



User Manual 用户手册



APG Serial bus gateway

PROFIBUS-DP Protocol transfer
MODBUS RTU RS485 master station
Model number: APG1501

CATALOGUE

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1.Preface

1.1 Document Usage Instructions

This document outlines the product's functional specifications, installation, operation, and settings, as well as information related to network protocols. This document is intended for use by well-trained electrical automation engineers only.

(1) Disclaimer

The author has conducted the necessary review of the document. However, as the product progresses and evolves, the document may contain errors in technical parameters or editing. We reserve the right to make adjustments and modifications without prior notification to the users.

(2) Trademark

PROFIBUS® is a registered trademark of the PI Association.

(3) Patent Description

The designer of this product has obtained patent protection for both its appearance and the technical implementation method. Any attempt to copy, imitate or reverse engineer it could potentially violate the law.

(4) Copyright

Without the author's permission, it is strictly prohibited to copy, distribute or use this document.

1.2 Safety matters

This product is a professional equipment for industrial use and can only be operated by personnel with electrical operation experience. Before use, please carefully read this manual and follow the instructions to operate it. Failure to do so may result in personal injury or product damage.

This product is designed with an IP20 protection level. When using it, it needs to be installed in a distribution cabinet with dust-proof and moisture-proof functions.



2.Specification parameters

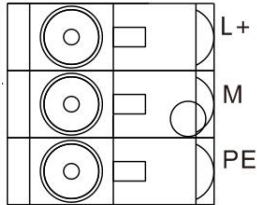
2.1 APG-1501 Specification Parameter Table

Profibus-DP Communication specification		
Serial Number	Item	Specification
1	Transmission mode	Profibus-DP V0 (IEC 61158 Type3)
2	Physical interface	DB9 female connector
3	Baud rate (kbps)	Automatically adapts to baud rate. The supported communication parameters are as follows: 9.6, 19.2, 45.45, 93.75, 187.5, 500, 1.5K, 3K, 6K,12M
4	Transmission format	Digital differential signal, compliant with RS485, NRZ; HD=4, parity check bit, start/stop delimiter
5	Communication address range	01-99
6	Transmission cable	Two-core shielded twisted-pair copper cable
7	Number of stations	Up to 32 without repeaters, up to 126 with repeaters
8	Port protection	Air discharge 15kV, contact discharge 8kV (IEC61000-4-2)
Modbus Communication Format		
1	Transmission mode	Modbus _RTU Master
2	Physical interface	Open type connector with 5 pins (including terminal resistor interface)
3	Baud rate (kbps)	2400,4800,9600,19200,38400,57600,115200
4	Function code	01H、 02H、 03H、 04H、 05H、 06H、 0FH、 10H
Other specifications		
1	Dimensions of the shape	(W) 31*(H)118* (D) 86mm
2	Installation method:	35mm guide rail
3	Protection level	IP20
4	Environmental temperature:	Transportation and storage: -40℃ to +70℃ Operating temperature: -20℃ to +55℃
5	Power supply voltage:	24 VDC(±20%)
6	Rated current:	110 mA (24 VDC)



3.Hardware description

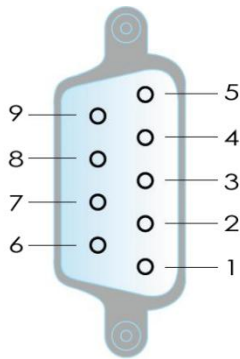
3.1 Power interface



Pin	Logo	Description
1	L+	24V, positive terminal of the DC power supply
2	M	negative terminal of the DC power supply
3	PE	ground connection

3.2 DP Communication interface

The module uses a DB9 female connector as the physical interface for Profibus-DP communication. The networking must be accomplished using compliant dedicated bus connectors and cables. The interface definition can be referred to as follows.

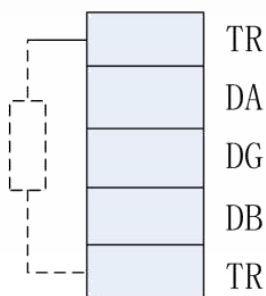


Pin	Signal	Description
1	-	N.C.
2	-	N.C.
3	D+	Receive/Transmit Data, Line B (Red)
4	CNTR-P	Direction Control of Repeater
5	DGND	Data Ground (Reference Voltage to VP)
6	VP	Power Supply 5.0V (Maximum 10mA)
7	-	N.C.
8	D-	Receive/Transmit Data, Line A (Green)
9	-	N.C.

