
# FLYSKY FRM303 Multi-Function High Performance RF 2.4GHz Module Instruction Manual



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Contents

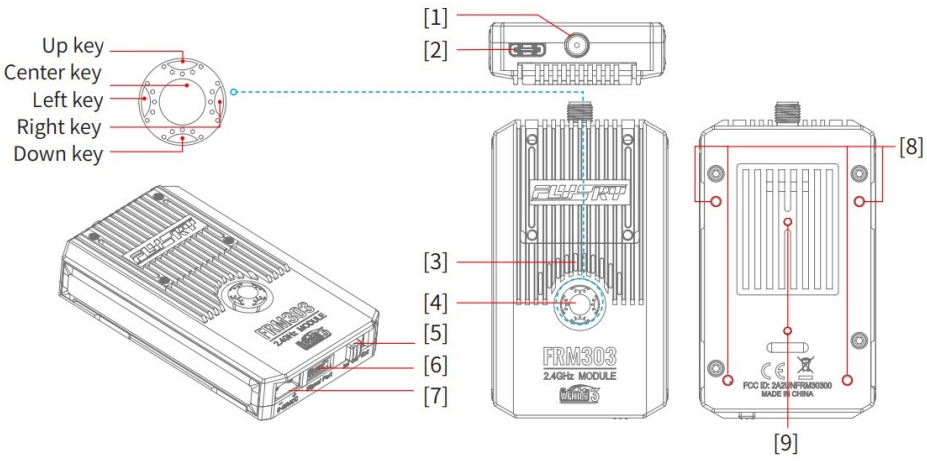


## Introduction

**FRM303** is a multi-function high performance RF module in compliance with the AFHDS 3 third generation automatic frequency hopping digital system protocol. It features an external replaceable single antenna, support of bi-directional transmission, three power supply methods, support of voltage alarm function in case of external power supply, and support of inputting PPM, S.BUS and UART signals. In the PPM and S.BUS signals, it supports settings of binding, model switching (automatic search of a receiver), receiver interface protocol setting and failsafe.

## Overview

### FRM303 RF Module

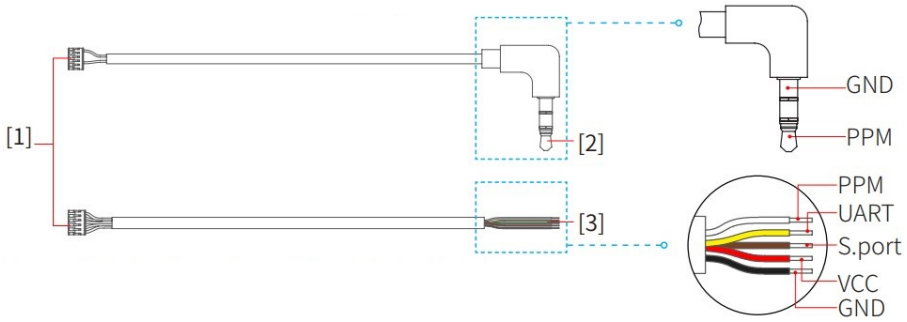



1. SMA Antenna Connector
2. Type-C USB Port
3. LED
4. Five-way Key
5. Three-position Power Switch(Int/Off/Ext)
6. Signal Interface
7. XT30 Power Supply Interface(Ext)
8. Location Holes of the Adapter
9. Screw Holes for Fixing the Adapter(M2)

### Two Cables Connecting Signal Connectors of FRM303

**Note:** These two cables are shipped with the transmitter as accessories for this version.

1. To Connect the Signal Interface of the FRM303 RF Module
2. 3.5MM Audio Head (FS-XC503 Cable)
3. DIY Interface (FS-XC505 Cable)




