# PROFIBUS DP / Modbus TCP Gateway EP-321MP

# **User Manual**



**REV 1.2** 

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User Manual

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# **1 Product Overview**

## 1.1 General

This document describes every parameters of the gateway EP-321MP and provides using methods and some announcements that help users use the gateway. Please read this document before using the gateway.

For further information, documentation etc., please visit the SiboTech website: http://www.sibotech.net/En/

### **1.2 Important User Information**

The data and examples in this document cannot be copied without authorization. Sibotech maybe upgrade the product without notifying users.

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The product has many applications. The users must make sure that all operations and results are in accordance with the safety of relevant field, and the safety includes laws, rules, codes and standards.



# 2 About the Gateway

# 2.1 Function

Connects Modbus TCP devices to PROFIBUS DP network, and establishes communication between them.

# 2.2 Features

• With an Ethernet interface (Modbus TCP master / Modbus TCP slave) and a PROFIBUS DP slave interface;

- Ethernet 10/100M adaptive;
- IP address conflict detection;
- Support DHCP, BOOTP and static setting;
- Support standard Modbus TCP master and slave protocol;
- I / O data monitoring capabilities;
- Easy-to-use configuration software EP-123

# 2.3 Technical specification

[1] PROFIBUS DP V0 protocol support, in line; JB / T 10308.3-2001: measurement and control of digital data communication in industrial control systems Part 3 of the fieldbus: PROFIBUS DP specification;

[2] PROFIBUS DP slave, baud rate adaptive, maximum baud rate of 12M;

[3] PROFIBUS DP input data up to 244 bytes of output data up to 244 bytes input + output data up to 488 bytes;

[4] As a Modbus TCP master Gateway, it can support up to Modbus TCP server access to 36 different IP or a different cell identifier;

**[5]** Gateway as a Modbus TCP master to support the function code: 01H, 02H, 03H, 04H, 05H, 06H, 0FH, 10H;

[6] Gateway as a Modbus TCP slave, up to 36 TCP connection;

[7] Gateway as a Modbus TCP slave, to support the function code: 03H, 04H, 06H, 10H;

[8] PROFIBUS DP interface the 1KV photoelectric isolation;

[9] Power supply 24VDC (11V to 30V), 160mA (24VDC);

[10] Operating temperature: -4 ° F to 140 ° F (-20°C~60°C), relative humidity 5% ~ 95% (non-condensing);

[11] External Dimensions (W\*H\*D): 1.57in\*4.92in\*4.33in (40mm\* 125mm \* 110mm);

[12] Installation: 35mm DIN rails;

[13] Protection class: IP20;

[14] Test standard: Complies with EMC test standards.

#### 2.4 Attention

• To prevent stress, prevent module panel damage;

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- To prevent bump, module may damage internal components;
- Power supply voltage control in the prospectus, within the scope of the requirements to burn module;
- To prevent water, water module will affect the normal work;
- Please check the wiring, before any wrong or short circuit.

# **2.5 Related Products**

Related products include:

PCA-100, ENC-310, ENC-311, ENB-302, PCO-150S and so on

More information about these products, please visit: <u>http://www.sibotech.net/En/</u>, or dial technical support line: +86-21-5102 8348





# **3 Hardware Description**

# 3.1 Product Appearance







### **3.2 Indicators**

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Indicators	Status	Description
STA(green)	flash	PROFIBUS DP bus data is communicating
S III (green)	Off	No data exchanging
DDE (red)	On	PROFIBUS DP connection has not been established
PBF (lea)	Off	PROFIBUS DP connection has been established
	Flash(red)	DHCP or BOOTP status
MS	On (red)	IP confliction
	OFF(red)	Normal communication
	On(green)	Modbus TCP connection has been established
NC	Elach(groop)	Modbus TCP connection is not established or
1NS	riasii(green)	disconnected
	OFF(green)	Modbus TCP is not started
MS, NS, and ST.	A flashes once	Boot up
MS and M	NS ON	Configuration status

### **3.3 DIP Switch**

# **3.3.1 Status Configuration Switch**

The configuration switch is located on the button of the product. The function is listed below:



Status(1)	Status(2)	Description
Off	Off	Run mode, allow reading and writing configuration data
Off	On	Run mode, reading and writing configuration data are not allowed
On	Off or On	Configuration mode, IP address is 192.168.0.10 (fixed), this mode can read and write configuration data but cannot finish communication between Modbus TCP and PROFIBUS DP

Notes:

Restart EP-321MP (power off and power on) after resetting the configuration to make the configuration take effect!



# **3.3.2 PROFIBUS DP Address Setting Switch**

The 2-code rotary switch in the left-side is used for setting the PROFIBUS DP address of the device.



In this example, the PROFIBUS node address will be 42((4x10) + (2x1)).

