![Delta Electronics, Inc. logo]

PROFIBUS DP
RTU-PD01 Slave Communication Module
Operation Manual

PLC1

📖 Table of Content

PROFIBUS DP Slave Communicaion Module RTU-PD01

1   Introduction to RTU-PD01

1.1   Product Introduction

1. Thank you for choosing Delta RTU-PD01 PROFIBUS DP Slave Communication Module. To ensure correct installation and operation of the product, please read this operation manual carefully before using it.

2. This operation manual only provides introductory information on RTU-PD01. Detailed information about PROFIBUS DP protocol is not included in this manual. Please refer to relevant literatures for more information on PROFIBUS DP protocol.

3. RTU-PD01 is a PROFIBUS DP slave communication module for connecting Delta's Slim series special I/O modules, digital I/O modules and standard Modbus devices to PROFIBUS DP network.

1.2   Features

1. Supports PROFIBUS DP cyclic data transmission.

2. Auto-detects baud rates; supports max. 12Mbps.

3. Self-diagnosis

4. Able to connect to max. 8 DVP-Slim type special I/O modules (i.e. analog I/O, temperature measurement, counter and positioning modules) and 16 digital I/O modules (max. 256 digital I/O points).

5. The RS-485 COM port is able to connect to max. 16 standard Modbus slave stations.

6. Supports max. 100 bytes of data input and 100 bytes of data output.

2   Profuct Profile and Outline

2.1 Parts and Dimensions
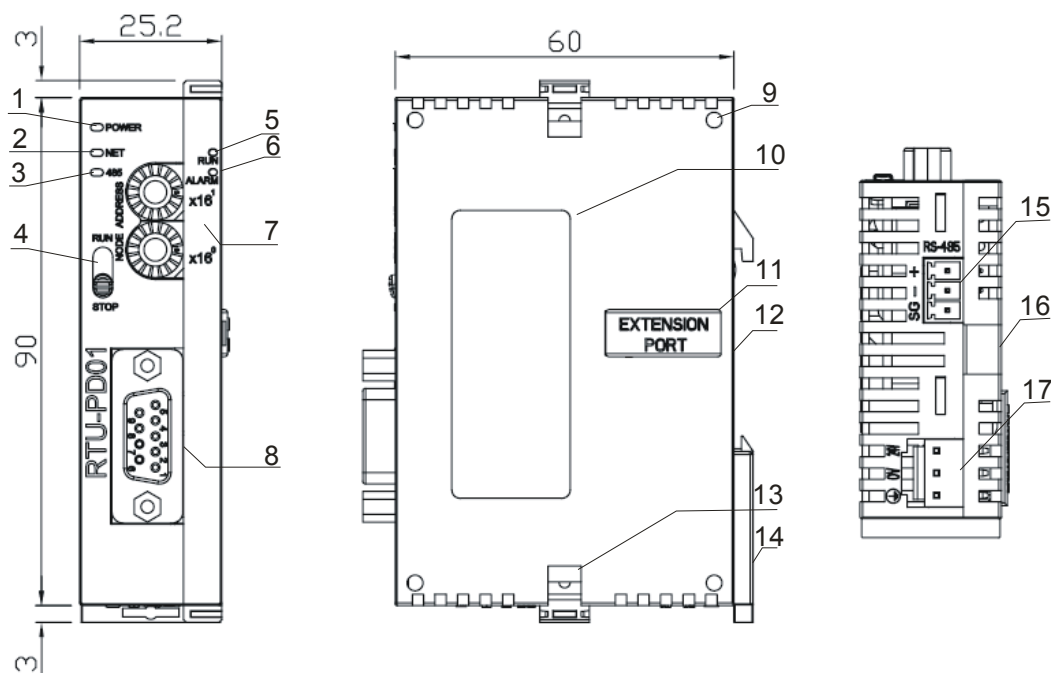
Unit: mm

1. POWER indicator	2. NET indicator	3. RS-485 indicator
4. RUN/STOP switch	5. RUN indicator	6. ALARM indicator
7. Address setup switch	8. PROFIBUS DP COM port	9. I/O module positioning hole
10. Nameplate	11. I/O module connection port	12. DIN rail (35mm)
13. I/O module fixing clip	14. DIN rail fixing clip	15. RS-485 COM port
16. I/O module fixing notch	17. DC24V power supply interface	

2.2 Specifications

PROFIBUS DP Port

Interface	DB9 connector
Transmission method	High-speed RS-485
Transmission cable	Shielded twisted pair cable
Electrical isolation	500VDC

Communication

Message type	Cyclic data exchange
Module name	RTU-PD01
GSD file	DELA09B9.GSD
Product ID	09B9 (HEX)

Serial transmission speed supported (auto-detection)	9.6kbps; 19.2kbps; 93.75kbps; 187.5kbps; 500kbps; 1.5Mbps; 3Mbps; 6Mbps; 12Mbps (bits per second)

Electrical Specification

| Power supply voltage	24VDC
Insulation voltage	500VDC
Power consumption	2.5W
Weight	90g

Environment

| Noise immunity	ESD (IEC 61131-2,IEC 61000-4-2): 8kV Air Discharge
	EFT (IEC 61131-2,IEC 61000-4-4): Power Line:±2kV,Digital Input:±2kV
	Comunication I/O: ±2kV
	Conducted Susceptibility Test (EN61000-4-6, IEC 61131-2 9.10): 150kHz ~ 80MHz,10V/m
	RS (IEC 61131-2, IEC 61000-4-3): 26MHz ~ 1GHz, 10V/m
Storage/operation	Operation: 0°C ~ 50°C (temperature), 50 ~ 90% (humidity), pollution degree 2
	Storage: -25°C ~ 70°C (temperature), 5 ~ 95% (humidity)
Shock/vibration immunity	International standards: IEC 61131-2,IEC 68-2-6 (TEST Fc)/IEC 61131-2& IEC 68-2-27 (TEST Ea)

3   Installation

3.1 Definition of PROFIBUS DP Port

| PIN	PIN name	Definition
1	--	N/C
2	--	N/C
3	RxD/TxD-P	Sending/receiving data P(B)
4	--	N/C
5	DGND	Data reference potential (C)
6	VP	Power voltage – positive
7	--	N/C
8	RxD/TxD-N	Sending/receiving data N(A)
9	--	N/C
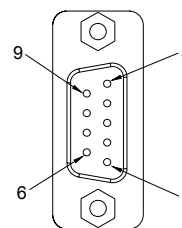
3.2 Connecting to PROFIBUS DP Port

Insert PROFIBUS DP bus connector into PROFIBUS DP port on RTU-PD01 (see the figure below)

Screw it tight to ensure RTU-PD01 and PROFIBUS DP bus are properly connected.
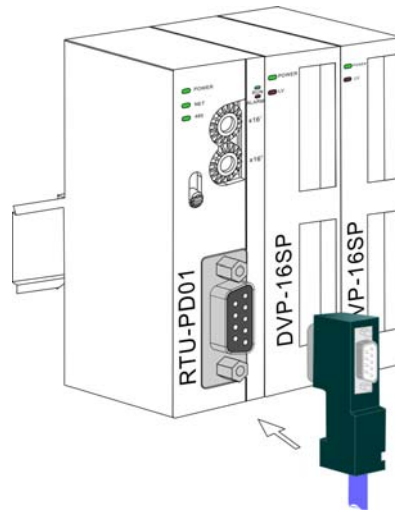
3.3 Installing RTU-PD01 and I/O Module on DIN Rail

- Use 35mm DIN rail.
- Open the DIN rail clips on RTU-PD01 and I/O module. Insert RTU-PD01 and I/O module on the DIN rail.
- Clip up the DIN rail clips on RTU-PD01 and I/O module to fix them on the DIN rail (see the figure below).

PROFIBUS DP Slave Communicaion Module RTU-PD01
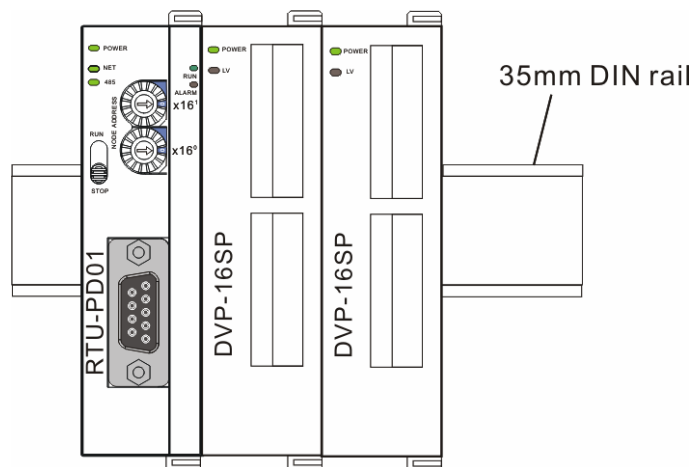
4 Components

4.1 RUN/STOP Switch

RUN
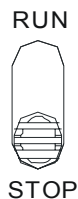
STOP

| Status	Description
RUN => STOP	1. Special I/O module switches from RUN to STOP.
	2. All Y points on digital output module turn OFF.
	3. Modbus function switch
	4. RUN LED turns off.
STOP => RUN	1. RTU-PD01 re-detects the number of digital I/O points and specialI/O modules.
	2. Special I/O module switches from STOP to RUN.
	3. Enable digital I/O modules.
	4. Enable Modbus function.
	5. RUN LED turns on.

