ELRS-R24-D

Matek Systems – ExpressLRS 2.4 GHz receiver
with diversity and two antennas



Read the safety instructions before installation. Install and configure the receiver with the propellers removed.

User manual · www.rotorama.com

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1. Safety instructions

Read this entire manual before installation and first use and keep it for future reference. The receiver is intended for controlling radio-controlled models and FPV drones. Incorrect installation or configuration may result in loss of control of the model.

- This product is not a toy. It is not intended for children; it contains small parts that can be swallowed.
- Always install and configure the receiver **with the propellers removed**. The motors may start unexpectedly during binding, testing or if the flight controller (FC) is configured incorrectly.
- Power the receiver only with a voltage within the range given in Chapter 2.4 and only via the 5V pad. Reverse polarity or a higher voltage (e.g. directly from the flight battery) will destroy the receiver.
- Before connecting the battery, check that no joint is short-circuited. Solder only with the power switched off.
- Do not power the receiver without the antennas connected – the telemetry transmitter section may be damaged.
- Protect the receiver from moisture, water, dust, undamped vibration and mechanical damage. The board has no housing; conductive objects (carbon frame, screws, wires) must not touch the components.
- Before every flight, check that the model responds correctly to commands and that failsafe (safe behaviour on signal loss) is configured in the flight controller (FC).
- Do not modify the receiver. Modifying the board or using antennas other than those supplied may breach the conditions for operating radio equipment (Chapter 3).

2. Product description

2.1 What the receiver is for

The Matek ELRS-R24-D is a small **ExpressLRS** receiver for the 2.4 GHz band. It receives commands from an ExpressLRS transmitter and passes them to the flight controller (FC) using the **CRSF** serial protocol; it sends telemetry back to the transmitter. The receiver has two IPEX MHF 1 connectors for two antennas and uses **diversity** – it switches between the antennas according to reception quality.

The receiver works with any ExpressLRS 2.4 GHz transmitter module from any manufacturer, as long as both have the same binding phrase and the same configuration options (Regulatory Domain, *Performance Options* and *Extra Data*).



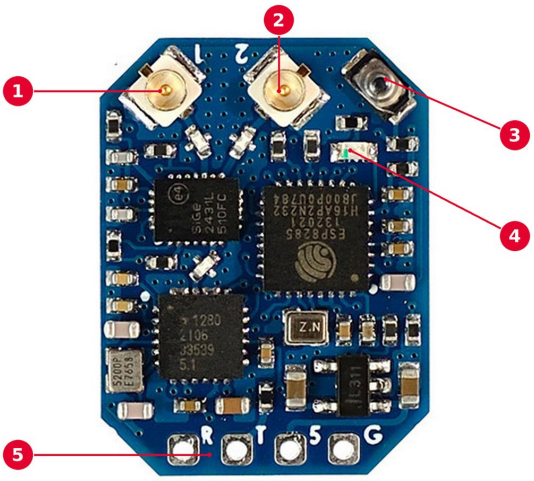
ELRS-R24-D receiver with both supplied antennas

2.2 Package contents

Qty	Item
1×	Matek ELRS-R24-D receiver
2×	antenna with IPEX MHF 1 connector

The package does **not** include connecting wires, heat-shrink tubing, a transmitter or a transmitter module. To update the firmware via UART you need a USB–UART adapter (Chapter 6.2).

2.3 Parts description



Component side

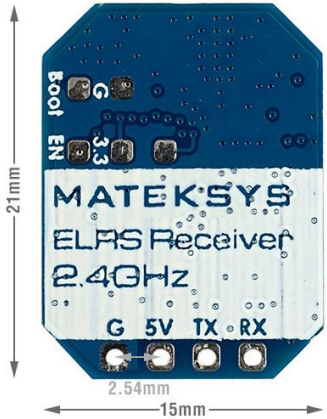
① Antenna connector 1 (IPEX MHF 1)

② Antenna connector 2 (IPEX MHF 1) – default diversity antenna (ANT2)

③ Boot button – enters bootloader mode for firmware updates

④ Status LED (see Chapter 5.4)

⑤ Solder pads R, T, 5, G for connection to the flight controller (FC)



Bottom side with board dimensions and pad labels G, 5V, TX, RX (2.54 mm pitch)

The bottom side also has pads labelled Boot, G, EN and 3.3. You do not need them for a normal installation.

2.4 Technical data

Data provided by the manufacturer Matek Systems.

Type designation	ELRS-R24-D
Processor / RF chip	ESP8285, SX1280/1281IMLTRT
PA/LNA	SE2431L, RX gain 12.5 dB
Frequency band	2.4 GHz (2400–2480 MHz)
Telemetry power	22.5–23 dBm
Diversity	antenna switching, default antenna ANT2
Antenna connector	2× IPEX MHF 1
Protocol to FC	CRSF (serial)
Input voltage	4–9 V DC at the 5V pad
Current draw	40–45 mA before binding 70–75 mA after binding 90–95 mA in WiFi mode
Board size	21 × 15 mm
Weight	3 g including 2 antennas
Firmware	ExpressLRS, target *MATEK R24-D 2.4GHz RX*
Firmware update	via WiFi or UART

※ The manufacturer states that the receiver hardware also supports the alternative mLRS firmware (target *Generic 2400 D PA*). This manual describes operation with the ExpressLRS firmware the receiver is supplied with.

