DAUDIN CO., LTD.

iO-GRID M

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 iO-GRID**M**, please refer to the *iO-GRID**M**-Series Product Manual*
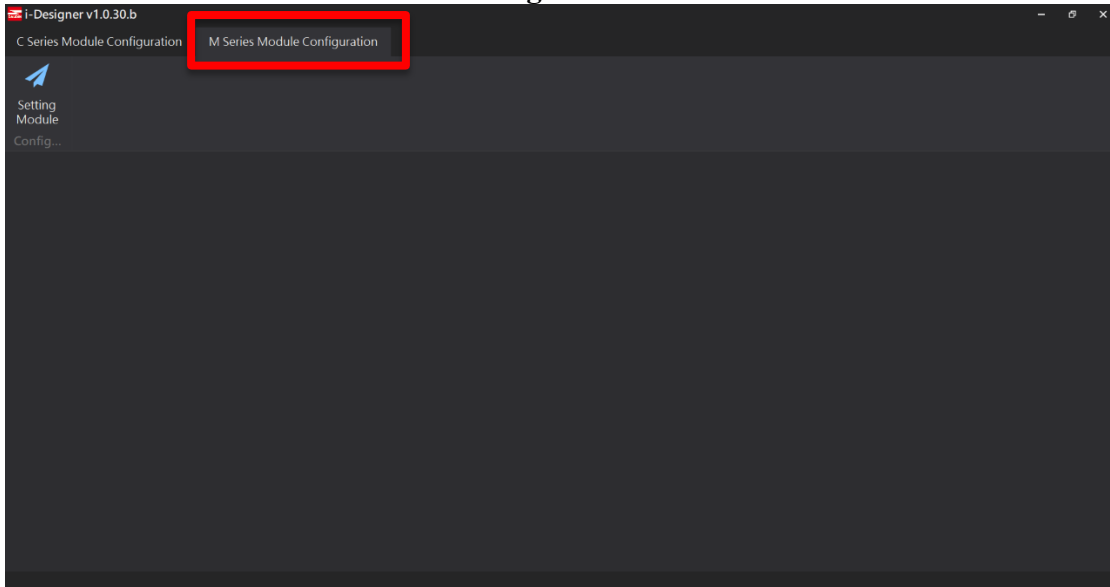
2.1   i-Designer Program Setup

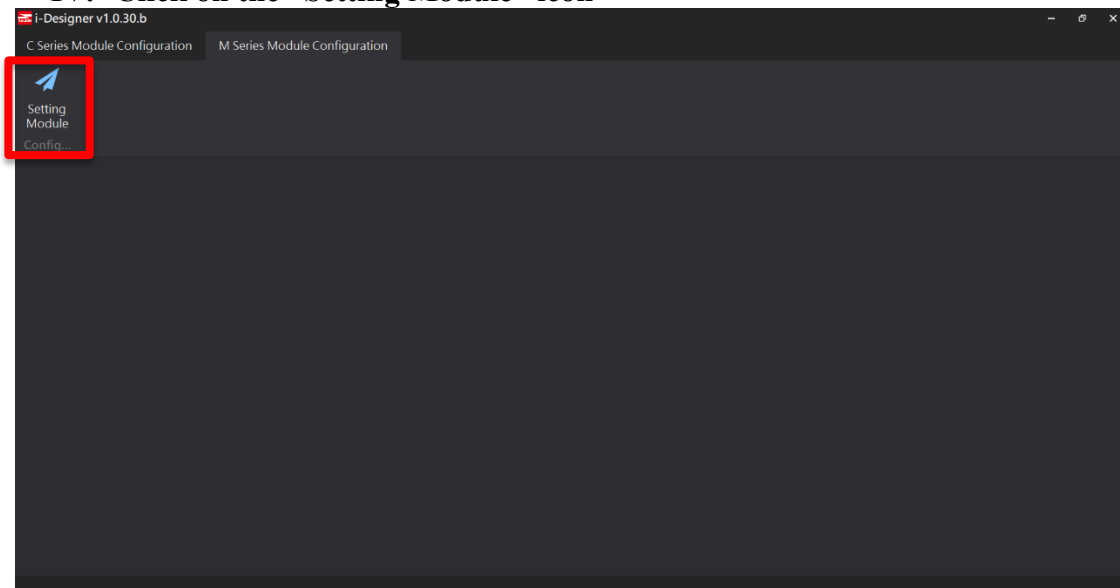I.   **Make sure that the module is powered and connected to the gateway module using an Ethernet cable**