4.2 Address Setup Switch

The two rotary address setup switches, $x16^0$ and $x16^1$, set up the node address of RTU-PD01 on PROFIBUS DP network in hex form. The range for rotation is 0 ~ F.

Address	Definition
H'1~ H'7D	Valid PROFIBUS address
H'0 or H'7E ~ H'FF	Invalid PROFIBUS address. NET LED will flash in red color if the node address falls within this range.
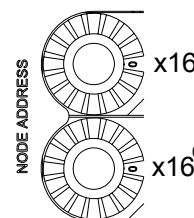
Example: If you need to set the node address of RTU-PD01 to 26 (decimal), simply switch $x16^1$ switch to "1" and $x16^0$ to "A". 26 (decimal) = 1A (hex) = $1x16^1 + Ax16^0$.

Note:

- Switch off the power supply before setting up the node address of RTU-PD01. Re-power the module after the setup is completed.
- Changing the value on the switch during the operation of RTU-PD01 is invalid.
- Use slot type screwdriver to set up the switch. Be careful not to scratch the module.

5   Establishing PROFIBUS DP Network by RTU-PD01

The right-side interface on RTU-PD01 is connectable to DVP-Slim series special I/O modules and digital I/O modules. The RS-485 port is connectable to standard Modbus devices. See the figure below for the connection of Slim series I/O modules and Modbus devices and into the PROFIBUS DP network.
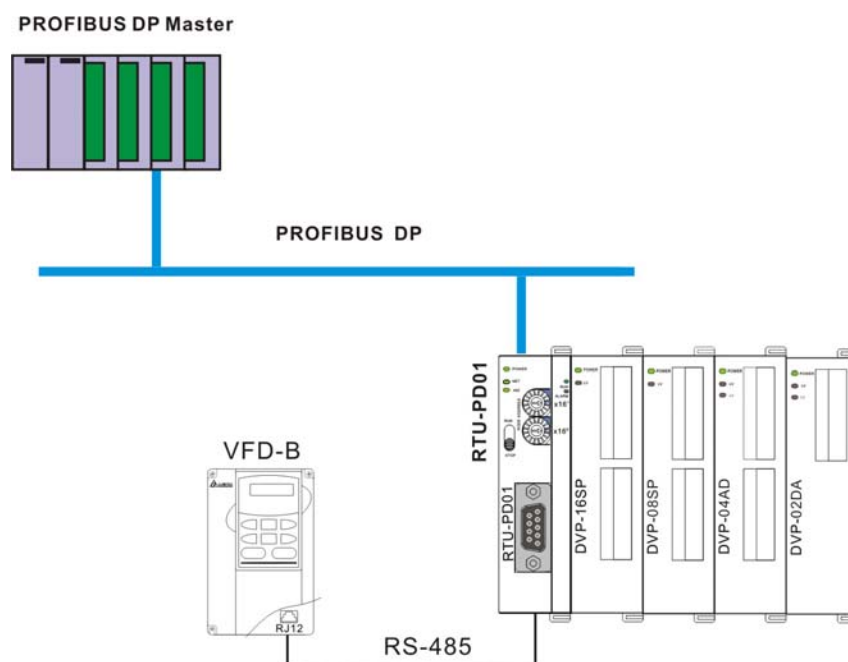
6   Transmission Distance and Baud Rate

The baud rate range for PROFIBUS DP is 9.6kbps ~ 12Mbps, and the length of transmission cable varies upon the transmission speed. The transmission distance ranges from 100m to 1,200m. See the table below for the baud rates RTU-PD01 supports and their corresponding communication distance.

| Baud rate (bps)	9.6k	19.2k	93.75k	187.5k	500k	1.5M	3M	6M	12M
Distance (m)	1,200	1,200	1,200	1,000	400	200	100	100	100

7 GSD File

The GSD file is a text file and can be used to identify PROFIBUS DP device (master or slave).A GSD file usually contains the supplier's information, baud rates supported and applicable I/O messages. When using RTU-PD01, you have to first import the GSD file to the configuration software for PROFIBUS DP master. After the import of the file, the configuration software for master will display RTU-PD01 and its configuration settings. You can download the GSD file for RTU-PD01 at Delta's website: http://www.delta.com.tw/

8 RTU-PD01 Settings and Configurations

8.1 RTU-PD01 Settings

When you set up RTU-PD01 in the configuration software for PROFIBUS DP master, there will be plenty of setup items for you to choose from, which adds flexibility to the manipulation of RTU-PD01. See the figure below for RTU-PD01 settings.
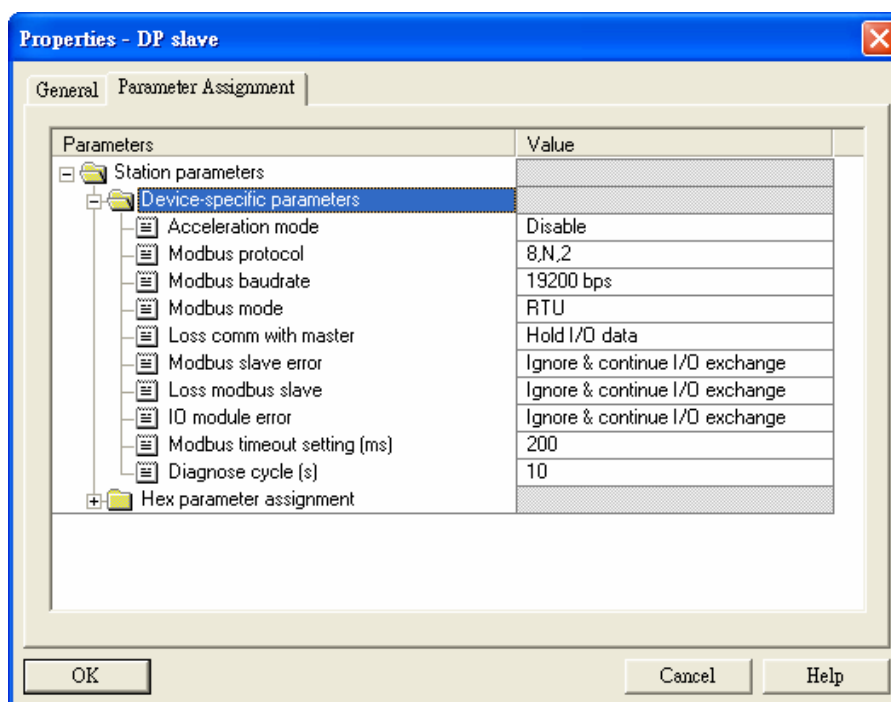
Definitions of settings:

Setup item	Setting	Definition
Acceleration mode	Enable	When the Modbus device is configured with many addresses and the addresses are consecutive, all contents in the consecutive addresses can be read or written at a time.
	Disable	When the Modbus device is configured with many addresses, only contents in a single address can be read or written.

Setup item	Setting		Definition
Modbus protocol	7, E, 1 7, O, 2 7, O, 1 8, E, 1 7, E, 2 8, O, 1	8, N, 1 8, N, 2	Modbus communication format (including data bit, stop bit and parity bit)
Modbus baudrate	1,200bps 19,200bps 2,400bps 38,400bps 4,800bps 57,600bps 9,600bps 115,200bps		Modbus serial transmission speed
Modbus mode	RTU/ASCII		Modbus communication mode
Loss communication with master	Hold I/O data		RTU-PD01 retains the I/O data before getting offline after getting offline from the master.
	Clear I/O data		RTU-PD01 reset all the I/O data to 0 after getting offline from the master.
Modbus slave error	Ignore & continue I/O exchange		RTU-PD01 continues exchanging data with the master even when Modbus read/write error occurs.
	Stop I/O exchange &report fault		RTU-PD01 stops exchanging data with the master when Modbus read/write error occurs.
Loss modbus slave	Ignore & continue I/O exchange		RTU-PD01 continues exchanging data with the master even when the Modbus slave is disconnected.
	Continue & report alarm		RTU-PD01 continues exchanging data with the master and alarms it when there is Modbus slave getting disconnected.
	Stop I/O exchange & report fault		RTU-PD01 stops exchanging data with the master and reports error to it when there is Modbus slave getting disconnected.
IO module error	Ignore & continue I/O exchange		RTU-PD01 continues exchanging data with the master even when error occurs in the right-side special I/O module.
	Continue & report alarm		RTU-PD01 continues exchanging data with the master and alarms it when error occurs in the right-side special I/O module.
	Stop I/O exchange & report fault		RTU-PD01 stops exchanging data with the master and reports error to it when error occurs in the right-side special I/O module.
Modbus timeout setting (ms)	0 ~ 65535		Modbus communication timeout. Unit: ms
Diagnose cycle (s)	1 ~ 20		Cycle for RTU-PD01 to diagnose the right-side special I/O module. Unit: s

8.2 Configuration Items

RTU-PD01 offers every flexible configuration method when being configured in PROFIBUS DP master configuration tool, for example, you can configure digital I/O modules or special I/O modules by the actual name of the module, or self-define the cofiguration.