## Specifications

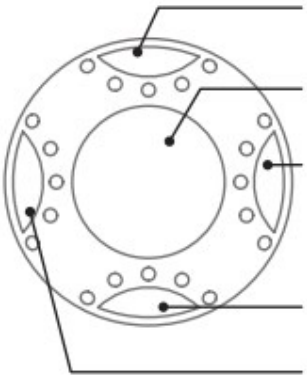
- **Product Name:** FRM303
- **Adaptive Devices:**
- **PPM:** Devices that can output standard PPM signals, such as FS-TH9X, FS-ST8, FTr8B receiver;
- **S.BUS:** Devices that can output standard S.BUS signals, such as FS-ST8, FTr8B receiver;
  Closed Source Protocol-1.5M UART: PL18;
  Open Source Protocol-1.5M UART: EL18;
  Open source protocol-115200 UART: Devices that can
  output open source protocol-115200 UART signal .
- **Adaptive Models:** Fixed-wing aircraft, racing drones, relays, etc.
- **Number of Channels:** 18
- **Resolution:** 4096
- **RF:** 2.4GHz ISM
- **2.4G Protocol AFHDS** 3
- **Maximum Power <** 20dBm (e.i.r.p.)  EU
- **Distance:** > 3500m (Air distance without interference)
- **Antenna:** External sigle SMA antenna Outer-screwinner-pin
- **Input Power:** XT30 Interfac:5~28V/DC Signal Interface: 5~10V/DC USB Port: 4.5~5.5V/DC
- **Working Current:** 98mA/8.4V(External power supply) 138mA/5.8V (Internal power supply) 135mA/5V( USB)• Data Interface: PPM, UART and S.BUS
- **Temperature Range:** -10℃ ~ +60℃
- **Humidity Range:** 20% ~ 95%
- **Online Update:** Yes
- **Dimensions:** 75*44*15.5mm(Excluding antenna
- **Weight:** 65g(Excluding antenna and adapter
- **Certifications:** CE, FCC ID:2A2UNFRM30300

## Basic functions

### Introduction to Switches and Keys

**Three-position power switch:** This switch allows you to switch the power supply way of the RF module: internal power supply (Int), power-off (Off), and external power supply (Ext). The external power supply is realized through the XT30 interface.
**Five-way key:** Up, Down, Left, Right and Center.The functions of the Five-way key are described below. It should be noted that a key is not valid when the input signal is recognized as a serial signal.

**Up:** Forced update, input signal settings
**Center:** Switching RF system and Binding
**Right:** Switching RF Models & Searching a receiver automatically
**Down:** Reset to factory and Failsafe
**Left:** Setting RX interface protocol
**Up** and **Down** are used for selection. The Right is used for confirmation. The Left is used for exit.



**Note:** In the key operations, if you hear a “Click”, it indicates that the action is valid. And the key operation is not cyclic.

**Power Supply of RF Module**

**The RF module can be powered in three modes:** Type-C interface, and internal power supply or XT-30 external power supply.

- Powering through the Type-C interface is the first priority. In the power supply through the Type-C interface, the RF module is not off when you switch the power in case of internal power supply or external power supply.
- In the internal power supply or external power supply (instead of power supply through the Type-C interface), the RF module will restart when you switch the power.

**When you remotely control a device, please do not use Type-C interface to supply power to the RF module to avoid losing control of the device. When the RF module is powered by Type-C interface, the RF module will automatically reduce the output power to avoid damage to the USB interface of the connected device. After the power is reduced, the remote control distance will be shortened.**

**External Voltage Alarm**

When the RF module is powered by a lithium battery connected through XT-30 interface for a long time, a voltage alarm function provided in the RF module will remind you of replacing the battery in time. When the RF module is powered on, the system automatically detects the power supply voltage and identifies the number of battery sections and the alarm voltage value according to the voltage. When the system detects that the battery voltage is lower than the corresponding alarm value, it will report an alarm. The specific table is as follows.

| Detect voltage | Identify the number of battery sections | Alarm voltage |
|---|---|---|
| ≤ 6V | 1S lithium battery | 3.65V |
| > 6V and ≤ 9V | 2S lithium battery | 7.3V |
| > 9V and ≤ 13.5V | 3S lithium battery | 11V |
| >13.5V and ≤ 17.6V | 4S lithium battery | 14.5V |
| >17.6V and ≤ 21.3V | 5S lithium battery | 18.2V |
| >21.3V | 6S lithium battery | 22V |

**High Temperature Alarm**

The temperature of the RF module may rise due to the use environment or long time working. When the system detects the internal temperature ≥ 60℃ , it will give an audible alarm. If the controlled model is in the air at this time, please turn off the RF module after the return. You can reuse the model after it cools down.

**Low Signal Alarm**

When the system detects that the received signal strength value is lower than the preset value, the system will give an audible alarm.