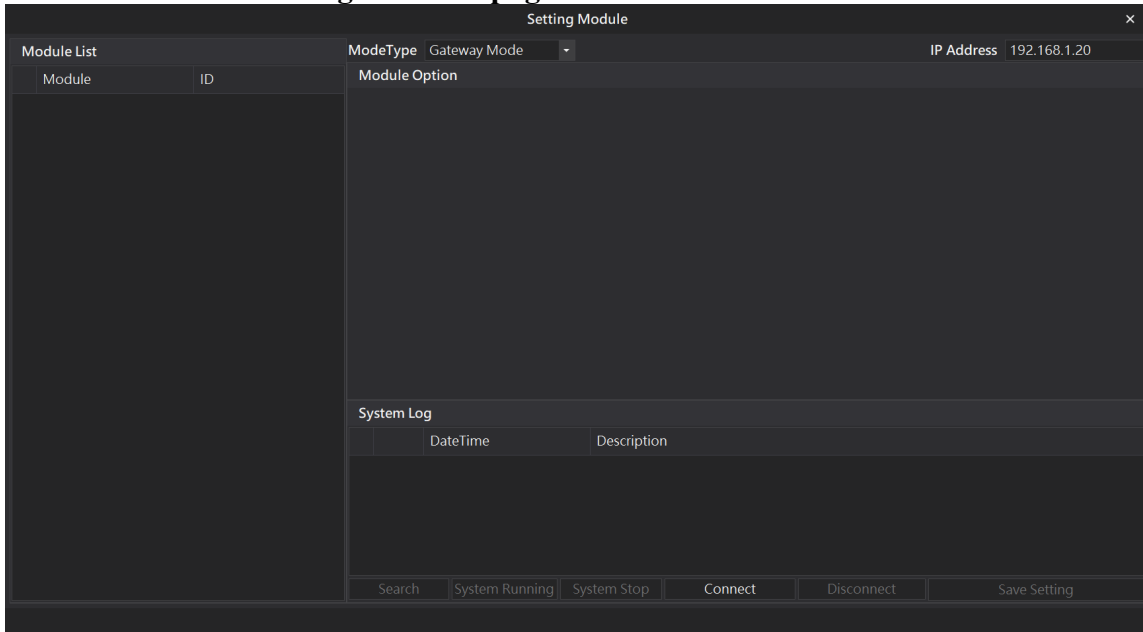
II.   **Click to launch the software**
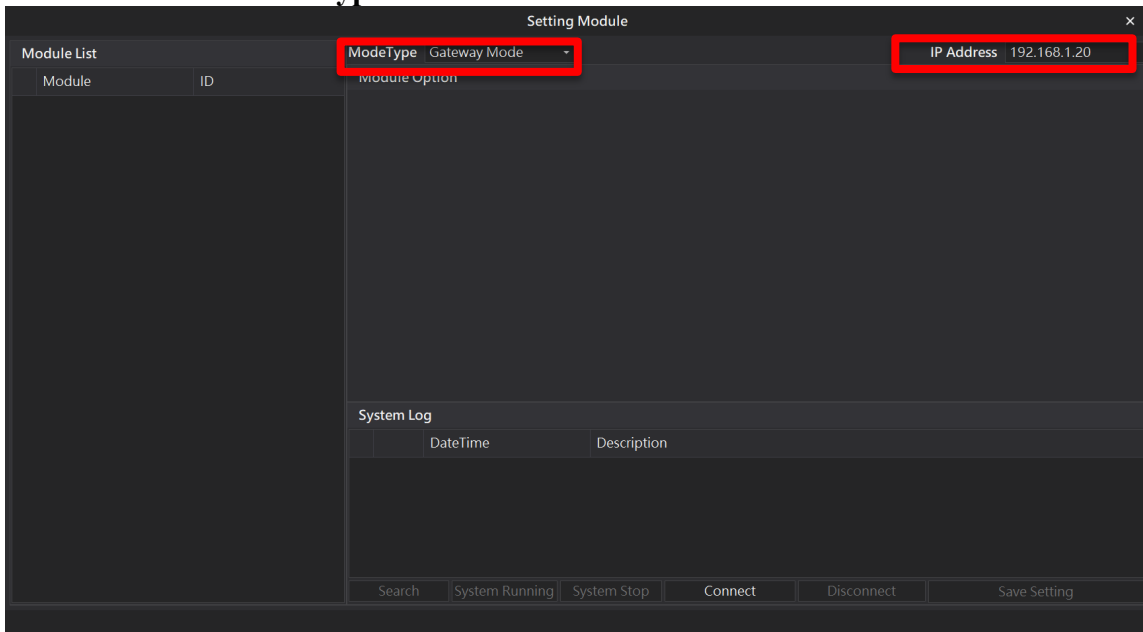
III. Select "M Series Module Configuration"

