Ruijie RG-HybridBox Hybrid Box

Hardware Installation and Reference Guide

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Preface

Intended Audience

This document is intended for:

- Network engineers
- Technical support and servicing engineers
- Network administrators

Technical Support

- Ruijie Networks website: https://www.ruijienetworks.com/
- Online support center: https://ruijienetworks.com/support
- Case portal: https://caseportal.ruijienetworks.com
- Community: https://community.ruijienetworks.com
- Email support: service_rj@ruijienetworks.com
- Live chat: https://www.ruijienetworks.com/rita

Conventions

1. Signs

The signs used in this document are described as follows:

Danger

An alert that contains important safety instructions. Before you work on any equipment, be aware of the hazards involved and be familiar with standard practices in case of accidents.

Warning

An alert that calls attention to important rules and information that if not understood or followed can result in data loss or equipment damage.

Caution

An alert that calls attention to essential information that if not understood or followed can result in function failure or performance degradation.

Note

An alert that contains additional or supplementary information that if not understood or followed will not lead to serious consequences.

Specification

An alert that contains a description of product or version support.

2. Notes

The manual provides configuration information, including models, port types, and command line interfaces, for reference purposes only. In the event of any discrepancy or inconsistency between the manual and the actual version, the actual version shall take precedence.

Contents

1 Product Overview

1.1 About the RG-HybridBox

The RG-HybridBox is a hybrid box designed to work with Rujie's RG-AM5528-SF optical i-Share master access point (AP). The RG-HybridBox provides 24 cable slots on the front panel for routing 24 hybrid pigtails. It also has U- slots and wire holders where 24 pairs of copper wires can be crimped. The built-in fiber splicing tray can accommodate 24 optical fibers.

1.2 Hardware Features

Figure 1-1 Front Top View of the RG-HybridBox

Figure 1-2 Rear Top View of the RG-HybridBox

Table 1-1 Description

No.	Description
1	Cable slots through which hybrid pigtails are routed in.
2	Cable holes through which hybrid cables are routed in.

