

Rhythm 3

User Manual

2024-05

v1.0



Caution

1. Do not expose the infrared camera lenses to a strong energy source such as the sun and laserbeam. The temperature of the observation target should not exceed 800°C, otherwise it will burn the camera and cause permanent damage.
2. Make sure the gimbal port and gimbal surface are free from any liquid before installation. Make sure the gimbal is securely installed onto the aircraft, the microSD card slot cover is clean and firmly in place.
3. Do not plug or unplug the microSD card during use.
4. When not in use, store the Rhythm3 in the storage case and replace the desiccant packets as necessary to prevent fogging the lenses due to excessive ambient humidity. If the lenses focus, the water vapor will usually dissipate after turning on the device for a while. The recommended storage environment is a relative humidity less than 40% at a temperature of 20±5°C.
5. Clean the surface of the camera lenses with a soft, dry, clean cloth.

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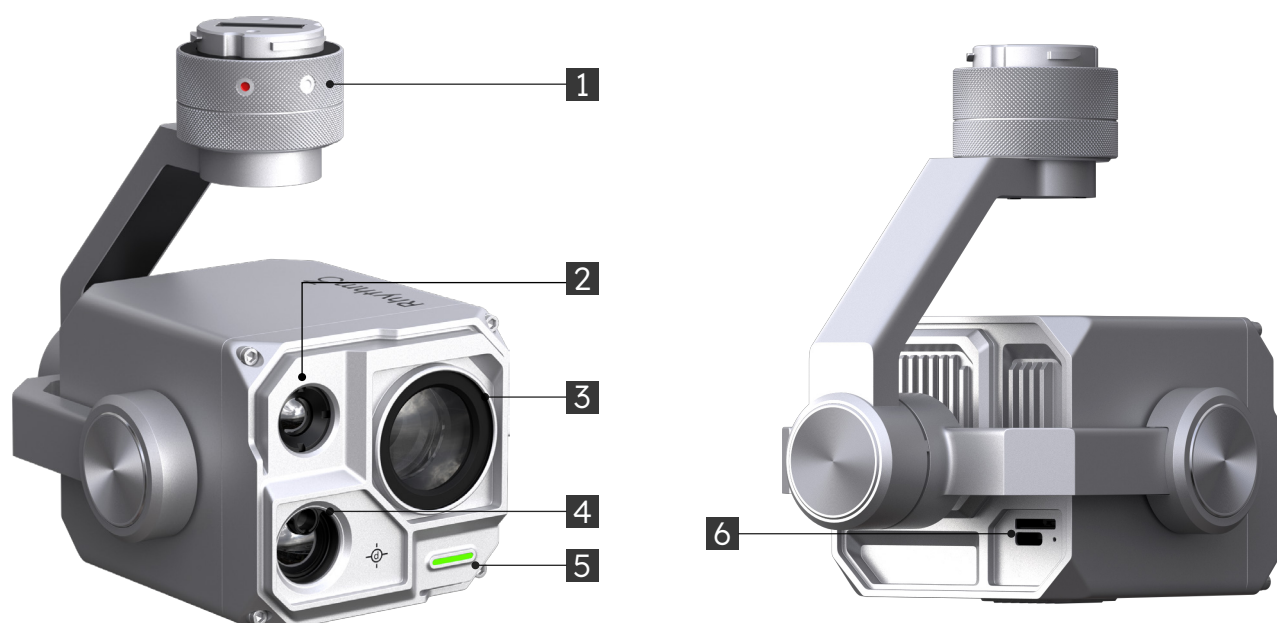
Product Profile

Introduction

Rhythm 3 is an integrated 3-sensor 3-axis multi-optical gimbal camera with a zoom camera, thermal imaging camera, and laser rangefinder.

The three-sensor system, supported by the advanced intelligent algorithms of the Nvidia Xavier NX edge computer, meets complex and diverse operational requirements.

It can simultaneously capture 640*512 high-resolution thermal imaging and 4K 30x optical zoom visible light images, while also equipped with a 1200m laser rangefinder to provide real-time distance and position information of the observation target.



