



Defender 20 Lite X

2S FPV drone with DJI O4 Wide video transmission
User manual — ExpressLRS 2.4 GHz version



Before your first flight, read the safety instructions in chapter 1 and the operator obligations in chapter 7.

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1. Safety Instructions

The Defender 20 Lite X is an electrically powered unmanned aircraft with sharp propellers and a camera. It is not a toy. Before your first flight, read this manual in full and familiarise yourself with the rules for operating drones in the country where you will be flying (chapter 7).

1.1 Before Your First Flight

- Check that the product has not been damaged in transport — frame, prop guards, propellers, wiring and connectors.
- Charge the drone battery as well as the goggles and remote controller batteries. Always fit a **fully charged** battery to the drone.
- Update the firmware of the air unit and the goggles (chapter 4.1) and bind the drone to the remote controller and the goggles.
- Practise your first flights in open space free of people, animals, vehicles and obstacles.

1.2 General Rules

- Never fly over people, animals or assemblies of people.
- Do not fly under the influence of alcohol, medication or any other substance that reduces attention.
- Do not fly in rain, snow, fog or strong wind. The product is not water resistant.
- Do not touch the motors and propellers immediately after a flight — the motors may be hot.
- Do not connect or disconnect the battery while the motors are running.
- Whenever you handle the drone outside flight, keep it in *Disarm* (motors off).
- Never leave the drone unattended with the battery connected.

❖ The remote pilot is always responsible for the safety of the flight and for compliance with the applicable law.

1.3 Propellers and Prop Guards

The propellers spin at high speed and can cause cuts. The prop guards (ducts) reduce this risk but do not remove it.

- Before every flight, check that the propellers are correctly fitted, tightened and free of cracked or broken blades. Always replace a damaged propeller, never repair it; use the supplied prop removal tool.
- The propellers must be fitted in the correct direction of rotation. If they are swapped, the drone will not take off after *Arm* or will flip over.
- The prop guards can be removed with four screws. Without the guards, fly only in open space and be aware that the propellers are exposed.

2. Product Description

The Defender 20 Lite X is a two-inch cinewhoop with prop guards, a two-cell power system and DJI O4 Wide digital video transmission. It is supplied as a BNF (Bind and Fly) — the drone is assembled and set up; the remote controller, goggles, battery and charger have to be purchased separately.



Defender 20 Lite X — top view

2.1 In the Box

- 1× Defender 20 Lite X O4 HD (BNF)
- 1× propeller removal tool
- 1× Defender carrying case

2.2 What Else You Will Need

- **Goggles:** DJI Goggles 3, DJI Goggles N3, DJI Goggles 2 or DJI Goggles Integra.
- **A remote controller** with an ExpressLRS 2.4 GHz RF module (the version described in this manual has an onboard ExpressLRS 2.4 GHz receiver).
- **A battery** — 2S Li-Po or LiHV — and a matching charger (see chapter 3).

2.3 Specifications

Wheelbase	87 mm
Dimensions (L×W×H)	137 × 125 × 47 mm
Weight without battery	75 ±3 g

Take-off weight	approx. 110 ±3 g (with a 520 mAh battery)
Electronics	Borg F7 AIO (flight controller, ESCs and receiver on a single board)
Electronic speed controllers (ESC)	4-in-1, 18 A continuous, bidirectional DShot
Motors	Defender 16 1103, 14000 KV
Propellers	Defender 20 Lite 2020-3
Power	2S Li-Po / LiHV
Video transmission	DJI O4 Wide Air Unit
Antennas	single video transmission antenna
Maximum speed	75 km/h (Manual mode)
Maximum hover time	approx. 6 min (2S 520 mAh battery)
Maximum take-off altitude	2000 m AMSL
Operating temperature	–10 °C to 40 °C
Satellite navigation	none

2.4 Camera and Video Transmission

Image sensor	1/2" CMOS
Lens	FOV 159°, format equivalent 16 mm, aperture f/2.8, focus 1 m to ∞
ISO range	100–6400 (auto), 100–12800 (manual)
Video resolution	4K 3840 × 2880 (4:3) at 30/50/60 fps 4K 3840 × 2160 (16:9) at 30/50/60 fps 1080p at 30/50/60/100/120 fps
Video format	MP4
Stabilisation	RockSteady 3.0+, can be switched off (Gyroflow supported)
Built-in storage	23 GB, no memory card slot
Live view quality	1080p at 30/48/50/60/100 fps
Lowest latency	from 20 ms (DJI Goggles 3, Racing mode)
Video transmission range	up to 6 km under CE