Configuration item	Configurable device	Configuration method
Modbus 1 read address	Modbus devices connected to RTU-PD01	Modbus
Modbus 2 read address		
Modbus 4 read address		
Modbus 8 read address		
Modbus 1 write address		
Modbus 2 write address		
Modbus 4 write address		
Modbus 8 write address		
Modbus 1 read & write address		
Modbus 2 read & write address		
Modbus 4 read & write address		
Modbus 8 read & write address		
DVP08SM11N	DVP08SM11N connected to RTU-PD01	Standard configuration method for digital I/O module
DVP08SN11R/T	DVP08SN11R or DVP08SN11T connected to RTU-PD01	
DVP08SP11R/T	DVP08SP11R or DVP08SP11T connected to RTU-PD01	
DVP16SP11R/T	DVP16SP11R or DVP16SP11T connected to RTU-PD01	
DVP08ST	DVP08ST module connected to RTU-PD01	
8 DI	Digital I/O modules connected to RTU-PD01	Self-defined configuration method for digital I/O module
8 DO		
8 DIDO		
16 DI		
16 DO		
16 DIDO		
32 DI		
32 DO		
32 DIDO		
64 DI		
64 DO		
64 DIDO		
DVP04AD	DVP04AD-S connected to RTU-PD01	Standard configuration method for special I/O module
DVP06AD	DVP06AD-S connected to RTU-PD01	
DVP02DA	DVP02DA-S connected to RTU-PD01	
DVP04DA	DVP04DA-S connected to RTU-PD01	
DVP06XA	DVP06XA-S connected to RTU-PD01	
DVP04PT	DVP04PT-S connected to RTU-PD01	
DVP04TC	DVP04TC-S connected to RTU-PD01	

Configuration item	Configurable device	Configuration method
1 AI		
2 AI		
4 AI		
8 AI		
1 AO		
2 AO	Special I/O modules connected to RTU-PD01	Self-defined configuration method for special I/O module
4 AO		
8 AO		
1 AIAO		
2 AIAO		
4 AIAO		
8 AIAO		

8.3   Settings of Configuration Items

8.3.1   Settings of Configuration Items for Digital I/O Modules

There are 2 types of configuration items for digital I/O modules, standard configuration and self-defined configuration. By standard configuration, the digital I/O module is named after its actual name, whereas it is named after the number of points by self-defined configuration. You do not have to set up parameters in the configuration. The digital I/O can correspond to the master directly after the configuration

8.3.2   Settings of Configuration Items for Special I/O Modules

The special I/O module is named after its actual name in the configuration. You can configure special I/O module by standard configuration items. Detailed configuration methods will be explained in the following paragraphs.

● Configuration method for DVP06AD-S and DVP04AD-S

Refer to the figure below for the relevant parameters to configure DVP06AD-S. DVP04AD-S and DVP06AD-S have the same parameters to set, except that DVP06AD-S has two more parameters for input channels to set than does DVP04AD-S (Therefore, only the parameter settings for DVP06AD-S are introduced in this section).
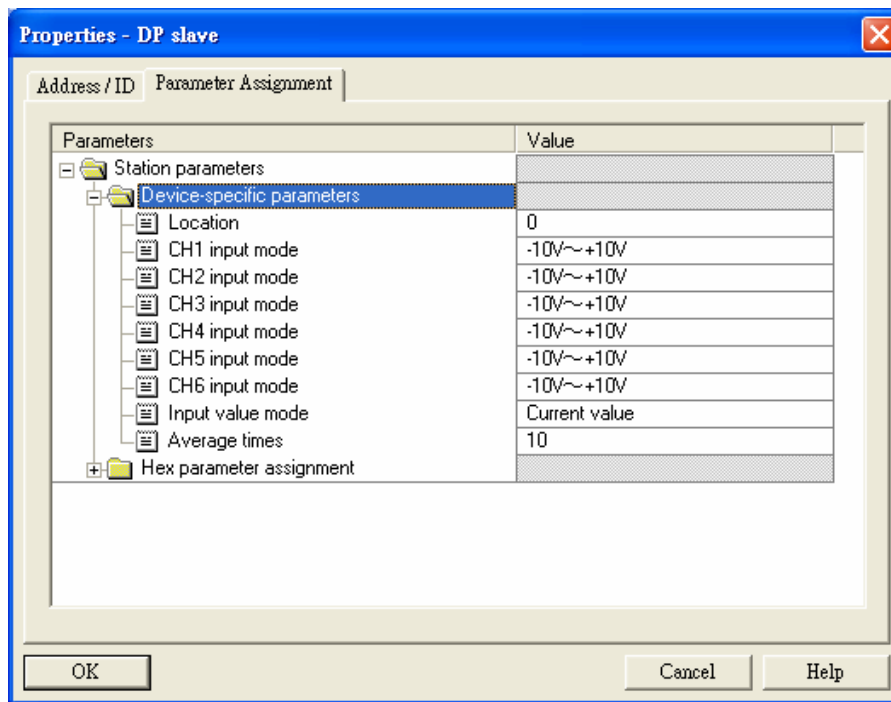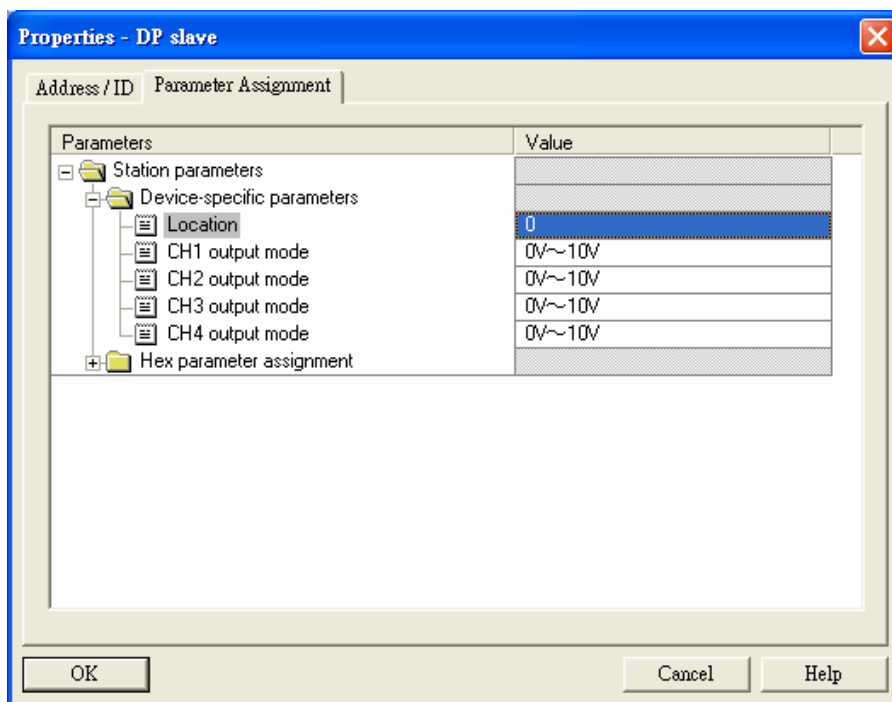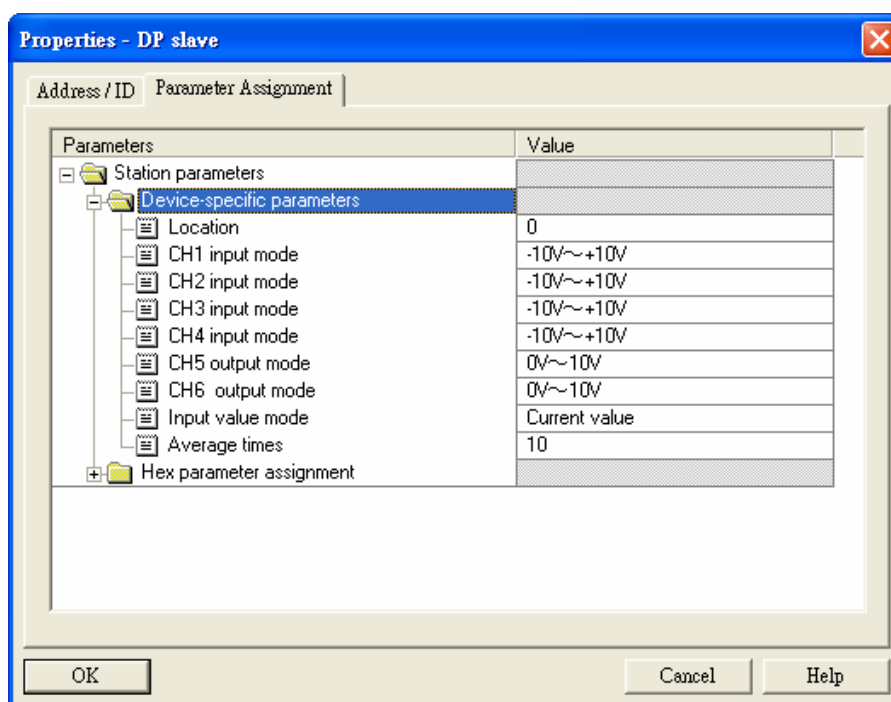
Definitions of configuration items:

Parameter	Value	Definition
Location	0 ~ 7	The location of DVP06AD-S at the right side of RTU-PD01. The location of the first special I/O module at the right side of RTU-PD01 is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
CH1 input mode CH2 input mode CH3 input mode CH4 input mode CH5 input mode CH6 input mode	-10V ~ +10V	The input channel on DVP06AD-S is set to mode 0: Voltage input mode. Input range: -10V ~ +10V
	-6V ~ +10V	The input channel on DVP06AD-S is set to mode 1: Voltage input mode. Input range: -6V ~ +10V.
	-12mA ~ +20mA	The input channel on DVP06AD-S is set to mode 2: Current input mode. Input range: -12mA ~ +20mA
	-20mA ~ +20mA	The input channel on DVP06AD-S is set to mode 3: Current input mode. Input range: -20mA ~ +20mA
Input value mode	Current value	Current value of the input signal in all channels on DVP06AD-S
	Average value	Average value of the input signals in all channels on DVP06AD-S
Average times	1 ~ 4096	The average times

● Configuration method for DVP04DA-S and DVP02DA-S

Refer to the figure below for the relevant parameters to configure DVP04DA-S. DVP04DA-S and DVP02DA-S have the same parameters to set, except that DVP04DA-S has two more parameters for input channels to set than does DVP02DA-S (Therefore, only the parameter settings for DVP04DA-S are introduced in this section).

Definitions of configuration items:

Parameter	Value	Definition
Location	0 ~ 7	The location of DVP04DA-S at the right side of RTU-PD01. The location of the first special I/O module at the right side of RTU-PD01 is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
CH1 output mode CH2 output mode CH3 output mode CH4 output mode	0V ~ 10V	The output channel on DVP04DA-S is set to mode 0: Voltage output mode. Output range: 0V ~ +10V
	2V ~ 10V	The output channel on DVP04DA-S is set to mode 1: Voltage output mode. Output range: 2V ~ 10V
	4mA ~ 20mA	The output channel on DVP04DA-S is set to mode 2: Current output mode. Output range: 4mA ~ 20mA
	0mA ~ 20mA	The output channel on DVP04DA-S is set to mode 3: Current output mode. Output range: 0mA ~ 20mA

● Configuration method for DVP06XA-S

Refer to the figure below for the relevant parameters to configure DVP06XA-S.

Definitions of configuration items:

Parameter	Value	Definition
Location	0 ~ 7	The location of DVP06XA-S at the right side of RTU-PD01. The location of the first special I/O module at the right side of RTU-PD01 is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
CH1 input mode CH2 input mode CH3 input mode CH4 input mode	-10V ~ +10V	The input channel on DVP06XA-S is set to mode 0: Voltage input mode. Input range: -10V ~ +10V
	-6V ~ +10V	The input channel on DVP06XA-S is set to mode 1: Voltage input mode. Input range: -6V ~ +10V
	-12mA ~ +20mA	The input channel on DVP06XA-S is set to mode 2: Current input mode. Input range: -12mA ~ +20mA
	-20mA ~ +20mA	The input channel on DVP06XA-S is set to mode 3: Current input mode. Input range: -20mA ~ +20mA
CH5 output mode CH6 output mode	0V ~ 10V	The output channel on DVP06XA-S is set to mode 0: Voltage output mode. Output range: 0V ~ +10V
	2V ~ 10V	The output channel on DVP06XA-S is set to mode 1: Voltage output mode. Output range: 2V ~ 10V
	4mA ~ 20mA	The output channel on DVP06XA-S is set to mode 2: Current output mode. Output range: 4mA ~ 20mA
	0mA ~ 20mA	The output channel on DVP06XA-S is set to mode 3: Current output mode. Output range: 0mA ~ 20mA
Input value mode	Current value	Current value of the input signal in CH1 ~ CH4 on DVP06XA-S
	Average value	Average value of the input signals in CH1 ~ CH4 on DVP06XA-S
Set average times	1 ~ 4096	The average times

● Configuration method for DVP04PT-S

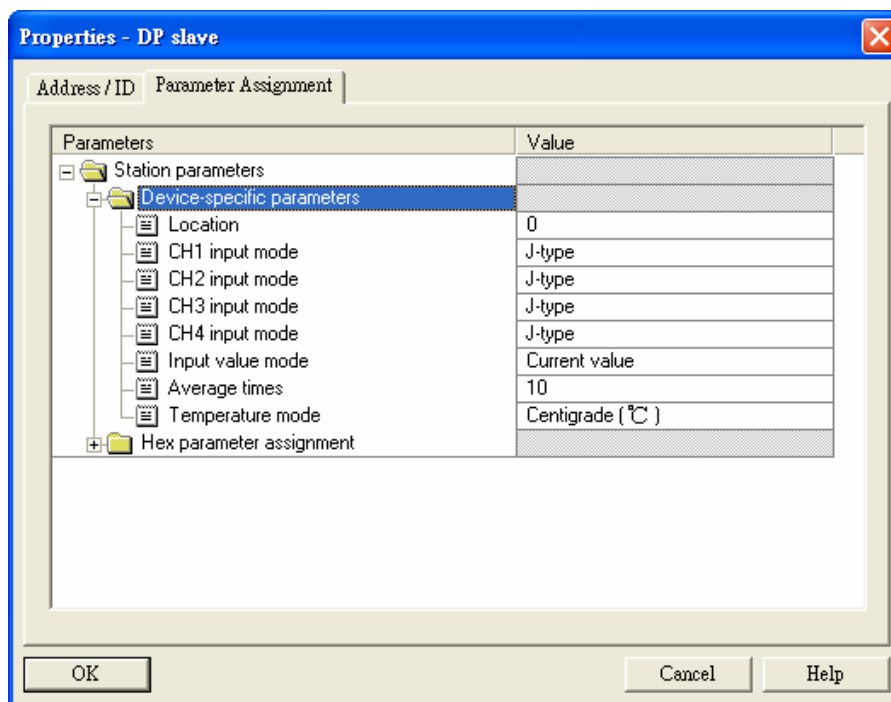Refer to the figure below for the relevant parameters to configure DVP04PT-S.
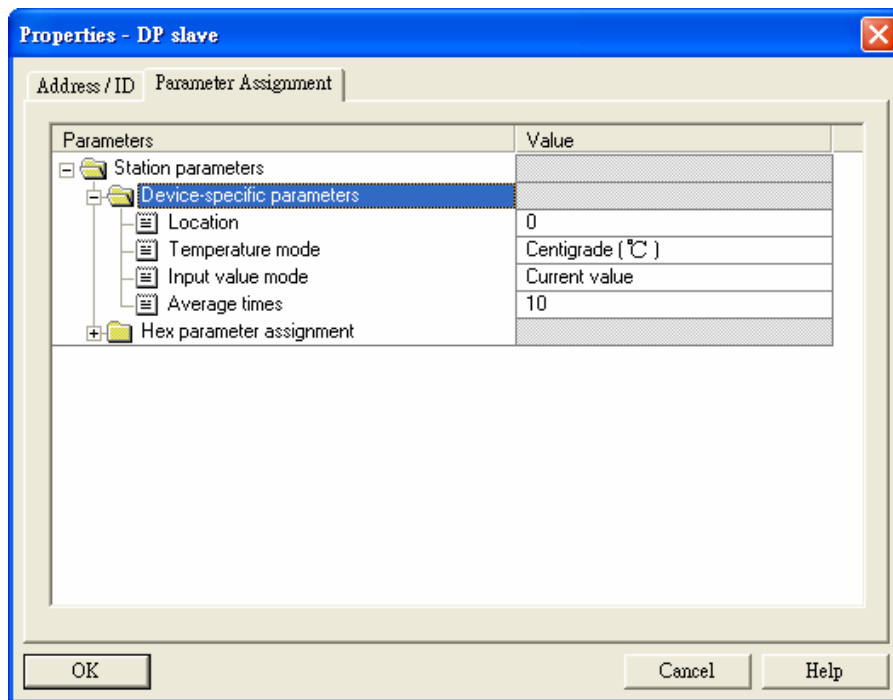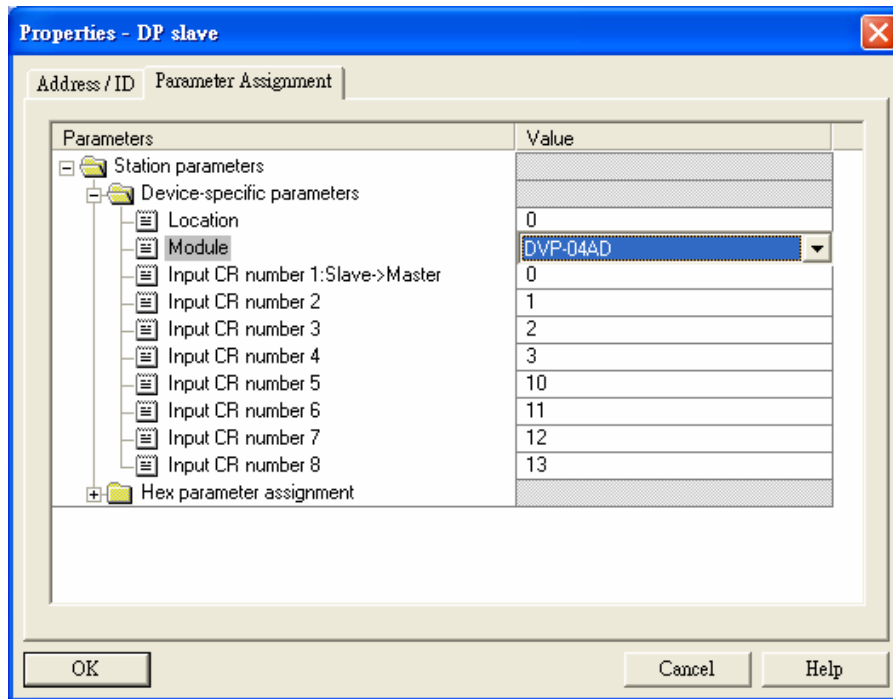

