# MK32E

## ENTERPRISE GROUND STATION USER MANUAL

**V1.1**

**Oct 2023**



2022 SIYI Technology Copyright

Thank you for purchasing SIYI's product.

MK32E enterprise ground station is the latest member of the family of SIYI links. It carries a 7-inch high-definition and high brightness monitor, and a dual way full HD image transmission system which can be expanded to up to 30 kilometers range. The Android system is upgraded to 4G RAM and 64G ROM. Optional combos of MK32E system can have dual operator and RC relay feature. The abundant features and powerful performance make it a commonly used equipment of smooth image transmission, stable datalink, and solid control for UAV commercial drones, UGV unmanned vehicles, USV unmanned boats, and robotics.

To ensure you a good experience of the product, please read this manual carefully. If you encounter any issue using the product, please consult the manual or check the online pages of this product on SIYI official store (https://shop.siyi.biz). You can also write an email to SIYI official A/S center (support@siyi.biz).


2022 SIYI Technology Copyright

## SIYI User Group - Facebook

**SIYI Official Website** (*https://siyi.biz/en/*)

**SIYI Official Store** (*https://shop.siyi.biz*)

**SIYI Official AliExpress Store** (*https://siyi.aliexpress.com*)

**SIYI YouTube Channel** (*https://www.youtube.com/c/SIYITech*)



2022 SIYI Technology Copyright

## User Manual Update Log

| Version | Date | Updates |
|---|---|---|
| **1.1** | 2023.10 | 1. Necessary update for product introduction.<br>2. Necessary update for SIYI FPV app.<br>3. User manual update log.<br>4. Main firmware update log.<br>5. SIYI FPV app update log.<br>6. Necessary update for technical specification.<br>7. Necessary update for packing list.<br>8. Necessary update for “Important Instructions on Promotion to Communication Range and Video Fluency”.<br>9. Necessary update for “SIYI TX App”.<br>10. Instruction in “Datalink” for connection to multiple GCS. |


2022 SIYI Technology Copyright

# CONTENT

READ TIPS ..... 1
Icons ..... 1
Safety ..... 1
Battery ..... 3
Storage / Carrying / Recycling ..... 4
1 INTRODUCTION ..... 5
1.1 Product Features ..... 5
1.2 Parts ..... 8
1.2.1 At a Glance ..... 8
1.2.2 Button / Switch Types and Default Channel Definitions ..... 9
1.2.3 Ports and Data Stream ..... 10
1.3 Technical Specification ..... 14
1.4 Packing List ..... 18
1.5 Status Indicator Definition ..... 20
1.5.1 Remote Controller Indicator ..... 20
1.5.2 Air Unit Indicator ..... 21
2 GET READY TO USE ..... 23
2.1 Remote Controller ..... 23
2.1.1 Power On / Off ..... 23
2.1.2 Charging ..... 24
2.1.3 Charging Indicator ..... 24
2.1.4 Change System Language ..... 25
2.2 Important Instructions on Promotion to Communication Range and Video Fluency ..... 29
2.2.1 General Precautions ..... 29
2.2.2 General Antenna Options and Wireless Mode Configuration for Different Range ..... 30
2.2.3 How to Place Remote Controller Antennas ..... 30
2.2.4 How to Place Air Unit Antennas ..... 32
2.2.5 The Communication Range Is Not as Expected and You Need Factory Support, Here Are the Necessary Information We Need ..... 36
3 SIYI TX APP ..... 38
3.1 Channels ..... 39



2022 SIYI Technology Copyright

3.1.1 End Point ..... 39
3.1.2 Middle Point ..... 40
3.1.3 Channel Reverse ..... 40
3.1.4 Channel Mapping ..... 41
3.2 Datalink ..... 43
3.2.1 Connection ..... 43
3.2.2 Flight Controller ..... 44
3.2.3 Baud Rate ..... 45
3.3 System ..... 47
3.3.1 Bind ..... 48
3.3.2 Multiple Air Unit ..... 48
3.3.3 Frequency Self-Adapting ..... 49
3.3.4 Throttle Stick ..... 50
3.3.5 Channel 15 ..... 50
3.3.6 Wireless Mode ..... 50
3.3.7 Joystick Deadzone ..... 51
3.4 Link Status ..... 52
3.5 Failsafe ..... 53
3.6 Buttons / Dials ..... 56
3.6.1 Buttons ..... 56
3.6.2 Dials ..... 57
3.7 Joystick Calibration ..... 58
3.8 Dial Calibration ..... 61
3.9 Multiple Links ..... 64
3.9.1 Remote Control Relay ..... 65
3.9.2 Dual Operator ..... 66
3.10 Device Info ..... 69
3.11 SIYI TX App Update Log ..... 70
4 DATALINK ..... 71
4.1 Communication with Android GCS through UART ..... 71
4.1.1 JIYI Agri-Assistant ..... 71
4.1.2 BOYING Agriculture ..... 72


2022 SIYI Technology Copyright

4.1.3 VK Agriculture....73
4.2 Communication with Android GCS through USB COM....75
4.2.1 QGroundControl....75
4.2.2 Mission Planner....76
4.3 Communication with Android GCS via Bluetooth....78
4.3.1 QGroundControl....78
4.3.2 Mission Planner....80
4.4 Communication with Android GCS through UDP....82
4.4.1 QGroundControl....82
4.4.2 Mission Planner....84
4.5 Communication with Windows GCS through Upgrade Port....86
4.5.1 QGroundControl....86
4.5.2 Mission Planner....88
4.6 Communication with Windows GCS by UDP through Remote Controller WiFi Hotspot....90
4.6.1 QGroundControl....90
4.6.2 Mission Planner....92
4.7 Solutions to Disconnection....94
4.8 SIYI Datalink SDK....96
4.8.1 Format....96
4.8.2 Commands....96
4.8.3 Communication Interface....100
4.8.4 SDK CRC16 Check Code....100
5 SIYI FPV APP....103
5.1 Settings....105
5.2 Link Status....106
5.3 Gimbal Camera....107
5.4 About SIYI FPV....109
5.5 SIYI FPV App Update Log....110
6 IMAGE TRANSMISSION....111
6.1 Control Gimbal Camera from SIYI FPV App or SIYI QGC App on SIYI Handheld Ground Station....111
6.1.1 Preparation....111


2022 SIYI Technology Copyright

6.1.2 Gimbal Pitch and Yaw Rotation ..... 113
6.1.3 Zoom ..... 114
6.1.4 Take pictures and Record Video ..... 114
6.2 Input Third-Party IP Cameras / Optical Pods ..... 115
6.3 Input HDMI Camera ..... 116
6.4 Input Dual-Channel Video Streams ..... 117
6.4.1 Input Dual SIYI Cameras / Gimbals / Air Unit HDMI Input Converters ..... 117
6.4.2 Input Dual Third-Party IP Cameras / Optical Pods ..... 117
6.4.3 Input an SIYI HDMI Converter and a Third-Party IP Camera ..... 117
6.5 Common IP Addresses ..... 119
6.6 Solutions to No Image ..... 120
6.7 Output Video Stream from Remote Controller to Other Device ..... 122
6.7.1 Through HDMI ..... 122
6.7.2 Through WiFi Hotspot ..... 122
6.7.3 Through LAN Port ..... 123
7 ANDROID OS ..... 126
7.1 Download Apps ..... 126
7.2 Import and Install App ..... 126
7.2.1 Through TF Card ..... 126
7.2.2 Through USB Disk ..... 126
7.2.3 Through Type-C File Transfer ..... 127
7.3 Check Android Firmware Version ..... 130
8 SIYI Assistant ..... 131
8.1 Firmware Update ..... 131
8.2 Main Firmware Update Log ..... 135
8.3 SIYI Assistant Update Log ..... 137
9 After-sale Service ..... 138
9.1 Repair Service ..... 138
9.2 Warranty ..... 139
9.2.1 7-Day Return & Refund ..... 139
9.2.2 15-Day Replacement ..... 140
9.2.3 1-Year Warranty Repair ..... 142


2022 SIYI Technology Copyright

# READ TIPS

## Icons

Please pay more attention to content indicated with the following marks:

**DANGER** Dangerous manipulation probably leads to human injuries.

**WARNING** Warnings on manipulation possibly leads to human injuries.

**CAUTION** Cautions on what manipulation may lead to property loss.

**Prohibited** **Mandatory** **Mark**

## Safety

MK32E enterprise ground station is designed and manufactured for professional application scenarios. Operators need to have certain basic skills, so please use it with caution. SIYI Technology does not assume any responsibility for any unnecessary product damage caused by irregular or irresponsible operation of this product, economic losses or even personal injury to the user or others. Minors must have professionals present to supervise and guide minors when using this product. SIYI Technology's products are designed for commercial use, and it is prohibited to use SIYI products for military purposes. It is prohibited to disassemble or modify this product without SIYI Technology's permission.


2023 SIYI Technology, All Rights Reserved

To jointly maintain flight safety and allow you to better utilize the features of this product, please pay special attention to the following matters:

⊘ It is prohibited to operate in crowded places (squares, parks, etc.), places with many obstacles (streets, parking lots, etc.), places with strong magnetic fields or signal interference sources (high-voltage lines, railway lines, radar stations, etc.) or other places that may cause using SIYI products to control aircraft, vehicles or models in areas where unnecessary economic losses or even personal injuries will occur.

⊘ During operation, never cover the remote controller antenna or otherwise block signal transmission.

⊘ The top of the standard omni-directional antenna on the remote controller is the part where signal transmission is weakest. Avoid pointing it at your aircraft, vehicle or model while working.

⊘ It is prohibited to use SIYI products to control aircraft, vehicles, or models when you are tired, drunk, or unwell.

⊘ Without special operation permission, it is prohibited to use SIYI products to control aircraft, vehicles, or models in rainy days, at night or in strong wind environments.

⊘ When the engine or motor on your aircraft, vehicle or model is still running, do not cut off the power to the remote controller in advance.

❗ For flight safety, please keep the aircraft within sight when operating the aircraft.

❗ When working, be sure to return to the main page from the system parameter setting page.


2023 SIYI Technology, All Rights Reserved

Before starting the operation, be sure to check the power of the remote controller and the power supply voltage of the air unit.

When finishing the operation, first power off the air unit and then the remote controller.

Before setting the remote controller parameters, be sure to power off the engine and motor to prevent accidental start.

Before starting the operation, be sure to pre-set the fail-safe function on the remote control or in the ground station software.

When installing, please avoid installing the air unit and GPS module too close to avoid interference. It is recommended that the distance between the air unit and the GPS module be longer than 20 cm.

## Battery

The remote controller is equipped with a built-in and chargeable Li-on battery. Please do read the precautions below before using.

The remote controller cannot be charged when it is powered on. Before charging the remote control, please turn off the remote control.

If you find that the battery is smoking, overheating, or bulging, please stop using it immediately.

If you find smoke or a strange smell coming from the remote controller, please stop using it immediately and contact your reseller or SIYI after-sales service center directly.


2023 SIYI Technology, All Rights Reserved

If the remote controller overheats (above 60 degrees Celsius), please stop using it immediately and cut off the power supply.

## Storage / Carrying / Recycling

When the SIYI product you own is idle, or you want to take the SIYI product out for work, or the product has reached the end of its service life, please pay special attention to the following matters:

### DANGER

When SIYI products are not in use, they should be kept away from areas easily accessible to children.

Please avoid placing SIYI products in an environment that is too hot (above 60 degrees Celsius) or too cold (below minus 20 degrees Celsius).

### CAUTION

Please avoid placing SIYI products in humid or sandy environments.

When carrying and transporting SIYI products, please avoid operations that may damage components such as vibration or impact.


2023 SIYI Technology, All Rights Reserved

# 1 INTRODUCTION

## 1.1 Product Features

### 7-Inch High-Definition Monitor

### 1000-Nit High Brightness Display

MK32E enterprise ground station comes with a built-in 7-inch high-definition and high brightness monitor. Max 1000 nit (cd/m²) of brightness presents high clear screen display information from ground control software and high-quality images.

### Long Range Wireless Digital Image Transmission

### Dual-Channel Full HD Video Stream

The link of MK32E is based on SIYI's independent wireless HD image transmission technology, which is an all-in-one link integrated with remote control, datalink, and video streaming. The technology has a smart feature that the transmission can automatically adapt to the frequency band with least interference.

**To experience the lowest latency, it is suggested to use MK32 with SIYI FPV app (choosing SIYI camera protocol) or SIYI QGC app (integrated SIYI camera protocol).*

### Android OS, Superior Performance

MK32E ground station carries Qualcomm 8-core CPU, which can smoothly decode 1080p 60 fps video stream by hardware in either H264 or H265 format. The Android system is upgraded to impressive 4G RAM and 64G ROM which can efficiently run various ground control software.


2023 SIYI Technology, All Rights Reserved

**MK32E Android platform also comes with full band 4G network and supports streaming HD video to cloud server by SDK development.*

## Dual Operator, Efficient Collaboration

Targeting popular industry application fields, relying on wireless high-definition image transmission technology, SIYI has given the MK32E link the feature of dual operator.

The "dual operator" function is developed for dual-operator scenarios and supports up to two ground units to establish links with the same air unit at the same time. One can be used to control the flight attitude of the drone, and the other can be used to control the gimbal camera, optical pod, and other payloads. In dual operator mode, two ground units can simultaneously acquire images from the same camera source or display images from different camera sources separately.

**To use the "dual operator" function, you need to purchase a dual combo. Ordinary combos are not equipped with this function.*

## Remote Control Relay, Remote Delivery

Targeting the field of drone logistics, relying on wireless high-definition image transmission technology, SIYI has endowed the MK32E link with the feature of remote-control relay.

The "remote-control relay" function is developed for ultra-long-distance flight missions. It supports two ground units to relay control the same air unit to reach a maximum transmission distance twice that of a single standard transmission


2023 SIYI Technology, All Rights Reserved

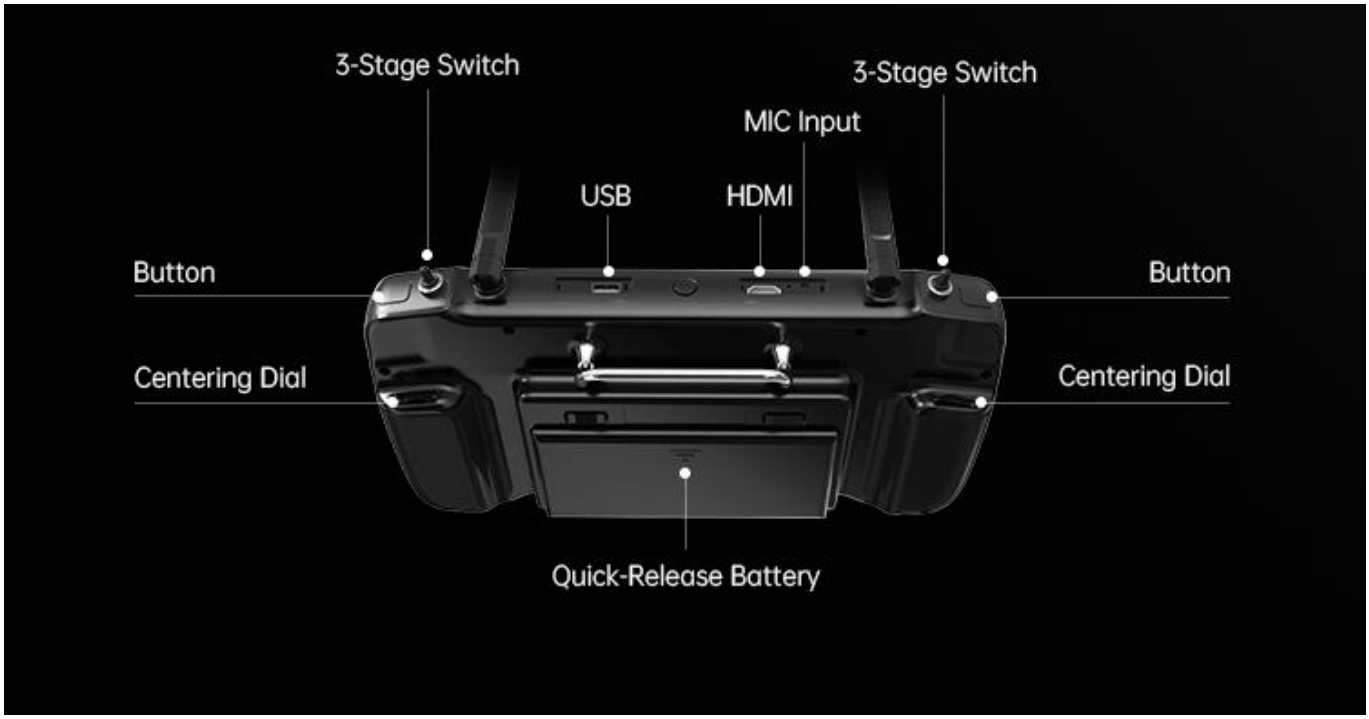
system. It can be widely used in cruise line inspection, unmanned distribution, unmanned logistics and other fields.

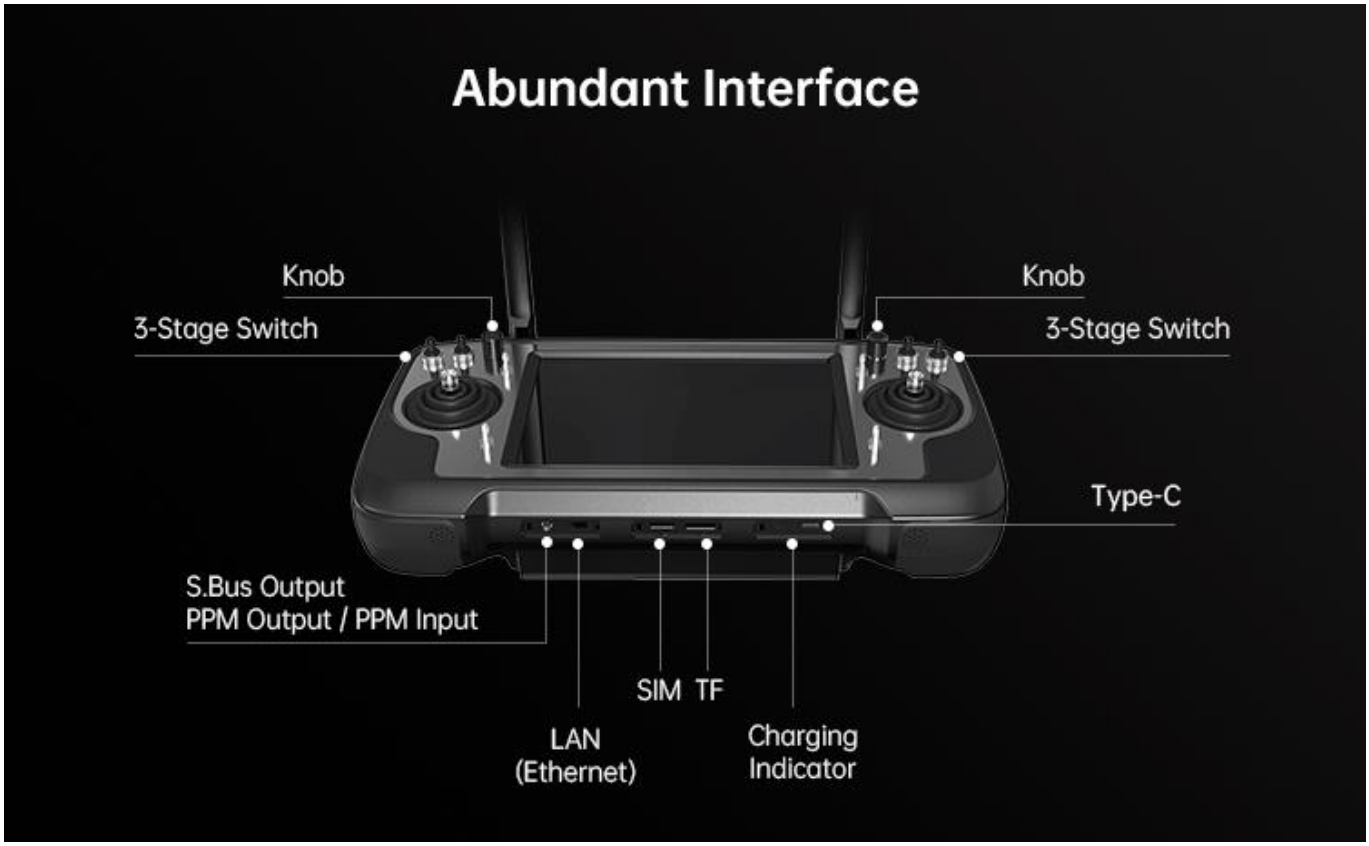
**To use the "remote-control relay" function, you need to purchase a dual combo. Ordinary combos are not equipped with this function.*


2023 SIYI Technology, All Rights Reserved

## 1.2 Parts

### 1.2.1 At a Glance





2023 SIYI Technology, All Rights Reserved

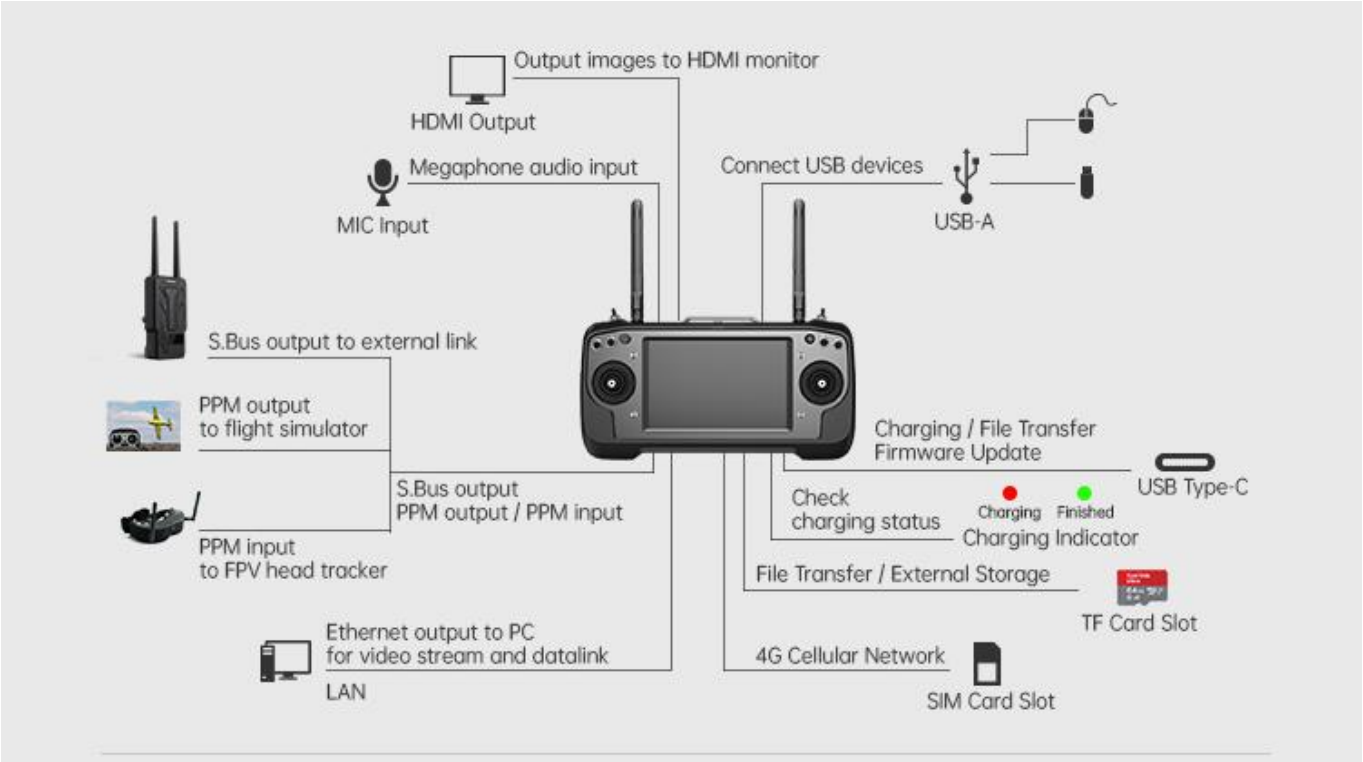
### 1.2.2 Button / Switch Types and Default Channel Definitions

MK32E remote controller comes with 16 physical channels and 16 communication channels in total. Communication channel 10 to 14 are also PWM channel 1 to 5 in default.

| Channel No. | Physical Channel Type | Default Mapping | Remark |
|---|---|---|---|
| 1 | Aileron | Joystick J1 | |
| 2 | Elevator (Mode 2) | Joystick J2 | |
| 3 | Throttle (Mode 2) | Joystick J3 | |
| 4 | Rudder | Joystick J4 | |
| 5 | | 3-Stage Switch SA | |
| 6 | | 3-Stage Switch SB | |
| 7 | | 3-Stage Switch SC | |
| 8 | | 3-Stage Switch SD | |
| 9 | | 3-Stage Switch SE | |
| 10 | | 3-Stage Switch SF | PWM 1 |
| 11 | | Left Dial LD1 | PWM 2 |
| 12 | | Right Dial RD1 | PWM 3 |
| 13 | | Left Dial LD2 | PWM 4 |
| 14 | | Right Dial RD2 | PWM 5 |
| 15 | | Button S1 | Searchlight A<br>Gimbal Pitch |
| 16 | | Button S2 | Searchlight B<br>Gimbal Centering |

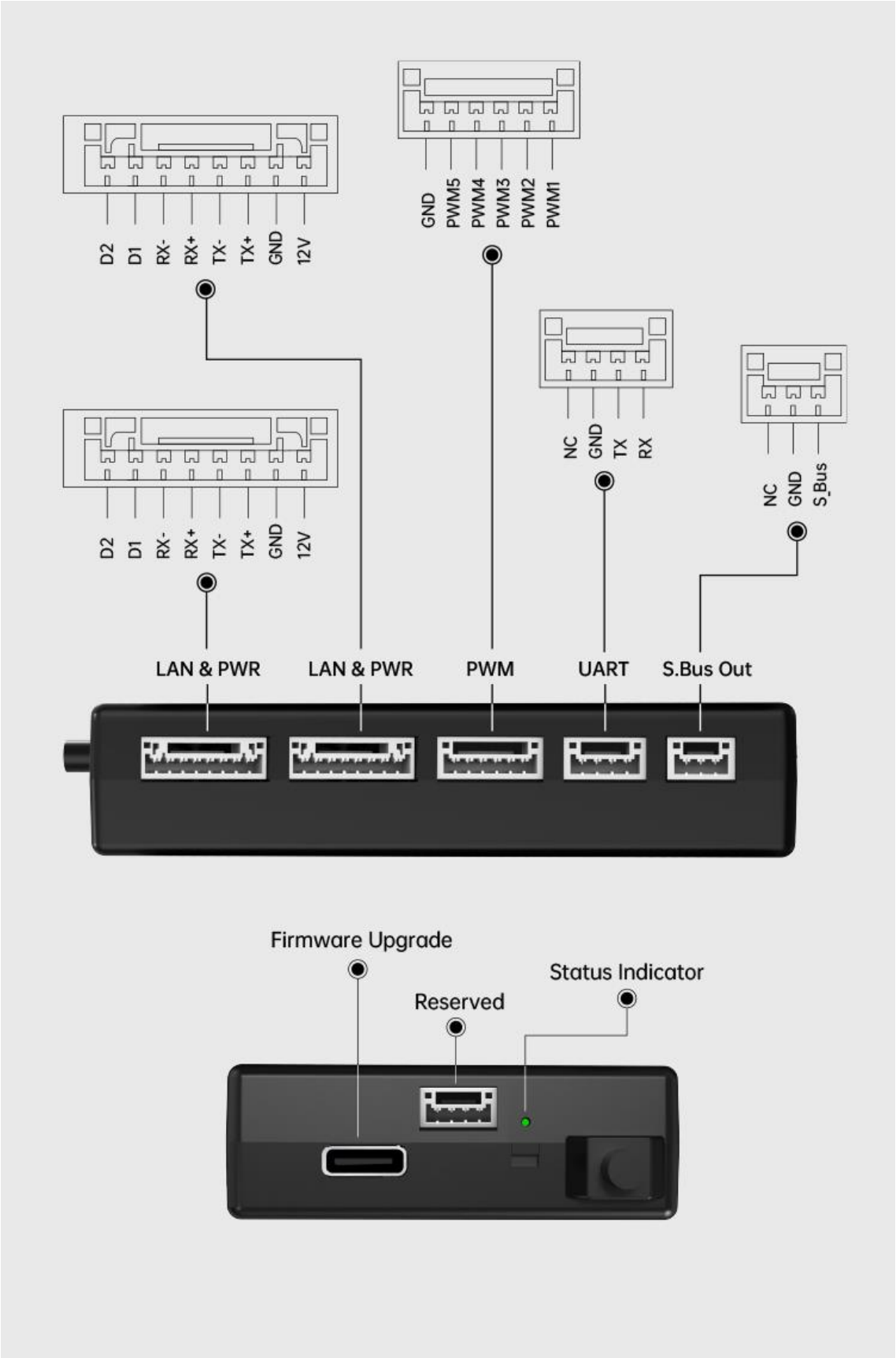

2023 SIYI Technology, All Rights Reserved

### 1.2.3 Ports and Data Stream



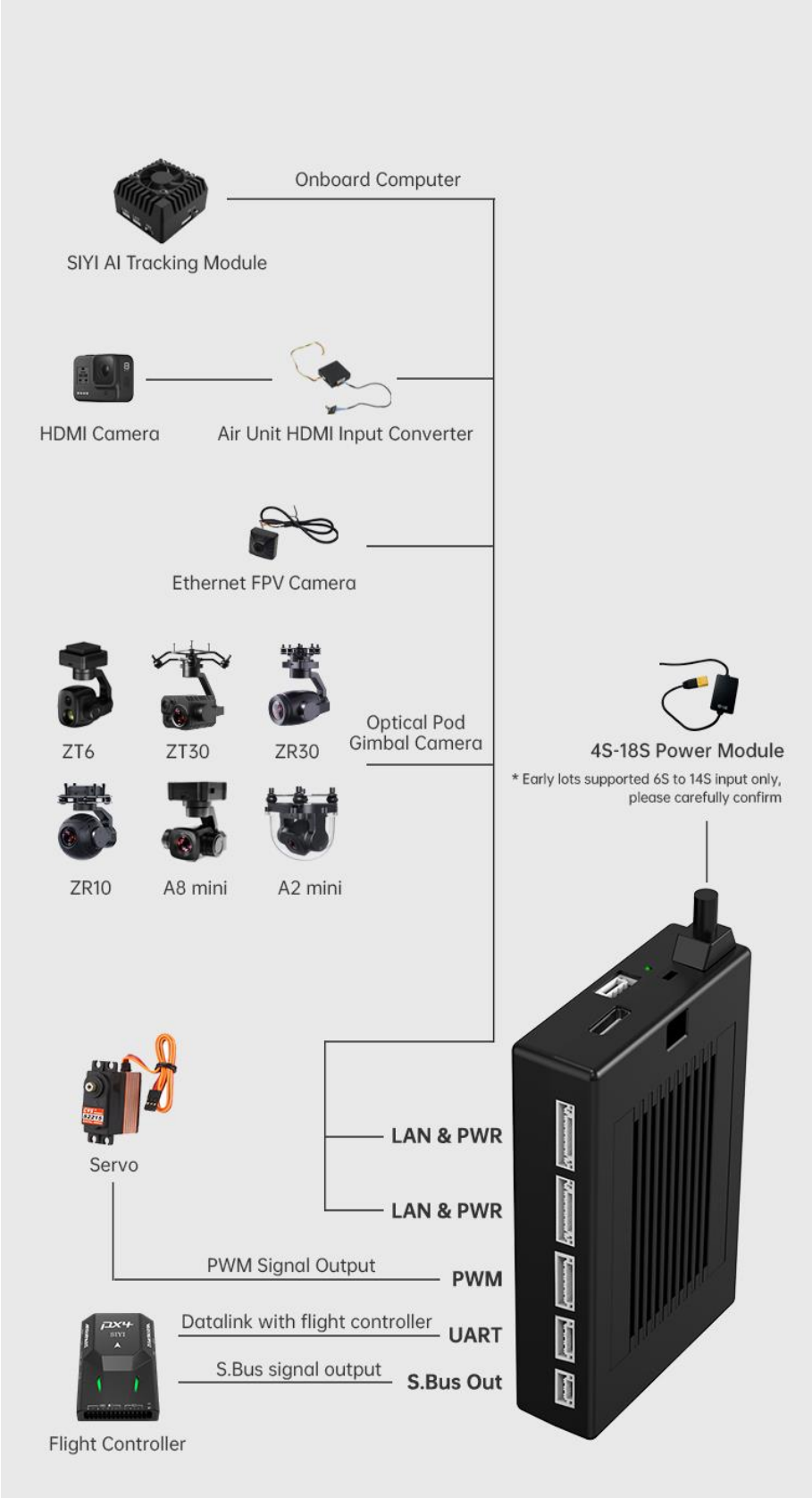

**Remote Controller Data Stream**


2023 SIYI Technology, All Rights Reserved




**Air Unit Ports**


2023 SIYI Technology, All Rights Reserved




**Air Unit Data Stream**


2023 SIYI Technology, All Rights Reserved

## Mark

Welcome to contact SIYI to get the SIYI Air Unit 3D Model for pre-installation.


