RP4TD-M

RadioMaster ExpressLRS 2.4 GHz
True Diversity receiver – user manual



Read this manual carefully before installation and keep it for future reference.

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

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1. Safety instructions

1.1 Before you start

The RadioMaster RP4TD-M is an ExpressLRS radio receiver designed to be built into FPV drones and other RC models. Read this entire manual before installation and keep it for future reference. Installation requires soldering and basic knowledge of flight controller (FC) configuration.

- This product is not a toy. It is not intended for children; keep small parts and heat-shrink tubes out of the reach of children.
- The receiver is intended solely for use with an ExpressLRS transmitter module in the 2.4 GHz band. Any other use is not permitted.
- A model fitted with the receiver is radio controlled. Loss of the link can cause uncontrolled movement of the model – always check the failsafe function before the first flight (Chapter 6.2).

1.2 Electrical installation

- Power the receiver only with **5 V** from the flight controller (FC) or a regulated supply. Never connect it directly to the model's battery.
- Solder only with the **battery disconnected** and the USB cable unplugged. The soldering iron tip can cause burns; work on a non-flammable surface.
- Before powering up for the first time, check that there is no short circuit between the pads and remove any flux residue.
- The receiver is sensitive to electrostatic discharge. Do not touch the components on the board and discharge yourself by touching a grounded object before handling.
- Do not operate the receiver without the antennas connected.

1.3 Operating environment

- Protect the receiver from moisture, dust, metal chips and mechanical damage.
- Do not mount the receiver in a way that keeps the button on the board permanently pressed (e.g. by heat-shrink tube or tape) – the receiver would start in bootloader mode and would not work.
- Always test a model with the receiver on the ground **with the propellers removed**.

2. Product description

2.1 Package contents

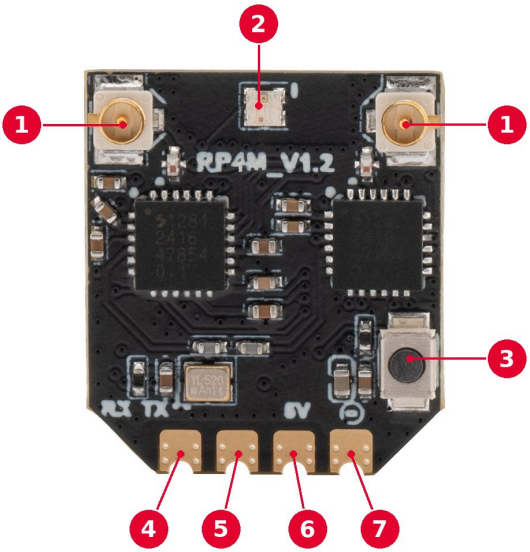
Qty	Item
1	RP4TD-M ExpressLRS 2.4 GHz True Diversity receiver
1	CRSF cable
3	Heat-shrink tube
2	2.4 GHz T antenna, 65 mm (installed on the receiver)
1	User manual



Package contents (manufacturer's illustrative photo)

Not included: flight controller (FC), radio with an ExpressLRS 2.4 GHz transmitter module, soldering equipment.

2.2 Parts overview



Top view of the receiver

① Antenna connectors (2×) – each belongs to one of the two radio chips (true diversity).

② Status LED (for the meaning of the signals see Chapter 5.2).

③ Button – binding mode and bootloader mode (Chapters 5.3 and 5.6).

④ RX – telemetry input from the flight controller (FC).

⑤ TX – control signal output to the flight controller (FC).

⑥ 5V – power supply.

⑦ GND – ground (marked with the ground symbol on the board).

※ Before soldering, always check the pad labels printed directly on the receiver board.

2.3 Technical data

Type	ExpressLRS 2.4 GHz receiver, true diversity (Gemini)
Processor (MCU)	ESP32
RF chip	2× SX1281
Frequency band	2.4 GHz (ISM)
Max. refresh rate	500 Hz / F1000 Hz
Telemetry power	max. 2× 10 mW
Operating voltage	5.0 V DC
FC interface	CRSF (UART)
WiFi updates	yes
Oscillator	TCXO (temperature compensated crystal oscillator)
Antennas	2× 2.4 GHz T antenna, 65 mm
Weight	1.00 g without antennas / 3.30 g with antennas
Dimensions	18.10 × 16.0 mm
Firmware target	RadioMaster RP4TD-M 2400 RX
Compatibility	all ExpressLRS 2.4 GHz transmitter modules and radios

The receiver comes with ExpressLRS firmware pre-installed. Data provided by the manufacturer RadioMaster.

2.4 Diversity and firmware versions

The RP4TD-M contains two separate radio chips, each with its own antenna (true diversity, Gemini technology). The receiver therefore copes better with interference and signal dropouts, for example when one antenna is shadowed by the model's frame.

