# Dropair Matter Gateway Product Manual


Model：Mini6X

Manufacturer: Dropair Lab Inc.

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# Contents

# Important Information

Mini6X is a low-voltage device. Before wiring, make sure the power supply and connected control circuits match the electrical ratings specified in this manual.
Incorrect wiring or connection to an unsupported voltage may damage the product or connected equipment.
The information in this document is provided for product installation, configuration, operation, and maintenance. Product specifications, firmware, hardware design, and documentation may be updated without prior notice.

# 1. Product Overview

Dropair Mini6X is a Matter gateway designed for HVAC control, equipment interface conversion, and smart home integration.
Mini6X connects to compatible HVAC equipment through low-voltage control interfaces and provides Matter connectivity through its built-in wireless communication module. It can be used to integrate compatible HVAC equipment into Matter-supported smart home platforms.
Mini6X includes:

- AC 24 V low-voltage power input L and N terminal
- 5 V DC power input Micro USB
- Wi-Fi, Bluetooth LE, and Thread wireless connectivity
- Internal Bluetooth module
- RJ45 thermostat interface
- 2 x 8 HVAC control I/O terminals
- Dry-contact output terminal
- LED status indicators

Mini6X is intended for indoor use only. This product is not waterproof.
Install the device in a dry location and keep it away from air-conditioning condensate, dripping water, pipe condensation, and high-humidity areas.
Water ingress or condensation may cause malfunction, electric shock, or product damage.

# 2. Product Datasheet

| Item | Specification |
|---|---|
| Model | Mini6X |
| MCU | GD321F103 |
| Power Input 1 | AC 24 V, +/-10%, 50/60 Hz, 0.5A Max |
| Power Input 2 | Micro USB 5 V DC, 1A Max |
| Matter Wireless Module | ESP32-C6-MINI-1-H8 |
| Wireless Functions | Wi-Fi, Bluetooth LE, Thread |
| Auxiliary Bluetooth Module | Yeelight BG21 Bluetooth module |
| Thermostat Interface | RJ45, T568B wiring |
| Bypass 24V power supply | AC 24 V, 0.1A Max |
| HVAC Control Interface | 2 x 8 control I/O terminal |
| Dry contact relay output | Load <=36 V, <=1 A |
| Product Dimensions, L x W x H | 54 x 54 x 24.5 mm |
| Item Weight | 52 g |
| Housing Color | White |
| Housing Material | ABS + PC FR3010 |
| Shape | Cuboid |
| Installation Location | Indoor installation only |
| Operating Environment | Indoor, dry location |
| Indicator Colors | Yellow, Green, Blue, Red |
| Configuration Method | Matter commissioning / supported app |
| Maintenance | No routine maintenance required |

# 3. Power Input Notice

Mini6X supports two low-voltage power input methods:

1. AC 24 V input
2. Micro USB 5 V DC input

When an AC 24 V thermostat is not connected, a Micro USB 5 V DC power input is recommended as the preferred power input method.

The RJ45 brown and brown-white wires are used as bypass AC 24 V thermostat power lines when required by the thermostat wiring or master/slaver adapter wiring. They are not Ethernet signal lines.

**Warning:** Do not connect Mini6X directly to 100-240 V power.

# 4. Wireless Communication Specifications

Mini6X contains two wireless communication modules.

## 4.1 Main Matter Communication Module

| Item | Specification |
|---|---|
| Module | ESP32-C6-MINI-1-H8 |
| Function in Mini6X | Main Matter communication module |
| Matter Version | Matter 1.5 |
| Wi-Fi | 2.4 GHz Wi-Fi |
| Wi-Fi Standard | IEEE 802.11 b/g/n/ax |
| Bluetooth | Bluetooth Low Energy |
| IEEE 802.15.4 | Supported |
| Thread | Supported |
| Antenna Type | On-board PCB antenna |
| Typical Use | Matter communication and smart home integration |

The ESP32-C6-MINI-1-H8 module is used as the main wireless communication module of Mini6X. Actual enabled wireless functions depend on the installed firmware and product configuration.