IV. Click on the "Setting Module" icon
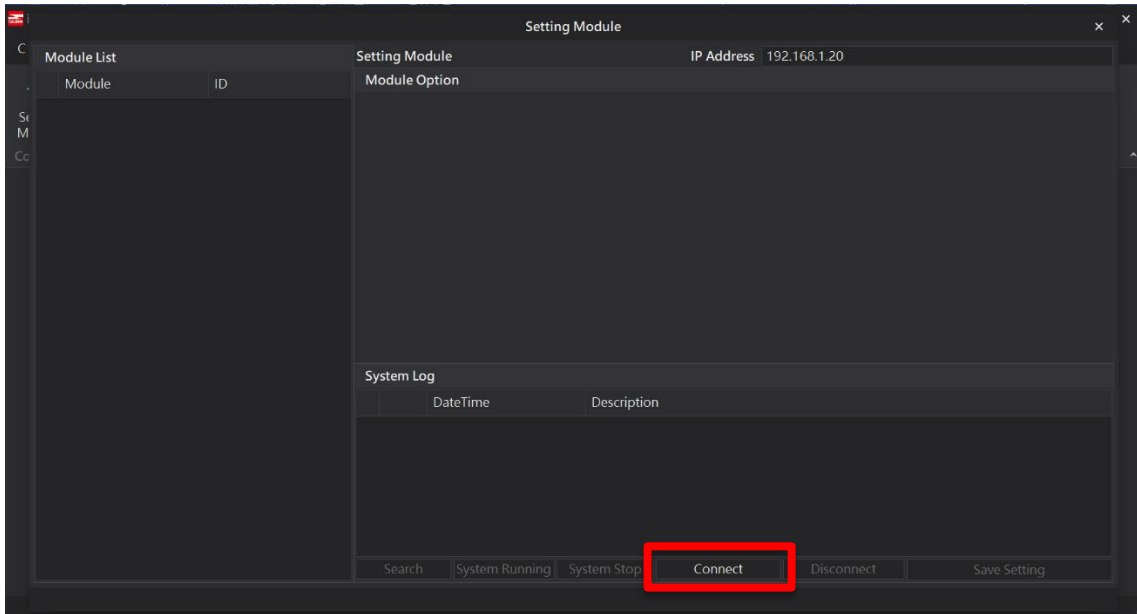
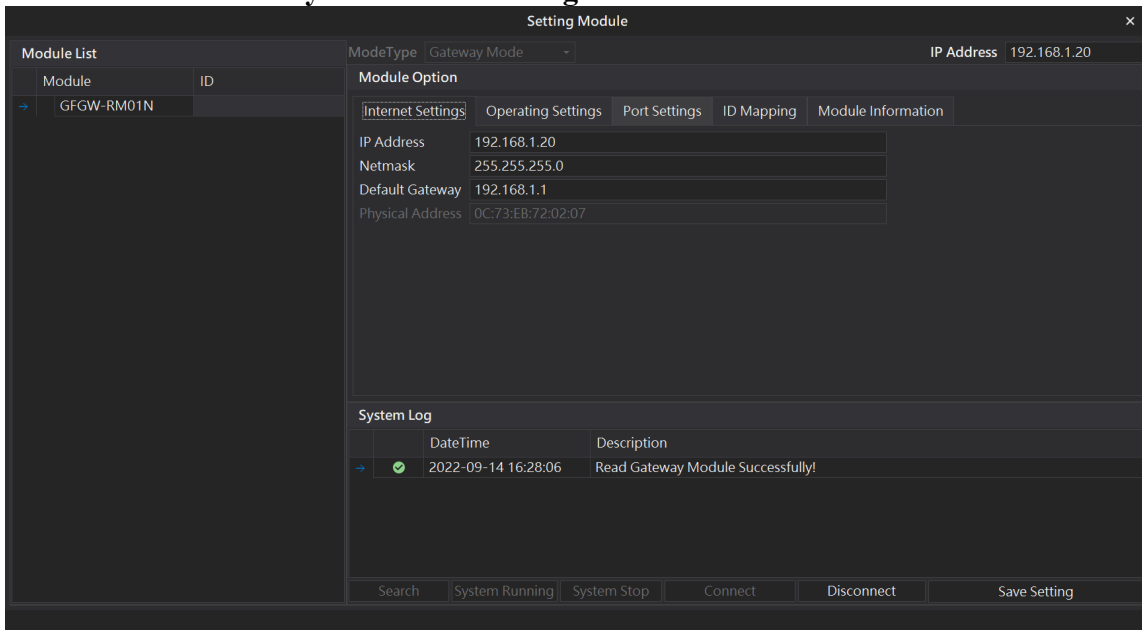## V. Enter the "Setting Module" page for M-series