Definitions of configuration items:

Parameter	Value	Definition
Location	0 ~ 7	The location of DVP04PT-S at the right side of RTU-PD01. The location of the first special I/O module at the right side of RTU-PD01 is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
Temperature mode	Centigrade (°C)	Collecting temperature in Centigrade by CH1 ~ CH4 on DVP04PT-S
	Fahrenheit (°F)	Collecting temperature in Fahrenheit by CH1 ~ CH4 on DVP04PT-S
Input value mode	Current value	Current value of the collected temperature at CH1 ~ CH4 on DVP04PT-S
	Average value	Average value of the collected temperatures at CH1 ~ CH4 on DVP04PT-S
Average times	1 ~ 4096	The average times.

● Configuration method for DVP04TC-S

Refer to the figure below for the relevant parameters to configure DVP04TC-S.

Definitions of configuration items:

Parameter	Value	Definition
Location	0 ~ 7	The location of DVP04TC-S at the right side of RTU-PD01. The location of the first special I/O module at the right side of RTU-PD01 is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
CH1 input mode	J, K, R, S, T	Thermocouple type for CH1 on DVP04TC-S
CH2 input mode	J, K, R, S, T	Thermocouple type for CH2 on DVP04TC-S
CH3 input mode	J, K, R, S, T	Thermocouple type for CH3 on DVP04TC-S
CH4 input mode	J, K, R, S, T	Thermocouple type for CH4 on DVP04TC-S
Input value mode	Current value	Current value of the collected temperature at CH1 ~ CH4 on DVP04TC-S
	Average value	Average value of the collected temperatures at CH1 ~ CH4 on DVP04TC-S
average times	1 ~ 4096	The average times
Temperature mode	Centigrade (°C)	Collecting temperature in Centigrade by CH1 ~ CH4 on DVP04TC-S
	Fahrenheit (°F)	Collecting temperature in Fahrenheit by CH1 ~ CH4 on DVP04TC-S

8.3.3 Self-Defined Configuration Settings for Special I/O Modules

In self-defined configuration, special I/O modules are named after their configurable number of control registers (CR). You can choose the CR in the special I/O module to be read or written when configuring. See the following paragraphs for the meanings of each configuration item.

● Configuration method for 8AI, 4AI, 2AI and 1AI modules

Refer to the figure below for the relevant parameters to configure an 8AI module. 8AI, 4AI, 2AI and 1AI modules have the same parameters to set, except that the number of configurable CRs in 1AI, 2AI and 4AI modules is different from that of 8AI module (Therefore, only the parameter settings for 8AI are introduced in this section).
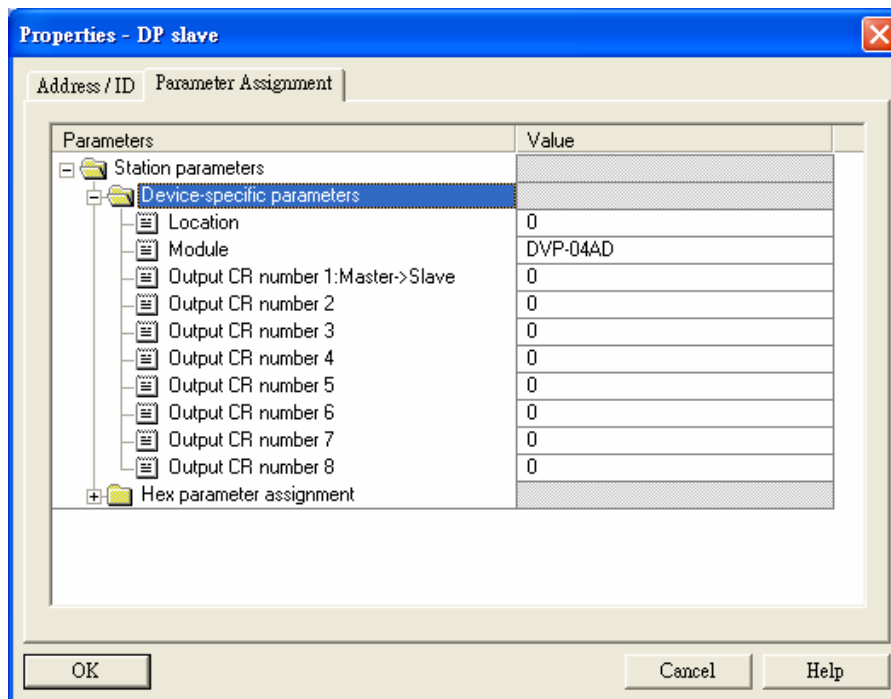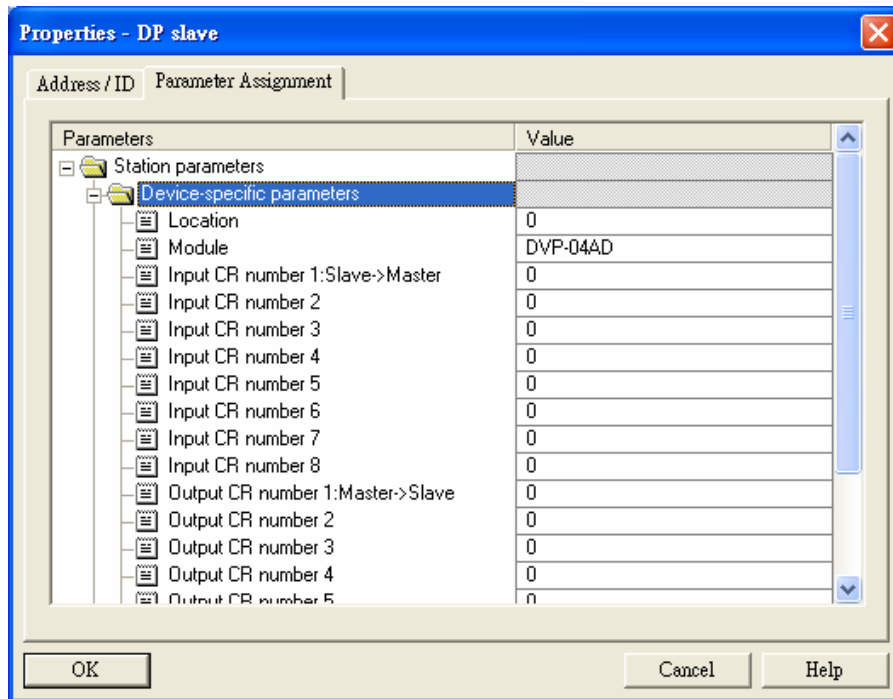

Definitions of configuration items:

Parameter	Value	Definition
Location	0 ~ 7	The location of the special I/O module at the right side of RTU-PD01. The location of the first special I/O module at the right side of RTU-PD01 is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
Module	DVP04AD DVP06XA DVP06AD DVP04PT DVP02DA DVP04TC DVP04DA DVP01PU	Special I/O module in use
Input CR number 1: Slave → Master	0 ~ 48	No. of the CR in special I/O module to be read by PROFIBUS DP master
Input CR number 2	0 ~ 48	
Input CR number 3	0 ~ 48	
Input CR number 4	0 ~ 48	
Input CR number 5	0 ~ 48	
Input CR number 6	0 ~ 48	
Input CR number 7	0 ~ 48	
Input CR number 8	0 ~ 48	

● Configuration method for 8AO, 4 AO, 2AO and 1AO modules

Refer to the figure below for the relevant parameters to configure an 8AI module. 8AO, 4AO, 2AO and 1AO modules have the same parameters to set, except that the number of configurable CRs in 1AO, 2AO and 4AO modules is different from that of 8AO module (Therefore, only the parameter settings for 8AO are introduced in this section).