## 4.2 Auxiliary Bluetooth Module

| Item | Specification |
|---|---|
| Module | Yeelight BG21 Bluetooth module |
| Wireless Type | Bluetooth Low Energy |
| Frequency Band | 2.4 GHz ISM band |
| Antenna | Integrated or module antenna, depending on module version |

## 4.3 Wireless Frequency Reference

| Wireless Function | Frequency Band |
|---|---|
| Wi-Fi 2.4 GHz | 2.4 GHz ISM band |
| Bluetooth LE | 2.4 GHz ISM band |
| Thread / IEEE 802.15.4 | 2.4 GHz ISM band |

The available channels and output power may depend on firmware configuration, regional

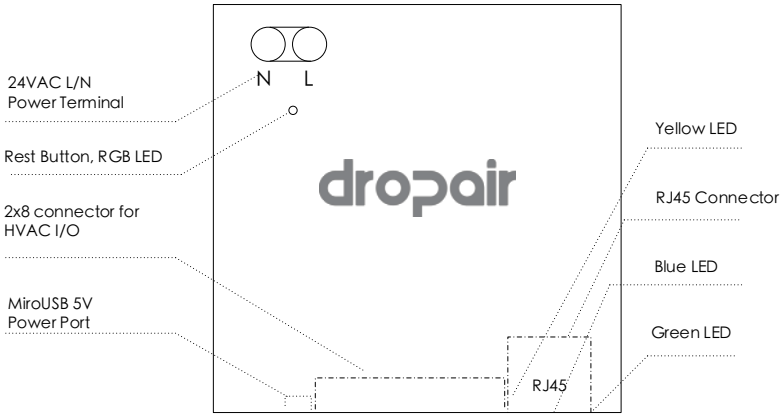
settings, and final product approval requirements.

# 5. Product Structure and Port Description

The following descriptions are for product identification and wiring reference. Actual housing label position and connector orientation may vary slightly depending on production version.

| Port / Part | Function | Notice |
|---|---|---|
| Micro USB | 5 V DC power input, Programme | 5 V DC, 1 A Max |
| AC 24 V L/N | Low-voltage AC power input | AC 24 V, 50/60 Hz, 0.5 A Max |
| RJ45 Interface | Low-voltage thermostat signal interface and AC 24 V bypass wiring | Use T568B cable. Do not connect to Ethernet or PoE equipment. |
| 2 x 8 Connector | HVAC control I/O terminal | Refer to operation manual. |
| RJ45 Left LED | 5 V power indicator | Yellow |
| RJ45 Right LED | General signal status indicator | Green |
| Front RGB LED, Blue | Wi-Fi connection status indicator | Visible through the small front hole |
| Front RGB LED, Red / Green | Communication status indicators | Rx, Tx data communication |

## 5.1 Interface Layout




# 6. RJ45 Interface

The RJ45 interface is used for compatible low-voltage thermostat connection and AC 24 V bypass wiring.
Use a CAT cable terminated according to the T568B standard.

**Warning:** Do not connect the RJ45 port to Ethernet, network equipment, router, switch, PoE equipment, or

unrelated devices.

### 6.1 T568B Pinout and Wire Definition

| RJ45 Pin | T568B Wire Color | Abbreviation | Mini6X Definition |
|---|---|---|---|
| 1 | White / Orange | OrW | Reserved / not used unless specified |
| 2 | Orange | Or | Heat call / W signal |
| 3 | White / Green | GW | Fan high / G3 signal |
| 4 | Blue | Bl | Cool call / Y signal |
| 5 | White / Blue | BlW | Fan medium / G2 signal |
| 6 | Green | G | Fan low / G1 signal |
| 7 | White / Brown | BrW | AC 24 V bypass line for thermostat or slaver adapter |
| 8 | Brown | Br | AC 24 V bypass line for thermostat or slaver adapter |

### 6.2 RJ45 Power Bypass Notice

| Wire | Function |
|---|---|
| White / Brown | AC 24 V bypass line |
| Brown | AC 24 V bypass line |

The brown and brown-white wires in the RJ45 cable are used as low-voltage AC 24 V bypass lines for thermostat power or a slaver adapter power connection.
Because this is an AC 24 V bypass connection, the brown and brown-white wires are not polarity sensitive.

