

2310EN V2.0.0





and SIEMENS PLC Modbus TCP Connection Operating Manual

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1. Remote I/O Module System Configuration List

Part No.	Specification	Description
GFGW-RM01N	Modbus TCP-to-Modbus RTU/ASCII, 4 Ports	Gateway
GFMS-RM01S	Master Modbus RTU, 1 Port	Main Controller
GFDI-RM01N	Digital Input 16 Channel	Digital Input
GFDO-RM01N	Digital Output 16 Channel / 0.5A	Digital Output
GFPS-0202	Power 24V / 48W	Power Supply
GFPS-0303	Power 5V / 20W	Power Supply

1.1 Product Description

- I. The gateway is used externally to connect with Siemens S7-1500's communication port (Modbus TCP).
- II. The main controller is in charge of the management and dynamic configuration of I/O parameters and so on.
- III. The power module is standard for remote I/Os and users can choose the model or brand of power module they prefer.

2. Gateway Parameter Settings

This section details how to connect a gateway to Siemens S7-1500. For detailed information regarding D, please refer to the D-GRID M-Series Product Manual

2.1 i-Designer Program Setup

I. Make sure that the module is powered and connected to the gateway module using an Ethernet cable



II. Click to launch the software





III. Select "M Series Module Configuration"

🔤 i-Designer v1.0.30.b				- 0	
C Series Module Configuration	M Series Module Configuration				
1					
Setting					
Module					
Config					

IV. Click on the "Setting Module" icon

E I-Designer VI.0.30.b		- 0	×
C Series Module Configuration	M Series Module Configuration		
Setting Module Config			



		Setti	ng Module				
Module List	ModeType G	ateway Mode			IP Address	192.168.1.20	
Module	Module Opt	ion					
	System Log						
	D	ateTime	Description				
				Connect			

V. Enter the "Setting Module" page for M-series

VI. Select the mode type based on the connected module

		Setting Module			^
Module List	ModeType Gateway Mc	ode 🔫		IP Address	192.168.1.20
Module	wodule Option				
	System Log				
	DateTime	Description			
			Connect		



VII. Click on "Connect"

			Setting	Module				
	Module List	Setting Module			IP Address	192.168.1.20		
	Module	Module Option	n					
Se M Cc								
		System Log						
		Dat	eTime	Description				
				ystem Stop	Connect	Disconnect		

VIII. Gateway Module IP Settings

		Setting Mo	dule					×
Module List					IP /	Address	192.168.1.20	
Module	Module Option							
→ GFGW-RM01N	Internet Settings	Operating Settings	Port Settings	ID Mapping	Module Information			
	IP Address	192.168.1.20						
	Netmask	255.255.255.0						
	Default Gateway	192.168.1.1						
	System Log							
	DateT	ime I	Description					
	→ ⊘ 2022-	09-14 16:28:06 F	Read Gateway Mo	dule Successfull	y!			
					Disconnect	Sa	ave Setting	

Note: The IP address must be in the same domain as the controller equipment

IX. Gatew	ay Module	Opera	tior	1al Mode	es				
				Setting M	odule				
Module List							IP Address	192.168.1.20	
Module		Module Opt	tion						
→ GFGW-RM01N		Internet Set	tings	Operating Setting	s Port Settings	ID Mapping	Module Information		
		Channel 1	Mode	Slave	- Timeout	25 🗘 ms			
		Channel 2	Mode	Slave	- Timeout	25 🗘 ms			
		Channel 3	Mode	Slave	- Timeout	25 🗘 ms			
		Channel 4	Mode	Slave	- Timeout	25 💲 ms			
		System Log							
			DateTim	ne	Description				
			22-09	}-14 16:28:06	Read Gateway Mc	odule successfully	1		
							Disconnect	Save Setting	

Note:

Set Group 1 as Slave and set the gateway to use the first set of RS485 port to connect to the main controller (GFMS-RM01N)