Figure 1-3 Internal View of the RG-HybridBox

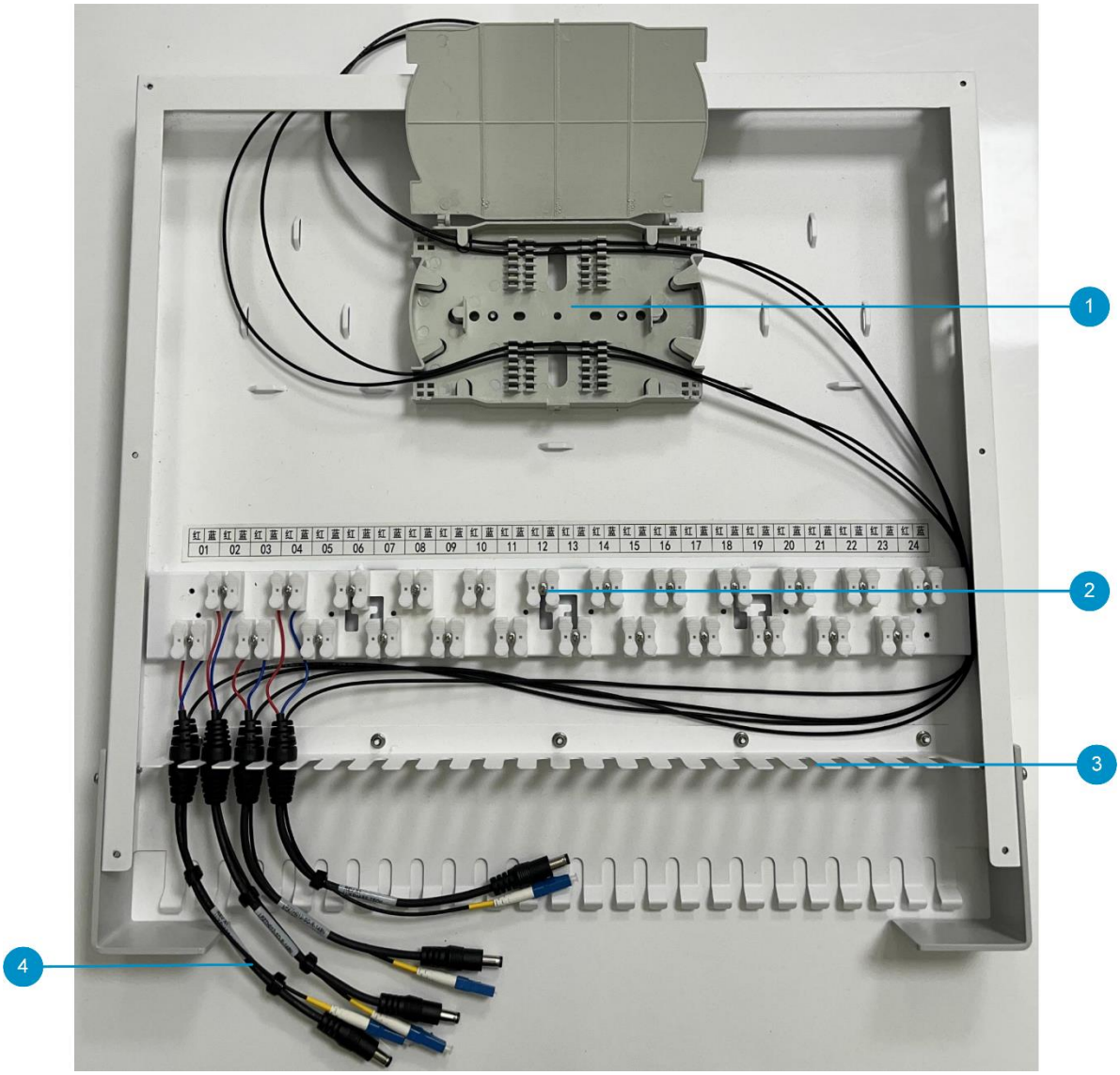


Table 1-2 Description

No.	Description
1	Fiber splicing tray that can accommodate 24 optical fibers.
2	Wire holders where 24 pairs of copper wires can be crimped.
3	U-slots used to secure hybrid pigtails.
4	Hybrid pigtail used to connect the optical i-Share master AP to the hybrid box.

1.3 Technical Specifications

Table 1-3 Technical Specifications

Model	RG-HybridBox
Dimensions (W x D x H)	440 mm x 440 mm x 44 mm (17.32 in. x 17.32 in. x 1.73 in.)
Weight	7.2 kg (15.87 lbs)
Temperature	Operating temperature: 0°C to 45°C (32°F to 113°F) at an altitude between 0 m to 1,800 m (5,905.51 ft.) Note: At an altitude from 1,800 m (5,905.51 ft.) to 5,000 m (16,404.20 ft.), every time the altitude increases by 220 m (721.78 ft.), the maximum temperature decreases by 1°C (1.8°F). Storage temperature: –40°C to +70°C (–40°F to +158°F)
Humidity	Operating humidity: 10% RH to 90% RH (non-condensing) Storage humidity: 5% RH to 95% RH (non-condensing)

2 Preparing for Installation

2.1 Safety Precautions

Danger

- To avoid personal injury and device damage, carefully read the safety precautions before installing the hybrid box.
- The following safety precautions may not cover all possible dangers.

2.1.1 General Safety Precautions

When the RG-HybridBox is used with the optical i-Share master AP,

(1) Do not install the device in an environment with high temperature, dust, harmful gases, flammable, explosive, electromagnetic interference (large radar stations, radio stations, substations), unstable voltage, strong vibration, or strong noise.

(2) The installation site should be free from water flooding, seepage, dripping, or condensation.

(3) The installation site should be selected according to communication network planning and technical requirements for communication equipment, and considerations such as climate, hydrology, geology, earthquake, electrical power, and transportation.

(4) Cut off all the power supplies and unplug all power cords before mounting the device in a rack or removing the device from a rack.

(5) Avoid handling the device frequently.

2.1.2 Electric Safety

When the RG-HybridBox is used with the optical i-Share master AP,

(1) Observe local regulations and specifications during electric operations. Only personnel with relevant qualifications can perform such operations.

(2) Before installing the device, check potential risks in the working environment, such as wet floor.

(3) Do not place the switch in a wet position, and keep the switch away from liquid.

Danger

Improper or incorrect electric operations may cause a fire, electric shock, and other accidents, and lead to severe and fatal personal injury and device damage.

2.1.3 Electrostatic Discharge Safety

When the RG-HybridBox is used with the optical i-Share master AP, take the following measures to prevent electrostatic damage.

(1) Keep the indoor installation environment clean and free of dust.