3.3 Modbus Communication interface

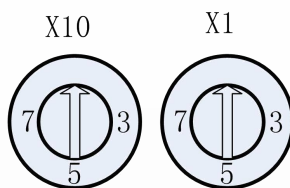
The module uses its own wiring socket as the physical interface for Modbus communication, where two TRs are terminal resistance selection terminals. An internal terminal resistance of 120R is integrated within the module. When TR1 is short-circuited to DA and TR2 is short-circuited to DB, the terminal resistances are effective. The interface definition is as shown in the table below.

Modbus Terminal Definition		
Pin	Signal	Description
1	TR1	Terminal resistor connection selection
2	DA	Receive/send data, line A (red)
3	DG	Data ground
4	DB	Receive/send data, line B (red)
5	TR2	Terminal resistor connection selection



3.4 Node ID setting

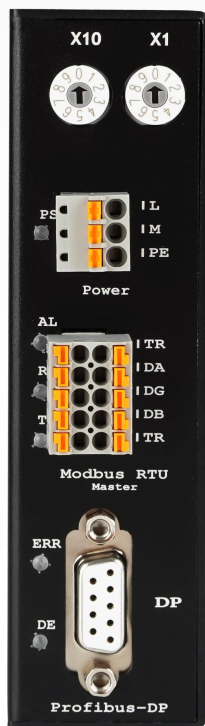
The module sets the node ID through two decimal-digit encoding switches, as shown in the figure below. The range of node ID setting is from 01 to 99. The module program only reads the node ID setting at power-on, and any modifications during operation are invalid.



Node ID setting switch

3.5 LED indication

LED indications are divided into 3 types. These include power indication, Modbus status indication, and Profibus status indication. The table below defines them.



Name	Colour	Explanation
PWR	green	Electrical indicator light
ALM	yellow	Modbus communication abnormality. Data timeout or incorrect received data
RX	green	Modbus has data reception
TX	green	Modbus has data transmission
ERR	Red light	Profibus-DP bus not in the correct mode; there are communication, operation errors, or the communication timing monitor (watchdog) detects communication timeout.
DE	green	Module enters operation (operate) state, successfully establishes cyclic data exchange with the master station

Definition of LED Indicator Lights



4.Protocol conversion

4.1 Status register

"Status" refers to the status register of the gateway				
The definition is as follows:				
Bit: 7	Bit: 6	Bit: 5	Bit: 1...4	Bit: 0
Retention	Received Error	Timeout	Error Code	Running Status

4.2 Control Register

"Control" is the control register of the gateway			
The definition is as follows:			
Bit: 3..7	Bit: 2	Bit: 1	Bit: 0
Keep	Reset Gateway	Error Clear	Start / Stop



