Ranger Nano ELRS Combo

ExpressLRS 2.4 GHz transmitter module for Nano bays and RP1 and RP2 receivers – user manual



Read this manual carefully before first use. Never power on the module without the antenna connected.

Rotorama, s.r.o. · www.rotorama.com

Contents

1. Safety instructions

2. Product description

2.1 Package contents

2.2 Ranger Nano module – parts

2.3 Module specifications

2.4 RP1 and RP2 receivers

3. Radio frequencies and conditions of use

4. Installing and setting up the module

5. RP1 and RP2 receivers

5.3 Binding the receiver to the module

6. Firmware and further documentation

7. Maintenance and troubleshooting

8. Information for the EU and Czech Market

9. Warranty and rights arising from defective performance

1. Safety instructions

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

1.1 General rules

- The product is intended for radio control of models and drones. Do not use it for any other purpose.
- The product is not a toy. Keep it away from children unless supervised by an adult.
- Protect the module and receivers from moisture, dust, impacts and direct sunlight. Do not interfere with the device beyond the procedures described in this manual.
- Whenever you change settings (power, packet rate, failsafe), always remove the propellers from the model and check how the model responds on the ground.

1.2 Antenna and radio transmission

- **Never power on the module without the antenna connected.** Transmitting without an antenna can damage the module's RF section. The same applies to the RP1 receiver – connect the antenna to the U.FL connector before applying power.
- Screw the module antenna onto the RP-SMA connector by hand, without tools.
- Do not hold the antenna in your hand while transmitting and do not point it at people at close range.
- The user is responsible for the transmit power setting. Set the power so that it does not exceed the limit valid in the country of operation (see Chapter 3).

1.3 Power supply and cooling

- Connect external power via the XT30 connector only within the range of **DC 6–16.8 V**. The voltage of a fully charged battery must not exceed this range – for example 4S LiHV (4.35 V/cell, 17.4 V) is **unsuitable** for the module; 4S Li-Po (4.20 V/cell, 16.8 V) is at the upper limit of the range.
- Observe the correct polarity of the XT30 connector. Never leave a Li-Po battery connected unattended.
- The module has a built-in fan and air vents. Do not cover them – an overheated module may reduce its output or be damaged.
- Power the RP1 and RP2 receivers with **5 V** only. A higher voltage will destroy the receiver.

2. Product description

The Radiomaster Ranger Nano ELRS Combo is a set consisting of an ExpressLRS 2.4 GHz transmitter module for Nano module bays and three ExpressLRS receivers. The module is inserted into a compatible radio (Radiomaster Zorro, Pocket or MT12) and allows it to use the ExpressLRS (ELRS) link – an open RC protocol with low latency and packet rates up to F-1000 Hz.

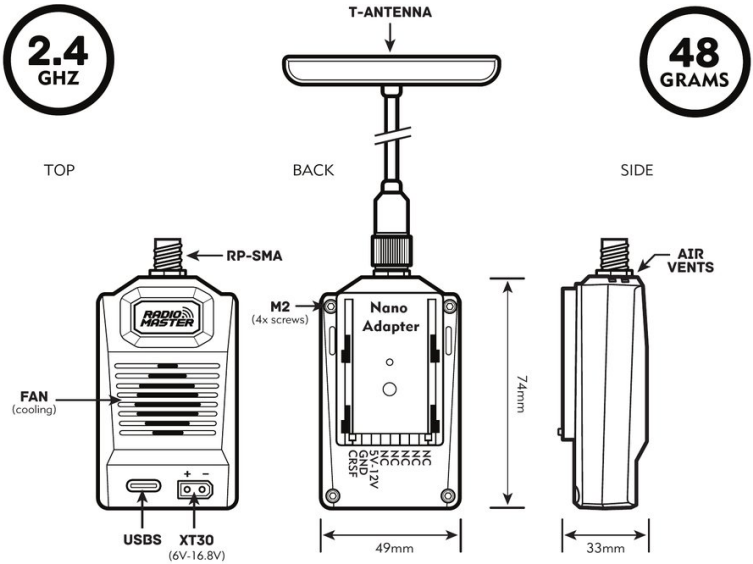
※ The Ranger Nano module is designed for Nano style module bays. It does not fit JR / Micro module bays – the Ranger and Ranger Micro modules are intended for those.

