



IOT9022DI / IOT9024DI RS485 DIN-Rail Photoelectric Isolated Hub Datasheet v1.0.1

High-Speed Data Transmission

Supports high-speed communication at up to 5 Mbps

Each slave port supports up to 254 standard RS485 slave devices

High Protection Level

Three-Way Isolation: Power / RS485 Input / RS485 Output

Operating Temperature: -40 to +85° C

Isolation Withstand Voltage: 5000 Vrms

ESD Protection: 15 kV Contact, 20 kV Air

Surge / Lightning Protection:

Power: 2000 V Common Mode, 1000 V Differential Mode

Ports: 2000 V Common Mode, 1000 V Differential Mode

High Noise Immunity

EFT Immunity: ± 4000 V Electrical Fast Transient/Burst

Common-Mode Rejection Ratio (CMRR): ≥ 70 dB @ 50 Hz

Power-Frequency Interference

EMI Protection: Resistant to electromagnetic interference from inverters and contactors in power distribution cabinets.



Product Overview

This product is an industrial-grade optically isolated RS485 hub, featuring 1-channel RS485 signal input and 4 independent RS485 signal outputs. It provides RS485 signal amplification, repeater, isolation, and multi-channel expansion, effectively addressing common issues associated with traditional RS485 bus networks, including star-topology wiring conflicts, insufficient transmission distance, and limited device capacity.

The product integrates an optical isolation module and an intelligent automatic transmit/receive switching circuit, eliminating the need for manual control of signal direction. It supports automatic baud rate adaptation across the full baud rate range and offers strong immunity against interference, lightning, short circuits, and surges.

Designed for demanding industrial environments, it is suitable for industrial automation, security and surveillance, building automation, instrumentation, IoT data acquisition, and other applications. By segmenting RS485 bus networks, a single-point failure will not affect communication across the entire bus, significantly improving overall system stability and reliability.

Communication Interface Parameters

Parameter	Technical Specifications
Interface Standard	Compatible with EIA/TIA RS-485 industrial standard
Port Configuration	IOT9024DI: 1-channel RS-485 Input (IN), 4-channel RS-485 Output (OUT1–OUT4) IOT9022DI: 1-channel RS-485 Input (IN), 2-channel RS-485 Output (OUT1–OUT2)*
Baud Rate	300bps ~ 5Mbps adaptive for full baud rate range
Transmission Distance	Up to 5 km (at 300bps low baud rate); up to 1.2 km for high-speed transmission at 115200bps
Isolation Voltage	5000Vrms photoelectric isolation (mutual isolation between input & output, and between output ports)
Transceiver Latency	$\leq 1\mu\text{s}$, zero data delay, zero packet loss
Load Capacity	A single output channel can support up to 254 standard RS-485 devices; total system supports expansion up to 254 devices
Connector Type	Spring-cage terminal block (3.81 mm pitch), A/B differential signal

Power Supply Parameters

Parameter	Technical Specifications
Power Supply Voltage	DC 9V–36V wide voltage input
Operating Current	Full load operating current $\leq 39\text{mA}$ (12V power supply)
Power Protection	Supports reverse polarity, overvoltage, overcurrent, and short circuit protection; device will not burn out if connected in reverse
Power Consumption	0.4W

Protection Level Parameters

Parameter	Technical Specifications
ESD Protection	IEC 61000-4-2: Contact discharge $\pm 15\text{kV}$, Air discharge $\pm 20\text{kV}$
EFT Surge Protection	IEC 61000-4-4: Supports $\pm 4\text{kV}$ Class A; full performance normal during standard test, no anomalies
Lightning Surge Protection	IEC 61000-4-5: Power/Signal ports: Common mode 2000V, Differential mode 1000V surge protection
Common-Mode Rejection Ratio (CMRR)	IEC 61000-4-16: $\geq 70\text{dB}$ @ 50Hz power frequency interference
Port Protection	Power / RS485 Input / RS485 Output – 3-way isolation
IP Rating	IP40

Environmental Adaptation Parameters

Parameter	Technical Specifications
Operating Temperature	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ (Industrial-grade wide temperature)
Storage Temperature	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Operating Humidity	5%RH $\sim$ 95%RH (non-condensing)

LED Indicator Definitions

Indicator	Status Description
POWER (Red)	Solid ON: Device powered normally OFF: Not powered or power failure
TX (Green)	Flashing: Transmitting RS485 data Solid/OFF: No data transmission
RX1–RX4 (Yellow)	Flashing: Communicating on corresponding channel OFF: No communication (allows intuitive assessment of each port's operating status)