**Warning:** Do not connect the brown or brown-white wire to 100-240 V mains power.

## 7. Master/Slaver Function

Mini6X supports a master/slaver adapter connection.
Any two Mini6X adapters can be used as a master/slaver pair. In this configuration, one adapter is used as the master adapter and is powered by AC 24 V. The second adapter is used as the slaver adapter.
The master adapter can provide AC 24 V bypass power through the RJ45 brown and brown-white wires.

### 7.1 Wiring Method

1. Power the master adapter from AC 24 V.

2. Connect a CAT cable to the RJ45 port of the master adapter.
3. Use the brown and brown-white wires from the RJ45 cable as the AC 24 V bypass output.
4. Connect the brown and brown-white wires to the AC 24 V input terminals of the slaver adapter, marked L and N.
5. The slaver adapter receives AC 24 V power through these two wires.

**Note:** For AC 24 V input, polarity is not required. The L and N markings are terminal names for the AC 24 V input connection.

### 7.2 RJ45 Brown / Brown-White Definition in Master/Slaver Mode

| RJ45 Pin | T568B Wire Color | Function |
|---|---|---|
| 7 | White / Brown | AC 24 V bypass and communication Line |
| 8 | Brown | AC 24 V bypass and communication Line |

**Warning:** Do not connect the RJ45 port to Ethernet, network equipment, router, switch, PoE equipment, or unrelated devices. Do not connect the brown or brown-white wire to 100-240 V mains power.

## 8. HVAC Control I/O Terminal

The 2 x 8 connector is a HVAC control I/O terminal.
It provides dry-contact output, RS485, HBS, etc., HVAC communication signals, low-voltage signal inputs/outputs, and brand-specific control interfaces.
The exact wiring method depends on the connected air-conditioner brand, model, control protocol, and firmware configuration.
For brand-specific and model-specific wiring, refer to the corresponding operation manual.

### 8.1 2 x 8 connector Terminal Layout

| Left Side Pin | Name | Right Side Pin | Name |
|---|---|---|---|
| 1 | On1 | 2 | On2 |
| 3 | RS485_A | 4 | RS485_B |
| 5 | RS485_A | 6 | RS485_B |
| 7 | HBSM_A | 8 | HBSM_B |
| 9 | 2WDC | 10 | Tx |
| 11 | S10V | 12 | Rx |
| 13 | ASK | 14 | 5-15V_Outside |
| 15 | 2WDC | 16 | GND |

## 8.2 2 x 8 connector Pin Definition

| Pin | Name | Description |
|---|---|---|
| 1 | On1 | Relay dry-contact output terminal 1 |
| 2 | On2 | Relay dry-contact output terminal 2 |
| 3 | RS485_A | RS485 A signal |
| 4 | RS485_B | RS485 B signal |
| 5 | RS485_A | RS485 A signal |
| 6 | RS485_B | RS485 B signal |
| 7 | HBS_A | HBS communication signal A |
| 8 | HBS_B | HBS communication signal B |
| 9 | 2WireOnOff | Two-wire On/Off control signal |
| 10 | CN105_Tx / LED | CN105 transmit / LED signal for supported models |
| 11 | Signal_10V | 10 V signal interface for supported models |
| 12 | CN105_Rx / IRM | CN105 receive / IRM signal for supported models |
| 13 | ASK | ASK signal interface for supported models |
| 14 | 5-15V_Outside | External 5-15 V interface for supported models |
| 15 | 2WireOnOff Mini6S | two-wire On/Off control signal |
| 16 | GND | Ground reference |

## 8.3 Dry Contact Output

| Item | Specification |
|---|---|
| Output Pins | 2X8 pin 1 On1 and pin 2 On2 |
| Output Type | Dry contact |
| Polarity | No polarity |
| Maximum External Voltage | 36 V Max |
| Maximum External Current | 1 A Max |

The dry-contact output is intended for low-voltage signal control only.

**Warning:** Do not connect the dry-contact output to 100-240 V mains voltage.

Do not use the dry-contact output to directly drive motors, compressors, heaters, or other high-power loads.

