# **ODOT Series Gateways**

# **ODOT-DPM02 User Manual**

Modbus-RTU to Profibus-DP Protocol Converter



### Sichuan Odot Automation System Co., Ltd.

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# 1. Overview

### **1.1. Product function**

ODOT-DPM02 Gateway is a protocol converter from Modbus-RTU to PROFIBUS-DP. It can realize the transformation between PROFIBUS-DP and Modbus-RTU. The devices (with RS485 interface and support Modbus - RTU protocol) can realize interconnect with PROFIBUS-DP fieldbus, by using this gateway. Such as: PLC, DCS, distributed I/O, frequency converter, motor start protection device, intelligent high and low voltage electrical appliances, power measuring device, the intelligent measuring equipment and instrument, etc.

### 1.2. The main technical parameters

- 1. Supported Modubs function code: 01/02/03/04/05/06/15/16
- 2. Support Profibus-DP/V0 protocol
- 3. DP communication rate: 9.6Kbps~12Mbps self-adaption
- 4. DP data area: Input max 244bytes

Output max 244bytes

Sum of Input and Output max 488bytes

- 5. DP slave station max slot: 42
- 6. Modbus master station: Support
- 7. Modbus slave station: Support
- 8. Supported Modbus stations: 31
- 9. Modbus baud rate: 1200~115200bps optional
- 10.8 data bits, None Parity, odd or even Parity, one or two stop bits
- 11. Power supply:  $9 \sim 36$  VDC. electric current Max. 50 mA@24 V

- 12. Working environment temperature: -40 $\sim$ 85°C, relative humidity: 5 $\sim$
- 95% (non-condensing)
- 13. Storage temperature: -55~125℃
- 14. Installation method: 35mm Standard guide rail installation
- 15. Shape size: 110\*27.5\*110(L\*W\*H,mm)
- 16. Protection grade: IP20
- 17. Product certification: CE

# 2. Hardware description

### 2.1. Product appearance



### 2.2. Indicators description

There are 4 LED status indicators in this gateway, the symbol definition and status description as shown in table 3.1

Table 3.1 LED indicators description

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Symbol	Definition	Status	Exolain
DW	Down indication	Red light ON*	Power supply on
ΓW	rower indication	Red light OUT	Power supply off
		Red light	
		always on	DD Due communication annou
DD	DP Network status	Red light	DP BUS COmmunication error
DP	indication	shining	
			DPBus communication is
		Ked light off*	normal
		Green light	Serial port sending datas
	Serial port send	<pre>shining*</pre>	
ΤХ	instruction	Green light	Serial port does not send
		does not	datas
		shining	
		Green light	Serial port receiving
RX	Serial port receive	<mark>shining*</mark>	datas
	instruction	Green light	Serial port does not
		does not	rocoivo datas
		shining	ICCCIVE UALAS

Notice: \*---The normal communication state of the ODOT-DPM02 gateway indicator.

# 2.3. Dail switch



As shown in the Profibus-DP address set, the High position switch (X16) dail to 0, the low position switch (X1) dial to 3, indicating that the address of this module in the DP network is 0\*16+3=3, Profibus-DP valid address range is 1-125.

### 2.4. PROFIBUS DP interface



Profibus DPinterface use DB9 pore joint, The pin is defined as follows:

	含义		信号名称	RS-485	针脚号
保护地	屏蔽,保护地	2	屏蔽		1
输出电压	负 24V 输出日	2	M24V		2
发送 数据一P	接收/发送 娄		RXD/TXD-P	B/B'	3
>	控制-P	-	CNTR-P		4
L .	数据地		DGND	C/C'	5
Ē	正电压	1	VP		6
输出电压	正 24V 输出目	2	P 24V		7
发送 数据-N	接收/发送		RXD/TXD-N	A/A'	8
N.	控制−N	2	CNTR-N		9
-1		2	CNTR-N 览端点的站需要	仅在总线电线号是可选的	9 1) 此信号 2) 这些信

# 2.5. Terminal definition

Equipment wiring use 10 pin 3.81mm spacing plug-in terminals, RS485 interface terminal is defined as "Table 2" below.

Table3.2 terminal definition

SN	Terminal	Definition

1	R-	RS422 Receive negative
2	R+	RS422Receive positive
3	B-/T-	RS485negative/RS422send negative
4	A+/T+	RS485positive/RS422send positive
5	SGND	Series port ground
6	RX	RS232receive
7	ТХ	RS232send
8	PE	Grounding terminal
9	V-	24V Input negative
10	V+	24V Input positive

### 2.6. Installation size



# 3. Application topology of product

RS485 interface set to Modbus RTU Master model, Typical network topology diagram (as follows)



RS485 interface set to Modbus RTU Slave model, Typical network topology diagram (as follows)



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# 4. Usage of this module in Siemens Step7

# 4.1. RS485 interface set to Modbus RTU Master model configuration

 Find the GSD files in the product disc, confirm that the folder contains the following files. If not, ask the supplier for it. And then copied the files to C:\Program Files\Siemens\Step7\S7DATA\GSD.



2. Open Step7 software, create a new project and name it as "TEST", no

Chinese characters in the storage path.