❖ **The video transmission range above was measured by the manufacturer in open space free of interference. The real range is always shorter, and in the open category it is limited anyway by the obligation to keep the drone in visual line of sight.**

3. Battery

3.1 Choosing a Battery

The drone is designed for **two-cell** Li-Po or LiHV batteries. The manufacturer states a take-off weight of approximately 110 g with a 520 mAh battery; the stated hover time of approximately 6 minutes refers to the same battery.

✱ **Never connect a battery with more cells than the drone is designed for. Doing so destroys the electronics and the air unit, and such damage is not a product defect.**

Key voltages of a two-cell battery:

State	Li-Po (2S)	LiHV (2S)
Fully charged	8.4 V (4.20 V/cell)	8.7 V (4.35 V/cell)
End the flight	7.0 V (3.5 V/cell)	7.0 V (3.5 V/cell)
Storage	7.6 V (3.8 V/cell)	7.6 V (3.8 V/cell)

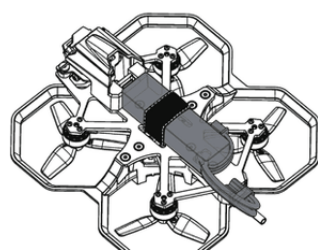
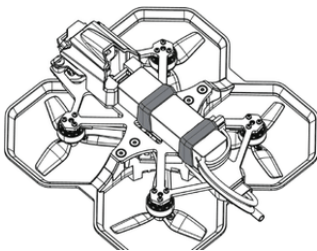
3.2 Charging

Charge the battery with a charger intended for Li-Po and LiHV cells, set to the correct chemistry and cell count. Choose the charging current according to the marking on the battery; if the battery manufacturer does not state one, charge at a current equal to one battery capacity per hour (1 C). A lower current is good for the battery, a higher one shortens its life.

- Charge under supervision, on a non-flammable surface and in a safety bag.
- Do not charge the battery straight after a flight — let it cool down first.
- Never charge a swollen, mechanically damaged or deeply chilled battery.

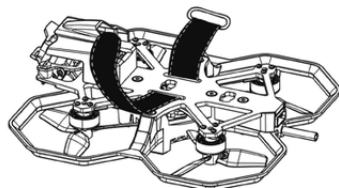
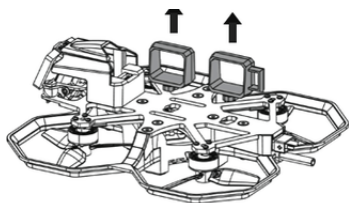
3.3 Installing the Battery

The drone offers two ways of securing the battery: a printed mount for original iFlight batteries and a strap for batteries of other sizes.



Left: the printed battery mount. Right: the battery strap.

- ① Rotate the battery mount 90° and pull it upward to remove it.
- ② Replace the battery strap or thread a new one through.



Removing the mount and replacing the battery strap

*** The battery must be secured firmly. A loose battery shifts in flight, changes the centre of gravity and may disconnect.**

3.4 Handling Li-Po Batteries

- Store batteries at storage voltage, in a dry place at room temperature.
- Never discharge a battery below the stated end-of-flight voltage; it would permanently lose capacity.
- Do not expose the battery to temperatures above 60 °C, to direct sun in a closed vehicle, or to fire.
- Stop using a damaged or swollen battery and hand it over at a take-back point (chapter 8.3).
- For transport, disconnect the battery from the drone and secure the battery connector against short circuit.

4. Getting Started

4.1 Activating the Air Unit

Power on the drone and the DJI goggles separately. Connect each device to a computer using the USB-C port and run *DJI Assistant 2 (Consumer Drones Series)* for activation and firmware upgrade. Please refer to the DJI O4 Air Unit user manual for details.

❖ **Before binding, both the air unit and the goggles must be updated to the latest firmware. Mismatched versions are the most common reason why binding fails.**

4.2 Binding the Drone and Remote Controller

ExpressLRS offers two binding procedures: a *binding phrase* and the traditional *bind* mode. The procedure below is described on an iFlight ExpressLRS transmitter; on other transmitters only the menu item names differ.

