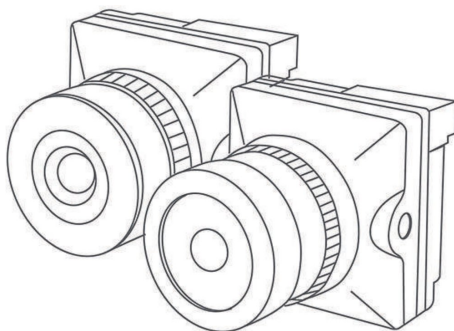




# Ratel 2

Caddx analog FPV camera  
User manual



**Read this manual carefully before installation and first power-up, and keep it for future reference.**

*[www.rotorama.com](http://www.rotorama.com)*

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# 1. Safety instructions

The Ratel 2 camera is an electronic component intended for installation in an FPV drone or another model. Installation and wiring should be carried out by a user experienced in soldering and wiring FPV electronics.

- Power the camera only with DC voltage in the range **DC 4.5–26 V**. Higher voltage or reversed polarity will permanently damage the camera.
- Check polarity and wire colours according to Chapter 3 before connecting. Do not connect or disconnect the camera while the model is powered.
- Always disconnect the model's battery when soldering or modifying the wiring.
- Protect the camera from water, moisture, dust and conductive dirt. The product is not waterproof.
- Do not touch the camera electronics or the OSD control board with bare hands without first discharging static electricity.
- Do not use the camera if it is mechanically damaged or has damaged wires or connectors.
- Do not point the lens directly at the sun or another strong light source for extended periods.
- This product is not a toy. Keep it out of reach of children – small parts (screws, connectors) may be swallowed.

## ► Using the camera on a drone

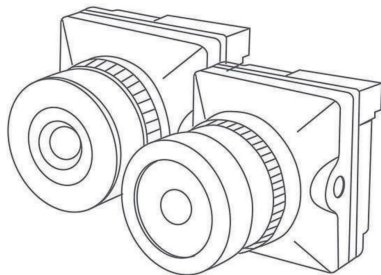
A drone equipped with a camera carries a sensor capable of capturing personal data. Under Regulation (EU) 2019/947, the operator of such a drone must therefore generally register, even for drones weighing less than 250 g. Respect the privacy of others when flying.

**\* The law of the country in which you operate the product always prevails. The information in this manual describes the situation in the Czech Republic; in another country, follow its regulations.**

## 2. Product description

### 2.1 Introduction

The Caddx Ratel 2 is an analog FPV camera in Micro format (19 × 19 mm) with a 1/1.8" sensor, 1200 TVL horizontal resolution and Super WDR. The TV system (PAL/NTSC) and the image aspect ratio (4:3/16:9) are switchable. Image settings are made in the OSD menu using a separate control board.



*Ratel 2 camera*

### 2.2 Package contents

- 1× Ratel 2 camera
- 1× OSD menu control board (joystick)
- 1× connection cable
- 1× screw set

A battery, video transmitter (VTX), flight controller (FC), FPV goggles and camera mount are **not** included.

### 2.3 Dimensions and mounting

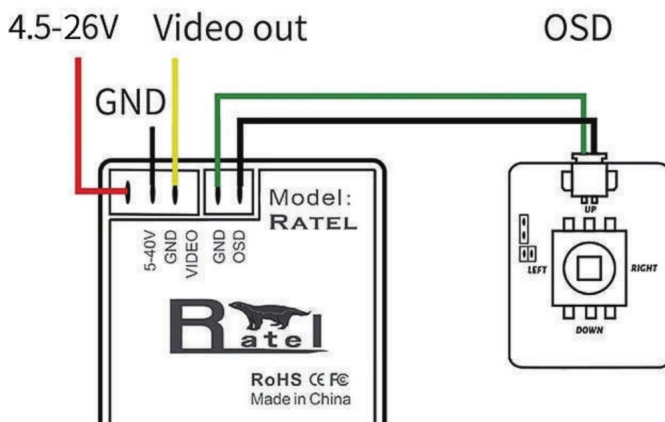


*Camera dimensions and side mounting hole for an M2 screw*

- The camera body measures 19 × 19 mm and is mounted in the frame or camera mount with two **M2** side screws.
- Tighten the screws with care and choose their length according to the thickness of the frame side plates. Set the camera tilt angle before tightening the screws.