SIMATIC Manager - 200smart-300	
文件(F) 编辑(E) 插入(I) PLC 视图(V) 选项(O) 窗口(W) 帮助(H)	
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□ □ 2005mart-300 ④ 圖 SIMATIC 300(1) 新建项目	
用户项目 库 多重项目	
名称 存储路径 人	
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Booot DrmUl-test 6: (Lidian (UL)(UL)(LEST beckup (odot D BS7_Pro1 C: \Program Files\Siemens\Step7\s7pro	
BS7_Pro2 C:\Program Files\Siemens\Step7\s7pro ≡	
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< <u> </u>	
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test 项目 🔽	
友徒位署(略谷)(5)・	
Trimitian Weity 2011 C:\Users\Administrator\Desktop\test 浏览(B)	
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IX下上,款得帮助。	1.

3. Right click on the project name, insert new object, select "SIMATIC 300", click the "SIMATIC 300", and then double-click the right of the "hardware", enter the hardware configuration interface.

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	••• MPI (1)				
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右键	复制	Ctrl+C			
	粘贴	Ctrl+V			
	删除	Del			
	插入新对象	•	SIMATIC 400 站点		
	PLC	•	SIMATIC 300 站点		
	重命名	F2	SIMATIC H 站点		
	对象属性	Alt+Return	SIMATIC PC 站点		
			其它站		
			SIMATIC S5		
			PG/PC		
			SIMATIC 200 Station		
			MPI		
			PROFIBUS		
■ 将 SIMATIC 300 站点 插入光标位	□ ] ]		Industrial Ethernet		

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	打开对象 Ctrl+Alt+O		
	剪切 Ctrl+X		
	复制 Ctrl+C		
	粘贴 Ctrl+V		
	删除 Del		
	PLC +		
	重命名 F2		
打开所选对象。			li

4. Before you can configure the hardware first click "Options", then click the "Install GSD files" in the pop-up box, click "Browse" and navigate to the directory where DPM02\_V2.GSD, in this sample is:

C:\Users\Administrator\Desktop\ODOT-DPM02-GSD, In the "Install GSD Files" screen, click "Install" and then "Yes"

- test				
助 站点(S) 编辑(E) 插入(I) PLC 视图(V)	选项(O) 窗口(W) 帮助(H)			- & ×
D 😅 🗣 🔍 🖏   🏯    🖿 🛍 🕍	自定义(Z)	Ctrl+Alt+E		
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」 在系统中安装新的 GSD 文件并更新目录的内容。				

HW Config - ISIMATIC 300(1)	配答) test]	
■	nume, 1835, C 视图(V) 选项(O) 窗口(W) 帮助(H)	
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<u>捕…</u> 标识	000T-DFM02 V2.0 安装 (C) 显示日志 (S) 全选 (A) 取消全选 (D) 美術	7 (分布式机架)所用 PROFIBUS- <b>モ</b> <u>く</u> 帮助

5. Click the toolbar "Options" and pull-down menu in the "update directory".

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<	皆定模块(Y) 目态网络(N) 守号表(S) 段音系统错误(R) 鳥編目录配置文件(E) 更新目录(U) 安装 HW 更新 安装 GSD 文件 左装条GSD 文件 도服务和支持中查找(F) 刻達用于 1 设备的 GSD 文件(C)	Ctrl+Alt+T	•	
插↓标识 通过检查所有 GSD 和举型文件来更新目录内容。				SIMATIC S7、M7 以及 C7 (分布式机架)所用 PROFIBUS- 毛g

6. In the "PROFIBUS-DP" - "Additional Field Devices" - "Gateway" you can find the gateway device "ODOT-DPM02 V2.0".

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■ 站点(S) 编辑(E) 插入(I) PLC 视图(V) 选项(O) 窗口(W) 帮助(H)	_ B ×
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	· 查孩 (E)
	配置文件(标准
< III	Image: Compatible PROFIBUS DP         Image: Compatible PROFIBUS DP Slaves         Image: Compatible PROFIBUS DP Slaves
, 按下 F1 以获取帮助。	

7. Start the configuration of thehardware, place the rail first, then put the power supply module and CPUModule in slot 1 and 2, right-click on the "X2 DP", add master station system.



8. Drag ODOT-DPM02 V2.0 module to DP bus directly, then will appear the configuration page as follows:

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9. Double-click the Gateway icon, Set the gateway address in the DP bus, this address should be the same as the gateway dial switch set address of the ODOT-DPM02 V2.0, and then click "OK", complete adding the gateway.

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1 S 307 10A 6ES7 307-1KA			P/DP Coupler, Release 2
2 CPU 315-2 PN/DP 6ES7 315-2			
II MPI/DP			atible PROFIBUS DP Slaves -
22 PR-10	确定	取消 帮助	t
12 1 # P 2	2044*	_	
		•	
可能的插入			Chg

10. Double-click the Gateway icon, then appear the following configuration.

雇性 - DP 从站       常规     分配参数       模块       订货号:       系列:       DP 从站类型:       标识(0):	Gateway ODOT-DPMO2 V2.0 ODOT-DPMO2 V2.0	SSD 文件(类型文件): DPM02_V2.GSD
- 地址 诊断地址 (A) :	2043	节点/主站系统 PROFIBUS 1 DP 主站系统(1)
- SYNC/FREEZE 能力- I SYNC 注释(C):	FREEZE	☑ 看门狗(₩)
 确定		