# **3.4 Connectors**

#### **3.4.1 PROFIBUS DP Connector**



DB9 pin	Function
3	PROFI_B, Data positive
5	GND (optional)
8	PROFI_A, Data negative



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# **3.4.2 Ethernet Connector**



RJ-45 port

pin	Signal Descriptions
S1	TXD+, Tranceive Data+, output
S2	TXD-, Tranceive Data-, output
S3	RXD+,Receive Data+,input
S4	Bi-directional Data+
S5	Bi-directional Data-
S6	RXD-,Receive Data-,input
S7	Bi-directional Data+
S8	Bi-directional Data-

## **3.4.3 Power Connector**



Pin	Function
1	GND, Power ground
2	NC, not connected
3	24V+, 24VDC
	,

# 4 Modbus TCP master

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# 4.1 Working Principle

The Ethernet port supports Modbus TCP master functions, as follows:

Data exchange of Modbus TCP and PROFIBUS DP of EP-321MP is set up through "mapping". There are two data buffer areas, one is PROFIBUS DP network input buffer and the other is PROFIBUS DP network output buffer. When the gateway acts as Modbus TCP master, Modbus read commands will write the read data to the network input buffer for PROFIBUS DP accessing. Modbus write register commands get data from network output buffer and export to the Modbus TCP slave equipment through write command.



Modbus TCP can support up to 36 Modbus TCP slave nodes and 128 commands, each command reads a set of consecutive Modbus registers.



# **5 Modbus TCP Slave**

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### **5.1 Working Principle**



Data exchange of Modbus TCP and PROFIBUS DP of EP-321MP is set up through "mapping". There are two data buffer areas, one is PROFIBUS DP network input buffer and the other is PROFIBUS DP network output buffer. Network input and output buffer is all for PROFIBUS DP. When the gateway acts as Modbus TCP slave, Modbus write register command will write the read data to the network input buffer for PROFIBUS DP accessing. Modbus read command gets data from network output buffer and export to the Modbus TCP master equipment through response message.

The gateway acts as Modbus TCP slave, support function: 03H, 04H, 06H and 10H. Users can select 03H function code to read the data PROFIBUS DP master outputted or use 04H function code to read he data PROFIBUS DP master outputted.

Network input buffer is Modbus TCP master output at the Modbus TCP side. It is mapped to the Modbus holding register. Users can use No.3 command or No.4 command to read back. Users can select command No. in the configuration software.

Network output buffer is Modbus TCP master input. It is mapped to Modbus input register. Users can use No.4 or No.3 function code to read data. Users can select command No. in the configuration software.

### 5.2 Network Status Monitoring

When the Gateway is a Modbus TCP slave, the gateway has the function of monitoring the network status.

When the Monitoring is enabled, the first word of input buffer is used as counter which record the number of TCP connections.



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# **6 Configuration Software EP-123**

## 6.1 About EP-123

EP-123 is a Windows-based platform, used to configure EP - 321MP and other products.

Here is to introduce the use of EP-123.Double-click on the icon to enter the main interface:

🐝 Configuration software E	P-123	
File(F) Edit(E) Tool(T) Help(H)		
Device	Configuration	
Device Fieldbus Ethernet	Configuration The type of fieldbus Profibus input bytes number Profibus output bytes number Double fault clear the input buffer	Profibus Set by the DP Master configuration software Set by the DP Master configuration software Open
Ready		Number

## 6.2 User Interface

EP-123 user interface include: title bar, menu bar, toolbar, status bar, equipment plate, configuration plate and comment plate.

Note: In this software, all gray parts cannot be modified.



Configuration software EP-123         ile (P) Edit (Q) Tool (P) Help (P)         Image: Select rest of the select of the select rest of the	Modbus TCP Master           Configurate statically           192.168.0.10           255.255.255.0           192.168.0.1           0.0.0           0.0.0           Close
ile (f) Edit (g) Tool (f) Help (f)       Menu Bar         evice       Configuration         Fieldbus       Select         Fieldbus       Select         Toolbar       ocol         IP setti       Toolbar         IP address       Subnet mask         Cateway address       DNS1         DNS2       Calibration unit identifier         Unit identifier(1~247)       Configuration plate:         Delay between polls (or       Input         Configuration plate:       Input	Modbus TCP Master           Configurate statically           192.168.0.10           255.255.255.0           192.168.0.1           0.0.0           0.0.0           Close
Fieldbus       Select       Toolbar         Fieldbus       Select       Toolbar         Baddress       Subnet mask       Gateway address         DNS1       DNS2       Calibration unit identifier         Unit identifier(1~247)       Response timeout(300~6)       Configuration plate:         Delay between polls(0~       Input       Configuration plate:	Modbus TCP Master Configurate statically 192.168.0.10 255.255.255.0 192.168.0.1 0.0.0.0 0.0.0.0 Close
Prieldbus     Select     Toolbar       Bthernet     IP sett     ocol       IP address     Subnet mask       Gateway address       DNS1       DNS2       Calibration unit identifier       Unit identifier(1~247)       Response timeout(300~6)       Delay between polls(0~       Input	Modbus TCP Master Configurate statically 192.168.0.10 255.255.255.0 192.168.0.1 0.0.0.0 0.0.0.0 Close
Fieldbus     Select     Toolbar       Bthernet     IP setti     Toolbar       IP address     Subnet mask       Gateway address       DNS1       DNS2       Calibration unit identifier       Unit identifier(1~247)       Response timeout(300~6)       Delay between polls(0~       Input	Modbus TCP Master Configurate statically 192.168.0.10 255.255.255.0 192.168.0.1 0.0.0.0 0.0.0.0 Close
IP sett IP address Subnet mask Gateway address DNS1 DNS2 Calibration unit identifier Unit identifier(1~247) Response timeout(300~6 Delay between polls(00~ Loud to the set of the	Configurate statically 192.168.0.10 255.255.255.0 192.168.0.1 0.0.0.0 0.0.0.0 Close
Subnet mask Gateway address DNS1 DNS2 Calibration unit identifier Unit identifier(1~247) Response timeout(300~6 Delay between polls(0~ Input Col	192. 185. 0. 10 255. 255. 255. 0 192. 168. 0. 1 0. 0. 0. 0 0. 0. 0. 0 Close
Gateway address DNS1 DNS2 Calibration unit identifier Unit identifier(1~247) Response timeout(300~ Delay between polls(0~ Input col	192. 168. 0. 1 0. 0. 0. 0 0. 0. 0. 0 Close
DNS1 DNS2 Calibration unit identifier Unit identifier(1~247) Response timeout(300~ Delay between polls(0~ Input configuration plate:	0.0.0.0 0.0.0.0 Close
DNS2 Calibration unit identifier Unit identifier(1~247) Response timeout(300~6 Delay between polls(0~ trutti	0. 0. 0. 0 Close
Calibration unit identifier Unit identifier (1~247) Response timeout (300~6 Delay between polls (0~ Input content to the terminal	Close
Unit identifier(1~247) Response timeout(300~6 Delay between polls(0~ Input con	
Response timeout (300~6 Delay between polls (0~ Input con	
Delay between polls (0~ Input CO	
112011111	nfiguration
Equipment plate:	rts cannot ate output
Users can choose operation be modified	
object, includes Ethernet type,	
adding node and command	
	Comment plate
	Explain the function of th
	configuration options

