ELRS Dualband Diversity

iFlight ExpressLRS receiver 2.4 GHz / 868 MHz
User manual



Read this manual and the safety instructions carefully before installation and first use.

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1. Safety instructions

Read this entire manual before installation and keep it for future reference. The receiver is designed to be built into radio-controlled models and FPV drones. Installation and setup should be carried out by a user with basic knowledge of electronics and soldering. This product is not a toy and must be kept away from children.

- Power the receiver **only with 5 V** from the 5 V pad of the flight controller or from a BEC. A higher voltage will permanently damage the receiver.
- Carry out all wiring, soldering and disconnecting **with the battery disconnected**. Before connecting the battery for the first time, check that there is no short circuit between the pads.
- Never power the receiver **without the antennas connected**. Transmitting telemetry without an antenna can damage the RF stage.
- Always **remove the propellers** before working on a drone with the battery connected. The motors may spin up unexpectedly, for example during binding or a failsafe test.
- Check that the model enters a safe state (failsafe) and the motors stop when the signal is lost – see Chapter 5.3.
- Protect the receiver from moisture, water, dust and mechanical damage. No conductive debris (carbon dust, metal shavings) may remain on the board.
- Do not make any modifications to the board that are not described by the manufacturer. Damage caused by such modifications is not a product defect.
- Observe the regulations for operating radio equipment and unmanned aircraft in the country where you operate the model (Chapter 3).

2. Product description

2.1 What the receiver is for

The **iFlight ELRS 100mW Dualband Diversity RX** is a radio control receiver for the **ExpressLRS** (ELRS) protocol. It passes commands from the radio to the flight controller (FC) and sends telemetry back. The receiver contains two Semtech LR1121 RF chips with two antennas (true diversity) and operates in the 2.4 GHz band as well as in the 868 MHz / 900 MHz sub-GHz band.

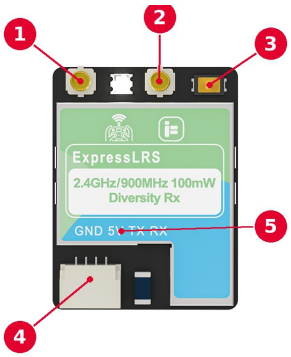
Besides single-antenna operation, the manufacturer states that the receiver supports the **True Diversity**, **Gemini** and **GemX** (Gemini Xrossband) antenna modes; in GemX one chip receives in the 868/900 MHz band while the other simultaneously receives in the 2.4 GHz band. GemX requires a transmitter module that supports this mode. The receiver has a shielded design.

2.2 Package contents

Qty	Item
1	iFlight ELRS 100mW Dualband Diversity RX receiver
2	Dual-band antenna (2.4 GHz / 868 / 900 MHz) with IPEX connector, length 160 mm

※ Not included: radio or ExpressLRS transmitter module. The manufacturer does not list an SH1.0 cable in the package contents.

2.3 Parts overview



Receiver – top view

① ② IPEX connectors for the two antennas.

③ Button on the board (binding, bootloader mode – Chapters 5.2 and 7.2).

④ SH1.0 connector for connection to the flight controller (FC).

⑤ Connector pin labels: **GND** – ground, **5V** – power, **TX** – data output to the FC, **RX** – telemetry input from the FC.

2.4 Technical data

Data provided by the manufacturer iFlight.

Parameter	Value
Protocol	ExpressLRS (ELRS)
Processor (MCU)	ESP32-PICO-D4
RF chip	2× Semtech LR1121
Frequency bands	2.4 GHz; 868 MHz; 900 MHz
Receiver type	GemX – GemX, Gemini and True Diversity modes
Telemetry power	100 mW (20 dBm)
LNA (low-noise amplifier)	2.4 GHz: yes; 868/900 MHz: no
TCXO	yes
Supply voltage	5 V
FC connector	SH1.0, pins GND / 5V / TX / RX
Antenna connectors	2× IPEX
Dimensions	24.3 × 18.5 × 6.5 mm (±0.5 mm)
Weight	4.9 g (±0.5 g)
Name in the Lua script	iF GemX 100mW RX

※ The receiver firmware version is not fixed – it varies by production batch. You can check the current version in the Lua script or in the ExpressLRS web interface (Chapter 6.2).