Definitions of configuration items:

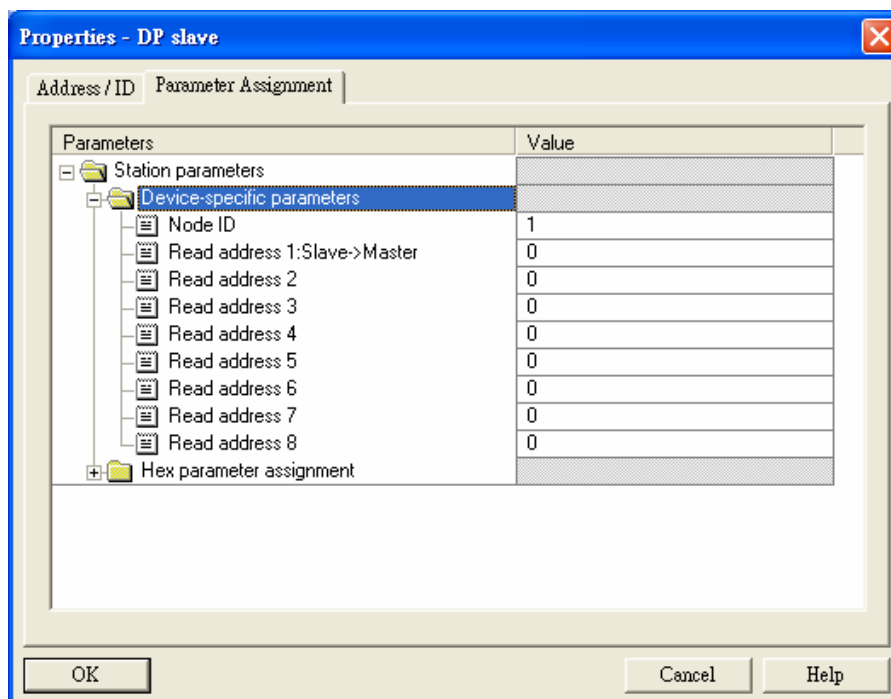| Parameter	Value		Definition
Location	0 ~ 7		The location of the special I/O module at the right side of RTU-PD01. The location of the first special I/O module at the right side of RTU-PD01 is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
Module	DVP04AD DVP06AD DVP02DA DVP04DA	DVP06XA DVP04PT DVP04TC DVP01PU	Special I/O module in use
Output CR number 1: Master → Slave	0 ~ 48		No. of the CR in special I/O module to be written by PROFIBUS DP master
Output CR number 2	0 ~ 48		
Output CR number 3	0 ~ 48		
Output CR number 4	0 ~ 48		
Output CR number 5	0 ~ 48		
Output CR number 6	0 ~ 48		
Output CR number 7	0 ~ 48		
Output CR number 8	0 ~ 48		

● Configuration method for 8AIAO, 4AIAO, 2AIAO and 1AIAO modules

Refer to the figure below for the relevant parameters to configure an 8AIAO module. 8AIAO, 4AIAO, 2AIAO and 1AIAO modules have the same parameters to set, except that the number of configurable CRs in 1AIAO, 2AIAO and 4AIAO modules is different from that of 8AIAO module (Therefore, only the parameter settings for 8AIAO are introduced in this section).

Definitions of configuration items:

Parameter	Value		Definition
Location	0 ~ 7		The location of the special I/O module at the right side of RTU-PD01. The location of the first special I/O module at the right side of RTU-PD01 is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
Module	DVP04AD DVP06AD DVP02DA DVP04DA	DVP06XA DVP04PT DVP04TC DVP01PU	Special I/O module in use
Input CR number 1: Slave → Master	0 ~ 48		No. of the CR in special I/O module to be read by PROFIBUS DP master
Input CR number 2	0 ~ 48		
Input CR number 3	0 ~ 48		
Input CR number 4	0 ~ 48		
Input CR number 5	0 ~ 48		
Input CR number 6	0 ~ 48		
Input CR number 7	0 ~ 48		
Input CR number 8	0 ~ 48		

Parameter	Value	Definition
Output CR number 1: Master → Slave	0 ~ 48	
Output CR number 2	0 ~ 48	
Output CR number 3	0 ~ 48	
Output CR number 4	0 ~ 48	No. of the CR in special I/O module to be written by PROFIBUS DP master
Output CR number 5	0 ~ 48	
Output CR number 6	0 ~ 48	
Output CR number 7	0 ~ 48	
Output CR number 8	0 ~ 48	

8.3.4   Modbus Configuration Settings

In Modbus configuration, parameters are named after the address of configurable Modbus device. See the following paragraphs for the meanings of each configuration item.

● Configuration method for Modbus 8 read address, Modbus 4 read address, Modbus 2 read address and Modbus 1 read address

Refer to the figure below for the relevant parameters to configure Modbus 8 read address. Modbus 8 read address, Modbus 4 read address, Modbus 2 read address and Modbus 1 read address have the same parameters to set, except that the addresses of configurable Modbus device for Modbus 4 read address, Modbus 2 read address and Modbus 1 read address are different from that of Modbus 8 read address (Therefore, only the parameter settings for Modbus 8 read address are introduced in this section).

Definitions of configuration items:

Parameter	Value	Definition
Node ID	1 ~ 254	Address of Modbus device connected to RTU-PD01
Read address 1: Slave → Master	0 ~ 65535	Parameter address of Modbus device to be read by PROFIBUS DP master
Read address 2	0 ~ 65535	
Read address 3	0 ~ 65535	
Read address 4	0 ~ 65535	
Read address 5	0 ~ 65535	
Read address 6	0 ~ 65535	
Read address 7	0 ~ 65535	
Read address 8	0 ~ 65535	

● Configuration method for Modbus8 write address, Modbus 4 write address, Modbus 2 write address, and Modbus 1 write address

Refer to the figure below for the relevant parameters to configure Modbus 8 write address. Modbus 8 write address, Modbus 4 write address, Modbus 2 write address and Modbus 1 write address have the same parameters to set, except that the addresses of configurable Modbus device for Modbus 4 write address, Modbus 2 write address and Modbus 1 write address are different from that of Modbus 8 write address (Therefore, only the parameter settings for Modbus 8 write address are introduced in this section).
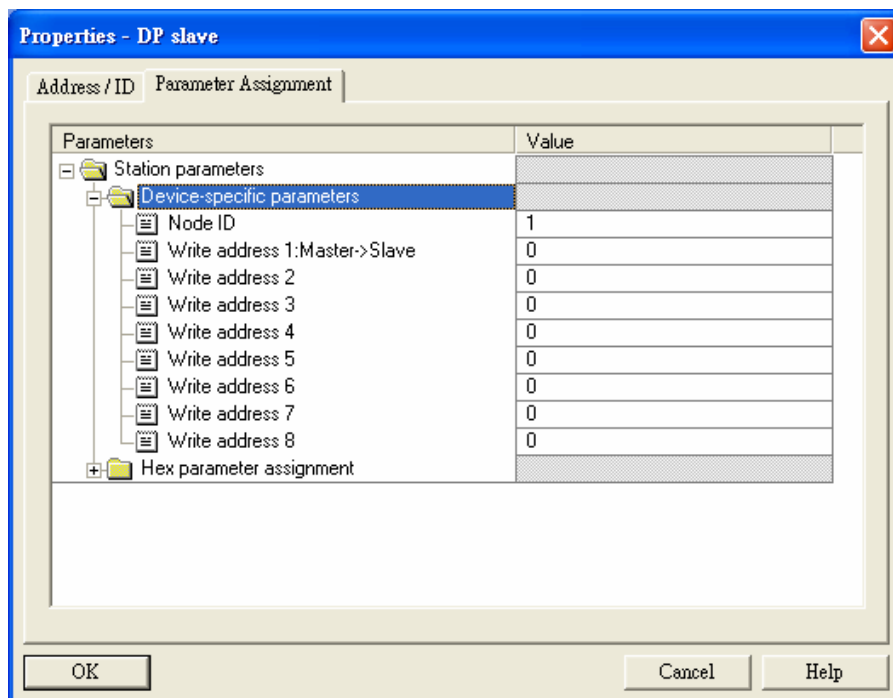
Definitions of configuration items:

Parameter	Value	Definition
Node ID	1 ~ 254	Address of Modbus device connected to RTU-PD01
Write address 1 : Master → Slave	0 ~ 65535	Parameter address of Modbus device to be written by PROFIBUS DP master
Write address 2	0 ~ 65535	
Write address 3	0 ~ 65535	
Write address 4	0 ~ 65535	
Write address 5	0 ~ 65535	
Write address 6	0 ~ 65535	
Write address 7	0 ~ 65535	
Write address 8	0 ~ 65535	

● Configuration method for Modbus 8 read & write address, Modbus 4 read & write address, Modbus 2 read & write address and Modbus 1 read & write address

Refer to the figure below for the relevant parameters to configure Modbus 8 read & write address. Modbus 8 read & write address, Modbus 4 read & write address, Modbus 2 read & write address and Modbus 1 read & write address have the same parameters to set, except that the addresses of configurable Modbus device for Modbus 4 read & write address, Modbus 2 read & write address and Modbus 1 read & write address are different from that of Modbus 8 read & write address (Therefore, only the parameter settings for Modbus 8 read & write address are introduced in this section).