Then click the "Parameters Assignment ", to set the Modbus parameters of the gateway(must match with the user's RS485 device connected), after completing setup, click "OK" button, as follows:

■性 - DP 从站					
常規   分間変数					
□ 🔄 站参数					
白 🔄 设备专用参数					
- 🗉 Modbus Mode 工作模式	Master Mode 主站模式				
—— 🗉 Baudrate 波特率	9600 bps				
—) Parity 校验位	None 无校验				
_	8 bit				
Stop_Bit 停止位	1 bit	Ξ			
Send Delay 报文发送间隔	20 ms				
	3.5t				
	100ms				
	Data Holding 数据保持				
Data Out Mode 数据输出模式	Poll Mode 轮询模式				
—) Slave ID 从站地址	1				
│ └ Slave Respond Delay 从站响应延迟	5ms				
☆ 🔁 分配十六进制参数		-			
	TTTN:当	684			
NH)/E	¥X/FI 7	市助			

### 11. To set device-specific parameters.

#### Modbus Mode:

Master Mode

### Baud rate:

Serial baud rate, Valid range:1200~115200bps, Default:9600bps.

### Parity:

Selectable no-parity、Odd parity、Even parity, Default setting is No-parity.

### Data\_Bit:

### Fixed to 8 bit data.

### Stop\_Bit:

1bit, 2bit, Default setting is 1bit.

### Send interval:

Modbus Send Interval(The interval from receiving respond from the slave

```
http://www.odot.cn
```

station to send the next command), valid range:0ms-5000ms, Default setting is 20ms.

### Receive Interval:

Frame interval detection time for receiving messages, range  $1.5t\sim200t$ , default setting is 3.5t (t : transmission time of the single character, related with the baud rate)

### Slave Timeout:

When master station has sent the command, until the slave station respond.10ms~5000ms optional, Default setting:100ms.

### Timeout Processing:

When slave station has read the data with timeout, you can choose to "clear data" or "keep data". Default setting is "keep data" mode. This setting only works for Modbus-Read.

### Data Out Mode:

You can choose "polling" mode or "event-triggered" mode. Modbus can send a command periodically under "polling mode". "Event-triggered" mode is sending a command only when output data has changed. Default setting is "polling" mode. This parameter only works for Modbus.

### Slave ID:

Master model of this parameter is invalid.

### Slave Respond Delay:

Master model of this parameter is invalid.

12. Modbus Master station mode data command configuration:

Modules start with M is master station module, can be used only under Modbus Master station mode.

Click the gateway icon and insert the required function block in the list below. Two diagnostic modules are inserted in the first two slots. According to the instructions of the IO module used in this example, using 04 functions to read the 8 continuous current input data of this IO module, we choose the function block in the next diagram box "Read 8 Word (3xxxx)".

*	
- 🚓 HW Config - [SIMATIC 300(1) (配置) test]	
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au (0)	查找 (P) #1
1 PS 307 10A	
2 CPU 315-2 PM/DP	配置文件(标准
$I = PROFILE((1) \cdot DP + \frac{1}{2} + \frac$	W: Reed 9 Words (Avery)
	W: Read 10 Words (4xxxx)
	M: Read 11 Words (4xxxx)
	M: Read 12 Words (4xxxx)
	- M: Read 13 Words (4xxxx)
	- M: Read 14 Words (4xxxx)
	M: Read 15 Words (4xxxx)
	M: Read 16 Words (4xxxx)
	M: Read 1 Words (3xxxx)
	M: Read Z Words (3xxxx)
	M: Kead 3 Words (3xxxx)
(1) ODOT-DPMO2 V2. 0	W: Read 5 Words (JXXXX)
「插」 □ DP ID \ 订货号/标识 □ I 9 地址 注释	M: Read 6 Words (3xxxx)
1 8DI M: Module Status Input 0	M: Read 7 Words (3xxxx)
2 1AI M: Module Err_Code Inp 2562	M: Read 8 Words (Зхихи)
3 8AI M: Read 8 Words (3xxxx 2582	- M: Read 9 Words (3xxxx) -
4	Ē.
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> (0) VR 1 PS 307 10A	地址/ID 分配参数 参数						
2 1 1 1 1 1 1 1 1 1 1 1 1 1	●     ●<	N: Read 9 Words (4xxxx)     N: Read 10 Words (4xxxx)     N: Read 11 Words (4xxxx)     N: Read 12 Words (4xxxx)     N: Read 13 Words (4xxxx)     N: Read 13 Words (4xxxx)     N: Read 15 Words (4xxxx)     N: Read 15 Words (4xxxx)     N: Read 16 Words (4xxxx)					
★ III (1) ODOT-DPMO2 V2.0 插 ① DP ID 订货号/标识 1 8DI M: Module Sta 2 1AI M: Module Err 3 6AI M: Read 6 Yei		M: Read 1 Words (3xxxx) M: Read 2 Words (3xxxx) M: Read 3 Words (3xxxx) M: Read 4 Words (3xxxx) M: Read 5 Words (3xxxx) M: Read 5 Words (3xxxx) M: Read 6 Words (3xxxx) M: Read 9 Words (3xxxx)					
	→ 确定    <取消	τ <sub>ζ</sub>					
按下 F1 以获取帮助。		Chg 🅢					

Double click the added function block "Read 8 Words (3xxxx)" to configure its parameters. The "Slave ID slave station number" must be consistent with the Modbus address set by the corresponding slave station. The "start address" refers to the Modbus buffer start address that needs to be read. For example, the Modbus slave station used in this case is 1 input modules, and its Modbus address table is shown as below.

