# ELRS 2.4G RX

iFlight ExpressLRS 2.4 GHz receiver
with T-dipole antenna 40 mm / 70 mm



**Read this entire manual carefully before installation and first use, and keep it for future reference.**

*www.rotorama.com*

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# 1. Safety instructions

## 1.1 General principles

- The receiver is an electronic component intended for installation in an RC model or FPV drone. It is not a toy and must be kept away from children.
- The controllability of the model depends on a correct link between the receiver and the radio. Incorrect installation or settings can lead to loss of control of the model, a crash and injury to persons or damage to property.
- Carry out all work on the model (wiring, configuration, binding, firmware updates) **always with the propellers removed**.
- First test a model with a newly installed or reconfigured receiver on the ground, and only then in a safe area without people.

## 1.2 Electrical installation

- Power the receiver only with **5 V** from the 5 V output of the flight controller. Never connect it directly to the model's flight battery.
- Before applying power for the first time, check that there is no short between the pads and remove any flux and solder residue.
- Solder only with a temperature-controlled fine soldering iron and briefly, so that the board is not damaged and the pads are not lifted.
- Do not heat-shrink the receiver or mount it permanently until its correct function has been verified. Heat-shrink must not press on the BOOT button permanently.

## 1.3 Antenna and radio operation

- Never power the receiver without the antenna connected – it transmits telemetry and may be damaged without an antenna.
- Use only the supplied antenna or an antenna recommended by the manufacturer. Amplifiers or antennas with higher gain are not permitted (see Chapter 3.2).
- Place the antenna as far as possible from conductive and magnetic components – the carbon frame, metal parts and motors. The manufacturer gives the same recommendation.
- The IPEX connector is mechanically delicate. Attach and remove the antenna perpendicular to the board and secure the antenna cable against pulling.

# 2. Product description

The iFlight ExpressLRS 2.4G RX is a small radio control receiver for the **ExpressLRS** (ELRS) system in the 2.4 GHz band. ExpressLRS is an open-source RC system with long range, low latency and a high update rate. The receiver communicates with the flight controller using the **CRSF** protocol, has a pre-fitted SH1.25 connector and also solder pads. The external T-dipole antenna is connected via an IPEX connector.

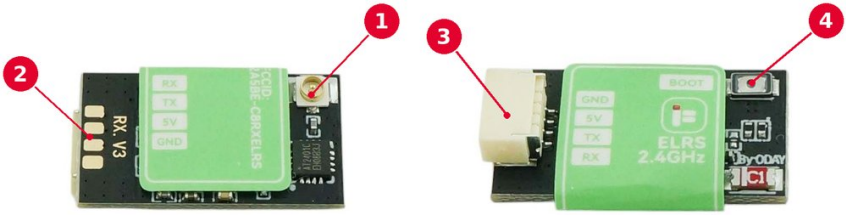
## 2.1 Package contents and variants

| Qty | Item |
|---|---|
| 1× | ExpressLRS 2.4 GHz receiver |
| 1× | T-dipole antenna with IPEX connector – lead length according to the selected variant (40 mm or 70 mm) |
| 2× | connection cable |

The product is sold in two variants that differ only in the length of the antenna lead: **40 mm** and **70 mm**. The receiver is identical in both variants and this manual applies to both.

**Not included:** flight controller (FC), radio or ExpressLRS 2.4 GHz transmitter module, battery and tools.

## 2.2 Parts description




*Both sides of the receiver*

① **IPEX antenna connector** – for connecting the supplied T-dipole antenna.

② **Solder pads** – alternative to the connector; the GND, 5V, TX and RX pin assignment is marked on the receiver label.

③ **SH1.25 connector** – GND, 5V, TX and RX pins for connection to the flight controller.

④ **BOOT button** – used to put the receiver into binding mode (Chapter 5.2).

## 2.3 Technical data

| Parameter | Value |
|---|---|
| Frequency band | 2.4 GHz ISM |
| Firmware | ExpressLRS – target *iFlight 2400RX* |
| Protocol to the flight controller | CRSF |
| Telemetry power | 20 dBm (100 mW) |
| Supply voltage | 5 V |
| Interface | 5V, GND, RX, TX |
| Connector | SH1.25 + solder pads |
| Antenna connector | IPEX |
| Antenna | T-dipole, lead 40 mm or 70 mm |
| Dimensions | 12 × 19.5 mm |
| Weight | 1.2 g |

※ The data are taken from the iFlight product page and from the product description at www.rotorama.com.

# 3. Legal conditions of use in the Czech Republic and the EU

## 3.1 The law of the country of use applies

European Union rules on radio equipment and on the operation of unmanned aircraft apply in all Member States, but national implementing rules differ from country to country – in particular the permitted frequency bands and maximum transmit powers, registration portals, geographical zones and compulsory insurance. The information in this chapter describes the situation in the Czech Republic. **If you use the product in another country, you must comply with the regulations of the country in which you use it.**

## 3.2 Frequency band and transmit power

The receiver receives the control signal and at the same time transmits telemetry back to the radio. According to the manufacturer, it operates in the 2.4 GHz ISM band with a telemetry power of up to **20 dBm (100 mW)**. Until the receiver receives a different instruction from the radio, after power-up it usually transmits at its default, typically maximum, power.

