



RadioMaster ER3 PRO

3-channel PWM ExpressLRS receiver
Dual-Band Gemini / Gemini-X · 2.4 GHz + Sub-GHz



Read the entire manual before first use, especially Chapters 1, 3 and 4. Operate the Sub-GHz band only in accordance with the regulations of the country of operation - in the Czech Republic in the EU868 domain; the 902-928 MHz band (FCC915) is not permitted for these devices in the Czech Republic.

Based on the manufacturer's original manual · Rotorama, s.r.o. · www.rotorama.cz

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1. Safety instructions

Before you start

- Read the entire manual before first use and keep it for future reference. If you pass the product on to another person, include this manual.
- The product is intended for persons aged 14 and over. It is not a toy.
- The receiver is designed for installation in RC aircraft and vehicle models. Do not use it for any other purpose.
- Installation, wiring and set-up require basic knowledge of electronics and RC modelling. If in doubt, ask an experienced modeller or your dealer.
- Do not use a receiver that is mechanically damaged, wet or shows signs of overheating.

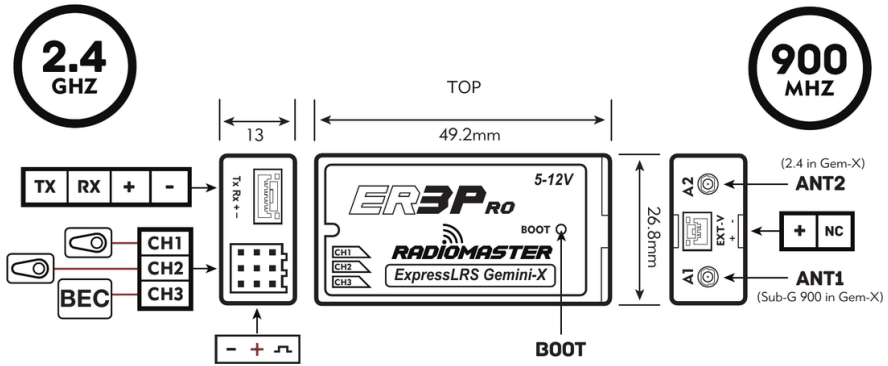
Power supply and wiring

- The receiver supply voltage is **DC 5.0–12.0 V**. Do not exceed this range.
- The receiver is powered through the servo output rail. The supply voltage is also the voltage for all connected servos – connect only servos rated for this voltage (Chapter 4.2).
- Never apply more than **70 V** to the EXT-V input – the receiver will be damaged (Chapter 4.3).
- Observe correct polarity. Change the wiring only with the power disconnected and always check it before connecting the battery.
- When handling LiPo and Li-ion batteries, follow the instructions of their manufacturer. Never charge batteries unattended.

Radio link

- Never power on the receiver without antennas connected. Use only the antennas supplied by the manufacturer, do not connect power amplifiers and do not modify the receiver electrically or mechanically.
- Check the link and the correct response of all servos before every run or flight.
- Before first use, set up and test the failsafe – the behaviour of the model on loss of signal (Chapter 6.2).
- Set the frequency band and transmit power in accordance with the regulations of the country in which you operate the model (Chapter 3).

2. Receiver description



Dimensions, connectors and wiring of the ER3 PRO receiver (labels from the manufacturer's original)

The RadioMaster ER3 PRO is a compact receiver designed for installations where space is limited but link reliability and system access remain important. Despite its small footprint, it retains a full-featured RF and telemetry interface, making it well suited for clean, space-constrained builds.

At its core is the **ExpressLRS** system, built around dual Semtech LR1121 transceivers and a dual-band Gemini X RF architecture operating on both 2.4 GHz and Sub-G 900 MHz. Combined with up to 100 mW telemetry output power, it provides a stable control link and enhanced telemetry performance for applications where reliable telemetry data is important.

With 3 PWM outputs, serial protocol support and dedicated telemetry interfaces, the ER3 PRO integrates easily into a wide range of aircraft and vehicle platforms. Locking connectors on the UART and voltage telemetry ports help ensure secure, reliable connections in demanding operating environments. Robust MMCX antenna connectors provide secure attachment and easy replacement, while the durable injection-molded housing delivers long-term protection in a compact form factor.

※ Conditions for operation in the Sub-GHz band in the CZ and EU are described in Chapter 3.2.

2.1 Connectors

Label	Description
CH1-CH3	PWM servo outputs. Pins –, +, signal as marked on the housing. Any output also serves as the power input (BEC) – Chapter 4.2. Default mapping: output CH1 = channel 1, CH2 = channel 2, CH3 = channel 3.