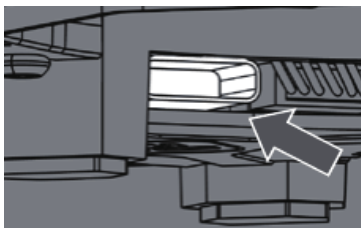
► 4.2.1 Binding with a Binding Phrase

When flashing the firmware of the receiver and of the RF module, set the same *binding phrase* in the ExpressLRS configurator — a shared pass phrase by which the two devices recognise each other. They will then bind automatically and the traditional procedure is not needed.

❖ **The *binding phrase* must be unique. With a simple phrase, another pilot's drone within signal range may bind to your transmitter.**

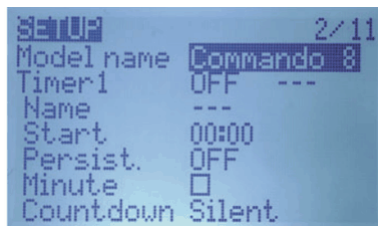
► 4.2.2 Traditional Binding

Put the receiver into binding mode first, and only then the remote controller.



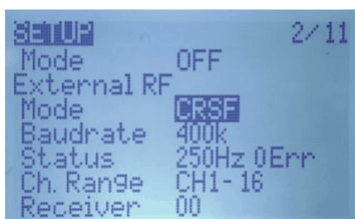
USB port used to power the receiver

- ① Power the drone on and off three times, or with the battery disconnected plug and unplug the USB cable three times. The blue LED on the receiver will start to double flash continuously — the receiver is in binding mode.
- ② On the powered-on remote controller, long press *Model setup* to enter the *MODELSEL* page.
- ③ Press *Next Page* to enter the *SETUP* page.



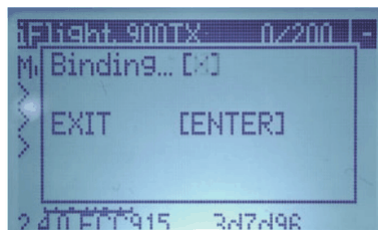
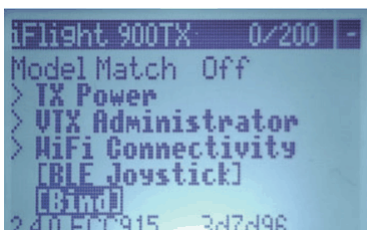
① The MODELSEL page ② The SETUP page

- ④ Under *External RF*, select the *CRSF* protocol.
- ⑤ Long press *System Settings* to enter the *TOOLS* menu, move the cursor to *ExpressLRS* and long press *Enter* to open it.



④ Selecting the *CRSF* protocol ⑤ The *TOOLS* menu

- ⑥ Move the cursor to *Bind* and press *Enter*.
- ⑦ After binding, the blue LED on the receiver stops flashing and turns solid.



⑥ Starting the bind ⑦ Bind was successful

*** Binding is quick — put the receiver into binding mode first. After binding, re-power both devices. Keep the receiver and the remote controller more than 1 m apart during the process. The firmware versions of the receiver and of the RF module must match.**

4.3 Binding the Drone and Goggles

- ① Power on the drone and the goggles.
- ② Press the bind button on the air unit. The binding status indicator starts to blink red.
- ③ Press the bind button on the goggles. The goggles start to beep continually.

- ④ Keep the air unit and the goggles within 0.5 m of each other. Once binding is successful, the status indicator turns solid green, the beeping stops and the image appears in the goggles.



The bind button on the air unit

4.4 Mode Switches

The factory settings of the drone are:

Function	Channel	Meaning
ARM	AUX1	Arms and disarms the motors. Low position = <i>Disarm</i> , high position = <i>Arm</i> .
ANGLE	AUX2	Self-levelling flight mode. It is on throughout the flight from the factory.