Structural Dimensions

Parameter	Technical Specifications
Dimensions	64.5mm $\times$ 27mm $\times$ 90.5mm (L $\times$ W $\times$ H)
Installation Method	Standard industrial rail mounting, compatible with DIN35 rails

Product Features

Isolation Protection & Signal Expansion

Input and output ports are completely electrically isolated, effectively preventing on-site high voltage, static electricity, and surge interference. This avoids single-point device failures or line short circuits from causing the entire RS485 bus to crash, thereby improving system fault tolerance and security. It features intelligent link diagnostics that expand a single RS485 bus into 4 independent network segments. When a fault occurs on one line, the link is automatically cut off while other lines remain unaffected. Supports star topology wiring, breaking the traditional daisy-chain wiring restrictions of RS485 buses to flexibly adapt to multi-device and multi-area distributed networking scenarios.

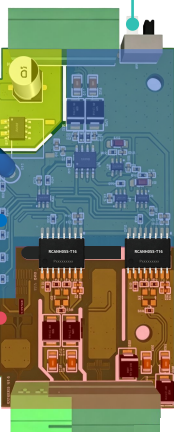
Power / RS485 Input / RS485 Output – 3-Way Isolation

120Ω Resistor Switch

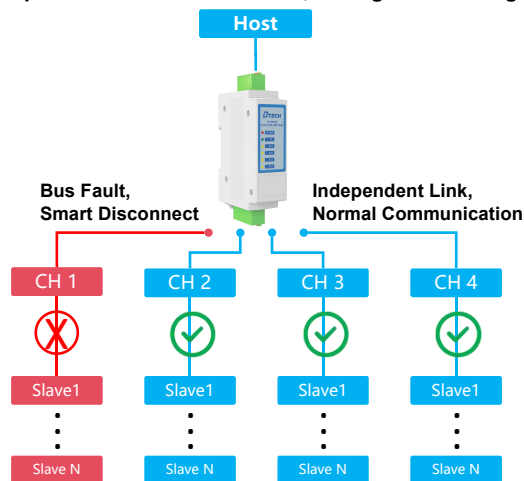
Power Isolation

RS485 Input Isolation

RS485 Output Isolation

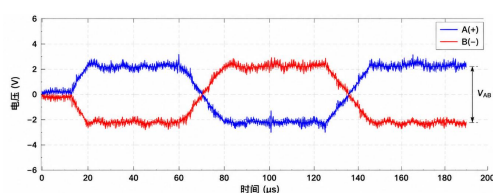


RS485 Output 4-Channel Full Isolation, Intelligent Link Diagnostics

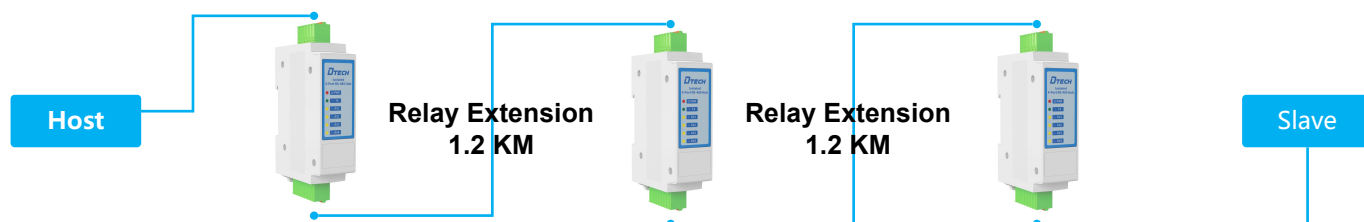
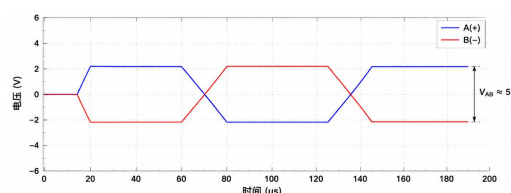


Signal Relay & Amplification

Reshapes, amplifies, and regenerates attenuated RS485 differential signals to extend bus transmission distance. Solves signal distortion and communication instability over long distances, ensuring high-speed, long-distance communication reliability.