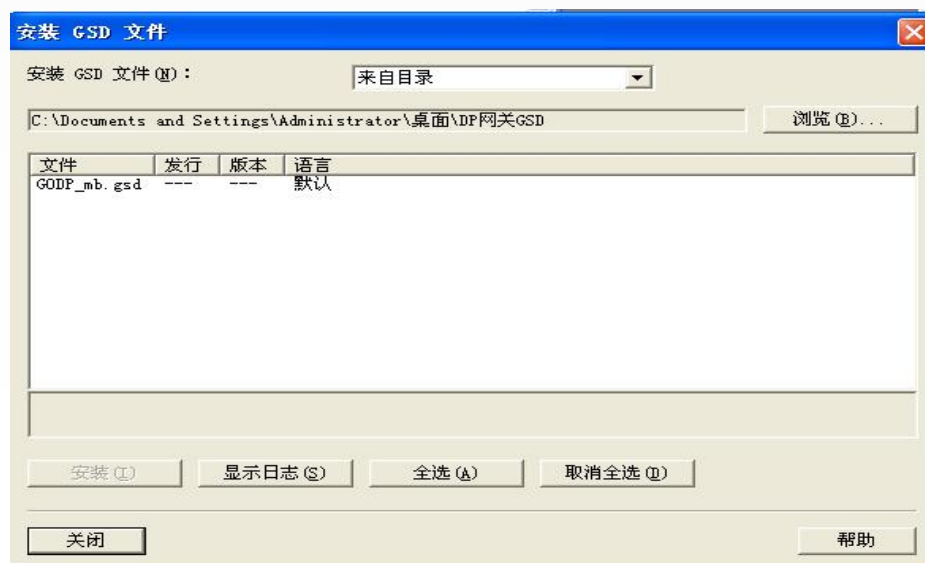
4.Product usage

The following is an explanation of the configuration parameters for the modules based on the STEP 7 software provided by Siemens.

5.1 Install the GSD file

Select file G0DP_MB.GSD to update the hardware directory.

After installing the GSD file, update the hardware directory. The G0DF_MB/IO_V10 module appears under the "PROFIBUS DP --Additional Field Devices --Gateway" directory, as shown in the figure:

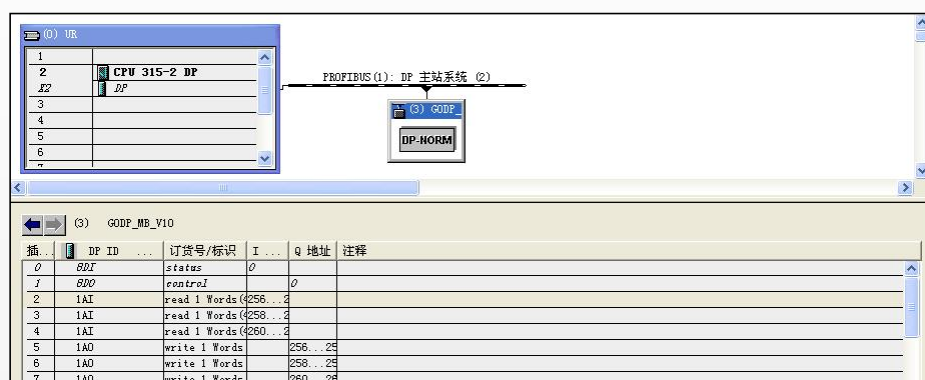
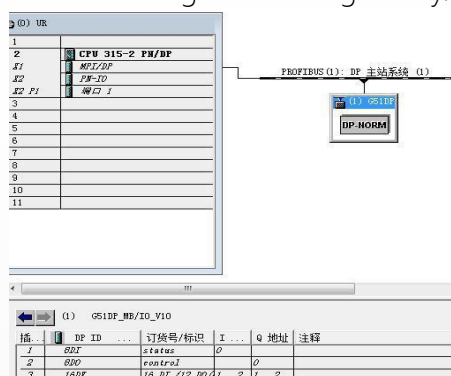


5.2 Hardware configuration

The G0DF_MB/IO_V10 module is dragged onto the DP bus and the communication parameters of DP are set.

The "status" is the status register of the gateway.

The "Control" is also the status register of the gateway.



5.3 Set gateway communication parameters:

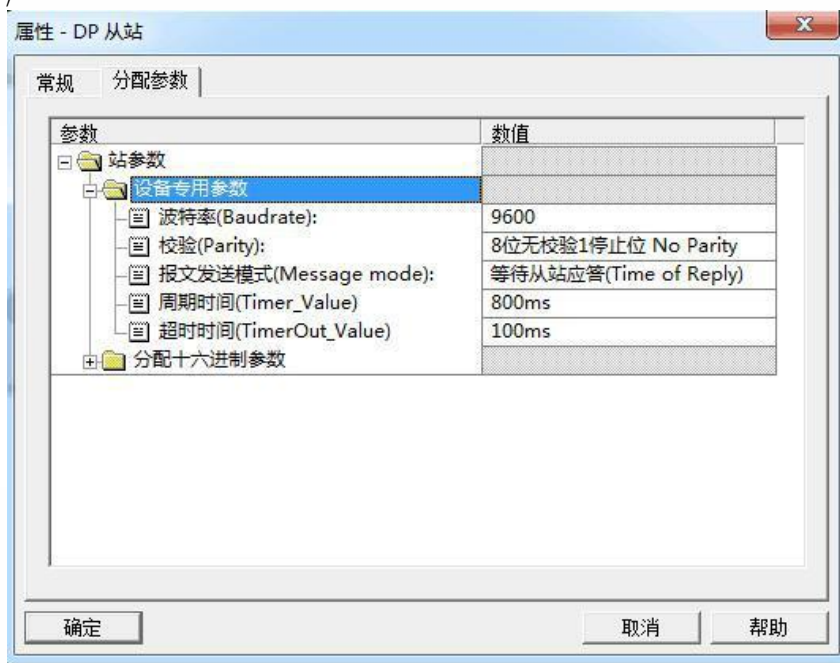
Baud rate: The communication frequency between the gateway and the frequency converter;