**Firmware Update**

**The RF module can be connected to the PC via Type-C interface to update the firmware through the FlySky Assistant. The corresponding states of the LED flashing in the update process are described in the following table. The update steps are as follows:**

1. At PC side, after downloading the latest FlySkyAssistant V3.0.4 or later firmware, thn start it.
2. After connecting the RF module to the PC with Type-C cable, finish the update through the Fly Sky Assistant.

| Color  | State | RF module state |
|---|---|---|
| Red | Two-flash-oneof | Waiting for firmware update or in forced update state |
| Red | Three-flashone-off (Fast) | Updating the receiver firmware |
| Yellow | Three-flashone-off (Fast) | Updating the RF module firmware |

If you cannot update the RF firmware through the above steps, you need to update it after it is in the forced update state. Then, complete the update by following the firmware update steps. The steps are as follows:
Push upwards the Up key over 9S while powering on the RF module. The red LED is in two-flash-one-off state, that is,it enters the forced update state.

**Restore the Factory Setting State**

**Restore the RF module to the factory default state. The setting steps are as follows:**
Press or push downwards the Down key over 3S and meanwhile power it on. The LED is solid on in red. After

that, the RF module is in the input signal identification state, the LED is red with ON for 2S and OFF for 3S.

**Input Signal Settings**

**FRM303 supports switching between serial signals, PPM signals and S.BUS signals. The steps are as follows:**

1. Push upwards the Up key for ≥ 3S and < 9S while powering on the RF module, it enters the input signal setting state. Now LED in blue is on.
2. Push upwards the Up key or push downwards the Down key to switch the input signal. LED flashing states vary with signals as shown in the table below.
3. Press the Center key for 3S to save the settings. Push leftwards the Left key to exit the signal setting state.

| Color | State | Input Signal |
|---|---|---|
| Blue | One-flash-one-of | PPM |
| Blue | Two-flash-one-of | S.BUS |
| Blue | Three-flash-one-of | Closed Source Protocol1.5M UAR T( Default) |
| Blue | Four-flash-one-of | Open Source Protocol1.5M UART |
| Blue | Four-flash-one-of | Open source protocol-115200 UA RT |

**Notes:**

1. Set the input signal to Closed Source Protocol-1.5M UART, when the PL18 transmitter is used.
2. Refer the documents of the corresponding transmitter for related setting, when Open Source Protocol-1.5M UART or Open source protocol-115200 UART is set.
3. When PPM or S.BUS is set, refer to Model functions( PPM or S.BUS) section for related setting.
4. When PPM is set, it can support non-standard PPM signals with a signal period range of 12.5~32ms, the number of channels is in the range of 4~18, and the initial identification range is 350-450us. To avoid automatic PPM identification errors, the identification of signal characteristics is limited, and PPM signals that exceed the above characteristics not recognize

**Input Signal Identification**

Used to judge whether the RF module receives a matching signal source after setting the input signal. After setting the input signal or without pressing the key (or pressing the key for <3S) to power on the RF module, then it will enter the input signal identification state. The LED is red with ON for 2S and OFF for 3S. And the LED flashing states vary with signals as shown in the table below.

| Color | LED state | RF module state |
|---|---|---|
| Red | ON for 2S and OFF for 3S | In input signal identification state (input signal mismatch) |
| Blue | flashing (slow) | Input signal match |

**Introduction to RF normal working State**

When the RF module recognizes the input signal, it enters the normal working state. The LED states correspond to different RF module states as shown in below.

| Color | State | RF module state |
|---|---|---|
| Green | Solid on | Normal communication with the receiver in two-way mode |
| Blue | flashing (slow) | No communication with the receiver in one-way or two-way mode |
| Blue | ON for 2S and OFF for 3S | Abnormal signal after successful input signal recognition |
| Red/Green/ Blue | flashing (slow) | Alarm state |

## Model functions

This section introduces the model settings for S.BUS or PPM signals in the normal operations of the FRM303 RF module. The setting methods for S.BUS or PPM signals are the same. Take PPM signals as a instance. It should be noted that the FRM303 input signals should be set to PPM and the transmitter's RF type should be set to PPM.