In the Czech Republic, operation in the 2400–2483.5 MHz band is governed by general authorisations of the Czech Telecommunication Office (ČTÚ):

| ČTÚ general authorisation | Band | Limit |
|---|---|---|
| VO-R/10 – short range devices, Art. 3(2)(j) | 2400–2483.5 MHz | 25 mW e.i.r.p. |
| VO-R/12 – wideband data transmission systems | 2400–2483.5 MHz | 100 mW e.i.r.p. |

- The e.i.r.p. limits include the antenna gain. **The user is responsible for the power setting and for compliance with the limit.**
- When building the firmware in the ExpressLRS Configurator, select the regulatory domain **EU CE 2400 (LBT)** for use in the EU and set the telemetry power (*Tlm Power*, Chapter 5.4) so that the limit applicable in the country of use is not exceeded.
- Operate the receiver only with the supplied antenna or an antenna specified by the manufacturer, without additional amplifiers.

## 3.3 Use in an unmanned aircraft

The receiver is part of the model's command link. When installed in a drone, the operation of the drone is governed by Regulation (EU) 2019/947 and the national rules of the country of operation – in particular operator registration, pilot competence, operational limits and FPV flying with goggles only with an observer. Details can be found in the drone's manual and on the website of the national aviation authority (in the Czech Republic www.caa.cz). We recommend liability insurance even where it is not compulsory.

# 4. Installation

## 4.1 What else you need

- a flight controller (FC) with a free full UART (RX and TX pair) and a 5 V output,
- a radio with an **ExpressLRS 2.4 GHz** transmitter module (internal or external),
- a computer with Betaflight Configurator (or the configurator of other FC firmware) and the ExpressLRS Configurator,
- for connection via the solder pads: a fine soldering iron, solder and flux.

## 4.2 Connecting to the flight controller (FC)

Connect the receiver either with the pre-fitted SH1.25 connector or with a connection cable soldered to the pads. One UART can serve only one device. The RX and TX wires are **crossed**:

| Receiver | Flight controller (FC) |
|---|---|
| GND | any GND pad |
| 5V | any 5 V (or 4.5 V) pad |
| TX | RX pad of the selected UART (e.g. RX2) |
| RX | TX pad of the same UART (e.g. TX2) |

- Check the wire order in the cable against the receiver label and the wiring diagram of your flight controller – do not rely on wire colours.
- Do not use a UART that the FC manufacturer reserves for SBUS receivers. It often has a resistor for signal inversion, which can cause the receiver LED to stay solid.
- Before applying power, check for shorts. For the first test we recommend powering the model from the flight battery, not just from USB.

## 4.3 Mounting the antenna

- Push the antenna onto the IPEX connector ① straight from above until it clicks.
- Route the active part of the antenna (T-dipole) away from the carbon frame, metal parts, motors and the video transmitter, ideally freely into open space.
- Secure the antenna cable (e.g. with a cable tie or heat-shrink) so that it cannot reach the propellers and so that the connector cannot be torn off by pulling the cable.

# 5. Setup

## 5.1 Flight controller setup (Betaflight)

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 (via UART)* and *Serial Receiver Provider* to **CRSF**.

③ Enable telemetry. Disable the RSSI channel (*RSSI Channel*) and *RSSI ADC*.

④ 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 them with *save*.

※ Tab and item names may differ between Betaflight Configurator versions. For INAV and other firmware, proceed similarly according to their documentation.

## 5.2 Binding to the radio

Binding requires the same **major version** of the ExpressLRS firmware (first number of the version) in the receiver and in the transmitter module. There are several binding methods:

**▶ Binding phrase – recommended**

Load the same binding phrase into the receiver and the transmitter module – in the ExpressLRS Configurator when flashing the firmware, or in the web interface of the device. The devices then connect by themselves without further steps. We recommend a unique phrase of at least 8 characters.

**▶ Power-cycling the receiver three times**

① Switch off the radio.

② Power the receiver on and off three times in a row: apply power, wait until the LED lights up and disconnect the power within 2 seconds. On the third time, leave the power on.

③ The LED blinks rapidly twice – the receiver is in binding mode.

④ Switch on the radio, run the ExpressLRS Lua script and select **[Bind]**.

⑤ A solid LED means that the receiver is bound.

**▶ BOOT button or Betaflight**

The receiver can also be put into binding mode by holding the BOOT button ④ for about 1.5 seconds, or with the *Bind Receiver* button on the *Receiver* tab in Betaflight Configurator or the *bind_rx* command in the CLI (requires a newer Betaflight version). Then complete the binding by selecting **[Bind]** in the Lua script.