1. Gimbal Connector

2. Tele Infrared Thermal Camera

3. Zoom Camera

4. Laser Range Finder

5. LED Indicator

6. micro SD Card Slot、type-c Slot

Installation



1. Align the white and red dots and insert the gimbal.
2. Rotate the gimbal connector counter clockwise to the locked position.

After installation, make sure that the gimbal lock is locked in place.

Make sure to press down the Gimbal detachment button when rotating the gimbal lock to remove the gimbal and camera. The gimbal lock should be fully rotated when removing the gimbal for next installation.

Ensure the microSD card slot cover is firmly in place to prevent dust or moisture entering during usage or storage.

Remote Controller Operation



1. Left Dial

Turn to adjust the gimbal's tilt.

2. Right Dial

Turn to adjust the gimbal's pan.

3. Record Button

Press to start/stop recording video.

4. Shutter Button

Press to take a photo, Taking single photo is supported during video recording.

5. Zoom C2 button

Zoom in.

6. Zoom C1 button

Zoom out.

7. Function Button Fn1

Default for the Gimbal's pitch angle one click back.

8. Function Button Fn2

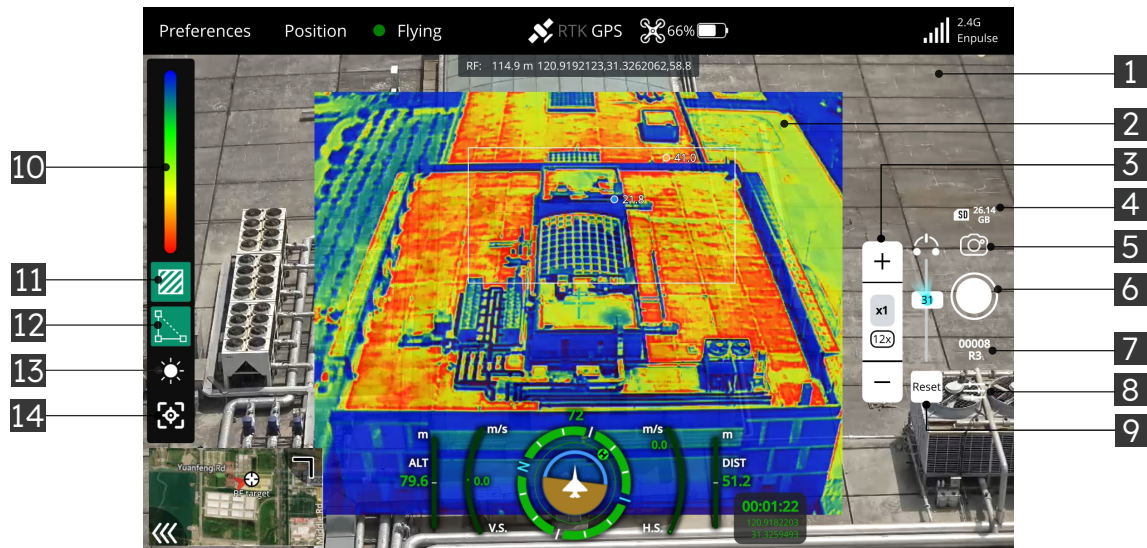
Default for digital zoom of thermal image.

9. Function Button Fn3

Default for switch zoom camera and infrared camera view.

App Controls

Besides capturing photos and recording videos, the touch interface provides more intuitive and convenient control options such as Thermometry and Range finder etc. The following image is for reference only. The actual interface varies according to the app version.



1. Zoom Camera

Display the Zoom Camera view.

2. Infrared Camera View

Display the Infrared Camera view.

3. Zoom

Display the camera zoom rate, Click "+" and "-" to adjust the zoom magnification of the zoom camera.

4. Display the current remaining capacity of the memory card.

5. Photo video Toggle

Tap to switch between photo and video modes.

6. Shutter/Record Button

Tap to shoot photos or start/stop recording.

7. Camera model

Display the current the number of photos/recording time

8. Parameter Settings

Tap to enter the photo and video settings.

9. Grid

Display the tilt axis angle of the gimbal.

10. Infrared Palette

The followingtable shows all palette options, click to switch.

11. Temperature Measurement

Spot Measurement:

Tap any position within the temperature measurement area on the screen to measure the temperature.

