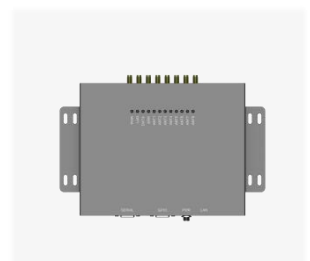
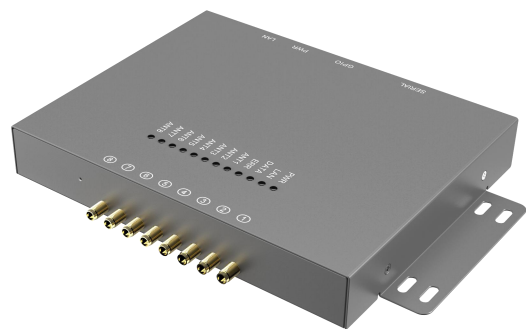


Operation

HW-RX-E8P Reader

UHF RFID Operation Manual



catalogue

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1 Introduction

1.1 Overview

The HW-RX-E8P is an ultra-high-frequency (UHF) eight-channel reader developed in-house by our company. Featuring exceptional sensitivity, superior channel isolation, and reliable inventory management capabilities, it delivers stable performance with a wide voltage supply range. The device integrates multiple communication interfaces including RJ45, RS232. Its 8 RF antenna ports significantly reduce peripheral hardware requirements, making it fully compatible with complex environments such as warehousing, logistics, and manufacturing.

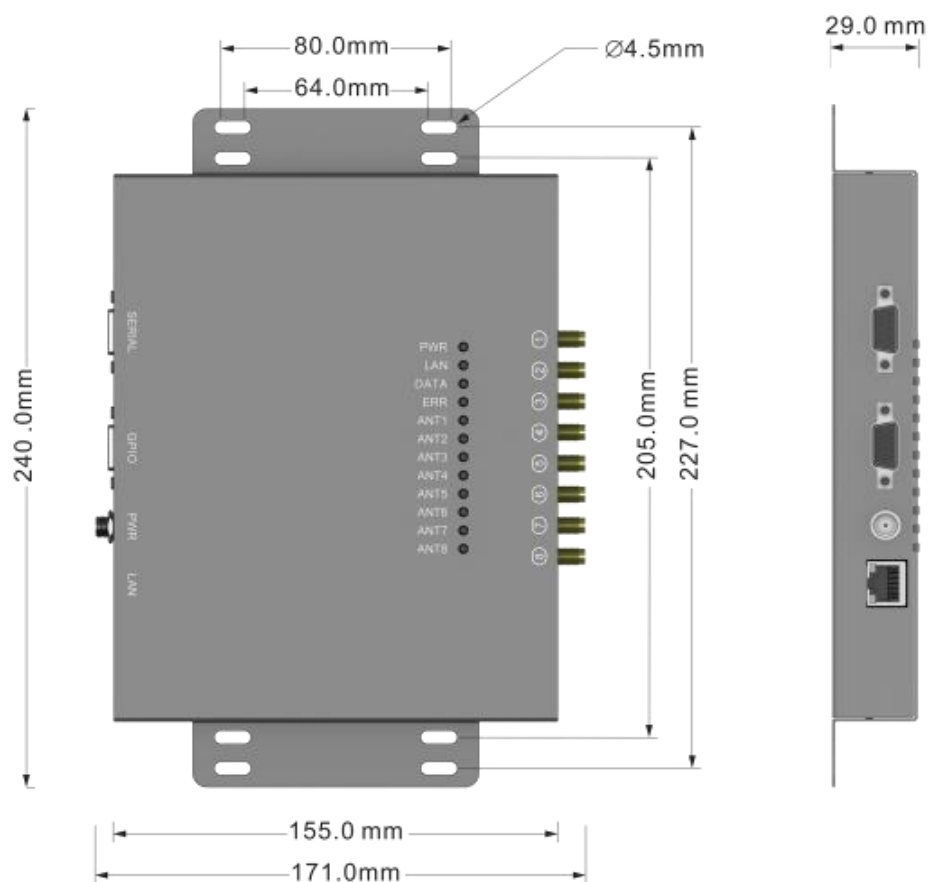
- Excellent reading sensitivity, with a sensitivity as high as -85dBm
- With an excellent reading range and antenna, it can identify tags up to 12 meters away.
- Excellence in collision avoidance algorithms, with a maximum tag recognition rate of 900 pcs/s
- Multiple communication modes with integrated RJ45, RS232 interfaces
- High power output, with a maximum output power of 25.32dBm
- 8-Bit RF Interface for Multi-node Recognition Applications
- Ultra-thin body design, ideal for applications with specific size requirements
- Global Gen2 Platform, Adapting to RFID Application Needs in Different Countries and Regions