(2) Maintain appropriate temperature and humidity.

2.2 Installation Environment Requirements

To ensure the normal running and prolonged service life of the device, the installation site must meet the following requirements.

2.2.1 Ventilation

The RG-HybridBox adopts a nature cooling design. Reserve sufficient space around the device to ensure normal heat dissipation.

2.2.2 Temperature and Humidity

When the RG-HybridBox is used with the optical i-Share master AP, maintain appropriate temperature and humidity in the equipment room to ensure the normal operation and service life of the RG-HybridBox.

(1) In an environment with high relative humidity, the insulating material may have poor insulation or even leak electricity.

(2) In an environment with low relative humidity, static electricity may be generated, which may damage the circuit on the device.

(3) In an environment with high temperature, the aging process of insulating materials will be accelerated, greatly reducing the performance and reliability of the device and severely affecting its service life.

For details about the temperature and humidity requirements of the RG-HybridBox, see Table 1-3.

2.2.3 Cleanliness

When used with the optical i-Share master AP, the RG-HybridBox complies with the following cleanliness requirements.

Dust poses a major threat to the device. The indoor dust takes on a positive or negative static electric charge when falling on the switch, causing poor contact of the metallic joint. Such electrostatic adhesion may occur more easily when the relative humidity is low, not only affecting the service life of the switch, but also causing communication faults. The following table describes the requirements for the dust content and granularity in the machine room.

Table 2-1 Requirements for Dust

Dust	Unit	Maximum Quantity
Dust particles (diameter ≥ 0. 5 μm)	Particles/m^3	≤ 3.5 x 10^6
Dust particles (diameter ≥ 5 μm)	Particles/m^3	≤ 3 x 10^4

Apart from dust, the salt, acid, and sulfide in the air of the equipment room must meet strict requirement. These harmful substances will accelerate metal corrosion and component aging. Therefore, the equipment room should be properly protected against the intrusion of harmful gases, such as sulfur dioxide, hydrogen sulfide, nitrogen dioxide, and chlorine gas. The following table lists limit values for harmful gases.

Table 2-2 Requirements for Gases

Gas	Average (mg/m^3)	Maximum (mg/m^3)
Sulfur dioxide (SO_2)	0.3	1.0
Hydrogen sulfide (H_2S)	0.1	0.5
Nitrogen dioxide (NO_2)	0.5	1.0
Chlorine gas (Cl_2)	0.1	0.3

Note

Average refers to the average value of harmful gases measured in one week. **Maximum** is the upper limit of the harmful gas measured in one week for up to 30 minutes every day.

2.2.4 Anti-interference

The RG-HybridBox is used in combination with the optical i-Share master AP. External interference may affect the device. These interference is coupled to the device through capacitive coupling, inductive coupling, electromagnetic radiation, common impedance (including the grounding system), and conducting wires (such as the power cord, signal cable, and output line). Pay attention to the following:

(1) Keep the device away from high-power radio stations, radar stations, and high-frequency high-current devices.

(2) Take electromagnetic shielding measures to minimize interference when necessary, for example, use shielded interface cables.

(3) Route interface cables only indoors to prevent signal ports from getting damaged due to overvoltage or overcurrent caused by lightning strikes.

2.2.5 EMI

When the RG-HybridBox is used with the optical i-Share master AP, pay attention to electromagnetic interference (EMI). Various interference sources, from either outside or inside the device or application system, affect the system in the conductive ways such as capacitive coupling, inductive coupling, and electromagnetic radiation.

There are two types of electromagnetic interferences: radiated interference and conducted interference, depending on the type of the propagation path.

When the energy, often RF energy, from a component arrives at a sensitive component through the space, the energy is known as radiated interference. The interference source can be either a part of the interfered system or a completely electrically isolated unit. Conducted interference occurs when interference is transferred from one unit to another through cables which are usually electromagnetic wires or signal cables connecting the source and the sensor. Conducted interference often affects the power supply, but can be controlled with a filter. Radiated interference may affect any signal path in the device, and is difficult to shield. To reduce electromagnetic interferences, pay attention to the following requirements:

(1) Effective measures should be taken for the power system to prevent electric grid interference.

(2) The working ground of the switches should be properly separated and kept as far as possible from the grounding device of the power device or the anti-lightning grounding device.

(3) Keep the device away from high-power radio stations, radar stations, and high-frequency high-current devices.