Area Measurement:

Drag to select an area within the temperature measurement area on the screen. The lowest temperaturehighest temperature, and their corresponding locations in this area will be displayed on the screen.

12. Laser Ranging

Tap to enable the laser ranging function. Laser ranging can measure the distance of objectswithin the measurement range, and displays the distance from the aircraft and the absolute heighof the measured object in the middle of the screen.

13. Spot metering

Tap to enable the spot metering function.

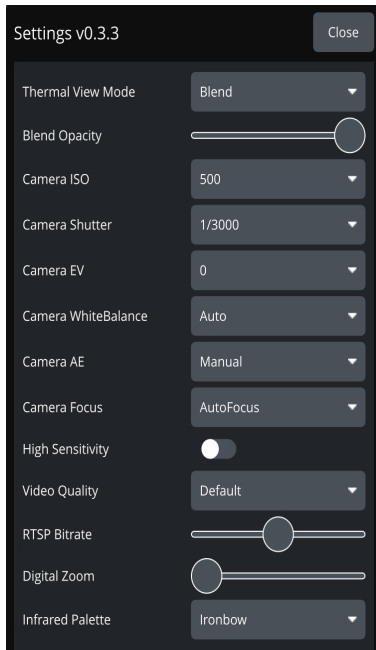
14. Smart track

Tap to enable the smart track function.

When the smart track function is enabled, the defaut mode is drag to select the target to track on the screem. If the "Track Algorithm" and "Smart Select" option is chosen in settings meau, the tracking feature switches to smart selection tracking mode, this mode supports automatic recognition of "people" and "cars" and other targets, as well as click tracking function.

Camera Settings

This chapter describes the detailed operation of the Rhythm3 camera settings menu and the detailed operation of the AI tracking function.



Thermal View Mode: Blend / Full / Picture in Picture.

Blend opacity: Regulate Blend opacity.

Camera ISO: Regulate ISO (500 ~ 128000).

Camera Shutter: Regulate Shutter (1/10000 ~ 1).

Camera EV: RegulateEV (-10.5 ~ +10.5).

Camera WhiteBalance: Regulate WhiteBalance.

Camera AE: Full Auto/Manual/Shutter Priority /ISO Priority.

Camera Focus: Auto/Manual.

High Sensitivity: Click open to improve the shooting effect in low-light environments.

Video Quality: Adjust the zoom camera Video Quality.

RTSP Bitrate: Adjust the zoom camera RTSP Bitrate.

Digital Zoom: Zoom cameras support up to 30x optical zoom and 3x digital zoom.

Infrared Palette: Click to switch infrared palette .

IR Zoom: Infrared Thermal camera support up to 2x digital zoom.

Hight/Low (TRUE/FALSE) Gain:

Hight: -40℃ to 150℃ ; Low: -40℃ to 550℃

On/Off thermometry: Click to open the temperature measurement function, support Spot measurement and Area Measurement.

Gimbal speed: Regulate the gimbal speed.

Yaw smooth: When Yaw mode is head, adjust the speed at which gimbal follows the head.

Yaw mode: Head/Global.

Gimbal Tracker Gain: Regulate the gimbal tracher gain.

NV Power Mode: Select the power management mode of NX.

NV Debug: Display the temperature、CPU and Memory usage of the NX.

Track Algorithm: Select track algorithms, including Nano and SiamRPN.

Smart Select: Select smart track function.

AI Expect Resolution: Adjust the resolution of AI expect.

UUID: Universally Unique Identifier.

Range Finder: Tap to enable the laser ranging function.

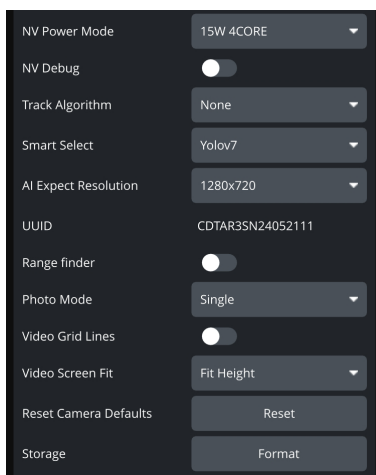
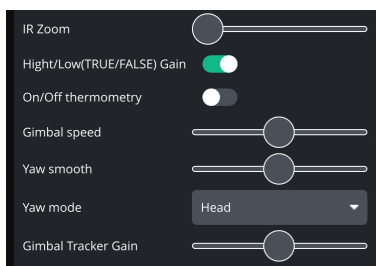
Photo Mode: Select photo model (Single/Time Lase).