1.2 Electrical Parameters

Radio frequency characteristics	
RF Protocol	EPC Global Class1 Gen2(ISO 18000-6C)
Transmit Peak Power	25.32dBm
Frequency	United States: 902.75-927.25MHz
Inventory Rate	Max.900tag/s
Reading Range	12 meters (read range varies by tag type)
Antenna Interface	8-channel SMA-K (external thread, internal hole) connector
RSSI	support
Receiving Sensitivity	-85dbm
Interface	
Ethernet	TCP Server,TCP Client,UDP
Serial	RS232
GPO	Terminal block with 4-channel optocoupler isolated outputs (compatible with 5-24V voltage levels), featuring low-level current tolerance Max.500mA
GPI	Terminal block with 4-channel optocoupler isolated inputs, supports PNP opto-coupler connection, compatible with 5-24V voltage levels
Electronics	
Supply Voltage	24VDC
Mechanics	
Dimensions	No interfaces or fittings included: 240.0mm(L)*155.0mm(W)*29.0mm (H) Includes interface and mounting parts: 240.0mm(L)*171.0mm(W)*29.0mm (H)
Weight	850g
Housing	metal plate
Housing Color	dark grey
Status indication	
Indicator Definition	PWR: Power Supply Indicator. If it remains illuminated, the power supply is functioning normally. LAN: Network status indicator. If it stays on, the network is connected. DATA: Data indicator, flashing indicates data interaction ERR: Error indicator. A persistent light indicates a device failure.
Work Environment	
Operating Temp.	-25°C~60°C

Storage Temp.	-40°C~85°C
Operating Humidity	10%~95% RH, no condensation
Application	various complex environments such as warehousing logistics and production manufacturing
Others	
upgrade	Support firmware upgrade
Development	Provide a C# SDK

1.3 RFID Device Dimensions



1.4 Antenna options

RFID Portal Antenna: HW-AB10010



Specification	Parameter
Frequency Range	902.75MHz-927.25MHz
Gain	10.5dBi
VSWR	≤1.3: 1
Polarization	circular polarization
Input Impedance	50Ω
Material	Steel, aluminum alloy, RF4
Connector	SMA-K
Dimension	460.0mm×220.0mm×32.5mm

Bottom Antenna NO.12: HW-AP8040



Specification	parameter
Frequency Range	902.75MHz-927.25MHz
Gain	10dBi
VSWR	≤1.5: 1
Polarization	circular polarization
Input Impedance	50Ω
Material	FR4
Connector	SMA-J
Dimension	480.0mm *420.0mm *2.0mm

2 Device Interface

The HW-RX-E8P reader features a comprehensive array of interface resources, providing users with multiple communication solutions:

- 24VDC wide voltage DC power supply interface;
- TCP/IP network interface function;
- RS232 serial interface;
- 8-channel SMA-K antenna interface;
- An external lead-in port with 4 input and 4 output opto-isolated GPIO interfaces, compatible with 24VDC.

The HW-RX-E8P interface is shown in the figure below:

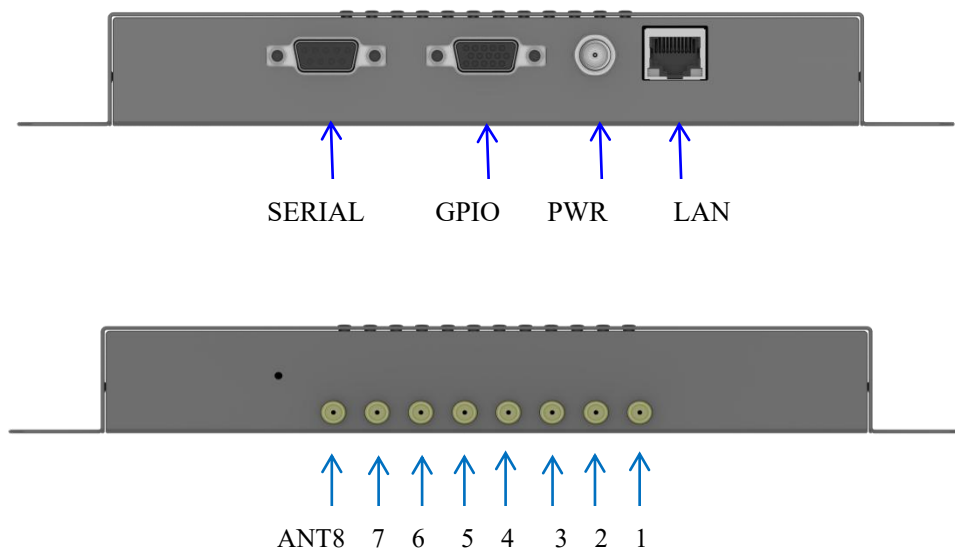


Figure 2-1 Schematic diagram of device interface

2.1 Power Interface

The device features a 24VDC power input and can be powered through the PWR interface (connector terminal).