The manufacturer supplies the receiver in two firmware versions: **FCC** and **LBT**. The version relates to the regulatory domain of the ExpressLRS firmware (*Regulatory Domain*). For the 2.4 GHz band, ExpressLRS offers the domains *ISM_2400* and *EU_CE_2400*; the EU domain (*EU_CE_2400*) uses LBT (Listen Before Talk). The receiver and the transmitter module must use the same setting, otherwise they will not connect. The domain can be changed by flashing the firmware again (Chapter 5.6); always choose the domain that applies in the country of use.

3. Legal conditions of use

3.1 The law of the country of use applies

European Union legislation (Directive 2014/53/EU on radio equipment, Regulations (EU) 2019/945 and 2019/947 on unmanned aircraft systems) applies in all member states, but national implementing rules differ from country to country – permitted frequency bands, maximum transmit power, operator registration, geographical zones or compulsory insurance. The information in this chapter describes the situation in the Czech Republic. If you operate the model in another country, you must follow the regulations of the country in which you operate it.

3.2 Radio frequencies and transmit power

The receiver operates in the 2.4 GHz band and transmits telemetry back to the radio. In the Czech Republic, operation is governed by the Czech Telecommunication Office (ČTÚ) general authorisation No. VO-R/10 (short-range devices):

Band	Limit in CZ	RP4TD-M manufacturer data
2400–2483.5 MHz	25 mW e.i.r.p.	telemetry max. 2× 10 mW

- The transmit power of the transmitter module in the radio is set by the user, who **is responsible for complying with the limit** applicable in the country of use.
- In the European Union, set the regulatory domain *EU_CE_2400* (LBT) in both the receiver and the transmitter module.
- Outside the Czech Republic, the bands and limits of the respective country apply.

3.3 Operating an unmanned aircraft

If the receiver is installed in a drone, its operation is governed by Regulation (EU) 2019/947 and the rules of the country of use – in particular operator registration, pilot competency, flight altitude up to 120 m, visual line of sight and the ban on flying over assemblies of people. When flying with FPV goggles, an observer must be present next to the pilot. Details can be found in the drone's manual and on the website of the Czech Civil Aviation Authority (www.caa.gov.cz).

4. Installation

4.1 What else you need

- a flight controller (FC) with a free full UART (pair of RX and TX pads) and a 5 V output,
- a radio with an ExpressLRS 2.4 GHz transmitter module running the same major firmware version (the first number of the version must match),
- soldering equipment and a computer with FC configuration software (e.g. Betaflight Configurator).

4.2 Connecting to the flight controller (FC)

The receiver communicates with the flight controller via the CRSF protocol over two wires. Connect it to any free UART of the flight controller – the TX and RX wires are **crossed**:

Receiver	Flight controller (FC)
⑦ GND	any GND pad
⑥ 5V	5 V pad
⑤ TX	RX pad of the selected UART (e.g. RX1)
④ RX	TX pad of the same UART (e.g. TX1)

- Use the supplied CRSF cable or your own wires; check the pad assignment in your FC manual.
- Avoid UARTs labelled “SBUS” or “RX inverted” – their built-in resistor can put the receiver into bootloader mode (LED solid on).
- Check the pads for short circuits. **Do not apply the heat-shrink yet** – first check that the receiver works (Chapter 5.2).

4.3 Antennas

- Both antennas are factory-installed. The connectors are fragile – attach and remove the antennas perpendicular to the board, without levering.
- Route the active parts of both antennas away from carbon, motors and wires, ideally in different directions (V shape or perpendicular), and secure them against the propellers.
- Replace damaged antennas. Other than T antennas give a shorter range.

4.4 Mounting

After testing (Chapter 5), cover the receiver with the supplied heat-shrink tube or use double-sided tape. Neither may press on button ③; keep the LED visible.

5. Setup

5.1 Flight controller (FC) configuration

Described for Betaflight Configurator; in other programs (e.g. INAV) items may differ.

① On the *Ports* tab, enable the *Serial RX* column for the UART the receiver is connected to.

② On the *Receiver* tab, set *Receiver Mode* to *Serial* and *Serial Receiver Provider* to *CRSF*; enable *Telemetry*.

③ If you use analog video or a system with OSD via MSP DisplayPort, set *RSSI Channel* to *Disabled* and disable *RSSI ADC*.

④ In the *CLI* tab, use the command *get serialrx* to check that *serialrx_inverted* and *serialrx_halfduplex* are *OFF*. If necessary, set them (*set serialrx_inverted = off*, *set serialrx_halfduplex = off*) and save with the command *save*.

5.2 LED indication

The receiver status is indicated by LED ② according to the ExpressLRS firmware:

LED	Status
rainbow fade (RGB LED)	starting up
slow blink (500 ms)	waiting for connection from the transmitter
double blink, then pause	binding mode
triple blink, then pause	connected, but *Model Match* mismatch
solid on	connected to the transmitter; with a single-colour LED also bootloader mode
fast blink (25 ms) / green “breathing” (RGB)	WiFi mode
100 ms blink (RGB: red)	radio chip not detected
off (RGB LED)	off or bootloader mode

With an RGB LED, the colour when connected indicates the packet rate (e.g. red F1000).