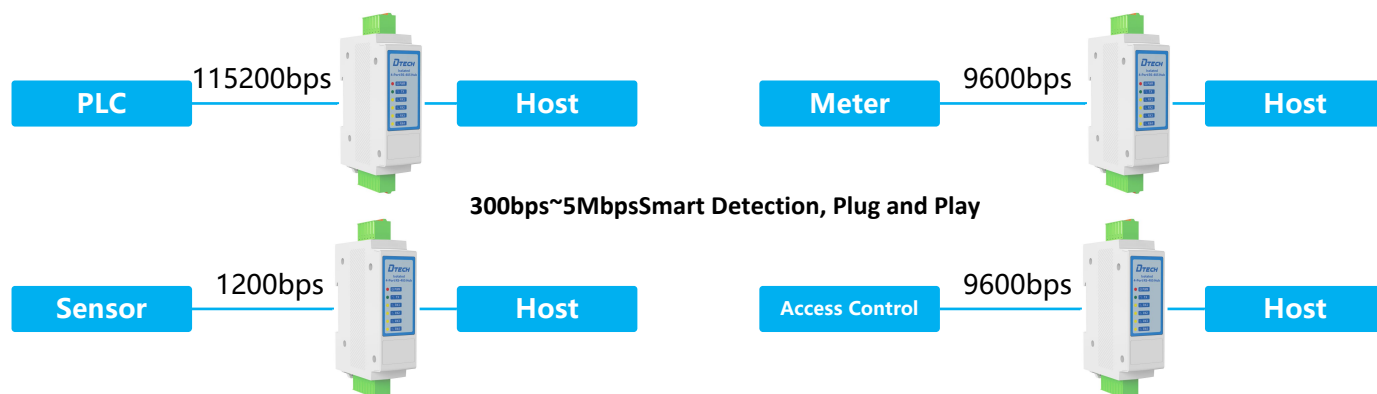


Signal Reshaping Interference Suppression



Smart Transceiver Control

Built-in automatic transceiver detection circuitry requires no manual parameter configuration. Automatically adapts to all standard RS485 device communication protocols for plug-and-play operation with zero debugging. Compatible with PLCs, meters, sensors, access control systems, surveillance, and various other RS485 terminal devices.

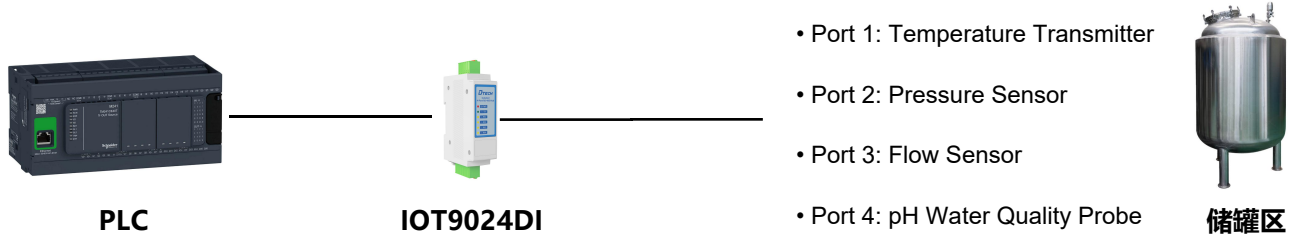


Application Case: Industrial Automation Application Solution

Industrial field sites face harsh operating conditions and numerous interference sources, such as motor start-stops, VFD high-frequency harmonics, equipment vibrations, cable damage, sensor moisture/water ingress, and electrostatic surges. For all Modbus-RTU bus networking, optically isolated RS485 hubs are the preferred choice. The following organizes the solution, wiring logic, zone planning, and core value across three application scenarios:

Multi-Loop Sensor Data Acquisition System

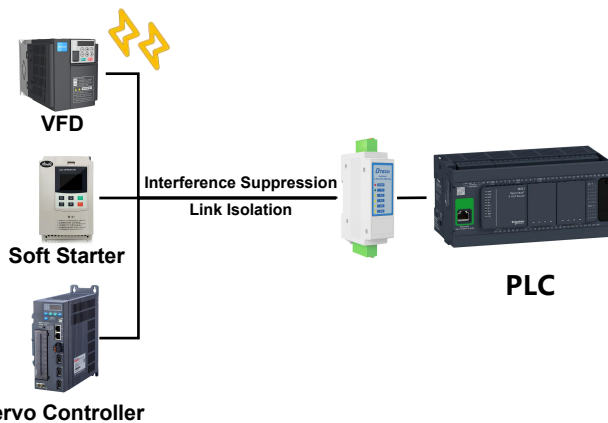
Each independently isolated output branch of the hub connects externally to field measurement devices: temperature transmitters, pressure sensors, pressure sensors, flow sensors, and pH water quality probes.