#### Toolbar:

Toolbar as shown below:

		× 古 杏	😹 🖿 🛛	è 👳
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The function from left to right is: New, Open, Save, Add Nodes, Delete Nodes, Add Commands, Delete Commands, Upload Config, Download Config, Conflict Detect, Auto Mapping, Export XIs and Monitor I/O data.

New: Create a new project

Gen: Open a project

Save: Save the project

Add a node: Add a Modbus TCP slave

Delete a node: Delete a Modbus TCP slave

Add command: Add a Modbus command

X Delete command: Delete a Modbus command

Lupload: Upload the configuration form the gateway

Download: Download the configuration into the gateway

Conflict detection: To check whether there are some conflicts with configured commands in the gateway memory data buffer

Auto mapping: Used to automatically calculate the mapped memory address without confliction by each command

Export Excel: Export the configuration into Excel

www.sibotech.net/en





# 6.3 Equipment View Operation

## 6.3.1 Equipment View Interface



## 6.3.2 Equipment View Operation Mode

For equipment interface, support three operation modes: edit menu, edit toolbar and right click edit menu.

	Add N	ode (N)		ъΙ
Device	Delet	e Node(D)		_
DUVICE RA-1	Add C	ommand (I)		-
F1e	Delet	e Command	(E)	
Ethe	hine c			







# **6.3.3 Equipment View Operation Types**

1) Add node operation: Left click on Ethernet or existing nodes, and then perform the operation of adding a new node. Then there is a new node named "New node" under Ethernet.

2) Delete node: Left click on the node to be deleted, and then perform the operation of deleting the node. The node and all commands will be deleted.

3) Add commands: Left click on the node, and then perform the operation of adding command to add a command for the node. It will pop up the command selecting dialog box for users to choose. Shown as below:

Select the command: Double click command item

12 Fetch Comm Event Log 13 Program Controller 14 Poll Controller 15 Force Multiple Coils 16 Preset Multiple Regist:	01 02 03 04 05 06 07 08 11 12 13 14 15 16	Read Coil Status Read Input Status Read Holding Registers Read Holding Registers Force Single Coil Preset Single Register Read Exception Status Diagnostics Fetch Comm Event Ctr Fetch Comm Event Log Program Controller Poll Controller Force Multiple Coils Preset Multiple Regist
---	--	---



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4) Delete commands: Left click on the command to be deleted, perform the operation of deleting the command.

5) Edit node: Left click the node needs to be reset, and then set parameters of this node in configuration interface.

6) Copy node: Left click the existing node, choose the node and execute the operation of copying nodes (include all commands under the node)

7) Paste node: Left click and choose any existing node, execute operation of paste node. Then at the Ethernet rear part you can see a new node (include all commands under the node); Node parameters of new node is default setting, it needs to be reset.

# 6.4 The Operation of Configuration Interface

# **6.4.1 Fieldbus Configuration Interface**

Click the fieldbus, the Fieldbus Configuration Area display configuration is as follows:

The configurable items include:

Bus Type: PROFIBUS DP

PROFIBUS DP input bytes: set by the PROFIBUS DP master configuration software

PROFIBUS DP output byte: set by the PROFIBUS DP master configuration software

Double fault clear: open and close optional.

💥 Configuration software	EP-123		
File(F) Edit(E) Tool(T) Help(H	)		
🗅 🚰 🔜 🕸 🗑 📹 🗙 📥 o	5 🚜 🔟 🖻 🖵		
Device	Configuration		
Device Fieldbus Ethernet	Configuration The type of fieldbus Frofibus input bytes number Profibus output bytes number Double fault clear the input buffer	Profibus Set by the DP Master configuration software Set by the DP Master configuration software Open 	
Ready	, A	Number	



# 6.4.2 Ethernet Configuration Interface

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Click Ethernet in configuration view interface; when choosing a different type of protocol, the configuration view interface and configurable items are different.