**Switching RF Model and Searching a Receiver Automatically**

**If the input signals are PPM and S.BUS, this RF module provides a total of 10 groups of models. The model related data will be saved in the model, such as RF setting, receiver ID after two-way binding, failsafe settings, and RX interface protocol. The setting steps are as follows:**

1. Press or push rightwards the Right key for 3S. After a "click", the LED lights up in white. It enters the RF model switching setting state. The LED flashing states vary with models, see the table below.
2. Push upwards the Up key or push downwards the Down key to select the appropriate model.
3. Press the Center key for 3S to save the settings. Pushleftwards the Left key to exit the model switching state.

| Color | State | Model |
|---|---|---|
| White | One-flash-one-of | RF model 1 |
| White | Two-flash-one-of | RF model 2 |
| White | Three-flash-one-of | RF model 3 |
| White | Four-flash-one-of | RF model 4 |
| White & Blue | Five-flash-one-of | RF model 5 |
| White & Blue | **White**: One-flash-one-off; **Blue**: One-flash-one-of | RF model 6 |
| White & Blue | **White:** Two-flash-one-off; Blue: One-flash-one-of | RF model 7 |
| White & Blue | **White:** Three-flash-one-off; **Blue:** One-flash-one-of | RF model 8 |
| White & Blue | **White:** Four-flash-one-off; **Blue:** One-flash-one-of | RF model 9 |
| ` White & Blue | **White:** Five-flash-one-off; **Blue:** One-flash-one-off | RF model 10 |

**After the two-way binding between the model and the receiver, you can quickly find the model that is bound with the corresponding receiver through this function. It can automatically exit the search state after successful location, and keep normal communications with the receiver. The search steps are as follows:**

1. In the model switching state, push rightwards the **Right** key to enter the receiver search mode. At this time, the LED is blue with quick flashing.
2. The receiver is powered on and the search is successful. Then it automatically exits the search state. At this time, the LED is solid on in green.

**Notes:**

1. In case of one-way communications between the receiver and the RF module, the automatic search of a receiver is not supported.
2. The search starts from the model where it is currently cated, to automatically switch to the next model. If not found, there is the cyclic search until you manually push leftwards the Left key to exit the search state.

**Setting RF System and Binding**

**Set the RF system and binding. After the RF system is set, the FRM303 RF module can carry out the one-way or two-way binding with the receiver that it is compatible with. Take the two-way binding as an example. The setting steps are as follows:**

1. Press the Center key for 3S. After a “click”, the LED lights up in magenta. The LED flashing states vary with RF systems, see the table below. Push upwards the Up key or push downwards the Down key to select a proper RF system.

2. Push rightwards the Right key. The LED is flashing quickly green. The RF module enters the binding state. Push leftwards the Left key to exit the binding state.
3. Make the receiver enter the binding state.
4. After the successful binding, the RF module automatically exits the binding state.

**Note:** If the RF module will bind with the receiver in oneway mode, when the receiver LED becomes slow flashing from fast flashing, indicating the binding is successful. Push leftwards the Left key to exit the binding state.

| Color | State | RF System |
|---|---|---|
| Magenta | One-flash-one-off | Classic 18CH in two-way |
| Magenta | Two-flash-one-of | Classic 18CH in one-way |
| Magenta | Three-flash-one-of | Routine 18CH in two-way |
| Magenta | Four-flash-one-off | Routine 18CH in one-way |

**Setting RX Interface Protocol**

Set the receiver interface protocol. The LED is cyan in this state.
**The setting steps are as follows:**

1. Press or push leftwards the Left key for 3S. After a “click”, the LED lights up in cyan. It enters the RX interface protocol setting state. The LED flashing states vary with protocols, see the table below.
2. Push upwards the Up key or push downwards the Down key to select the appropriate protocol.
3. Press the Center key for 3S to save the settings. Push leftwards the Left key to exit the protocol setting state

| Color | State | RX Interface Protocol |
|---|---|---|
| Cyan | One-flash-one-of | PWM |
| Cyan | Two-flash-one-of | i-BUS out |
| Cyan | Three-flash-one-of | S.BUS |
| Cyan | Four-flash-one-of | PPM |

**Note:** In the two-way mode, regardless of whether the receiver is powered on, this setting can be successful. In the one-way mode, this setting can take effect only in case of re-binding with the receiver.