地址	缓存器名称	低限值	高限值	存取	说明
30001	韧体版本 模块型式	无	无	可读	高字节=韧体版本 低字节 = 103
30002	电流输入1	0	4095	可读	电流输入 12 Bits
30003	电流输入2	0	4095	可读	"
30004	电流输入3	0	4095	可读	"
30005	电流输入4	0	4095	可读	"

This example reads the current input value of the 8 channels of the IO module, so the "O" of the "start address" is changed to "1". (Note: when the slave address code starts from 1, its address is encoded as an PLC address, and the "start address" subtracts the actual PLC address from the address table by 1. When the slave address code starts from 0, the "start address" is the actual coding address in the address table. For the PLC address in this case, the starting address is 2-1=1) According to the actual situation, other data modules can be inserted in the rear slot.

13. Click "Save and Compile", if without error, use USB-MPI cable to connect the PC and CPU 315-2 DP.In the pop-up interface, click "OK" - "yes".



14. On 2 # Slot "8AI" module, right-click, and then click on the "Monitor / Modify" and in the pop-up panel, check the "monitoring," then you can read the value of each channel. The red box in the following figure is the readed value

in this case.

Im 站点(S) 编辑(E) 插入(D PLC 视图(V) 选项(O) 金口(W) 帮助(H)       □ 2* 2* 2
董 監视/传改 - 8AI - (R-/S2)     董 監視/传改 - 8AI - (R-/S2)     董 監視/作改 - 8AI - (R-/S2)     董 監視/作文 - 8AI - (R-/S2)     董 監視/作文 - 8AI - (R-/S2)     董 監 記     董      董 監 記     董 監 記     董      董 監 記     董      董 監 記     董      董 監 記     董      董 監 記     董      董
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当 监视/传改 - 8AI - (R-/S2)
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1 路径(P) DPM01-TEST\SIMATIC 300(1)\CPU 315-2 DP
Z2 22 地址 符号 星示格式 22本位 修改数値
3 1 PIW 258 HEX W#16#09A0
4 2 PIW 260 HEX W#16#0CA0
6 3 PIW 262 HEX W#16#0000
4 PIW 264 HEX W#16#0000
5 PIW 266 HEX W#16#0000
6 PIW 268 HEX W#16#0000
7 PIW 270 HEX W#16#0000
6 PIW 272 HEX W#16#0000 ,
(2) 0007-DFM01 V2.0 (行天教 (1)) (使用 PS 再報24)以及
插 [ DP ID 订货号/标识 I 地址 9 地址
0 6DI M: Module Status Input(S CH) 0 有条件地运行 立即运行
1 1AI M: Module Err_Code Input (1 CR) 255257   □ 協調(0)
2 00 00 00 00 00 00 00 00 00 00 00 00 00
4 O触发器(D)

The image above is the usage of the AI module, the corresponding DI, DO, AO modules and other standard Modbus devices is similar to it.(Notice: I、Q address can be revised by yourself)

### $15. \ \mbox{The master station's diagnosis module}$

覸 HW Config - [SIMATIC 300(1) (配置) test]	
💵 站点(S) 编辑(E) 插入(I) PLC 视图(V) 选项(O) 窗口(W) 帮助(H)	_ & ×
D 😂 💱 📓 🖏 🎒 🗈 💼 🖬 🏟 🕼 🏗 🗠 🔀	
D UR     D UR     D UR     D UR     D UN     D	□ x 查找 (2)
	<ul> <li>M: Write 15 Words (Axxxx)</li> <li>M: Write 15 Words (Axxxx)</li> <li>M: Write Single Bit (Dxxxx)</li> <li>M: Write Single Word (Axxxx)</li> <li>M: Module Status Input (B CH)</li> <li>M: Module Status Input (A CH)</li> <li>M: Module Status Input (A CH)</li> <li>M: Module Status Input (A CH)</li> </ul>
(1) DDDT-DFM02 V2.0 插. ① DP ID 订货号/标识 I Q 地址 注释 1 SDI M: Module Status Input 0 2 IAI M: Module Err_Lode Inp2562 3 SAI M: Read 8 Words (3xxxxx 2582 4 5 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7	<ul> <li>M. Module Status Input(0 CR)</li> <li>M. Module Krr_Code Input(1 CR)</li> <li>M. Module Krr_Code Input(1 CR)</li> <li>S. DP Input 16 Bits (Dxxxx)</li> <li>S. DP Input 24 Bits (Dxxxx)</li> <li>S. DP Input 32 Bits (Dxxxx)</li> </ul>

The master station's diagnosis module is optional module, the master station's

diagnosis module can only be used under the Modbus Master Mode. The master station's diagnosis Module is divided into two kinds: "Module Status Input" and "Module Err\_Code Input. "state Module can only be inserted into slot 1, error code module can be inserted into slot 0 and slot 1, when the error code module was inserted into slot 1, slot 0 can only be inserted by the state module.



State module can monitor the working state of each data slot, when a certain data slot facing a failure, the state of the corresponding bit will be setted as 1, and will be automatically reset after recovery.

