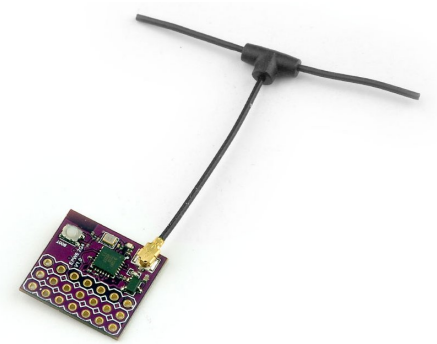
EPW6 TCXO

ExpressLRS 2.4 GHz receiver with 6 PWM outputs
Happymodel · user manual



Read this entire manual carefully before first use and keep it for future reference. Never power the receiver without an antenna connected.

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

Contents

1. Safety instructions

2. Product description

2.1 What the receiver is for

2.2 Package contents

2.3 Parts and pinout

2.4 Specifications

3. Radio frequencies and legal conditions of use

4. Installation in the model

4.1 What else you need

4.2 Antenna

4.3 Connecting servos, ESC and power

4.4 Placement in the model

5. Getting started

5.1 Binding to the transmitter

5.2 Wi-Fi mode and web interface

5.3 Channel mapping and output modes

5.4 Failsafe

5.5 CRSF serial output

6. Firmware and further guides

7. Maintenance and troubleshooting

8. Information for the EU and Czech Market

9. Warranty and rights arising from defective performance

1. Safety instructions

The receiver is an electronic component intended to be installed in a radio-controlled model. Incorrect wiring or configuration may lead to loss of control of the model and to injury or property damage. Please follow the instructions below.

- This product is not a toy and is not intended for children. Keep it out of the reach of children – it contains small parts that could be swallowed.
- Never power the receiver **without an antenna connected**. Transmitting telemetry without an antenna may damage the RF section.
- The supply voltage must match the specifications in Chapter 2.4. A higher voltage or reversed polarity will destroy the receiver.
- When working on the model on the bench, binding, configuring outputs and updating firmware, **always remove the propeller** or otherwise make sure the motor cannot start unexpectedly.
- Before every flight or run, check the function of all channels and the failsafe settings (Chapter 5.4).
- Operate the model only within signal range and in accordance with the regulations of the country of use (Chapter 3).
- Protect the receiver from moisture, water, dust, vibration and mechanical damage. Do not solder on the board while it is powered.
- Do not make any modifications to the product that are not described in this manual.

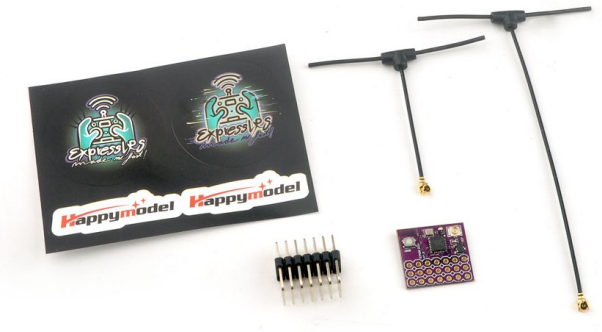
2. Product description

2.1 What the receiver is for

The Happymodel EPW6 TCXO is a receiver for the **ExpressLRS** (ELRS) radio 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 has **6 PWM outputs** to which servos and electronic speed controllers (ESC) are connected directly. It is therefore intended mainly for model airplanes, cars and boats **without a flight controller (FC)**.

The receiver can also be switched to a **CRSF** serial output (Chapter 5.5) so that it can later be used with a flight controller or a stabilizer. The **TCXO** version contains a temperature-compensated crystal oscillator which keeps the frequency stable even with larger temperature changes.

