; the actual range depends on the environment, antennas, output power and packet rate.

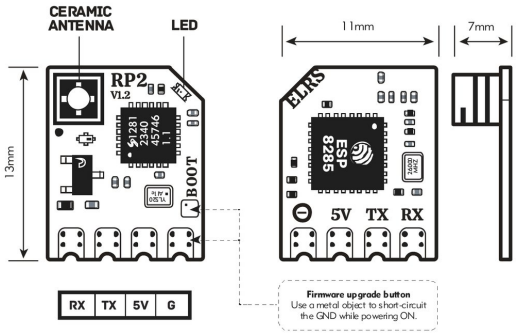
2.4 RP1 and RP2 receivers

RP1 and RP2 are miniature ExpressLRS 2.4 GHz receivers with a CRSF interface. The RP1 has a U.FL socket for an external T-antenna, the RP2 has a built-in ceramic antenna.

Parameter	RP1	RP2
Size	13 × 11 × 3 mm	13 × 11 × 7 mm
Weight	2.2 g (w/antenna)	2.2 g (w/antenna)
Antenna	external, U.FL socket	ceramic, built-in
MCU	ESP8285	ESP8285
RF chip	SX1281	SX1281
Frequency band	2400–2483 MHz	2400–2483 MHz
Input voltage	5 V	5 V
Receiver protocol	CRSF	CRSF
Default firmware (target)	RadioMaster RP1/2 2400 RX	RadioMaster RP1/2 2400 RX



RP1 receiver – TOP and BOTTOM, 65 mm T-antenna.
Firmware upgrade button = BOOT button



RP2 receiver – TOP, BOTTOM and SIDE view, ceramic antenna

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

3.1 The law of the country of use applies

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

3.2 Frequency bands

Device	Radio interface	Frequency band
Ranger module	ExpressLRS	2400–2480 MHz
Ranger module	Wi-Fi, Bluetooth	2.4 GHz band
RP1, RP2 receivers	ExpressLRS (incl. telemetry)	2400–2483 MHz

3.3 Output power and regulatory domain

In the Czech Republic, the 2400–2483.5 MHz band is used under general authorisations issued by the Czech Telecommunication Office (ČTÚ):

General authorisation	Use	Limit
VO-R/10, Art. 3, band j)	short-range devices (incl. remote control, telemetry)	25 mW e.i.r.p.
VO-R/12, Art. 2, band a)	wideband data transmission (ETSI EN 300 328)	100 mW e.i.r.p.

- The limits apply to the radiated power (e.i.r.p.) **including antenna gain**. The directional Moxon antenna has a higher gain than the T-antenna.
- The module's output power is adjustable in the ExpressLRS configuration. **The user is responsible for setting the power in compliance with the regulations.**
- The module is sold in **FCC** and **LBT** versions. For operation in the EU, use firmware with the EU regulatory domain (LBT – Listen Before Talk). The module and the receivers must use the same regulatory domain, otherwise they will not bind.
- Use only the antennas specified by the manufacturer, without additional amplifiers. Operation under a general authorisation is not entitled to protection against interference.

4. Module Installation and Setup

4.1 Module bay adapter

The module connects to the radio via an adapter matching the module bay:

- **Micro Adapter** – for a JR bay with a standard 5-pin socket,
- **Nano Adapter** – for a bay with a standard 8-pin socket (Nano / Lite).

Fit the adapter onto the ADAPTER connector on the back of the module and secure it with the M2×5 screws using the supplied hexagon screwdriver. Do not overtighten the screws. Then insert the module into the bay of the switched-off radio.

For compatible Futaba radios with CRSF support, a cable is included that plugs into the CRSF socket on the bottom of the module.

4.2 Antenna

Before powering on, screw one of the supplied antennas onto the RP-SMA connector. The omnidirectional **T-antenna** is suitable for general use; the directional **Moxon antenna** provides focused RF coverage for long-range applications – keep the model in the antenna's main direction of radiation.

4.3 Power supply

- By default, the module is powered by the radio through the module bay.
- The **XT30** connector allows external power supply of the module with a DC voltage of **6–16.8 V**.
- The **USB-C** connector is used for firmware updates.

4.4 Radio setup with EdgeTX

① Switch on the radio with the module and antenna attached.

② In *Model Setup*, enable the external RF module (*External RF*) and select **CRSF** as the protocol.

③ Configure the ExpressLRS module (packet rate, power, telemetry, binding) via the ExpressLRS Lua script in the radio's *Tools* menu or directly in the module menu on the OLED display.

④ F-1000 Hz mode requires a radio running EdgeTX 2.7.1 or later.