3. Legal conditions for operating radio equipment

3.1 The law of the country of operation applies

The receiver is radio equipment – in addition to receiving commands it also transmits telemetry. EU legislation applies in all member states, but national rules differ – permitted frequency bands, maximum transmit power and rules for operating drones and models. 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 operate it.**

The operation of the drone or model in which you install the receiver is also subject to the rules for operating unmanned aircraft systems (in the EU, Regulation (EU) 2019/947).

3.2 Frequency band and transmit power

Frequency band	2400–2480 MHz (manufacturer's data)
Telemetry power	22.5–23 dBm (manufacturer's data)
Max. transmit power per EU declaration of conformity	on request from the importer (Chapter 8)

In the Czech Republic, operation in the 2.4 GHz band is governed by the general authorisations of the Czech Telecommunication Office (ČTÚ):

General authorisation	Band	Max. power
VO-R/12/11.2021-11 (wideband data)	2400.0–2483.5 MHz	100 mW e.i.r.p.; FHSS 100 mW/100 kHz
VO-R/10/05.2025-5 (short-range devices)	2400–2483.5 MHz	25 mW e.i.r.p.

- The limits apply to the **combination of transmitter power and the antenna used** (e.i.r.p.) and must not be exceeded in any operating mode.
- Do not use additional amplifiers; use the antennas specified by the manufacturer.
- The operator is responsible for compliant configuration and operation. Current wording: www.ctu.cz.

3.3 Regulatory domain in the firmware

When building the firmware in the ExpressLRS Configurator, the **Regulatory Domain** option is mandatory. Select the domain appropriate for the country in which you will fly. The transmitter module and the receiver must have the same regulatory domain, otherwise they will not connect.

4. Installation in the model

4.1 What else you need

- a radio with an ExpressLRS 2.4 GHz transmitter module,
- a flight controller (FC) with a free full serial UART port (TX and RX pins) and a 5 V output,
- a soldering iron, thin wires and heat-shrink tubing,
- a computer with the flight controller configurator (e.g. Betaflight or INAV) and the ExpressLRS Configurator,
- for updating via UART, a USB–UART adapter (Chapter 6.2).

4.2 Connecting to the flight controller (FC)

Receiver	Flight controller (FC)	Function
RX (R)	TX of the selected UART	telemetry
TX (T)	RX of the selected UART	control
5V (5)	5V or 4V5	power
G	GND	ground

The signal wires cross over: receiver TX goes to FC RX and receiver RX goes to FC TX. Do not apply a voltage outside the 4–9 V range to the 5V pad, e.g. directly from the flight battery.

- The CRSF protocol requires a full UART pair (TX and RX).
- After soldering, check that no joint is shorted to an adjacent pad.
- Insulate the receiver with heat-shrink tubing or mount it so that it does not touch conductive parts. The Boot button must not remain permanently pressed (e.g. by heat-shrink) – the receiver would start in bootloader mode.

4.3 Antennas

- Before switching on for the first time, connect both antennas to connectors ① and ②. Place the IPEX MHF 1 connector straight on and press until it clicks; when disconnecting, pull on the connector, not on the cable.
- Route the active ends of the antennas outside the frame, ideally at an angle of approximately 90° to each other, and as far as possible from carbon parts, metal parts, motors, electronic speed controllers (ESC) and the video transmitter (VTX).
- Secure the antennas so that they cannot get into the propellers. Replace a damaged antenna.

4.4 Configuring the flight controller (FC)

Procedure in the flight controller configurator (the location of the options may differ between configurator versions):

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

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

③ Enable *Telemetry* (in INAV on the *Configuration* tab).

④ Set *RSSI Channel* and *RSSI ADC* to *Disabled*.

⑤ On the *CLI* tab, use *get serialrx* to check that *serialrx_inverted* and *serialrx_halfduplex* are *OFF*. If necessary, set them with *set serialrx_inverted = off* and *set serialrx_halfduplex = off* and store with *save*.

When finished, close the configurator and disconnect the flight controller from USB.

Configure failsafe (behaviour on signal loss) in the flight controller (FC) on the *Failsafe* tab and verify it before the first flight, with the propellers removed, by switching off the radio.

5. Binding with the transmitter

5.1 Factory state of the receiver

The receiver comes preloaded with ExpressLRS firmware with a binding phrase used for factory quality control. It will not enter bind mode using the traditional binding procedure.

Therefore flash the receiver with your own binding phrase (Chapter 6) or set it via WiFi in the web interface (Chapter 5.2). The manufacturer does not recommend traditional binding.

- Choose a unique binding phrase of at least 8 characters (letters and numbers), e.g. your pilot handle. It is not a password – it prevents your devices from interfering with those of other pilots.
- The transmitter module must have the same binding phrase, regulatory domain and configuration options.
- The major firmware version (the first number of the version) of the transmitter module and the receiver must match, otherwise the devices will not connect.