2023 SIYI Technology, All Rights Reserved

## 1.3 Technical Specification

### Overall

| | |
|---|---|
| **Max Transmission Range** | 5 km<br>(Unobstructed, free of interference) |
| **Channels** | 16 physical channels<br>16 communication channels |
| **Datalink Compatible Flight Controllers** | PX4 / Ardupilot Open-source Flight Controllers:<br>SIYI N7, etc.<br><br>Agriculture Flight Controllers:<br>BOYING Paladin V2<br>JIYI K++ V2 / K3A Pro<br>VK V7AG / V9AG |
| **Video Stream Compatible Android GCS** | SIYI Original App:<br>SIYI FPV<br><br>Open-source GCS:<br>QGroundControl<br>Mission Planner<br><br>Agriculture GCS:<br>BOYING Agriculture<br>JIYI Agri-Assistant / IFLY<br>VK Agriculture |
| **Video Stream Compatible Windows GCS** | Open-source GCS:<br>QGroundControl<br>Mission Planner (H264 only) |

### Remote Controller (Ground Unit)

| | |
|---|---|
| **Monitor** | 7-inch High Definition and High Brightness LCD Touchscreen |
| **System** | Android 9.0 OS<br>4G RAM, 64G ROM |
| **Battery Capacity & Type** | 10200 mAh 7.4V 2S Li-ion<br>75.48 Wh |
| **Fast Charging Protocol** | PD 30W |
| **Charging Time** | 3.5 hours (PD 30W) |
| **Battery Life** | 10 hours |
| **Antenna Gain** | Omni Antenna: 5 dBi<br>2.4G Rod Antenna: 5 dBi |
| **Interface & Ports** | Video Output: Standard HDMI<br>External Device (Mouse, USB Disk): USB-A |


2023 SIYI Technology, All Rights Reserved

| | |
|---|---|
| | Charging: Type-C<br>Firmware Upgrade: Type-C<br>File Transfer: Type-C / USB-A<br>Mobile Network: SIM Card Slot<br>External Storage: TF Card Slot / USB-A<br>Communication Port: LAN (Ethernet)<br>RC Signal Input / Output: Bottom Audio Port |
| **Dimensions** (Antenna Overlapped) | 308 x 148 x 72 mm |
| **Weight** (Antenna Overlapped) | 1440 g |
| **Waterproof Level** | IP4X |
| **Working Temperature** | -10℃ ~ 50℃ |

## Air Unit

| | |
|---|---|
| **Signal Output** | 16 channels of SBUS<br>5 channels of PWM |
| **Interface & Ports** | S.Bus RC Signal Output: S.Bus Out (GH1.25 3-Pin)<br>Datalink (to FC): UART (GH1.25 4-Pin)<br>PWM Channel 1 to 5: PWM (GH1.25 6-Pin)<br>Video Input / Network Communication: 2 x LAN & PWR (GH1.25 8-Pin)<br>Firmware Upgrade: Type-C |
| **Antenna Gain** | Omni Antenna: 5 dBi<br>2.4G Rod Antenna: 5 dBi |
| **Working Voltage** | MK15E Air Unit:<br>4S ~ 18S / 16.8 ~ 75.6 V<br>(Early lot supported 6S to 14S input only, please carefully confirm) |
| **Power Consumption** | MK15E Air Unit:<br>- Average: 3.2 W<br>- Summit: 12 W |
| **Dimensions** (Antenna Excluded) | 75 x 48 x 17 mm (fan included) |
| **Weight** (Antenna Excluded) | 116 g |
| **Working Temperature** | -10℃ ~ 50℃ |

## Air Unit HDMI Input Converter

**(Optional, Packed with HDMI Combo)**

| | |
|---|---|
| **Video Input** | Micro HDMI |


2023 SIYI Technology, All Rights Reserved

| | |
|---|---|
| **Video Output** | Ethernet |
| **Working Voltage** | 12 V |
| **Power Consumption** | 3 W |
| **Video Recording Resolution** | 1080p (1920*1080) @ 30 fps<br>720p (1280*720) @ 30 fps |
| **Recording Bitrate** | 12 Mbps (H265 codec) |
| **File Storage Format** | FAT32 |
| **Video Recording Format** | H265 |
| **Supported TF / SD Card Type** | MicroSD Class10<br>Less than 32GB |
| **Dimensions** | 42 x 41 x 11 mm |
| **Weight** | 26 g |
| **Working Temperature** | -10℃ ~ 50℃ |

## R1M Recording FPV Camera

**(Optional)**

| | |
|---|---|
| **Video Output** | Ethernet |
| **Image Sensor** | 1/2.9 Inch, 2 MP |
| **FOV** | Diagonal: 90°<br>Horizontal: 80° |
| **Working Voltage** | 12 V |
| **Power Consumption** | 2.5 W |
| **Video Recording Resolution** | 1080p (1920*1080) @ 30 fps<br>720p (1280*720) @ 30 fps |
| **Recording Bitrate** | 12 Mbps |
| **Video Recording Format** | MP4 |
| **Supported TF / SD Card Type** | MicroSD Class10<br>Less than 32GB |
| **File Storage Format** | FAT32 |
| **Dimensions** | 42 x 42 x 25 mm |


2023 SIYI Technology, All Rights Reserved

| | |
|---|---|
| **Weight** | 23 g |
| **Working Temperature** | -10℃ ~ 50℃ |


2023 SIYI Technology, All Rights Reserved

## 1.4 Packing List

### Normal Edition

| Standard Combo | HDMI Combo |
|---|---|
| 1 x MK32E Remote Controller<br>2 x Standard Omni Antenna<br>2 x 2.4G Rod Antenna | |
| 1 x MK15E Air Unit<br>2 x Standard Omni Antenna<br>2 x 2.4G Rod Antenna | |
| | 1 x Air Unit HDMI Input Converter |
| 1 x PX4 / Ardupilot Standard Telemetry Cable<br>1 x S.Bus Cable (Male)<br>1 x PWM Cable<br>1 x Ethernet Cable | |
| 1 x 30W PD Fast Charger (Type-C, US Plug, PSE Certified)<br>1 x PD Fast Charging Cable (Type-C to Type-C)<br>1 x Type-C to USB-A Converter | |
| 1 x Carrying Case | |

### Dual Edition

| Dual Combo |
|---|
| 2 x MK32 Remote Controller (Dual Edition)<br>4 x Standard Omni Antenna<br>4 x 2.4G Rod Antenna |
| 2 x MK15E Air Unit (Dual Edition)<br>4 x Standard Omni Antenna<br>4 x 2.4G Rod Antenna |
| 2 x PX4 / Ardupilot Standard Telemetry Cable<br>2 x S.Bus Cable (Male)<br>2 x PWM Cable<br>2 x Ethernet Cable |
| 2 x 30W PD Fast Charger (Type-C, US Plug, PSE Certified)<br>2 x PD Fast Charging Cable (Type-C to Type-C)<br>2 x Type-C to USB-A Converter |
| 2 x Carrying Case |

Mark


2023 SIYI Technology, All Rights Reserved

The major difference between dual edition and normal edition are:

Dual edition comes with “Dual Operator” and “Remote Control Relay” features. Normal edition does not.


2023 SIYI Technology, All Rights Reserved

## 1.5 Status Indicator Definition

The status indicators on remote controller and air unit use three different colors and different blinking frequencies to indicate the system's working or abnormal status.

### 1.5.1 Remote Controller Indicator

Solid Red: No communication between remote controller and air unit.

Fast Red Blinks: Remote controller is binding to air unit.

Slow Red Blinks: Firmware does not match.

Triple Red Blinks: Image transmission initialization failed.

Four-time Red Blinks: Remote controller joysticks require calibration.

Slow Red-Green-Yellow Blinks: Image transmission is starting.

Slow Yellow Blinks: Remote controller working voltage abnormal.

Double Yellow Blinks: Remote controller Bluetooth is not identified.

Four-time Yellow Blinks: Remote controller Android system is in file transfer mode through the Type-C port.

Yellow-Red Blinks: Remote controller high-temperature alert, level one.

Yellow-Red-Red Blinks: Transmitter high-temperature alert, level two.

Yellow-Red Blinks: Transmitter high-temperature alert, level three.

Solid Green: Perfect communication, receiving 100% data package.

Green Blinks: Blinking frequency indicates the system's signal quality. More frequently it blinks, worse the signal quality is.


2023 SIYI Technology, All Rights Reserved

Slow Green Blinks: Receiving 95% to 99% data package.

Green Blinks (every 3/5 second): Receiving 50% to 75% data package.

Green Blinks (every 3/10 second): Receiving 25% to 50% data package.

Green Blinks (every 1/25 second): Receiving less than 25% data package.

Green-Red Blinks: Air unit high-temperature alert, level one.

Green-Red Blinks: Air unit high-temperature alert, level two.

Green-Red Blinks: Air unit high-temperature alert, level three.

### 1.5.2 Air Unit Indicator

Solid Red: No communication between remote controller and air unit.

Fast Red Blinks: Remote controller is binding to air unit.

Slow Red Blinks: Firmware does not match.

Triple Red Blinks: Image transmission initialization failed.

Slow Red-Green-Yellow Blinks: Image transmission is starting.

Yellow Blinks: Low voltage alert (voltage input from PMU is lower than 12V).

Solid Green: Perfect communication, receiving 100% data package.

Green Blinks: Blinking frequency indicates the system's signal quality. More frequently it blinks, worse the signal quality is.

Slow Green Blinks: Receiving 95% to 99% data package.

Green Blinks (every 3/5 second): Receiving 50% to 75% data package.

Green Blinks (every 3/10 second): Receiving 25% to 50% data package.

Green Blinks (every 1/25 second): Receiving less than 25% data package.

Green-Red Blinks: Air unit high-temperature alert, level one.



2023 SIYI Technology, All Rights Reserved

Green-Red Blinks: Air unit high-temperature alert, level two.

Green-Red Blinks: Air unit high-temperature alert, level three.


2023 SIYI Technology, All Rights Reserved

# 2 GET READY TO USE

## 2.1 Remote Controller

### 2.1.1 Power On / Off

Power On:

When the remote controller is off power, press the power button once, battery level indicators light on. Then immediately press and hold the power button for about two seconds and remote controller is powered on.

Power Off:

When the remote controller is working, press and hold the power button for about two seconds, remote controller monitor will pop up a window with some buttons. Tap the power-off button to power off the ground unit.

**CAUTION**

Mandatory Power Off: When the ground unit is working, press and hold the power button for about eight seconds, ground unit will be forced to power off.

**Mark**

Screenshot: When the ground unit is working, press and hold the power button for about two seconds, ground unit monitor will pop up a window with some buttons. Touch the screenshot button to take a screenshot of current screen display.

Screen Off: When the ground unit is working, press the power button once, ground unit


2023 SIYI Technology, All Rights Reserved

monitor will be off for energy saving.

### 2.1.2 Charging

You can charge the remote controller only when it is powered off and only by using the original PD fast charger.

1. Connect the remote controller to the PD charger and plug it into power supply.
2. The charging indicator lights on red; ground unit starts charging.
3. The charging indicator lights on green, charging is finished.

**CAUTION**

Normal 5V charger adapter cannot charge the ground unit, please do use SIYI original PD fast charger.

The remote controller cannot be charged when it is working. Please do power off the remote controller before charging.

### 2.1.3 Charging Indicator

Solid Red: Remote controller under charging.

Solid Green: Charging finished.


2023 SIYI Technology, All Rights Reserved

### 2.1.4 Change System Language

MK32E Android system supports almost all available languages, which can be switched in system settings easily.

**Mark**

The factory language of MK32E Android system is “Chinese (Simplified)”.

**Steps**

1. Go to Android system settings.

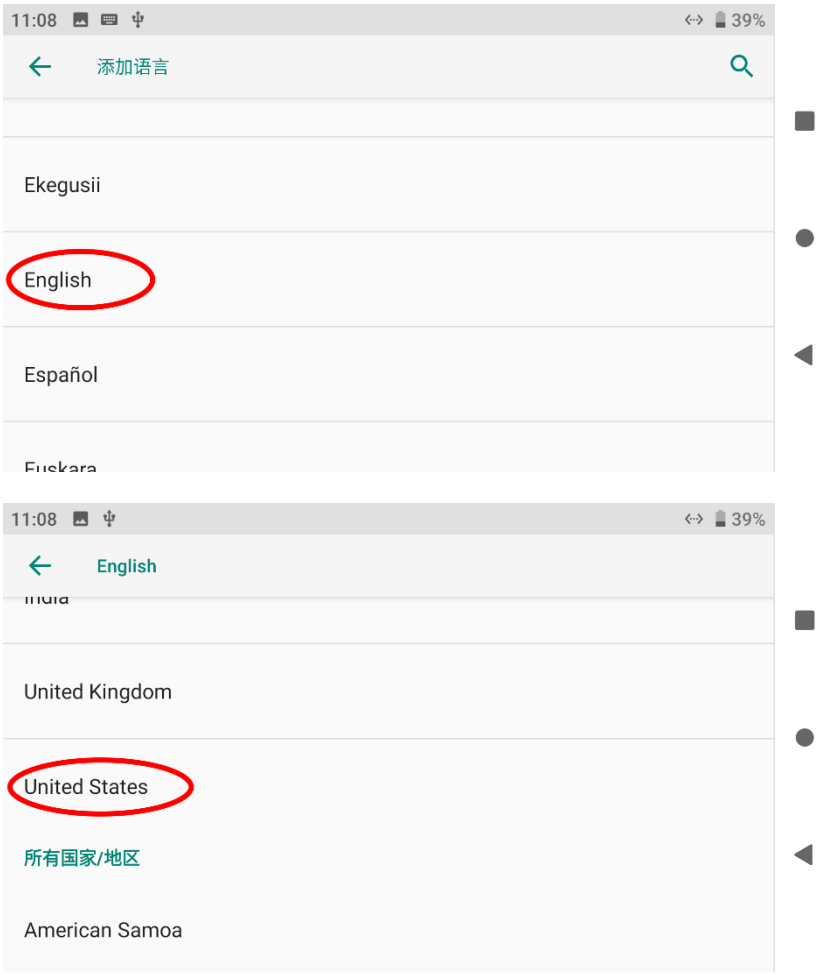
2. Slide down to find “System (Language, Time, Backup, Update)” and enter.

2023 SIYI Technology, All Rights Reserved

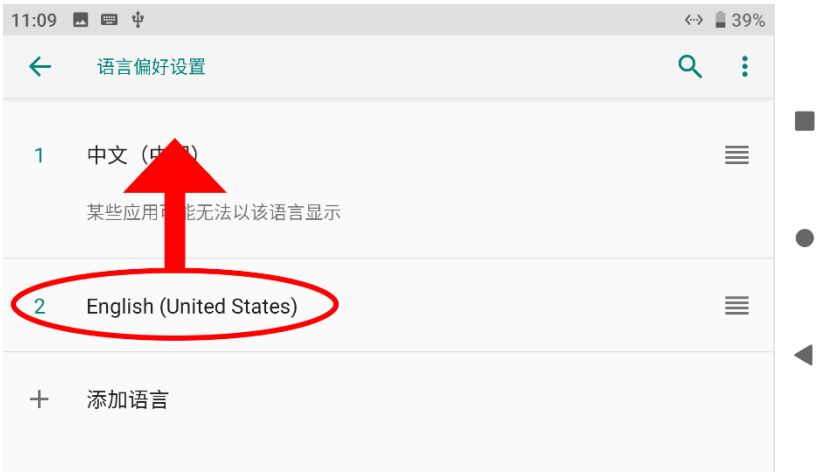
3. Go to “Language and Input” and choose “Language”, then “Add Language”.

4. Let’s take an example of “English (US)”. Slide down to find “English”, then choose “United States”. The page will jump back to “Language and Preference”.


2023 SIYI Technology, All Rights Reserved

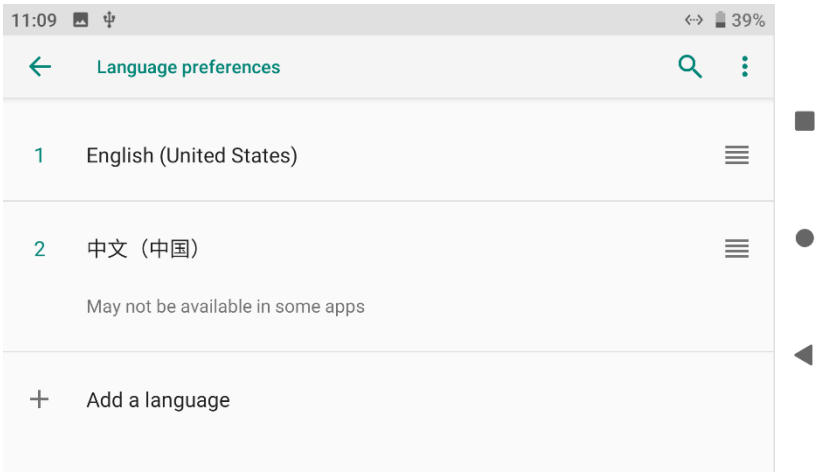



5. Drag the just added “English (US)” language bar to the first line, system language will change to English (US) automatically.





2023 SIYI Technology, All Rights Reserved





2023 SIYI Technology, All Rights Reserved

## 2.2 Important Instructions on Promotion to Communication Range and Video Fluency

To have the best communication range and video fluency with MK32E / MK15E system, please carefully read the below tips for antenna options, antenna setup, and link configuration.

### 2.2.1 General Precautions

1. It is suggested that not to run SIYI FPV app and QGroundControl app simultaneously with video streaming, not even running one at backstage, as it still occupies bandwidth thereby lower the communication range.

2. Only power batteries are allowed to power the air unit. HD image transmission system requires very high standard to the current of power supply, the instancy of the current response, and the current ripple. Power supply from the third-party power module, modified power module or from PDB may interfere the link stability and the communication range. If you do not need the power module, it is suggested that you use the HM30 air unit.


2023 SIYI Technology, All Rights Reserved

### 2.2.2 General Antenna Options and Wireless Mode Configuration for Different Range

**1. Close Range**

Two standard omni antennas on ground unit.

Wireless mode: Close range flight mode.

**2. Long Range**

Two 2.4G rod antennas or two standard long-range antennas on ground unit.

Wireless mode: Long range flight mode.

3. The signal at the top of the standard omni antenna is weak. When flying directly above the ground, the flying height of the aircraft should be as low as 100 meters.

4. When the ground unit is working with long range antennas, the aircraft should always be in front of the antenna panel instead of being vertical of the antenna or on opposite.

### 2.2.3 How to Place Remote Controller Antennas

1. The SMA connectors should be screwed tightly.
2. The antennas should stand vertically from the control panel of the remote


2023 SIYI Technology, All Rights Reserved

controller, and the antennas' flat side should always point to the aircraft or the vehicle. Do not cross or overlap the antennas during mission. Please refer to the below pictures for antenna orientation.

2023 SIYI Technology, All Rights Reserved

### 2.2.4 How to Place Air Unit Antennas

1. The SMA connectors should be screwed tightly.
2. On multirotor, the standard omni antennas should be hanging vertically from the drone arms with the antenna heads pointing to ground. On plane, the standard omni antenna can stand vertically above the wings. The antenna flat side should always point to the remote controller during flight.
3. The air unit antenna feeder wire should be placed away from E.S.C and motors, and any other equipment with heavy current or interference. Do not cross or overlap the antenna feeder wires.
4. The antenna body, feeder wire, and the SMA connectors should not touch the metal / carbon-fiber structure parts directly. Please reserve at least 10 mm distance between these parts and the structure parts.
5. The two air unit antennas should be placed away from each other for at least 50 mm distance. And try your best to avoid any kinds of obstruction between the ground unit and the aircraft during flight.


2023 SIYI Technology, All Rights Reserved

6. Please be very careful with the antenna wire's SMA connectors and its solder connectors. Do not drag them or bend them in case of any damage. To adjust the position of the antenna, please always try to bend the middle part of the antenna feeder wires.

## ⚠ CAUTION

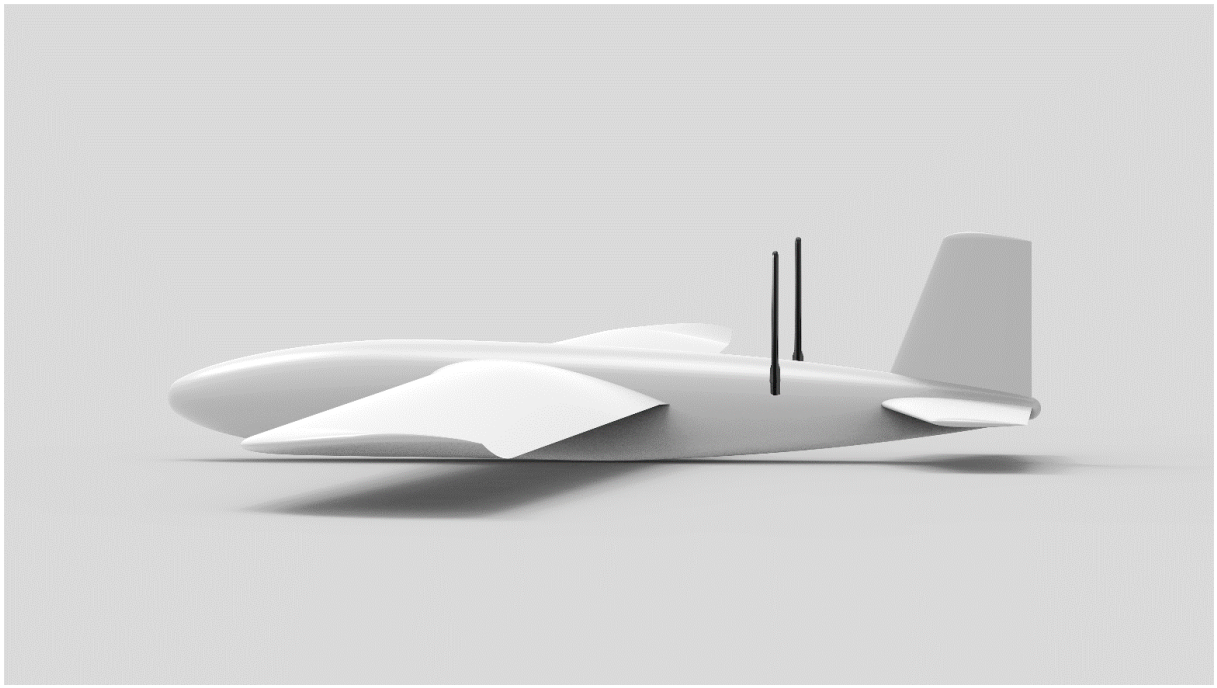
As shown in the picture below, for small and medium-sized multi-rotor drones, the air unit antenna should be placed downward perpendicular to the arm to keep the flat surface of the antenna facing the direction of the remote controller.

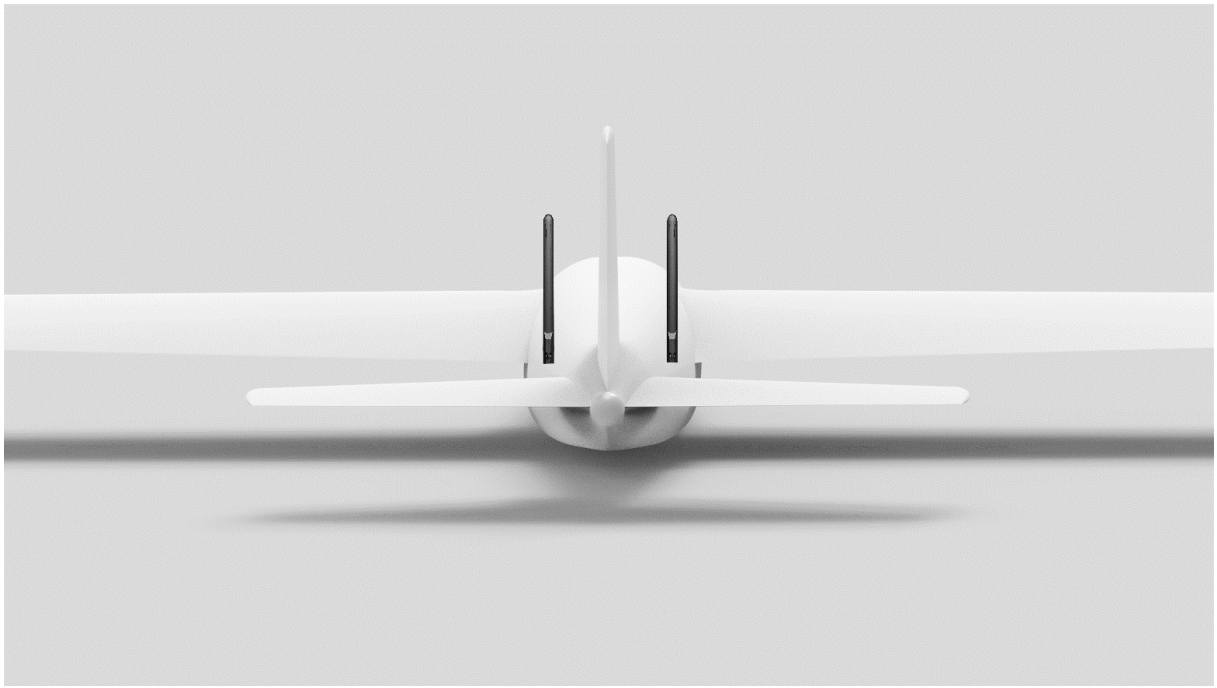
2023 SIYI Technology, All Rights Reserved

As shown in the figure below, for large multi-rotor drones, the air unit antenna should be placed vertically downwards from the motor base to keep the flat surface of the antenna facing the direction of the remote control.

2023 SIYI Technology, All Rights Reserved

As shown in the figure below, for fixed-wing aircraft, the air unit antenna can be placed vertically to the wings or vertical tail upwards and try to keep the flat surface of the antenna facing the direction of the remote controller.



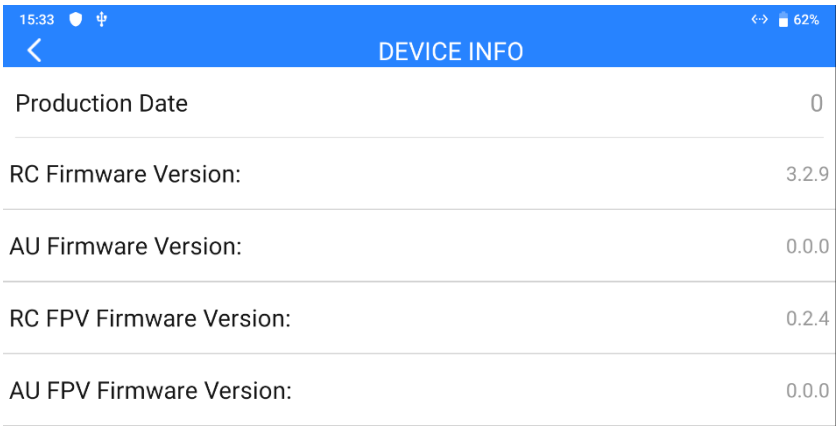




2023 SIYI Technology, All Rights Reserved

### 2.2.5 The Communication Range Is Not as Expected and You Need Factory Support, Here Are the Necessary Information We Need

1. The obvious things that make you think about range is not good.
   - Signal Loss: Image disappears, and RC status indicator is red.
   - Only image disappears (RC status indicator is green).
2. Flight altitude and distance of your drone when you observe the above things.
3. Flight test environment (pictures or videos taken in the orientation of the flight).
4. Check software information relevant to communication.
   - Wireless Mode
   - Remote Controller and Air Unit Firmware Version




   - SIYI FPV app version

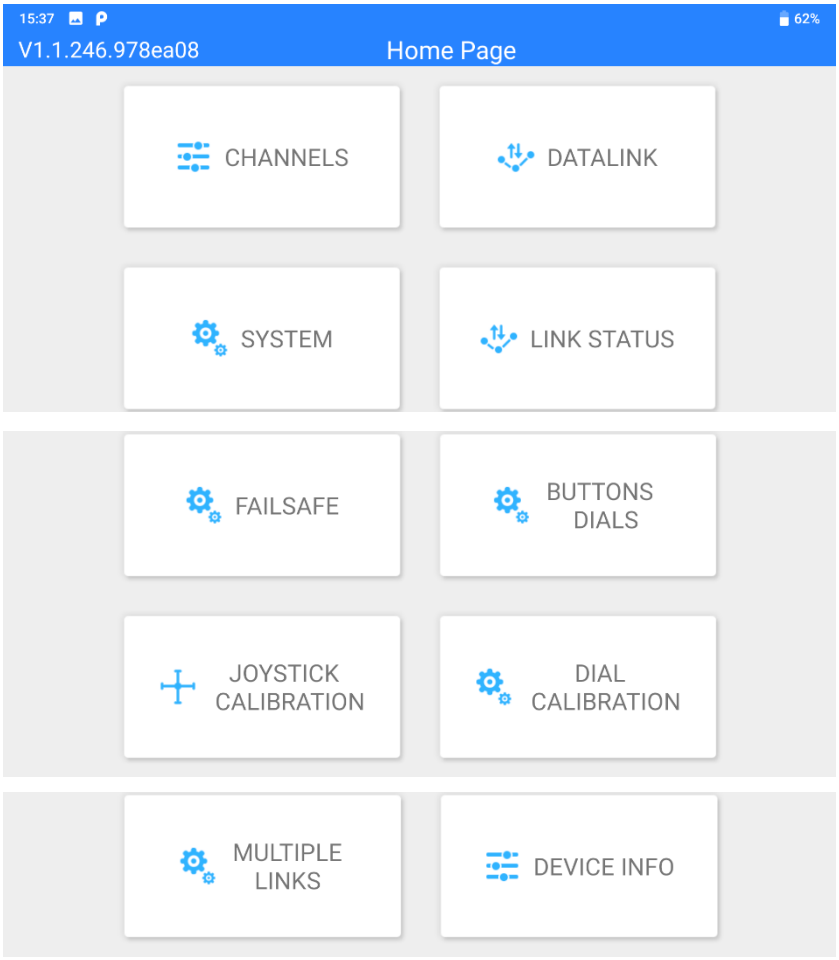

2023 SIYI Technology, All Rights Reserved

5. Check hardware configuration relevant to communication.
   - Remote Controller Antenna Type, Antenna Installation, Operating Angle (all with pictures)
   - Air Unit Antenna Type, Antenna Installation (both with pictures)
   - Air Unit Power Supply / Voltage and if the original BEC is removed / modified.
6. If all above trouble shooting still didn't help find the cause to unexpected range, please provide a screenshot of SIYI FPV app with all OSD turned on when the drone is flying closely to the range limit that you have experienced, or provide a screen recorded video of the running SIYI FPV app during the whole flight.