Definitions of configuration items:

Parameter	Value	Definition
Node ID	1 ~ 254	Address of Modbus device connected to RTU-PD01
Read address 1: Slave → Master	0 ~ 65535	Parameter address of Modbus device to be read by PROFIBUS DP master
Read address 2	0 ~ 65535	
Read address 3	0 ~ 65535	
Read address 4	0 ~ 65535	
Read address 5	0 ~ 65535	
Read address 6	0 ~ 65535	
Read address 7	0 ~ 65535	
Read address 8	0 ~ 65535	
Write address 1: Master → Slave	0 ~ 65535	Parameter address of Modbus device to be written by PROFIBUS DP master
Write address 2	0 ~ 65535	
Write address 3	0 ~ 65535	
Write address 4	0 ~ 65535	
Write address 5	0 ~ 65535	
Write address 6	0 ~ 65535	
Write address 7	0 ~ 65535	
Write address 8	0 ~ 65535	

9 LED Indicator and Trouble-shooting

There are 5 LED indicators on RTU-PD01: POWER, NET, RS-485, RUN and ALARM.

● POWER LED

POWER LED displays whether the power supply on RTU-PD01 is working normally.

LED status	Indication	How to correct
Green light on	Normal	---
Off	No power supply	Check if the power supply is normal.

● NET LED

NET LED displays whether the communication between RTU-PD01 and PROFIBU DP master is working normally.

LED status	Indication	How to correct
Green light on	Normal	---
Red light on	RTU-PD01 is not connected to the master.	1. Check if RTU-PD01 is connected to PROFIBUS DP bus. 2. Check if the communication cable between RTU-PD01 and PROFIBUS DP master is in normal status.

LED status	Indication	How to correct
Red light on	RTU-PD01 is not connected to the master.	3. Check if the actual address of RTU-PD01 is consistent with the one set in the master configuration software.
Red light flashes	RTU-PD01 setting or configuration error	1. Check if the PROFIBUS address of RTU-PD01 is between 1 and 125 (decimal). 2. Check if the I/O modules actually connected to RTU-PD01 and their order are consistent with the software configuration.

- RS-485 LED

  RS-485 LED displays whether the RS-485 communication between RTU-PD01 and the Modbus device connected is working normally.

LED status	Indication	How to correct
Green light on	Normal	---
Green light flashes	The Modbus function has not been enabled, or no Modbus slave is configured.	---
Red light on	All Modbus slaves are off-line	Check if the RS-485 cable is working normally, or the communication format is correct.
Red light flahses	The RS-485 communication with part of the Modbus devices connected is abnormal.	Check if part of the RS-485 devices connected have not responded or responded incorrectly.

- RUN LED

  RUN LED displays whether RTU-PD01 is operating or in stop status.

RUN status	Indication
Green light on	RTU-PD01 is operating.
Off	RTU-PD01 is in stop status.

- ALARM LED

  ALARM LED displays whether the right-side special I/O module is working normally and the power supply is sufficient.

LED status	Indication	How to correct
Off	Normal	---
Red light on	DV24V power supply is insufficient.	Check if the power supply is overloaded.
Red light slowly flashes (on 0.5s and off 0.5s)	Error in special I/O module	Please refer to the explanations on error registersfor special I/O module in "DVP-PLC Application Manual – Special Modules".
Red light fast flashes (on 0.3s and off 0.3s)	Special I/O module is off-line.	1. Check if the power supply on special I/O module is normal. 2. Check if the connection between RTU-PD01 and special module is working normally.

10 Application Example 1

Mission:

Exchanging data between S7-300 (Siemens PLC) and RTU-PD01 through PROFIBUS DP network

Connecting RTU-PD01 to PROFIBUS DP network:

1. S7-300 as the PROFIBUS DP master; RTU-PD01 as the slave. See the PROFIBUS DP network in the figure below.
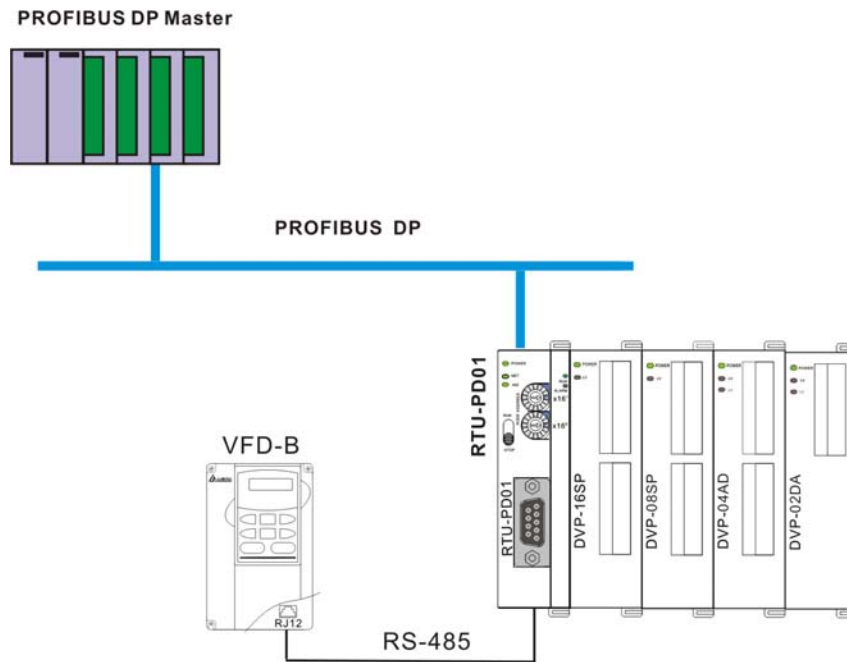
2. Set the PROFIBUS address of RTU-PD01 to "1".
3. Connect RTU-PD01 to DVP16SP, DVP08SP, DVP04AD-S and DVP02DA-S in order at its right hand side. Make sure the connection and wiring between RTU-PD01 and the special I/O modules and to the entire network is correct.

Configuring RTU-PD01 in PROFIBUS DP network (the software configuration):