When data slot fault occurs, the error code module can display the exact error data slot number and a specific error code, user can judge the reason according to the error code, and then adopt corresponding adjustment. Detailed description please refer to "error code table".

Error code modules can only display one slot fault condition, when multiple slot failure occured at the same time, the error code module will display the lowest error slot's serial number.

Right-click on 0 and 1 slot, select "monitoring/modify", in the pop-up panels choose the "monitor", then it will display module status and error code.

<b>.</b>	监	见/修改	- 8DI -	(R-/S0)		<u> </u>	×	) 🛍 监视/修改 - 1AI - (R-/S1)
通	通过分配的 CPV 服务进入在线状态							通过分配的 CPU 服务进入在线状态
躍	祒(	P) DP	MO1-TES	T\SIMATIC 300(1)\CP	V 315-2 DP			路径(P) DPM01-TEST\SIMATIC 300(1)\CPV 315-2 DP
Г		地址		符号	显示格式	状态值	修改数值	▲ 地址 符号 显示格 <mark>式 状态值 修</mark> 改数值
	1	I	0.0		BOOL	true		1 PIW 256 HEX W#16#010B
	2	I	0.1		BOOL	false		
3	3	I	0.2		BOOL	false		
4	•	I	0.3		BOOL	false		
	5	I	0.4		BOOL	false		
(	5	I	0.5		BOOL	false		
1	1	I	0.6		BOOL	false		
1	3	I	0.7		BOOL	false		
								4
	ĸ	行无	效(0)	使用 F5 更穿	<b>船制</b> 符号			🗙 行无效(0) 使用 F5 更新强制符号
Г	有条	件地运行	ī —	立即运行				「有条件地运行———」」立即运行——————
	✓ ¦	ĺ视(₩)		🔐 状态值(S)		启用外设输出(	E)	☑ ☑ 监视 (M) ☑ ⑥ 状态值 (S) ☑ 自用外设输出 (C)
	T ft	改 (F)		➡ゐ 修改值(I)		I/O 显示(D)		□ 修改 (F) 🔹 修改值 (I) 🔽 I/O 显示 (D)

As shown above, when the data communication module facing a fault, the module state corresponding bit will be setted as 1. The error code of 0 x010B, 0 x01 indicates a problem with the first data slot, the 0 x0b fault indicate that the fault is "slave station response time out", error code in is showed as the following table.

Error code	Fault description	Troubleshooting method
0x00	Slave station works	No
	normally	
		Slave does not support the current
0x01	Illegal function code	function code, please read the slave
0.01		manual to choose the function code
		module.
		Slave data beyond the address range,
0x02	Illegal data address	read to slave manual to revise the
		starting address or data length.
		Data length error, data length
002	T11 1 1 . 1	beyond the maximum allowed 125
0x05	iiiegai uata value	(Word) or 2000 (Bit), modify the
		length

### Modbus Master station Error code table

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0x04	Slave device in fault	Check the slave device state
0x06	Slave device in busy	Check the slave device state
0x07	Parity fault	Check the parity, baud rate, stop bit, check the hardware connection status
0x09	CRC check fault	the slave response massage CRC calculation error, check the slave device
0x0B	Slave device response timeout	Increase the timeout, check the hardware connection status, check the communication parameters, such as baud rate
OxOE	The response message length error	Increase the space between the receiving character
0x0F	Write to slave device response errors	Check the hardware connection status

## 4.2. RS485 interface set to Modbus RTU Slave model

### configuration

1. Modbus slave model data address table

Data area	Valid address range
0 area (OXXXX)	0~1951
1 area (1XXXX)	0~1951
3 area (3XXXX)	0~121
4 area (4XXXX)	0~121

 $2 \rightarrow 10$  refer to 4.1(master model)  $1 \rightarrow 9$ .