The protocol type selection: Modbus TCP master

Modbus	TCP	master	configuration	view	is	shown	as	follows
wioubus	ICI	master	configuration	VICW	15	SHOWI	as	10110 w 5.

🔏 Gateway Configuration Soft	ware EP-123		
File(F) Edit(E) Tool(T) Help(H)			
🗋 🗃 📓 📽 🗑 🗶 📥 🖕			
Device	Configuration		
Fieldbus	Type of Protocol	Modbus TCP Master	
Ethernet	Assign IP Mode	Manual Assign	
	IP Address	192.168.0.10	
	Subnet Mask	255.255.255.0	
	Gateway Address	192.168.0.1	
	DNS1	0.0.0	
	DNS2	0.0.0	
	Check unit ID	Off	
	Unit ID(1~255)		
	Response timeout(300~60000ms)	1000	
	Delay between polls(0~2500ms)	0	
	Output Mode	Change of Value	
	Scan Rate(1~255)	10	
	1		
Ready			Number

The configurable items include: assign IP mode, IP address, subnet mask, gateway address, DNS1, DNS2, response timeout, delay between polls, output mode. As shown below:

Assign IP mode: Manual Assign, BOOTP and DHCP optional.

Response wait time: After the Modbus TCP master sent out commands, it waited for response from the slave.

Delay between polls: A Receive the right response after one Modbus command has been sent or sending next Modbus command after response timeout.

Output mode: Continuous output, disable output and change-of-value output can be selected.

The protocol type selection: Modbus TCP Slave Modbus TCP slave configuration view is as follows:



Gateway Configuration	Software EP-123	
File(F) Edit(E) Tool(T) Help(		
	Ð	
1 🚰 🔚 隊 🗑 🗙 占	告 🖧 👅 🖻 🖵	
Device	Configuration	
Fieldbus	Type of Protocol	Modbus TCP Slave
Ethernet	Assign IP Mode	Manual Assign
	IP Address	192.168.0.10
	Subnet Mask	255.255.255.0
	Gateway Address	192.168.0.1
	DNS1	0.0.0.0
	DNS2	0.0.0.0
	Check unit ID	Off
	Unit ID(1~255)	1
	Response timeout(300~60000ms)	1000
	Delay between polls(0~2500ms)	0
	Output Mode	Change of Value
	Scan Rate(1~255)	10
	Network status instruction	Both ends network monitors each other
	Modbus TCP master read data function code	04 read data which DP wrote to the Ethernet,03 read the v
	Starting address of read-only register(data flow from	1 DP tr 0
	Starting address of read/write register(data flow from	n Ethe 0

Assign IP Mode: Manual Assign, BOOTP and DHCP optional, default value is manual assign;

Check unit ID: open and close optional.

D-224140

Unit ID (1~255): valid when "Check unit ID" is opened, 1~255 optional.

Scan rate: the ratio of slow scan cycle and fast scan cycle.

Network status indication: mutual surveillance of both ends, PROFIBUS DP monitors the network state of Modbus TCP, Modbus TCP monitor PROFIBUS DP network state and no indicating optional.

Modbus TCP master read data function code: "04H read the data DP sent to the Ethernet, 03H read back the written data", "03H read the data DP sent to the Ethernet, 04 read back the written data" is optional. Among them: "04H read the data DP sent to the Ethernet, 03H read back the written data" means that Modbus TCP master is using the 04H function code to read the output data from the PROFIBUS DP master to the Ethernet side, the use of 03H read back the written data" means that Modbus TCP master, 04 read back the written data DP sent to the Ethernet, 04 read back the written data DP sent to the Ethernet, 04 read back the written data DP sent to the Ethernet, 04 read back the written data of the PROFIBUS DP master; "03H read the data DP sent to the Ethernet, 04 read back the written data" means that Modbus TCP master is using the 03H function code to read the output data from the PROFIBUS DP master to the Ethernet, 04 read back the written data." means that Modbus TCP master is using the 03H function code to read the output data from the PROFIBUS DP master to the Ethernet, 04 read back the written data." means that Modbus TCP master is using the 03H function code to read the output data from the PROFIBUS DP master.

The first address of read-only register (data direction: DP to Ethernet): range 0 to 65535, default value of 0;

The first address of the read/write registers (data direction: Ethernet to DP),: range 0 to 65535, default value of 0.

#### **6.4.3 Node Configuration Interface**

In the equipment view, click on the Ethernet, the protocol type is Modbus master, right-click on the "Ethernet", adding new nodes, the node configuration view interface displays the following:

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K Configuration software EP	-123	
File(F) Edit(E) Tool(T) Help(H)		
占 🕹 📲 📽 🎬 🖀 🗧	2010	
Device	Configuration	
Fieldbus B-Ethernet New node	Unit identifier(1~247)	
	To access the IP address of the server	
	Device status	Open
	Memory mapping address(HEX)	
	Bit offset of memory mapping(0~7)	
Ready		Number //

Configurable parameters: Unit identifier to access the server's IP address, device status, memory-mapped address, and memory-mapped offsets

The unit identifier: Modbus TCP slave address 1 to 247 optional.

To access the server IP address: IP address to access Modbus TCP slave.

Device status: open, close, optional. When it is opened, memory-mapped address and memory-mapped bits offset is available.