Label	Description
BOOT	Button on the top side. Hold for 10 seconds to reset the receiver to bind mode (Chapter 5.4).
Tx Rx + -	4-pin UART port with locking connector - CRSF or SBUS output for telemetry sensors and serial peripherals.
EXT-V + NC	2-pin locking JST-GH voltage detection input up to 70 V; NC = not connected (Chapter 4.3).
A1 (ANT1)	MMCX antenna connector. Sub-GHz band in Gemini X mode.
A2 (ANT2)	MMCX antenna connector. 2.4 GHz band in Gemini X mode.

2.2 Specifications

Item	ER3 PRO PWM - Dual-Band GEMINI and GEMINI-X Receiver
Variant	LBT (for the EU)
Size	49.2 × 26.8 × 13 mm
Weight	13.5 g (without antennas)
Input Voltage	DC 5.0-12.0 V (power to the receiver)
Wireless Protocol	ExpressLRS
RF Chip	2× Semtech LR1121
Frequency bands	2.4 GHz and Sub-GHz 900 MHz (Chapter 3.2)
Output Channels	3 × PWM
Serial Output	CRSF / SBUS
Bus Interface	CRSF
Telemetry Power	Up to 100 mW (LUA adjustable)
Detection Range EXT-V	DC 4.0-70 V (monitor main battery)
Supply voltage V-PWM	up to 12 V
Antenna Connector	MMCX
Antenna Type	2× 2.4 GHz & 2× Dual-Band (25 cm)
Firmware	ExpressLRS

3. Legal requirements in the CZ and EU

3.1 The law of the country of operation applies

Radio equipment and model aircraft operation are governed by EU law (Directive 2014/53/EU, Regulation (EU) 2019/947), but national rules differ – bands and power limits, registration, pilot age, zones and insurance. This chapter describes the situation in the Czech Republic. When operating the model in another country, follow the regulations of the country in which you operate it.

3.2 Radio frequencies and transmit power

The ER3 PRO operates in the 2.4 GHz and Sub-GHz bands and transmits telemetry at up to 100 mW (manufacturer's data, adjustable in the ExpressLRS LUA script). The conformity assessment under Directive 2014/53/EU (EU-type examination certificate No. 0370-RED-12463, notified body No. 0370) covers the following radio interfaces:

Interface	Frequencies	Max. power (e.i.r.p.)
ExpressLRS 2.4 GHz – chip 1	2402.4–2479.4 MHz	13.48 dBm
ExpressLRS 2.4 GHz – chip 2	2402.4–2479.4 MHz	13.43 dBm
Wi-Fi (WebUI)	2412–2472 MHz	15.71 dBm

The Sub-GHz band (868/900 MHz) is not covered by this conformity assessment. Operation in this band is the responsibility of the user and must comply with the regulations of the country of operation.

Simplified EU declaration of conformity: Hereby, Shenzhen RadioMaster Co., Ltd declares that the radio equipment type ER3 PRO 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.

Limits in the Czech Republic:

Band	Limit in the CZ	Regulation
2400–2483.5 MHz	100 mW e.i.r.p. (FHSS)	VO-R/12/11.2021-11
863–870 MHz	25 mW e.r.p., limited duty cycle	VO-R/10/05.2025-5
FCC915, AU915 (902–928 MHz)	operation not permitted	mobile networks and GSM-R railway network

- Set the same Sub-GHz regulatory domain on the receiver and the transmitter module (in the WebUI). In the CZ only the **EU868** domain can be considered; never use FCC915 or AU915 in the CZ.
- The receiver is supplied in the EU **LBT** (Listen Before Talk) variant – it checks that the 2.4 GHz channel is free before transmitting.

- The limits apply to radiated power including antenna gain. The user is responsible for the power setting. Set the telemetry power so that the limit is not exceeded.

3.3 Operating a model aircraft

Under Regulation (EU) 2019/947 a model aircraft is an unmanned aircraft; the Czech authority is the Civil Aviation Authority (ÚCL), www.caa.gov.cz. Basic open category rules:

- Operators of models of 250 g or more, or with a camera, must register (in the CZ at dron.caa.gov.cz) and mark the registration number on the model.
- Keep the model in visual line of sight, no higher than 120 m above the ground, and never fly over assemblies of people.
- Larger models are usually operated in subcategory A3 – at least 150 m from residential, commercial, industrial and recreational areas.
- The minimum pilot age is 16; exceptions are set out in Article 9 of Regulation (EU) 2019/947, e.g. flying under the direct supervision of a qualified pilot.
- Model aircraft clubs and associations may fly under an ÚCL authorisation (Article 16 of the Regulation) on its terms. Liability insurance is recommended.