11. Double click the gateway icon to show the following configuration

```
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```

模块 订货号: 系列: DP 从站类型: 标识(D):	Gateway ODOT-DPMO2 V2.0 DDOT-DPMO2 V2.0	GSD 文件(类型文件): DPMO2_V2.GSD
_地址	2043	节点/主站系统 
-SYNC/FREEZE 能力 反 SYNC	FREEZE	☑ 看门狗(\\)
		*

Then click "allocation parameter", set the Modbus parameter of the gateway (it must match the RS485 device connected by the user), and click the "confirm" button after the setting is completed, as following:

属性 - DP 从站		x
常规 分配参数		
	44.2	_
	数值	
_	Slave Mode 从站模式	
—— — Baudrate 波特率	9600 bps	
_────────────────────────────────────	None 无校验	
_─── Data_Bit 数据位	8 bit	
_── Stop_Bit 停止位	1 bit	=
_───── Send Delay 报文发送间隔	20 ms	
────────────────────────────────────	3.5t	
_────────────────────────────────────	100ms	
────────────────────────────────────	Data Holding 数据保持	
────────────────────────────────────	Poll Mode 轮询模式	
— 🗐 Slave ID 从站地址	1	
└────────────────────────────────────	5ms	
		-
明正 明正		A)

#### Modbus Mode:

Slave Mode

#### Baudrate:

Serial baud rate, Valid range:1200~115200bps, Default:9600bps.

#### Parity:

Selectable no-parity, Odd parity, Even parity, Default setting is No-parity

Data\_Bit:

#### Fixed to 8 bit data

#### Stop\_Bit:

1bit、2bit, Default setting is 1bit.

#### Send Interval:

### This parameter slave model invalid

Receive Interval:

Frame interval detection time for receiving messages, range 1.5t~200t, default setting is 3.5t (t : transmission time of the single character, related with the baud rate)

#### Slave Response Timeout:

This parameter slave model invalid

#### Timeout Processing Method:

This parameter slave model invalid

#### Data Out Mode:

This parameter slave model invalid

### Slave ID:

Slave ID number, valid range 1-247, default setting is 1

#### Slave Respond Delay:

Slave response delay time is the time from the slave station receives the requested message from the master station, then processes the data, to the message is returned. Oms<sup>2</sup>2000ms optional, default is 5ms.

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12. Modbus slave mode data command configuration

Start with S:is a slave module, can be used only under Modbus slave model.

Insert slave model module at number 0 slot, insert an input module "DP Input 8 Words (4xxxx)" in No. 1 slot, and fill in the starting address of the Modbus 4xxxx zone.



Insert an input module "DP Input 8 Words (3xxxx)" in No. 2 slot, and fill in the starting address of the Modbus 3xxxx zone.



After saving and compiling, download the configuration program to PLC

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Right click on 1 and 2 slot, click "monitor / modify", and then select monitor to see DP input data. The data values in the blue blank are consistent with the data written by the Modbus Poll master station, as shown in the following diagram.

当 監视/修改 - 8AI - (R-/S1)									
通过分配的 CPV 服务进入在线状态									
路径 (E) DFM01-TEST\SIMATIC 300(1)\CPU 315-2 DP									
	^	地址		符号	显示格式	华太位	修改数值		
1		PI₩	258		HEX	W#16#0007			
2		PIW	260		HEX	W#16#0023			
3		PIW	262		HEX	W#16#AAFF			
4		PIW	264		HEX	<del>\##10#0000</del>			
5		PIW	266		HEX	W#16#0000			
6		שדת	060		עתוז	117#16#0000			

DP input data:

Mbpoll1       Tx = 154: Err = 0: ID = 1: F = 03: SR = 1000ms							
	Alia	- 00000	_				
0		0x0007					
1		0x0023					
2		0xAAFF					
3	L	0x0000					
4		0x0000					
		0.0000					

Modbus Poll master station input data:

18. Modify output value in DP output data, then click Modify button, as shown below.

	当 监视/修改 - 8AO - (R-/S2)									
j	通过分配的 CPV 服务进入在线状态									
1	路径(P) DPM01-TEST\SIMATIC 300(1)\CPV 315-2 DP									
	核排 效果 易云悠起 状态值 终时新伯									
	1	PQ₩	256		HEX	₿ <b>6</b>	W#16#32FF			
	2	PQ₩	258		HEX	<u>64</u>	W#16#DDAE			
	3	PQ₩	260		HEX	<b>64</b>	₩ <b>#</b> 16 <b>#</b> 4423			
	4	PQ₩	262		HEX	<u>64</u>	W#16#0000			
	5	PQ₩	264		HEX	24	W#16#0000			
	6	PQ₩	266		HEX	24	W#16#0000			
	7	PQ₩	268		HEX	26	W#16#0000			
	8	PQ₩	270		HEX	<b>64</b>	¥#16#0000			
	4						4			
	🗙 行无效 (D) 使用 IP5 更新强制符号									
- 有条件地运行 - 立即运行 - 広部运行 - 広部 - 石 - 広部 - C - 広部 - C - C - C - C - C - C - C - C							諭出 (E)			
	۲ و	] 修改 3. 酬士	(ፑ) 翠ጣ)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	設值(I)	▼ I/O 显示	0)			

Read the data from Modbus slave station in Modbus Poll master station, which is consistent with the output value of DP, as shown in the following figure.

Mbpoll1           Tx = 224: Err = 0: ID = 1: F = 04: SR = 1000ms					
Alias	00000				
0	0x32FF				
1	0xDDAE				
2	0x4423				
3	0x0000				

19. Modbus slave station state module

Modbus Slave State Module can only be used under the slave mode, from DP side can read slave status to judge the working state of Modbus slave station. The error code is 0 when the station is working normally. When the error occurs from the slave station, the error code will indicate the cause of the error. As shown below, 0x0402 indicates that when the 04 function read input register (3xxxx) area, return the "data address error". At this point, we need to modify the "starting address" for Modbus master station to read data.





### Other error codes are shown in the following table:

Error code	Fault description	Troubleshooting method
0x00	Slave station working normally	No