Memory mapped address (HEX): Address range that equipment state is mapped in the module memory, 0x0000~0x00F3. Calculate by clicking "Auto mapping".

Bit offset of memory mapping  $(0 \sim 7)$ : Bit x where equipment state is in memory mapping byte,  $0 \sim 7$ .





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Configuration software	e EP-123	
'ile(F) Edit(E) Tool(I) Help(	(H)	
) 🚰 🖬 🐩 🖬 🗙 🗄	* * * •	
levice	Configuration	
Fieldbus	Unit identifier(1~247)	1
Ethernet	To access the IP address of the server	
-Node-1	Device status	Open
	Memory mapping address(HEX)	
	Bit offset of memory mapping(0 $\sim$ 7)	
	"Device status"Options: open, close. The :	following two options are available in t

# **6.4.4 Command Configuration View Interface**

Interface in the device view; click the Ethernet node commands, the configuration view screen displays as shown below.

Configurable parameters: Modbus register start address, data number, the starting address of memory mapping (HEX), bit offset of memory mapping, byte exchange and scan mode etc.





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💥 Configuration software EP-	123		
File(F) Edit(E) Tool(T) Help(H)			
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Device	Configuration		
Device Fieldbus Ethernet New node Read Holding Register	Configuration Slave address(1~247) Function code The starting address of Modbus register Data number The starting address of memory mapping(HEX) Bit offset of memory mapping(0~7) Byte number Byte-exchange The type of check Scanning mode	3 Non-exchange CRC Quick-scan	
	The address range of data mapping in the modul calculate the mapping address to allow the sof	e memory, the user can click automatically tware to calculate	
Ready		Number	

Modbus registers start address: Modbus start address of the station equipment in the register / switch / coils and other range is  $0 \sim 65535$ ;

Note: The configuration software EP-123, the entry refers to the address of the agreement, when the user input PLC address, it will pop up the dialog box below. After clicking OK, the PLC address users input will be converted into the protocol address.



PLC address and the corresponding protocol address for example the following table:

Commond	Examples of DLC address	Corresponding protocol	
Command	Examples of PLC address	addresses	
Coil Status	00001~00010	00000~00009	
Input state	10001~10010	00000~00009	
Holding Registers	40001~40010	00000~00009	
Input register	30001~30010	00000~00009	

For example: When Modbus command is configured as 03H (read holding register), when users input 40001 in this item (Modbus register starting address), it will pop up the dialog box after confirming. When clicking OK, PLC address 40001 will be converted into 0.

Data number: Register/switching value/coil numbers.

Memory mapping starting address (HEX): Data starting address in module memory buffer.



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Address range that data is mapped in the module memory

Read command: 0x0000~0x00F3

Write command: 0x4000~0x40F3

Users can also use this area after write command is about local data exchange: 0x0000~0x00F3

Memory mapping bit offset  $(0 \sim 7)$ : For the bit operation command, means the position where the start bit is in

the byte, range $0 \sim 7$ 

Byte swap: No swap, double byte swap and four-byte optional.

# 6.4.5 Comment Interface

```
The number of data:
Functional code(3, 4, 16): The number of register 1{\sim}122
Functional code(1, 2, 15): The number of switching value or loop 1 \sim 400
```

# **6.5 Conflict Detection**

It is used to check whether there exists confliction in "memory mapping data". If users find confliction, it can be adjusted in time. The interface is shown below:



# 6.5.1 Command List Operation

It shows configured command in the command list interface. Check box before each command is used to



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check the position of this command in memory mapping area. Click one command and check the box, it will show the position where relevant commands occupy in the memory mapping area. Click the command again and uncheck the box, the command will not be shown in the mapping area. This function will be used for confliction detect among commands in memory mapping area.

> Command List ✓Device status ✓Read Coil Status ✓Read Input Registers ✓Read Holding Registers ✓Preset Single Register

# 6.5.2 Memory Mapping Area Operation

Memory mapping area divides into input area and output area.

Input mapping address range: 0x0000~0x3FFFF;

Output mapping address range: 0x4000~0x7FFFF.

Each grid represents one byte address.

Green: read command is shown in input mapping area, it will be in green without conflict.

Yellow: Write command: When address mapping area is located in input area, it will be in yellow without conflict;

Blue: When address mapping area is located in output area, it will be in blue without conflict.

Red: In input area or output area, different command occupied on the same byte, this byte area will be in red.

Input area			Output area	
0000			4000	•
0010			4010	
0020			4020	
0030			4030	
0040			4040	
0050			4050	
0060			4060	
0070	energy		4070	-
Input	Output	Conflict	Local data exchange	

For bit operation command, the above grid displaying meaning works the same.

Click input/output area grids, each bit of relevant byte in the grid will show whether each bit is occupied. As is shown below:



#### **EP-321MP PROFIBUS DP/ Modbus TCP Gateway User Manual** Input area Output area 0000 ٠ 4000 0010 4010 0020 4020 0030 4030 0040 4040 0050 4050 4060 0060 0070 4070 Output Conflict Local data exchange Input

# 6.6 Hardware Communication

Hardware communication menu items are shown as follows:



# 6.6.1 Ethernet Configuration

Here is the dialog of Ethernet configuration

Ethernet C	onfiguratio	n	
V 🔽	se the searcl	h function	
The	IP address 1	to connect:	
Г		•	
HO		Cancel	

When "Use the search function" is checked, SST-EP-CFG will automatically search for the EP-321MP and



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other identifiable hardware when communicating between software and hardware, then list the device in the list.