2.3 Tools

Table 2-3 Tools

Common Tools	Phillips screwdriver, flat-blade screwdriver, hybrid cable, fiber fusion splicer, diagonal plier, cable ties, scissors, and label paper
Special Tools	Anti-ESD tools
Meters	Multimeter

Note

The RG-HybridBox is delivered without a tool kit. The tool kit is customer-supplied.

3 Installing the Hybrid Box

Note

Before installing the hybrid box, make sure that you have carefully read the requirements described in Chapter 2, and the requirements have been met.

3.1 Package Contents

Check the items according to the package contents before installation.

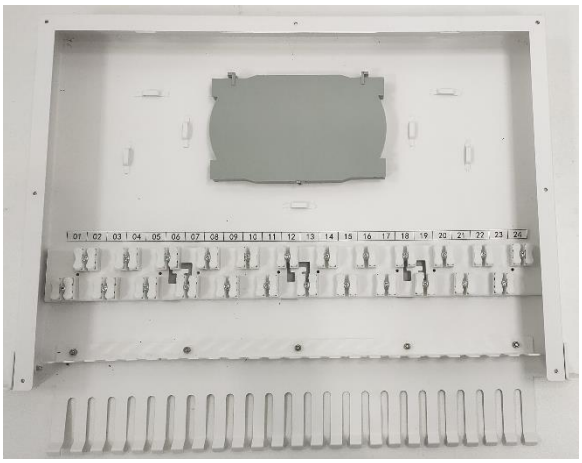
Table 3-1 Package Contents

Item	Quantity
RG-HybridBox hybrid box	1
Top cover	1
Mounting bracket	2
M4 x 8 mm Phillips countersunk screw	4
Hybrid pigtail	24

3.2 Installing the Hybrid Box

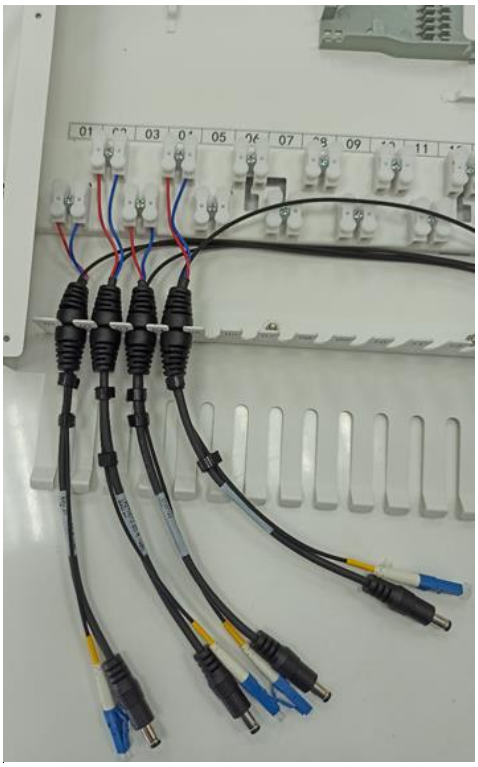
(1) Use a screwdriver to unscrew the top cover of the hybrid box and remove the top cover.

Figure 3-1 Removing the Top Cover



(2) Route hybrid pigtails into the U-slots of the hybrid box in sequence. Crimp the copper cables (red and blue wires) of the hybrid pigtails into the wire holders in sequence. Then gently pull the red and blue wires outward to ensure that they are securely connected.

Figure 3-2 Installing the Copper Cable of the Hybrid Pigtail

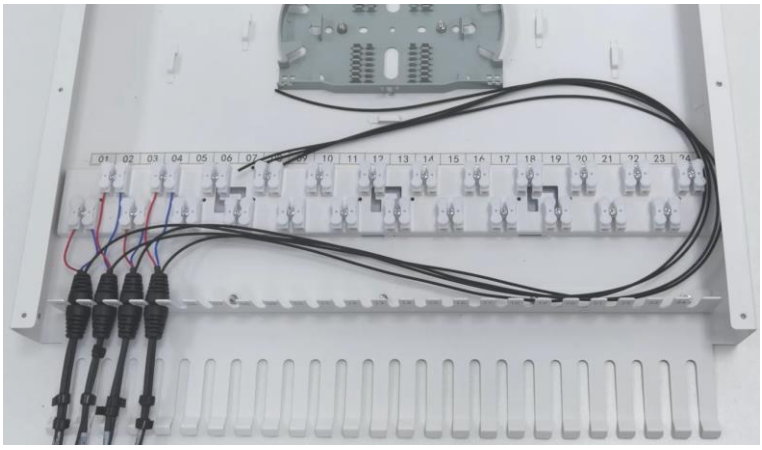


Caution

24 cable slots on the front panel of the hybrid box correspond to 24 wire holders inside the hybrid box respectively. If the optical fiber is routed through slot 1, the copper cable must also be crimped in wire holder 1 to avoid confusion.