VI. Select the mode type based on the connected module

VII. Click on "Connect"

VIII. Gateway Module IP Settings

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

## IX. Gateway Module Operational Modes

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*"
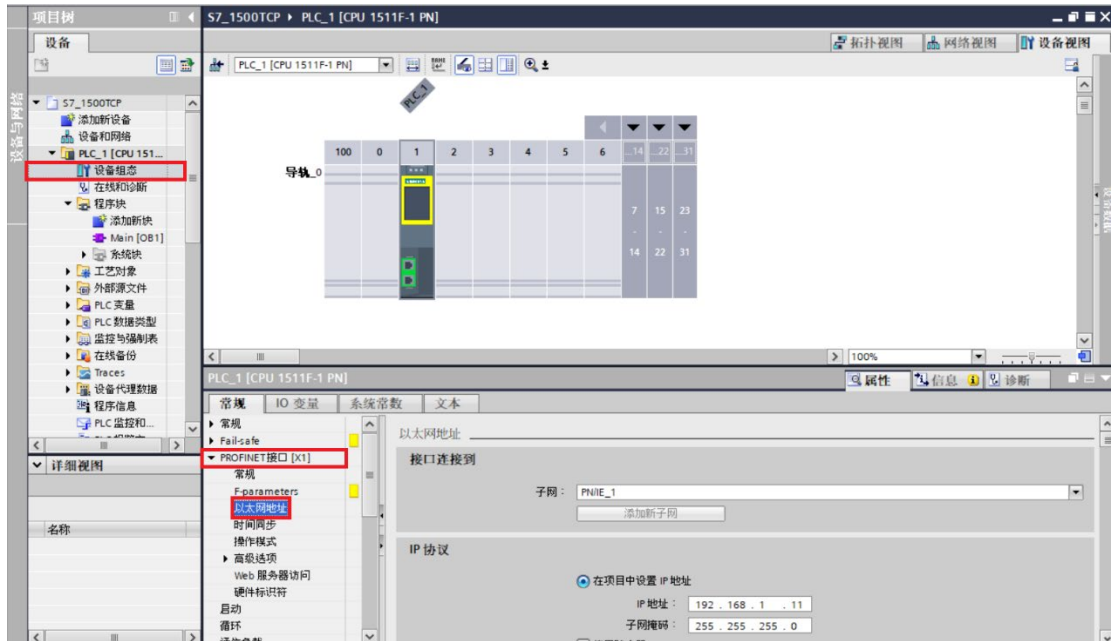
3.1 Siemens S7-1500 hardware connection

I. **The Ethernet port is at the bottom center of machine. Match this port to the gateway's Ethernet port.**
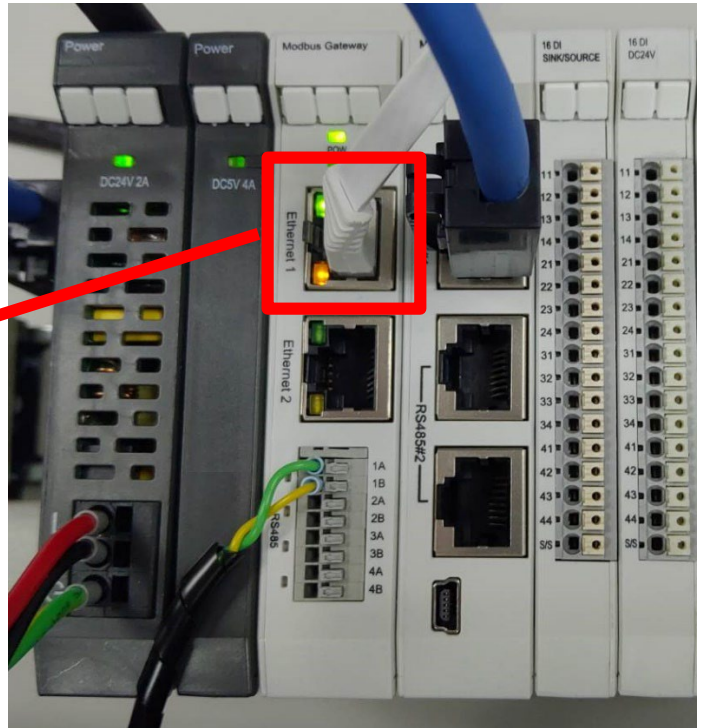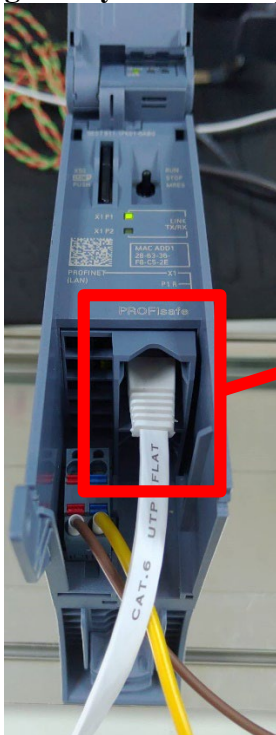
3.2 Siemens S7-1500 IP Address and Connection Setup
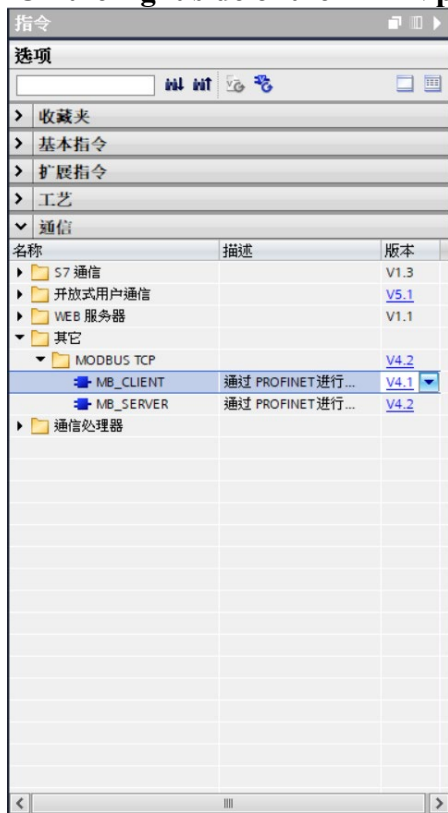
I. **Launch the TIA Portal, click on "Device Configuration" and then the "PROFINET Port" on the left side of the program**