- 24VDC wide voltage DC power supply. We recommend switching power supplies for optimal performance.
 - brand : MW,
 - Model: NDR-240-24
 - Input: 100-240VAC 2.8A 50/60Hz
 - Output:24VDC,10A

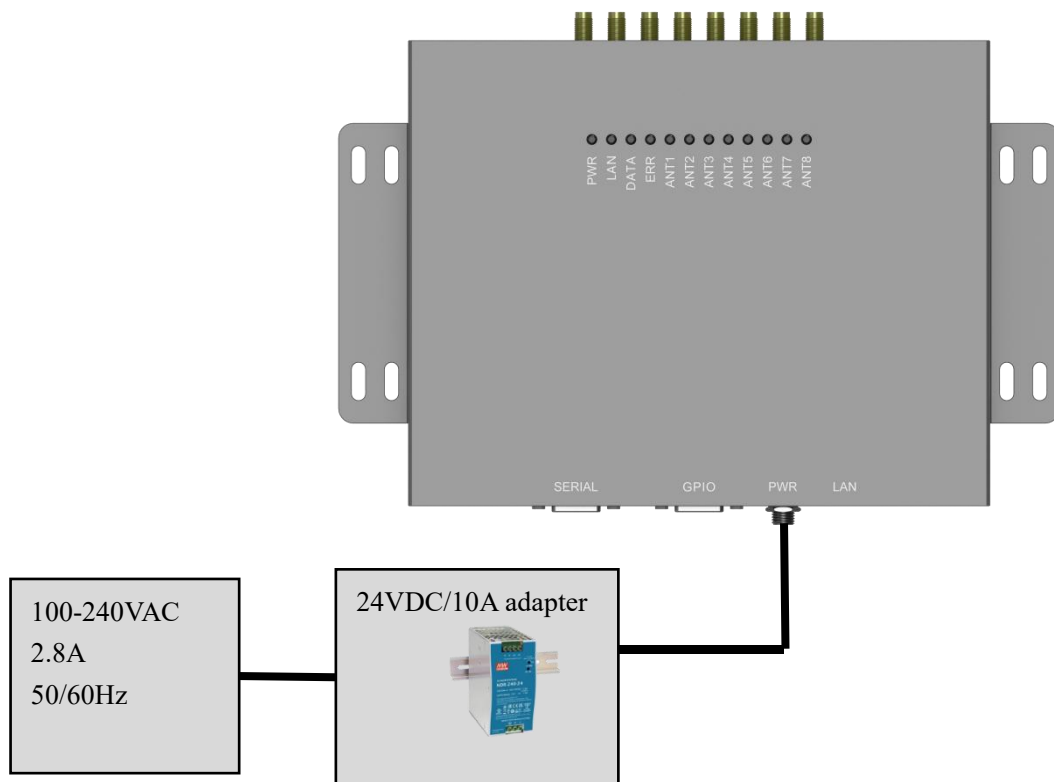


Figure 2.1-1 Schematic diagram of power supply wiring

2.2 Serial Interface

The serial interface uses a DB9 female connector, as shown in the diagram below.

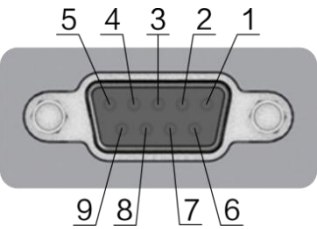


Figure 2.2-1 Schematic diagram of serial interface

This serial port supports multiple communication protocols, with RS232 as the default interface. The pin definitions are as follows:

DB9 Motherboard Pin Definitions	
Pin number	Interface function: Isolated RS232
PIN 1	485A (Customizable)
PIN 2	RS232TXD
PIN 3	RS232RXD
PIN 4	485B (Customizable)
PIN 5	GND
PIN 6	RFU (Reserved for Future Use)
PIN 7	RFU (Reserved for Future Use)
PIN 8	CANL (Customizable)
PIN 9	Customizable CANH

Table 2.2-1 DB9 Serial Interface Pin Definitions

2.3 TCP/IP Network Port

The RFly-R6 reader supports TCP/IP communication through an RJ-45 aviation-grade network port, as shown in the interface diagram below.