3. Legal conditions of use in the CZ and EU

3.1 The law of the country of use applies

Regulations (EU) 2019/947 and 2019/945 on unmanned aircraft and the rules on radio equipment apply in all EU member states, but national implementing rules differ from country to country – permitted frequency bands and maximum transmit power, registration portals, geographical zones and compulsory insurance. The information in this chapter describes the situation in the Czech Republic. **If you operate the receiver in another country, you must comply with the regulations of the country in which you use it.**

3.2 Frequency bands and transmit power

The receiver transmits telemetry back to the radio. The manufacturer states a maximum telemetry power of **100 mW (20 dBm)**. The band in which the receiver operates is determined by the **regulatory domain** selected in the ExpressLRS firmware. In the Czech Republic, short-range devices are covered by the CTU general authorisation **VO-R/10**:

Band	Power limit	Note
2400–2483.5 MHz	25 mW e.i.r.p.	duty cycle not limited
863–870 MHz	25 mW e.r.p.	in individual sub-bands, duty cycle limited or spectrum access techniques (e.g. LBT) required
869.4–869.65 MHz	500 mW e.r.p.	duty cycle 10 % or LBT
902–928 MHz (FCC)	—	**not permitted for this use in the Czech Republic**

- In Europe, use the **EU 868** regulatory domain for the sub-GHz band. The **FCC 915** domain is intended for the USA and must not be used in the Czech Republic.
- **The user is responsible** for setting the transmit power of the radio and of the receiver telemetry in line with local limits. Full text: VO-R/10 at ctu.gov.cz.

3.3 Use in a drone or model

The receiver is part of the control system of an unmanned aircraft. Drone operation is governed by Regulation (EU) 2019/947 – operator registration (always required if the drone carries a camera), pilot competency, max. height 120 m, flying within visual line of sight (with an observer when flying FPV) and no flying over assemblies of people. Information for the Czech Republic: www.caa.gov.cz.

4. Installation

4.1 Placing the receiver and antennas

- Connect the antennas to the IPEX connectors **before powering up for the first time**. Press the connector on straight and carefully, without levering – it is mechanically delicate.
- The manufacturer recommends mounting the antennas **as far as possible from conductive or magnetic parts** – carbon frame, metal and motors.
- Route the active antenna ends outside the frame, pointing **in different directions** (e.g. one vertical, one horizontal, or a V shape), so diversity can compensate when one antenna is shadowed.
- Secure the antennas away from the propellers; do not bend the coax sharply. Keep the receiver away from the ESC, VTX and power wires. Heat shrink or tape must not press on button ③.

4.2 Connecting to the flight controller (FC)

The receiver talks to the flight controller via the **CRSF** protocol over a serial line (UART). Connect it to any free full UART according to the FC wiring diagram:

Receiver	Flight controller (FC)
GND	GND (ground)
5V	5 V output (or 4.5 V from USB, if the FC has one)
TX	**RX** of the chosen UART (e.g. R2)
RX	**TX** of the same UART (e.g. T2)

- The signal pins are wired **crosswise**: receiver TX to FC RX and receiver RX to TX of the same UART.
- A UART labelled “SBUS” or “RX for receiver” often has an inverter or pull-down resistor on which an ESP receiver may not work (LED stays solid). Avoid it if possible.
- After soldering, remove flux and check for shorts. Apply heat shrink only after the test in Chapter 5.1.

4.3 Flight controller setup

Procedure for Betaflight Configurator (similar in other firmware):

① On the *Ports* tab, enable *Serial Rx* for the UART the receiver is connected to and save.

② On the *Receiver* tab, select *Receiver Mode: Serial (via UART)* and *Serial Receiver Provider: CRSF* and save.

③ After binding (Chapter 5.2), check channel response and order (*Channel Map*) on the *Receiver* tab and that failsafe activates when the radio is off.

5. Getting started

5.1 First power-up and status LED

Remove the propellers and connect the battery to the drone (USB power alone may not always supply the 5 V pad). Watch the receiver status LED. According to the ExpressLRS documentation it means:

LED	Receiver status
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
fast blink (25 ms)	Wi-Fi mode
medium blink (100 ms)	RF chip not detected
solid on	connected to the transmitter, or bootloader mode

If the LED does not light up at all, disconnect the power immediately and check the wiring. If the LED is solid without the radio switched on, the receiver is in bootloader mode – proceed according to Chapter 7.2.

5.2 Binding to the transmitter

The transmitter and receiver will only connect if their ExpressLRS firmware has the **same major version number** (the first number of the version). The transmitter module must support the band you want to fly on; for GemX mode it must have two LR1121 RF chips.

▶ Binding with a Binding Phrase (recommended)

Set **the same Binding Phrase** in the transmitter module and in the receiver – when flashing the firmware in ExpressLRS Configurator or in the receiver web interface (Chapter 6.2). The devices will then connect automatically after power-up.

▶ Binding with the Bind button

① Switch off the radio.