**※ A receiver with a binding phrase loaded may not enter manual binding mode. In that case reflash the firmware without a binding phrase, or use the same phrase in the transmitter module.**

## 5.3 LED indication

| LED status | Meaning |
|---|---|
| slow blinking | waiting for connection to the radio |
| double blink and pause | binding mode |
| solid | connected to the radio |
| 3 fast blinks and pause | Model Match mismatch (wrong model selected) |
| very fast blinking | WiFi mode (starts after 60 s without a link) |
| off | no power – disconnect and check the wiring |

## 5.4 Receiver settings in the Lua script

Once bound, the receiver can be configured from the radio in the ExpressLRS Lua script (menu *SYS* → *Tools* → *ExpressLRS*). The most important items:

- **Tlm Power** – telemetry power of the receiver. The *MatchTX* option adjusts the telemetry power to the transmitter power. Set it in accordance with Chapter 3.2.
- **Model Match** – when enabled, the receiver only connects to the model whose ID in the radio matches; protects against flying with the wrong model selected.
- **Packet Rate** – update rate. A higher rate means lower latency but lower sensitivity and range. Changing it in flight causes a brief disconnection.
- **Telem Ratio** – share of packets carrying telemetry. A lower share leaves more packets for control.

## 5.5 Firmware update

Flash the firmware with the **ExpressLRS Configurator**. Select an official release, the iFlight device category and the target **iFlight 2.4GHz RX**, set the regulatory domain (Chapter 3.2) and optionally a binding phrase. There are two ways to flash:

- **Betaflight Passthrough** – receiver connected to the flight controller, Betaflight Configurator closed, FC connected to the computer by USB cable; method *BetaflightPassthrough*, button *Flash*.
- **WiFi** – in the Configurator select the *WiFi* method and the *Build* button (creates the file firmware.bin.gz, do not extract it). Switch on the receiver and leave it for at least 60 seconds without a connection to the radio until it switches to WiFi mode. Connect to the network **ExpressLRS RX** with the password **expresslrs**, open the address **10.0.0.1** in a browser and upload the file on the *Update* tab.

After a successful upload the LED blinks slowly again. The major firmware version must match your transmitter module.

## 5.6 Further documentation

The official ExpressLRS documentation is available at www.expresslrs.org, the documentation of the EdgeTX radio firmware (including the Lua script) at edgetx.org.

# 6. Pre-flight check

## 6.1 Arm, Disarm and failsafe

- Assign the **Arm** (motors on) and **Disarm** (motors off) switch in the radio to channel **AUX1** (channel 5) as a two-position switch. ExpressLRS transmits AUX1 in every packet, so a Disarm command is not lost even with a weak signal.
- Set the behaviour on signal loss (failsafe) in the flight controller (in Betaflight on the *Failsafe* tab).
- Test the failsafe function **with the propellers removed**: with the model armed, switch off the radio and check that the motors stop as configured.

## 6.2 Pre-flight check

- the antenna is connected, undamaged and out of reach of the propellers,
- the receiver LED is solid (connected to the radio),
- the correct model is selected in the radio,
- all channels respond in the correct direction on the *Receiver* tab in Betaflight (or in the OSD),
- the Arm/Disarm switch works and the model can be reliably disarmed,
- telemetry (signal strength, voltage) is displayed on the radio.

# 7. Maintenance and troubleshooting

## 7.1 Maintenance and storage

- After a crash, check the antenna, the IPEX connector and the connection wires. Replace a damaged antenna.
- Protect the receiver from moisture, dust, dirt and conductive objects.
- Store it in a dry place at room temperature, out of direct sunlight.

## 7.2 Troubleshooting

| Problem | Cause and solution |
|---|---|
| LED off | The receiver has no power. Disconnect the power and check the 5V and GND wiring. |
| LED solid, but the radio does not connect | The receiver is probably in bootloader mode. Check that the BOOT button is not pressed or squeezed by heat-shrink. Disconnect the RX and TX wires from the FC and power up – if the LED blinks slowly, move the receiver to another UART. |
| Cannot bind | The major firmware version in the receiver and in the transmitter module does not match, or a binding phrase is loaded in the receiver. Align the versions, or the phrase. |
| 3 fast blinks and pause | Model Match mismatch. Select the correct model in the radio, or disable Model Match. |
| Connected, but the FC does not respond | Check the TX/RX crossover, the UART selected on the *Ports* tab and the CRSF setting on the *Receiver* tab. |
| Short range, dropouts | The antenna is damaged or shielded by the frame, metal or motors. Relocate it or replace it. Check the Packet Rate and transmitter power settings. |
| DJI / digital unit with 6 wires | When binding by power-cycling three times, the SBUS/DJI HDL wire may interfere – disconnect it. |

# 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 (iFlight ExpressLRS 2.4G RX) is given in this manual and in the proof of purchase; 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.