3. Siemens S7-1500 Connection Setup

This chapter explains how to use the TIA Portal program to connect S7-1500 to a gateway and add a remote I/O module. For detailed information, please refer to "*SIMATIC S7-1500*"

3.1 Siemens S7-1500 hardware connection

I. The Ethernet port is at the bottom center of machine. Match this port to the gateway's Ethernet port.



3.2 Siemens S7-1500 IP Address and Connection Setup

I. Launch the TIA Portal, click on "Device Configuration" and then the "PROFINET Port" on the left side of the program

	项目树 🔳 📢	S7_1500TCP → PLC_1 [CPU 1511F-1 PN]			_ # = ×
	设备		新扑视图	品 网络视图	1 设备视图
	19 🔳 🖻	👉 PLC_1 [CPU 1511F-1 PN] 💌 🗮 🕎 🖌 🔛 🛄 🔍 ±			
设备与 网 结					
	▶ □ 盘控与强制表		1007		~
	Traces		> 100%	1.0.0	
	▶ 🧱 设备代理数据		S METE	168 1 11	sign
	建 程序信息	□ 常現			
	→ PLC 监控和 V	▶ 常規 ▲ 以太网地址			
		▼ PROFINET接口 [X1] 接口连接到			
	- 叶和花四	常規 Foormaters 又支援地社 时间相子			•
	<	操作様式) 高級処理 Web 服务器坊问 硬件标识符 目3功 溜环 子別検索 第25.255.255.0 になかの日本 「 なび日中设置 P 地址 「P 地址: 192.168.1 .11 子別検索: 255.255.0 になかの日本 「 なかの日本 「 なのの日本 「 のののの日本 「 のののの日本 「 ののののの日本 「 ののののの日本 「 ののののの日本 「 のののののののののののののののののののののののののののののののののの			v

II. Click on "Ethernet Address" and type in the IP address as the same as the gateway at 192.168.1.XXX



IP地址:	192	. 168	. 1	. 1
子网掩码:	255	. 255	. 25	5.0
使用路由器				
路由器地址:	0	. 0	. 0	. 0



III. On the right side of the MAIN program, select "Commands"



- A. Click on the "Communication" menu
- B. Click on the "Others" menu
- C. Click on the "Modbus TCP" menu
- D. Click to add a new "MB CLIENT"

IV. Reading of the communication register



Triggers "REQ" with rising edge DISCONNECT: Set to "false"

MB_MODE set to "0"
 MB_DATA_ADDR set to "44097"
 DATA_LEN set to "Data Length"
 DATA_PTR set to CPU's register address
 CONNECT setup will be explained below



V. Writing of the communication register



Triggers "REQ" with rising edge DISCONNECT: Set to "false"

MB_MODE set to "1" MB_DATA_ADDR set to "48193" DATA_LEN set to "Data Length" DATA_PTR set to CPU's register address CONNECT setup will be explained below

Notes:

 $\%_{\text{ID-GRID}}$'s first GFDI-RM01N has the register address at 1000(HEX) converted to 4096(DEC)+1 and the starting address at 44097

 $\times_{1D-GRID}$'s first GFDO-RM01N has the register address at 2000(HEX) converted to 8192(DEC)+1 and the starting address at 48193

% For MODE settings, please refer to Siemens <u>MB_MODE, MB_DATA_ADDR and DATA_LEN</u> <u>Parameters</u>

3.3 CONNECT Setup for MB_CLIENT V4.1 or Above

The PLC on the client uses the "MB_CLIENT" command. The biggest difference from the old version of the command is that now DB needs to be created manually for CONNECT. The section below shows how to add and setup a DB

I. Under the "Program Block" in the "Project" column on the left, click on "Add a new block" and then select "DB (Data block)"