Video Grid Lines: Tap to open the video grid lines.

Video Screen Fit: Select video screen fit (Width/Height/Stretch).

Reset Camera Defaults: Reset the camera to the default settings.

Storage: Tap to format and remove all content from the microSD card. Opera with caution.



Updating Firmware

Do not power off the aircraft or detach the Rhythm3 while updating the firmware. Restart them once firmware update is complete.

Please prepare the official firmware and the commissioning cable (RJ45 to 5-pin GH network cable) in advance. Here are the specific steps:

1. Make sure that the Rhythm3 is securely mounted onto the aircraft, and that aldevices are powered on.
2. Set the PC IP address to 192.168.2.5 (network segment 2).
3. Connect the PC network port to the aircraft's E1 or E2 port using the debugging cable.
4. Open the computer's default browser and access: <http://192.168.2.119:8080>
5. On the upgrade interface, select the upgrade file and click "Upload file" to upload the firmware, begin the automatic upgrade. During the upgrade process, the Rhythm3 will restart automatically.

Firmware upgrade

Upload Firmware

选择文件 R2L_v0.9.9.codev Upload file

```
apply default param yaml: /root/mavlink_camera/R2L.yaml
create bash shell: /root/mavlink_camera/mavlink_camera.sh
mavlink_camera not exists.
create config: /etc/supervisor/conf.d/tracker.conf
apply default param yaml: /root/tracker/R2L.yaml
create bash shell: /root/tracker/tracker.sh
tracker: started
mav_gb: started
mavlink_camera: started
Version: v0.9.9
OTA END
```

Network

IP/Netmask:

192	168	2	119	24
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Gateway:

192	168	2	1	
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Mavlink UDP Target:

192	168	2	117	14550
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Apply

Caution:

If the upgrade fails, restart and try to upgrade it again. Any other questions please contact the official after-sales service.

Appendix

Specifications

Product Name	Rhythm3
Weight	815g
Dimensions	150*112*153mm
IP rating	IP44
Power input	24V, 10W to 24W
Operating Temperature	-10°C to 50°C
Gimbal control range	Pitch: -90° to +20° Pan: 360° limitless
Mount type	P-Mount
Min control accuracy	1°
Angel control accuracy	±0.01°
Stream link	rtsp://192.168.2.119:8554/eo (ir)
File servicer	Support
Geo-tag	Support
Target location processing	Support
Protocol	MAVLINK 2.0

Edge Computer

SOM	Nvidia Jetson Xavier NX
AI performance	21 TOPS
GPU	384-core NVIDIA Volta™ GPU with 48 Tensor Cores
GPU Max Freq	1100 MHz
CPU	6-core NVIDIA Carmel ARM®v8.2 64-bit 6MB L2 + 4MB L3
CPU Max Freq	2-core @ 1900MHz; 4/6-core @ 1400Mhz
Memory	8GB 128-bit LPDDR4x ; 59.7GB/s
Storage	16 GB eMMC 5.1

Range finder

Wave	905nm (Class 1)
Measure range	5-1200m
Measure accuracy	6-60m $\pm 1m$, 70-100m $\pm 1.5m$, 110-400m $\pm 2m$, >400m $\pm 0.4\%m$
Laser angle	4~10 mrad
Measure HZ	$\leq 1Hz$
Laser output size	6mm
Reception size	17mm