4.5 Module controls

The OLED display shows the module status and settings. Use the five-way navigation key (NAV KEY) to move through the menu and change values. The two assignable shortcut buttons (BUTTON) can be assigned frequently used functions. The module supports Wi-Fi and Bluetooth for wireless configuration and connectivity; it also has a built-in ExpressLRS Backpack and a 3-axis accelerometer for supported features.

5. Receiver Installation and Binding

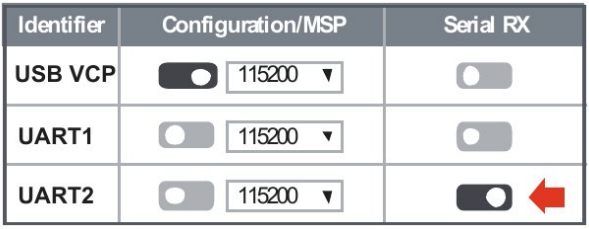
5.1 Wiring

Connect the receiver to a free UART of the flight controller (FC) using the supplied silicone wires. The signal wires are crossed:

Receiver pad	Connect to flight controller (FC)
RX	TX of the selected UART
TX	RX of the selected UART
5V	5 V output
G	GND (ground)

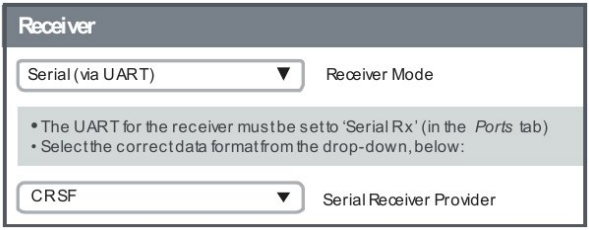
On the RP1, connect the antenna to the U.FL socket before powering on. Place the antenna as far as possible from carbon parts and high-current wires.

5.2 Betaflight Configurator setup



Ports tab – UART2 set as Serial RX (example)

① Open Betaflight Configurator, go to the *Ports* tab and enable **Serial RX** on the UART the receiver is connected to (e.g. UART2 as shown above). *Save and Reboot*.



Receiver panel – Serial (via UART), CRSF provider

② On the *Configuration* tab, click on *Serial-based receiver* on the *Receiver* panel, and select **CRSF**. In newer versions of Betaflight Configurator this setting is on the *Receiver* tab.

5.3 Binding (traditional method)

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!

※ Binding can also be achieved with an identical Binding Phrase set on both the module and the receiver (option in *Device options*). See the ExpressLRS documentation for details.

5.4 Receiver firmware update

- The RP1 and RP2 have built-in Wi-Fi: the firmware can be updated via Wi-Fi and the receiver configured via the built-in WebUI from a PC or mobile phone.
- Firmware upgrade mode (bootloader): use a metal object to short-circuit the **BOOT** button to GND while powering ON.
- The firmware target for both receivers is **RadioMaster RP1/2 2400 RX**, for the module **RadioMaster Ranger 2.4GHz TX**.
- When configuration via Wi-Fi is finished, exit Wi-Fi mode.

6. Firmware and Further Guides

The module and the receivers use the open-source ExpressLRS system. Firmware updates, descriptions of all settings and detailed procedures can be found on the official websites:

- www.expresslrs.org – ExpressLRS documentation,
- www.edgetx.org – EdgeTX radio firmware.

We wish to thank the ExpressLRS team for their support and testing during the development of the Ranger series.

7. Maintenance and Troubleshooting

7.1 Maintenance

- Keep the air vents and the fan clean; remove dust with a dry brush or compressed air.
- Check the condition of the antennas and connectors. Replace a damaged antenna.
- Protect the receivers from moisture and short circuits, e.g. with heat-shrink tubing.
- Store the product in a dry place, away from direct sunlight.

7.2 Troubleshooting

Problem	Possible cause and solution
Module does not bind with the receiver	different regulatory domain or incompatible firmware on module and receiver; receiver not in bind mode (see 5.3); different Binding Phrase
Flight controller receives no signal	RX/TX wires swapped; Serial RX enabled on a different UART; CRSF protocol not selected
Short range	low output power; damaged or poorly placed receiver antenna; Moxon antenna not pointing towards the model
Radio does not detect the module	external RF module not enabled or not set to CRSF; adapter not seated correctly
Module overheats	air vents covered, fan not working, high output power

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 (RadioMaster Ranger; RP1, RP2 receivers) is given on the product and its packaging; the firmware version can be found in the ExpressLRS Lua script or in the ExpressLRS web interface.

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.