Verification: The communication method of the frequency converter;

Message mode:

(1) Wait for response: The messages between the gateway and the frequency converter are sent in the following sequence: after the previous message is sent and the frequency converter responds, the next message is sent;

(2) Periodic transmission: The gateway sends messages to the frequency converter at a fixed period to transmit data. Regardless of whether the frequency converter responds or not; Period time: In the message mode of periodic transmission, the set time; Timeout time: The time the gateway waits for the response from the frequency converter;



Modbus as Master or Slave: The APG1502 is set as Modbus Master by default and cannot be changed.

Baudrate: Baud rate setting. 2400, 4800, 9600 (default), 19.2k, 38.4k, 57.6k, 115.2k

Parity: Data bits, parity method, stop bits settings. 8 Data bits, None Parity, 1 Stop Bit (default)

8 Data bits, Even Parity, 1 Stop Bit

8 Data bits, Odd Parity, 1 Stop Bit

Data Update Mode: Data update mode. Time of Reply (default): Response

Same Interval: Same interval response

Response Timeout: Response timeout 100ms (default)

Delay Between Polls: Same interval polling delay 200ms (default)

5.4 Add Slot

The Slots were added based on the actual operational requirements. Each Slot corresponds to a Modbus message and requires the allocation of parameters, including the slave station address and the address of the operation register.

- **Reading operations such as:**

Read the operating frequency slot of the frequency converter with address 3 and insert it.

4	1AI	read 1 Words (4xxxx)	256...2
---	-----	----------------------	---------

- **Set parameters:**

From Station Address: 3

Starting Address: 4098 (Decimal Data)

If you need to read other data, adding new slot setting parameters can be found in the frequency converter manual.

For example: Output Current: 4101; Output Torque: 4127; Fault Code: 4136

属性 - DP 从站

地址/ID 分配参数

参数	数值
站参数	
设备专用参数	
从站地址(Modbus No.):	3
起始地址(Start Address):	4098
分配十六进制参数	

(3) GODP_MB_V10

插...	DP ID	订货号/标识	I ...	Q 地址
0	BDI	status	0	
1	BDO	control		0
2	1AI	read 1 Words (4256...2		
3	1AI	read 1 Words (4258...2		
4	1AI	read 1 Words (4260...2		
5	1AO	write 1 Words		256...2E
6	1AO	write 1 Words		258...2E
7	1AO	write 1 Words		260...2E

- **Writing operations such as:**

Insert into the frequency slot with the frequency converter address set to 3

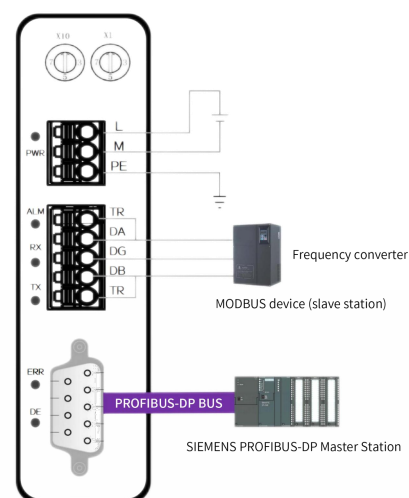
```
7 | 1A0 |set single word (06H Command)| |256...255
```

5.5 Start the gateway

After the hardware configuration is completed, the gateway is not activated. The data enabling the frequency conversion of the gateway also needs to be mapped to the corresponding PLC address.

Starting APG1501%Q0.0=TRUE can enable the gateway.

5.6 Appearance and application schematic diagram



Official website



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