2023 SIYI Technology, All Rights Reserved

# 3 SIYI TX APP

Users can configure remote controller in “SIYI TX” app.



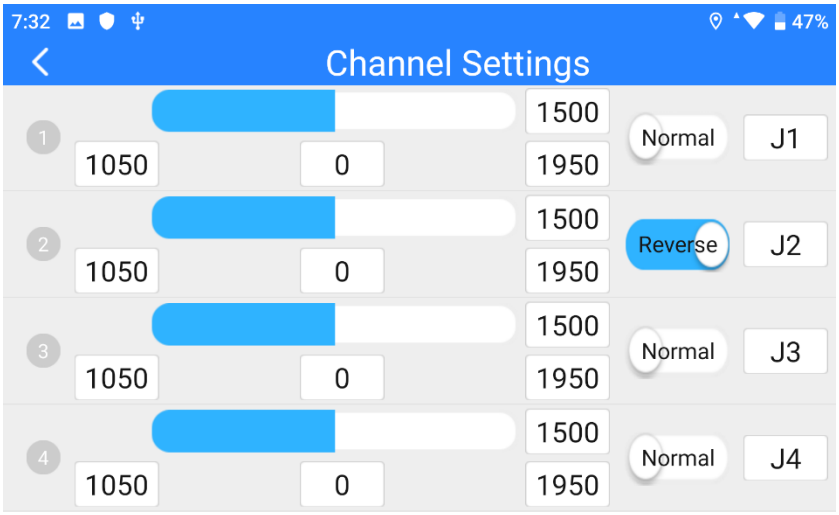

**Mark**

This chapter was made according to “SIYI TX” v1.1.246.


2023 SIYI Technology, All Rights Reserved

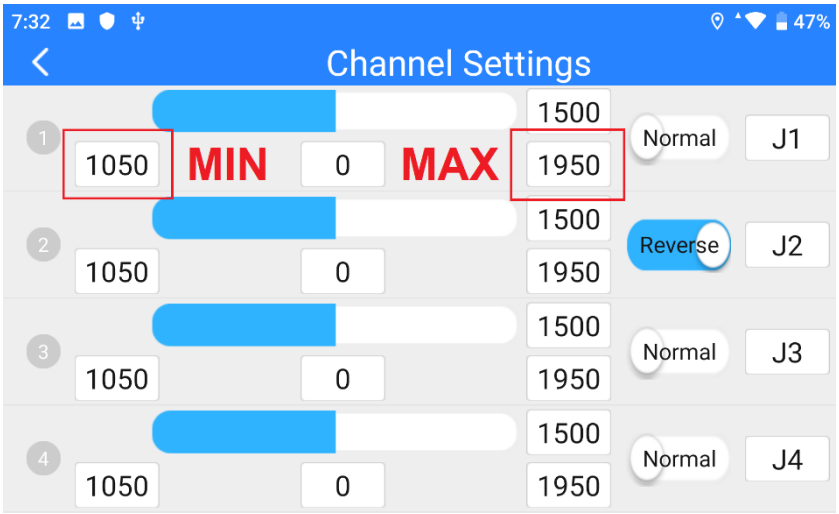
## 3.1 Channels

Channel settings of End Point, Middle Point, Channel Reverse, and Channel Mapping.




### 3.1.1 End Point

Remote controller's default end point range is between 1050 and 1950.



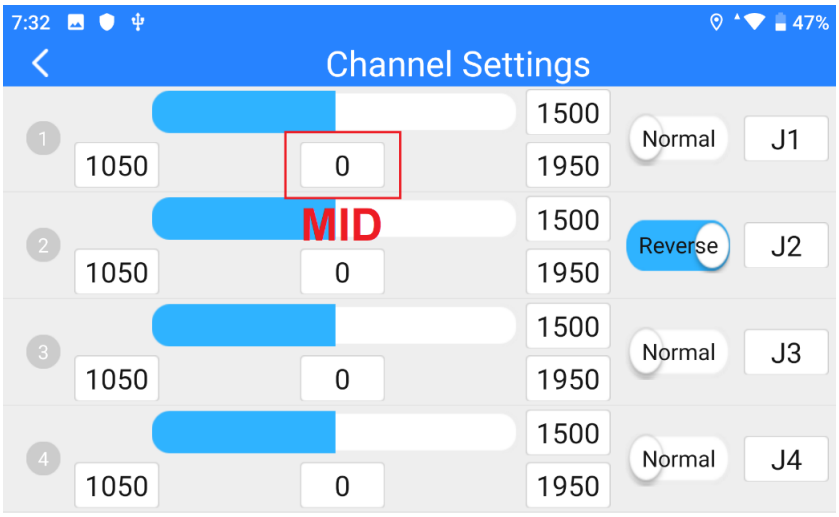


2023 SIYI Technology, All Rights Reserved

Select a target channel and input your required maximum or minimum channel value. It's done.

### 3.1.2 Middle Point

The default Middle Point value is "1500".



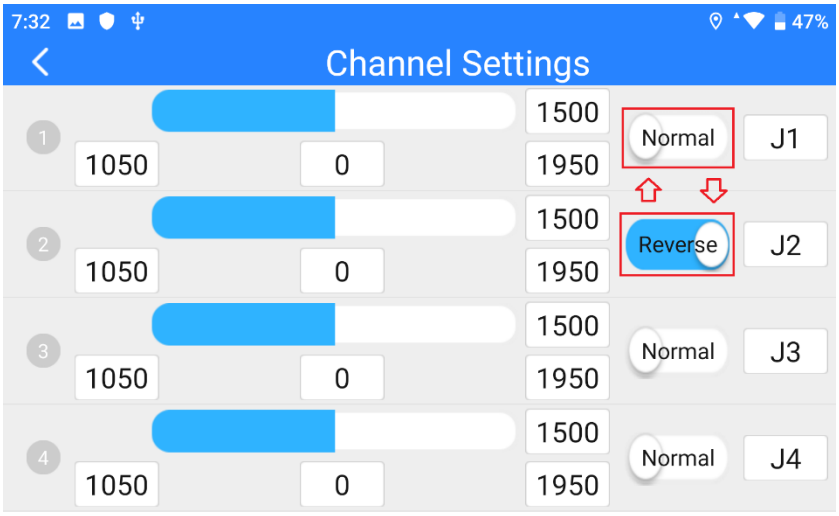

Select a target channel and input your required middle point value. It's done.

### 3.1.3 Channel Reverse

Channel Reverse is to reverse a channel's output direction.



2023 SIYI Technology, All Rights Reserved




Select a target channel. Then touch the “Normal” or “Reversed” button. It’s done.

### 3.1.4 Channel Mapping

MK32 remote controller has 16 physical channels, an RSSI channel, and 16 communication channels. Users are allowed to define or to map the physical channels (buttons, switches, joysticks) and the RSSI channel to the communication channels freely.

Select a target channel. Then touch a mapped button / switch / joystick, it will pop

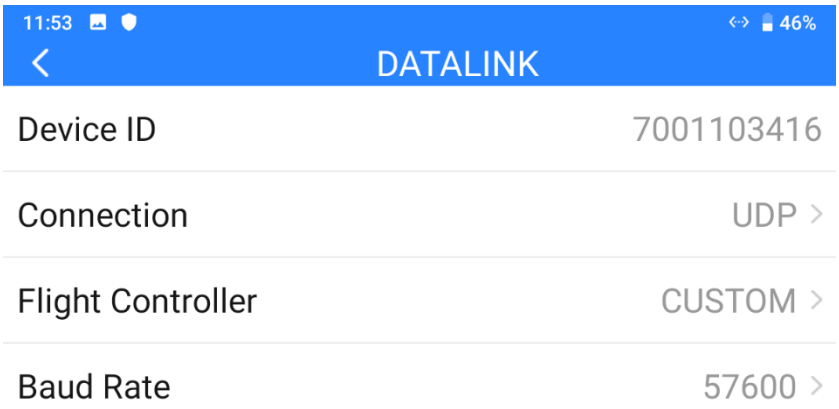

2023 SIYI Technology, All Rights Reserved

up a list of all physical channels. Select the button / switch / joystick you want to re-map to. It's done.


2023 SIYI Technology, All Rights Reserved

## 3.2 Datalink

In Datalink Settings you can check the device ID, switch datalink connection and flight controller type, and configure customized baud rate.




**About Datalink Settings**

Device ID: Display the device ID of the integrated Bluetooth module in remote controller. It also shows as the Bluetooth name before pairing.

Connection: Available datalink ports in remote controller.

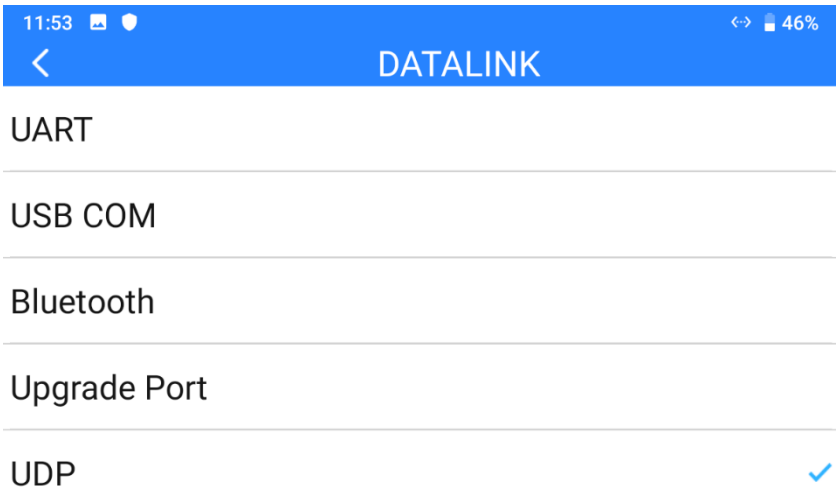
Flight Controller: Compatible flight controller models by remote controller.

Baud Rate: The baud rate here must match the baud rate of PX4 / Ardupilot flight controller TELEM port which is used for datalink and configured in GCS.

### 3.2.1 Connection

Available datalink connection types in remote controller are: UART, USB COM, Bluetooth, Type-C Upgrade Port, and UDP.


2023 SIYI Technology, All Rights Reserved




**About Datalink Connection**

UART: Telemetry data goes through the built-in UART port in the remote controller.

*Compatible with specific Android GCS, such as BOYING, JIYI, and VKFLY.

*Developers can acquire SDK from SIYI to use the port for their GCS.

USB COM: Telemetry data goes through the built-in CP2102 port in the remote controller.

*Compatible with Android QGroundControl.

Bluetooth: Telemetry data goes wirelessly through the built-in Bluetooth connection.

*Compatible with most Android and Windows GCS.

Type-C Upgrade Port: Telemetry data goes to Windows GCS through the Type-C port on MK32 remote controller.

UDP: Telemetry data goes through UDP network protocol.

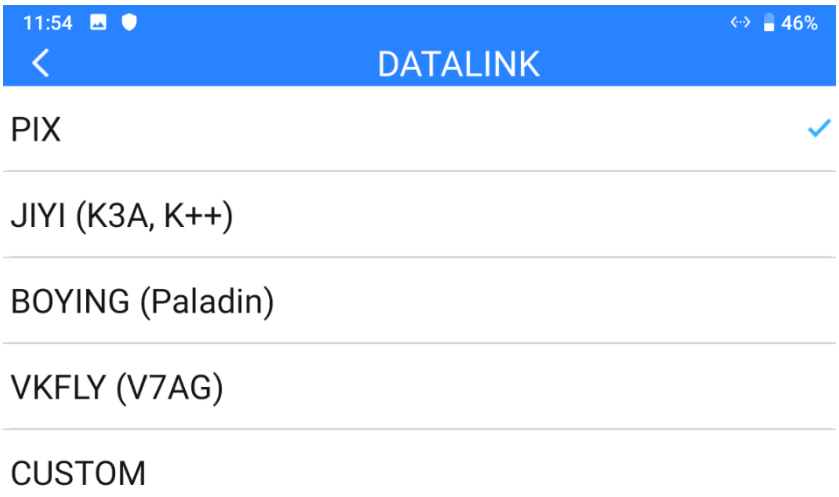
### 3.2.2 Flight Controller

Select your required flight controller type for datalink connection in the provided


2023 SIYI Technology, All Rights Reserved

list.

Currently supported flight controller models are: SIYI N7 Autopilot, PX4 / Ardupilot Flight Open-source Controllers, JIYI (K3A or K++), BOYING (Paladin), VKFLY (V7AG) agriculture flight controllers, and customized flight controllers.



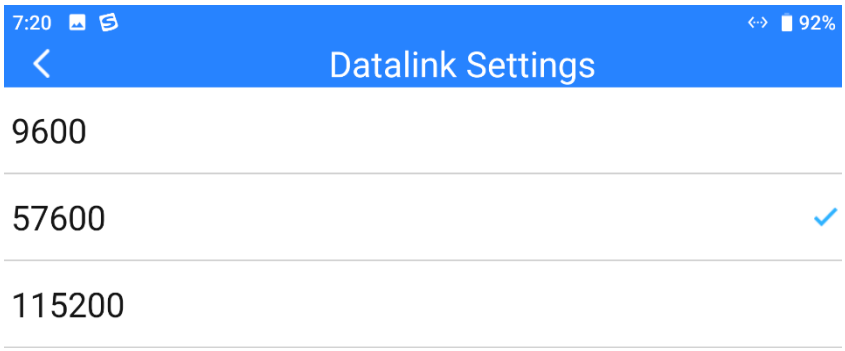

**Mark**

Please make sure that the remote controller has been bound to the air unit before switching flight controller type, otherwise it would fail.

### 3.2.3 Baud Rate

If your flight controller model was not found in the list, please choose “Custom” and manually configure the baud rate of your flight controller in this page.


2023 SIYI Technology, All Rights Reserved



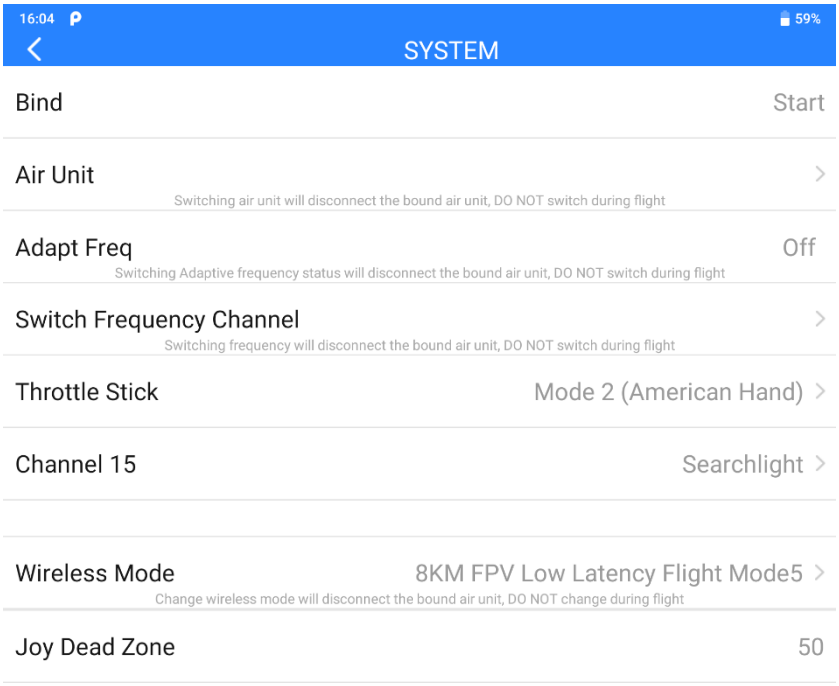

**Mark**

Please make sure that the remote controller has been bound to the air unit before configuring baud rate, otherwise it would fail.


2023 SIYI Technology, All Rights Reserved

## 3.3 System

Configure some important system functions for the remote controller.




**About System Settings**

Bind: Check current binding status or start binding process on remote controller.

Multiple Air Unit: Remote controller can save up to five bound air units for switching quickly with no need to bind them again.

Adapt Frequency: When binding, remote controller searches and switches to the frequency band with lowest interference automatically.

Switch Frequency Channel: Manually switch the working frequency to a channel.

Throttle Stick: Switch throttle types among Mode 1, Mode 2, Mode 3, and Custom.

Channel 15: Switch controlling channel 15 between the searchlight switch of the IP67 camera and the pitch axis rotation of the A2 mini gimbal.

Wireless Mode: Switch wireless mode for different communication range.


2023 SIYI Technology, All Rights Reserved

Joystick Deadzone: Configure the joystick deadzone value for smooth control based on your habit.

### 3.3.1 Bind

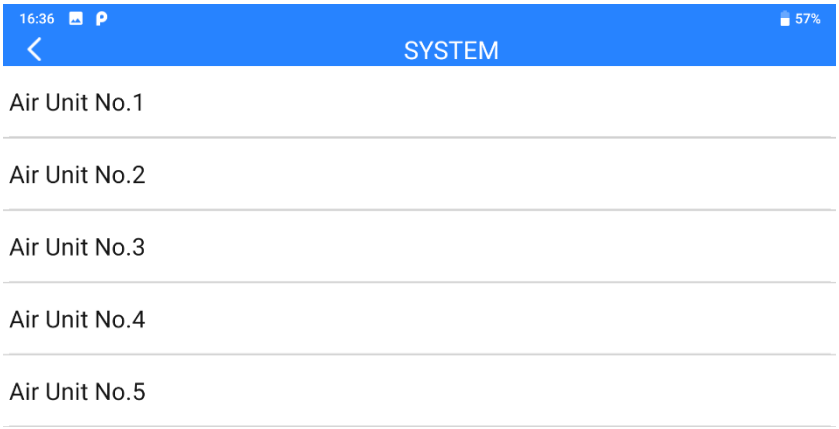
Please follow the steps below to bind the ground unit to the air unit.

1. In “SIYI TX” application, go to “System” page, then touch “Bind - Start”.
2. Ground unit status indicator will turn to “Red Fast Blinking”. And in “Bind” menu, it displays “Binding”.
3. Press and hold the binding button on the air unit for about two seconds, air unit status indicator will turn to “Red Fast Blinking” as well.
4. Then wait for 5 to 10 seconds till both ground unit and air unit status indicators have turned to “Solid Green”. Binding is done.

### 3.3.2 Multiple Air Unit

The multiple air unit function supports saving multiple bounded air unit and corresponding channel setting data on the same remote control. In this way, after each air unit and remote controller are bound for the first time, users no longer need to re-bind to switch between them.


2023 SIYI Technology, All Rights Reserved




**DANGER**

It is forbidden to switch the air unit during flight. Switching the air unit during flight will cause the link to go out of control!

### 3.3.3 Frequency Self-Adapting

In strong-interference environment, turn on the function, remote controller will automatically search for the frequency band with least interference to get the best transmission quality.

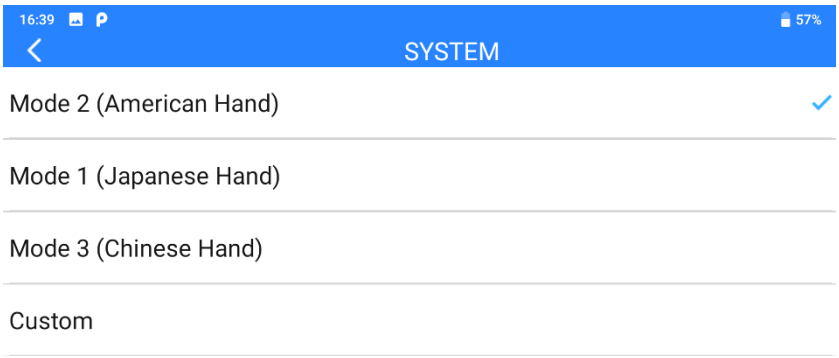
**Mark**

After turning on the function in “SIYI TX”, please restart the remote controller, otherwise it would fail.


2023 SIYI Technology, All Rights Reserved

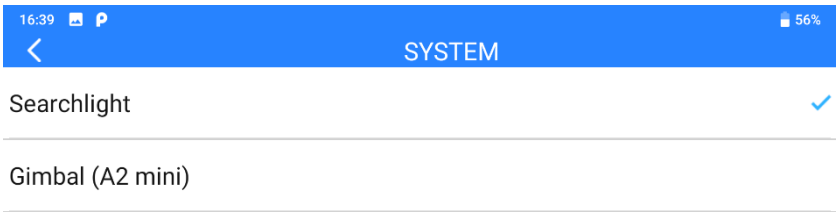
### 3.3.4 Throttle Stick

Switch throttle joystick type. Available types are Mode 1 (Japanese Hand), Mode 2 (American Hand), Mode 3 (Chinese Hand), and Customize Hand.




### 3.3.5 Channel 15

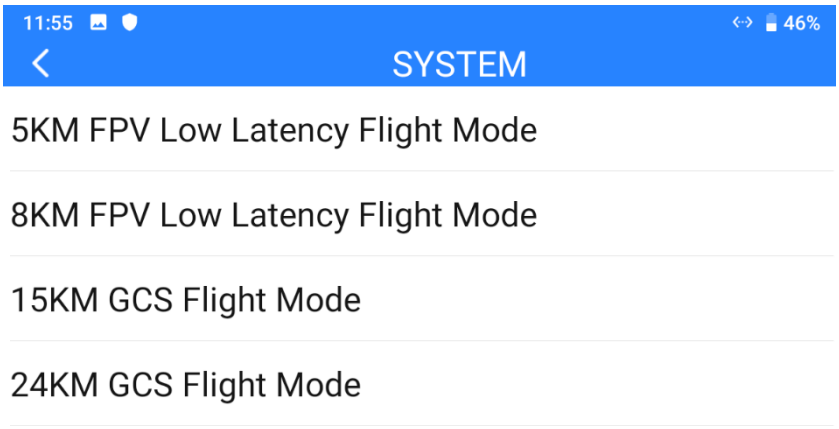
Switch controlling channel 15 to the IP67 camera's searchlight function or the A2 mini gimbal's pitch axis rotation.




### 3.3.6 Wireless Mode

SIYI link supports switching wireless communication modes and cooperates with different types and different gain antennas to achieve the conditions most conducive to wireless communication and the ultimate communication distance.


2023 SIYI Technology, All Rights Reserved

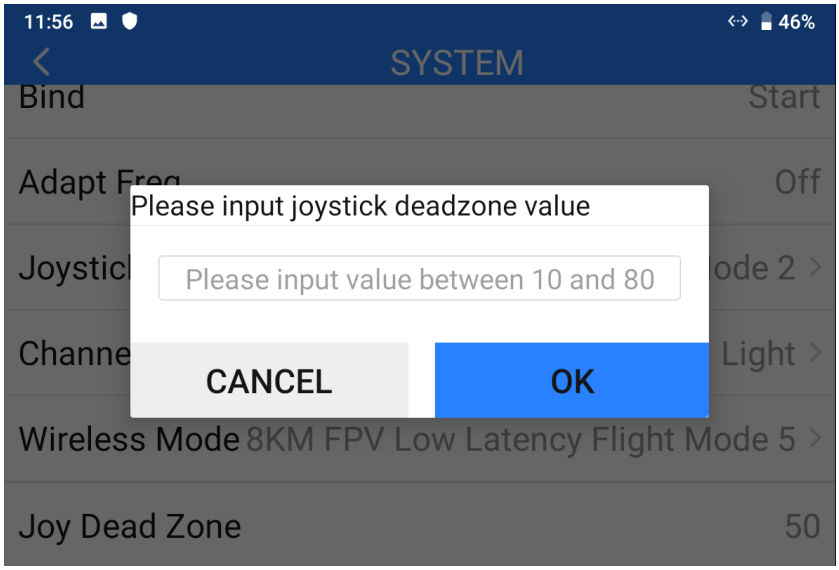



**Mark**

Before configuring wireless modes, please carefully read the chapter 2.2 in this manual "Important Instructions on Promotion to Communication Range and Video Fluency".

### 3.3.7 Joystick Deadzone

Adjust the joystick dead zone to adapt to various control feels.

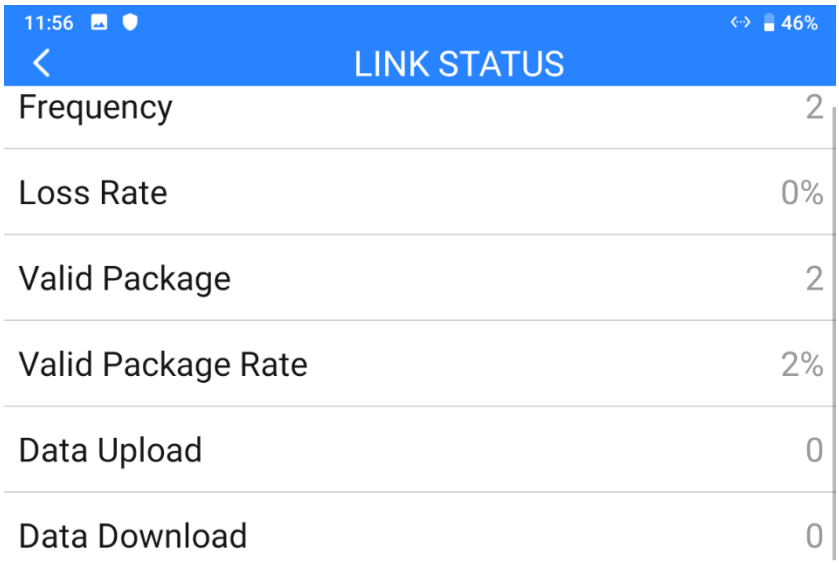




2023 SIYI Technology, All Rights Reserved

## 3.4 Link Status

Link Status page digitalized the system's transmission quality by displaying the link's real-time status in numbers and percentage.




**About Link Status**

Frequency: The current frequency that the system is working at.

Loss Rate: Loss percentage of data package which failed to be received by the ground unit per second.

Received Pack: Quantity of data package which are successfully received by the ground unit per second.

Received Rate: Received percentage of data package which are successfully received by the ground unit per second.

Upload: Data uploaded to the air unit per second by bit.

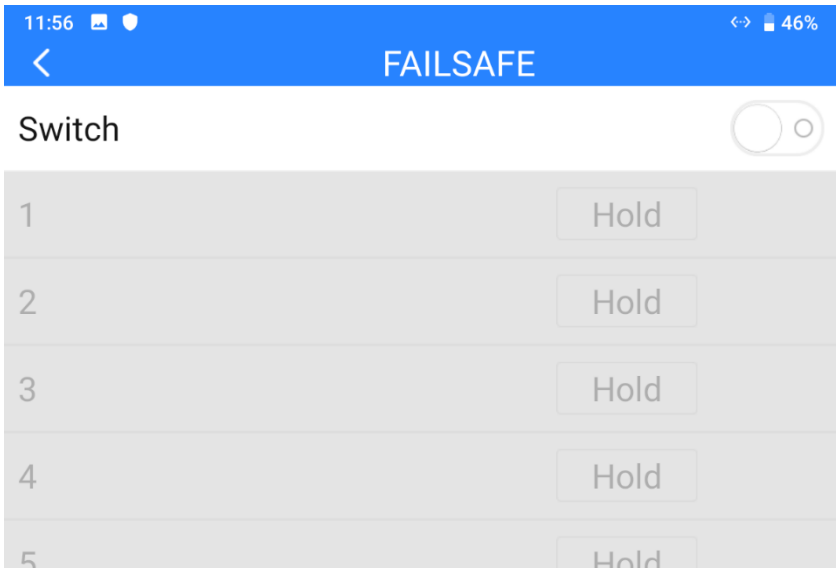
Download: Data downloaded from the air unit per second by bit.


2023 SIYI Technology, All Rights Reserved

## 3.5 Failsafe

After finishing binding the ground unit to the air unit for the first time, please do configure the system with Failsafe function immediately.

Failsafe function is to avoid aircraft crash by keeping the air unit outputting the pre-configured channel value when the air unit lost communication with the ground unit.

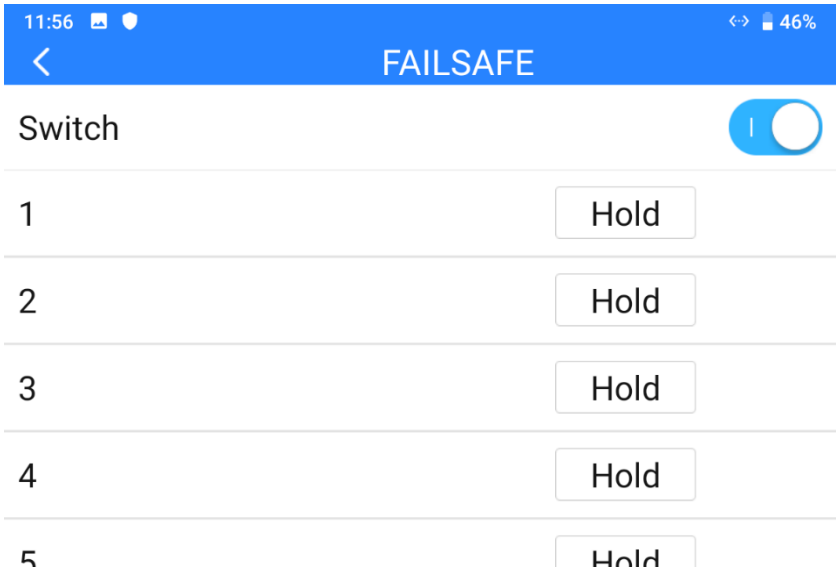



Please follow the steps below to configure your system with Failsafe function.

