SPD3□□□-WA Serial Port I/O Control Module

# User Manual

scan the QR code to learn more

I. Precautions

· Do not operate this product beyond its design limits under any
circumstances.

· The power supply for this product is 24V DC. Strictly prohibit the
use of 220V AC power.

· This product should be installed in a safe location. The shell's
maximum withstand temperature is +85℃.

· When used in environments with strong magnetic interference,
Shielded cable is recommended for signal lines.

· Strictly prohibit unauthorized disassembly, modification, or repair
of this product.

· Pay attention to the wiring method of this product to ensure correct
Wiring and avoid damaging the product.

· Read this manual carefully before installation and use. If you have
Any questions, please contact our technical support personnel or refer
to relevant technical guidance videos.

· Our company is not responsible for damage to components other than
this product during use.

· Please download the latest electronic version of the documentation.
The content of this manual is for reference only. We continuously improve
the user experience, and technical parameters are subject to change
without notice.
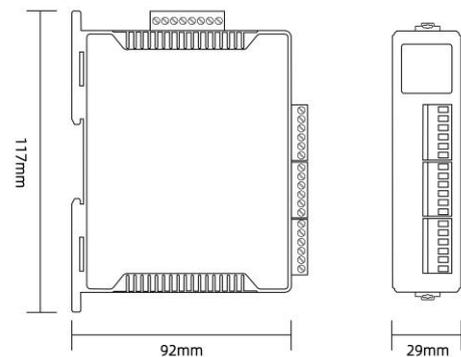
II. Product Dimensions

• Product dimensions: **117mm (L) X 92mm (W) X 29mm (H)**

• Industrial-grade flame-retardant plastic shell, standard DIN35 rail mounting.

III. Operating Environment

• Do not expose this product to excessively high or low temperatures.

• The surrounding environment must be free from strong vibration, impact, and electromagnetic interference such as large currents and sparks.

• The operating environment must not contain harmful substances that cause severe corrosion to metal or plastic components.
Do not use or store the product in harsh environments, otherwise it will affect the electrical performance of the product.

• Operating Temperature: -40℃～+80℃ Relative Humidity: 10% ~ 90%RH (non-condensing)

IV. After-Sales Service

We are committed to providing you with comprehensive after-sales service and warranty policy. The product warranty period is three years. During the warranty period, if the product fails due to non-human factors, we will provide free repair or replacement service. Damage caused by violation of operating regulations and requirements will require payment of parts cost and repair fee. After the warranty period expires, we continue to provide technical support and assistance. During this period, replacement parts are provided at cost price.

V. Application Fields

Automation Equipment   Medical Electronics   Remote Monitoring   Process Control

· Product Introduction

SPD Switch Control Module is engineered based on a new-generation embedded system design. The module features an isolated communication interface, allowing it to communicate independently with a PC or PLC, or form networks with multiple communication modules. Additionally, the module is equipped with a transient suppression circuit that effectively mitigates various surge pulses, ensuring reliable operation in harsh environments.

SPD3□□□-WA Series Serial I/O Control Module adopts the standard MODBUS-RTU protocol, facilitating seamless communication with host computers and enabling rapid network integration for building monitoring systems. With isolated output and communication interfaces, it is suitable for controlling various digital signals in industrial settings. The module meets the demanding requirements of industrial applications such as medical electronics, security monitoring, smart buildings, smart homes, power monitoring, and process control.

This product requires independent power supply and uses a DIN35mm standard rail mounting method. Field installation is simple, usage is flexible, and it can handle various field applications.