2.1 Package contents

Qty	Item
1	Ranger Nano 2.4 GHz ELRS transmitter module
1	2.4 GHz T-antenna (RP-SMA) for the module
2	RP1 ExpressLRS 2.4 GHz receiver, each with a 2.4 GHz T-antenna with U.FL connector (65 mm)
1	RP2 ExpressLRS 2.4 GHz receiver with integrated ceramic antenna
–	Connection wires for the receivers, manufacturer's manual cards

Not included: radio, battery for external power, USB cable and the directional Moxon antenna (sold separately).

2.2 Ranger Nano module – parts



Front view (TOP), rear view (BACK) and side view (SIDE)

Part	Description
T-ANTENNA / RP-SMA	T-antenna and RP-SMA antenna connector
FAN (cooling)	Cooling fan
AIR VENTS	Air vents
USBS	USB-C connector
XT30 (6V–16.8V)	External power input DC 6–16.8 V
M2 (4x screws)	4 × M2 screws of the Nano adapter
Nano Adapter	Nano module bay connector. Used pins: CRSF, GND, 5V–12V; the other pins (NC) are not connected.

2.3 Module specifications

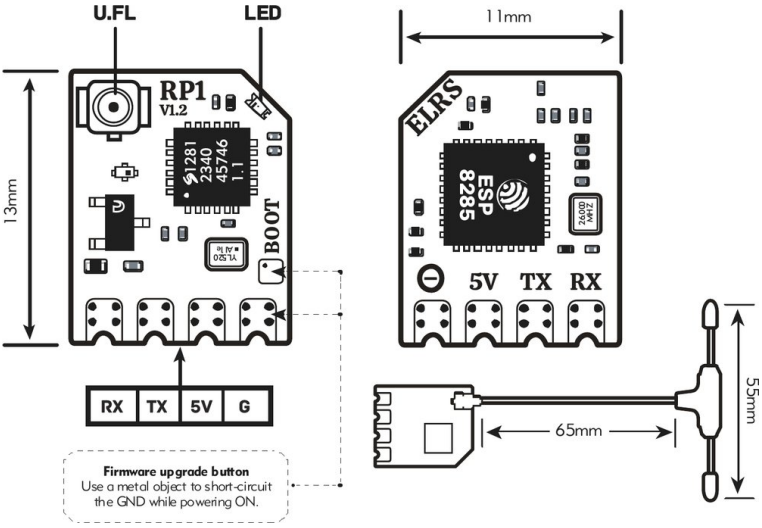
Regulatory domain	ISM2400
MCU	ESP32 (main), ESP8285 (aux, as ExpressLRS Backpack)
RF chip	SX1281IMLTRT
Frequency range	2400–2480 MHz

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
RF output power – default	100 mW
Control distance	max. 2 km
Wi-Fi / Bluetooth	yes / yes
XT30 power supply	DC 6–16.8 V
Weight	48 g (with antenna), 39 g (without antenna)
Dimensions	136 × 42 × 26 mm (with T-antenna), 74 × 42 × 26 mm (without antenna)
Default firmware (target)	RadioMaster Ranger Nano 2.4GHz TX

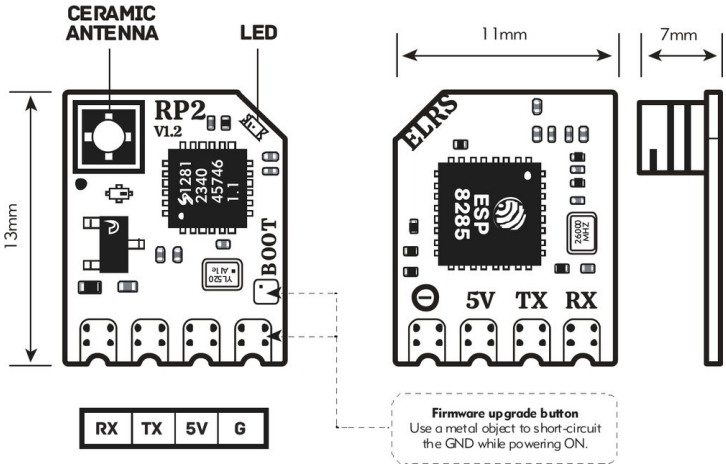
Features: built-in ExpressLRS Backpack, high-efficiency fan cooling, Wi-Fi and Bluetooth support, packet rates up to F-1000 Hz.

2.4 RP1 and RP2 receivers

RP1 and RP2 are miniature ExpressLRS 2.4 GHz receivers with a CRSF bus. The **RP1** has a U.FL connector for an external T-antenna, the **RP2** has an integrated ceramic antenna. Both receivers have built-in Wi-Fi for firmware updates and configuration via a web interface.