1. Make sure that the ground unit is bound to the air unit.

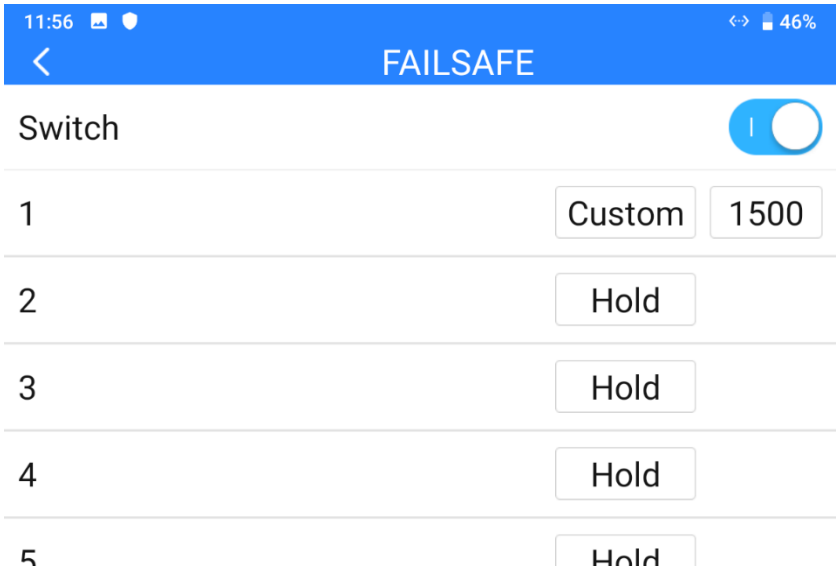
2. Go to “Failsafe” page.


2023 SIYI Technology, All Rights Reserved




3. Failsafe function is not activated in default. The numbers on left represent channels. Channels display “Hold” when no channel value was input.

4. If you require a specific value in the channel, please turn on Failsafe switch first and switch from the “Hold” button to “Custom”. Then input your required channel value for Failsafe.




5. After configuration, the channel would output the value if the air unit lost communication with the ground unit during flight.



2023 SIYI Technology, All Rights Reserved

## Mark

If your flight controller communicates with the air unit through S.Bus protocol, then it is unnecessary to configure your system with Failsafe function (unless it is specially required by flight controller to activate Failsafe function and switch to RTH, by holding a specific value in a channel). You just configure your GCS with protection measures, because there are Out-of-Control marks in S.Bus protocol which tells the flight controller what situations belong to Out-of-Control.

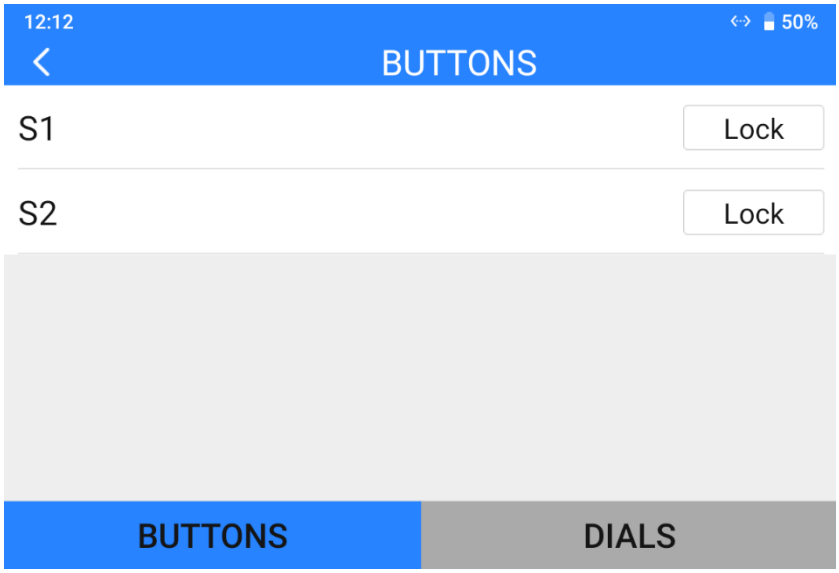

2023 SIYI Technology, All Rights Reserved

## 3.6 Buttons / Dials

Remote controller supports changing the way that the buttons and the dials work.

### 3.6.1 Buttons

The function changes the way that the S1 and S2 buttons.




**About Buttons**

Lock: After pressing, the button bounces back but the channel will keep outputting 1950. Press the button again to reset channel output to 1050.

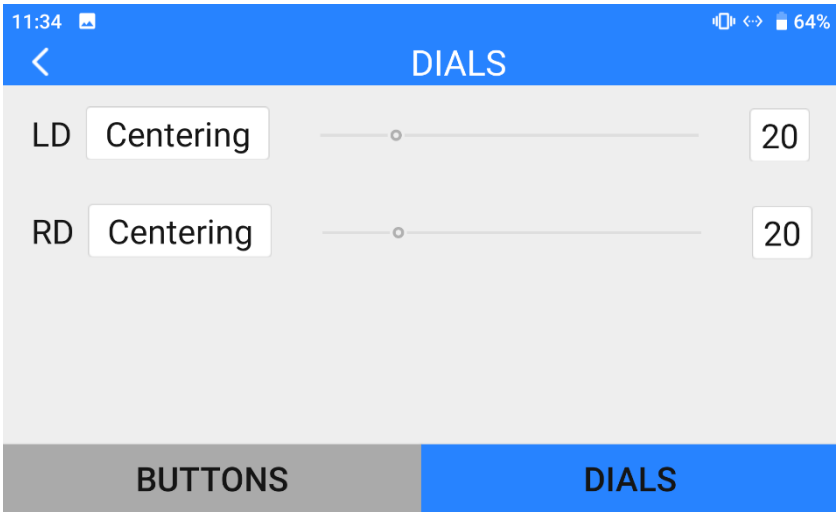
Reset: Press and hold the button, the channel will output 1950. Release the button, channel output resets to 1050.

3-Stage: After pressing, the button will bounce back but the channel will keep outputting 1950. Press and hold the button for two seconds, the channel will output 1500. Press the button again to reset channel output to 1050.


2023 SIYI Technology, All Rights Reserved

### 3.6.2 Dials

The function changes the way that the two dials (LD, RD) work.




**About Dials**

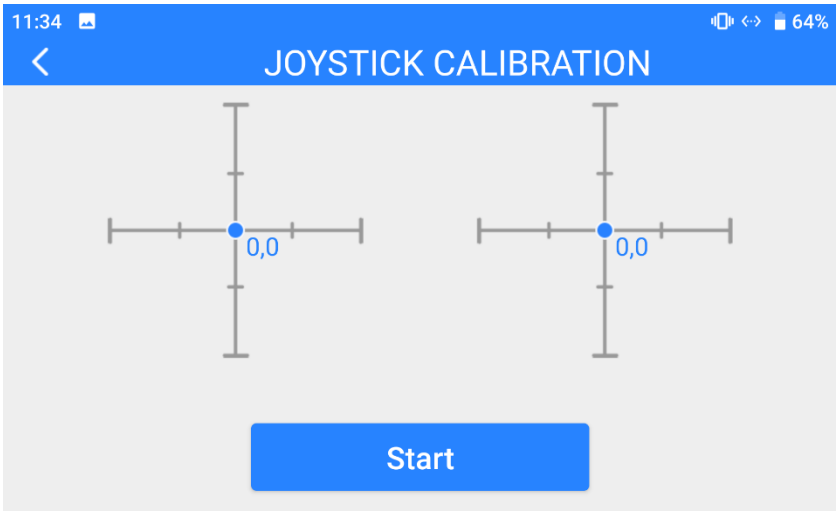
Centering: Under “Centering” mode, when you push the dial and release, the dial’s outputting value will return to the initial value (middle point of the channel).

Thumb-slide: Under “Thumb-slide” mode, when you push the dial and release, the dial’s outputting value will stay at the current value.


2023 SIYI Technology, All Rights Reserved

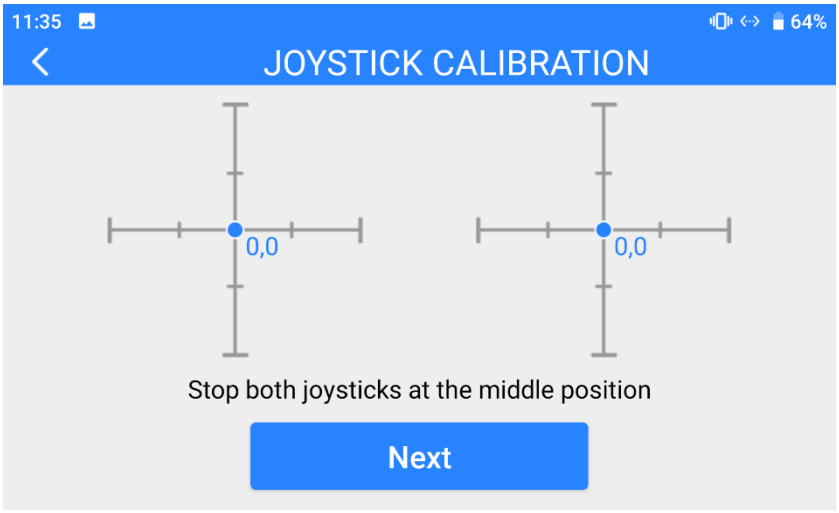
## 3.7 Joystick Calibration

Joystick calibration function help users calibrate both joysticks' middle positions and maximum / minimum positions. Regular calibration helps maintain the control accuracy of the joysticks.




### Steps

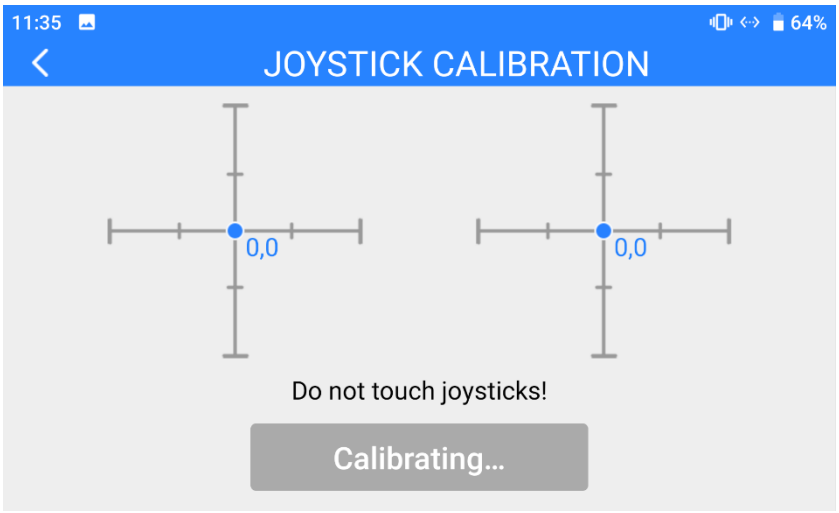
1. Before calibrating the joysticks, please make sure that both joysticks are naturally standstill, not displaced by any force.
2. In "Joystick Calibration" page, touch "Start", the page shows as below.





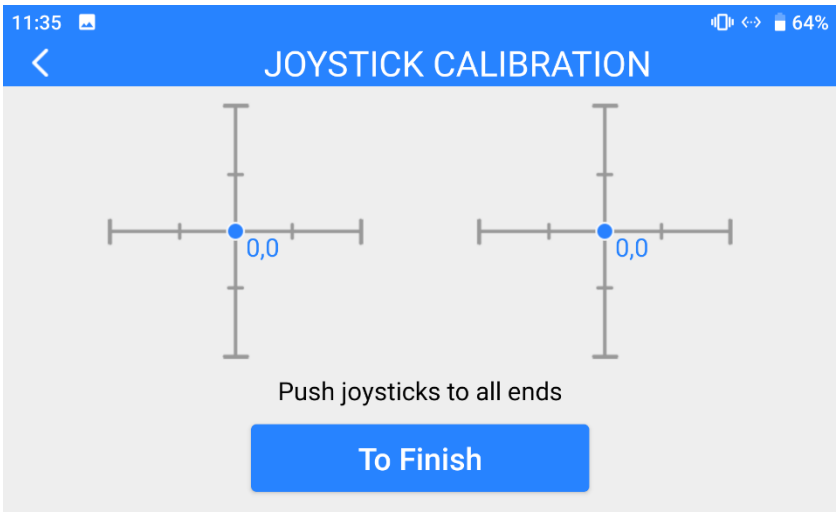
2023 SIYI Technology, All Rights Reserved

3. According to the tips, if joystick coordinates are not “(0, 0)” when both joysticks are standstill, it shows that joystick middle points are displaced. Please touch “next” and do not touch joysticks.




4. Calibration of joystick middle points are finished. The next step is to calibrate joystick maximum and minimum positions.

   Please follow the tips again to push each joystick to its maximum/minimum positions on all four dimensions.




*Up: 0, 100*


2023 SIYI Technology, All Rights Reserved

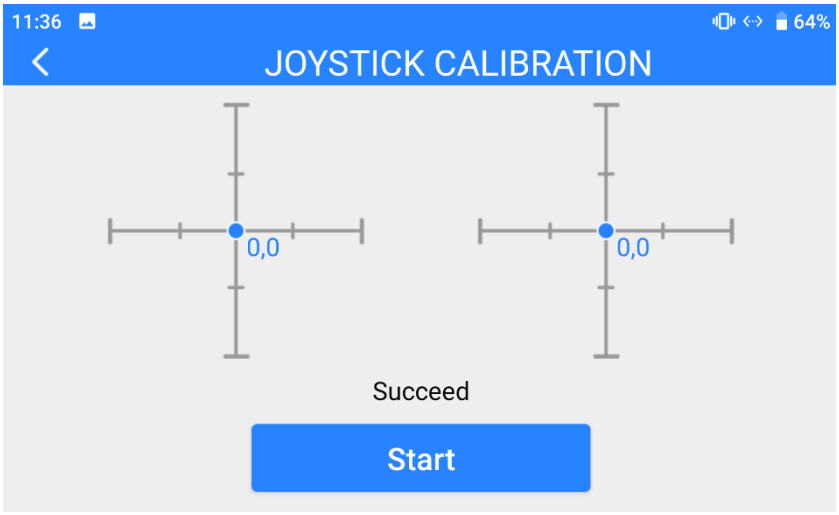
*Down: 0, -100*

*Left: -100, 0*

*Right: 100, 0*

Then touch “Finish”.

5. The Joystick Calibration page will turn to its initial page. Joystick calibration is finished.



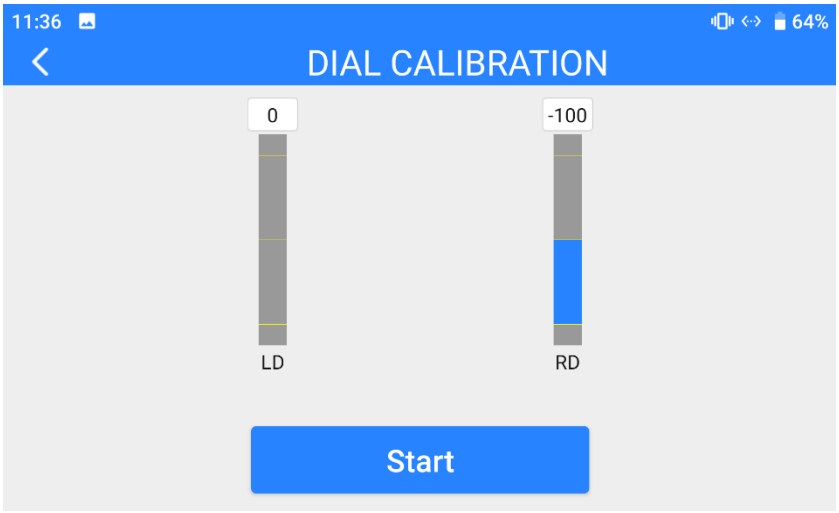

**Mark**

If the joysticks do not stay in middle (coordinates are not (0, 0)) or do not output maximum/minimum value (-100 or 100), you shall calibrate them immediately.


2023 SIYI Technology, All Rights Reserved

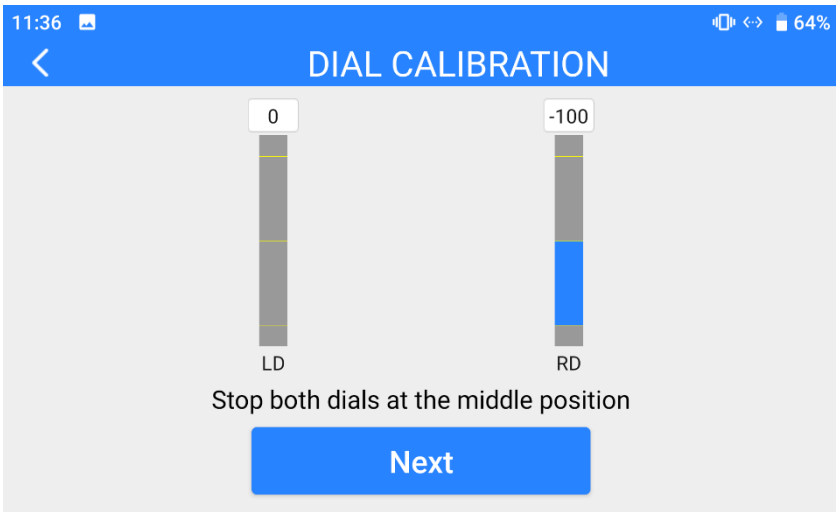
## 3.8 Dial Calibration

Dial calibration function help users calibrate both dials' middle positions and maximum/minimum positions. Regular calibration helps maintain control accuracy of the dials.




### Steps

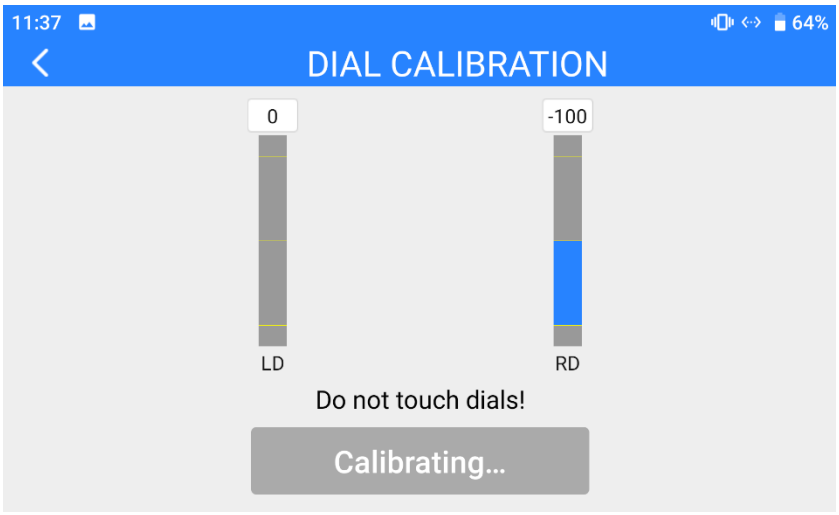
1. Before calibrating the dials, please make sure that both dials are naturally standstill, not displaced by any force.
2. In "Dial Calibration" page, touch "Start", the page shows as below.



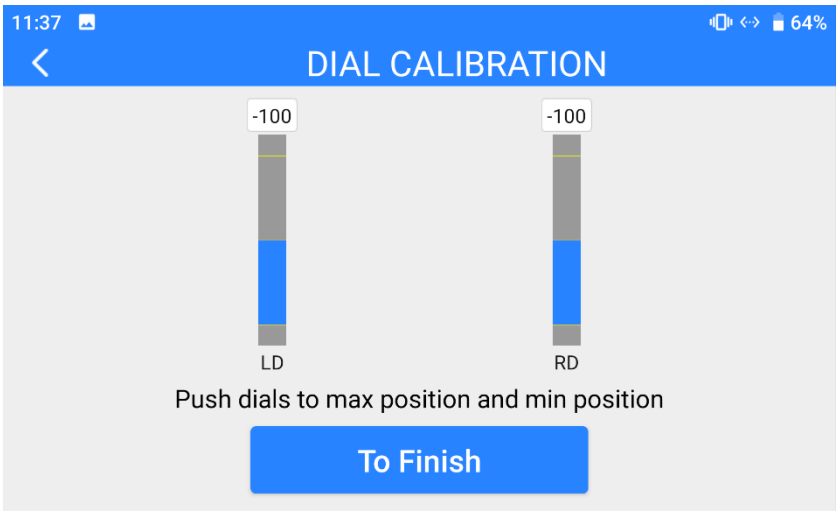


2023 SIYI Technology, All Rights Reserved

3. According to the tips, if dials' coordinates are not "(0, 0)" when both dials are standstill, it means that dial middle points are displaced. Please touch "next" and do not touch the dials.




4. Calibration of dial middle points is finished. The next step is to calibrate dial maximum and minimum positions.

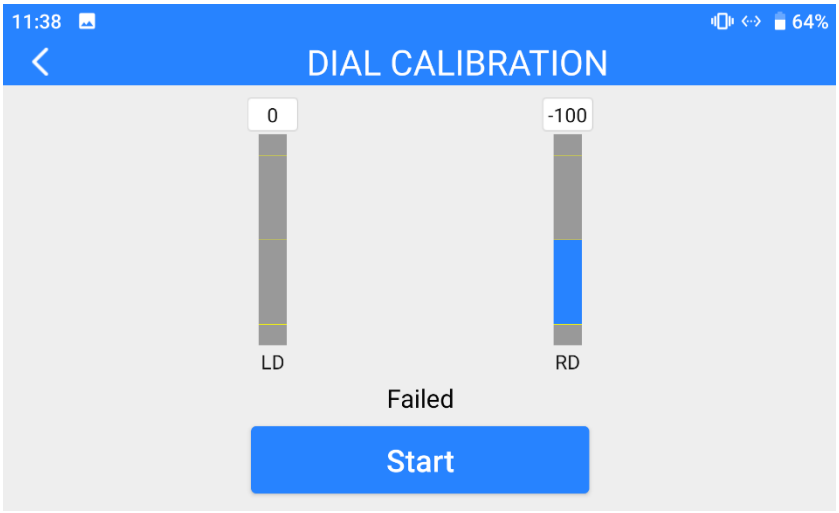



Please follow the tips again and push each dial to its maximum and minimum position.

Then touch "Finish".

5. Dial Calibration page will return to its initial page. Dial calibration is finished.


2023 SIYI Technology, All Rights Reserved



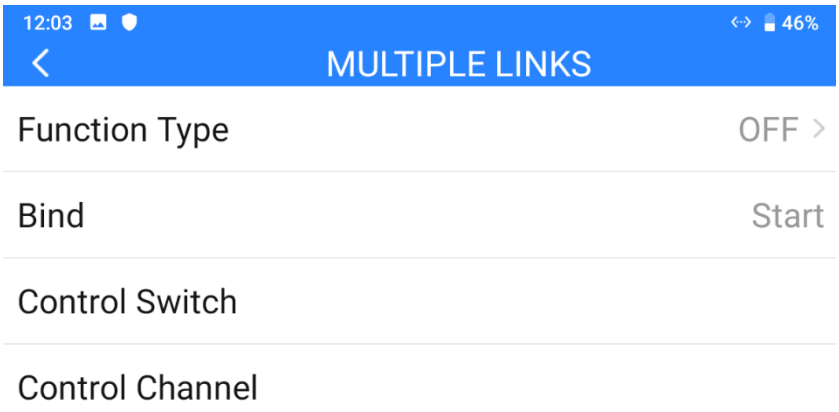

**Mark**

If the dials do not stay in middle (coordinates are not 0) or do not output maximum / minimum value (-100 or 100), you shall calibrate them immediately.


2023 SIYI Technology, All Rights Reserved

## 3.9 Multiple Links

The Multiple Links feature only comes with the dual edition, which includes details of its two main function “Remote Control Relay” and “Dual Operator”.




**About Multiple Links**

Function Type: Switch the function between “Remote Control Relay” and “Dual Operator” and switching between “TX-A” and “TX-B” at the same time.

Bind: Bind “TX-A” and “TX-B” with the air unit in turns after configuring function type.

Control Switch: Define a button or a switch to take over control in “Remote Control Relay” mode, or to switch control of certain channels between “TX-A” and “TX-B” in “Dual Operator” mode.

Control Channel: In “Dual Operator” mode, define channel mapping for TX-A and assign channels to TX-B according to your requirement.

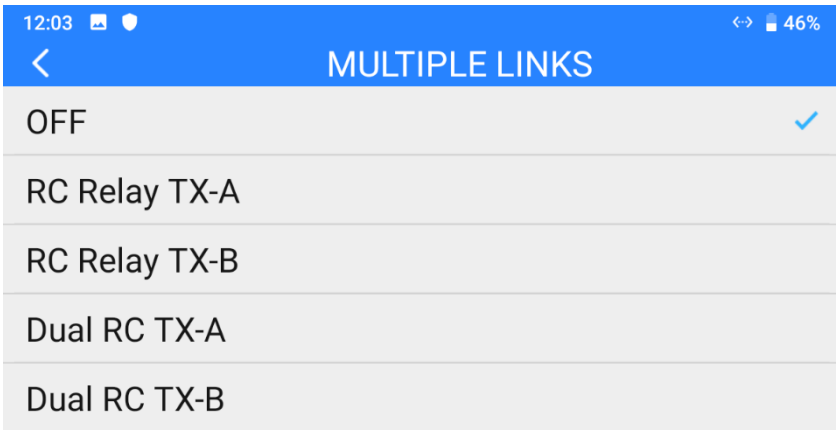

2023 SIYI Technology, All Rights Reserved

### 3.9.1 Remote Control Relay

The "remote-control relay" function is developed for ultra-long-distance flight missions. It supports two ground units to relay control the same air unit to reach a maximum transmission distance twice that of a single standard transmission system.

**Steps**

1. Prepare two MK32E remote controllers (dual edition).
2. Go to “Multiple Links – Function Type”, assign the two remote controllers as “RC Relay TX-A” and “RC Relay TX-B”.




3. Bind “TX-A” and “TX-B” to the same air unit in turns.
4. In “Control Switch” page, assign a switch / button / dial to switch control of the air unit from “TX-A” to “TX-B”.


2023 SIYI Technology, All Rights Reserved

5. RC Relay settings are finished.

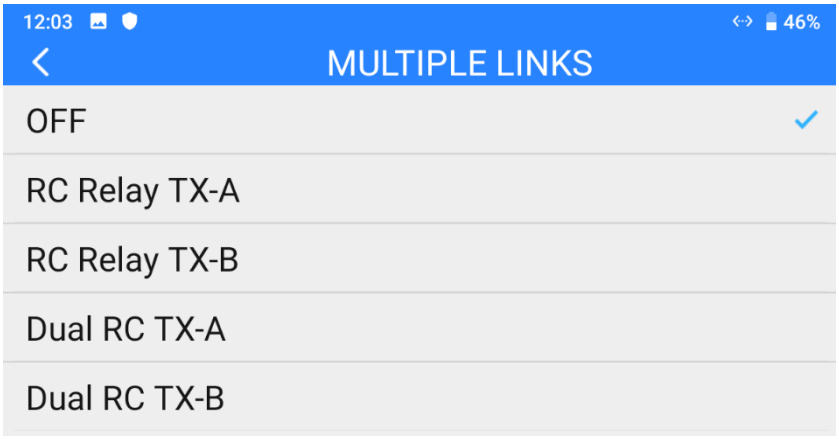
### 3.9.2 Dual Operator

The "dual operator" function is developed for dual-operator scenarios and supports up to two ground units to establish links with the same air unit at the same time. One can be used to control the flight attitude of the drone, and the other can be used to control the gimbal camera, optical pod, and other payloads.

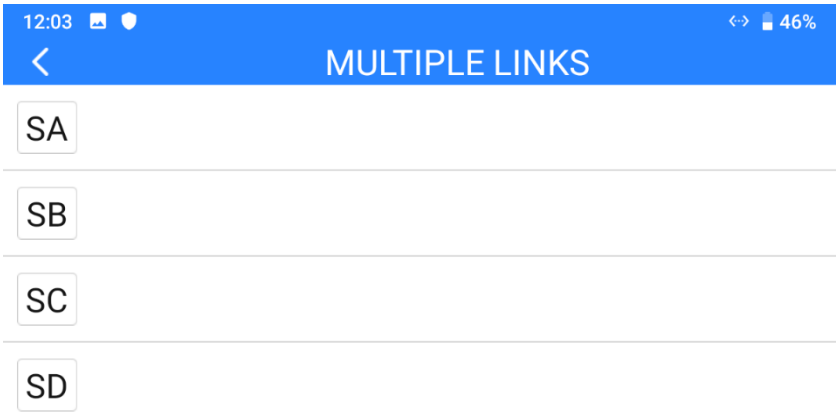
**Steps**

1. Prepare two MK32E remote controllers (dual edition).
2. Go to “Multiple Links – Function Type”, assign the two ground units as “Dual RC TX-A” and “Dual RC TX-B”.


2023 SIYI Technology, All Rights Reserved

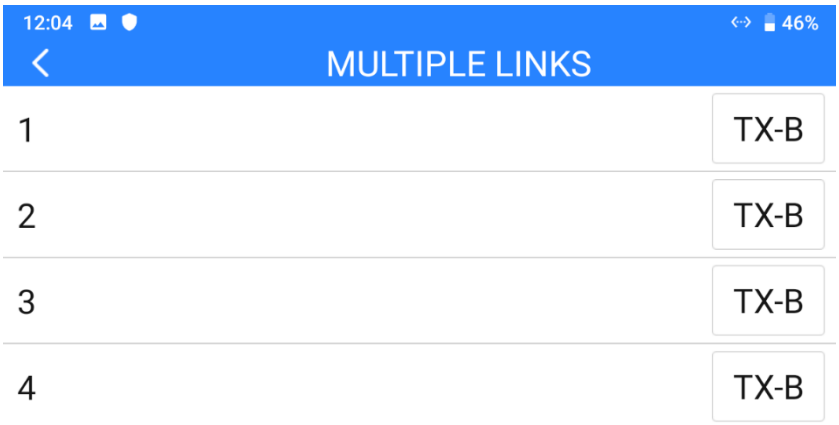



3. Bind “TX-A” and “TX-B” with the same air unit in turns.
4. In “Control Switch” page, assign a switch / button / dial to switch control to the air unit from “TX-A” to “TX-B”.




5. In “Control Channels” page, configure channel mappings for “TX-A”, then assign the decided channels to “TX-B”. Thus, when the Dual RC function is enabled, “TX-A” can authorize to “TX-B” or withdraw from “TX-B” the control of the assigned channels.


2023 SIYI Technology, All Rights Reserved




6. Dual RC settings are finished.

**Mark**

The “Dual Operator” function works similarly to “Wireless Coach” function. Thus, the dual editions can also be used for drone training and education.