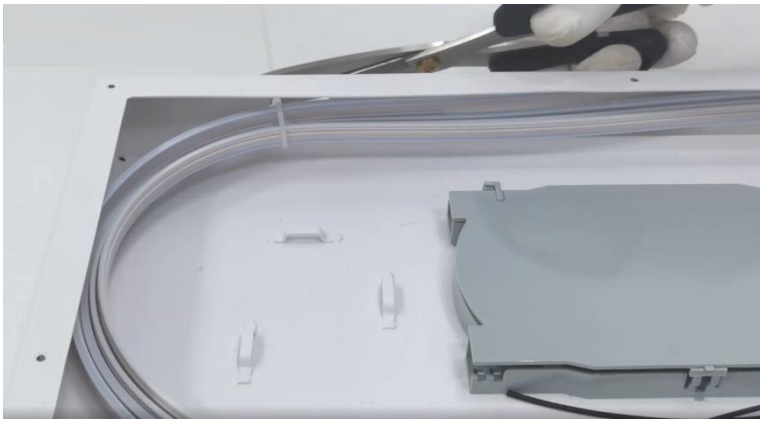
(3) Route the optical fibers of the hybrid pigtails along the wire holders to the back of the wire holders.

Figure 3-3 Routing the Optical Fiber of the Hybrid Pigtail



(4) Route the hybrid cables into the hybrid box through the cable holes on the rear of the hybrid box. Secure the hybrid cables with cable ties.

Figure 3-4 Securing Hybrid Cables with Cable Ties



(5) Split the optic fiber from the copper cable of a hybrid cable. Peel off the outermost sheath of the copper cable by 30 mm (1.81 in.) to 50 mm (1.97 in.). Peel off the sheaths of the two wires in the copper cable by 5 mm (0.20 in.) and crimp them into the wire holders in sequence. Then gently pull out the wires to ensure that they are securely connected.