项目树 🔲 📢	漆加新块 ×
<mark>₩</mark>	名称: 数据块_1
 ▼ 57_1500TCP ▲ 没备和网络 ◆ ● PLC_1 [CPU 151 ● Y 设备组态 ○ 在线指公析 ● 2 程序快 ● 2 程序快 ● ※ 添加新块 ● 2 程序快 ● ● 外部源文件 > ● ● 外部源文件 > ● ● ● PLC 数据类型 > ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	送記 全局 DB 道枳块 语言: 道枳块 通号: 通号: 5 ● 自动 描述: 函数块 通数块 更多信息

II. From the generated DB list, add a new data type and type in "TCON_IP_V4" to generate a configuration list

		- Ta le to ta da da da	PJ3PJKESHIE T	- LS- 191	898418/049	3.70天师1里	ent out			-
名称 雪 ▼ Static	数据类型	起始值	保持	可从 HMI/	从 н	在 HMI	设定值	监控	注释	
■ <新增>	TCON_IP_v4									

_		名称			数据类型	起始值
1	-	• S	tatic		1	
2	-	• •	Static	_1	TCON_IP_v4	
3	-		Int	terfaceId	HW_ANY	64
4	-		ID		CONN_OUC	1
5	-		Co	nnectionType	Byte	16#0B
6	-		Ac	tiveEstablished	Bool	1
7	-		▼ Re	moteAddress	IP_V4	
8	-		• •	ADDR	Array[14] of Byte	
9	-			ADDR[1]	Byte	192
10				ADDR[2]	Byte	168
11	-			ADDR[3]	Byte	1
12	-			ADDR[4]	Byte	20
13	-	-	Re	motePort	UInt	502
14	-		Lo	calPort	UInt	0

III. With the list generated, we can proceed to set up the connection

Interfaceld: Hardware ID - the value is as illustrated below

ID: Station number

ConnectionType: For Modbus TCP, please use 11 or "16#0B'

ActiveEstablished:

RemoteAddress: Please set up according to the connection's IP address

RemorePort: When used as a client, please set the connection device's port to "502"

LocalPort: When used as a client, please set it to "0"



IV. Under "Device Configuration", double-click on "PROFINET Port" to see the hardware ID under "Hardware ID" under "Attributes".

the natuwale ID u	nuci II	aru	w ai v		u	Iuc		AL	thibutes .
	R.C.								▶ 切換分区方向 三
					•	-	•	•	
100 0	1 2	3	4	5	6	14	22	31	
导 轨_ 0				_	_				2 A
						7		23	-
						14		31	
<									> 100%
PROFINET 接口_1 [Module]									◎属性 目信息 3 日诊断 ■ ■ ▼
常規 10 变量 系统常	数 文本								
常规	硬件标识名	:							
F-parameters	SCIT WORK								
以太网地址	硬件标识	符							
时间间步			*** /st. 4>	-					
操作候式			硬件称1	识符: [64				
▶ 局级选坝									
web服务器切回 硬件标识符									