RP1 receiver – top side (TOP), bottom side (BOTTOM) and T-antenna



RP2 receiver – top side, bottom side and side view

Labels: **U.FL** – antenna connector (RP1), **CERAMIC ANTENNA** – ceramic antenna (RP2), **LED** – status LED, **BOOT** – pad for firmware update mode (firmware upgrade button), solder pads **RX, TX, 5V, G** (G = GND).

Parameter	RP1	RP2
Dimensions	13 × 11 × 3 mm	13 × 11 × 7 mm
Weight	2.2 g (with antenna)	0.55 g
Antenna	65 mm T-antenna, U.FL	ceramic, integrated
MCU / RF chip	ESP8285 / SX1281	ESP8285 / SX1281
Frequency band	2400–2483 MHz	2400–2483 MHz
Telemetry RF power	10 mW	10 mW
Max. packet rate	500 Hz / F-1000 Hz	500 Hz / F-1000 Hz
Min. refresh rate	25 Hz	25 Hz
Input voltage	5 V	5 V
Protocol	CRSF	CRSF
Firmware (target)	RadioMaster RP1/2 2400 RX	RadioMaster RP1/2 2400 RX

The receivers contain a temperature-compensated crystal oscillator (TCXO) for a stable frequency even when the temperature changes, and are compatible with all ExpressLRS 2.4 GHz transmitter modules and radios.

3. Radio frequencies and conditions of use

3.1 The law of the country of operation applies

The rules for radio equipment are based on European Union legislation, but national implementing regulations differ from country to country – permitted frequency bands, maximum transmit power and the conditions for operating models and drones. The information in this chapter describes the situation in the Czech Republic. If you use the product in another country, you must follow the regulations of the country in which you use it.

3.2 Frequency bands and transmit power of the product

Device	Frequency band	Transmit power
Ranger Nano module – ELRS RC link	2400–2480 MHz	default 100 mW; adjustable
RP1, RP2 receivers – telemetry	2400–2483 MHz	10 mW
Module and receivers – Wi-Fi, module – Bluetooth	2.4 GHz band	see EU Declaration of Conformity

The maximum transmitted power in each band is stated in the EU Declaration of Conformity, which is available from the importer (Chapter 8.2).

3.3 Limits in the Czech Republic

Band	Equipment category	Limit (e.i.r.p.)
2400–2483.5 MHz	Wideband data transmission systems (VO-R/12)	100 mW
2400–2483.5 MHz	Non-specific short-range devices (VO-R/10)	25 mW

- The e.i.r.p. limit includes the antenna gain. With a directional antenna (e.g. Moxon) the module power must therefore be set lower.
- The **LBT** (Listen Before Talk) version is intended for use in the EU. The FCC version is intended for markets outside the EU.
- The current wording of the general authorisations is available on the website of the Czech Telecommunication Office www.ctu.gov.cz.

※ The user is responsible for the transmit power setting and for complying with the limits valid in the country of operation.

4. Installing and setting up the module

4.1 Inserting the module into the radio

① Switch off the radio.

② Screw the T-antenna onto the module's RP-SMA connector.

③ Slide the module with its Nano Adapter connector into the Nano module bay on the back of the radio until it clicks into place.

④ Switch on the radio. The module is powered by the radio through the Nano module bay.

4.2 Radio setup with EdgeTX

① In the model settings open the *Model Setup* page and in the *External RF* section enable the external module with the **CRSF** protocol.

② Run the ExpressLRS Lua script (*SYS* → *Tools* → *ExpressLRS*). The script shows the module status and offers its settings – packet rate (Packet Rate), transmit power (TX Power), telemetry, Wi-Fi and binding (Bind).

③ Set the transmit power in accordance with the limits in the country of operation (Chapter 3).

F-1000 Hz mode requires EdgeTX 2.7.1 or later on the radio.

4.3 External power via XT30

The XT30 connector is used to power the module from an external battery, for example to relieve the radio's battery. The permitted voltage is **DC 6–16.8 V** (see Chapter 1.3). Use a fully charged battery before flying.

4.4 Moxon antenna

The supplied T-antenna is designed for general purpose flying. An optional Moxon antenna is available separately for directional applications. A directional antenna has a higher gain – take it into account when choosing the transmit power.