· Wiring and Indication
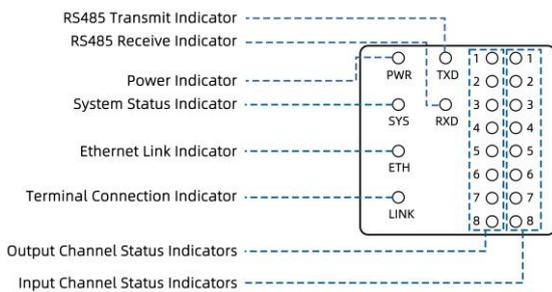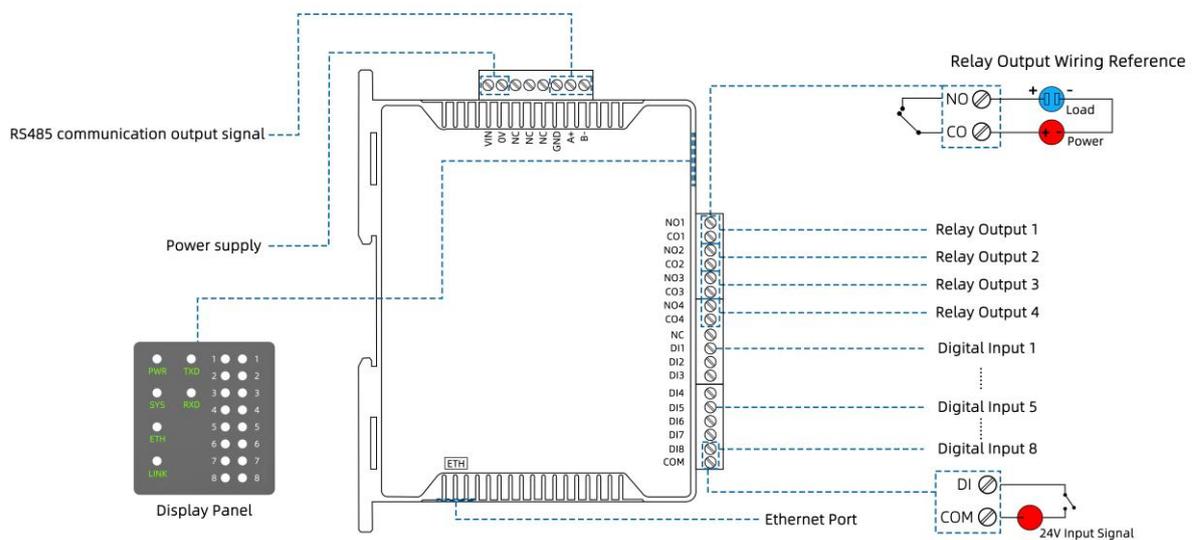
Indicator Mark	Function Description
PWR	Power indicator
SYS	System status indicator, flashes when abnormal
ETH	Ethernet link indicator
LINK	Terminal connection indicator
TXD	RS485 Transmit indicator, flashes when sending data
RXD	RS485 Receive indicator, flashes when receiving data
Left 1-8	Corresponding channel output indicators, light up when signal is output.
Right 1-8	Corresponding channel input indicators, light up when signal is input.

Note:

1. This module is available in three communication versions: RS485/Ethernet (ETH)/ RS485 + Ethernet.

2. The Ethernet port is active only in versions equipped with Ethernet functionality.

3. For specific Ethernet features and operation, please refer to the Serial Server Manual.

· Technical Parameters

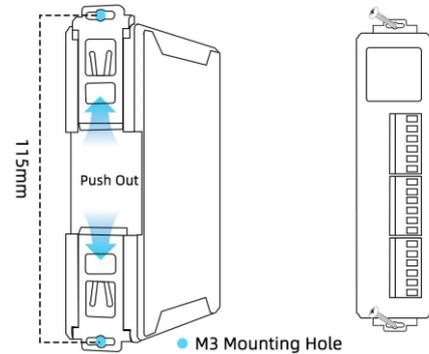| Basic Parameters	
Power Supply	DC12～36V(DC24V recommended)
Power Consumption	＜3W
Control Interval	≥50mS
ESD Protection	±15KV
Isolation Voltage	1500VDC
Power Protection	Reverse connection voltage< -40V
Dielectric Strength	1500 VAC / 1 minute (Power, Input, Output)
Insulation Resistance	≥100MΩ (Power, Input, Output)
EMC Compatibility	Complies with GB/T18268.1 (IEC61326-1)
Applicable Field Devices	Devices supporting MODBUS-RTU protocol: Configuration software, PLC, HMI, PC, etc.
Input Terminal	
Number of Channels	8 channels
Input Type	24V Active Signal
Response Time	≤10mS
Output Terminal	
Number of Channels	4 channels
Output Type	Relay
Response Time	≤20 mS
Switching Capacity	10 A @ 250 VAC; 10 A @ 28 VDC
Load Type	Resistive Load
Output Terminal	
Output Signal	RS485/ Ethernet
Communication Protocol	Standard MODBUS-RTU protocol
Communication Distance	1200m (RS485 typical)
Environmental Conditions	
Operating Temperature	-40℃～+80℃
Storage Temperature	-40℃～+85℃
Relative Humidity	10%～90%RH (non-condensing)
Atmospheric Pressure	80kPa～106kPa