II. **Click on "Ethernet Address" and type in the IP address as the same as the gateway at 192.168.1.XXX**
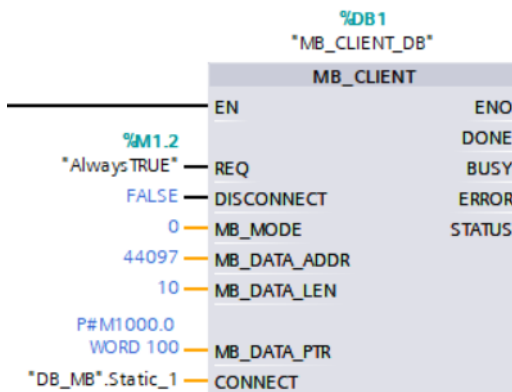
III. On the right side of the MAIN program, select "Commands"

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
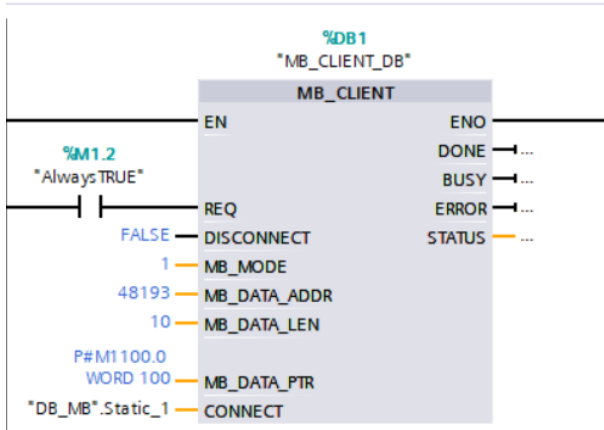
DISCONNECT: Set to "false"

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:

※ iO-GRID𝓜's first GFDI-RM01N has the register address at 1000(HEX) converted to 4096(DEC)+1 and the starting address at 44097

※ iO-GRID𝓜'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 *MB_MODE, MB_DATA_ADDR and DATA_LEN Parameters*

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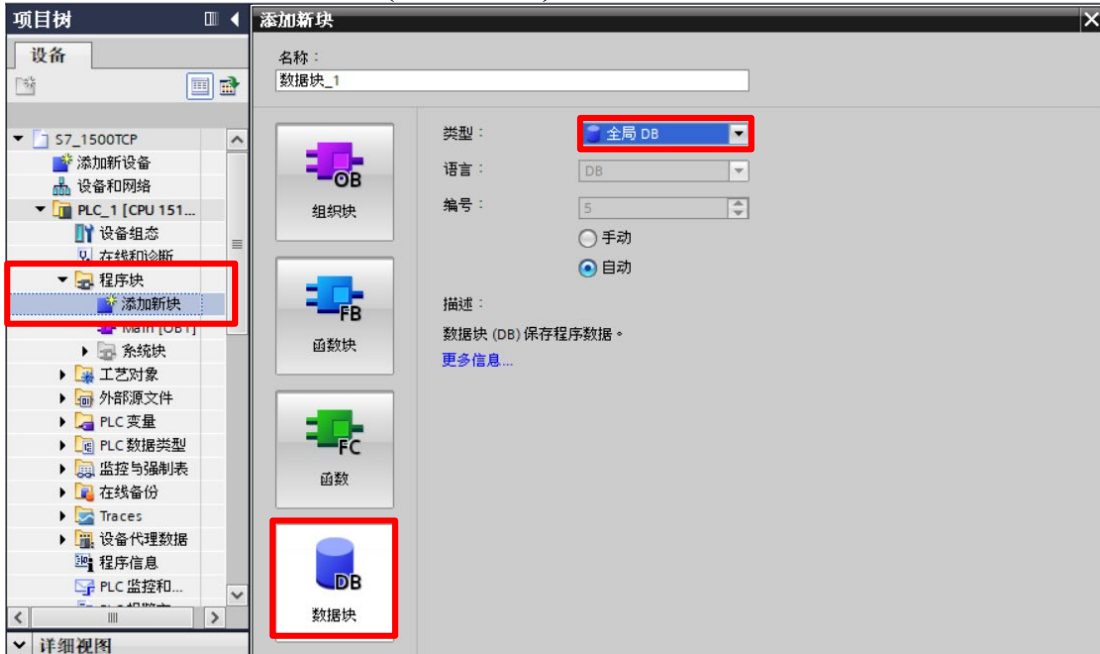
II. **From the generated DB list, add a new data type and type in "TCON_IP_V4" to generate a configuration list**