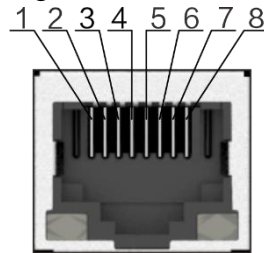


Figure 2.3-1 Schematic diagram of TCP/IP interface

The TCP/IP network port definitions are shown in the table below:

Pin number	Interface function: TCP/IP network communication
PIN 1	TX+
PIN 2	TX-
PIN 3	RX+
PIN 4	POE V+
PIN 5	POE V+
PIN 6	RX-
PIN 7	POE V-
PIN 8	POE V-

Table 2.3-1 TCP/IP Network Port Definitions

2.4 GPIO interface

The GPIO interface uses a DB15 female connector for output.

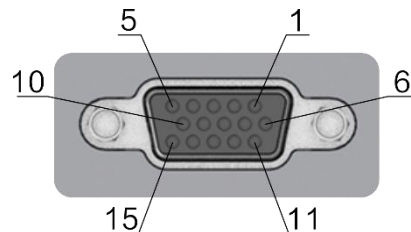


Figure 2.4-1 Schematic diagram of the GPIO interface

The GPIO interface features 4 input and 4 output channels, with its configuration details as shown in the table below:

GPIO Pin Definitions		
quotation marks	definition	function
PIN 1 ~ PIN4	GPO1 ~ GPO4	A universal logic output port compatible with 5-24V voltage levels, featuring a low-level current tolerance of up to 500mA. This capability is not available for high-level outputs.
PIN 5	OPT VCC	Input of opto-isolated power supply (external power source), operating voltage range: 5-24V
PIN6	PWR OUT	The auxiliary power output delivers a voltage of approximately PWR voltage minus 0.5V, providing an external power supply with a maximum output of 18W (depending on the power adapter)

		and a maximum output current of 750mA.
PIN 10	OPT GND	ground of photoelectric isolation (external power supply)
PIN 11 ~ PIN14	GPI1 ~ GPI4	General-purpose logic input port, compatible with 5-24V voltage levels
PIN 15	GND	Equipment location

Table 2.4-1 GPIO Pin Definitions

PIN 5 and PIN 10 are external power input terminals, which provide power to the GPIO and its connected peripherals (e.g., alarm).

PIN6 and PIN15 (PWR OUT) serve as auxiliary power outputs, providing internal power to the device. When external power is unavailable for the GPIO ports (PIN5 and PIN10), these pins can be connected to supply power to the GPIOs. Note that the opto-isolation function is disabled when the GPIOs are powered externally, but remains active when powered through PIN6 and PIN15's PWR OUT.

The principle of GPI and GPO circuit is as follows.