4. Installation and power supply

4.1 Mounting the receiver and antennas

- Mount the receiver so that it is protected against vibration, moisture and mechanical damage and is not close to heat sources. The flat-sided housing makes mounting easier.
- Connect the servo plugs with the correct pin orientation (–, +, signal) as marked on the housing and shown in the figure in Chapter 2.
- In Gemini X mode, connector A1 operates in the Sub-GHz band and connector A2 in the 2.4 GHz band – therefore connect a dual-band antenna to A1.
- Route the antennas as far as possible from metal and carbon parts, power cables and ESCs, preferably perpendicular to each other. Do not bend the antenna cables at sharp angles and protect them from damage.
- Connect and disconnect the antennas only with the receiver switched off.

4.2 Receiver and servo power

The receiver is powered through the servo output rail – in the figure in Chapter 2 the power from the ESC's BEC is connected to output CH3. The supply voltage (DC 5.0–12.0 V) is also the voltage for all servos connected to the receiver. Use only servos rated for this voltage.

Servo power requirements: Please ensure that the power supply current of the ESC BEC matches the power consumption requirements of the servos used. If using high-voltage and high-torque servos, it is recommended to use a 2S battery (7.4 V nominal, 8.4 V fully charged) for direct power supply or a suitable high-current UBEC.

※ A fully charged 2S LiPo battery has 8.4 V (2×4.20 V/cell), 2S LiHV 8.7 V (2×4.35 V/cell). A fully charged 3S LiPo battery has 12.6 V (3×4.20 V/cell) and therefore exceeds the receiver's maximum supply voltage of 12.0 V.

4.3 EXT-V input and voltage detection

IMPORTANT: The maximum input voltage for the EXT-V (external voltage input) telemetry reading is 70 V. Do not exceed 70 V or the receiver will be damaged.

The EXT-V input on the ER3 PRO is accessed through the 2-pin JST-GH connector. Solder the red wire to the positive (+) terminal of the battery or ESC. The ER3 PRO features independent ADC channels for EXT-V and receiver supply voltage (V-PWM), so it can monitor two power sources simultaneously. The EXT-V detection range is DC 4.0–70 V; the V-PWM supply is measured up to 12 V.

Solder only with the battery disconnected and always insulate the joint.

5. Set-up and binding

5.1 Firmware and Wi-Fi

The receiver is configured with the ExpressLRS LUA script on the radio or in the ExpressLRS web interface (WebUI), accessed via Wi-Fi from a mobile phone, tablet or PC:

Device	Wi-Fi network	Password	URL (open in browser)
transmitter module	ExpressLRS TX	expresslrs	http://10.0.0.1/
receiver	ExpressLRS RX	expresslrs	http://10.0.0.1/

When updating the firmware, select this device:

Device Category	RadioMaster Dual 2.4GHz/900MHz
Device	ER3Pro Dual Band True Diversity + 3×PWM RX

※ The item name may differ slightly depending on the version of ExpressLRS Configurator – always select the device labelled ER3 Pro. Transmitter module and receiver firmware must be compatible (same ExpressLRS major version).

5.2 Recommended LUA settings

IMPORTANT: The recommended ELRS LUA settings on the remote-control end are:

Parameter	Standard servos	Performance servos
Packet Rate	100Hz Full	333Hz Full
Telem Ratio	Std (1:32) – default	Std (1:128)
Switch Mode	8ch	8ch



```

RM Boxer 0/100 | -
Packet Rate 100Hz Full
Telem Ratio Std (1:32)
Switch Mode 16ch
    
```

Fig. 1 – Packet Rate, Telem Ratio and Switch Mode in the LUA script (values for illustration)

5.3 Telemetry voltage calibration

Calibration of the telemetry voltage will be required on your radio:

- ① Navigate to the *TELEMETRY* page on your radio and locate the **RxBt** sensor.
- ② Edit the *SENSOR* settings and adjust the *Offset* until the displayed reading matches the actual voltage of the battery in the model.
- ③ If there is a large difference, adjustment of the *Ratio* may also be required.

For best results, calibrate the voltage of your radio using a fully charged battery of the correct cell count intended for use in the model.