Figure 3-5 Splitting the Optic Fiber from the Copper Cable of a Hybrid Cable

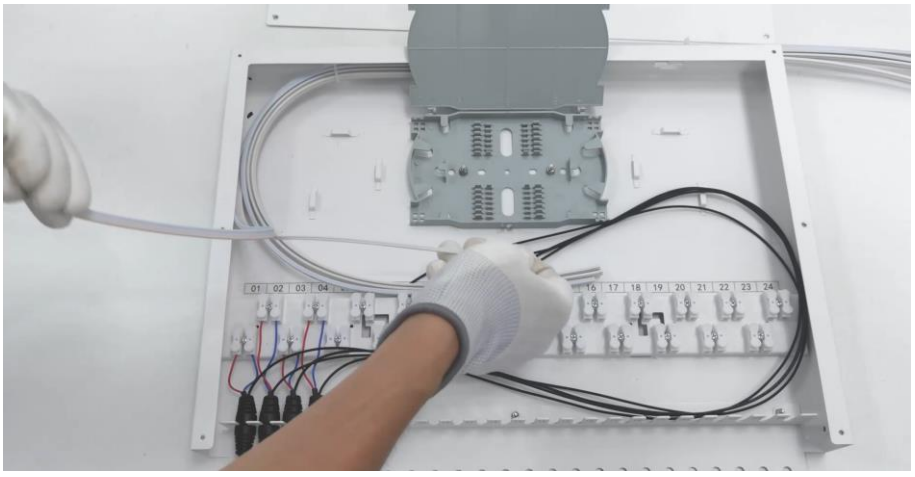


Figure 3-6 Peeling Off the Sheaths of Two Wires in the Copper Cable

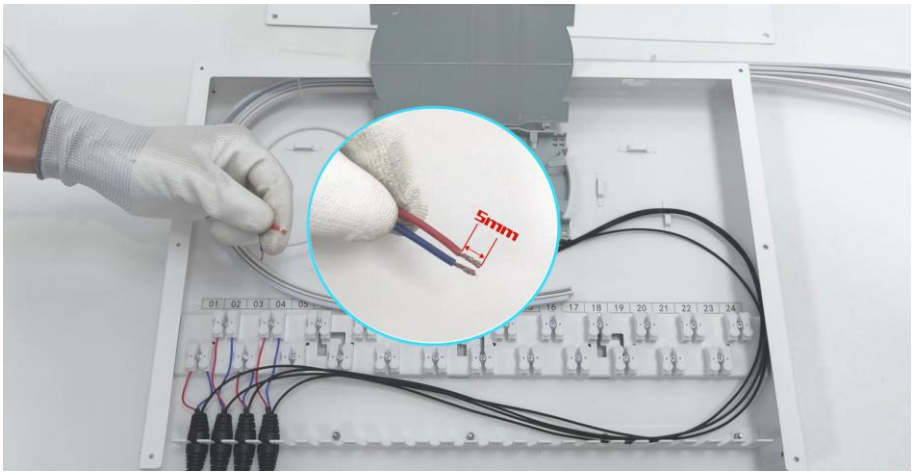
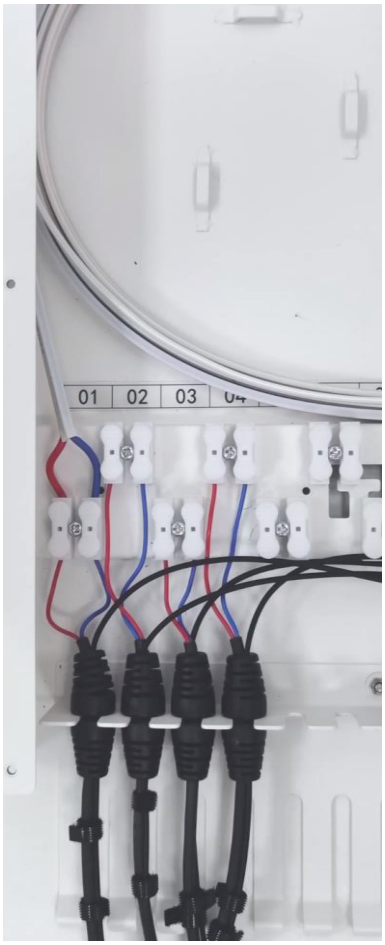


Figure 3-7 Crimping Two Wires of the Copper Cable into the Wire Holder



(6) Choose the corresponding hybrid cable and hybrid pigtail. Route the optical fibers of the hybrid cable and hybrid pigtail through heat shrink tubes and peel off the sheaths of their optical fibers in the splicing tray of the hybrid box to expose the glass fibers. Splice the optical fibers according to the fiber splicing specifications, and then coil the optical fibers.

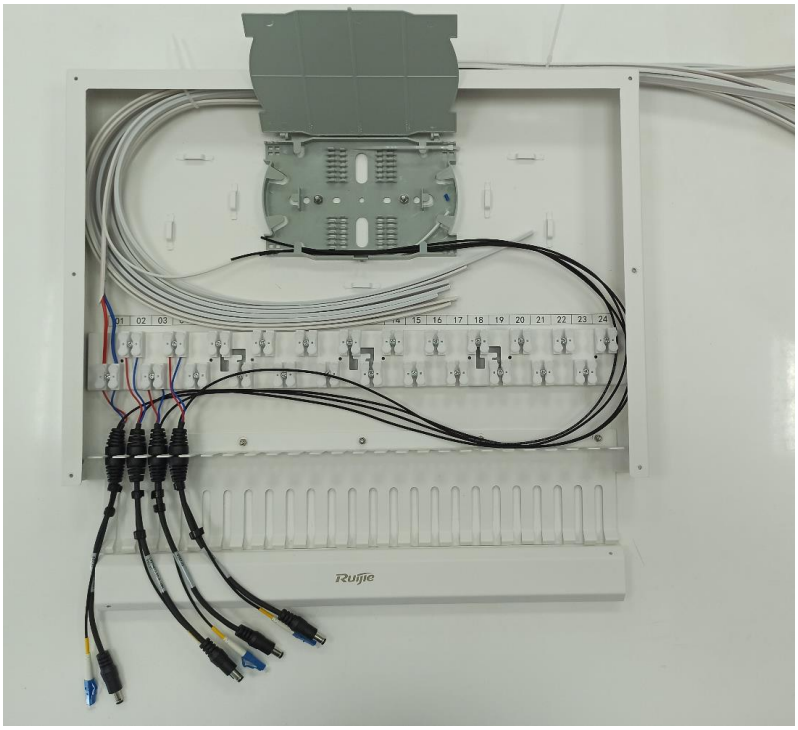
Caution

Optical fibers can be spliced and coiled after the top cover of the hybrid box is opened.