## 3. Connection

### 3.1 Wiring diagram



Connection of the camera (left) and the OSD menu control board (right)

| Wire colour | Signal    | Connect to                                                                           |
|-------------|-----------|--------------------------------------------------------------------------------------|
| red         | 4.5-26 V  | positive power supply (e.g. power output of the flight controller or VTX)            |
| black       | GND       | ground (negative power supply)                                                       |
| yellow      | Video out | video input of the flight controller (FC) with OSD or of the video transmitter (VTX) |
| green       | OSD       | OSD menu control board                                                               |
| black       | GND       | ground of the OSD menu control board                                                 |

❖ **The board printing in the manufacturer's diagram shows "5-40V" at the power pin. The binding value is the manufacturer's specification: DC 4.5-26 V.**

### 3.2 Connection procedure

- ① Disconnect the model's battery.
- ② Connect the cable to the power and video connector on the back of the camera.
- ③ Connect the red wire to a 4.5-26 V supply, the black wire to ground (GND) and the yellow wire to the video input of the FC or VTX.
- ④ To use the OSD menu, connect the control board to the second connector (GND and OSD signals).
- ⑤ Before connecting the battery for the first time, check the polarity and for possible short circuits again.

## 4. Camera OSD menu

### 4.1 Entering the menu and controls

The camera has its own OSD menu, which is displayed directly in the camera image (in the goggles or on a monitor). It is operated with a separate control board connected to the OSD connector.

- **Short press** the menu board to enter the OSD settings.
- The joystick directions are marked *UP*, *DOWN*, *LEFT* and *RIGHT* on the board. Items marked with the ↵ symbol open a submenu.
- Leave a submenu with the *RETURN* item.
- When you have finished, select *SAVE EXIT*. The control board is only used for setup and does not need to be connected during flight.

✱ **The values in the “Shown” column are those displayed in the manufacturer's original manual. The factory settings of your unit may differ.**

### 4.2 Main menu

| Item (MAIN MENU) | Function                                                          |
|------------------|-------------------------------------------------------------------|
| AE ↵             | exposure and image brightness (Ch. 4.3)                           |
| WB ↵             | white balance (Ch. 4.4)                                           |
| DAY&NIGHT ↵      | day / night mode (Ch. 4.5)                                        |
| IMAGE ENHANCE ↵  | contrast, sharpness, colour saturation, noise reduction (Ch. 4.6) |
| VIDEO SETTING ↵  | TV system, output, aspect ratio, D-WDR (Ch. 4.7)                  |
| LANGUAGE         | OSD menu language (Ch. 4.8)                                       |
| RESET            | restore factory settings                                          |
| SAVE EXIT        | save settings and exit the menu                                   |
| EXIT             | exit the menu                                                     |

### 4.3 AE - exposure

| Item          | Range / options | Shown | Meaning                      |
|---------------|-----------------|-------|------------------------------|
| BRIGHTNESS    | 0-30            | 12    | image brightness             |
| EXPOSURE MODE | GLOBE / BLC     | GLOBE | exposure metering mode       |
| BLC           | 1-8             | -     | backlight compensation level |
| ADVANCED      | submenu         | -     | advanced exposure settings   |

| Item   | Range / options | Shown | Meaning               |
|--------|-----------------|-------|-----------------------|
| RETURN | -               | -     | back to the main menu |

**GLOBE** meters exposure over the whole image. **BLC** (Back Light Compensation) brightens foreground objects in strong backlight; the compensation level can be set in the range 1-8.

## 4.4 WB - white balance

| Item   | Range / options | Shown | Meaning                          |
|--------|-----------------|-------|----------------------------------|
| MODE   | ATW / MWB       | ATW   | automatic / manual white balance |
| RGAIN  | 0-32            | -     | red gain                         |
| BGAIN  | 0-32            | -     | blue gain                        |
| RETURN | -               | -     | back to the main menu            |

**ATW** (Auto Tracking White balance) continuously adapts the white balance to the lighting conditions. In **MWB** mode (manual white balance) you set the colour rendering manually using RGAIN and BGAIN.

## 4.5 DAY&NIGHT

| Item   | Range / options         | Shown | Meaning               |
|--------|-------------------------|-------|-----------------------|
| MODE   | BW / AUTO / COLOR / EXT | EXT   | colour mode           |
| RETURN | -                       | -     | back to the main menu |

**BW** – permanently black and white image, **COLOR** – permanently colour image, **AUTO** – automatic switching according to lighting, **EXT** – switching by an external signal.