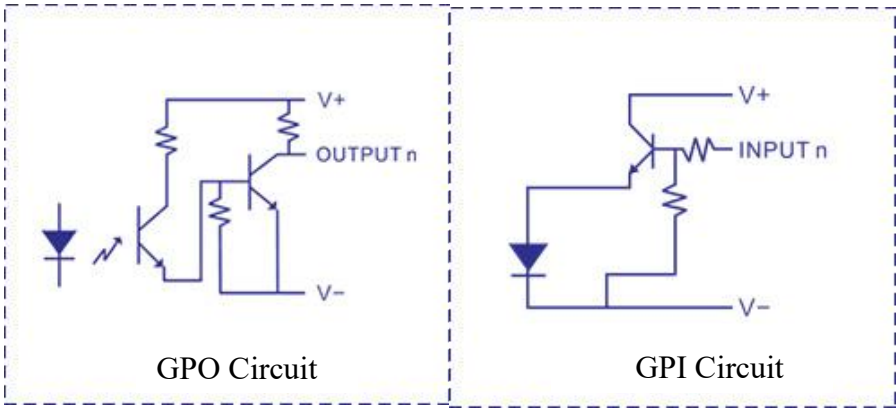


Figure 2.4-2 GPIO Circuit

2.5 Status Indicator Light

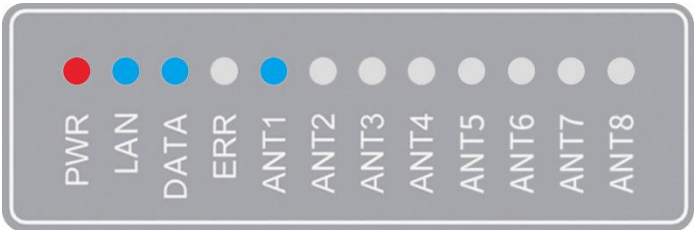


Figure 2.5-1 Schematic diagram of status indicator lights

state indicator definition	
pilot lamp	state definition
PWR	Power indicator: The red light remains on when power supply is normal.
LAN	The network port is connected and always on
DATA	Data is flashing
ERR	Error message: The red light stays on for device abnormalities
ANT1-ANT8	Antenna indicator: displays the current open antenna port number in blue

Table 2.5-1 Status Indicator Definitions

2.6 Bee-buzzing Indicator

bell definition	
warning tone	deictic function
Ding-dong-ding	The device started normally
1 short (one sound)	network malfunction
1 long, 1 short (two sounds)	RF module failure
1 long, 2 short (three sounds)	Both the network and RF modules are experiencing simultaneous failures

Table 2.6-1 Definition of Beezer

2.7 Reset Hole

The device has a reset hole on the back, as shown in the figure below. Press the reset button in the hole to restart the product.

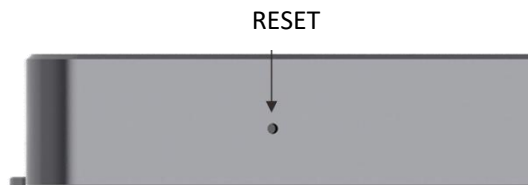


Figure 2.7-1 Schematic diagram of reset hole

3 Equipment Installation

3.1 Installation Preparation

Before setting up the test platform, you need to prepare the following equipment and materials:

- ♦ 1 HW-RX-EXP reader/writer;
- ♦ Includes a standard 24V switch-mode power supply;
- ♦ Includes 1 standard network cable.
- ♦ 1 GPIO communication line;
- ♦ 1 RS232 serial cable
- ♦ 1 power cable;
- ♦ 8 antenna feed lines;
- ♦ UHF antenna: RFID Portal Antenna (model HW-AB10010), quantity: 1 to 8 units
- ♦ UHF antenna: Bottom Antenna No.12 (HW-AP8040), quantity: 1-8 units
- ♦ 1 digital peripheral
- ♦ EPC C1G2/ISO 18000-6C: Several UHF tags;
- ♦ One PC running Windows XP or later;

Before connecting the device, install it in a secure and reliable location on-site. As shown in the figure below:

Recommended screw size: M4*12



Figure 3.1-1 RFID Reader Installation Diagram

3.2 Hardware Connection

Recommended hardware connection sequence: Antenna feeder → Communication network cable → Power adapter → RS232 serial port. The connection diagram is shown below:

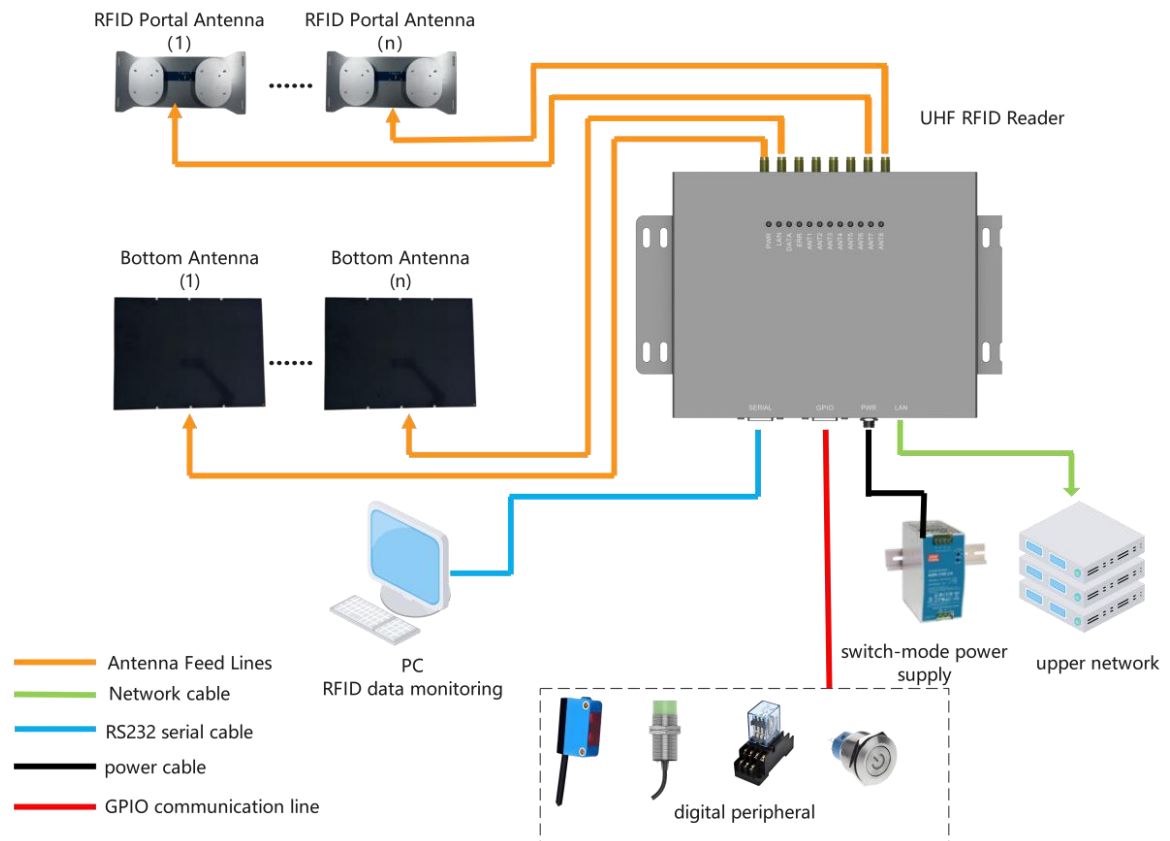
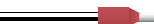