Users can select whether to use the search function. When users use search function, it will search all EP-321MP equipment when uploading and downloading the configuration. When users don't use the search function, users must appoint the IP address of equipment which needs to be connected. It will only list one device when uploading and downloading the configuration.

Serial number	Model number	IP address	MAC addr
1	EP-321MP	192.168.0.22	00-40-9d-f1
<	IIII		>
Landed	Refre	sh	Cancel

When disable searching, you must set the remote device IP.

Ethernet	Configuration	×
	Use the search fu	inction
T	he IP address to c	connect:
J	192 . 168 . 0	. 111
	ок	Cancel

And then click OK button.



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# 6.6.2 Upload Configuration

Serial number	Model number	IP address	MAC addre
. L	Er-J2110	192.100.0.22	00-40-94-11-
<			>
Landed	Refre	sh	Cancel

When select upload configuration, then the dialog window will be show as follow:

Then click "Landed" button. If upload the configuration is successful it will pump up the window as follow:

Upload successfu	ılly!
Unload	Cancel
	Upload successfu

# 6.6.3 Download Configuration

The operation of download configuration is the same as upload configuration:



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Serial number	Model number	IP address	MAC addre
1	EP-321MP	192.168.0.22	00-40-9d-f1-
- Ic			
<u>د</u>			>
Landed	Refre	sh	Cancel

Downlos	ıd			
	Download su	ccessfull	y!	
	Download		Cancel	

# 6.7 Open and Save Configuration

# 6.7.1 Save Configuration

Select "Save" and save the configured project as .chg file.

 File (F)
 Edit (E)
 Tool (I)

 New (M)
 Ctrl+N

 Open (Q)...
 Ctrl+O

 Save (S)
 Ctrl+S

 Save As (A)...
 Recent Files

 Exit (X)
 Exit (X)

# 6.7.2 Open Configuration

User Manual

Select "Open" and open the saved .chg file.

File(E)	Edit(E)	Tool ( <u>T</u> )
New (N)		Ctrl+N
Open ((	D	Ctrl+0
Save (3	Save (S)	
Save /	As ( <u>A</u> )	
Recent	Files	
Exit Q	D D	

# **6.8 Export EXCEL**

Excel configuration Excel file will help users to check the relevant configuration.

Select the export xls icon , export the configuration information to excel and save. Select the appropriate path, shown as below:



User N	lanual			
	Save As			?
	Save in:	My Documents	- E 😁	<b></b>
	My Recent Documents Desktop My Documents	My eBooks		
	My Computer			

# 6.9 Monitor I/O Data

This function is used to monitor the buffer data, click "Debug" button on the toolbar and it will pop up the dialog box of searching equipment:

Serial number 1	Model number EP-321MP	IP address 192.168.0.22	MAC addr 00-40-9d-f1
<	100	].	>
Landed	Refre	sh	Cancel

Click "Landed", it will pop up the I/O data monitor dialog box below:

	anual		
u <u>5</u>			
No.	Time	Data Direction	
1	22:10:32	Input Data	01 00 00 00 00 00 00 00 00 00 00 00
2	22:10:32	Output data	00 00 00 00 00 00 00 00 00 00 00 00 00
3	22:10:33	Input Data	01 00 00 00 00 00 00 00 00 00 00 00
4	22:10:33	Output data	
5	22:10:34	Input Data	01 00 00 00 00 00 00 00 00 00 00 00
6	22:10:34	Output data	00 00 00 00 00 00 00 00 00 00 00 00
7	22:10:35	Input Data	01 00 00 00 00 00 00 00 00 00 00 00
8	22:10:35	Output data	00 00 00 00 00 00 00 00 00 00 00 00
9	22:10:36	Input Data	01 00 00 00 00 00 00 00 00 00 00 00
10	22:10:36	Output data	00 00 00 00 00 00 00 00 00 00 00 00
11	22:10:37	Input Data	01 00 00 00 00 00 00 00 00 00 00 00
12	22:10:37	Output data	00 00 00 00 00 00 00 00 00 00 00 00
13	22:10:38	Input Data	01 00 00 00 00 00 00 00 00 00 00 00
14	22:10:38	Output data	00 00 00 00 00 00 00 00 00 00 00 00
		-	

Click "Save Content" button can save relevant content to the PC hard disk. This button becomes "Stop saving". If you want to finish saving, you can press "Stop saving" button. It can pause displaying buffer data by clicking "Pause Show".





# 7. Application





8. Step7 Read and Write Gateway Data

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EP-321MP provides modules shown as follow. The maximum allowed number of modules is 64 in Step7. The maximum allowed number of input bytes is 244, the max number of output bytes is 244 and the aggregate of maximum number of input bytes and output bytes is 488.