5.3 Binding to the transmitter

The receiver and the transmitter module must have the same major firmware version and the same regulatory domain. They can be bound in several ways:

- **Binding phrase** (recommended) – the same phrase set in the transmitter module and the receiver (when flashing or in the web interface); the devices then connect automatically.
- **Button** – with the receiver powered, press button ③ for 1.5 s.

- **Power cycling** – three times in a row, connect power and disconnect it within 2 s after the LED lights up; leave it on the fourth time.
- **Betaflight** – the *Bind Receiver* button on the *Receiver* tab or the *bind_rx* command in the CLI (requires a newer version of Betaflight).

The LED starts double blinking. On the radio, run the ExpressLRS Lua script and select *[Bind]*. As soon as the LED is solid on, binding is complete. The binding remains stored; to cancel binding mode, power the receiver off and on again.

5.4 Connection check

When connected, the ExpressLRS Lua script shows **C** (Connected) in the top right corner. On the *Receiver* tab in Betaflight Configurator, check that sticks and switches move the right channels. “Model Mismatch” means a mismatched *Model Match* setting – turn it off or reassign it to the current model.

5.5 WiFi mode

If the receiver gets no transmitter signal for **60 s** after power-up, it enters WiFi mode (also available via *WiFi Connectivity → Enable RX WiFi* in the Lua script). It creates the access point *ExpressLRS RX*, password *expresslrs*; open the web interface at **10.0.0.1** to set the binding phrase, view the firmware version or upload firmware. During longer bench sessions, keep the video transmitter (VTX) cooled.

5.6 Firmware update

Flash the firmware with **ExpressLRS Configurator** using the target **RadioMaster RP4TD-M 2400 RX**. Always choose the regulatory domain (*Regulatory Domain*) that applies in the country of use and the same binding phrase as in the transmitter module. Flashing methods:

- **WiFi** – the program builds the firmware (*Build*) and you upload the file *firmware.bin.gz* unchanged via the web interface (Chapter 5.5), *Update* tab.
- **Betaflight Passthrough** – via the flight controller's USB; the flight controller configuration software must be closed beforehand.
- **UART** – via a USB-UART adapter; put the receiver into bootloader mode by holding button ③ while connecting power (LED solid on).

▶ Further guides

ExpressLRS official documentation
www.expresslrs.org

EdgeTX official documentation – radio setup
edgetx.org

6. Operation

6.1 Pre-flight check

- The antennas are undamaged, firmly attached and out of reach of the propellers.
- The receiver is connected to the transmitter (LED solid on) and the channels in the configuration software correspond to the controls.
- Always switch the radio on before the model and switch it off only after disconnecting the model's battery.
- Before flight, insert a fully charged model battery (Li-Po 4.20 V/cell, LiHV 4.35 V/cell) and end the flight at 3.5 V/cell at the latest.

6.2 Failsafe check

Failsafe is the flight controller's response to signal loss. It is configured in the flight controller (in Betaflight on the *Failsafe* tab), not in the receiver.

① Remove the propellers.

② Arm (start the motors) and apply a little throttle.

③ Switch off the radio. Depending on the failsafe settings, the motors must stop or the model must switch to the configured mode.

④ Switch the radio back on, Disarm (stop the motors) and check that the link has been restored.

6.3 Range and telemetry

Range depends on the selected packet rate, the transmitter module power, antenna placement and ambient interference. A higher packet rate means a shorter range. Watch the signal values (RSSI, LQ) transmitted via telemetry on the radio or in the OSD and end the flight when the link quality drops significantly.

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- After a crash, check the antennas, connectors and solder joints.
- Clean the receiver with a dry brush; do not use solvents or water.
- Store in a dry place, away from direct sunlight and heat sources.

7.2 Troubleshooting

Problem	Cause and solution
LED does not light up at all	Disconnect power immediately and check the 5 V and GND wiring. With an RGB LED, this may be bootloader mode – see the next row.
LED solid on, receiver does not connect (bootloader)	Button ③ is pressed (heat-shrink, tape) – release it. Otherwise disconnect the RX and TX wires from the FC: if the LED starts blinking slowly, connect the receiver to a different UART.
LED blinks slowly, no connection	Binding phrase, major firmware version or regulatory domain (FCC/LBT) do not match. Unify the settings and bind again.
Triple blink	*Model Match* mismatch – adjust the setting in the Lua script (Chapter 5.4).
Fast blinking	The receiver is in WiFi mode – switch on the radio and restart the receiver.
Connected, but the FC does not respond to the sticks	TX/RX wires swapped, *Serial RX* not enabled on the correct UART or CRSF protocol not set (Chapter 5.1).
Short range, dropouts	Damaged or shadowed antenna, antennas near carbon or wires, low transmitter module power or too high a packet rate.

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:** type designation (RP4TD-M); the board revision is printed on the receiver board. The firmware version is shown in the ExpressLRS web interface (Chapter 5.6).

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.