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

		名称	数据类型	起始值
1		Static		
2		Static_1	TCON_IP_v4	
3		InterfaceId	HW_ANY	64
4		ID	CONN_OUC	1
5		ConnectionType	Byte	16#0B
6		ActiveEstablished	Bool	1
7		RemoteAddress	IP_V4	
8		ADDR	Array[1..4] of Byte	
9		ADDR[1]	Byte	192
10		ADDR[2]	Byte	168
11		ADDR[3]	Byte	1
12		ADDR[4]	Byte	20
13		RemotePort	UInt	502
14		LocalPort	UInt	0

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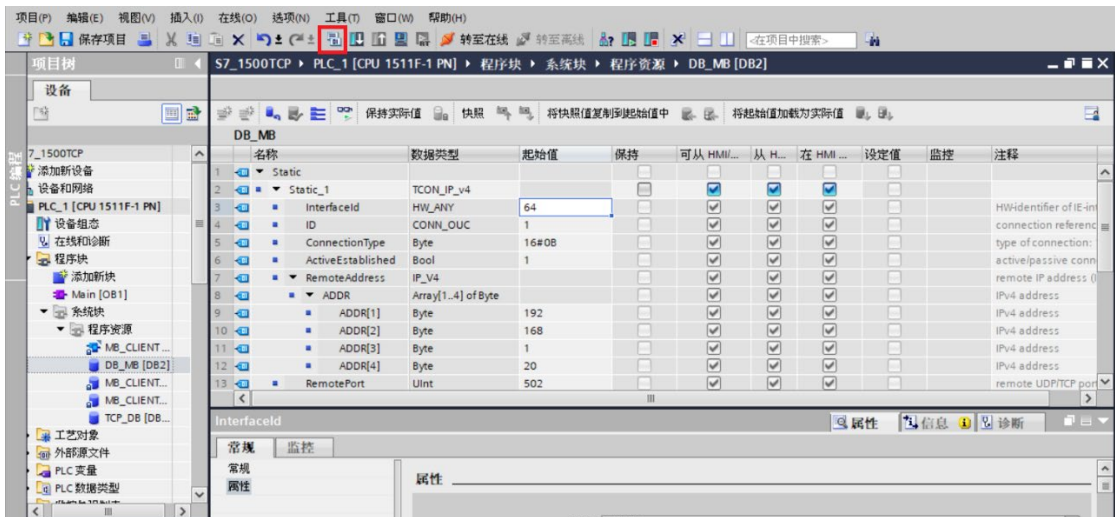
RemorePort: When used as a client, please set the connection device's port to "502"

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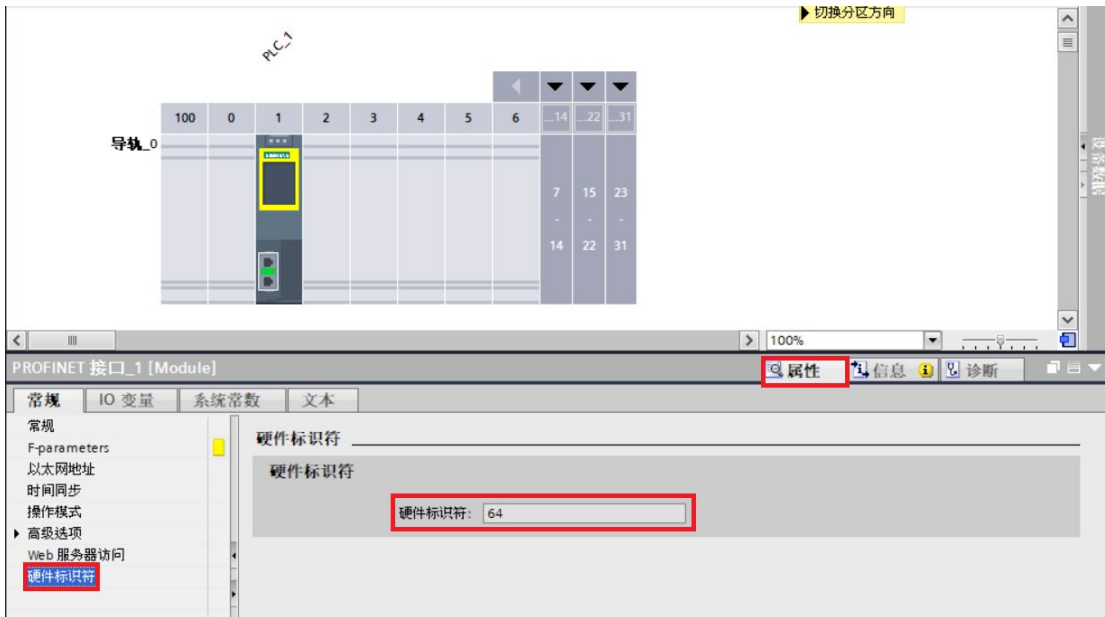
V. Once the DB module has been established, please compile the program and set up MB_CLIENT's CONNECT pins