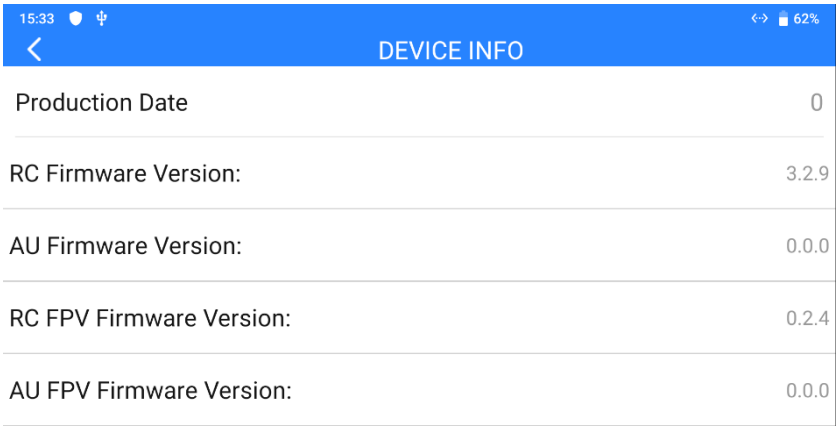
**DANGER**

When the “Dual Operator” function is enabled and “TX-A” lost control to the air unit, “TX-B” will lose control to the air unit, either.


2023 SIYI Technology, All Rights Reserved

## 3.10 Device Info

Displays the major factory information of the system.




**About Device Info**

Production Date: Displays the manufacturing date of the system.

RC Firmware Version: Displays the function firmware version of the remote controller.

AU Firmware Version: Displays the function firmware version of the air unit.

RC FPV Firmware Version: Displays the FPV firmware version of the remote controller.

AU FPV Firmware Version: Displays the FPV firmware version of the air unit.

**Mark**

The remote controller and air unit FPV firmware are not open for customer upgrade.


2023 SIYI Technology, All Rights Reserved

## 3.11 SIYI TX App Update Log

| Date | 2023-07-18 |
|---|---|
| Version | 1.1.240 |
| Updates | 1. New (MK32): Support remote controller signal output. |

| Date | 2023-07-11 |
|---|---|
| Version | 1.1.239 |
| Updates | 1. Improve: Frequency self-adapting support searching for the best channel.<br>2. Fix: System settings do not display setting status.<br>3. New: Support manually switching frequency channel. |


2023 SIYI Technology, All Rights Reserved

# 4 DATALINK

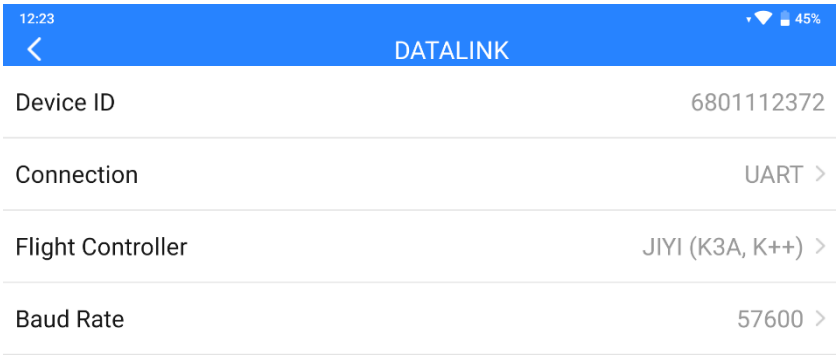
Datalink is one of the core features in most SIYI links.

Remote controller supports communication with different ground control software through various hardware interface.

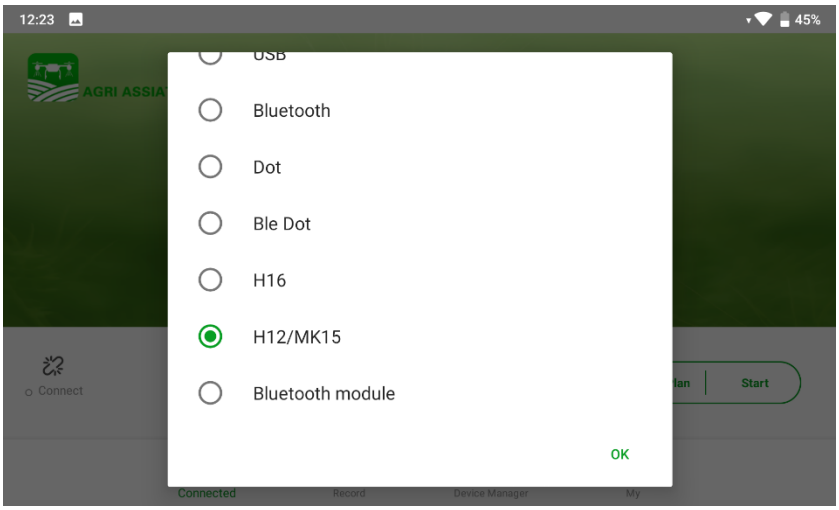
## 4.1 Communication with Android GCS through UART

### 4.1.1 JIYI Agri-Assistant

1. In “SIYI TX” app, go to “Datalink”, and choose “UART” in “Connection”, “JIYI (K3A / K++)” in “Flight Controller”, and “57600” in “Baud Rate”.



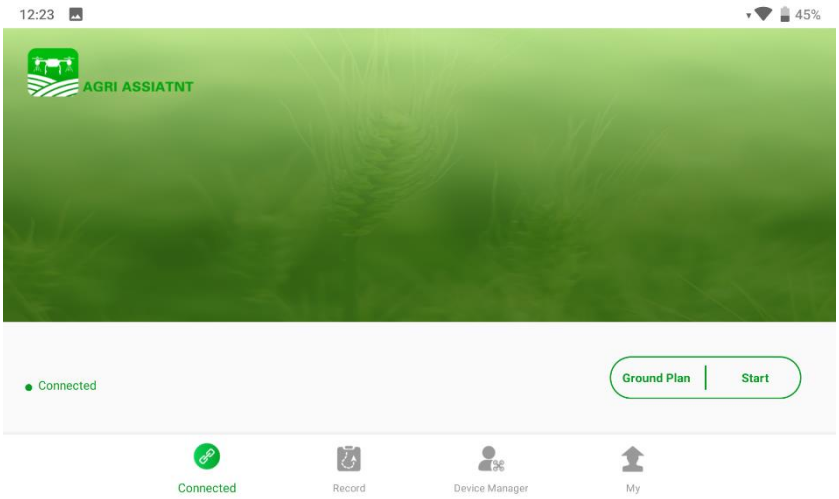

2. Run JIYI Agri-Assistant, choose “MK15” as the connection method.





2023 SIYI Technology, All Rights Reserved

3. After confirming, remote controller will communicate with JIYI app automatically and shows “device connected”. Datalink connection is established.

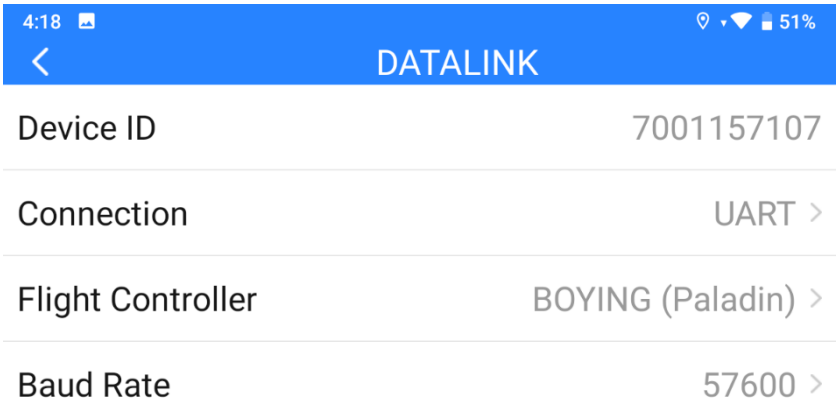



**Mark**

SIYI links also support datalink connection to JIYI Agri-Assistant through Bluetooth.

### 4.1.2 BOYING Agriculture

1. In “SIYI TX” app, go to “Datalink”, and choose “UART” in “Connection”, “BOYING (Paladin)” in “Flight Controller”, and “57600” in “Baud Rate”.




2. Run BOYING agriculture, choose “MK15” as the connection method.


2023 SIYI Technology, All Rights Reserved

3. After confirming, remote controller will communicate with the BOYING app automatically and shows “device connected”. Datalink connection is established.

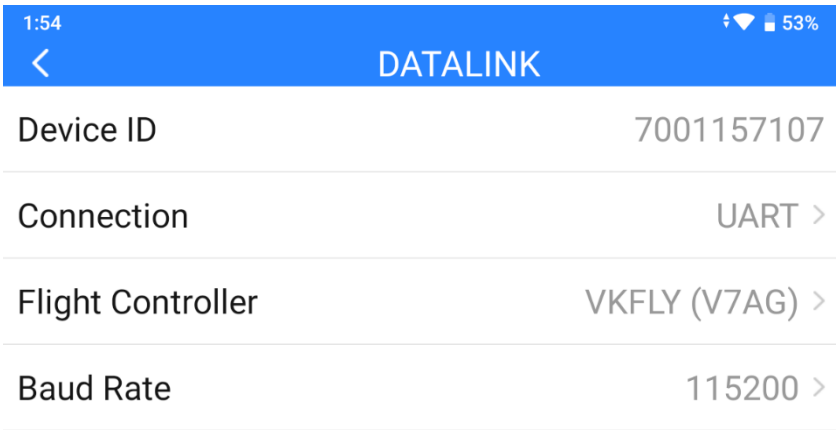
**Mark**

SIYI links also support datalink connection to BOYING GCS through Bluetooth.

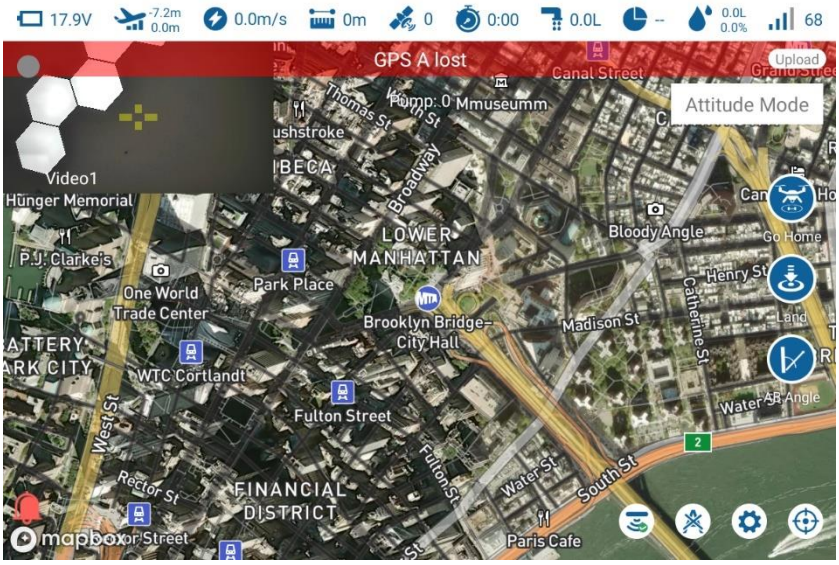
### 4.1.3 VK Agriculture

1. In “SIYI TX” app, go to “Datalink”, and choose “UART” in “Connection”, “VK (V7AG / V9AG)” in “Flight Controller”. The baud rate will automatically adapt to “115200”.


2023 SIYI Technology, All Rights Reserved




2. Run VK GCS, remote controller will communicate with the VK app automatically and shows “device connected”. Datalink connection is established.




**Mark**

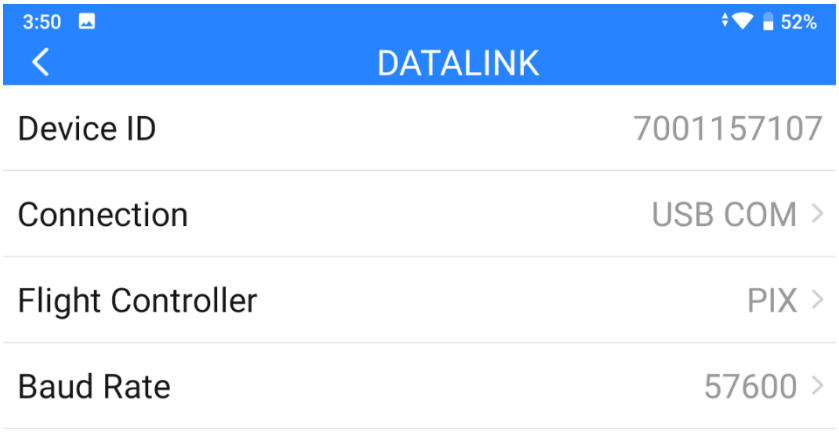
SIYI links also support datalink connection to BOYING GCS through Bluetooth.


2023 SIYI Technology, All Rights Reserved

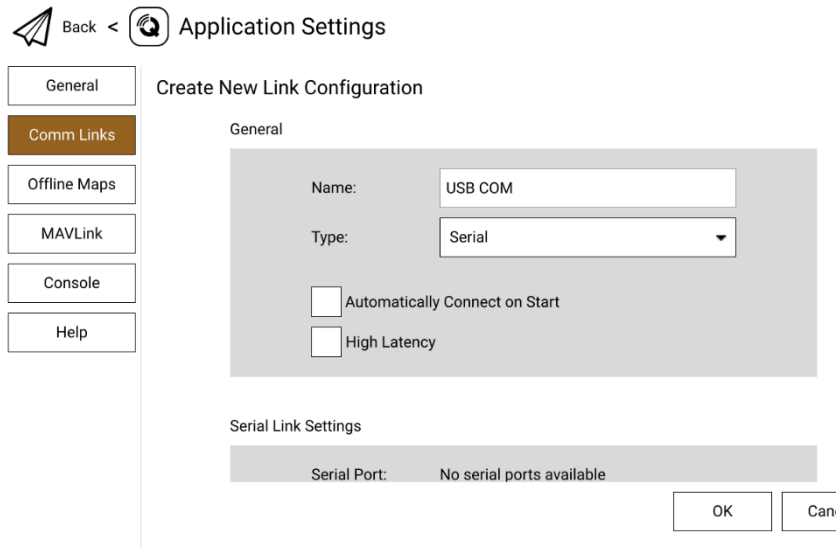
## 4.2 Communication with Android GCS through USB COM

### 4.2.1 QGroundControl

1. In “SIYI TX” app, go to “Datalink”, and choose “USB COM” in “Connection”, “PIX / PX4 / Ardupilot” in “Flight Controller”, and match the baud rate with the flight controller TELEM port’s.



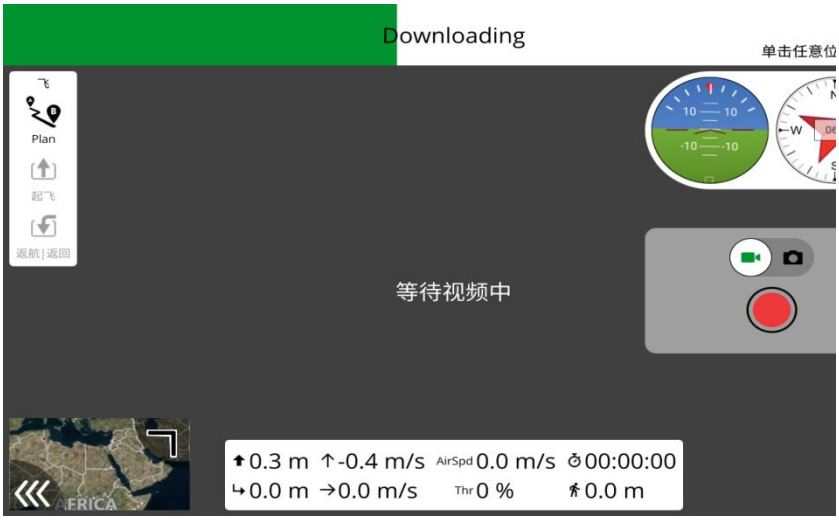

2. Run QGroundControl, go to “Application Settings – Comm Links” and “Add” a new connection. Name it as “USB-COM”. Connection “Type” as “Serial”. Match the baud rate.





2023 SIYI Technology, All Rights Reserved

3. Confirm and start to “Connect”. The top progress bar in QGC starts to move, which means the remote controller is communicate with QGC automatically. Please wait until the datalink connection is established.



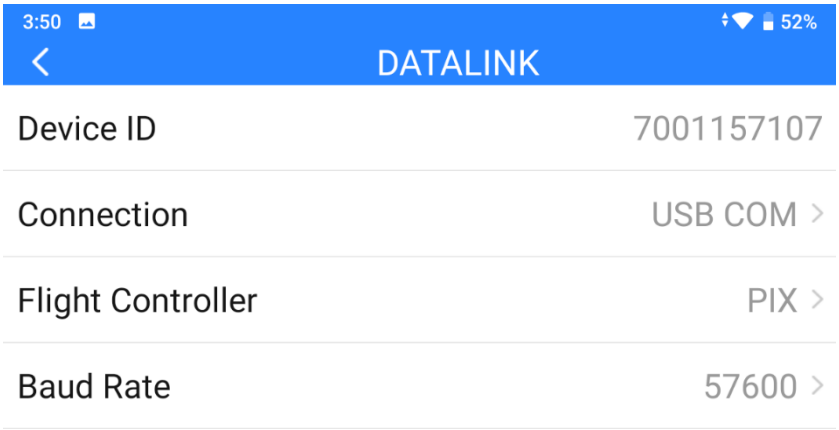

**Mark**

If it is your first time adding a new connection in QGC, please do not check the option “Automatically Connect on Start”. It can be checked later when you confirm that the datalink is connected successfully.

### 4.2.2 Mission Planner

1. In “SIYI TX” app, go to “Datalink”, and choose “USB COM” in “Connection”, “PIX / PX4 / Ardupilot” in “Flight Controller”, and match the baud rate with the flight controller TELEM port’s.


2023 SIYI Technology, All Rights Reserved




2. Run Mission Planner, select the relevant port and match the baud rate.

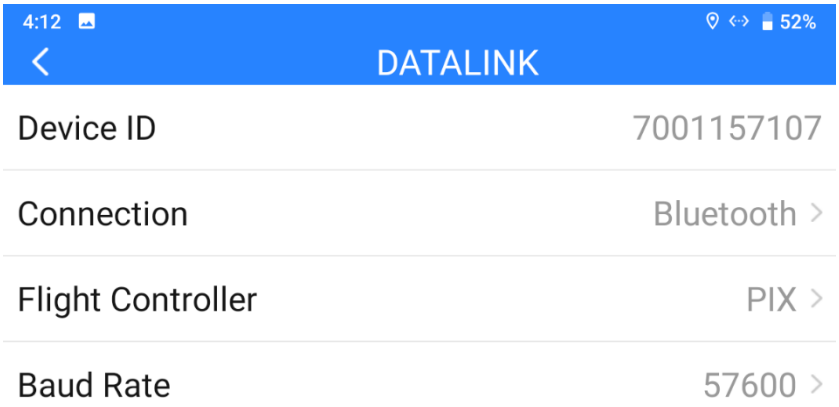
3. Please wait until the datalink connection is established.

2023 SIYI Technology, All Rights Reserved

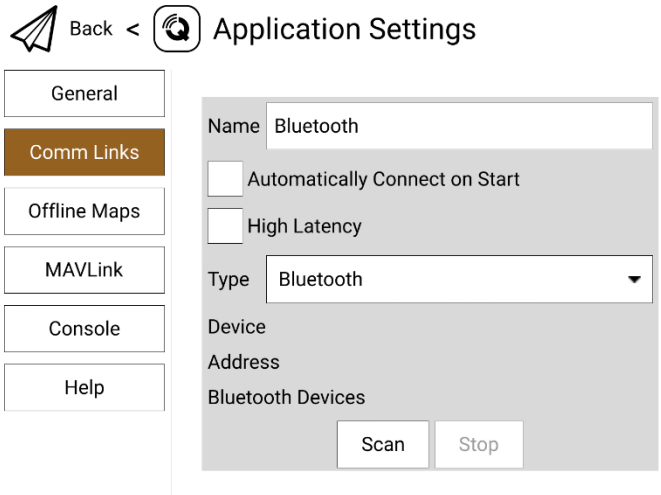
## 4.3 Communication with Android GCS via Bluetooth

### 4.3.1 QGroundControl

1. In “SIYI TX” app, go to “Datalink”, and choose “Bluetooth” in “Connection”, “PIX / PX4 / Ardupilot” in “Flight Controller”, and match the baud rate with the flight controller TELEM port’s.

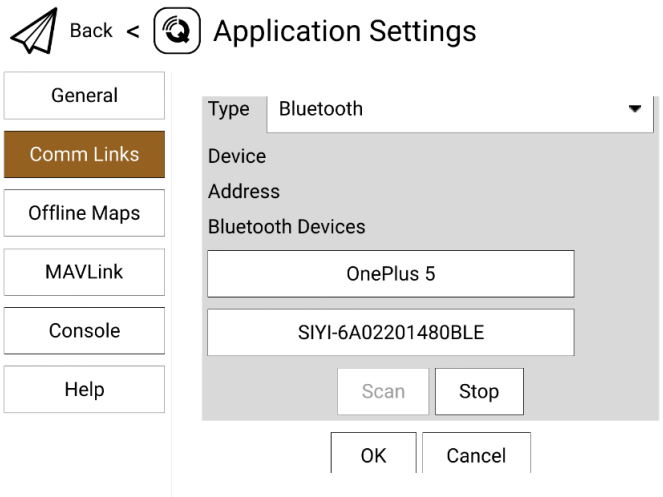



2. In Android OS, go to “System Settings - Bluetooth”, search the Bluetooth device with the same ID shown in “Device ID” (“SIYI 68********”), and pair.
3. Run QGroundControl, go to “Application Settings - Comm Links” page, and “Add” a new connection. Name it as “Bluetooth”.

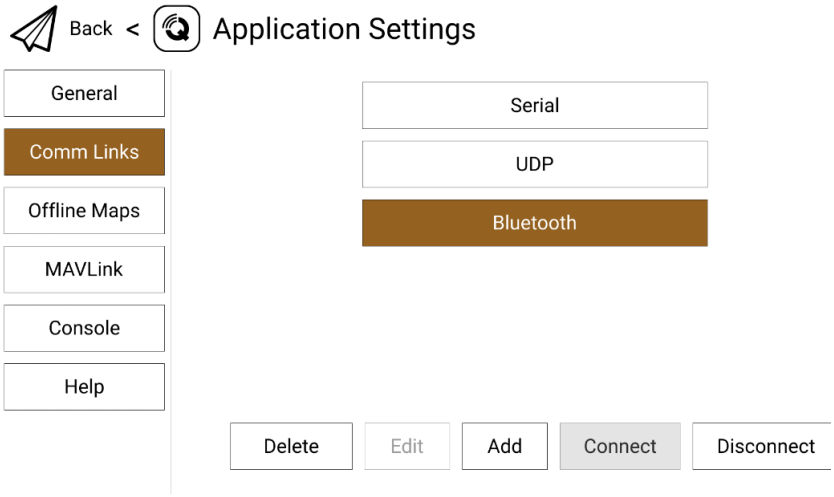



4. Set the type as “Bluetooth”, then touch “Scan”.


2023 SIYI Technology, All Rights Reserved

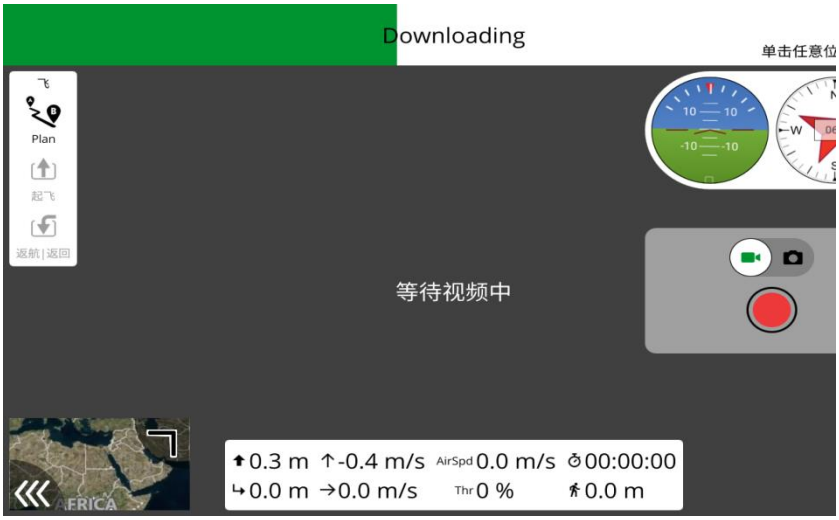



5. Touch the Bluetooth device of which the name is starting with “SIYI-XXXXXXX”, then touch “OK” to go back to the Comm Links page.




4. Confirm and start to “Connect”. The top progress bar in QGC starts to move, which means the remote controller is communicate with QGC automatically. Please wait until the datalink connection is established.


2023 SIYI Technology, All Rights Reserved




**Mark**

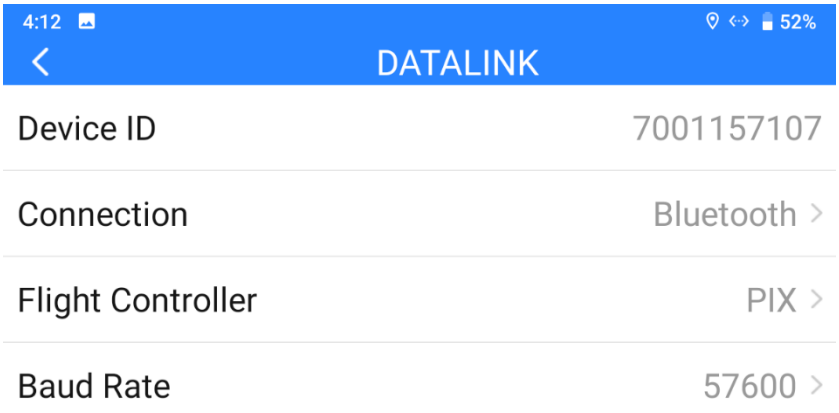
Step 1 and 2 have been finished before delivery.

If it is your first time adding a new connection in QGC, please do not check the option "Automatically Connect on Start". It can be checked later when you confirm that the datalink is connected successfully.

### 4.3.2 Mission Planner

1. In "SIYI TX" app, go to "Datalink", and choose "Bluetooth" in "Connection", "PIX / PX4 / Ardupilot" in "Flight Controller", and match the baud rate with the flight controller TELEM port's.


2023 SIYI Technology, All Rights Reserved




2. Run Mission Planner, select the relevant port (COM-xx Bluetooth) and match the baud rate.

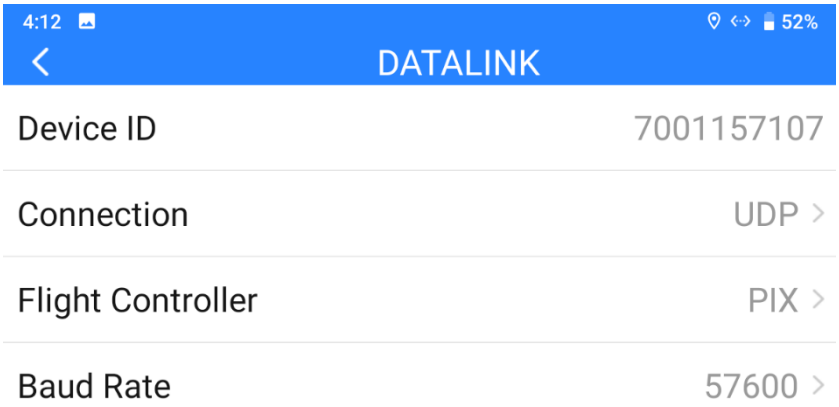
3. Please wait until the datalink connection is established.

2023 SIYI Technology, All Rights Reserved

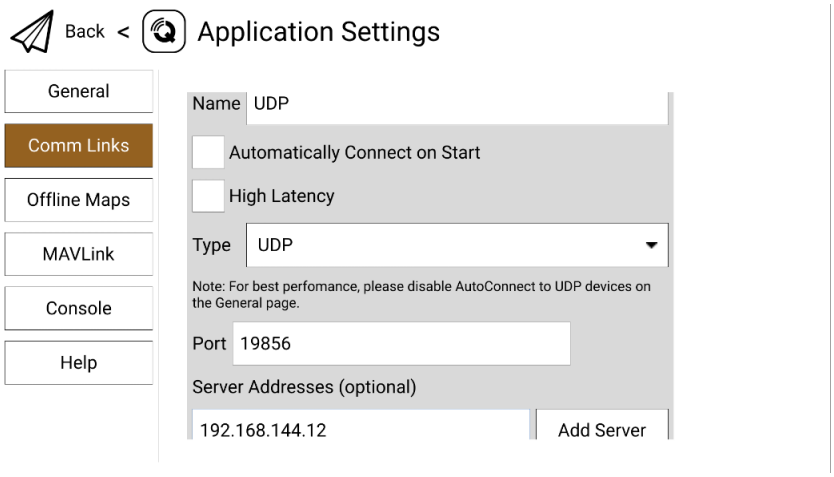
## 4.4 Communication with Android GCS through UDP

### 4.4.1 QGroundControl

1. In “SIYI TX” app, go to “Datalink”, and choose “UDP” in “Connection”, “PIX / PX4 / Ardupilot” in “Flight Controller”, and match the baud rate with the flight controller TELEM port’s.