Solution Advantages

When cable damage occurs due to workshop equipment vibration, short circuits caused by motor surges, sensor burnout from water ingress, or line grounding faults, the failure is strictly isolated to the affected branch. Disconnecting the faulted bus line prevents impacts on other work areas. The PLC can continue to read data normally from remaining measurement points across production lines and storage tank areas, preventing a total collapse of the sensor bus network.

VFD, Soft Starter, and Servo Controller Communication Networking



In workshops, large numbers of variable frequency drives, soft starters, and servo drives rely on the RS485 bus for Modbus communication to achieve remote start/stop control, operating frequency/current readouts, fault code queries, and parameter downloads. VFDs and servo drives are typical sources of severe high-frequency interference; during operation, they generate harmonics and peak surges that propagate along communication lines.

Distributed Workstation & Assembly Line Equipment Networking

Assembly lines and material handling lines adopt a layout where one line corresponds to one independently isolated RS485 branch.

During single-line maintenance power-offs, on-site wiring debugging, or equipment fault power-offs, only the corresponding branch needs to be disconnected. Communication across all other assembly lines remains unaffected, eliminating the need for a full plant shutdown and significantly reducing production losses caused by line commissioning and fault repairs.

Summary of 3 Core Functions of Isolated RS485 Hubs

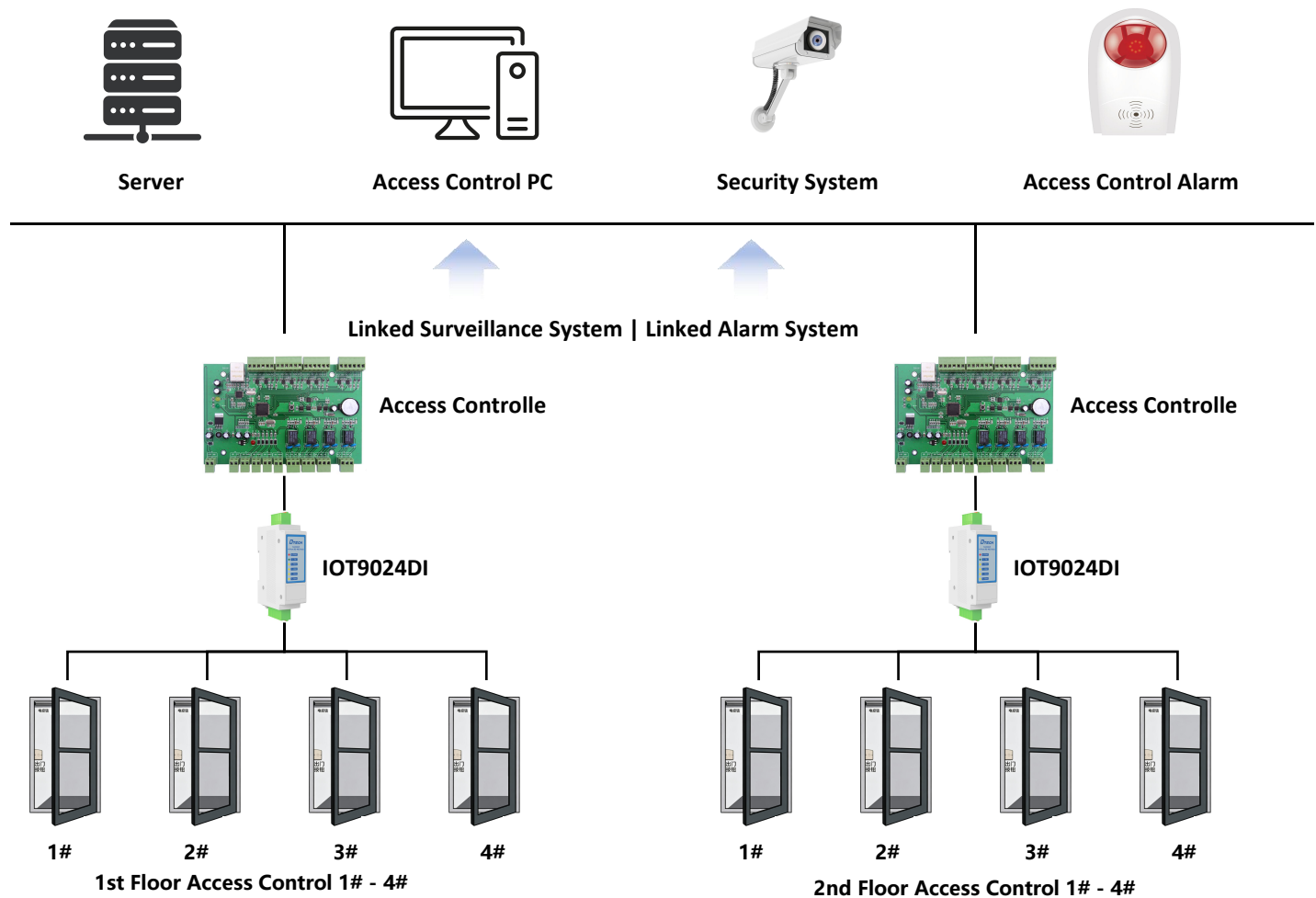
Fault Isolation: Short circuits, equipment burnouts, or line faults on a single branch are contained and do not spread to others.