· Terminal Description

Terminal Mark	Function Description
VIN	Power supply positive terminal, DC12-36V input
0V	Power supply negative terminal
NC	No Connection (Empty pin)
NC	No Connection (Empty pin)
NC	No Connection (Empty pin)
GND	RS-485 communication signal ground
A+	RS-485 communication signal positive
B-	RS-485 communication signal negative
NO1	Channel 1 Relay NO (Normally Open)
CO1	Channel 1 Relay COM (Common)
NO2	Channel 2 Relay NO (Normally Open)
CO2	Channel 2 Relay COM (Common)
NO3	Channel 3 Relay NO (Normally Open)
CO3	Channel 3 Relay COM (Common)
NO4	Channel 4 Relay NO (Normally Open)
CO4	Channel 4 Relay COM (Common)
NC	No Connection (Empty pin)
DI1	Channel 1 Digital Input
DI2	Channel 2 Digital Input
DI3	Channel 3 Digital Input
DI4	Channel 4 Digital Input
DI5	Channel 5 Digital Input
DI6	Channel 6 Digital Input
DI7	Channel 7 Digital Input
DI8	Channel 8 Digital Input
COM	Digital Input Common (COM)
ETH	Ethernet port（optional）

· **Installation Instructions**

This module uses the DIN35mm rail mounting method. The rail should comply with the installation dimension specifications for the TH35-7.5 type rail according to the national standard GB/T19334-2003. Users can easily install or remove the module on the rail. Installation must be stable and secure. This module also supports screw mounting without a rail.
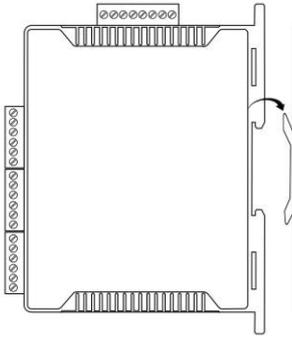
－ Installation method of guide rail －   － Screw installation method －
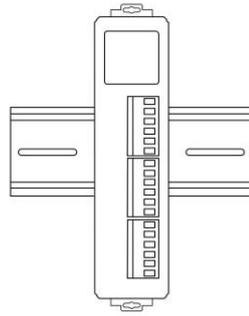
· **Product Naming Rules**

SPD3840-WA11L: Eight-channel digital input, four-channel relay output control module, RS485 communication, DC12-36V power supply, W form factor.								
SPD	3	84	0	W	A	1	1	L
Product Type	Input/Output	DI/DO Channel Count	AI Channel Count	Product Form Factor	Control Type	Isolation Rating	Communication Method	Power Supply
Serial Port I/O Control Module	1 Digital Input 2 Digital Output 3 Bidirectional I/O 9 User-Defined	00-88	0-8	N Form Factor K Form Factor M Form Factor W Form Factor F Form Factor R Form Factor Y Form Factor Q Form Factor	A Relay B NPN Output C Photoelectric Input D Fiber Optic Input E Other Types	0 None 1 1500V 2 3000V 9 Other	0 No Comm 1 RS485 2 ETH 3 RS485+ETH 4 CAN 9 Other Comm	L DC12-36V H AC220V C +12V D +24V

