RP3-H

ExpressLRS 2.4 GHz receiver
RadioMaster · User manual



Read the entire manual carefully before first use, in particular the safety instructions in chapter 1.

Rotorama, s.r.o. · www.rotorama.com

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1. Safety instructions

1.1 General

The RP3-H receiver is part of the control chain of an RC model. Incorrect installation, wiring or setup can result in loss of control of the model and in damage to property or injury to persons. Read the entire manual before first use.

- Always connect and disconnect the receiver with the model **powered off**.
- When setting up, binding or updating firmware, **remove the propellers**; on a helicopter make sure the rotor cannot spin up.
- The receiver supply voltage (input + / −) must be within **DC 4.5–8.4 V**. A higher voltage will destroy the receiver.
- Only connect a voltage within the detection range of **DC 4.0–35 V** to the Ext-V input and observe correct polarity.
- Do not shorten the antennas, bend them sharply or put them under tension. A damaged antenna significantly reduces range.
- Before every flight, check the link with the transmitter and the failsafe function (see chapter 6).
- Protect the receiver from moisture, dust, conductive debris and mechanical damage.
- This product is not a toy. Keep it and its small accessories out of the reach of children.

1.2 Radio transmission

The receiver operates in the 2.4 GHz band and, in addition to receiving commands, transmits telemetry back to the transmitter; it also has built-in Wi-Fi for firmware updates. Operate it in accordance with the regulations of the country in which you use the model (see chapter 7).

2. Product description

2.1 Introduction

Designed specifically for use with the RadioMaster Nexus Helicopter Flybarless control unit and compatible with all CRSF/S.BUS enabled flight controllers, the RP3-H ExpressLRS receiver comes with a built-in TCXO and an integrated housing design that makes the receiver tougher and ready to mount in modern helicopter frames. With the RP3-H receiver, you can get reliable, stable, and accurate signal reception, which enhances your flight experience and allows for superior performance even in demanding environments. The RP3-H also features an **Ext-V** telemetry input for compatibility with older ESCs that do not provide battery voltage telemetry via the control unit.

The RP3-H receiver uses the Skyworks SKY66112 power amplifier to increase telemetry performance; the PA provides up to 100 mW of telemetry power and antenna switching for antenna diversity. It is developed around the ESP8285 MCU and SX1281IMLTRT RF chip, offering LoRa and FLRC 2.4 GHz RF links that provide incredible range and low latency. With Wi-Fi built in, firmware updates can be done on your craft without the need to remove the receiver.

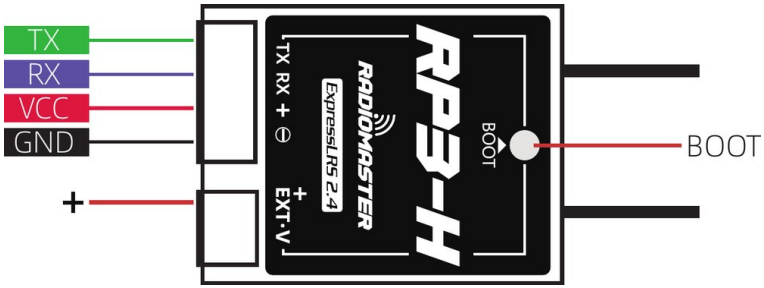
▶ **Features**

- Perfect for helicopters and any application that needs a rugged cased serial receiver.
- Plug'n'play, solder-free — compatible with the NEXUS helicopter flight controller.
- Optimised PCB design for better heat dissipation.
- LNA for better receiver range, PA for better telemetry range.
- Antenna diversity for improved signal stability and range.
- Built-in TCXO (temperature compensated crystal oscillator).
- Automatically detects voltage telemetry of an external battery or of the receiver battery / ESC BEC voltage.
- Compatible with all 2.4 GHz ExpressLRS modules and transmitters with built-in 2.4 GHz ExpressLRS.

2.2 TCXO — temperature compensated crystal oscillator

The TCXO ensures high stability and accuracy in frequency control, compensating for temperature variations. This results in consistent and reliable signal reception, even in extreme temperature conditions. It also reduces frequency drift over time, providing long-term frequency stability and preventing signal degradation. Learn more: www.expresslrs.org/hardware/crystal-frequency-error.