Figure 3.2-1 Schematic diagram of UHF RFID Reader connection

3.2.1 GPIO Pin Sequence

order num ber	wire marking	Line Color	Sequence definition	
1	GPI1	purple	General-purpose logic input port, compatible with 5-24V voltage levels	 GPI1
2	GPI2	gray		 GPI2
3	GPI3	white		 GPI3
4	GPI4	pink colour		 GPI4
5	GPO1	black	A universal logic output port compatible with 5-24V voltage levels, featuring a low-level current tolerance of up to 500mA. This capability is not available for high-level outputs.	 GPO1
6	GPO2	black and white		 GPO2
7	GPO3	brown		 GPO3
8	GPO4	Brown and white		 GPO4
9	VCC_IN	red	Input of opto-isolated power supply (external power source), operating voltage range: 5-24V	
10	PWR_OUT	Red and white	The auxiliary power output delivers a voltage of approximately PWR voltage minus 0.5V, providing an external power supply with a maximum output of 18W (depending on the power adapter) and a maximum output current of 750mA.	 VCC-IN
				 PWR-OUT
				 GND
				 OP-GND
11	GND	sky blue	Equipment location	
12	OP_GND	blue	ground of photoelectric isolation (external power supply)	

Note: The final line number is subject to the line number label.

3.2.2 Antenna Usage

The HW-RX-E8P UHF RFID Reader supports two antenna configurations: either the HW-AB10010 RFID Portal Antenna or the HW-AP8040 Bottom Antenna No.12. Users can adjust the number of antennas based on their specific operational needs.

Number	Antenna name	Antenna model	key parameter	way to install
1	RFID Portal Antenna	HW-AB10010	Antenna gain : 10.5 dBi	It can be mounted on a metal backplate bracket, with its upper surface covered by either a plastic or POM (polyoxymethylene) casing, and connected via a feeder.
2	Bottom Antenna NO.12	HW-AP8040	Antenna gain : 10 dBi	It can be mounted on a metal backplate bracket, with its upper surface covered by either a plastic or POM (polyoxymethylene) casing, and connected via a feeder.