2.2 Package contents

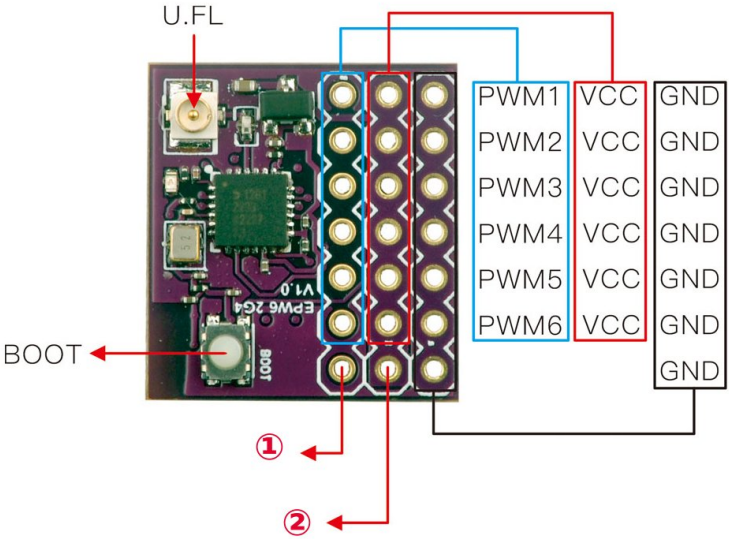


Package contents (manufacturer's illustrative photo)

- 1× Happymodel EPW6 TCXO 2.4 GHz receiver
- 2× 2.4 GHz antenna with IPEX MHF1 / U.FL connector (shorter and longer)
- 7-pin headers with 2.54 mm pitch (for soldering)

The package does **not** include a radio transmitter or an ExpressLRS transmitter module, servos, an ESC, a battery or connecting cables.

2.3 Parts and pinout



Receiver pinout (manufacturer's diagram)

Marking	Meaning
U.FL	antenna connector (IPEX MHF1 / U.FL)
BOOT	button – binding and enabling Wi-Fi mode (Chapter 5), bootloader mode for updates
PWM1–PWM6	signal outputs 1–6 for servos and ESCs (left column of pins)
VCC	positive supply for servos (middle column of pins)
GND	negative / ground (right column of pins)
①	voltage measurement input (Voltage sense), max. 34 V
②	receiver power input (Input DC)

Each PWM – VCC – GND row of pins matches the layout of a standard three-pin servo connector (signal – plus – minus).

2.4 Specifications

Manufacturer	Happymodel
Model	EPW6 TCXO 2.4 GHz (board marking EPW6 2G4)
RC system	ExpressLRS 2.4 GHz
Frequency range	2400–2480 MHz
Telemetry power	12 dBm
MCU / RF chip	ESP8285 / SX1280 (SX1281)
Outputs	6× PWM, or serial CRSF
Supply voltage	5–8.4 V
Voltage measurement	max. 34 V
Antenna connector	IPEX MHF1 / U.FL
Board dimensions	19 × 17.5 mm
Weight	1.49 g
Firmware update	via Wi-Fi
Use	model airplanes, cars and boats, FPV drone builds

※ The manufacturer's wiring diagram states a range of 4–9 V for the power input, while the specifications state 5–8.4 V. Observe the **narrower range of 5–8.4 V**.

3. Radio frequencies and legal conditions of use

3.1 The law of the country of use applies

The receiver is a radio device. European Union regulations apply in all member states, but national implementing regulations differ from country to country – permitted frequency bands, maximum transmit power and 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 country in which you operate it.**

If you use the receiver in a drone or airplane, also follow the rules for operating unmanned aircraft (Regulation (EU) 2019/947 and national regulations). The operator of the model is responsible for its lawful operation.

3.2 Frequency band and transmit power

The receiver receives the control signal and transmits telemetry back to the radio. It operates in the 2.4 GHz band:

Band in the CZ	Limit in the CZ	Product
2400–2483.5 MHz	25 mW e.i.r.p. (VO-R/10)	2400–2480 MHz, telemetry 12 dBm

- In the Czech Republic, the 2.4 GHz band for short-range devices is used under a general authorisation of the Czech Telecommunication Office, without an individual licence.
- You set the power of the radio (transmitter module) yourself. **The user is responsible for complying with transmit power limits.** Outside the Czech Republic, the limits of the respective country apply.
- The declaration of conformity stating the maximum transmitted power under Directive 2014/53/EU (RED) is available from the importer (Chapter 8).