In the classic receivers, there are two cases: Only one interface can be set with the interface protocol; two interfaces can be set with the interface protocol. In the enhanced receivers, the Newport interface can be set with the interface protocol. After setting, the output signals corresponding to the receiver interfaces are listed in the table below.

| Item | Classic receivers only one interface can be set with the interface protocol, for example, FTr4, FGr4P and FGr4s | Classic receivers only two interfaces can be set with the interface protocol, for example, FTr16S, FGr4 and FTr10. | Enhanced receivers enhanced receivers such as FTr12B and FTr8B with Newport interface NPA, NPB, etc. |
|---|---|---|---|
| PWM | CH1 interface outputs PWM, and i-BUS interface outputs i-BUS out | CH1 interface outputs PWM, and i-BUS interface outputs i-BUS out | NPA interface outputs PWM, the rest Newport interface output PWM |
| -BUS out | out CH1 interface outputs PPM, and i-BUS interface outputs i-BUS out. | CH1 interface outputs PPM, and i-BUS interface outputs i-BUS out | NPA interface outputs i-BUS out, the rest Newport interface output PWM. |
| S.BUS | CH1 interface outputs PWM, and i-BUS interface outputs S.BUS. | CH1 interface outputs PWM, and i-BUS interface outputs S.BUS. | NPA interface outputs S.BUS, the rest Newport interface output PWM. |
| PPM | CH1 interface outputs PPM, and i-BUS interface outputs S.BUS | CH1 interface outputs PPM, and i-BUS interface outputs S.BUS. | NPA interface outputs PPM, the rest Newport interface output PWM. |

**Setting Failsafe**

**Set failsafe. There three options can be set: No output, Free and Fixed value.The setting steps are as follows:**

1. Push downwards the Down key for 3S. After a “click”, the LED lights up in red. The LED flashing states vary with Failsafe setting, see the table below.
2. Push upwards the Up key or push downwards the Down key to select the appropriate item.
3. Press the Center key for 3S to save the settings. Push leftwards the Left key to exit the failsafe setting state.

| Color  | State | Failsafe Setting Item |
|---|---|---|
| Red | One-flash-one-of | No output for all channels |
| Red | Two-flash-one-of | All channels keep the last output before failsafe. |
| Red | Three-flash-oneof | The current output value is the failsafe value of each channel. |

**Signal Strength Output**

This RF module supports the signal strength output. By default, it is enabled Switch-off is not allowed. CH14 outputs the signal strength, instead of channel data sent by the transmitter.

## Attentions

-  Make sure the RF module is installed and calibrated correctly, failure to do so may result in serious injury.
- Keep the RF’s antenna at least 1cm away from conductive materials such as carbon or metal.

- In order to ensure good signal quality, do not hold the RF antenna during use.
- Do not power on the receiver during the setup process to prevent loss of control.
- Make sure to remain within range to prevent loss of control.
- It is recommended that an external power supply is used in order to make sure that the RF module is getting enough power to function correctly.
- When the RF module is not in use, please turn the power switch to the OFF position. If it is not used for a long time, please power it off. Even a very small current may cause damage to the RF module battery.
- It is not allowed to use Type-C to supply power to the RF module when the model aircraft is in flight to avoid accidental conditions.

## Certifications

#### FCC Compliance Statement

**This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:**

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

**Warning:** changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
**If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:**

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

**EU DoC Declaration**
Hereby, [Flysky Technology co., ltd] declares that the Radio Equipment [FRM303] is in compliance with RED 2014/53/EU.
**The full text of the EU DoC is available at the following internet address:**
**www.flyskytech.com/info_detail/10.html**

**RF Exposure Compliance**
The device has been evaluated to meet general RF exposure requirement.The device can be used in portable exposure condition without restriction.
**Environmentally friendly disposal**
Old electrical appliances must not be disposed of together with the residual waste, but have to be disposed of separately. The disposal at the communal collecting point via private persons is for free. The owner of old appliances is responsible to bring the appliances to these collecting points or to similar collection points. With this little personal effort, you contribute to recycle valuable raw materials and the treatment of toxic substances.

**Disclaimer: The factory preset transmission power of this product is ≤ 20dBm. Please adjust it in accordance your local laws. The consequences of damage caused by improper adjustments shall be borne by the user.**

Figures and illustrations in this manual are provided for reference only and may differ from actual product appearance. Product design and specifications may be changed without notice.

**FCC ID:** 2A2UNFRM30300

## Documents / Resources

| | |
|---|---|
|  | FLYSKY FRM303 Multi-Function High Performance RF 2.4GHz Module [pdf] Instruction Manual<br>FRM303, FRM303 Multi-Function High Performance RF 2.4GHz Module, Multi-Function High Performance RF 2.4GHz Module, High Performance RF 2.4GHz Module, RF 2.4GHz Module, 2.4GHz Module, Module |

## References

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Manuals+,