If the target equipment requires higher voltage or higher current control, use an external properly

rated relay, contactor, or interface module.

# 1 9. LED Indicators

Mini6X has several LED indicators for power, wireless connection, and communication status.

## 9.1 RJ45 Port Indicators

| Indicator Position | Color | Meaning |
|---|---|---|
| Left side of RJ45 port | Yellow | 5 V power indicator |
| Right side of RJ45 port | Green | General signal status indicator |

The yellow LED indicates 5 V power status.
The green LED is a general signal indicator. Its exact behavior may depend on firmware version and operating mode.

## 9.2 Front Indicators

| Indicator | Color | Meaning |
|---|---|---|
| Front RGB LED | Blue | Wi-Fi connection status |
| Front RGB LED | Red | Communication status indicator |
| Front RGB LED | Green | Communication status indicator |

Position: Logo side, rest hole.

# 10. Safety Instructions

1. Read this manual before installation and operation.
2. Use only a supported low-voltage power input.
3. Do not connect Mini6X directly to 100-240 V mains power.
5. Do not exceed the dry-contact output rating of 36 V and 1 A.
6. Use only compatible low-voltage HVAC control circuits.
7. Install the product indoors in a dry and protected location.
8. Do not install the device in wet, dusty, corrosive, explosive, or high-temperature environments.
9. Do not use the device if the housing, terminals, wiring, or insulation is damaged.
10. Keep low-voltage signal wiring separated from high-voltage power wiring.
11. Confirm wiring before powering on the device.

12. Incorrect wiring may damage Mini6X or the connected HVAC equipment.

# 2 11. Installation Requirements

Before installation, confirm the following:

- The available power source is AC 24 V within +/-10%, or Micro USB 5 V DC.
- The power supply capacity is sufficient for Mini6X.
- The HVAC equipment uses a compatible low-voltage control interface.
- The relay dry-contact output is suitable for the target control circuit.
- The installation location has acceptable Wi-Fi or Thread wireless signal coverage.
- The product will be installed indoors and protected from moisture.

Recommended tools and materials:

- Screwdriver suitable for terminal wiring
- AC 24 V low-voltage power cable, if AC 24 V input is used
- Micro USB 5 V DC power source, if Micro USB input is used
- CAT cable for RJ45 thermostat or master/slaver adapter connection, if used
- Low-voltage signal cable
- Cable label or marker
- Matter-compatible controller or smart home platform

# 3 12. Installation Procedure

## Step 1 - Confirm Product and Wiring

Check the product label and confirm that the model is Mini6X.
Confirm the terminal labels before wiring.

## Step 2 - Turn Off Related Power

Before connecting wires, turn off the related low-voltage power source and HVAC control power.
Confirm that the circuit is not energized before wiring.

## Step 3 - Connect Power Input

Connect Mini6X using one or both supported power input methods.
When an AC 24 V thermostat is not connected, a Micro USB 5 V DC input is recommended as the preferred power input method.

**Warning:** Do not connect the power input to 100-240 V mains power.

## Step 4 - Connect RJ45 Thermostat Interface

If a compatible low-voltage thermostat is used, connect it through the RJ45 interface.
Use CAT cable with T568B termination.
Confirm the wire definitions before connection.

**Warning:** Do not connect the RJ45 port to Ethernet or network equipment.

## Step 5 - Connect Master/Slaver Adapter Wiring, If Used

If a slaver adapter is used, connect the master adapter RJ45 brown and brown-white wires to the AC 24 V input terminals of the slaver adapter.
Use only AC 24 V low-voltage wiring for this function.

## Step 6 - Connect 2X8 HVAC Control I/O Terminal

Connect the HVAC low-voltage control interface to the 2X8 terminal according to the applicable operation manual.
For dry-contact control, use the pin 1 and pin 2.
For RS485, HBSM, CN105, two-wire On/Off, or other brand-specific interfaces, follow the corresponding operation manual.