✳ **Keep the ANGLE mode on until you are familiar with the controls. Once it is switched off, the drone no longer levels itself and behaves like an acrobatic aircraft.**

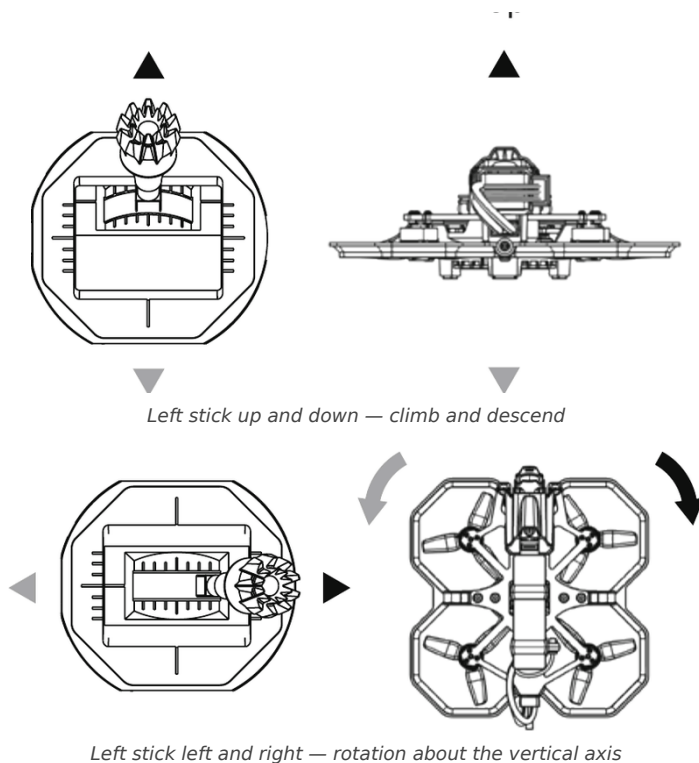
5. Flying and Controls

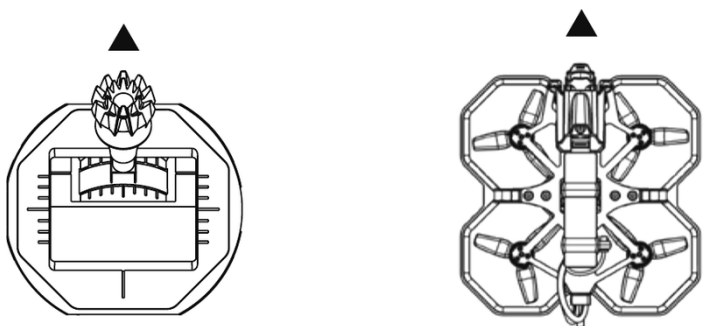
5.1 Pre-Flight Check

- The goggles, remote controller and drone batteries are **fully charged**.
- The propellers are correctly and firmly fitted, with no cracks.
- The drone battery is secured and connected, and the goggles battery is properly connected.
- Nothing obstructs the motors and they spin up smoothly after *Arm*.
- The goggles work and display the image from the camera.
- The goggles antennas are firmly fitted and the remote controller antenna is unfolded.
- You have checked the airspace and met the obligations in chapter 7.

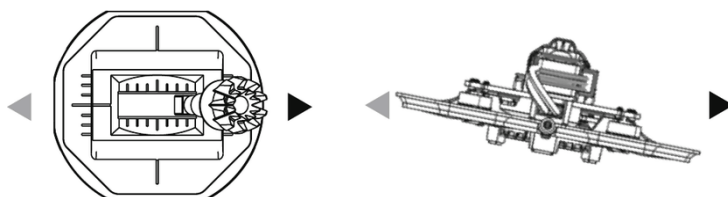
5.2 Controls

The controls follow *Mode 2*: throttle and yaw on the left stick, pitch and roll on the right one.





Right stick up and down — flying forward and backward



Right stick left and right — flying sideways

✳ **Move the sticks smoothly. Slamming a stick to its end stop leads to loss of control, especially with ANGLE mode off.**

5.3 After the Flight

- Disarm first, and only then pick the drone up.
- Disconnect the drone battery before you switch off the remote controller and the goggles.
- Let the battery cool down and store it at storage voltage.
- Check the propellers, prop guards and the camera mount.

6. Maintenance and Troubleshooting

6.1 Maintenance

- After flying in dust or grass, blow the drone out with compressed air. Do not use water or solvents.
- Check that the motor and prop guard screws are tight; check more often after hard landings.
- Watch the condition of the camera module dampers — hardened or torn dampers cause a shaking image.
- Clean the camera lens with a soft optical cloth.
- Always replace damaged propellers as a complete set, otherwise vibrations occur.