VI. CONNECT Pin Setup

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

	CONNECT			
"Clock_2Hz"	Bool	%M0.3		
"Clock_5Hz"	Bool	%M0.1		
"Clock_10Hz"	Bool	%M0.0		
"Clock_Byte"	Byte	%MB0		
"DB_MB"	全局 DB	DB2		>>
"DiagStatusUpdate"	Bool	%M1.1		
"FirstScan"	Bool	%M1.0		
"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

"DB_MB".Static_1.		CONNECT		
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.**
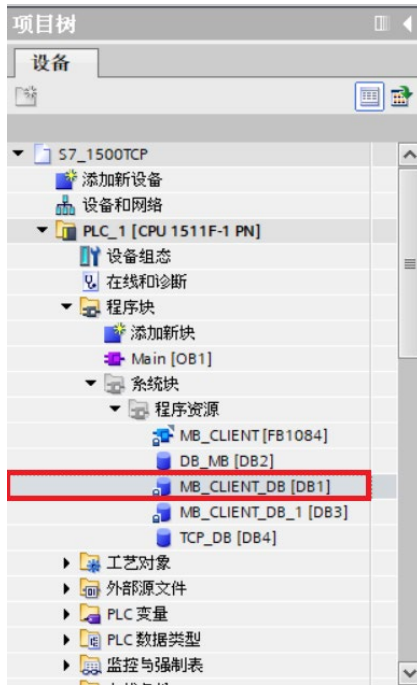
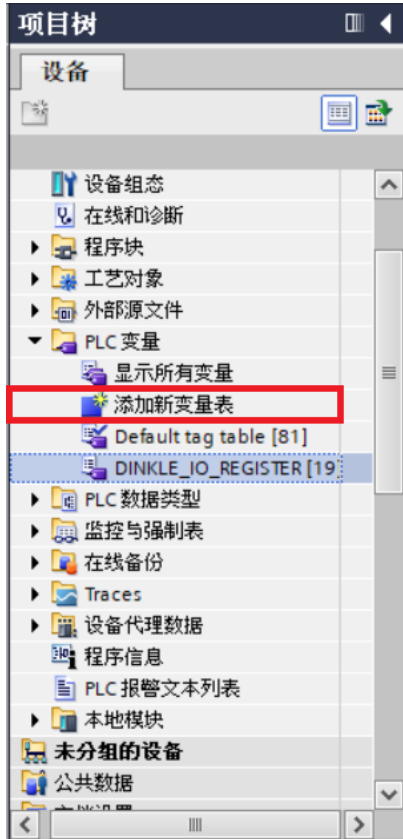**VIII.** **In the "MD_UNIT_ID" field for the selected DB module, type in the control module station number that you need to connect**
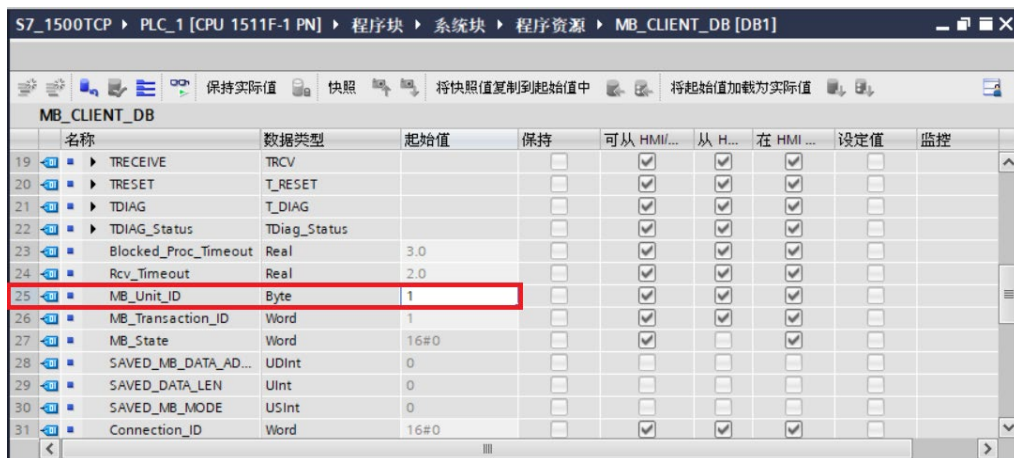
4. Siemens S7-1500 Simple Programming Example