2.3 Connections



RP3-H receiver connection diagram

Connection	Function
TX	serial bus output (CRSF / S.BUS) — connect to the RX input of the flight controller
RX	serial bus input — connect to the TX output of the flight controller
+ (VCC)	receiver power supply DC 4.5–8.4 V
− (GND)	ground
Ext-V (+)	voltage detection input (telemetry), range DC 4.0–35 V
BOOT	button used when flashing firmware (see the ExpressLRS documentation)



JST-GH connectors: left bus and power (TX RX + −), right Ext-V input

2.4 Specifications

Parameter	Value
Item	RP3-H ExpressLRS 2.4GHz Nano Receiver
Type	ISM
MCU	ESP8285
RF chip	SX1281
Power amplifier	Skyworks SKY66112
Telemetry RF power	max. 100 mW
Antennas	2× 150 mm, 2.4 GHz
Frequency range	2.404–2.479 GHz
Maximum refresh rate	500 Hz / F1000 Hz
Minimum refresh rate	25 Hz
Working voltage	DC 4.5–8.4 V
Voltage detection range (Ext-V)	DC 4.0–35 V
Weight	5.1 g (including two antennas)
Dimensions	28 × 24 × 8 mm
Firmware	ExpressLRS, pre-installed
FW target	RadioMaster RP3-H Diversity 2400 RX
Bus interface	CRSF / S.BUS

2.5 Package contents

- 1× RP3-H ExpressLRS 2.4GHz Nano Receiver
- 2× 150 mm IPX1 2.4 GHz T antenna (installed)
- 1× JST-GH CRSF 4-wire pigtail
- 1× JST-GH 4-wire to JST-GH CRSF cable
- 1× JST-GH 4-wire to single servo pins (single Dupont connectors)
- 1× voltage telemetry wire
- 1× quick start guide

The package does **not** include a transmitter or ExpressLRS transmitter module, a flight controller or a battery.

3. Installation and wiring

3.1 Mounting the receiver and antennas

- Mount the receiver securely, e.g. with double-sided tape or a cable tie, so that it cannot vibrate freely and the cables are not under tension.
- Place it as far as possible from sources of interference — the electronic speed controller (ESC), video transmitter and high-current power leads.
- Route the active ends of both antennas away from carbon and metal frame parts and, if possible, point them perpendicular to each other so that antenna diversity better covers different model attitudes.
- Secure the antennas so that they cannot get into the rotor, propellers or moving parts.

3.2 Connecting to the flight controller

The receiver is connected with a four-wire JST-GH cable to the bus of the flight controller or helicopter control unit:

① **NEXUS** — use the JST-GH to JST-GH CRSF cable from the package; no soldering required.

② **Flight controller (FC) with solder pads** — use the pigtail: receiver TX to RX of the selected UART, receiver RX to TX of the same UART, + to a 4.5–8.4 V supply, − to GND.

③ **Flight controller or device with servo pins** — use the JST-GH to Dupont cable.

Then enable the serial receiver on the respective UART in the flight controller configuration and select the **CRSF** protocol (or S.BUS). The receiver output protocol is set in its configuration (ExpressLRS Lua script on the transmitter or web interface via Wi-Fi).

3.3 Voltage telemetry — Ext-V input

If your ESC does not provide battery voltage via the flight controller, plug the voltage telemetry wire from the package into the Ext-V connector and connect its other end to the positive pole of the voltage to be measured. The receiver automatically detects whether it measures the voltage of an external battery or the voltage of the receiver battery / ESC BEC.

The voltage at the Ext-V input must not exceed 35 V. Connect the wire only with the power disconnected and make sure its end cannot cause a short circuit.

4. Binding and status indication

4.1 Traditional binding

For traditional binding, the binding phrase must be commented out in user_defines on the RX, i.e. no binding phrase may be set in the receiver firmware. The transmitter module and the receiver must run compatible ExpressLRS firmware.

① Power off your transmitter.

② Plug in and unplug your receiver three times.