EO Camera

Sensor	4K SONY 1/2.5 Exmor R CMOS Sensor (8.51 MP)
Recommended illumination	$f = 4.4 \text{ mm to } 88.4 \text{ mm}$; F2.0 to F3.8
Lens	Approx. 70.2° to 4.1°
Zooming	30x optical zoom with SONY@FPSR (Full Pixel Super-Resolution Imaging Technology) 90 Hybrid zooming without quality lose
Focus	MF/AF-C/AF-S
EV compensation	Auto/ Manual -10.5 to +10.5 dB
Noise reduction	6 steps (3DNR , 2DNR 3DNR separate mode)
Spot AE	Point support
Electronic shutter speed	1 to 1/10000s
ISO	Auto / Manual 500 ~ 128000
Video resolution	3840×2160@30fps, 20~40M
Video format	mp4
Image quality	3840x2160
Image format	Jpeg
Storage temperature/ Humidity	-20°C to 60°C / 20% to 95%
Operating temperature/ Humidity	-5°C to 60°C / 20% to 80%

EI camera

Type	Uncooled VOx Microbolometer (VOx)
Lens	Focal length: 9.1 mm (equivalent:40mm) FOV 48°×38°, 1.31mrad, DFOV 61°, F1.0
Video resolution	640*512 @30 Hz
Video format	mp4
Image quality	640*512
Image format	R-JPEG
Pixel pitch	12um
Spectral Band	8-14um
NETD	≤50mK @25°C
Temperature Measurement Method	Spot /Area Measurement
Palette	White hot/Fulgurite /Iron Red/Hot Iron/Medical/ Arctic/Rainbow 1/Rainbow 2/Tint/Black Hot
Temperature Measurement Range	High Gain: -40°C to 150°C Low Gain: -40°C to 550°C
Temperature Measurement Accuracy	±3°C or ±3% @ working temperature -20°C~60°C
Operating Temperature	-40°C~80°C (-20°C~60°C Radiometric)

After-Sales Service Policies

Limited Warranty

Under this Limited Warranty, CodevDynamics warrants that each CodevDynamics product that you purchase will be free from material and workmanship defects under normal use in accordance with CodevDynamics's published product materials during the warranty period. CodevDynamics's published product materials include, but not limited to, user manuals, safety guidelines, specifications, in-app notifications, and service communications.

The warranty period for a product starts on the day such product is delivered, If you cannot provide invoice or other valid proof of purchase, then the warranty period will start from 60 days after the shipping date that shows on the product, unless otherwise agreed upon between you and CodevDynamics.

What This After-Sales Policy Does NOT Cover

1. Crashes or fire damage caused by non-manufacturing factors, including but not limited to, pilot errors.
2. Damage caused by unauthorized modification, disassembly, or shell opening not in accordance with official instructions or manuals.
3. Water damage or other damages caused by improper installation, incorrect use, or operation not in accordance with official instructions or manuals.
4. Damage caused by a non-authorized service provider.
5. Damage caused by unauthorized modification of circuits and mismatch or misuse of the battery and charger.
5. Damage caused by flights which did not follow instruction manual recommendations.
7. Damage caused by operation in bad weather (i.e. strong winds, rain, sand/dust storms, etc.)
8. Damage caused by operating the product in an environment with electromagnetic interference (i.e. in mining areas or close to radio transmission towers, high-voltage wires, substations, etc.).
9. Damage caused by operating the product in an environment suffering from interference from other wireless devices (i.e. transmitter, video-downlink, Wi-Fi signals, etc.).
10. Damage caused by operating the product at a weight greater than the safe takeoff weight, as specified by instruction manuals.

11. Damage caused by a forced flight when components have aged or been damaged.
12. Damage caused by reliability or compatibility issues when using unauthorized third-party parts.
13. Damage caused by operating the unit with a low-charged or defective battery.
14. Uninterrupted or error-free operation of a product.
15. Loss of, or damage to, your data by a product.
16. Any software programs, whether provided with the product or installed subsequently.
17. Failure of, or damage caused by, any third party products, including those that CodevDynamics may provide or integrate into the CodevDynamics product at your request.
18. Damage resulting from any non-CodevDynamics technical or other support, such as assistance with “how-to” questions or inaccurate product set-up and installation.
19. Products or parts with an altered identification label or from which the identification label has been removed.

Your Other Rights

This Limited Warranty provides you with extra and specific legal rights. You may have other rights according to the applicable laws of your state or jurisdiction. You may also have other rights under a written agreement with CodevDynamics. Nothing in this Limited Warranty affects your statutory rights, including rights of consumers under laws or regulations governing the sale of consumer products that cannot be waived or limited by agreement.