0x01	Illegal function code	Slave does not support the current function code, please read the slave manual to choose the function code module.
0x02	Illegal data address	Slave data beyond the address range, read to slave manual to revise the starting address or data length.
0x03	Illegal data value	Data length error, data length beyond the maximum allowed 125 (Word) or 2000 (Bit), modify the length
0x07	Parity error	Check parity, baud rate and stop bits, check the status of hardware connection.
0x09	CRC check fault	the slave response massage CRC calculation error, check the slave working state
OxOE	The response message length error	Increase the space between the receiving character

### Modbus slave station error code table

# 5. Modbus-RTU Brief introduction of protocol

对于您来说,您只需要了解Modbus有4个区对应的8条重要的功能码:4条读、2 条写单个位或寄存器,2条写多个位或者多个寄存器。For you, you only need to understand the 8 important function codes of the Modbus with 4 zones: 4 read, 2 write single bits or registers, 2 write multiple bits or multiple registers.

(Address description using PLC address)

### 5.1. Modbus Storage Area

The controller (or Modbus device) storage area stored by Modbus is identified by OXXXX, 1XXXX, 3XXXX and 4XXXX.

Storage	Namo	Data	Read/	Address of storage
area mark	Name	type	Write	unit
OXXXX	Output coil	bit	Read/ Write	00001 <sup>~</sup> 0XXXX, XXXX: related to device
1XXXX	Input of discrete quantity	bit	Read only	10001~1XXXX, XXXX: related to device
3XXXX	Input register	byte	Read only	30001 <sup>~</sup> 3XXXX, XXXX: related to device
4XXXX	Input/Keep register	byte	Read/ Write	40001 <sup>~</sup> 4XXXX, XXXX: related to device

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### 5.2. Modbus Function Code

Modbus message is relatively fixed, so you only need to know a little bit. After reading several messages, you will know its structure and ask for details when needed.

(1) Read output coil state

Function code: 01H

Master station inquiring message format:

		Starting	Starting	Coil	Coil	
Addres	Functi	address	address	quatity	quatity	CPC
S	on code	High	Low	High	Low	UKU
		position	position	position	position	
0x11	0x01	0x00	0x13	0x00	0x25	XXXX

Function: read the slave station output coil OXXXX state.

Notice: some devices' coil starting address is 00000, corresponding to the 00001 address in the device, deferred by turn.

For this example: read the output coil of 0X11 slave station, the register starting address is 0x13=19, the number of coils is 0x0025H=37; so the function of inquiring message is: to read 0X11 (17) slave station output coil 00019 to 00055, and there are 37 coils.

Slave station respond format:

	Functi	D	Coil	Coil	Coil	Coil	Coil	
Addr	on	Bytes	state	state	state	state	state	CRC
ess	code	count	19-26	27-34	35-42	43-50	51-55	
0x11	0x01	0x05	0xCD	0x6B	0xB2	0x0E	0x1B	XXXX

Function: returned output coil OXXXX state from device

(2) Read the state of the discrete-time input

Function code: 02H

Master station inquiring message format:

		Starting	Starting	Coil	Coil	
Addres	Functi	address	address	quatity	quatity	CDC
S	on	High	Low	High	Low	CKC
		position	position	position	position	
0x11	0x02	0x00	0xC4	0x00	0x16	XXXX

Function: read the slave station input coil 1XXXX state.. Notice: some devices' coil starting address is 10000, corresponding to the 10001 address in the device, deferred by turn.

For this example: read the input coil of 0X11 slave station, the register starting address is 0x00C4=196, the number of coils is 0x0016=22; so the function of inquiring message is: to read 0X11 (17) slave station input coil 10196 to 10217, and there are 22 coil's discrete input state.

#### Slave station response format:

Addr ess	Functi on code	Bytes count	DI 10196-10203	DI 10204-10211	DI 10212-10217	CRC
0x11	0x02	0x03	OxAC	OxDB	0x35	XXXX

Function: return of the input coil 1 XXXX state from the machine

(3) Read output / hold register

Function code: 03H

Master station inquiring message format:

		Register		D	Register	
	Funct	start	Register	Register	quatity	
Addre		1.1	start	quatity	T	ODO
SS	10n	address	address Low	High	Low	CRC
55	code	High			position	
		nosition	position	position		
		P03101011				

0x11         0x03         0x00         0x6B         0x00         0x03         xxxx							
	0x11	0x03	0x00	0x6B	0x00	0x03	XXXX

Function: read from the slave station to keep the register 4XXXX value. Notice: some devices' register starting address is 40000, corresponding to the 40001 address in the device, deferred by turn.

For this example: read the keep register value of 0X11 slave station, the register quatity number is 0x0003; so the function of inquiring message is: to read 0X11 (17H) slave station's 3 keep register 40107—40109, and there are 22 coil's discrete input state.

	р.	1
	Keg1	
Regis		
	ster	
ter		
	4010	
40109		
	9	CRC
High	Ŭ	one
111 811	Low	
nocit	LOW	
posit	nogi	
:	posi	
10N		
	tion	
0x2A	0x64	XXXX
	01101	
	Regis ter 40109 High posit ion 0x2A	Regis ter 40109 9 High posit ion 0x2A Ox64

Function: read the keep register' svalue returned from the slave station: (40107)=0x022B, (40108)=0x0106

(4) Read the input register

Function code: 04H

;

Master station inquiring message format:

		Register	D	Register	Register;	
Addr	Functi	starting	Kegister starting	' s	s quatity	
	on	address		quatity	Low	CRC
ess	code	High	address Low	High	position	