Module	Consistent
4 Words Input, 4 Words Output	Word Consistent
8 Words Input, 8 Words Output	Word Consistent
24 Words Input, 24 Words Output	Word Consistent
56 Words Input, 56 Words Output	Word Consistent
1 Byte Input	Byte Consistent
1 Word Input	Word Consistent
2 Words Input	Word Consistent
4 Words Input	Word Consistent
8 Words Input	Word Consistent
16 Words Input	Word Consistent
32 Words Input	Word Consistent
64 Words Input	Word Consistent
2 Words Input Consistent	Total length Consistent
4 Words Input Consistent	Total length Consistent
8 Words Input Consistent	Total length Consistent
16 Words Input Consistent	Total length Consistent
1 Byte Output	Byte Consistent
1 Word Output	Word Consistent
2 Words Output	Word Consistent
4 Words Output	Word Consistent
8 Words Output	Word Consistent
16 Words Output	Word Consistent
32 Words Output	Word Consistent
64 Words Output	Word Consistent
2 Words Output Consistent	Total length Consistent
4 Words Output Consistent	Total length Consistent
8 Words Output Consistent	Total length Consistent
16 Words Output Consistent	Total length Consistent

As is shown above, the data modules which EP-321MP supports include: Word consistency, Byte consistency and length consistency.

For the data modules that support Word and Byte consistency, you can use command "MOVE" to access the data during STEP7 programing.



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For the data modules that support length consistency, user can take compression way to send and receive data. The compression way mainly uses "SFC 15" when sending and receiving uses "SFC 14":





	ŰDH	PWR_DAT	7	
	EN	ENO	5	
¥#16#0-	LADDR	RET_VAL	- <b>M</b> W50	
P#DB100. DBX0.0 BYTE 16-	RECORD			

SFC15

www.sibotech.net/en



# 9 Installation

# 9.1 Mechanical Dimension

Mechanical Dimension: 1.57inch (width) \* 4.92inch (height) \* 4.33inch (depth)

## 9.2 Installation

35mm DIN rail installation













# **Appendix: Using STEP7 Set PROFIBUS DP**

The following show how to use STEP7 to configure EP-321MP: First of all, copy \*. gsd file to the following path: *Step7\S7data\gsd*\

1. Open SIMATIC Manager 灯 ; Figure 1:

SIMATIC Manager	
Eile PLC View Options Window Help	

Figure 1

2. Click File->New, create a new project; Figure 2:

SIMATIC Manager		_ 🗆 🗙
Eile PLC View Options Window Help		
🗅 🚅 🔡 🐖 💯 🗐 📢		
	New Project	
	User projects Libraries Multiprojects	
	Name Storage path	
	🔽 Add to current multiproject	
	Name: <u>T</u> ype:	
	T_MODBUS	
	Channel Landing	
	Storage Totation	

Figure 2

- **User Manual**
- 3. Insert->Station->SIMATIC 300 Station; Figure3:

SIMATIC Manager - T_MODBUS	
Ejle Edit Insert PLC View Options Window Help	
🗅 😂 🔐 🐖 🕺 🖻 🛍 🖆 😰 🐾 🐁 🦕 🏣 🏛 🕋 🔨 No Filter > 💽 🏹 🞇 🕮 🖷 🖿 📢	
B T_MODBUS D:\Program Files\Siemens\Step7\s7proj\T_MODB_1	
Image: Construction of the second	

Figure 3

4. Open S7 PLC hardware configuration: SIMATIC 300(1)->Hardware, double-click; Figure 4:

Figure 4

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5. Click Option->Update Catalog, update GSD in device catalog.

Image: Start Control 200(1)	HW Config - [SIMATIC 300(1) (Configuration) T_MODBU5]	
Image:	🕅 Station Edit Insert PLC View Options Window Help	_ <u>-</u>
Eind: Frofil Standard FROFIDUS DE FROFIDUS DE FROFIDUS -FA THE FROFIDUS -FA TH		
Eind:     Profil     Standard       Profil     Standard     T       Standard     Standard     T       Standard     Standard     Standard		
Profil Standard  Profil		Find:
Profil [Standard       PROFINE DF       PROFINE TO       SIMATIC 300       SIMATIC 400       SIMATIC PC Based Control 300/400       SIMATIC PC Station		
Provide Subscription     Provide Subscription     Provide Subscription     Provide Subscription     Provide Subscription     Provide Subscription     Subscrite     Subscription     Subscription     Subscription     Subscri		Frofil Standard
SIMATIC 300 (1) S Designation		PROFIBUS DP
SIMATIC 300 SIMATIC 300 SIMATIC 200 SIMATIC PC Based Control 300/400 SIMATIC PC Station SIMATIC 300 (1) S Designation		PROFIBUS-PA
SIMATIC 300(1) SDesignation		E MATIC 300
SIMATIC 200 (1) S Designation		E SIMATIC 400
SIMATIC 300(1) SDesignation		E SIMATIC PC Based Control 300/400
SIMATIC 300(1) SDesignation		H. SIMAILU PU Station
SIMATIC 300(1) S Designation		
SIMATIC 300(1) S Designation		
SIMATIC 300(1) S Designation		
SIMATIC 300(1) S Designation		1
SIMATIC 300(1) S Designation		
SIMATIC 300(1) S Designation		
S Designation	SIMATIC 300(1)	
	S Designation	
PROFILIS-DP claves for STMATE ST MT and CT T.		PROFIBIS-DP slaves for STMATIC S7 M7 and C7
(distributed rack)		(distributed rack)
Press F1 to get Help.	) Press F1 to get Help.	Chq //