5.2 Setting the binding phrase via WiFi

① Switch off the radio and power up the receiver (connect the model's power supply, propellers removed).

② Wait at least 60 seconds. Without a connection to the transmitter, the receiver switches to WiFi mode – the LED blinks rapidly.

③ On your phone or computer, connect to the WiFi network **ExpressLRS RX**, password **expresslrs**.

④ In the browser, open the address **10.0.0.1**.

⑤ Enter the binding phrase in the web interface and save the settings.

⑥ Power-cycle the receiver, then switch on the radio.

※ The time after which the receiver without a connection switches to WiFi is set by the *Auto WiFi On Interval* option. If the receiver has been configured with your home WiFi credentials and connects to that network, the ExpressLRS RX network will not appear.

5.3 Connection check

① Switch on the radio and the model (propellers removed).

② Once connected, the receiver LED lights up solid.

③ On the radio, run the *ExpressLRS* Lua script (*SYS* → *Tools* menu). A **C** in the top-right corner means that the transmitter module and the receiver are connected.

④ In the flight controller (FC) configurator, on the *Receiver* tab, check that the channels respond to stick movements.

If the script shows *Model Mismatch* instead of the connection, the Model ID in the receiver differs from the current model in the radio. If you do not use the Model Match feature, set it to *Off* in the script.

5.4 LED indication

LED	Status
solid on	connected to the transmitter, or bootloader mode
double blink, pause	bind mode
slow blink (500 ms)	waiting for connection from the transmitter
triple blink, pause	connected, but Model Match mismatch
medium blink (100 ms)	radio chip not detected
fast blink (25 ms)	WiFi mode

Meaning of the indication according to the ExpressLRS documentation

6. Firmware update and further guides

Flash the firmware with the **ExpressLRS Configurator**. Select the target **MATEK R24-D 2.4GHz RX**, the regulatory domain (Chapter 3.3) and your binding phrase. Optionally, you can enter your home WiFi credentials.

6.1 Updating via WiFi

① In the ExpressLRS Configurator, select the *WiFi* method, set the options and click *Build*. Do not unzip the generated firmware file.

② Put the receiver into WiFi mode (Chapter 5.2, steps ① to ④), or in the ExpressLRS Lua script select *Wifi Connectivity* → *Enable RX WiFi*.

③ At the address 10.0.0.1, upload the firmware file and wait for the process to finish.

6.2 Updating via UART

Use this method also when the receiver cannot be updated via WiFi or via the flight controller (passthrough) – the manufacturer specifies it as the way to recover the receiver.

① Disconnect the receiver from the flight controller and connect it to a USB–UART adapter: receiver TX to adapter RX, receiver RX to adapter TX, 5V to 5V and G to GND.

② Hold the Boot button ③ and plug the adapter into USB. Release the button – the LED must be solid (bootloader mode).

③ In the ExpressLRS Configurator, select the target *MATEK R24-D 2.4GHz RX*, the *UART* method, set the binding phrase and the firmware options.

④ Tick *Erase before flash* and *Force Flash* and click *Flash*.

⑤ After the green success message, disconnect the adapter and reconnect the receiver to the flight controller.

If the system does not detect the adapter, install the driver for its chip type (e.g. CP210x, FTDI FT232, CH340, CH9102).

6.3 Further guides

Detailed documentation on the ExpressLRS system and on radios with EdgeTX is available on the official websites:

- ExpressLRS: www.expresslrs.org
- EdgeTX: edgetx.org

7. Maintenance and troubleshooting

7.1 Maintenance and storage

- After every flight, and especially after a crash, check the antennas, their connectors and the solder joints.
- Remove dirt with a dry soft brush. Do not use water or solvents.
- Store in a dry place, away from direct sunlight and heat sources, in an antistatic bag.

7.2 Troubleshooting

Problem	Cause and solution
LED blinks slowly, receiver does not connect	Different binding phrase, regulatory domain, configuration options or major firmware version. Align the settings of the receiver and the transmitter module.
LED solid immediately after power-up, radio switched off	The receiver is in bootloader mode. Check that the Boot button is not pressed (heat-shrink). Disconnect the RX and TX wires from the FC – if the LED starts blinking slowly, connect the receiver to another UART.
LED triple blink, pause	Model Match mismatch. Adjust the setting in the ExpressLRS Lua script (Chapter 5.3).
LED blinks at medium speed (100 ms)	Radio chip not detected. Contact the seller.
Connected, but channels in the FC do not respond	TX/RX wires swapped, Serial RX not enabled on the correct UART, CRSF protocol not selected, or inversion / half-duplex enabled (Chapter 4.4).
Cannot update via WiFi or passthrough	Flash the firmware via UART (Chapter 6.2).
Short range	Check the antenna connection, damage and placement (Chapter 4.3).

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@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 **ELRS-R24-D** (manufacturer Matek Systems); the receiver board is printed with “MATEKSYS ELRS Receiver 2.4GHz”.

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.