**Warning:** Do not connect incompatible equipment or unknown voltage circuits.

## Step 7 - Check Wiring

Before powering on, verify:

- Power input terminal position
- No short circuit between terminals
- Relay output circuit voltage is within the limit
- RJ45 wiring follows T568B pinout
- HAVC equipment wiring matches the applicable operation manual
- All terminal screws are tightened
- No exposed conductor is outside the terminal

## Step 8 - Power On

Turn on the selected low-voltage power source.
Check the LED status.
If the LED does not turn on or indicates an error, turn off power and recheck wiring.

### Step 9 - Commission the Device

Use a Matter-compatible controller or smart home platform to commission Mini6X.
Follow the app instructions to add the device.
During commissioning, keep the smart phone or controller close to Mini6X and ensure that the wireless network is available.

### Step 10 - Functional Test

After commissioning, test the following:

- Device online status
- Wi-Fi or Thread connection status
- HVAC control response
- Relay dry-contact output operation
- RJ45 thermostat signal, if used
- Master/slaver adapter power connection, if used
- LED status
- Recovery after power cycle

## 13. Matter Commissioning Notes

Mini6X uses the ESP32-C6-MINI-1-H8 module for Matter-related wireless communication.
Mini6X supports Matter 1.5.
Depending on firmware configuration, Mini6X may use Wi-Fi or Thread for Matter operation.
Bluetooth LE may be used during commissioning.
Make sure the Matter controller, smart home hub, border router, Wi-Fi network, or Thread network is correctly configured before commissioning.
If commissioning fails:

1. Move the controller closer to Mini6X.
2. Confirm that Mini6X is powered correctly.
3. Confirm that the device is in commissioning mode.
4. Check Wi-Fi or Thread network availability.
5. Restart the commissioning process.
6. Reset Mini6X only when necessary.

# 14. Firmware Upgrade

Mini6X supports firmware upgrade depending on product configuration.
Do not turn off the power during the firmware upgrade.
If the firmware upgrade fails, keep the device powered and retry according to service instructions.
Firmware upgrade should be performed only through approved tools or official service procedures.

# 15. Maintenance

Mini6X does not require routine maintenance.
Basic maintenance:

- Keep the device clean and dry.
- Check wiring terminals if the device is serviced.
- Check that the enclosure is not damaged.
- Check that no water, dust, or foreign objects enter the device.
- Do not use solvents or spray cleaners.

If the product behaves abnormally, disconnect power and contact Dropair support.

# 16. Troubleshooting

| Problem | Possible Cause | Suggested Action |
|---|---|---|
| No LED indication | No power input | Check AC 24 V or Micro USB 5 V DC power supply |
| Yellow LED near RJ45 is off | 5 V power not available | Check Micro USB power input or internal 5 V power status |
| Device cannot be commissioned | Device not in pairing mode | Reset or enter commissioning mode |
| Device cannot join network | Wi-Fi / Thread network issue | Check router, Matter controller, or Thread border router |
| Blue Wi-Fi indicator abnormal | Wi-Fi connection not established | Check network condition and commissioning status |
| Relay does not operate | Incorrect control logic or wiring | Check 2X8 pin 1 and pin 2 wiring |
| HVAC does not respond | Incompatible interface or wiring error | Check 2X8 wiring and operation manual |
| RJ45 thermostat signal abnormal | Incorrect RJ45 termination | Check T568B wiring and thermostat terminal definition |

| Problem | Possible Cause | Suggested Action |
|---|---|---|
| Slaver adapter has no power | Brown / brown-white bypass wiring is incorrect or master adapter is not powered by AC 24 V | Check master adapter AC 24 V input and RJ45 pin 7 / pin 8 wiring |
| Device restarts repeatedly | Power supply unstable | Check power supply capacity and voltage |
| Firmware upgrade fails | Communication interrupted | Keep the device powered and retry |
| Wireless signal unstable | Metal enclosure or poor signal coverage | Relocate device or improve network coverage |

# 17. Storage and Transportation

Store the product in a dry, clean, and ventilated environment.
Avoid:

- High temperature
- High humidity
- Direct sunlight
- Strong vibration
- Static discharge
- Corrosive gas
- Mechanical impact

Transport the product in protective packaging.

# 18. Disposal

Do not dispose of the product with unsorted household waste.
Dispose of the product according to local electronic waste regulations.