Caution

- The optical fiber and copper cable in the same hybrid cable must be connected to the corresponding optical fiber and copper cable in the same hybrid pigtail.
- When connecting cables inside the hybrid box, twist the exposed copper cores into a bundle and hide them in the cable hole to prevent short circuits caused by poor contact.
- After the optical fibers are spliced, coil and secure the optical fibers in the fiber termination tray.

Figure 3-8 Coiling the Optical Fiber



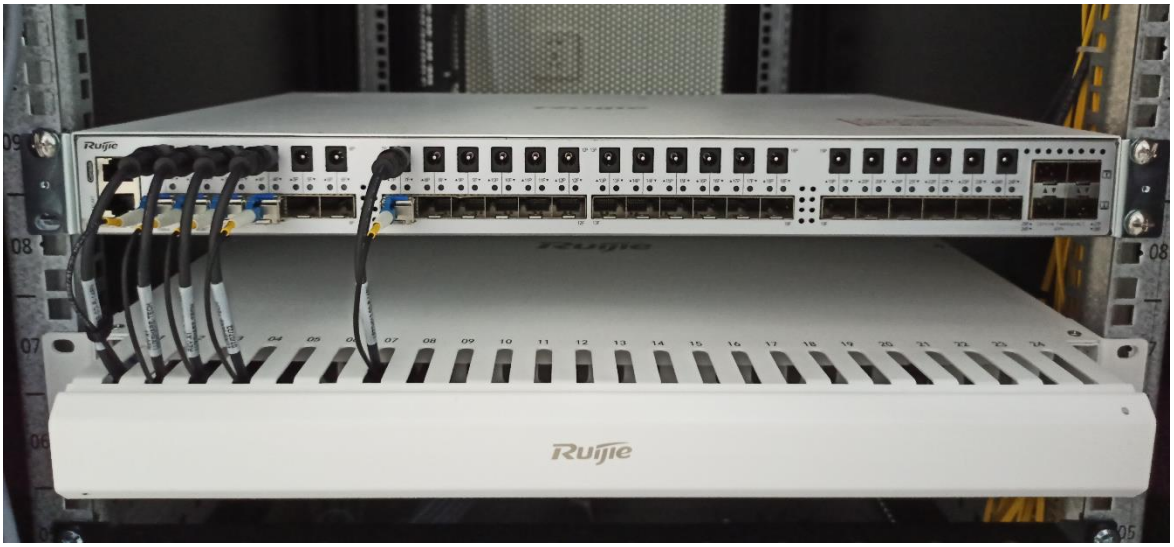
(7) Splice other optical fibers in sequence and secure them in the fiber termination tray.

(8) Install the top cover of the hybrid box using screws, and install the hybrid box on the rack.

Note

- The hybrid box is installed above or below the optical i-Share master AP. You are advised to install the hybrid box 1 RU away from the master AP.
- The LC and DC connectors of the hybrid pigtails should be connected to the optical i-Share master AP in a one-to-one manner by matching the sequence number on the master AP to avoid incorrect connections.

Figure 3-9 Installing the Hybrid Box and Master AP



Caution

For the cabinet with a depth of less than 600 mm (23.62 in.), the cabinet door cannot be closed after an optical i-Share master AP and a hybrid box are installed.

(9) Clearly mark the dormitory number corresponding to an optical port, bound optical port, installation position, and the MAC address of the AP with a label to facilitate management.

3.3 Checklist After Installation

Warning

Cut off the power supply to avoid personal injury and damage to components caused by incorrect connection.

(1) Check whether the positive and negative terminals of the red and blue wires are correctly connected to the power terminals in the wire holder of the hybrid box.

(2) Check whether the optical fiber and copper cable in the same hybrid cable are properly connected to the corresponding optical fiber and copper cable in the same hybrid pigtail.

(3) Check whether there is adequate clearance around the device for heat dissipation.