· **Product Model Selection Guide**

SPD3840-WA11L-BLE: Module with built-in Bluetooth function for terminal connection (default version)

SPD3840-WA11L-4G: Module with 4G function for terminal connection

SPD3840-WA11L-WIFI: Module with Wi-Fi function for terminal connection

SPD3840-WA11L: Basic version, without terminal connection function

· MODBUS-RTU Communication Protocol

The MODBUS-RTU protocol defines multiple function codes to achieve different functions. This manual explains the message format for commonly used function codes. This module only supports some of these function codes: 0X03, 0X04, 0X06, 0X10.

Function Code	Register add	Function Description
0X01	0XXXX	Read Coil Status (bit operation), e.g., read relay or digital output current state (ON/OFF)
0X02	0XXXX	Read Input Status (bit operation), e.g., read one or more groups of digital input states (ON/OFF)
0X05	0XXXX	Write Single Coil (bit operation), e.g., force a relay or digital output ON/OFF
0X03	4XXXX	Read Holding Registers
0X04	4XXXX	Read Input Registers (can be replaced by 0X03)
0X06	4XXXX	Write Single Holding Register
0X10	4XXXX	Write Multiple Holding Registers

· Communication Parameter Settings

Parameter	Setting Range	Default Value
Address	1～247	1
Baud Rate	1200、2400、4800、9600、14400、19200、38400、56000、57600、115200	9600
Parity	None, Even, Odd	None
Stop Bits	1, 2, 0.5, 1.5	1

· Communication Protocol Description

This communication board complies with the MODBUS RTU bus protocol, RS485 interface. The communication format is 11 bits:

1 start bit

8 data bits

1 parity bit (if used)

1 stop bit (with parity), 2 stop bits (without parity)

Data type: Unsigned int

With Parity

Start Bit	1	2	3	4	5	6	7	8	Parity Bit	Stop Bit

Without Parity

Start Bit	1	2	3	4	5	6	7	8	Stop Bit	Stop Bit

The message frame starts with a silence interval of more than 3.5 character times. The first field transmitted is the module add, followed by the function code, then the register add then the data, followed by the CRC16 check. It ends with a silence interval of more than 3.5 character times. The frame format is as follows:

Start Bit	Module add	Function Code	Register add High Byte	Register add Low Byte	Register Data High Byte	Register Data Low Byte	CRC16 calibration	End
>3.5 Chars	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	1 Byte	2 Byte	>3.5 Chars
	1–247	0X03 0X06	0X00	0X01	0X00	0X01	CRC	

Function Code: 0X01

1.Host Request Frame:

1 Byte	2 Byte	3 Byte	4 Byte	5 Byte	6 Byte	7 Byte	8 Byte
ADR	0X01	Start address Hi	Start address Lo	Qty Hi	Qty Lo	CRC Lo	CRC Hi
Module address (1~247)	Function code	coil start address to be read		number of coils to be read		CRC16 checksum from bytes1 to 6	

2.Slave Response Frame (Correct) : Coil status 0 = OFF and 1 = ON

1	2	3	4、5	6、7	......	N-1、N	N+1	N+2
ADR	0X01	Coil status Byte Count	Coil Status 1 Data	Coil Status 1 Data	......	Coil Status N Data	CRC16 Lo	CRC16 Hi
Module address (1~247)	Function code	Returns the number of bytes in coil status	Returns the wire net status data (one coil status is two bytes)				CRC16 checksum from bytes 1 to N	

Function Code: 0X02

1.Host Request Frame:

1	2	3	4	5	6	7	8
ADR	0X02	Start address Hi	Start address Lo	Qty Hi	Qty Lo	CRC Lo	CRC Hi
Module address (1~247)	Function code	The coil input start address to be read		number of coils to be read		CRC16 checksum from bytes1 to 6	