② Put the receiver into binding mode in one of these ways: connect and disconnect the power within 2 s three times in a row; or hold button ③ on the receiver for about 1.5 s; or press *Bind Receiver* on the *Receiver* tab in Betaflight Configurator.

③ Check that the LED double-blinks and pauses – the receiver is in binding mode.

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

⑤ As soon as the receiver LED is solid, binding is complete.

※ A receiver with older firmware and a flashed Binding Phrase may not enter binding mode. Binding information remains stored until the next binding.

5.3 Connection check

- When connected, the letter **C** (Connected) appears in the top right corner of the ExpressLRS Lua script.
- If the message *Model Mismatch* appears, the model ID in the radio and in the receiver do not match. Switch the *Model Match* option off and on again, or leave it off.
- With the **propellers removed**, check failsafe: after switching off the radio, the motors must stop and Arm (motor start) must not be possible.
- Before the first flight, do a range check on the ground and check telemetry (RSSI, LQ) on the radio.

6. Settings and firmware

6.1 Antenna modes: Gemini and GemX

- **Gemini** – the transmitter sends each packet simultaneously on two frequencies within one band (2.4 GHz or 868/900 MHz) and the receiver picks them up with both antennas. This improves interference resistance and link quality (LQ) stability, but not range. With a standard single-antenna module, the receiver works as a diversity receiver in one band.
- **GemX (Gemini Xrossband)** – the transmitter sends each packet simultaneously in the sub-GHz band and in the 2.4 GHz band; one receiver antenna works in the sub-GHz band, the other at 2.4 GHz. Requires a transmitter module with two LR1121 chips and an X mode (e.g. X150 or X100 Full Res).
- Setup: in the ExpressLRS Lua script, select *Antenna Mode: Gemini* **in both the transmitter and the receiver** (in X modes the option is locked).

6.2 Lua script and web interface

Configure the receiver (packet rate, telemetry power, antenna mode, Model Match) from the radio using the ExpressLRS Lua script (EdgeTX: *SYS* → *Tools* → *ExpressLRS*). The receiver appears there as **iF GemX 100mW RX**. The receiver has Wi-Fi: if it is not connected to a transmitter 60 s after power-up, it switches to Wi-Fi mode (fast-blinking LED). In the web interface you can change the Binding Phrase, configure outputs and upload firmware.

6.3 Firmware update

- Keep the receiver and transmitter module firmware on the **same major version**. The manufacturer recommends using the latest ExpressLRS firmware.
- Flash the firmware with **ExpressLRS Configurator** via Wi-Fi or through the flight controller (Betaflight passthrough) and select the regulatory domain valid for your country (Chapter 3.2). Do not disconnect the power while flashing.
- Verify the correct firmware target for this receiver in ExpressLRS Configurator under iFlight or with the manufacturer at shop.iflight.com. Firmware intended for a different receiver may render the device inoperable.

6.4 Further documentation

The official documentation for ExpressLRS and EdgeTX can be opened from the QR codes below: www.expresslrs.org, www.edgetx.org.

ExpressLRS documentation

www.expresslrs.org

EdgeTX documentation

www.edgetx.org

7. Maintenance and troubleshooting

7.1 Maintenance

- After a crash, check the antennas, their IPEX connectors and coaxial cables. Replace a damaged antenna – it reduces range and may endanger the RF stage.
- Check that the antennas have not moved towards the propellers or the carbon frame.
- Keep the receiver dry. Remove moisture and dirt with a dry brush; do not use water or solvents.
- Store in a dry place, away from direct sunlight and heat sources.

7.2 Troubleshooting

Problem	Cause and solution
LED does not light up	No power or a wiring fault – disconnect the power immediately and check the GND and 5V wires.
LED solid without radio	Bootloader mode: check that button ③ is not pressed (heat shrink, tape). Disconnect the RX/TX wires from the FC and power up again; if the LED then blinks slowly, move the receiver to another UART.
Cannot bind	Different major firmware version, different Binding Phrase, different regulatory domain or band of transmitter and receiver.
LED: triple blink	Model Match mismatch – see Chapter 5.3.
Connected, FC does not respond	Swapped TX/RX wires, wrongly configured UART (*Serial Rx*) or protocol (CRSF).
GemX does not work	The transmitter module does not support GemX, or X mode and *Antenna Mode: Gemini* are not selected.
Short range, dropouts	Damaged or shielded antenna, antenna close to carbon or motors, low power or unsuitable 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:** the type designation (iFlight ELRS 100mW Dualband Diversity RX) is given on the label on the receiver; in the ExpressLRS Lua script the receiver is listed as *iF GemX 100mW RX*.

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.