V. Once the DB module has been established, please compile the program and set up MB_CLIENT's CONNECT pins

16 H tel		67	150	DOTO	0			44 . 4. 67.44	A STOCK SKAN		1021	I DER -			
		37.	_150		.r -	PEC_1 [CP0 13	[IF-IPN] / 住/F	坎 , 京流以	任日虹線		JD2]				
设备															
19		-	1		2	崖 🏆 保持实际	际值 🔒 快照 🎮	- 鸟、将快照(直复制到起始值中	■ ■ 将	起始值加	裁为实际值	B, B,		3
			DB_	MB											
7_1500TCP	^		2	名称			数据类型	起始值	保持	可从 HMI/	从 H	在 HMI	设定值	监控	注释
👔 添加新设备		1	-	· St	tatic										1
。 设备和网络		2		• •	Sta	stic_1	TCON_IP_v4								
PLC_1 [CPU 1511F-1 PN]		3	-			InterfaceId	HW_ANY	64		1	V	V			HW-identifier of IE-in
1 设备组态	=	4				ID	CONN_OUC	1		1	1	V			connection reference
2. 在线和诊断		5	-			ConnectionType	Byte	16#0B		1	1	V			type of connection:
🖌 🔜 程序块		6	-			ActiveEstablished	Bool	1			1	1			active/passive conn
■ 添加新块		7			-	RemoteAddress	IP_V4			1	1	Image: A start and a start			remote IP address (I
- Main [OB1]		8	-			- ADDR	Array[14] of Byte			1	V	V			IPv4 address
▼ 20 条统块		9	-			ADDR[1]	Byte	192		1		V			IPv4 address
▼ 🛃 程序资源		10				ADDR[2]	Byte	168		1	1	V			IPv4 address
MB_CLIENT		11				ADDR[3]	Byte	1		¥	1				IPv4 address
🗧 DB_MB [DB2]		12	-			ADDR[4]	Byte	20		1	v	V			IPv4 address
MB_CLIENT		13				RemotePort	UInt	502			v	 Image: A start of the start of			remote UDP/TCP por
MB_CLIENT			<						Ш						>
		Int	erfa	celd								9	属性 🚺	信息 🗈	2 诊断
→ 工艺対象 → 外部源文件		1	営規	T	监	控									
PIC变量		1 1	常规			1	100000								2
		4					and the second sec								and the second se



VI. CONNECT Pin Setup

Click on the CONNECT pin's 🔳 and select the DB module just setup earlier.

-	"Clock_2Hz"	Bool	%M0.3	-
-	"Clock_5Hz"	Bool	%M0.1	
-	"Clock_10Hz"	Bool	%M0.0	
-	"Clock_Byte"	Byte	%MBO	
	"DB_MB"	全局 DB	DB2	>>
-	"DiagStatusUpdate"	Bool	%M1.1	
-	"FirstScan"	Bool	%M1.0	
Ę	"Local"	Hw_SubModule		•

Then select the "Static" list just generated

"DB_MB".	CONNECT	
无		
🕣 Static_1	TCON_IP_v4	>>

Finally, select "None" to complete the setup process

"D	B_MB".Static_1.	IECT		
	无			
-	ActiveEstablished	Bool		active/passive
-	ConnectionType	Byte		type of connec
-	ID	CONN_OUC		connection ref
-	InterfaceId	HW_ANY		HW-identifier of
-	LocalPort	UInt		local UDP/TCP p
-	RemoteAddress	IP_V4		remote IP addr >>
-	RemotePort	UInt		remote UDP/TC



*Once the setup is complete, if you can connect to the network to shut off the module but there is no control module matched, a potential cause is the PLC still has the default "FF" for its packet output station number. Please refer to the section below for solution.

VII. Under the "Program Block" in the "Project" column on the left, select "System Block" and then select the "MB_CLIENT_DB" module for connection.



VIII. In the "MD_UNIT_ID" field for the selected DB module, type in the control module station number that you need to connect

S7_1500TCP → PLC_1 [CPU 1511F-1 PN] → 程序块 → 系统块 → 程序资源 → MB_CLIENT_DB [DB1] _ 直											_ •	■×	
🥶 🥶 🔩 🛃 🚬 🤓 保持实际值 🔒 快照 🔍 将快照值复制到起始值中 🌄 🕃 将起始值加载为实际值 見 🗉													
MBCUENT DB													
	1	名	称		数据类型	起始值	保持	可从 HMI/	从 H	在 HMI	设定值	监控	
19	-			TRECEIVE	TRCV			V		V			^
20	-			TRESET	T_RESET				V	Image: A start of the start			
21	-		٠	TDIAG	T_DIAG			V	 Image: A start of the start of				
22	-	•	۲	TDIAG_Status	TDiag_Status			¥	V	Image: A start of the start			
23	-	•		Blocked_Proc_Timeout	Real	3.0		¥	 Image: A start of the start of	Image: A start of the start			
24	-			Rcv_Timeout	Real	2.0		Image: A start and a start	V	V			
25				MB_Unit_ID	Byte	1			¥	¥			=
26		٠		MB_Transaction_ID	Word	1		 Image: A start of the start of	\checkmark				
27	-			MB_State	Word	16#0		 Image: A start of the start of					_
28	-			SAVED_MB_DATA_AD	UDInt	0							_
29	-			SAVED_DATA_LEN	UInt	0							_
30	-	•		SAVED_MB_MODE	USInt	0							
31	-			Connection_ID	Word	16#0		V	V				~
	<					III							>