2.Slave Response Frame (Correct) : Coil status 0 = OFF and 1 = ON

1	2	3	4、5	6、7	......	N-1、N	N+1	N+2
ADR	0X02	Coil status Byte Count	Coil Status 1 Data	Coil Status 1 Data	......	Coil Status N Data	CRC16 Lo	CRC16 Hi
Module address (1~247)	Function code	Returns the number of bytes in coil status	Returns multiple coil input status data				CRC16 checksum from bytes1 to N	

Function Code: 0X05

1.Host Request Frame: Coil status 0 = OFF and 1 = ON

1	2	3	4	5	6	7	8
ADR	0X05	Coil address Hi	Coil address Lo	Force Data Hi	Force Data Lo	CRC Lo	CRC Hi
Module address (1~247)	Function code	Written coil address		Number of coils written		CRC16 checksum from bytes1 to 6	

2.Slave Response Frame (Correct) :

1	2	3	4	5	6	7	8
ADR	0X05	Coil address Hi	Coil address Lo	Force Data Hi	Force Data Lo	CRC Lo	CRC Hi
Module address (1~247)	Function code	Written coil address		Returns coil status data		CRC16 checksum from bytes1 to 6	

Function Code: 0X03

1.Host Request Frame:

1 Byte	2 Byte	3 Byte	4 Byte	5 Byte	6 Byte	7 Byte	8 Byte
ADR	0X03	Start address Hi	Start address Lo	Reg Qty Hi	Reg Qty Lo	CRC Lo	CRC Hi
Module address (1~247)	Function code	The register starting address to read is		Number of registers read		CRC16 checksum of bytes 1 to 6	

2.Slave Response Frame (Correct) :

1	2	3	4、5	6、7	······	N-1、N	N+1	N+2
ADR	0X03	Byte Count	Reg 1 Data Hi	Reg 1 Data Lo	……	Reg N Data Hi, Reg N Data Lo	CRC Lo	CRC Hi
Module address (1~247)	Function code	Returns the effect of reading register bytes	Returns multiple register data (one register data is two bytes)				CRC16 checksum of bytes 1 to N	

Function Code: 0X06

1.Host Request Frame:

1	2	3	4	5	6	7	8
ADR	0X06	Reg address Hi	Reg address Lo	Reg Data Hi	Reg Data Lo	CRC Lo	CRC Hi
Module address (1~247)	Function code	Register address to be written		Register data to be written		CRC16 checksum of bytes 1 to 6	

2.Slave Response Frame (Correct) :

1	2	3	4	5	6	7	8
ADR	0X06	Reg address Hi	Reg address Lo	Reg Data Hi	Reg Data Lo	CRC Lo	CRC Hi
Module address (1~247)	Function code	Returns the register address written		Returns the written register data		CRC16 checksum of bytes 1 to 6	

Function Code: 0X10

1.Host Request Frame:

1	2	3、4	5、6	7	8、9	10、11	······	N-1、N	N+1	N+2
ADR	0X10	Start Add	Reg Qty	Byte Count	Reg 1 Data	Reg 2 Data	……	Reg N Data	CRC Check	CRC Check
Module address (1~247)	Function code	The starting address of the register to be written	Validity of register written	Number of register data bytes written	Multiple register data written (One register data is two bytes)				CRC16 checksum of bytes 1 to N	

2.Slave Response Frame (Correct) :

1	2	3	4	5	6	7	8
ADR	0X10	Start Add Hi	Start Add Lo	Reg Qty Hi	Reg Qty Lo	CRC Lo	CRC Hi
Module address (1~247)	Function code	Returns the starting address of the register written		Returns the number of registers written		CRC16 checksum of bytes 1 to 6	