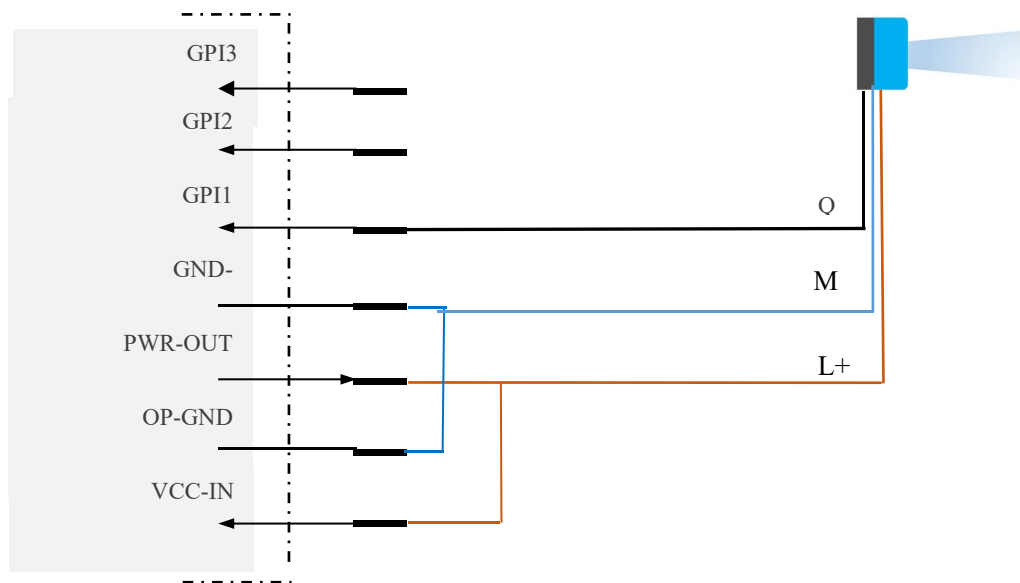
3.2.3 GPI Input Peripheral Devices

The GPI input pins of the HW-RX-E8P UHF RFID Reader primarily support external devices with switchable outputs, including PNP/NPN photoelectric switches, proximity sensors, and push-button switches. Alternatively, these pins can connect to either normally open (NO) or normally closed (NC) contacts of relays.

3.2.3.1 Photoelectric Sensor or PLC Q-point wiring (non-isolated type)

Non-isolated GPIO: The power supply for the photoelectric sensor is provided by the reader's internal power source. Pay attention to the reader supply voltage should not exceed the limit range of the photoelectronic sensor (usually DC10 ~ DC30V).

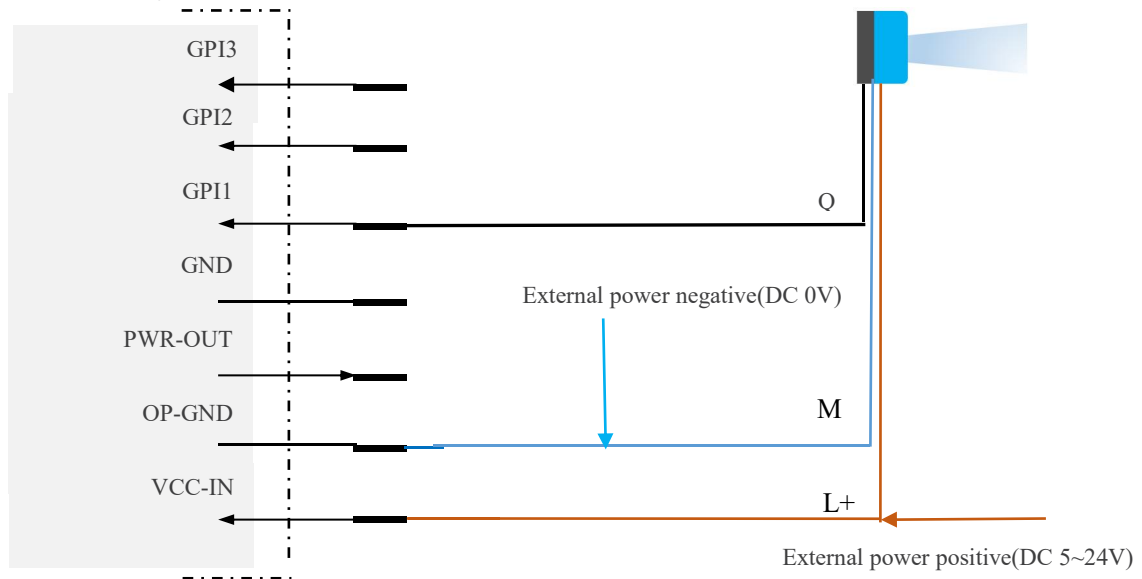
PLC Q-points can also be used to trigger the reader, pay attention to level matching and signal common ground.



3.2.3.2 Photoelectric Sensor or PLC Q-point wiring (isolated type)

Isolated GPIO: The power supply for the photoelectric sensor is provided by the external power source. Pay attention to the external supply voltage should not exceed the limit range of the photoelectric (usually DC10~30V).