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

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

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

※ If the transmitter module and the receiver are flashed with the same binding phrase, they connect automatically and traditional binding is not needed.

4.2 LED status

Status	Status light	Meaning
Receiver disconnected	slow flash (500 ms)	waiting for transmitter
Wi-Fi upgrade mode	fast flash (25 ms)	Wi-Fi on
Bind mode	double flash	receiver in bind mode
Mode matching failed	triple flash	receiver functional, mode selection error
Receiver connected	solid	receiver functional

5. Firmware and further guides

5.1 Firmware update

The receiver comes with ExpressLRS firmware pre-installed. Thanks to the built-in Wi-Fi, the firmware can be updated on the craft without removing the receiver, e.g. with the ExpressLRS Configurator or the receiver web interface. When building the firmware, select the target **RadioMaster RP3-H Diversity 2400 RX**.

- Keep the transmitter module and the receiver on compatible ExpressLRS firmware versions.
- Do not interrupt the receiver power supply during the update.
- The BOOT button is used when flashing firmware; the procedure is described in the ExpressLRS documentation.

5.2 FCC and LBT regulatory domain

The manufacturer supplies the receiver with either **FCC** or **LBT** (Listen Before Talk) firmware. The LBT version is intended for Europe. The transmitter module and the receiver must use the same regulatory domain, otherwise they will not connect. Within the EU, use firmware with the LBT (EU) regulatory domain.

5.3 Further guides

A detailed description of ExpressLRS settings (binding phrase, packet rate, telemetry, Wi-Fi, failsafe) can be found on the official ExpressLRS website.

Official ExpressLRS documentation
www.expresslrs.org

6. Checks, maintenance and troubleshooting

6.1 Before every flight

- Check that the receiver LED is solid and that the model responds to all controls in the correct direction.
- Check the failsafe: with the propellers removed or the rotor secured, switch off the transmitter and verify that the flight controller enters the configured failsafe mode.
- Check the antennas, connectors and receiver mounting.

6.2 Maintenance

- After a crash, check the housing, antennas and cables; replace damaged antennas.
- Remove dirt with a dry brush; do not use solvents.
- Store the receiver in a dry place, out of direct sunlight.

6.3 Troubleshooting

Problem	Possible cause and solution
LED flashes slowly, model does not respond	transmitter is off, receiver is not bound, or the binding phrase, regulatory domain (FCC / LBT) or firmware version differs; bind again according to chapter 4.1
LED flashes fast	receiver is in Wi-Fi mode; switch on the transmitter or disconnect and reconnect the receiver power
LED flashes three times	receiver is connected but the selected mode does not match; check the settings in the ExpressLRS Lua script
Flight controller does not see channels	TX and RX wires swapped, wrong UART or protocol (CRSF / S.BUS) in the flight controller configuration
No voltage telemetry	check the Ext-V wire connection and that the voltage is within 4.0–35 V
Short range	damaged or badly routed antennas, antennas shielded by carbon or metal

7. Radio parameters and conditions of use

7.1 The law of the country of use applies

European Union regulations apply in all member states, but national implementing regulations differ from state to state — 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 follow the regulations of the state in which you use it.

7.2 Frequency band and transmit power

Frequency range	2.404–2.479 GHz
Max. telemetry RF power	100 mW (manufacturer's specification)
Wi-Fi	2.4 GHz, only for firmware updates and configuration

In the Czech Republic, operation in the 2400–2483.5 MHz band is governed by the general authorisations of the Czech Telecommunication Office (ČTÚ) (VO-R/12 for wideband data transmission with a limit of 100 mW e.i.r.p., VO-R/10 for short-range devices with a limit of 25 mW e.i.r.p.). The user is responsible for the power setting, the regulatory domain and compliance with local regulations.

7.3 Operating models and drones

The operation of unmanned aircraft including RC models is governed by Regulations (EU) 2019/947 and 2019/945 and by national regulations. Before flying, check the obligations that apply to your model (operator registration, pilot competency, zones, insurance) with the aviation authority of the country of operation — in the Czech Republic with the Civil Aviation Authority (www.caa.gov.cz).

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 (RP3-H) is printed on the receiver housing.

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.