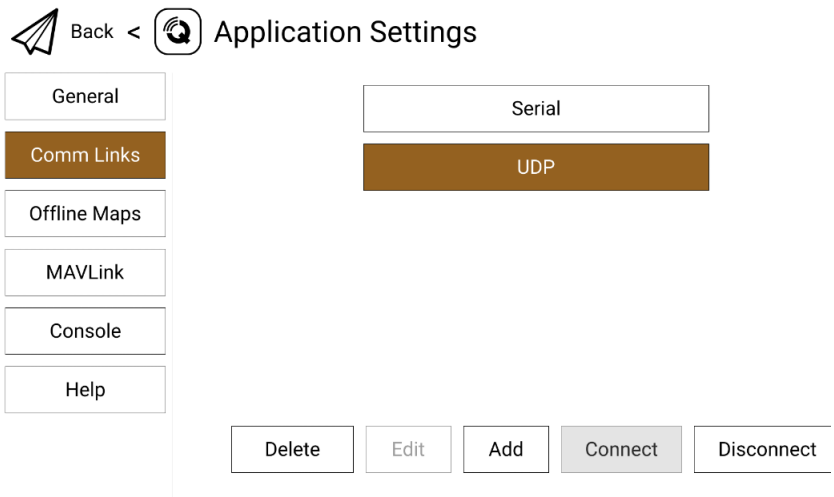



2. Run QGroundControl, go to “Application Settings - Comm Links” page, and “Add” a new connection. Name it as “UDP”.

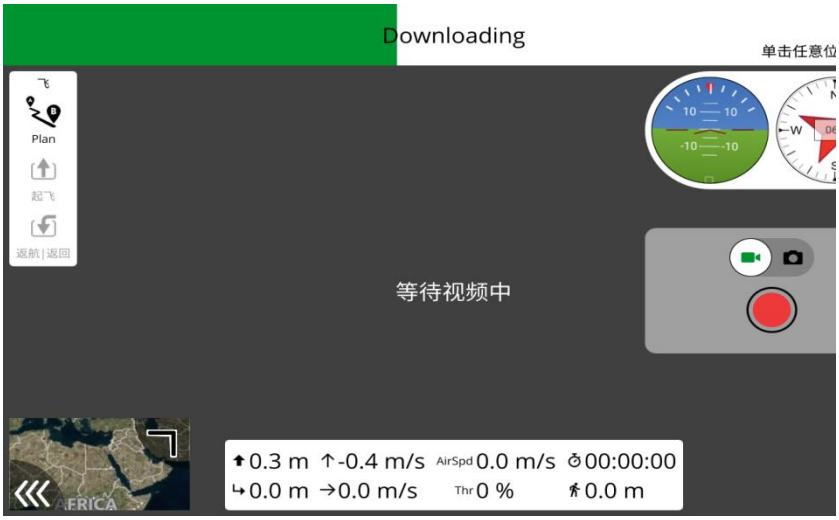



3. Set the connection “Type” as “UDP”, “Port” as “19856”, “Server Addresses” as “192.168.144.12” and “Add Server”.


2023 SIYI Technology, All Rights Reserved




4. Confirm and start to “Connect”. The top progress bar in QGC starts to move, which means the remote controller is communicate with QGC automatically. Please wait until the datalink connection is established.



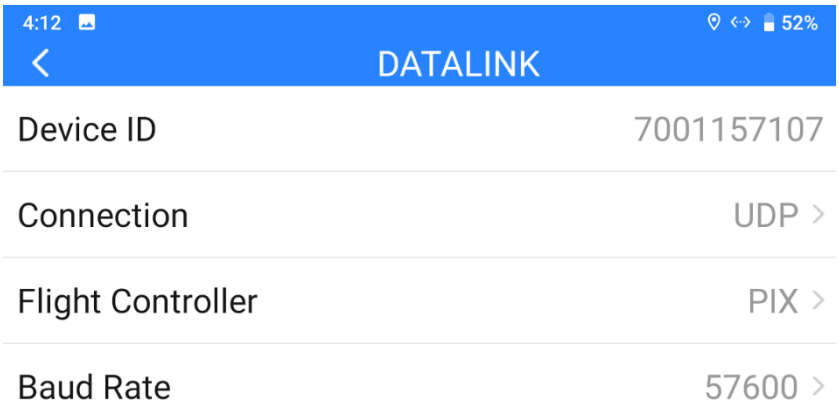

**Mark**

If it is your first time adding a new connection in QGC, please do not check the option “Automatically Connect on Start”. It can be checked later when you confirm that the datalink is connected successfully.


2023 SIYI Technology, All Rights Reserved

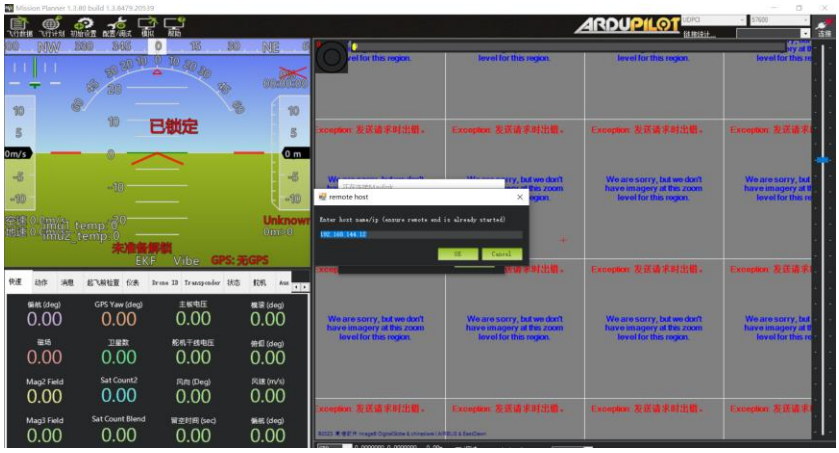
### 4.4.2 Mission Planner

1. In “SIYI TX” app, go to “Datalink”, and choose “UDP” in “Connection”, “PIX / PX4 / Ardupilot” in “Flight Controller”, and match the baud rate with the flight controller TELEM port’s.




2. Run Mission Planner, select the relevant port (UDPCI) and match the baud rate. “Port” as “19856”. “Server addresses” as “192.168.144.12”. Then connect.

2023 SIYI Technology, All Rights Reserved




3. Please wait until the datalink connection is established.

**Mark**

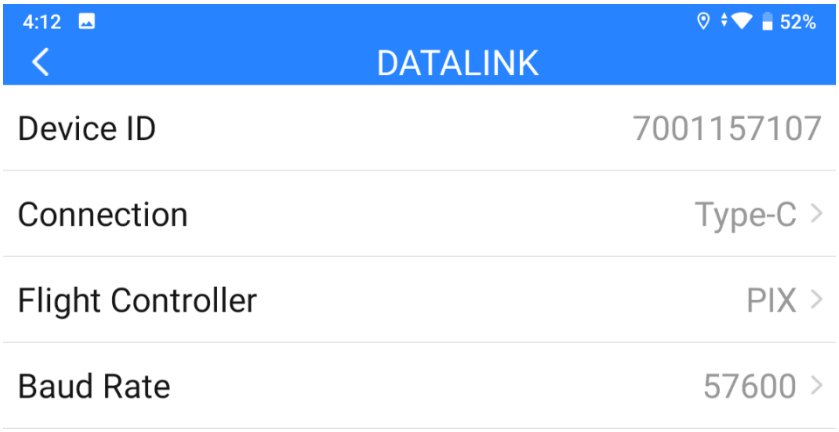
To use UDP datalink connection in Mission Planner, the remote controller FPV firmware should be v0.2.4 and above.


2023 SIYI Technology, All Rights Reserved

## 4.5 Communication with Windows GCS through Upgrade Port

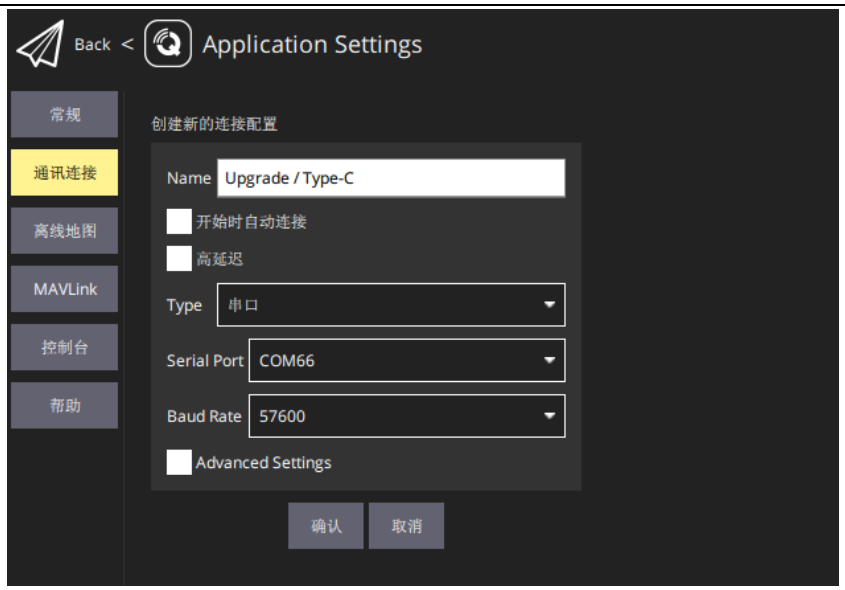
### 4.5.1 QGroundControl

1. Connect the remote controller's upgrade port to the Windows computer, the Windows system will generate a communication port for the remote controller.
2. In "SIYI TX" app, go to "Datalink", and choose "Upgrade Port (MK15) / Type-C (MK32)" in "Connection", "PIX / PX4 / Ardupilot" in "Flight Controller", and match the baud rate with the flight controller TELEM port's.

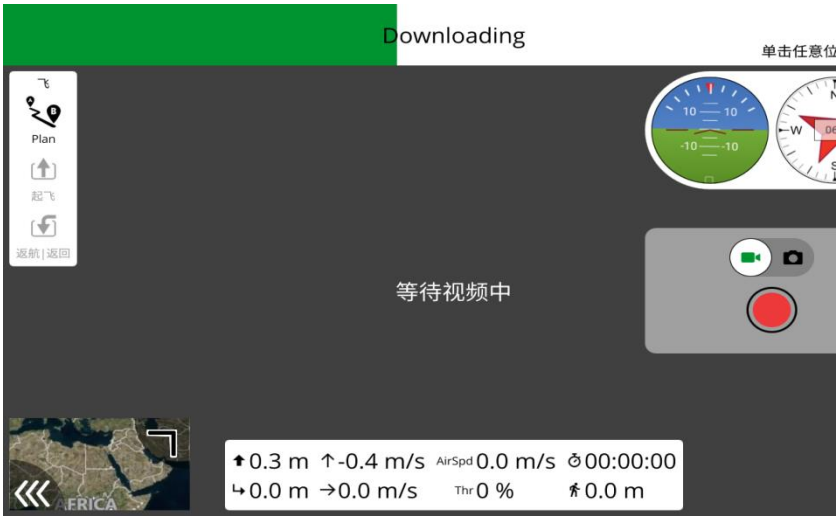



3. Run QGroundControl, go to "Application Settings – Comm Links" and "Add" a new connection. Name it as "USB-COM". Connection "Type" as "Serial". Match the baud rate.


2023 SIYI Technology, All Rights Reserved




4. Confirm and start to “Connect”. The top progress bar in QGC starts to move, which means the remote controller is communicate with QGC automatically. Please wait until the datalink connection is established.



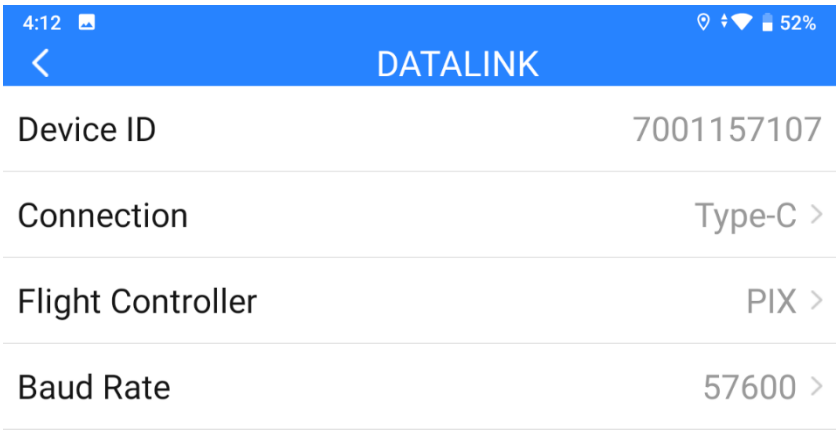

**Mark**

If it is your first time adding a new connection in QGC, please do not check the option “Automatically Connect on Start”. It can be checked later when you confirm that the datalink is connected successfully.


2023 SIYI Technology, All Rights Reserved

### 4.5.2 Mission Planner

1. Connect the remote controller's upgrade port to the Windows computer, the Windows system will generate a communication port for the remote controller.
2. In "SIYI TX" app, go to "Datalink", and choose "Upgrade Port (MK15) / Type-C (MK32)" in "Connection", "PIX / PX4 / Ardupilot" in "Flight Controller", and match the baud rate with the flight controller TELEM port's.




3. Run Mission Planner, select the relevant port and match the baud rate.

4. Please wait until the datalink connection is established.

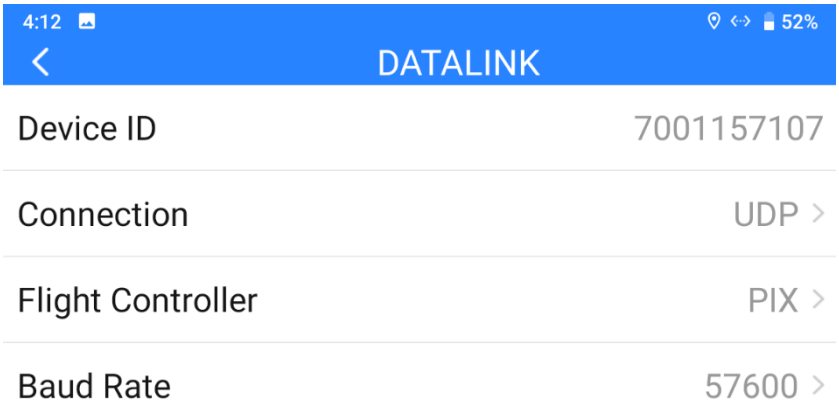

2023 SIYI Technology, All Rights Reserved

2023 SIYI Technology, All Rights Reserved

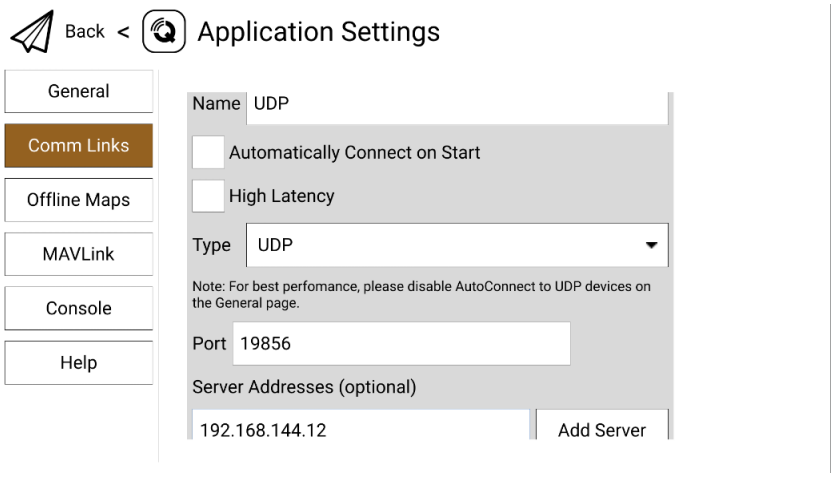
## 4.6 Communication with Windows GCS by UDP through Remote Controller WiFi Hotspot

### 4.6.1 QGroundControl

1. In “SIYI TX” app, go to “Datalink”, and choose “UDP” in “Connection”, “PIX / PX4 / Ardupilot” in “Flight Controller”, and match the baud rate with the flight controller TELEM port’s.



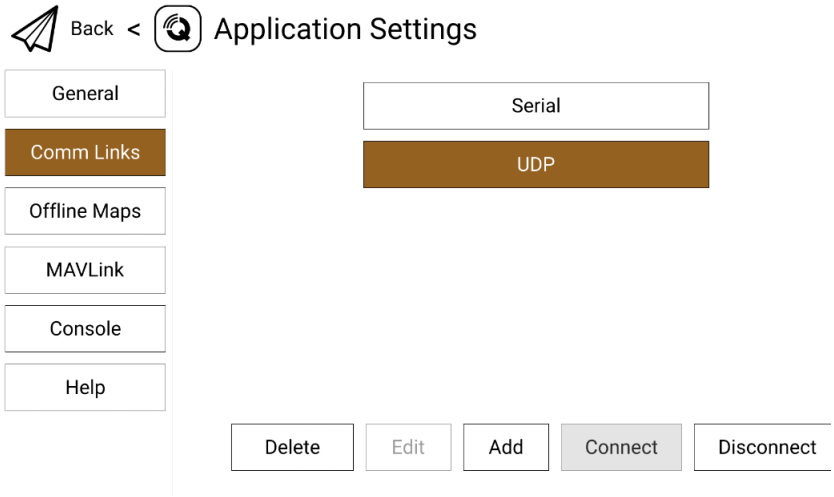

2. Enable the WiFi hotspot in remote controller Android system, connect the remote controller with the Windows computer through WiFi.
3. Run QGroundControl, go to “Application Settings - Comm Links” page, and “Add” a new connection. Name it as “UDP”.



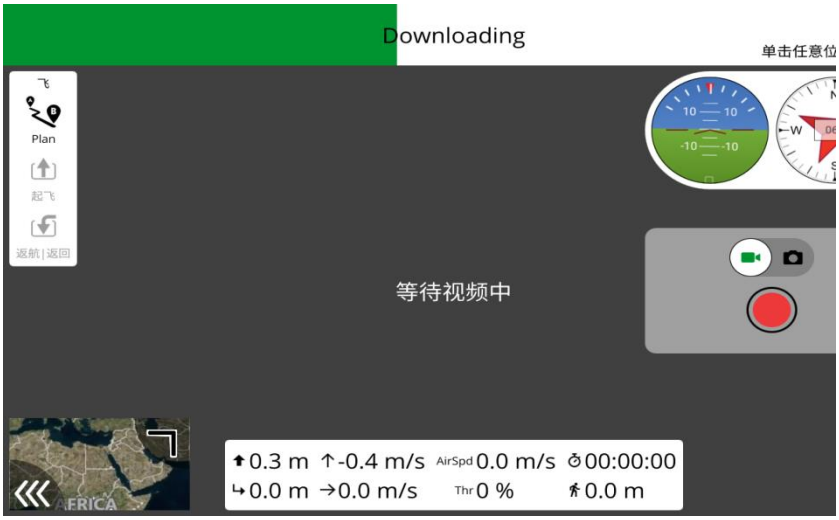


2023 SIYI Technology, All Rights Reserved

4. Set the connection “Type” as “UDP”, “Port” as “19856”, “Server Addresses” as “192.168.144.12” and “Add Server”.




5. Confirm and start to “Connect”. The top progress bar in QGC starts to move, which means the remote controller is communicate with QGC automatically. Please wait until the datalink connection is established.



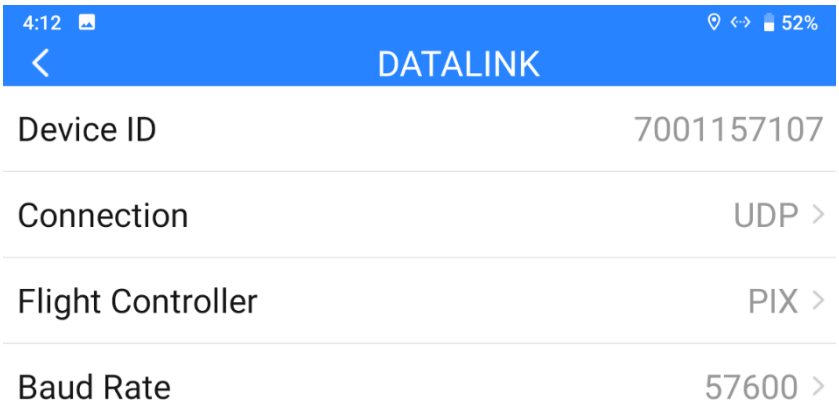

**Mark**


2023 SIYI Technology, All Rights Reserved

If it is your first time adding a new connection in QGC, please do not check the option "Automatically Connect on Start". It can be checked later when you confirm that the datalink is connected successfully.

### 4.6.2 Mission Planner

1. In "SIYI TX" app, go to "Datalink", and choose "UDP" in "Connection", "PIX / PX4 / Ardupilot" in "Flight Controller", and match the baud rate with the flight controller TELEM port's.




2. Enable the WiFi hotspot in remote controller Android system, connect the remote controller with the Windows computer through WiFi.
3. Run Mission Planner, select the relevant port (UDPCl) and match the baud rate. "Port" as "19856". "Server addresses" as "192.168.144.12". Then connect.


2023 SIYI Technology, All Rights Reserved

4. Please wait until the datalink connection is established.

## Mark

To use UDP datalink connection in Mission Planner, the remote controller FPV firmware should be v0.2.4 and above.


2023 SIYI Technology, All Rights Reserved

## 4.7 Solutions to Disconnection

When the remote controller is in good communication with the air unit, but it fails to establish datalink connection with GCS, please try to follow the steps below for troubleshooting.

1. Confirm if the air unit is wired to the flight controller by correct telemetry cable.
2. If you are using a customized telemetry cable, please check:
   - If cable pin map is correct?
   - If the TX and RX pins in the flight controller and air unit telemetry port are swapped?
3. In “SIYI TX” app, go to the “Link Status” page to check communication status. When the communication is good, “data download” is not 0. If it is “0”, please go back to check step 1 and 2.
4. In “SIYI TX” app, go to the “Datalink” page and check:
   - If “Connection” is correctly configured?
   - If “Flight Controller” is correctly configured?
   - If “Baud Rate” matches with your flight controller?
   - In the GCS, check if the datalink settings are correctly configured.
5. If it is PX4 / Ardupilot open-source flight controller, please try to switch telemetry cable connection between the TELEM 1 port and the TELEM 2 port on flight controller.
6. If both the remote controller and air unit are the latest firmware?


2023 SIYI Technology, All Rights Reserved

**Mark**

If you have done trouble shooting by following all steps above, but there are still no clues, please contact your reseller or SIYI after-sale service.


2023 SIYI Technology, All Rights Reserved

## 4.8 SIYI Datalink SDK

SIYI links can be integrated to customers' own network or ground station by acquiring SDK communication protocol.

### 4.8.1 Format

| Field | Index | Bytes | Description |
|---|---|---|---|
| STX | 0 | 2 | 0x5566: starting mark |
| CTRL | 2 | 1 | 0: need_ack (if the current package need "ack")<br>1: ack_pack (if the package is an "ack" package)<br>2-7: Reserved |
| Data_len | 3 | 2 | Data field byte length.<br>Low byte in the front. |
| SEQ | 5 | 2 | Frame sequence (0~65535) .<br>Low byte in the front. |
| CMD_ID | 7 | 1 | Command ID |
| DATA | 8 | Data_len | Data |
| CRC16 | | 2 | CRC16 check to the complete data package.<br>Low byte in the front. |

### 4.8.2 Commands

### Request Remote Controller Hardware ID

| CMD_ID:0x40 ------ Request Remote Controller Hardware ID | | | |
|---|---|---|---|
| Send data format | | | |
| No. | Data Type | Data Name | Data Description |
| | | | |
| ACK data format | | | |
| | Uint8_t | hardware_id[12] | Hard ID String (10 digits) |

Example:
Send (HEX): 55 66 01 00 00 00 00 40 81 9c
Response (HEX): 55 66 02 0C 00 09 00 40 36 38 30 31 31 33 30 31 31 31 00 00 7b 8b


2023 SIYI Technology, All Rights Reserved

## Request Remote Controller System Settings

| CMD_ID:0x16 ------ Request Remote Controller System Settings | | | |
|---|---|---|---|
| Send data format (10 Hz) | | | |
| No. | Data Type | Data Name | Data Description |
| | | | |
| ACK data format | | | |
| | Uint8_t | match | Bind:<br>0: Start<br>1, 2: Binding<br>3: Finished |
| | Uint8_t | Baud_type | Telemetry Baud Rate:<br>0: BAUD_4800<br>1: BAUD_9600<br>2: BAUD_38400<br>3: BAUD_57600<br>4: BAUD_76800<br>5: BAUD_115200<br>6: BAUD_230400 |
| | Uint8_t | Joy_type | Joystick Type:<br>0: Mode 1<br>1: Mode 2<br>2: Mode 3<br>3: Custom |
| | Uint8_t | Rc_bat | Ground Unit Battery Level x 10V |

## Send System Settings Commands to Remote Controller

| CMD_ID:0x17 ------ Send System Settings Commands to Remote Controller | | | |
|---|---|---|---|
| Send data format | | | |
| No. | Data Type | Data Name | Data Description |
| | Uint8_t | match | Bind:<br>0: Start<br>1, 2: Binding<br>3: Finished |
| | Uint8_t | Baud_type | Telemetry Baud Rate:<br>0: BAUD_4800<br>1: BAUD_9600<br>2: BAUD_38400<br>3: BAUD_57600<br>4: BAUD_76800<br>5: BAUD_115200<br>6: BAUD_230400 |
| | Uint8_t | Joy_type | Joystick Type:<br>0: Mode 1<br>1: Mode 2<br>2: Mode 3<br>3: Custom |
| | Uint8_t | reserved | |
| ACK Data Format | | | |
| | int8_t | sta | 1: ok<br>Negative number means error |


2023 SIYI Technology, All Rights Reserved

## Request Remote Control Channels

| CMD_ID:0x42 ------ Request Remote Control Channel Data | | | |
|---|---|---|---|
| Send data format | | | |
| No. | Data Type | Data Name | Data Description |
| | Uint8_t | freq | Output Frequency<br>0: OFF<br>1: 2Hz<br>2: 4Hz<br>3: 5Hz<br>4: 10Hz<br>5: 20Hz<br>6: 50Hz<br>7: 100Hz |
| ACK data format | | | |
| 1 | int16_t | CH1 | Two bytes in each channel (default 1050~1950) |
| 2 | int16_t | CH2 | |
| 3 | int16_t | CH3 | |
| ……. | int16_t | …….. | |
| 16 | int16_t | CH16 | |

Mark:

Enabling RC channel output will affect telemetry communication as they are using the same port.

Example:

Send (HEX):

55 66 01 01 00 00 00 42 02 B5 C0 (4 Hz)

55 66 01 01 00 00 00 42 00 F7 E0（OFF）

Response (HEX) (2 Hz):

55 66 00 20 00 99 00 42 DC 05 DC 00 DC 05 DC 05 DC 05 DC 05 DC 05 DC 05 DC 05 DC 05 1A 04 DC 05 DC 05 1A 04 1A 04 FF 88

## Request Remote Controller Link Status

| CMD_ID:0x43 ------ Request Remote Controller Link Status | | | |
|---|---|---|---|
| Send data format | | | |
| No. | Data Type | Data Name | Date Description |
| | | | |
| ACK data format | | | |
| | uint16_t | freq | Frequency |



2023 SIYI Technology, All Rights Reserved

| | | | |
|---|---|---|---|
| | uint8_t | pack_loss_rate | Loss Rate |
| | uint16_t | real_pack | Valid Package |
| | uint16_t | real_pack_rate | Valid Package Rate |
| | uint32_t | data_up | Data upload byte/s |
| | uint32_t | data_down | Data download byte/s |

Example:

Send (HEX): 55 66 01 00 00 00 00 43 e2 ac

Response (HEX): 55 66 02 0F 00 01 00 43 02 00 00 02 00 02 00 00 00 00 00 00 00 00 00 2E 5C

## Request FPV Link Status

| CMD_ID:0x44 ------ Request FPV Link Status | | | |
|---|---|---|---|
| Send data format | | | |
| No. | Data Type | Data Name | Data Description |
| | | | |
| ACK Data Format | | | |
| | int32_t | signal | Signal percentage: % |
| | int32_t | inactive_time | -- |
| | int32_t | upstream | Data upload: byte/s |
| | int32_t | downstream | Data download: byte/s |
| | int32_t | txbandwidth | Upload bandwidth (txbandwidth / 1000 Mbps) |
| | int32_t | rxbandwidth | Download bandwidth (rxbandwidth / 1000 Mbps) |
| | int32_t | rssi | RF power: dBm |
| | int32_t | freq | Current frequency: Mhz |
| | int32_t | channel | Current Channel |

Example:

Send (HEX): 55 66 01 00 00 00 00 44 05 dc

Response (HEX): 55 66 02 24 00 02 00 44 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A4 15 00 00 6C 00 00 00 2C D9

## Request Firmware Version

| CMD_ID:0x47 ------ Request Firmware Version | | | |
|---|---|---|---|
| Send data format | | | |
| No. | Data Type | Data Name | Data Description |
| | | | |
| ACK Data Format | | | |
| | uint32_t | rc_version | Remote controller function firmware version |
| | uint32_t | rf_version | Air unit function firmware version |



2023 SIYI Technology, All Rights Reserved

| | | | |
|---|---|---|---|
| | uint32_t | ground_version | Remote controller FPV firmware version |
| | uint32_t | sky_version | Air unit FPV firmware version |

Mark:

The request firmware version is four bytes in hexadecimal, with the first byte in the low bit and the last byte in the high bit. The first byte is the product ID, and the remaining three bytes are the version number.

For example, 0x00 0x03 0x05 0x68, the product ID is 0x68, and the version number is 5.3.0. The same applies to other version numbers.

Example:

Send (HEX): 55 66 01 00 00 00 00 47 66 ec

Response (HEX): 55 66 02 10 00 02 00 47 00 03 05 68 07 02 05 69 02 02 00 56 02 02 00 56 6d 21

### 4.8.3 Communication Interface

SIYI datalink SDK supports four interfaces, which can be switched in SIYI TX app.