TELEMETRY		10/11	SENSOR11		7.40
8: TRSS	-20dB	*	Type	Custom	
9: TQ1y	100%	*	ID	0008	1
10: TSNR	15dB	*	Source	Ext. module	
11: RxBt	7.40		Unit	V	
12: Curr	0.0A		Precision	0.0	
13: Capa	0mAh		Ratio	-	
14: BAt%	0.3%		Offset	-1.0	

Fig. 2 - RxBt sensor on the *TELEMETRY* page and the *Offset* value in the sensor settings (*SENSOR*)

5.4 Binding the receiver

► Passphrase binding

- ① OPEN the ExpressLRS LUA and navigate to the *WiFi Connectivity* page. Select the *Enable WiFi* option and connect to your radio's Wi-Fi with a mobile phone, tablet or PC (see Chapter 5.1). OPEN the ExpressLRS web page at <http://10.0.0.1/> and choose a unique bind phrase (bind phrases are not secret and can be read). *Save and Reboot*.
- ② Power ON the receiver and wait 60 seconds for the LED to blink rapidly to indicate Wi-Fi mode. Connect your phone, tablet or PC to the receiver's Wi-Fi (see Chapter 5.1). OPEN the ExpressLRS web page at <http://10.0.0.1/> and enter the matching bind phrase previously entered on your radio. *Save and Reboot*. Once both radio and receiver have the same bind phrase set, they will automatically bind.

► Traditional binding

- ① The first time you power on your receiver, the LED is doing a quick double blink, which indicates the receiver is in bind mode. If this is not the case, hold down the BOOT button for 10 seconds to reset the receiver.
- ② Power ON your transmitter/radio and use the *[Bind]* button on the ExpressLRS LUA script, which sends out a binding pulse.
- ③ If the receiver has a solid light, it's bound!



Fig. 3 – [Bind] button in the LUA script

※ To bind the receiver a second time or to another radio, power cycle the receiver 3 times. On the third power cycle, the LED will double blink indicating bind mode. If this does not work, hold down the BOOT button for 10 seconds (reset to bind mode) or use the passphrase method.

WARNING: All previous settings in the receiver will be erased and need to be re-entered when using the reset button.

6. Operation

6.1 LED indication

LED	Meaning
quick double blink	bind mode
rapid blinking (60 s after power-on)	Wi-Fi mode – connection to the WebUI
solid light	receiver is bound

6.2 Pre-operation check

- Check the mounting of the receiver, antennas and all connectors.
- Make sure the supply voltage matches the receiver and the servos (Chapter 4.2). Install a fully charged battery before operation.
- Switch on the radio first and only then power on the receiver.
- Check that all servos respond in the correct direction and over their full range of travel.
- Check the link stability and telemetry values (signal strength, voltage of the monitored sources).
- Check the failsafe: with the model secured (for electric power, without the propeller) switch off the radio and check that the servos and ESC behave according to the failsafe settings. Failsafe set-up is described in the ExpressLRS documentation.

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- Keep the receiver clean and dry. Do not clean it with solvents.
- Regularly, and after every hard impact, check the connectors, servo cables and antenna cables.
- Store in a dry place at room temperature with the battery disconnected.
- Update the firmware only with the correct device selected (Chapter 5.1) and with the regulatory domain matching the regulations of the country of operation (EU868 in the CZ).

7.2 Troubleshooting

Problem	Possible cause and solution
Receiver does not bind	Different bind phrase or regulatory domain on the transmitter module and receiver; incompatible firmware; receiver not in bind mode – power cycle it 3 times or reset it with the BOOT button (Chapter 5.4).
LED does not light after power-on	Check the supply voltage (5.0–12.0 V), polarity and orientation of the power plug on the servo rail (Chapter 4.2).
Servos do not respond correctly	Check the orientation of the servo plugs, the servo power (Chapter 4.2) and the Packet Rate setting for the servo type (Chapter 5.2).
UART port sends no data	Check the selected CRSF / SBUS protocol in the WebUI or LUA script and the wiring of the Tx and Rx wires.
Cannot connect to the receiver's Wi-Fi	After power-on, wait 60 seconds for the LED to blink rapidly and connect to the ExpressLRS RX network (Chapter 5.1).
Telemetry reports wrong voltage	Check the EXT-V wiring (Chapter 4.3) and the voltage calibration on the radio (Chapter 5.3).

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@rotorاما.cz
Phone	+420 252 252 098
Website	www.rotorاما.cz

8.2 Product conformity



- 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@rotorاما.cz.
- **Product identification:** the type designation (ER3 PRO) is printed on the top cover of the receiver; the firmware version is shown in the ExpressLRS web interface (WebUI).

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

Rights of the buyer under Czech law

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.