This demonstration shows how to use the program to control io-GridM'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
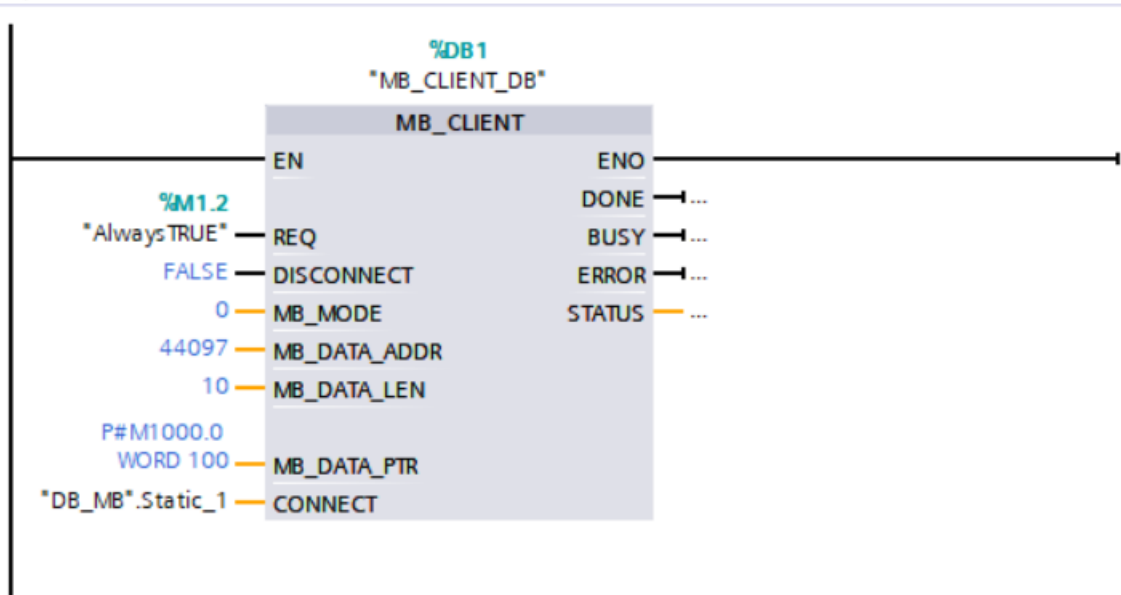

II. With the variable chart established, define the "Variable Names" and "Addresses"
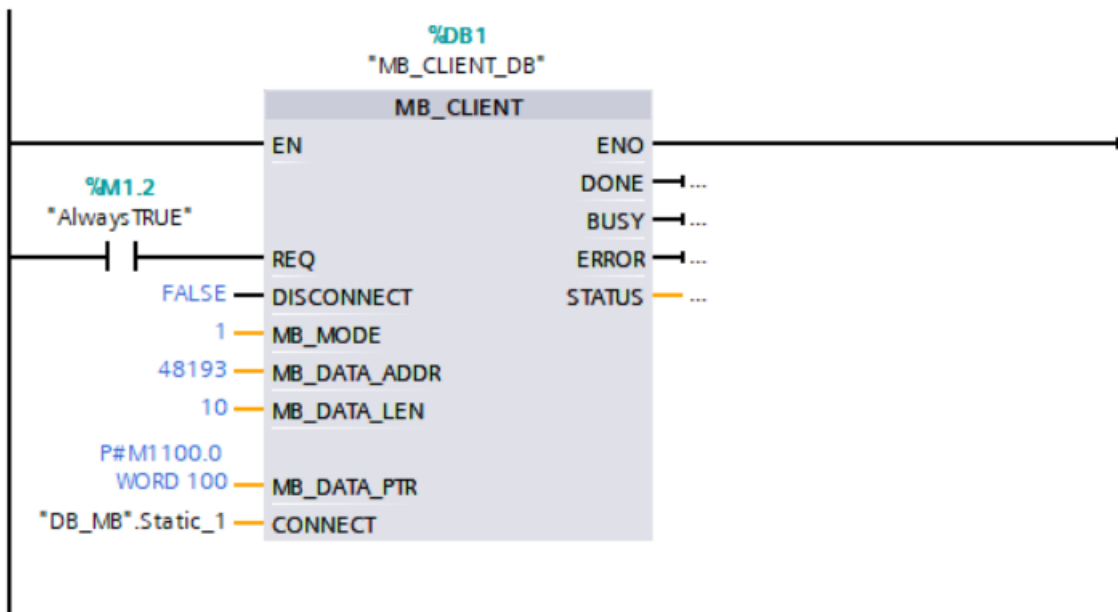
III. A variable's address depends on the address you have set up for communication. Please see the demonstration below:

1. This section reads io-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

```
                        %DB1
                     "MB_CLIENT_DB"

                      MB_CLIENT
                 ─── EN              ENO ───
      %M1.2                         DONE ─┤...
"AlwaysTRUE" ─── REQ               BUSY ─┤...
      FALSE ─── DISCONNECT         ERROR ─┤...
          0 ─── MB_MODE           STATUS ── ...
      44097 ─── MB_DATA_ADDR
         10 ─── MB_DATA_LEN
   P#M1000.0
   WORD 100 ─── MB_DATA_PTR
"DB_MB".Static_1 ─── CONNECT
```

2. This section writes io-GRID*M*'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

```
                        %DB1
                     "MB_CLIENT_DB"

                      MB_CLIENT
                 ─── EN              ENO ───
      %M1.2                         DONE ─┤...
"AlwaysTRUE"                        BUSY ─┤...
         ─┤ ├─── REQ               ERROR ─┤...
      FALSE ─── DISCONNECT         STATUS ── ...
          1 ─── MB_MODE
      48193 ─── MB_DATA_ADDR
         10 ─── MB_DATA_LEN
   P#M1100.0
   WORD 100 ─── MB_DATA_PTR
"DB_MB".Static_1 ─── CONNECT
```

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"