6.2 Troubleshooting

Symptom	What to check
The drone will not bind to the remote controller	Matching firmware versions of the receiver and the RF module, a unique <i>binding phrase</i> , the order of binding (receiver first), a distance of more than 1 m. Re-powering both devices usually helps.
No image in the goggles	Activation and firmware of the air unit and the goggles, the bind, the antennas, the charge of the goggles battery.
The drone flips over after <i>Arm</i>	The direction of rotation and the position of the propellers.
The motors cannot be armed	The position of the ARM switch, the battery voltage, the drone standing level, and the warnings shown in the goggles.
The image shakes (jello)	Propeller balance and integrity, the condition of the camera dampers, screw tightness.
Short flight time	Battery capacity and age, its temperature before take-off, motor cleanliness.

7. Drone Operation and Radio Regulations

7.1 Which Rules Apply Where

Regulations (EU) 2019/947 and 2019/945 apply in all member states of the European Union, but national implementing rules differ from country to country — registration portals, the minimum pilot age, geographical zones, compulsory insurance, permitted frequency bands and maximum transmitter power. The information in this chapter describes the situation in the Czech Republic. If you operate the drone in another country, you must follow the rules of the state in which you fly.

7.2 Registration and Pilot Competency

- The drone carries a camera, and therefore **registration of the operator is mandatory** regardless of the take-off weight being below 250 g (Section 54a of Act No. 49/1997 Coll., Article 14 of Regulation (EU) 2019/947).
- Registration is free of charge and is done online on the portal of the Czech Civil Aviation Authority, dron.caa.cz. Mark the drone with the operator registration number you are assigned.
- The remote pilot must hold the corresponding competency — for the open category, the A1/A3 online training and test on the same portal.
- Liability insurance is not mandatory for a drone of this weight, but we strongly recommend it.

7.3 Operating Subcategories and Limits

The product does not carry a class label under Regulation (EU) 2019/945 and was placed on the market after 1 January 2024. Subcategory A2 is therefore not available for it.

❖ **Subcategory A1 for privately built unmanned aircraft requires a take-off weight below 250 g and at the same time a flight speed below 19 m/s (UAS.OPEN.020(5)). The manufacturer states a maximum speed of 75 km/h for this model, i.e. approximately 20.8 m/s. Consider operating in subcategory A3, or within a model aircraft club under Article 16 of Regulation (EU) 2019/947. If in doubt, ask your national aviation authority for an opinion.**

The following always applies in the open category:

- a maximum height of 120 m above the closest point of the surface of the earth,
- the drone in visual line of sight at all times; **when flying with FPV goggles, an unmanned aircraft observer** must stand next to the pilot and keep the drone in sight without optical aids,
- no flying over assemblies of people or over people not involved in the operation,

- in subcategory A3, an additional distance of at least 150 m from residential, commercial, industrial and recreational areas,
- respecting the geographical zones for unmanned aircraft systems (map at dronemap.gov.cz).

Verify the real take-off weight by weighing — including the battery, the prop guards and any additional equipment.

7.4 Radio Bands and Transmitter Power

Transmitter	Frequency band	Transmitter power
Video transmission	5170–5250 MHz	< 23 dBm e.i.r.p. (CE)
DJI O4 Wide	5725–5850 MHz	< 14 dBm e.i.r.p. (CE)
Receiver ExpressLRS	2400–2483.5 MHz	transmits telemetry only; for the iFlight ELRS 2.4GHz Nano RX 12.3 dBm (17 mW)

- In the Czech Republic, the conditions for using these bands are laid down by the general authorisations of the Czech Telecommunication Office — VO-R/10 for short range devices and VO-R/12 for broadband data transmission.
- In the **5150–5170 MHz segment, stations used by unmanned aircraft systems must not be operated** (VO-R/12). The air unit does not use this segment.
- The user is responsible for the choice of channel, for setting the transmitter power and for complying with the limits that apply at the place of flight.

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@rotorاما.cz
Phone	+420 252 252 098
Website	www.rotorاما.cz

8.2 Product conformity



- 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@rotorاما.cz.
- **Product identification:** the type designation (Defender 20 Lite X) and the serial number are given on the label on the product packaging and on the proof of purchase.

8.3 Disposal of electrical equipment and batteries



- 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. Any warranty terms of the manufacturer **do not in any way limit** the buyer's rights arising from these regulations.

- 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.