Interference Isolation: Isolates electromagnetic interference from VFDs, motors, and high-power equipment to ensure stable PLC communication.

Convenient O&M: Partitioned independent buses allow maintenance in a single work area without shutting down the entire system, perfectly matching distributed assembly line layouts.



Application Case: Access Control System RS485 Bus Isolation Solution

**Access Control Hub Comprehensive Features**

Core Function Addresses the drawbacks of daisy-chain RS485 access control buses by providing physical and fault isolation between floor branches, segmenting card readers and access equipment on each floor into independent branches.

Detailed Features

Floor Communication Mutual Isolation Each floor functions as an independent communication branch without mutual interference, achieving full communication fault isolation between floors.

Fault Isolation Protection If a single floor experiences a reader short circuit, damaged communication cable jacketing, RS485 A/B line short, power short, or equipment burnout, only that floor's branch isolates the fault. All remaining floor access control devices stay online and communicate normally.

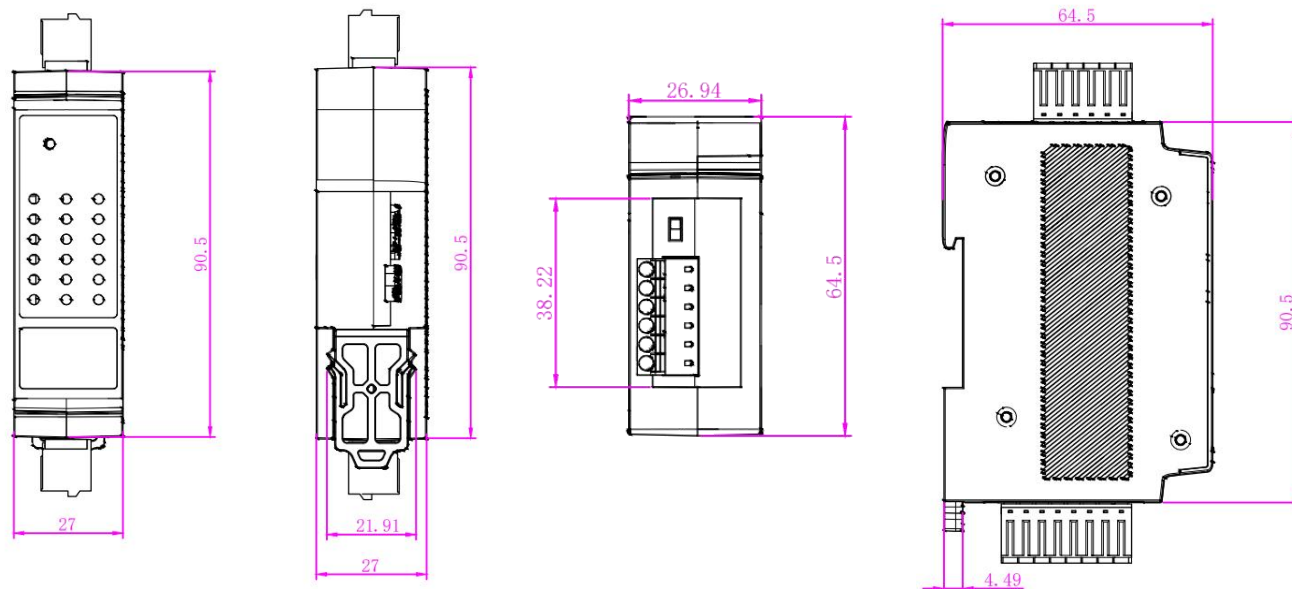
Eradicates Traditional Daisy-Chain Bus Vulnerabilities Traditional daisy-chain RS485 buses use a series architecture where a single short circuit, wire jacket damage, A/B short, or device failure crashes the entire bus and disconnects the whole building's access system. Branching via hubs prevents single-point failures from spreading.