4. Installation in the model

4.1 What else you need

- a radio or transmitter module with **ExpressLRS 2.4 GHz** (e.g. a radio running EdgeTX firmware),
- servos and an electronic speed controller (ESC) with servo connectors, or a flight controller (FC) when using the CRSF output,
- a 5–8.4 V power source – typically the ESC's BEC or a separate BEC,
- a soldering iron for soldering the pin headers or wires,
- a phone, tablet or computer with Wi-Fi for configuring the receiver (Chapter 5.2).

4.2 Antenna

- Connect the antenna to the U.FL connector **before powering up for the first time**. Snap the connector on straight, without levering – it is mechanically delicate.
- Choose the shorter or longer antenna according to the space in the model. Route the active part of the antenna (the T-shaped end) as far as possible from carbon parts, metal, motors and high-current wires.
- Do not bend the antenna sharply at the connector and secure the cable against being pulled out.

4.3 Connecting servos, ESC and power

- To connect servo plugs, solder the pin headers from the package into the holes in the board. Alternatively, wires can be soldered directly.
- Connect the servos and the ESC to rows PWM1–PWM6 in the correct orientation: signal – PWM, plus – VCC, minus – GND (figure in Chapter 2.3).
- Supply power to the receiver via power input ② and GND. The voltage must be within 5–8.4 V.
- If you want to monitor a voltage (e.g. of the flight battery) in the radio's telemetry, connect the measured voltage to input ① (max. 34 V) and the common ground to GND.
- Before connecting the battery, check the polarity of all connections. Have the propeller removed when powering up for the first time.

4.4 Placement in the model

Mount the receiver so that it cannot move freely, protect it against vibration and moisture (e.g. with heat-shrink tubing) and keep the BOOT button and LED accessible. Do not place it right next to the ESC, motor or video transmitter.

5. Getting started

The procedures in this chapter are based on the official documentation of the ExpressLRS system (www.expresslrs.org). Function names and the location of options may differ depending on the firmware version.

5.1 Binding to the transmitter

The receiver and the transmitter module must run a **compatible ExpressLRS firmware version**. They can be bound in two ways:

▶ Using a matching binding phrase

Set the **same** binding phrase on the transmitter module and on the receiver – when flashing firmware in ExpressLRS Configurator or in the receiver's web interface (Chapter 5.2). A unique phrase with at least 8 letters and digits is recommended. After power-up, the devices connect automatically.

▶ Manual binding

① Switch off the radio.

② Put the receiver into bind mode: power it on and off three times in a row (each time within approx. 2 seconds). With newer firmware versions, holding the **BOOT** button for about 1.5 seconds is sufficient.

③ The receiver LED blinks twice quickly and repeats – the receiver is in bind mode.

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

⑤ Once bound, the receiver LED is lit solid.

※ If a binding phrase is set on the receiver, it will not enter manual bind mode.

LED status	Meaning
blinking	powered, no connection to the transmitter
double blink, repeating	bind mode
solid	connected to the transmitter
three fast blinks and a pause	model number mismatch (Model Match)
fast blinking	Wi-Fi mode

5.2 Wi-Fi mode and web interface

Outputs, failsafe, the binding phrase and firmware are configured in the receiver's web interface. Enable Wi-Fi mode in one of these ways:

- power up the receiver and leave it for about 60 seconds without a connection to the transmitter,
- hold the **BOOT** button for about 5 seconds,
- select *Enable Rx WiFi* in the ExpressLRS (Lua) script on the radio.

Connect your phone or computer to the **ExpressLRS RX** network with the password **expresslrs** and open **http://10.0.0.1/** in the browser. Because of the receiver's small antenna, stay close to it. The address 10.0.0.1 may clash with your home router – disconnecting from your home network helps.

5.3 Channel mapping and output modes

- Default: channel 1 → PWM1, channel 2 → PWM2 … channel 6 → PWM6.
- In the web interface, any channel can be mapped to any output, and one channel to several outputs.
- Channel 5 (AUX1) carries only two states (on/off). Use a different channel for proportional control.
- For more full-resolution channels (recommended for a receiver with 6 outputs), select a full-resolution switch mode (Full Resolution) in the transmitter module.