Figure 5

6. Here you can find your equipment in the right side of the window; Figure 6

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Figure 6

7. Set PLC rack, click the "Hardware Catalog \ SIMATIC 300 \ RACK-300 \ Rail"; Figure 7:

EP-321MP PROFIBUS I	DP/ Modbus TCP Gateway	
User Manual		
By W Config-[SIMATIC 300(1) (Configuration) 해 Station Edit Insert PLC Yew Options Windo	T_MODBUS] 	_D× _8×
	Eind:	M1 M4
2	Profil Standard	•
4	CPU 314 IFM	
	General Parameters       U 315         Address:       If a subnet is selected, the next available address is         Subnet:       EST 315-2AP00-0AB0         Subnet:       EST 315-2AP00-0AB0         Subnet:       EST 315-2AP00-0AB0         Subnet:       EST 315-2AP00-0AB0         Delete       U 315         U 315       U 10	
<[	U 315-2 br	
(0) VR	U 317-2 PM/DP U 317F-2	
S Module Order number 1 2 3 4 5 6 7 7 8 9 9 10 Press Et to net Help.	OK     Cancel     Help     V 319-3 PK/DP       OK     Cancel     Help     V 319-3 PK/DP       Discrete     Cru bit     Discrete     Cru bit       Discrete     Cru bit     Discrete     Discrete       Discrete     Cru bit     Discre     Discrete       Discre<	v ns: NEI + DP up to 32 v CDP

Figure 7

8. Set CPU module and select the corresponding device type and the occupied slots.

9. Create PROFIBUS DP network and set up PROFIBUS DP: Click New and then Network settings, select DP; select a baud rate such as 187.5Kbps, then "OK". Double-click it; Figure 8:

HW Config - [SIMATIC 300(1) (Configuration) T_MODBUS]			_ 🗆 ×
🕅 Station Edit Insert PLC View Options Window Help			_ 8 ×
D 😂 🐎 🖩 🧞 🎒 Da 🖻 🚵 🏫 🖪 🗖 🗖 🔀 🕺			
			, mi wi
🚍 (0) UR			
1		Find:	<u>m</u> t mi
2		Profil Standard	-
3			1
5		THE CPU 314C-2 DP	-
6 Properties - PROFIBUS inter	face DP (R0/52.1)	× U 314C-2 PtP	
		U 315	
General Farameters		V 315-2 DP	
Properties - New subpat I	PROFIBILIS	■ 5551 315-24F01-04F0	
Propercies - New subject		BEST 315-2AF02-0AB0	
General Network Set	tings	BEST 315-2AF03-0AB0	
		BEST 315-2AF82-0AB0	
Highest PROFIBUS		Options BEST 315-2AF83-0AB0	
Address:	126 T Lhange	5FST 315-2A010-0A00	
		315-2 PN/DP	
Tearrierian Bata'		315F-2 DP	
Iransmission have.	45.45 (31.25) Kbps	315F-2 PN/DP	
	187.5 Kbps	316	
	1.5 Mbps	315-2 DF	
	3 Mhne	317-2 PN/DP	
(0) UR Profile:	DP	317F-2	
S Module Order number	Standard Universal (DP/FMS)	317F-2 PN/DP	
	User-Defined	318-2	
2	<u><u>Bus</u></u>	319F-3 PN/DP	
3		614	
4 0K	Cano	el Help M7	
			-
7		the steway	
8		Work memory 48 KB; 0.3 ms/1000 instructions; MPI -	+ DP <u>~</u> ≤
9		connections; for multi-tier configuration up to 3	2
		. Duogerez	×
ress F1 to get Help.			Chg

Figure 8



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10. Select PROFIBUS Master station address, Figure 9:

Real HW Config - [SIMATIC 300(1) (Configuration) T_MODBUS]	
🖓 Station Edit Insert PLC Yiew Options Window Help	
🗩 (0) VR	
1	
Select PROFIBUS Addres	SS Profil Standard
6 Properties - PROFIBUS interface DP (R0/52.1)	CPU 314C-2 PtP
U Ceneral Tarameters	
Address: 2 💌 If a subnet is s	selected, 6ES7 315-2AF01-0AB0
Highest address 126	ole address is 🛛 🔂 6ES7 315-2AF02-0AB0
Transmission rate' 187 5 Khng	🗄 🦲 6ES7 315-2AF03-0AB0
A GALDINA SALVALING AUDI	6ES7 315-2AF82-0AB0
<u>S</u> ubnet:	E 6657 315-2460 0400
The not networked The second second	New
FAUFLOUS (1) 101.5 Kops	Properties CPU 315-2 PM/DP
	CPU 315F-2 DP
	Delete CPU 315F-2 PN/DP
	CPU 316-2 DP
	CPU 317-2
	CPU 317-2 PN/DP
	CPU 317F-2
S Module Order numbe	CPU 317F-2 PM/DP
0K C	ancel Help CPU 319-3 PM/DP
	EV 319F-3 PM/DP
4	CPV 614
5	
6	E Gateway
	6ES7 315-24E00-04E0
	Work memory 48 KB; 0.3 ms/1000 instructions; MPI + DP
	modules
) Desce E1 ke web Uzle	
Fress Fit wight help.	



11. Drag EP-321MP to PROFIBUS DP network bus, and drag data modules to slots, that is mapping the input and output data module into master controller's memory. Figure 10:





Figure 10

Operation is divided into two steps, the first step is dragging EP-321MP to PROFIBUS DP network bus, the mouse will change shape, and that is to say, it can be placed. The second step is dragging data module into master controller's memory.

12. Compile and download into PLC.