· **Register Definition Table**

PLC add	Register add (HEX)	Function Definition	R/W Attribute	Value Range and Description
00000		Channel 1 Relay Output Control	Bit Operation	0xFF00: Relay Close 0x0000: Relay Open 0x5500: Relay Toggle
00001		Channel 2 Relay Output Control	Bit Operation	Same as Channel 1 parameter value
00002		Channel 3 Relay Output Control	Bit Operation	Same as Channel 1 parameter value
00003		Channel 4 Relay Output Control	Bit Operation	Same as Channel 1 parameter value
00004		Channel 5 Relay Output Control	Bit Operation	Same as Channel 1 parameter value
00005		Channel 6 Relay Output Control	Bit Operation	Same as Channel 1 parameter value
00006		Channel 7 Relay Output Control	Bit Operation	Same as Channel 1 parameter value
00007		Channel 8 Relay Output Control	Bit Operation	Same as Channel 1 parameter value
10000		Channel 1 Input Signal Acquisition	Bit Operation	0: Open, No Signal | 1: Closed, Signal Present
10001		Channel 2 Input Signal Acquisition	Bit Operation	Same as Channel 1 parameter value
10002		Channel 3 Input Signal Acquisition	Bit Operation	Same as Channel 1 parameter value
10003		Channel 4 Input Signal Acquisition	Bit Operation	Same as Channel 1 parameter value
10004		Channel 5 Input Signal Acquisition	Bit Operation	Same as Channel 1 parameter value
10005		Channel 6 Input Signal Acquisition	Bit Operation	Same as Channel 1 parameter value
10006		Channel 7 Input Signal Acquisition	Bit Operation	Same as Channel 1 parameter value
10007		Channel 8 Input Signal Acquisition	Bit Operation	Same as Channel 1 parameter value
40083	52	Communication add	Read/Write	1～247
40084	53	Baud Rate	Read/Write	0：1200bps 1：2400bps 2：4800bps 3：9600bps 4：14400bps 5：19200bps 6：38400bps 7：56000bps 8：57600bps 9：115200bps
40085	54	Parity Bits	Read/Write	0：None 1：Even 2：Odd
40086	55	Stop Bits	Read/Write	0：1 Stop Bit 1：0.5 Stop Bits 2：2 Stop Bits
40087	56	Device Number 1	Read Only	0～65536
40088	57	Device Number 2	Read Only	0～65536
40089	58	Firmware Version	Read Only	0～65536
40090	59	Device Category	Read Only	0～65536

· **Controller Output Status**

Control Relay: 0x05				
Channel 1 Relay Close	01 05 00 00 FF 00 8C 3A		Channel 2 Relay Close	01 05 00 01 FF 00 DD FA
Channel 1 Relay Open	01 05 00 00 00 00 CD CA		Channel 2 Relay Open	01 05 00 01 00 00 9C 0A
Channel 1 Relay Toggle	01 05 00 00 55 00 F2 9A		Channel 2 Relay Toggle	01 05 00 01 55 00 A3 5A
Channel 3 Relay Close	01 05 00 02 FF 00 2D FA		Channel 4 Relay Close	01 05 00 03 FF 00 7C 3A
Channel 3 Relay Open	01 05 00 02 00 00 6C 0A		Channel 4 Relay Open	01 05 00 03 00 00 3D CA
Channel 3 Relay Toggle	01 05 00 02 55 00 53 5A		Channel 4 Relay Toggle	01 05 00 03 55 00 02 9A

Read Relay Status: 0x01 0 indicates relay open | 1 indicates relay closed		
Host Sends	01 01 00 FF 00 01 CD FA	Read Relay Status
Module Returns	01 01 01 00 51 88	All Relays Open
Host Sends	01 01 00 FF 00 01 CD FA	Read Relay Status
Module Returns	01 01 01 01 90 48	Channel 1 Relay Close, All Other Relays Open

· **Controller Input Status**

Read Input Status: 0x02 0 indicates open, no signal | 1 indicates closed, signal present		
Host Sends	01 02 00 00 00 01 B9 CA	Read Channel 1 Input Status
Module Returns	01 02 01 00 A1 88	Channel 1 Input Status: Open, No Signal
Host Sends	01 02 00 00 00 08 79 CC	Read 8-Channel Input Status
Module Returns	01 02 01 00 A1 88	Read 8-Channel Input Status