## 4.6 IMAGE ENHANCE

| Item       | Range / options | Shown | Meaning               |
|------------|-----------------|-------|-----------------------|
| CONTRAST   | MANUAL / AUTO   | AUTO  | contrast              |
| SHARPNESS  | MANUAL / AUTO   | AUTO  | sharpness             |
| COLOR GAIN | MANUAL / AUTO   | AUTO  | colour saturation     |
| 3DNR       | MANUAL / AUTO   | AUTO  | 3D noise reduction    |
| RETURN     | -               | -     | back to the main menu |

## 4.7 VIDEO SETTING

| Item           | Range / options | Shown | Meaning   |
|----------------|-----------------|-------|-----------|
| VIDEO STANDARD | PAL / NTSC      | PAL   | TV system |

| Item        | Range / options | Shown | Meaning                               |
|-------------|-----------------|-------|---------------------------------------|
| HD FORMAT   | CVBS            | CVBS  | video output format                   |
| IMAGE RATIO | 4:3 / 16:9      | 4:3   | image aspect ratio                    |
| D-WDR       | OPEN / CLOSE    | OPEN  | digital wide dynamic range (on / off) |
| RETURN      | -               | -     | back to the main menu                 |

- Select the same TV system (PAL / NTSC) as supported by your FPV goggles or monitor.
- Select the 4:3 or 16:9 aspect ratio according to the goggles or monitor display so that the image is not distorted.

## 4.8 Language, saving and reset

- **LANGUAGE** – OSD menu language: English, Simplified and Traditional Chinese, Russian, Spanish, Italian, French, Polish, Portuguese, Japanese.
- **RESET** – restores the camera's factory settings.
- **SAVE EXIT** – saves the changes and exits the menu.
- **EXIT** – exits the menu.

## 5. Specifications

| Parameter             | Value                                                                                                          |
|-----------------------|----------------------------------------------------------------------------------------------------------------|
| Name                  | Ratel 2                                                                                                        |
| Model                 | MN01-2000B (black), MN01-2000R (red)                                                                           |
| Image sensor          | 1/1.8"                                                                                                         |
| Horizontal resolution | 1200 TVL                                                                                                       |
| TV system             | NTSC & PAL (switchable)                                                                                        |
| Image                 | 16:9 & 4:3 (switchable)                                                                                        |
| WDR                   | Super WDR (HDR)                                                                                                |
| Min. illumination     | Starlight                                                                                                      |
| FOV                   | 165° / 160°                                                                                                    |
| Electronic shutter    | PAL: 1/50 ~ 100,000<br>NTSC: 1/60 ~ 100,000                                                                    |
| Camera OSD            | separate OSD control board                                                                                     |
| OSD languages         | English, Chinese (Simplified and Traditional), Russian, Spanish, Italian, French, Polish, Portuguese, Japanese |
| Day / night           | Auto / Color / B&W / EXT                                                                                       |
| Dimensions            | 19 × 19 mm                                                                                                     |
| Power input           | DC 4.5–26 V                                                                                                    |
| Weight                | 5.9 g                                                                                                          |

## 6. Maintenance and storage

- Clean the lens only with a soft optical cloth or a brush. Do not use solvents or abrasive cleaners.
- After a crash, check the lens, camera body, mounting screws and cable. Replace a damaged cable.
- Regularly check that the M2 mounting screws are tight and the cable connector is fully inserted.
- Store the camera in a dry place, away from direct sunlight and heat sources, protected from dust.

## 7. Troubleshooting

| Problem                                  | Possible cause and solution                                                                                                                                                      |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No image                                 | Check the power supply (4.5–26 V), polarity, ground (GND) and the yellow video wire connection. Make sure the VTX is transmitting and the goggles are tuned to the same channel. |
| Black and white image                    | BW mode is selected in the DAY&NIGHT menu or night mode has been activated. Select COLOR, or check the EXT mode.                                                                 |
| Image rolls or is distorted              | Mismatch of the PAL / NTSC TV system or aspect ratio between the camera and the goggles. Adjust VIDEO SETTING.                                                                   |
| Interference in the image (lines, noise) | Interference from the motor power supply. Power the camera from a filtered FC / VTX output and route the video wire away from power wires.                                       |
| Cannot open the OSD menu                 | Check the control board connection (GND, OSD) and short press the joystick.                                                                                                      |
| Blurred image                            | Clean the lens. Check that the lens has not come loose or been scratched in a crash.                                                                                             |

## 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.com                             |

### 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 model designation (Ratel 2 – MN01-2000B / MN01-2000R) is shown on the back of the camera.

## 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](http://www.asekol.cz), [www.ecobat.cz](http://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](http://www.coi.cz).