Reduces O&M Difficulty, Simplifies Fault Location When an offline fault occurs, only the affected floor's branch drops offline. Maintenance personnel can immediately pinpoint the faulty floor and inspect only that floor's wiring and reader devices without dismantling the main bus line floor by floor, enabling highly efficient troubleshooting.

Expanded Features

- Each branch features built-in self-recovering short circuit protection and overcurrent protection
- Signal relay amplification for both the main trunk bus and each floor branch, extending RS485 communication distance

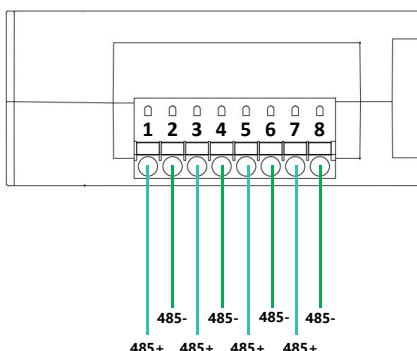
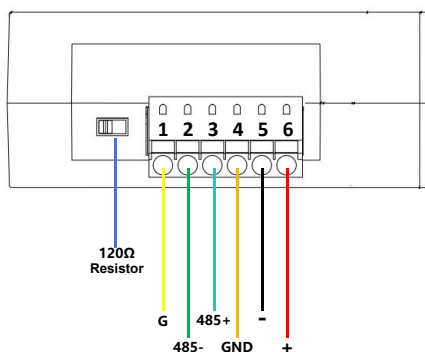
Product Structural Dimensions



Installation and Operating Specifications

- 1.The device uses DIN35 rail mounting. Simply snap the device clip onto a standard industrial rail to secure it, making installation easy, firm, and reliable.
- 2.Strictly follow terminal definitions when wiring, distinguishing power positive/negative poles and RS485 signal A/B lines to prevent equipment failure caused by miswiring.
- 3.Shielded twisted pair (STP) cables are recommended for wiring, with the shielding layer grounded at a single end to effectively reduce electromagnetic interference and enhance communication stability.
- 4.A regulated DC power supply is recommended to prevent severe voltage fluctuations and ensure long-term stable operation of the device.
- 5.Overvoltage power supply is prohibited, as well as prolonged power-on under port short-circuit conditions. Periodic inspection of wiring and device status is recommended in harsh environments.

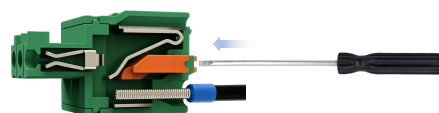
接线说明



Wiring Method



Removal Method



Common Top Wiring	
No.	Description
1	G (Signal Ground)
2	RS485-
3	RS485+
4	GND (Power Ground)
5	- (Power Negative)
6	+ (Power Positive)
DIP Switch	120Ω Resistor

Note: The 120Ω resistor is OFF by default and only applies to the input RS485 channel.

IOT9024DI Bottom Wiring		
Port	No.	Description
RS485-1	1	RS485+
	2	RS485-
RS485-2	3	RS485+
	4	RS485-
RS485-3	5	RS485+
	6	RS485-
RS485-4	7	RS485+
	8	RS485-

IOT9022DI Bottom Wiring		
Port	No.	Description
RS485-1	1	RS485+
	2	RS485-
NG	3	NG
	4	NG
RS485-2	5	RS485+
	6	RS485-
NG	7	NG
	8	NG

Standard Accessories

1. Standard Host Unit x1
2. 6-pin Spring-type Terminal Block (3.81mm Pitch) x1
3. 8-pin Spring-type Terminal Block (3.81mm Pitch) x1
4. Slotted Screwdriver x1

Ordering Models

Model	Specification	Power Supply
IOT9024DI	4-Channel DIN-Rail Optically Isolated RS485 Hub	DC 9–36V
IOT9022DI	2-Channel DIN-Rail Optically Isolated RS485 Hub	DC 9–36V