		position	position	position		

0x11	0x04	0x00	0x08	0x00	0x01	XXXX
Functi	on: read	the input re	gister's 3XXX	XX value of	slave stati	on.

Notice: some devices' register starting address is 30000, corresponding to the 30001 address in the device, deferred by turn.

For this example: read the keep register value of 0X11 slave station, the starting address is 0x0008H, register quatity is 0x0001; so the function of inquiring message is: to read 0X11 (17) slave station' s 1 input register 30008, the slave station' s reply format.

Addino	Functi	Puter	Input register	Input register	
Addre	FUNCLI	bytes	30008	30008	CRC
SS	on code	count	High position	Low position	
0x11	0x04	0x02	0x01	0x01	XXXX

Function: read the value returned from the slave staton to the input register 30008, (30008) =0x0101

(5) Forcibly setted single coil

Function code: 05H

Master station's inquiring message format:

Addr ess	Functi on code	Coil address High position	Coil address Low position	Disconne ction sign	Disconne ction sign	CRC
0x11	0x05	0x00	OxAC	0xFF	0x00	XXXX

Function: Forcibly set the 0x01(17) slave station's 0XXXX coil value. Coil's starting address 00000, corresponding to the 00001 address in the device, deferred by turn.

Disconnection sign=FF00, Set coil ON.

Disconnection sign=0000, Set coil OFF.

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Example: Starting address is 0x00AC=172. Forcibly set the coil 0172 of slave station 17 to ON state.

Reply format: Return the original message to where it comes

Addra	Functi	Coil address	Coil address	Disconne	Disconn	
Addr	FUNCLI	coll address	coll address	ction	ection	CRC
ess	on code	High position	Low position	sign	sign	
0x11	0x05	0x00	OxAC	0xFF	0x00	XXXX

Function: Forcibly set coil 0172 of slave station 17 to ON state, then return the original message to where it comes.

(6) Reset the single keep register

Function code: 06H

Master station inquiring message format:

Addre ss	Funct ion code	Register starting address High position	Register starting address Low position	Register quatity High position	Register quatity Low position	CRC
0x11	0x06	0x00	0x87	0x03	0x9E	XXXX

Function: Preset the single keep register 4XXXX value. Coil's starting address 40000, corresponding to the 40001 address in some device, deferred by turn.

Example: Preset single keep register 40135' s value of slave station 17 to 0x039E

Respond format: return the original message to where it comes

Addino	Funct	Register	Register	Register	Register	
Addre	ion	starting	starting	quatity	quatity	CRC
SS	code	address	address Low	High	Low	

		High	position	position	position	
		position				
0x11	0x06	0x00	0x87	0x03	0x9E	XXXX

Function: Preset the single keep register 40135' s value of slave station 17 to 0x039E, then return the original message to where it comes.

(7) Forcibly reset the multiple coil

Function code: OFH

Master station inquiring message format:

		Coil	Coil						
		star	start	Coil	Coil				
	Func	ting	ing	quati	quat	Byte	Coil	Coil	
Addr	tion	addr	addre	ty	ity	S	atata	atata	CDC
ess	1 1011	ess	SS	High	Low	coun			CKU
	code	High	Low	posit	posi	t	20-27	28-29	
		posi	posit	ion	tion				
		tion	ion						
0x11	0x0F	0x00	0x13	0x00	0x0A	0x02	0xCD	0x00	XXXX

Function: Forcibly preset the multiple continuous coil OXXXX to  $\ensuremath{\text{ON/OFF}}$  state.

Notice: Coil' s starting address 00000, corresponding to the 00001 address in some device, deferred by turn.

Example: Forcibly preset the multiple continuous coil of slave station 0x11, coil's starting address is 0x0013=19, coil quatity is 0x000A=10

So, this inquiring message's function is: forcibly preset the 10 coil's

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```

value 00019—00028 of 0x11 (17) slave station; CDH→00019-00026; 00H →00027-00028;

Slave station's respond cormat:

Addr ess	Functi on code	Coil starting address High position	Coil starting address Low position	Coil quatity High position	Coil quatity Low position	CRC
0x11	0x0F	0x00	0x13	0x00	OxOA	XXXX

(8) Preset multiple register

Function code: 10H

Master station inquiring message cormat:

Ad dr es s	Fun cti on cod e	Star t regi ster addr ess High posi tion	Start regis ter addre ss Low posit ion	Regis ter quati ty High posit ion	Regis ter quati ty Low posit ion	Bytes count	Dat a Hig h pos iti on	Da ta Lo w po si ti on	Dat a Hig h pos iti on	Da ta Lo w po si ti on	CRC
0x	0x	0.00	0v87	0x00	$0 \times 0 2$	$0 \times 04$	0x	0x	0x0	0x	XXX
11	10	0.00	0101	0200	UXUZ	0304	01	05	А	10	Х

Function: Preset multiple keep register's value 4XXXX of slave station Notice: Keep register's starting address 40000, corresponding to the 40001 address in some devices, deferred by turn.  $_{\circ}$ 

Example: Preset the multiple keep register's value of the slave station 0x11, register's starting address is 0x0087=135, coil quatity is 0x0002=2

So, this inquiring message's function is: preset the 2 keep register's value  $0105H \rightarrow 40135$ ;  $0A10H \rightarrow 40136$  of 0x11 (17) slave station;

Respond format:

				Registe	Regist	
		Starting	Starting	r	er	
Addr	Functi	register	register	quatity	quatit	CPC
ess	on code	address High	address Low	High	y Low	UNU
		position	position	positio	positi	
				n	on	
0x11	0x10	0x00	0x87	0x00	0x02	XXXX

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