**1) UART Serial Port**

Port Name: /dev/ttyHS0
Baud Rate: 115200

**2) USB COM (USB to Serial)** (Baud rate is the same with datalink baud rate)

**3) Bluetooth**

4) **MK15 RC Upgrade Port / MK32 RC Type-C Port** (Virtual serial port based on USB port)

### 4.8.4 SDK CRC16 Check Code

```
const uint16_t crc16_tab[256];
```


2023 SIYI Technology, All Rights Reserved

```
/************************************************************
CRC16 Coding & Decoding G(X) = X^16+X^12+X^5+1
************************************************************/
uint16_t CRC16_cal(uint8_t *ptr, uint32_t len, uint16_t crc_init)
{
    uint16_t crc,   oldcrc16;
    uint8_t  temp;
    crc = crc_init;
    while (len--!=0)
    {
        temp=(crc>>8)&0xff;
        oldcrc16=crc16_tab[*ptr^temp];
        crc=(crc<<8)^oldcrc16;
        ptr++;

    }
    //crc=~crc;      //??
    return(crc);
}

uint8_t crc_check_16bites(uint8_t* pbuf, uint32_t len,uint32_t* p_result)
{
       uint16_t crc_result = 0;
       crc_result= CRC16_cal(pbuf,len, 0);
       *p_result = crc_result;

       return 2;
}


const uint16_t crc16_tab[256]= {0x0,0x1021,0x2042,0x3063,0x4084,0x50a5,0x60c6,0x70e7,
                                0x8108,0x9129,0xa14a,0xb16b,0xc18c,0xd1ad,0xe1ce,0xf1ef,
                                0x1231,0x210,0x3273,0x2252,0x52b5,0x4294,0x72f7,0x62d6,
                                0x9339,0x8318,0xb37b,0xa35a,0xd3bd,0xc39c,0xf3ff,0xe3de,
                                0x2462,0x3443,0x420,0x1401,0x64e6,0x74c7,0x44a4,0x5485,
                                0xa56a,0xb54b,0x8528,0x9509,0xe5ee,0xf5cf,0xc5ac,0xd58d,
                                0x3653,0x2672,0x1611,0x630,0x76d7,0x66f6,0x5695,0x46b4,
                                0xb75b,0xa77a,0x9719,0x8738,0xf7df,0xe7fe,0xd79d,0xc7bc,
                                0x48c4,0x58e5,0x6886,0x78a7,0x840,0x1861,0x2802,0x3823,
                                0xc9cc,0xd9ed,0xe98e,0xf9af,0x8948,0x9969,0xa90a,0xb92b,
                                0x5af5,0x4ad4,0x7ab7,0x6a96,0x1a71,0xa50,0x3a33,0x2a12,
                                0xdbfd,0xcbdc,0xfbbf,0xeb9e,0x9b79,0x8b58,0xbb3b,0xab1a,
```


2023 SIYI Technology, All Rights Reserved

```
 0x6ca6,0x7c87,0x4ce4,0x5cc5,0x2c22,0x3c03,0xc60,0x1c41,
 0xedae,0xfd8f,0xcdec,0xddcd,0xad2a,0xbd0b,0x8d68,0x9d49,
 0x7e97,0x6eb6,0x5ed5,0x4ef4,0x3e13,0x2e32,0x1e51,0xe70,
 0xff9f,0xefbe,0xdfdd,0xcffc,0xbf1b,0xaf3a,0x9f59,0x8f78,
 0x9188,0x81a9,0xb1ca,0xa1eb,0xd10c,0xc12d,0xf14e,0xe16f,
 0x1080,0xa1,0x30c2,0x20e3,0x5004,0x4025,0x7046,0x6067,
 0x83b9,0x9398,0xa3fb,0xb3da,0xc33d,0xd31c,0xe37f,0xf35e,
 0x2b1,0x1290,0x22f3,0x32d2,0x4235,0x5214,0x6277,0x7256,
 0xb5ea,0xa5cb,0x95a8,0x8589,0xf56e,0xe54f,0xd52c,0xc50d,
 0x34e2,0x24c3,0x14a0,0x481,0x7466,0x6447,0x5424,0x4405,
 0xa7db,0xb7fa,0x8799,0x97b8,0xe75f,0xf77e,0xc71d,0xd73c,
 0x26d3,0x36f2,0x691,0x16b0,0x6657,0x7676,0x4615,0x5634,
 0xd94c,0xc96d,0xf90e,0xe92f,0x99c8,0x89e9,0xb98a,0xa9ab,
 0x5844,0x4865,0x7806,0x6827,0x18c0,0x8e1,0x3882,0x28a3,
 0xcb7d,0xdb5c,0xeb3f,0xfb1e,0x8bf9,0x9bd8,0xabbb,0xbb9a,
 0x4a75,0x5a54,0x6a37,0x7a16,0xaf1,0x1ad0,0x2ab3,0x3a92,
 0xfd2e,0xed0f,0xdd6c,0xcd4d,0xbdaa,0xad8b,0x9de8,0x8dc9,
 0x7c26,0x6c07,0x5c64,0x4c45,0x3ca2,0x2c83,0x1ce0,0xcc1,
 0xef1f,0xff3e,0xcf5d,0xdf7c,0xaf9b,0xbfba,0x8fd9,0x9ff8,
 0x6e17,0x7e36,0x4e55,0x5e74,0x2e93,0x3eb2,0xed1,0x1ef0
};
```


2023 SIYI Technology, All Rights Reserved

# 5 SIYI FPV APP

SIYI FPV is an Android application developed by SIYI to configure many SIYI products for video display, camera stream settings, and communication link status monitoring.

**Mark**

This chapter is edited based on SIYI FPV App v2.5.15.660.

SIYI FPV App can be downloaded from SIYI official website:

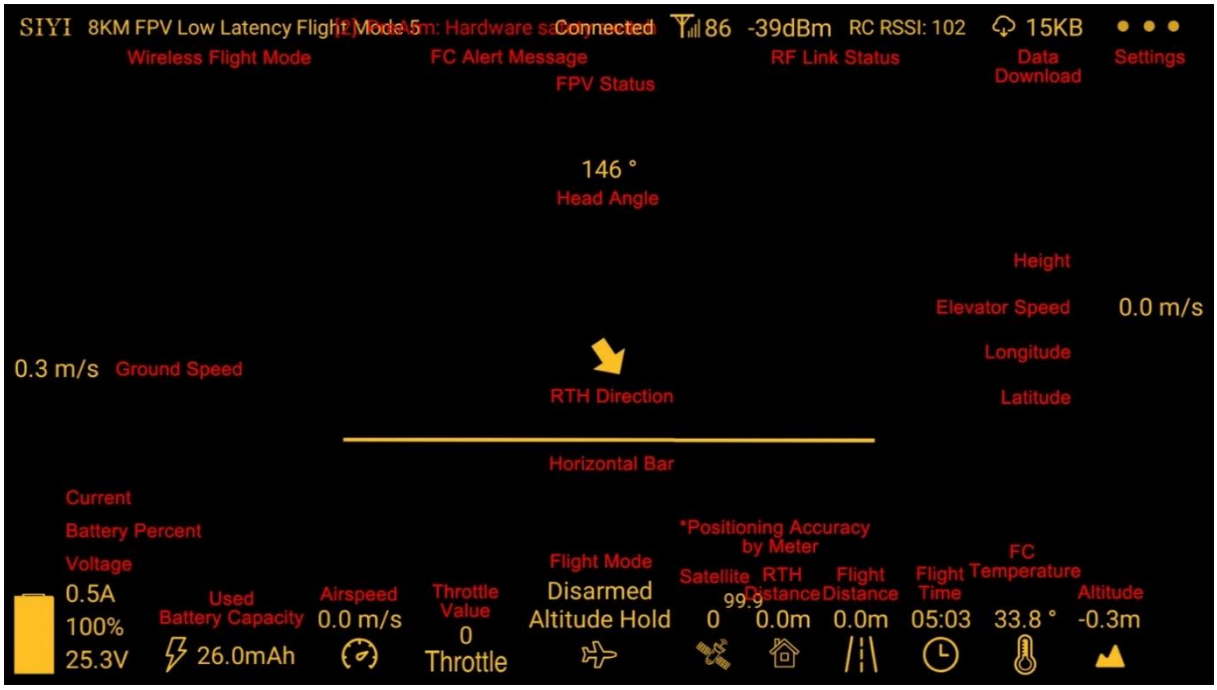
https://siyi.biz/en/index.php?id=downloads&asd=427

**SIYI FPV App compatible SIYI devices**

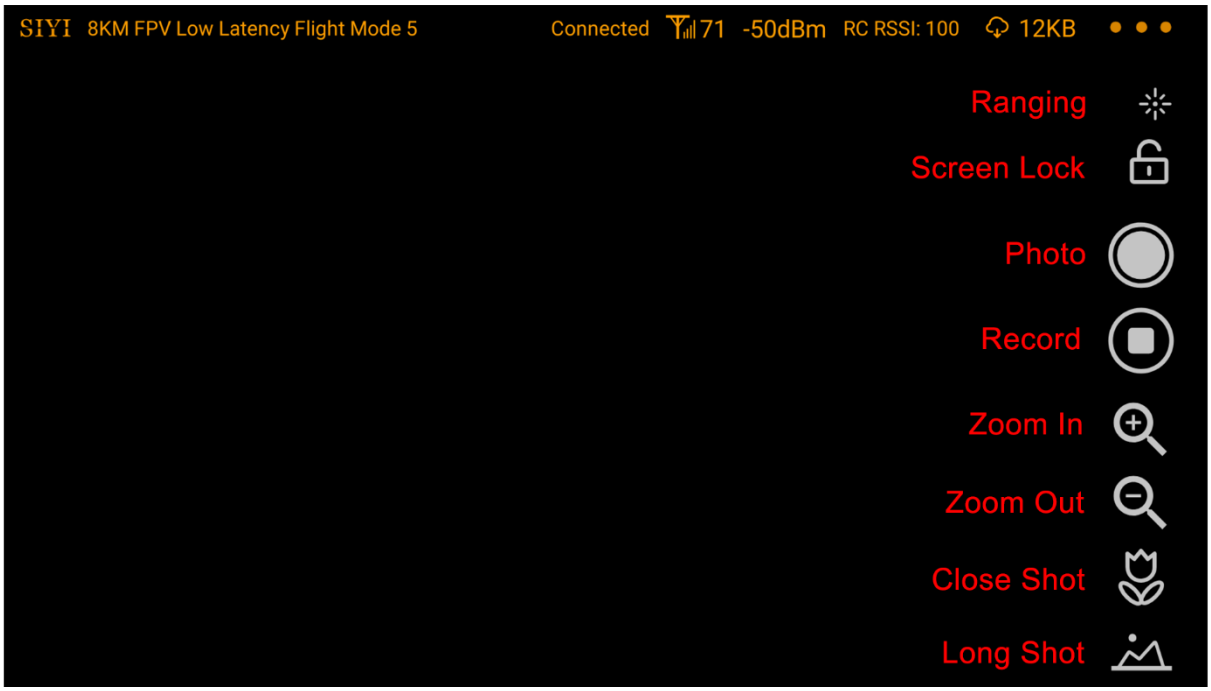
- ZT30 Four-Sensor Optical Pod
- ZR30 4K AI 180X Hybrid Zoom Optical Pod
- A2 mini Ultra-Wide-Angle FPV Gimbal
- MK32 / MK32E Enterprise Handheld Ground Station
- A8 mini AI Zoom Gimbal Camera
- ZR10 2K 30X Hybrid Zoom Optical Pod
- R1M HD Recording FPV Camera
- Air Unit HDMI Input Converter
- HM30 Full HD Image Transmission System
- MK15 / MK15E Mini Handheld Ground Station


2023 SIYI Technology, All Rights Reserved

## SIYI FPV App OSD Information Definition




## SIYI FPV Camera Function Icon Definition

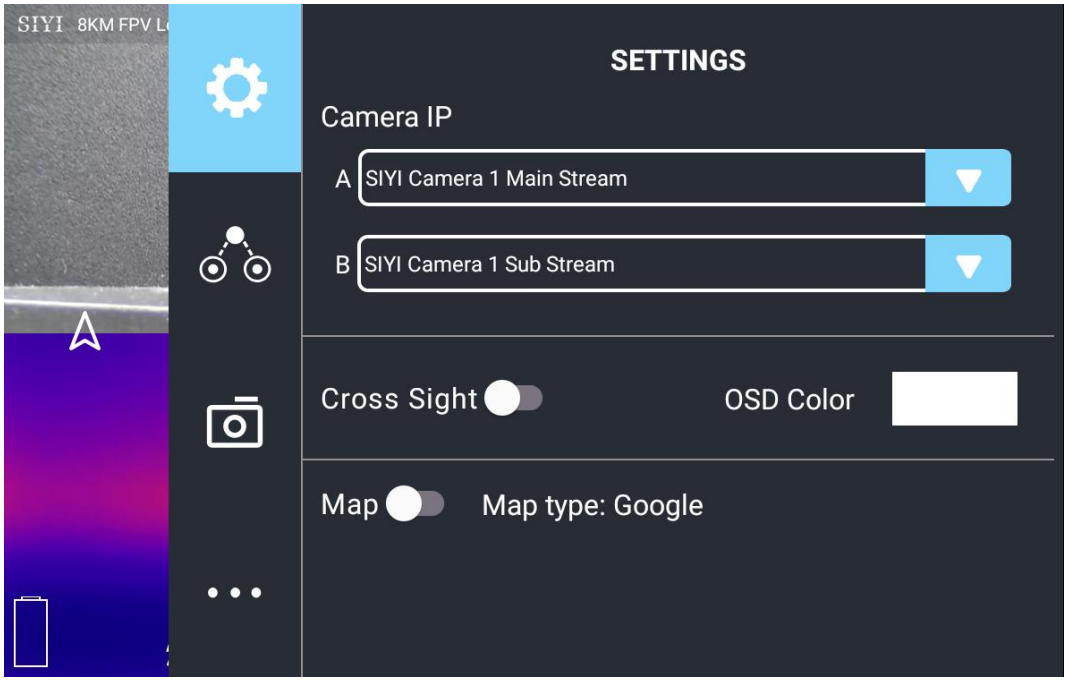




2023 SIYI Technology, All Rights Reserved

## 5.1 Settings

In “Settings” page, you can select camera type with stream type, select or input video stream IP addresses, custom app interface, and switch video decoding type.




**About Settings**

Camera IP: Select between SIYI Camera 1 and SIYI Camera 2, between main stream and sub stream, select or input video stream RTSP addresses, disable image, or rotate the relevant image in 180 degrees.

Cross Sight: Enable / disable a cross sight in the center of the image.

Map: Enable / disable the map box over the left-bottom corner of the image.

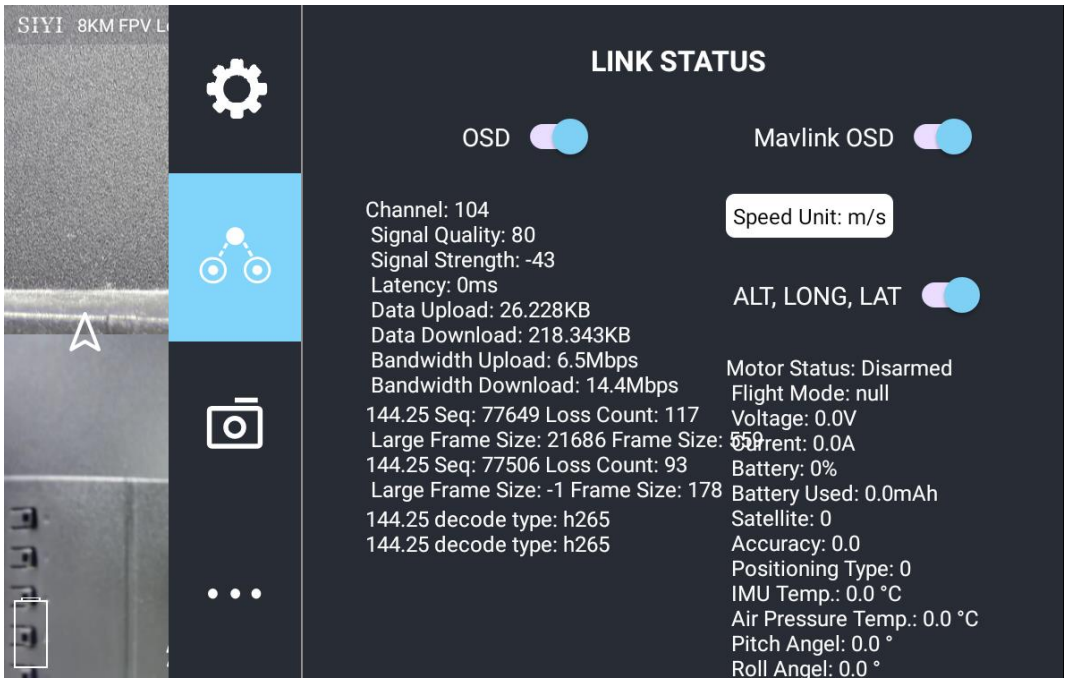
OSD Color: Custom the color of all OSD information.

Decoding Type: Switch between “Hardware Decoding” and “Software Decoding”. Please refer to your camera and your device to display video for the best decoding type.


2023 SIYI Technology, All Rights Reserved

## 5.2 Link Status

Display the link status directly over the FPV image.




**About Link Status**

OSD: Enable / disable standard OSD information.

Mavlink OSD: Enable / disable Mavlink OSD information.

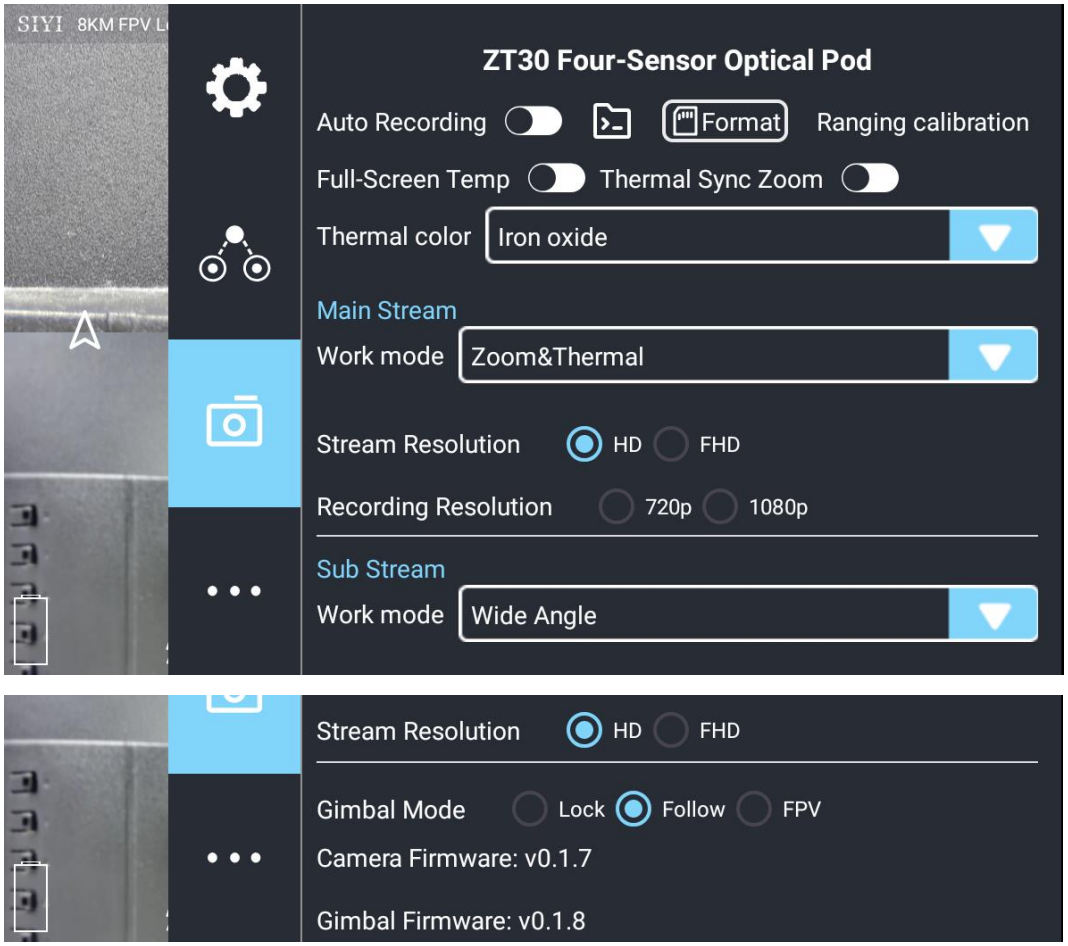
Speed Unit: Switch speed unit between meter per seconds and kilometer per hour.

Longitude and Latitude: Enable / disable information.


2023 SIYI Technology, All Rights Reserved

## 5.3 Gimbal Camera

Configure the abundant functions of SIYI optical pod and gimbal camera.




**About Gimbal Camera**

Boot Record: Enable / disable automatic video recording by SD card as soon as gimbal camera is powered.

File Manager: Preview stored images in TF card. Format the TF card.

Laser Calibration: The target position in the camera image may need to be calibrated to match the accurate laser rangefinder orientation.

Full Image Thermometric: Enable / disable the full image temperature measurement feature in the thermal imaging camera.


2023 SIYI Technology, All Rights Reserved

Synchronize Zoom: Enable / disable simultaneous zooming of the thermal camera and the zoom camera.

Main / Sub Stream: Configure the main stream and the sub stream separately for their camera source and parameters.

Image Mode: Select the video stream's image type and camera source. Single image or split image. Zoom camera, wide angle camera, or thermal imaging camera.

Stream Resolution: Decide to switch the output resolution of the current video stream or not according to camera source. Max output resolution is Ultra HD (1080p).

Record Resolution: Decide to switch the recording resolution or not according to camera source. Max record resolution is 4K.

Gimbal Working Mode: Switch gimbal working mode among Lock Mode, Follow Mode, and FPV Mode.

- Lock Mode: Horizontally, gimbal does not follow when aircraft rotates.
- Follow Mode: Horizontally, gimbal follows when aircraft rotates.
- FPV Mode: Gimbal rotates simultaneously as aircraft rolls to get FPV view, and output images with enhanced stability.

Camera Firmware Version: Display current camera firmware version.

Gimbal Firmware Version: Display current gimbal firmware version.

Zoom Firmware Version: Display current gimbal firmware version.


2023 SIYI Technology, All Rights Reserved

## 5.4 About SIYI FPV

Displays the software version of SIYI FPV and common contact information of SIYI Technology.

2023 SIYI Technology, All Rights Reserved

## 5.5 SIYI FPV App Update Log

| Date | 2023-08-24 |
|---|---|
| Version | 2.5.15.660 |
| Updates | 4. New (ZT30): Laser calibration. Display laser ranging target's coordinates.<br>5. New: Support TF format.<br>6. New (ZT30): Thermal color palette.<br>7. New: File manager to preview stored pictures in TF card.<br>8. Improve: New icon indication for missing TF card. |

| Date | 2023-07-31 |
|---|---|
| Version | 2.5.14.644 |
| Updates | 1. New: Status indication for successfully integrated flight controller attitude data.<br>2. New: Google map is supported.<br>3. Fix: Flight controller location was no accurate. New icons for flight controller location and device location.<br>4. New: Status indication for missing TF card. |


2023 SIYI Technology, All Rights Reserved

# 6 IMAGE TRANSMISSION

The MK32E link supports up to 1080p resolution, 60 fps, and real-time image transmission with a latency as low as 150 milliseconds. It is suitable for SIYI optical pods and gimbal cameras and supports connecting to third-party optical pods and gimbal cameras. The external air unit HDMI input converter can be expanded to support cameras with HDMI input. The air unit can expand the connection to dual video stream inputs through its dual Ethernet ports.

## 6.1 Control Gimbal Camera from SIYI FPV App or SIYI QGC App on SIYI Handheld Ground Station

Gimbal connects to air unit directly to control gimbal rotation, gimbal functions, and video display in SIYI FPV app or SIYI QGC app when the air unit is communicating with the ground station.

### 6.1.1 Preparation

It is necessary to prepare the tools, firmware, and software below before controlling gimbal camera in this way.

- SIYI Handheld Ground Station (MK32E Standard Combo / MK15E Enterprise Standard Combo is suggested for excellent compatibility with SIYI gimbal cameras)


2023 SIYI Technology, All Rights Reserved

- A8 mini Gimbal Camera

**Mark**

Above products can be purchased from SIYI directly or from SIYI authorized dealers.

- SIYI Gimbal to SIYI Link Cable

**Mark**

Above tools come with product package.

- SIYI FPV App (v2.5.15.660 or latest version)
- SIYI QGC App

**Mark**

Above software can be downloaded from relevant product page on SIYI official website.

### SIYI FPV App Steps

1. Power air unit and bind it with ground station.
2. Use SIYI Gimbal to SIYI Link Cable to connect the air unit's Ethernet port with the gimbal camera's Ethernet port.
3. Update SIYI FPV app to the latest.
4. Run SIYI FPV app, go to "Settings" and select the relevant SIYI camera type


2023 SIYI Technology, All Rights Reserved

with main / sub stream, video stream will display. Gimbal motion and camera functions can be controlled by ground station touchscreen.

**SIYI QGC App Steps**

1. Power air unit and bind it with ground station.
2. Use SIYI Gimbal to SIYI Link Cable to connect the air unit's Ethernet port with the gimbal camera's Ethernet port.
3. Run SIYI QGC app, go to "Comm Links – Video Settings", and select "RTSP Video Stream" for "Source", then enter the default RTSP addresses of SIYI gimbal camera, video stream will display. Gimbal motion and camera functions can be controlled by ground station touchscreen.

### 6.1.2 Gimbal Pitch and Yaw Rotation

While SIYI FPV App or SIYI QGC app is running,

Sliding on touchscreen can control gimbal rotation. Sliding left and right are yaw rotation, up and down are gimbal pitch rotation.

Double tap touchscreen, gimbal will automatically center.

**Mark**

Slide on touchscreen and hold it, gimbal will continue rotating till it reaches physical limit. Farther that you hold it from the center of the screen, faster the gimbal rotates.


2023 SIYI Technology, All Rights Reserved

### 6.1.3 Zoom

While SIYI FPV App or SIYI QGC app is running,

Touching “Zoom in” or “Zoom out” icon on can control the zoom camera, up to 6X digital zoom.

### 6.1.4 Take pictures and Record Video

While SIYI FPV App or SIYI QGC app is running,

Touch “Photo” icon once on to take a picture. Touch “Record” icon to start video recording. Touch “Recording” icon to stop video recording.

**Mark**

Before taking a picture or recording video, it is necessary to insert SD card into the camera.

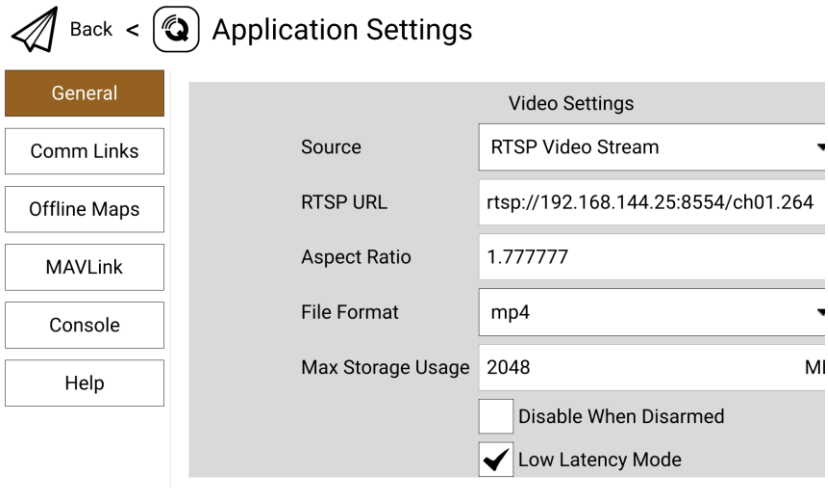

2023 SIYI Technology, All Rights Reserved

## 6.2 Input Third-Party IP Cameras / Optical Pods

Before connecting a third-party camera to the air unit, please change its IP address to “192.168.144.X”. The X should not be “11”, “12”, or “20”, otherwise it won’t work. The three addresses have been occupied by the air unit, the ground unit, and the Android system.

### Steps

1. In camera settings, check and copy the RTSP address of your camera.
2. Let’s take SIYI QGroundControl as an example. Run QGC, go to “General – Video Settings”.




3. Configure “Source” as “RTSP Video Stream”. Then input the copied RTSP address of your camera after “RTSP URL”.
4. Go back to QGC home page to check image display.


2023 SIYI Technology, All Rights Reserved

## 6.3 Input HDMI Camera

HDMI camera must be through the SIYI air unit HDMI input converter to output to the SIYI air unit, please refer to the steps below for detail.

1. Let's take SIYI QGroundControl as an example. Run QGC, go to "General - Video Settings".
2. Configure "Source" as "RTSP Video Stream". Then input the RTSP addresses of the SIYI HDMI converter for "RTSP URL".
3. Go back to QGC home page to check image display.


2023 SIYI Technology, All Rights Reserved

## 6.4 Input Dual-Channel Video Streams

Dual-channel video stream can work in multiple ways.

### 6.4.1 Input Dual SIYI Cameras / Gimbals / Air Unit HDMI Input Converters

Please assign different IP addresses to SIYI cameras, gimbals, and air unit input converters. It is suggested to use “192.168.144.25” and “192.168.144.26”. Then, after connecting both cameras / converters to the air unit and running SIYI FPV app, you can see dual video stream when the IP addresses are selected as “SIYI Camera 1” and “SIYI Camera 2”.

### 6.4.2 Input Dual Third-Party IP Cameras / Optical Pods

Make sure that the two IP cameras / pods use different IP addresses and connect them to the air unit. Then open SIYI FPV app, input the RTSP addresses, and you will see two video streams.

### 6.4.3 Input an SIYI HDMI Converter and a Third-Party IP Camera

Make sure that the IP camera use a different IP address from the HDMI converter and connect them to the air unit. Then open SIYI FPV app, input the RTSP addresses, and you will see two video streams.


2023 SIYI Technology, All Rights Reserved

**Mark**

Dual video stream does not work when the two cameras use the same IP address.

For more details about the IP addresses of SIYI links and gimbal cameras, please refer to the chapter 6.5 in this manual.


2023 SIYI Technology, All Rights Reserved

## 6.5 Common IP Addresses

Air Unit IP Address: 192.168.144.11

Remote Controller IP Address: 192.168.144.12

Android System IP Address: 192.168.144.20

SIYI Camera / Gimbal IP Address: 192.168.144.25

IP67 Camera A's IP Address: 192.168.144.25

IP67 Camera B's IP Address: 192.168.144.26

Air Unit HDMI Input Converter's IP Address: 192.168.144.25

IP67 Camera A's RTSP Address: rtsp://192.168.144.25:8554/main.264

IP67 Camera B's RTSP Address: rtsp://192.168.144.26:8554/main.264

Air Unit HDMI Input Converter's RTSP Address: rtsp://192.168.144.25:8554/main.264

Common Video Player: SIYI FPV, QGroundControl, EasyPlayer

Network Diagnosis Tool: Ping Tools

**Mark**

SIYI FPV camera and air unit HDMI input converter are labeled with RTSP addresses before delivery. Please pay an attention.

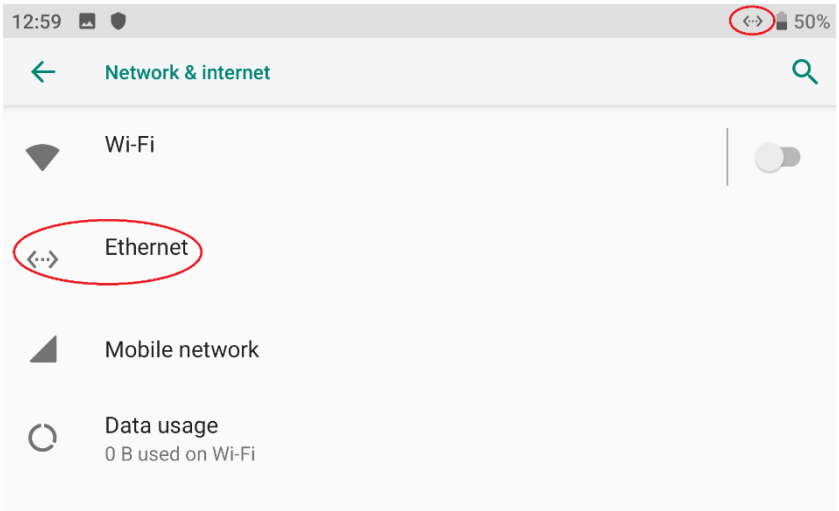

2023 SIYI Technology, All Rights Reserved

## 6.6 Solutions to No Image

If remote controller failed to display image, please try to follow the steps below to investigate possible reasons.

1. Check communication:
   - If the remote controller is bound with the air unit (remote controller and air unit status indicator is green)?
   - If the camera is well connected to the air unit (remote controller successfully pings to the air unit and to the camera IP addresses)?
2. Check software settings:
   - SIYI FPV App: If camera IP addresses are correct?
   - QGroundControl App: If RTSP addresses are correct?
3. Check network:

   Ethernet Switch: In Android system status bar, check if the Ethernet icon exists. If not, please enable Ethernet function in Android system settings.