5. RP1 and RP2 receivers

5.1 Connecting to the flight controller (FC)

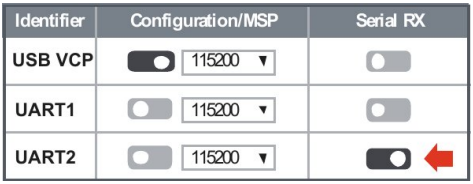
Connect the receiver to a free UART of the flight controller (FC) with four wires:

Receiver pad	Connection to the FC
RX	TX of the selected UART
TX	RX of the selected UART
5V	5 V supply
G	GND

- The RX and TX wires are crossed – receiver RX to flight controller TX and vice versa.
- Route the RP1 receiver antenna as far as possible from carbon parts, wires and the video transmitter (VTX), ideally with the antenna ends outside the frame.
- Insulate the receiver with heat-shrink tubing so that it cannot touch conductive parts.

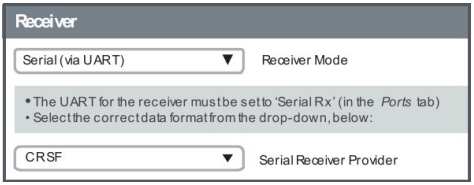
5.2 Setup in Betaflight Configurator

① On the *Ports* tab enable **Serial RX** for the UART the receiver is connected to (UART2 in the picture). Save and restart (*Save and Reboot*).



Ports tab – Serial RX on UART2

② On the *Configuration* tab, in the *Receiver* panel, select **Serial-based receiver** (Serial (via UART)) and select **CRSF** as the *Serial Receiver Provider*.



Receiver panel – Serial (via UART) and CRSF

5.3 Binding the receiver to the module (traditional binding)

This procedure applies to a receiver that has no binding phrase set in its firmware (*Binding Phrase* in *Device options*).

① Power OFF your radio.

② Plug in and unplug the receiver power 3 times.

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

④ Power ON your radio and use the **[Bind]** button in the ExpressLRS Lua script, which sends out a binding pulse.

⑤ If the receiver LED is solid, it is bound.

Instead of traditional binding, the module and receiver can be bound with an identical binding phrase set in the firmware of both devices. The procedure is described in the documentation listed in Chapter 6.2.

5.4 Function and failsafe check

- On the *Receiver* tab in Betaflight Configurator, check that stick and switch movements correspond to the channels.
- Without propellers, check that the model enters failsafe after the radio is switched off and that Arm (motor start) is not possible.

6. Firmware and further documentation

6.1 Firmware update

- The module and receivers use ExpressLRS firmware. Updates can be made via Wi-Fi (web interface), and for the module also via the USB-C connector. Use ExpressLRS Configurator with the target **RadioMaster Ranger Nano 2.4GHz TX** for the module and **RadioMaster RP1/2 2400 RX** for the receivers.
- The module and receiver must have a compatible ExpressLRS firmware version (the same major version). After updating one device, update the other one as well.
- Wi-Fi of the module is enabled in the ExpressLRS Lua script. A receiver without a link to the module switches to Wi-Fi mode by itself after some time.
- If the receiver does not respond after a failed update, put it into update mode: use a metal object to short-circuit the **BOOT** pad to ground (GND) while powering it on.

※ Do not disconnect power during an update. Firmware for another device (a different target) can render the module or receiver inoperable.

6.2 Further documentation

Official project documentation: www.expresslrs.org and www.edgetx.org. Manufacturer's website: www.radiomasterrc.com.

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- Keep the module's air vents and fan clean.
- Check the RP-SMA connector and the antenna – a damaged antenna significantly reduces range.
- On the RP1 receiver check the U.FL connector and the antenna cable, especially after a crash.
- Store the product in a dry place at room temperature. Store a battery for external power at a storage voltage of 3.8 V/cell.

7.2 Troubleshooting

Problem	Possible cause and solution
Lua script does not show the module	The external module is not enabled or does not use the CRSF protocol (Chapter 4.2). Check that the module is fully inserted in the bay.
Receiver does not bind	Different major firmware version or different binding phrase. Align the firmware and repeat binding (Chapter 5.3).
Receiver LED is off	No 5 V supply – check the wiring and solder joints.
Betaflight shows no channels	Swapped RX/TX wires, Serial RX on another UART or CRSF protocol not selected (Chapter 5.2).
Short range	Damaged or poorly positioned antenna, low transmit power, high packet rate.
Module overheats	Covered air vents or a faulty fan.

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 Nano, RP1 and RP2 receivers) is marked on the module housing and on the receiver boards; the firmware version is shown by the ExpressLRS Lua script or the receiver's 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.