Supported output modes according to the ExpressLRS documentation:

Mode	Parameters
PWM – frequency	50, 60, 100, 160, 333 or 400 Hz
pulse width	normal 988–2012 µs (centre 1500 µs), extended 885–2115 µs, half 494–1006 µs (centre 750 µs)
10 kHz	duty cycle 0–100 % (e.g. switching a brushed motor transistor)
on / off	binary output (high / low level)

5.4 Failsafe

- Failsafe is activated when the link quality (LQ) drops to 0 or when the receiver receives no valid packet for 1 second – whichever comes first.
- The default failsafe value is 1500 µs on all outputs except output 3, which has 988 µs (throttle).
- Failsafe values can be set for each output in the web interface within 988–2012 µs.
- Until the transmitter connects, the receiver generates no pulses on its outputs. This allows the usual ESC throttle range calibration procedure.
- **Always test** the failsafe function by switching off the radio – with the propeller removed.

※ If you use an output other than PWM3 for throttle, set a failsafe value on it that stops the motor.

5.5 CRSF serial output

To connect a flight controller, some of the outputs can be switched to the CRSF serial protocol. Procedure according to the manufacturer:

① Enable Wi-Fi mode on the receiver (Chapter 5.2).

② Open the page **http://10.0.0.1/hardware.html**.

③ In the *PWM output pins* field, remove pins **1** and **3**.

④ In the *CRSF Serial Pins* fields, enter *RX pin* = **3** and *TX pin* = **1** and save the settings.

According to the ExpressLRS documentation, the pins that can be switched to serial output are usually in the rows of channels 2 and 3; in newer firmware versions this can also be done directly in the output settings of the web interface. CRSF output can also be obtained by flashing the serial receiver firmware (Chapter 6.1).

❊ The hardware.html page is intended for advanced users. Incorrect pin settings may disable the receiver until you configure it again or flash the firmware.

6. Firmware and further guides

6.1 Firmware targets

Firmware is flashed with **ExpressLRS Configurator**. The manufacturer specifies the following targets:

Target	Output
Generic ESP8285 6xPWM 2.4Ghz RX	6× PWM (outputs 1–6)
HappyModel_EP_2400_RX	serial CRSF (TX and RX pins)

The current ExpressLRS target list also includes the target **HappyModel EPW6 2.4GHz PWM RX** for this receiver. The receiver firmware must be compatible with the transmitter module firmware.

6.2 Firmware update via Wi-Fi

① In ExpressLRS Configurator, select the target, set the binding phrase and build the firmware file (.bin).

② Enable Wi-Fi mode on the receiver and connect to the **ExpressLRS RX** network (Chapter 5.2).

③ At **http://10.0.0.1/**, select the firmware file with the *Choose File* button and click *Update*.

④ Wait for it to finish. Do not disconnect power until the LED starts blinking again.

6.3 ExpressLRS and EdgeTX documentation

Detailed information about the ExpressLRS system and about setting up your radio can be found in the official documentation at www.expresslrs.org and www.edgetx.org.

7. Maintenance and troubleshooting

- Regularly check the antenna, the U.FL connector, the solder joints and the servo connectors.
- Replace a damaged antenna with a 2.4 GHz antenna with the same connector.
- Store the receiver in a dry place, unpowered and out of the reach of children.

Problem	Possible cause and solution
receiver does not bind	incompatible receiver and module firmware versions – make them match; a binding phrase is set on the receiver – use the same phrase; the radio was switched on while entering bind mode
LED: three fast blinks	model number mismatch (Model Match) – adjust the settings in the radio
servos do not respond	transmitter not connected (without a connection the receiver generates no pulses); connector plugged in the wrong way; wrong channel mapping (Chapter 5.3); no servo power
short range	antenna not connected or damaged; antenna routed near carbon or metal; low transmitter module power
cannot open 10.0.0.1	receiver not in Wi-Fi mode; device connected to another network – disconnect from your home Wi-Fi
CRSF not working	check the pin settings (Chapter 5.5) and the TX/RX wiring to the flight controller (receiver TX to FC RX and vice versa)

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 (EPW6 2G4) is printed on the printed circuit board of the receiver.

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.