Mark


2023 SIYI Technology, All Rights Reserved

If you have done trouble shooting by following all steps above, but there are still no clues, please contact your reseller or SIYI after-sale service.


2023 SIYI Technology, All Rights Reserved

## 6.7 Output Video Stream from Remote Controller to Other Device

There are multiple ways to output video stream from remote controller.

### 6.7.1 Through HDMI

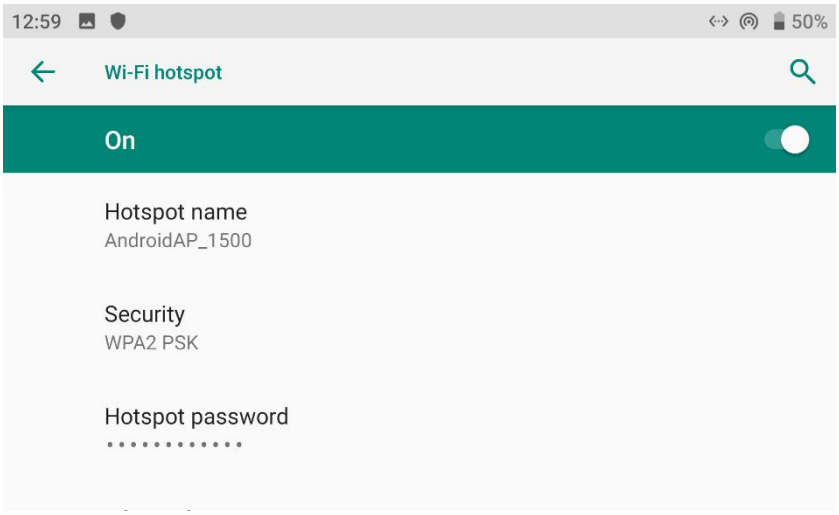
It's just one step outputting video stream to an HDMI monitor.

Use a standard HDMI cable to connect remote controller's HDMI port to the monitor's HDMI port, the video stream will display.

### 6.7.2 Through WiFi Hotspot

Let's take an example of outputting video stream to a Windows laptop, running SIYI QGroundControl.

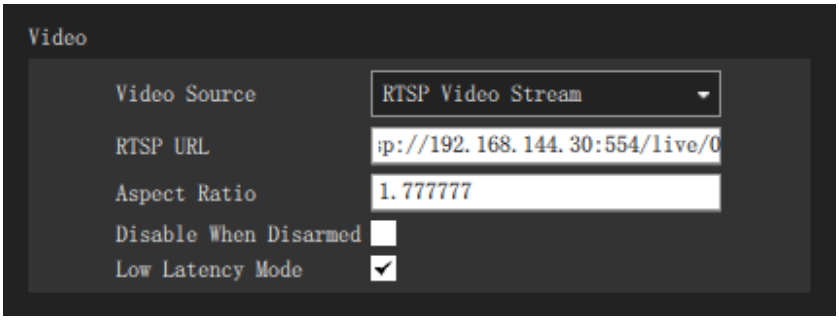
1. Go to Android system settings "Network & Internet – Hotspot & Tethering – Wi-Fi Hotspot".




2. Enable "Wi-Fi Hotspot", configure the hotspot name and its password.


2023 SIYI Technology, All Rights Reserved

3. Connect the Windows laptop's with the remote controller through WiFi.
4. Run SIYI QGroundControl on the laptop, go to "Application Settings - Video". Switch the video source to "RTSP Video Stream".




5. In "RTSP URL", input the RTSP addresses of the camera, return to QGC homepage and you will see the video stream.

**Mark**

If the same video source is used in the laptop and the remote controller simultaneously, one of the video streams may delay or stuck due to bandwidth limit. If it happens, you can assign one video stream as "SIYI Camera 1 / 2" protocol, and another video stream as standard RTSP protocol.

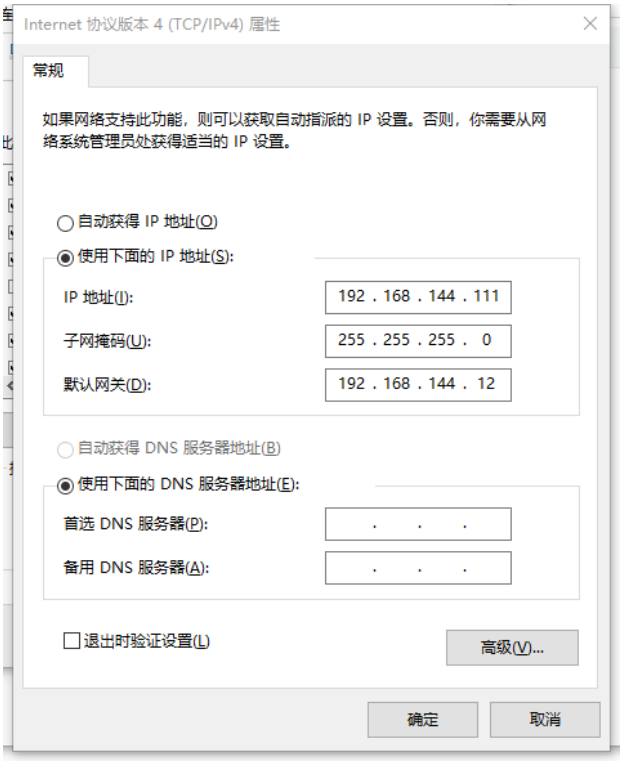
### 6.7.3 Through LAN Port

Let's take an example of outputting video stream to a Windows laptop, running Easyplayer.

1. Connect MK32 ground unit's bottom LAN port to a Windows computer's RJ45 port. Then go to Ethernet settings in Windows settings.


2023 SIYI Technology, All Rights Reserved

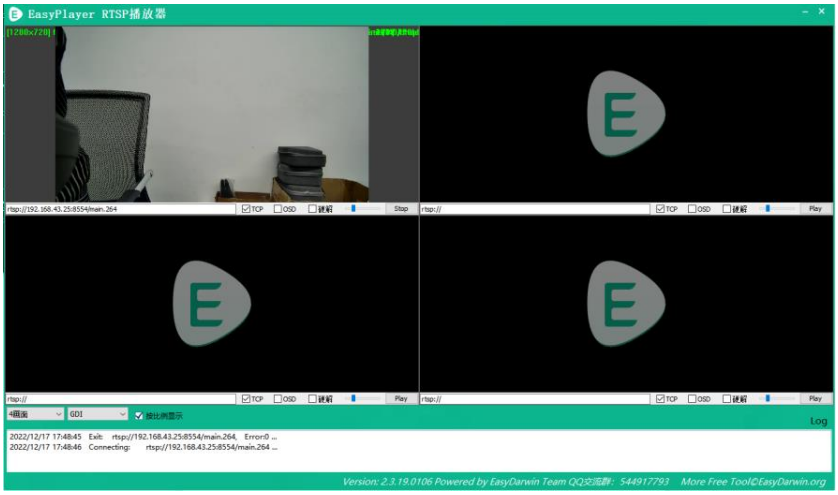
2. Go to “Internet Protocol Version 4 (TCP / IPv4)” and change IP addresses as below. Then confirm.




3. Run Easyplayer on Windows.

4. Input the complete RTSP addresses of the connected camera or gimbal in Easyplayer to display the video stream.


2023 SIYI Technology, All Rights Reserved





2023 SIYI Technology, All Rights Reserved

# 7 ANDROID OS

## 7.1 Download Apps

Pre-installed applications in the remote controller are:

- SIYI TX
- SIYI FPV
- SIYI QGroundControl
- Ping Tools

If you need to download the above apps, please visit the relevant product pages on SIYI Official Sites (www.siyi.biz).

## 7.2 Import and Install App

### 7.2.1 Through TF Card

Save the files into your TF card and insert the card into the remote conroller. Copy the files from the TF card to the Android system storage. Then go to “File Manger” in the Android system and find the files to install.

### 7.2.2 Through USB Disk

Save the files into your USB disk and plug the disk onto the remote controller.


2023 SIYI Technology, All Rights Reserved

Copy the files from the disk to the Android system storage. Then go to “File Manger” in the Android system and find the files to install.

**CAUTION**

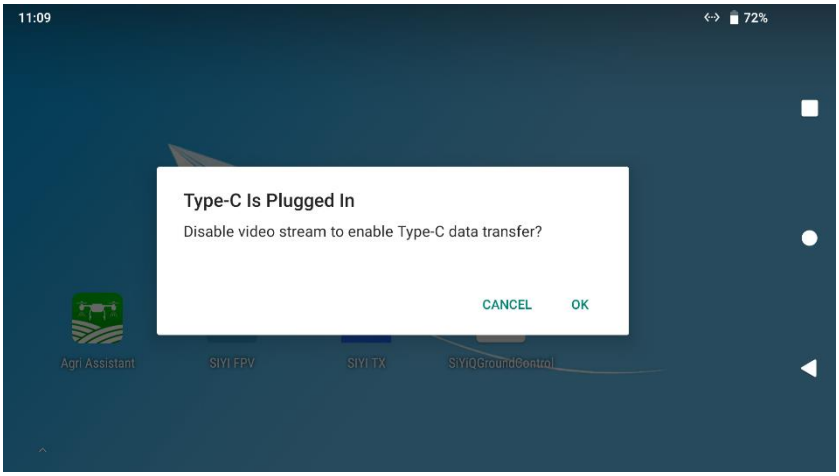
Please try to simplify the Android system as much as possible and avoid installing useless apps to avoid possible system overwhelming during flight.

### 7.2.3 Through Type-C File Transfer

Remote controller can be connected to Windows computer directly through the Type-C port as file transfer mode.

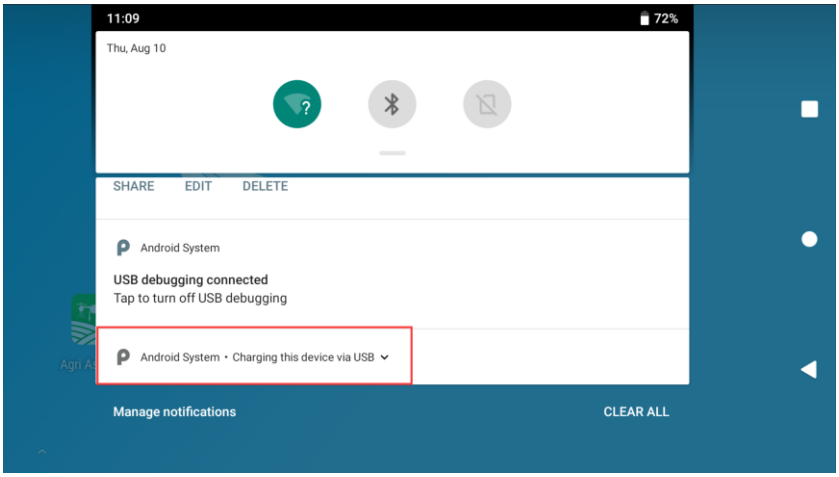
**Steps**

1. Connect the remote controller to the Windows computer through the Type-C port.
2. Confirm to “Disable video stream to enable Type-C data transfer”.

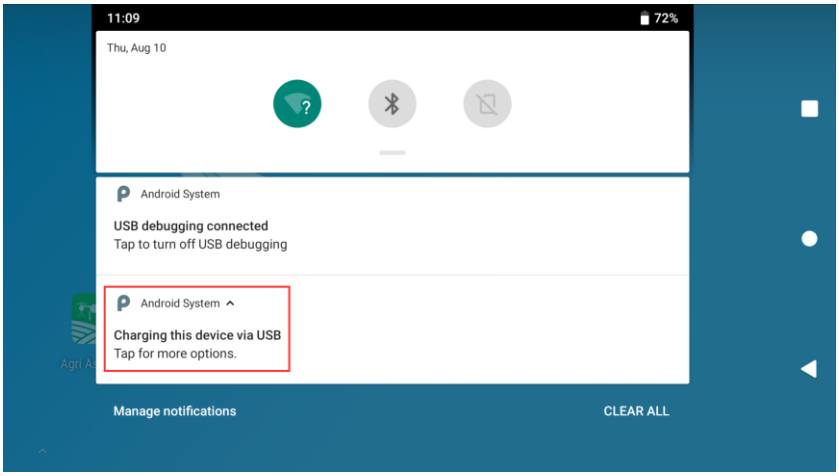



3. Tap “Android System – Charging this device via USB”.

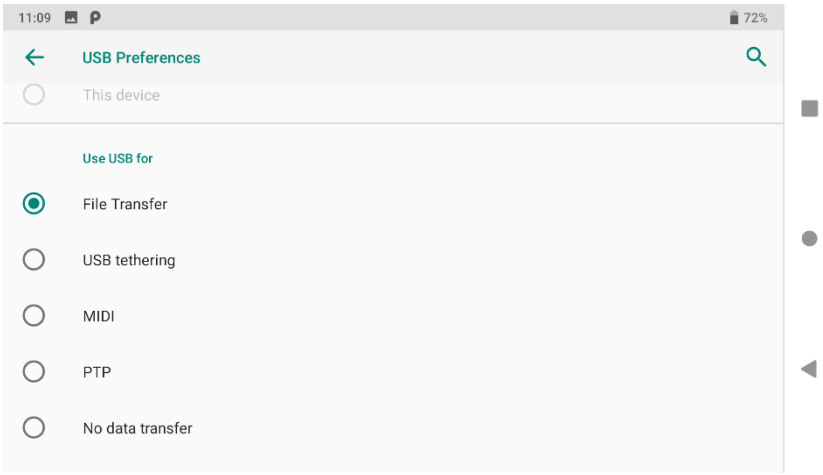

2023 SIYI Technology, All Rights Reserved




4. Keep tap for more information.

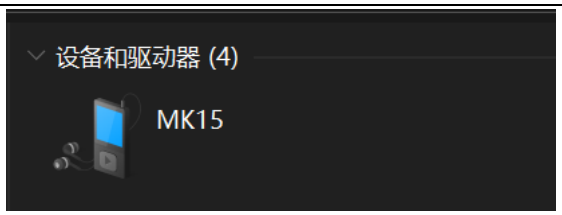



5. Choose “File Transfer”.




6. You will see the remote controller as a storage device in your Windows computer.


2023 SIYI Technology, All Rights Reserved





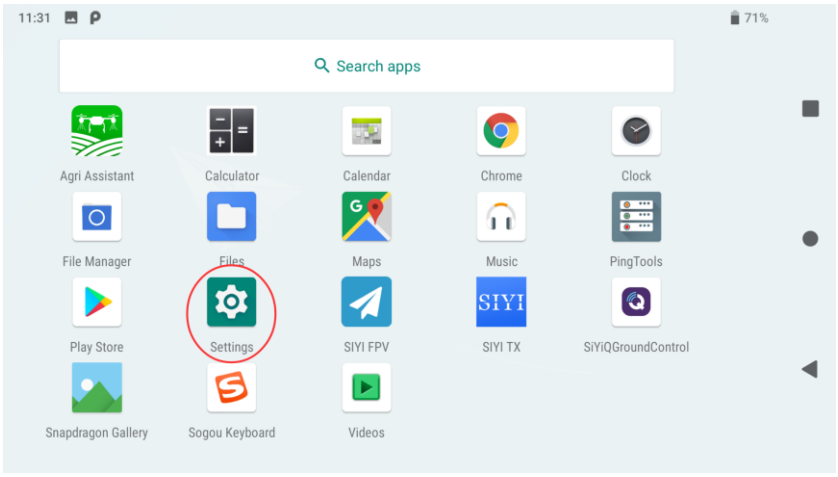
2023 SIYI Technology, All Rights Reserved

## 7.3 Check Android Firmware Version

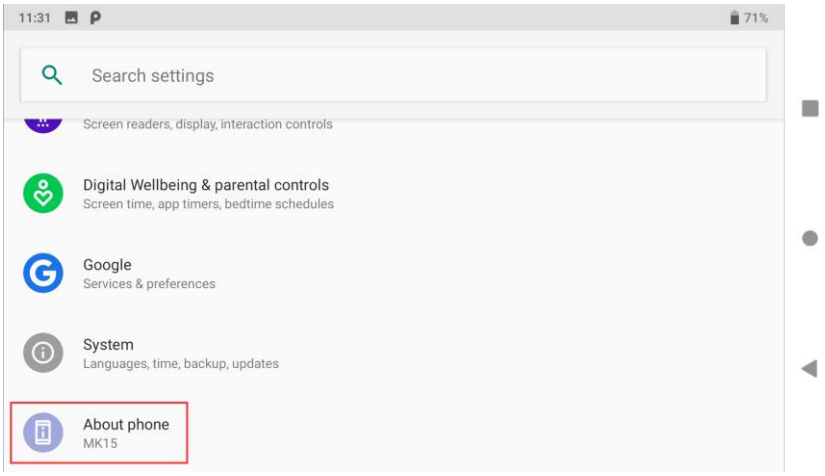
Remote controller carries a specialized Android system.

### Steps

1. Go to Android system settings.




2. Slide down to the “About Phone” settings.




3. Slide down to the last option to check the Android firmware version.


2023 SIYI Technology, All Rights Reserved

# 8 SIYI Assistant

SIYI PC Assistant is a Windows software developed by SIYI to configure many SIYI products for configuration, firmware update, and calibration.

**Mark**

The manual is edited based on SIYI PC Assistant v1.3.7.

SIYI PC Assistant and the relevant firmware pack can be downloaded from SIYI official website:

https://siyi.biz/en/index.php?id=downloads1&asd=193

## 8.1 Firmware Update

SIYI remote controller and air unit can be connected to Windows computer and be upgraded through SIYI Assistant.

Before upgrading, it is necessary to prepare the tools, software, and firmware below.

- SIYI PC Assistant (v1.3.7 or latest version)
- Remote Controller Firmware
- Air Unit Firmware


2023 SIYI Technology, All Rights Reserved

**Mark**

Above software and firmware can be downloaded from relevant product page on SIYI official website.

- Cable (USB-C to USB-A)

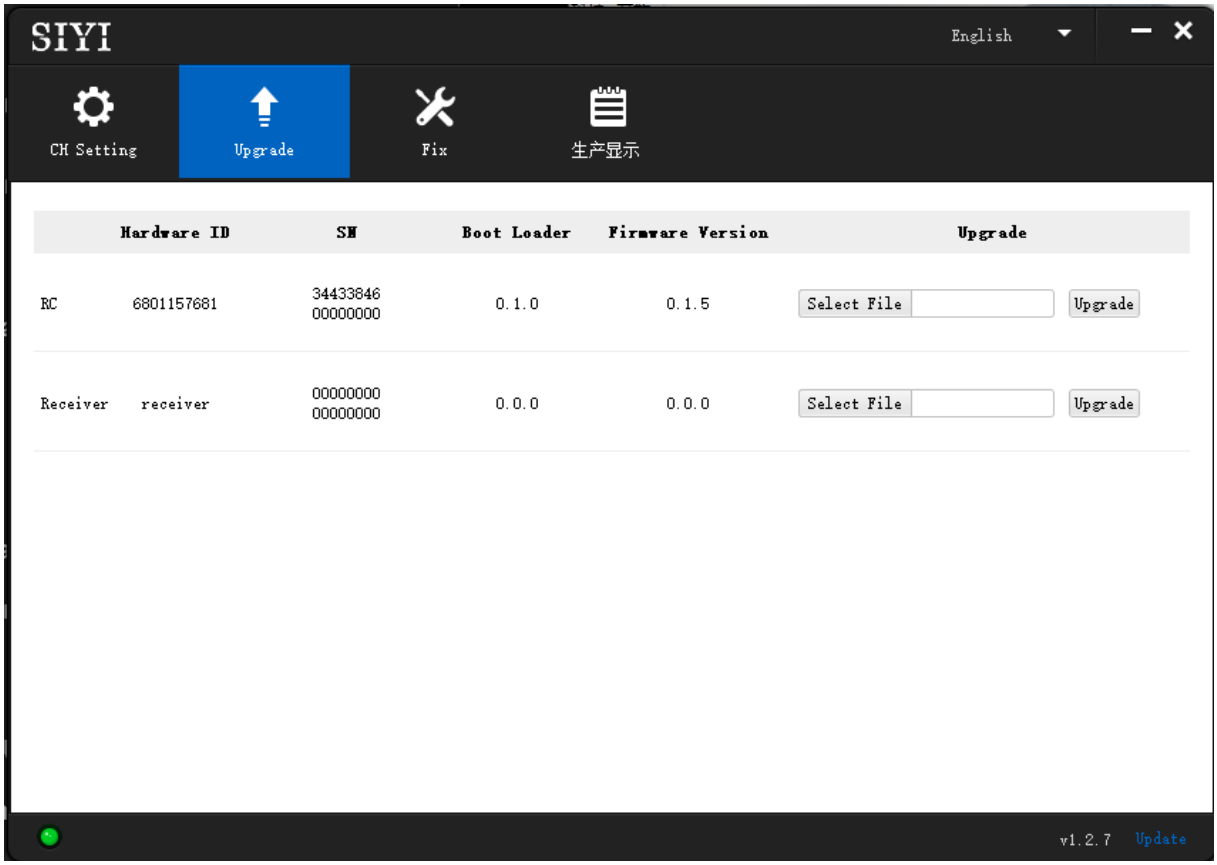
**Mark**

Above tools come with product package.

**Firmware Upgrade Steps**

1. Install “SIYI Assistant” on your Windows device.
2. Use the upgrade cable to connect the remote controller’s upgrade port to the Windows computer’s USB port.
3. Run “SIYI Assistant” and switch to the “Upload” page to check the current firmware version of the remote controller and the air unit.


2023 SIYI Technology, All Rights Reserved




4. If the firmware is not the latest, then click the “Select File” button in the “RC” line to import the latest remote controller firmware. Then click “Upgrade” and wait till it is “100%” finished.

5. Disconnect the ground unit from the Windows device. Connect the air unit’s Type-C port to your Windows device’s USB port. Then repeat the above steps to upgrade air unit firmware.

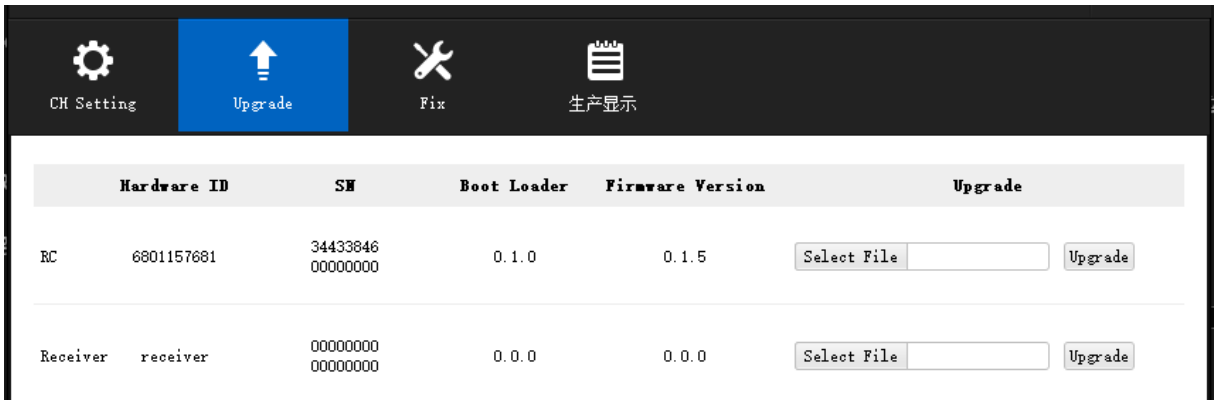
## Mark

Please choose the correct firmware according to the initial number in the boot loader number version. For instance, if the boot loader number is 5.1.0, then please choose the



2023 SIYI Technology, All Rights Reserved

firmware version starting with number 5. If the boot loader number is 0.1.0, then please choose the RF firmware version with number 0.




Don’t worry if the ground unit firmware and the air unit firmware are different in initial numbers, they can still bind and work normally if their firmware version match.


2023 SIYI Technology, All Rights Reserved

## 8.2 Main Firmware Update Log

| | |
|---|---|
| **Date** | 2023-08-31 |
| **Remote Controller Firmware** | 0.1.7 svn6940 |
| **Air Unit Firmware** | 5.3.0 svn6815 |
| **HD-Ground** | 0.2.4 svn839 |
| **SIYI TX App** | 1.1.240 |
| **SIYI FPV** | 2.5.15.660 |
| **Updates** | 1. New: Support establishing UDP datalink with other network device through Android WiFi hotspot (HD-Ground should be 0.2.4).<br>2. New: Support establishing UDP datalink with Mission Planner (HD-Ground should be 0.2.4).<br>3. New: Now SIYI datalink SDK can request remote controller and air unit firmware version.<br>4. New: Compatible with A2 mini gimbal pitch rotation control.<br>5. New: Support switch RC signal output type in “SIYI TX” app.<br>6. Fix: Binding failure caused by baud rate change did not sync.<br>7. New: Support auto frequency channel adaptive and manual switching frequency channel (HD-Ground should be 0.2.4).<br>8. New: Triple commands to acquire remote controller channel data output. |

| | |
|---|---|
| **Date** | 2023-04-17 |
| **Remote Controller Firmware** | 0.1.3 svn6602 |
| **Updates** | 1. New: Compatible with a new Bluetooth chip. |

| | |
|---|---|
| **Date** | 2023-04-03 |
| **Remote Controller Firmware** | 0.1.2 svn6564 |
| **Updates** | 1. New: Support binding to up to five air units in turns. |

| | |
|---|---|
| **Date** | 2022-11-24 |


2023 SIYI Technology, All Rights Reserved

| | |
|---|---|
| **Remote Controller Firmware** | 0.1.1 svn6286 |
| **Updates** | 1. Fix: Dial calibration may fail unintentionally. |


2023 SIYI Technology, All Rights Reserved

## 8.3 SIYI Assistant Update Log

| Date | 2023-08-24 |
|---|---|
| Version | v1.3.7 svn6958 |
| Updates | 1. New: Compatibility to a new model.<br>2. New: Support ZT30 to switch between H265 and H264 codec.<br>3. Improve: Gimbal calibration function has its own page now.<br>4. New: Gimbal configuration (thermal synchronize zoom, thermal color palette) |


2023 SIYI Technology, All Rights Reserved

# 9 After-sale Service

If there were any questions or problems using SIYI Technology's product, you can always try to send an email to SIYI Official A/S Center (support@siyi.biz) or consult your sales representative or dealer for answers or solutions.

## 9.1 Repair Service

If your purchased SIYI products cannot work properly, please contact SIYI Official A/S Center for consulting.

Usually there are two situations for acquiring repair service.

- Product Defect
- Product Damage

SIYI products under the two situations can be sent back to SIYI for repairing. Defect products with valid warranty can be repaired for free. Defect products without valid warranty or damaged products should be charged of repair fees after repairing. Please refer to SIYI's Official A/S Quotation for detail.


2023 SIYI Technology, All Rights Reserved

## 9.2 Warranty

SIYI Technology guarantees that, subject to the following conditions, Return & Refund Service, Replacement Service, and Warranty Repair Service can be requested. Please contact SIYI directly (support@siyi.biz or your sales manager) or authorized SIYI dealer for more detail.

### 9.2.1 7-Day Return & Refund

You can request Return & Refund Service:

Within seven (7) days of receiving a product if the product has no manufacturing defect, has not been activated and is still in new or like-new condition.

Within seven (7) days of receiving a product if the product has a manufacturing defect.

Return & Refund Service will not be provided where:

It is requested beyond seven (7) calendar days of receiving a product.

A product sent to SIYI for Return & Refund Service does not include all original accessories, attachments or packaging, or any item is not in new or like-new condition, i.e., with cracks, dents, or scratches.

A legal proof of purchase, receipt or invoice is not provided or is reasonably believed to have been forged or tampered with.


2023 SIYI Technology, All Rights Reserved

Any fault or damage of the product is caused by unauthorized use or modification of the product, including exposure to moisture, entry of foreign bodies (water, oil, sand, etc.) or improper installation or operation.

Product labels, serial numbers, waterproof marks, etc. show signs of tampering or alteration.

Damage is caused to the product by uncontrollable external factors, including fire, floods, high winds, or lightning strikes.

A product is not delivered to SIYI within seven (7) calendar days after Return & Refund Service confirmation is sent from SIYI.

Other circumstances stated in this policy.

### 9.2.2 15-Day Replacement

You can request Replacement Service:

Within fifteen (15) calendar days of receiving the product if the product has sustained a substantial damage in transit, provided always that the damage proof issued by the carrier can be provided to SIYI.

Within fifteen (15) calendar days of receiving the product if the product does not match the original description of the product in one or more significant respects.


2023 SIYI Technology, All Rights Reserved

Within fifteen (15) calendar days of receiving the product if the product suffers performance failure.

Replacement Service will not be provided where:

Service is requested more than fifteen (15) calendars days after receiving a product.

Legal proof-of-purchase, receipts, or invoices are not provided, or are reasonably believed to have been forged or tampered with.

A product sent to SIYI for replacement does not include all original accessories, attachments, and packaging, or contains items damaged by user error.

A product is found to have no defects after all appropriate tests are conducted by SIYI.

Any fault or damage of the product is caused by unauthorized use or modification of the product, including exposure to moisture, entry of foreign bodies (water, oil, sand, etc.) or improper installation or operation.

Damage is caused by uncontrollable external factors, including fires, floods, high winds, or lightning strikes.

Received product has not been sent back to SIYI seven (7) calendar days after replacement confirmation from SIYI.

Proof of damage during transit issued by the carrier cannot be provided.



2023 SIYI Technology, All Rights Reserved

Other circumstances stated in this policy.

### 9.2.3 1-Year Warranty Repair

You can request warranty repair service:

If a product does not function as warranted during the warranty period, you may obtain after-sales service by contacting SIYI's service center. You will need to provide a valid proof-of-purchase, receipt, or order number for the warranty service.

Charges may apply for services not covered by this Limited Warranty. Please contact SIYI for information specific to your location.

Please note that the warranty service is only available in the respective SIYI service regions where you purchased your SIYI product.

Warranty Repair service will not be provided where:

Crashes or fire damage caused by non-manufacturing factors, including but not limited to pilot errors.

Damage caused by unauthorized modification, disassembly, or shell opening not in accordance with official instructions or manuals.

Damage caused by improper installation, in correct use, or operation not in accordance with official instructions or manuals.


2023 SIYI Technology, All Rights Reserved

Damage caused by non-authorized service provider.

Damage caused by unauthorized modification of circuits and mismatch or misuse of the battery and charger.

Damage caused by operation in bad weather (i.e., strong winds, rain, sand/dust storms, etc.)

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.)

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.)

Damage caused by reliability or compatibility issues when using unauthorized third-party parts.

Damage caused by operating the unit with a low-charged or defective battery.

Products or parts with an altered identification label or from which the identification label has been removed.


2023 SIYI Technology, All Rights Reserved

**SIYI Technology**

Business Inquiry: info@siyi.biz

Phone: +86 400 838 2918

A/S Center: support@siyi.biz



2023 SIYI Technology, All Rights Reserved