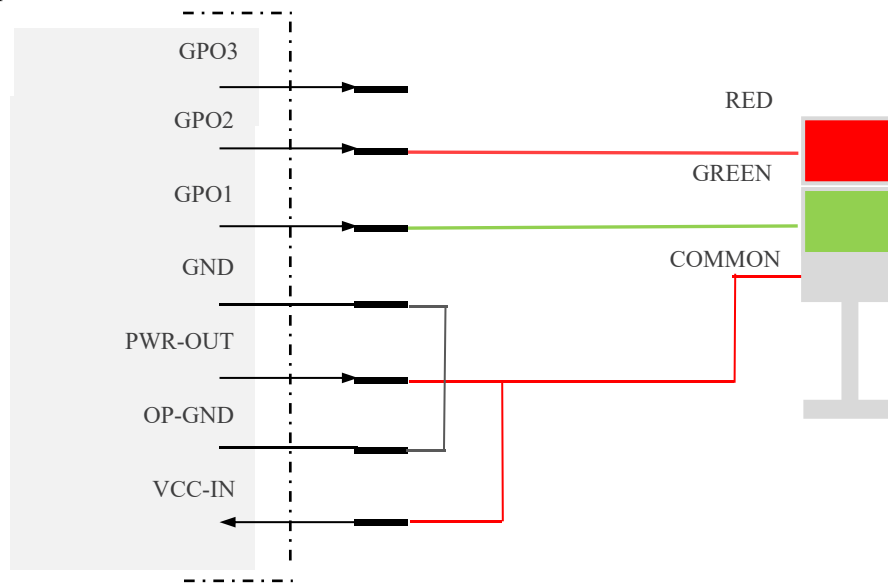
PLC Q-point can also be used to trigger the reader, pay attention to the level matching and signal common ground.



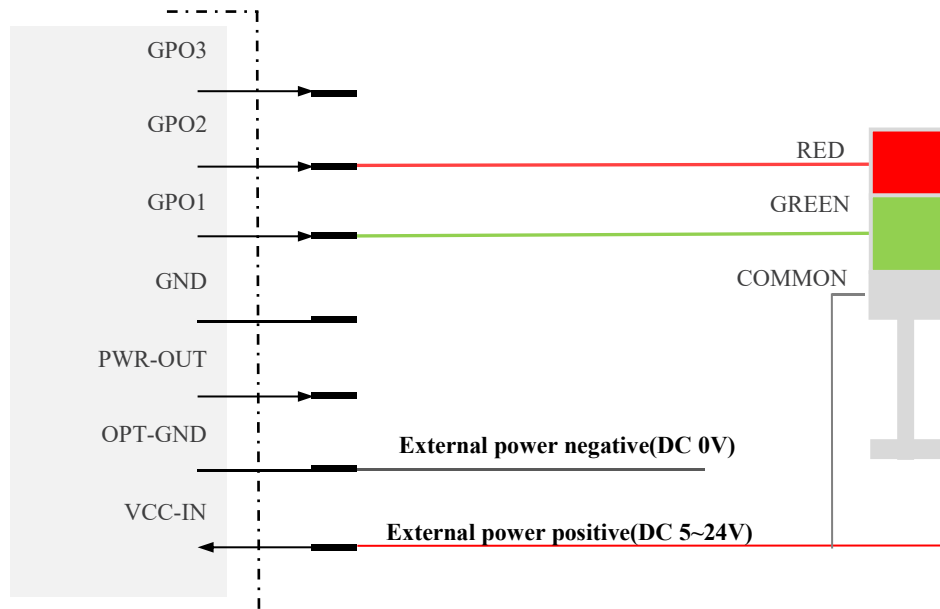
3.2.4 GPO Output Peripheral

3.2.4.1 Alarm Lamp Wiring Diagram

(1)Non-isolated GPIO: The power supply for the Alarm lamp is provided by the reader's internal power source. If the reader is powered by DC12V or POE, the voltage of the alarm lamp should be 12V; if the reader is powered by 24V, the voltage of the alarm lamp should be DC24V. After connecting the cables, the corresponding GPO can be set to low level to light up the alarm lamp.



(2)Isolated GPIO: The power supply for the Alarm lamp is provided by the external power source. The voltage of the alarm lamp should be the same as that of the external isolated power supply (range DC5V-24V), and the recommended voltage is DC12V or DC24V; the external isolated power supply should be independent of the main power supply of the device, or else it will not be able to isolate the power supply. After connecting the cable, the corresponding GPO can be set to low level to light up the alarm lamp.



3.2.4.2 Relay Wiring Diagram

When the reader GPO current driving capability is insufficient, it can be connected to an external SSR(Solid State Relay), and drive the relay through GPO low level (default set high) to indirectly drive the work of higher power appliances. (Here take GPO non-isolated power supply as an example).