4. Siemens S7-1500 Simple Programming Example

This demonstration shows how to use the program to control 10-GRID's input/output contacts

I. Under "PLC Variable" of the project column on the left, click on "Add a New Variable Chart", which will come in handy when you compile your program later

项目树	
设备	
13k	
📑 设备组态	^
☑ 在线和诊断	
▶ 🔜 程序块	
▶ 🙀 工艺对象	
▶ 🔤 外部源文件	
▼ 📜 PLC 变量	
🗞 显示所有变量	≡
📑 添加新变量表	
💥 Default tag table [81]	
👆 DINKLE_IO_REGISTER [19]	
▶ 📑 PLC 数据类型	
▶ 🔜 监控与强制表	- 11
▶ 🕎 在线备份	- 11
Traces	- 11
▶ 🚆 设备代理数据	- 11
聖程序信息	- 11
国 PLC 报警文本列表	
▶ <u>□</u> 本地模块	
🔚 未分组的设备	
↓ 公共数据	~
< III	>

II. With the variable chart established, define the "Variable Names" and "Addresses"

										- 変量	■ 用户常量
	1	🖻 🕑 🚏 🛍									
[DINK	LE_IO_REGISTER									
		名称	数据类型	地址	保持	可从	从 H	在 H	注释		
1	-	Dinkle_DO1	Word	%MW1100							
2	-	Dinkle_DO2	Word	%MW1102							
З	-	Dinkle_DO3	Word	%MW1104							
4	-	Dinkle_DO4	Word	%MW1106							
5	-	Dinkle_DO5	Word	%MW1108							
6	-	Dinkle_DO6	Word	%MW1110							
7	-	Dinkle_DI1	Word	%MW1000							
8		Dinkle_DI2	Word	%MW1002							
9	-	Dinkle_DI3	Word	%MW1004							
10	-	Dinkle_DI4	Word	%MW1006							
11	-	Dinkle_DO7	Word	%MW1112							
12	-	Dinkle_DO9	Word	%MW1116							
13		Dinkle_DO8	Word	%MW1114	-						
14	-	Dinkle_TEST1	Word	%MW1200							
15		Dinkle_TEST2	Word	%MW1202							
16	-	Dinkle_TEST13	Word	%MW1204							
17	-	Dinkle_TEST14	Word	%MW1206							
18		Dinkle_TEST15	Word	%MW1208							
19		<添加>				Image: A start and a start		Image: A start and a start			



III. A variable's address depends on the address you have set up for communication. Please see the demonstration below:

1. This section reads in-GRID^M's register address and starts storing data at M1000 in the PLC The register's address is at 1000(HEX) converted to 4096(DEC)+1, with the starting address at 44097



2. This section writes D-GRID⁷/2's register address and starts writing data at M1000 in the PLC The register's address is at 2000(HEX) converted to 8192(DEC)+1, with the starting address at 48193





IV. Program Control I/O

The two sections of this program have the same functions if defined so in the new variable chart earlier as below:

In this demonstration, "Dinkle_DI1" has been defined as "%MW1000" and "Dinkle_DO1" as "%MW1100". Therefore, a user can type in "Dinkle_DI1".%X0 and "Dinkle_DO1".%X0 to define the coils, which will function the same as typing in "%M1000.0" and "%M1100.0"