● Create a new project by software wizard

1. Open SIMATIC Manager.
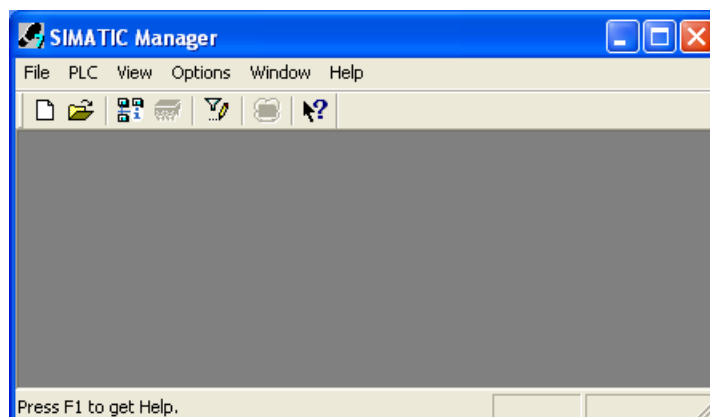
2. Select "File" => "New Project Wizard".
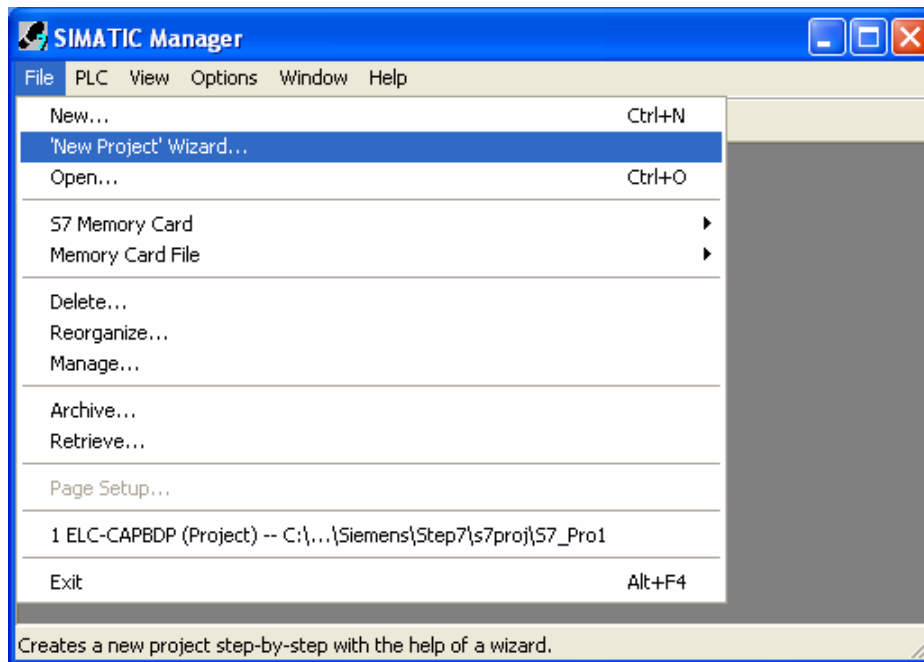
3. Click "Next" in the wizard.
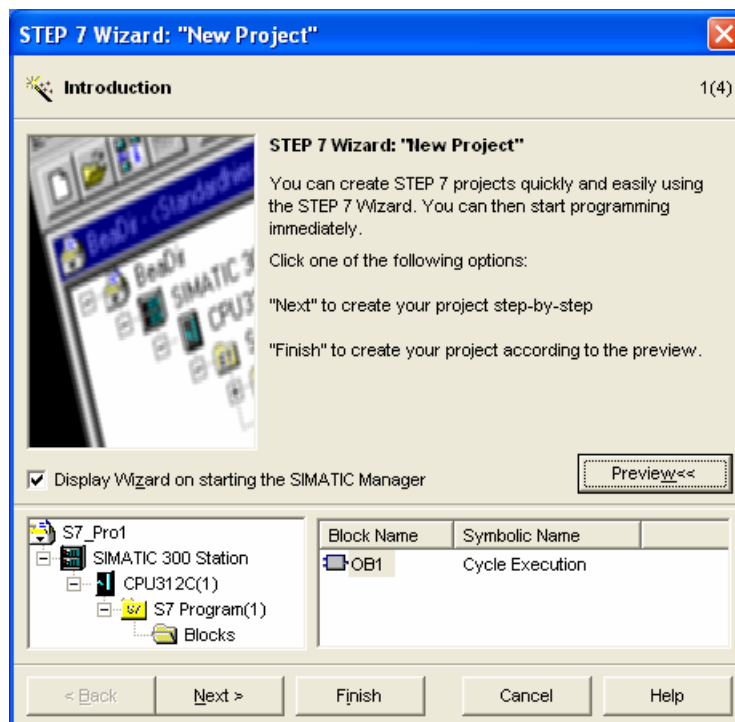
4. Select "CPU315-2 DP" for CPU as we are using the S7-300 model. Click "Next".
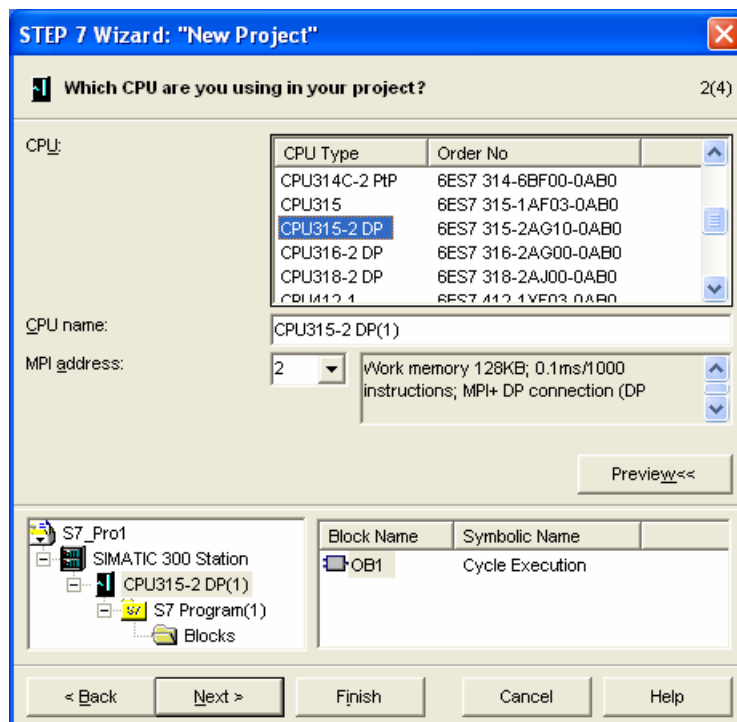
5. Select the block we need and click "Next".
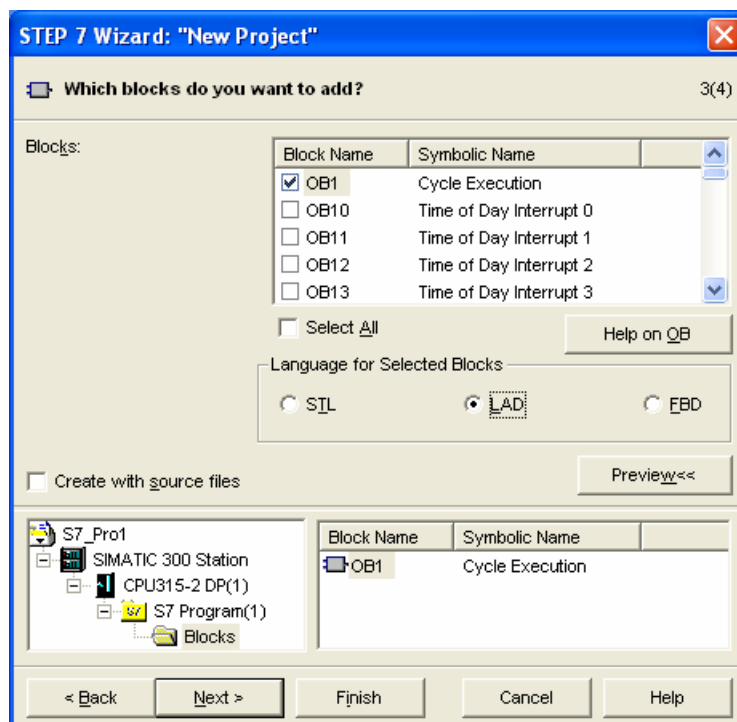
6. Enter the project name and click "Finish".
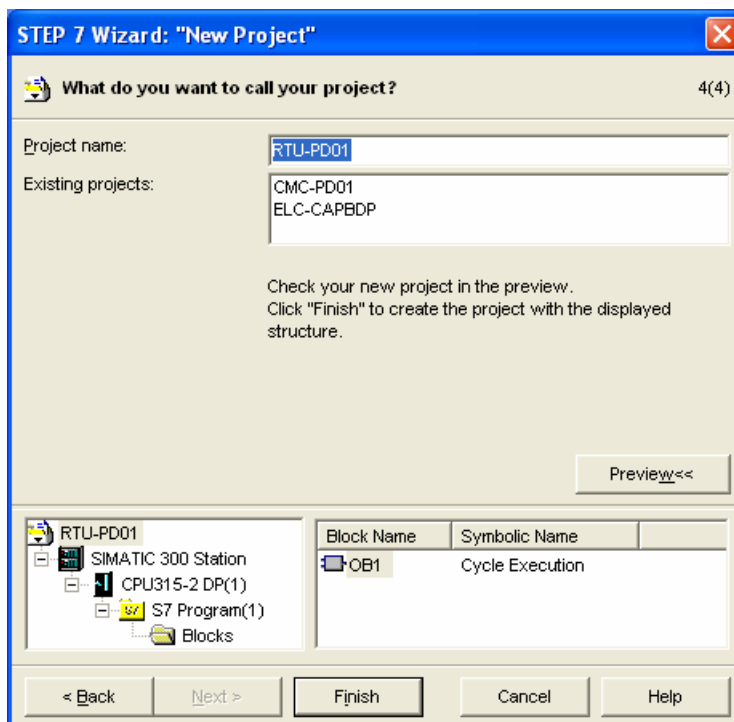
7. A new window will appear after the project is created.
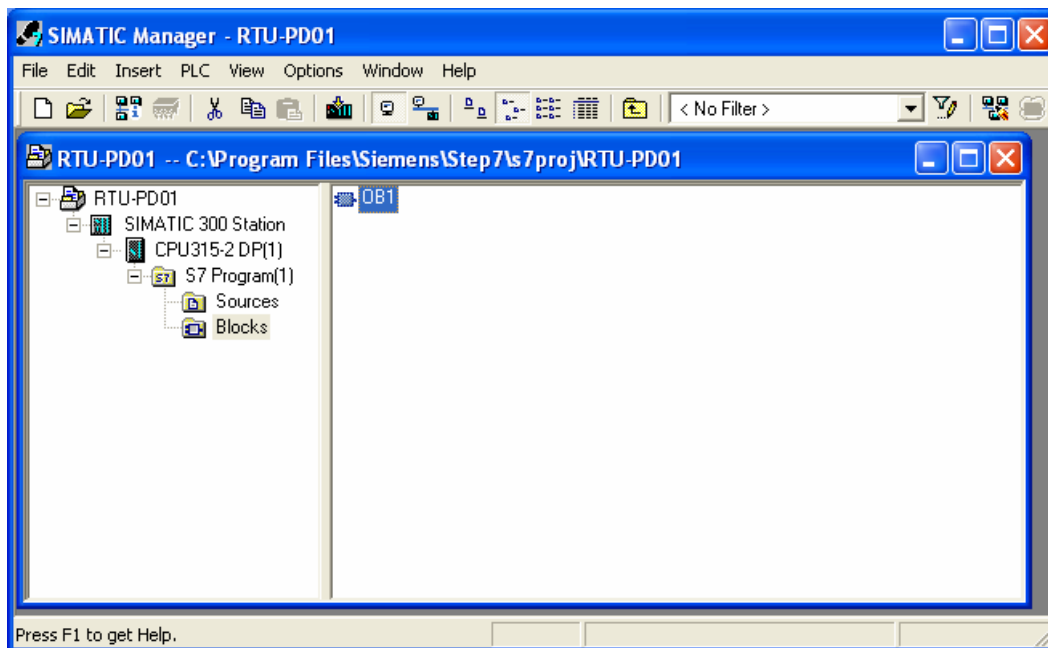
- Add PROFIBUS DP bus

1. Select "SIMATIC 300 Station" in the project created. Double click "Hardware", and a new window (HW-Config) will appear.
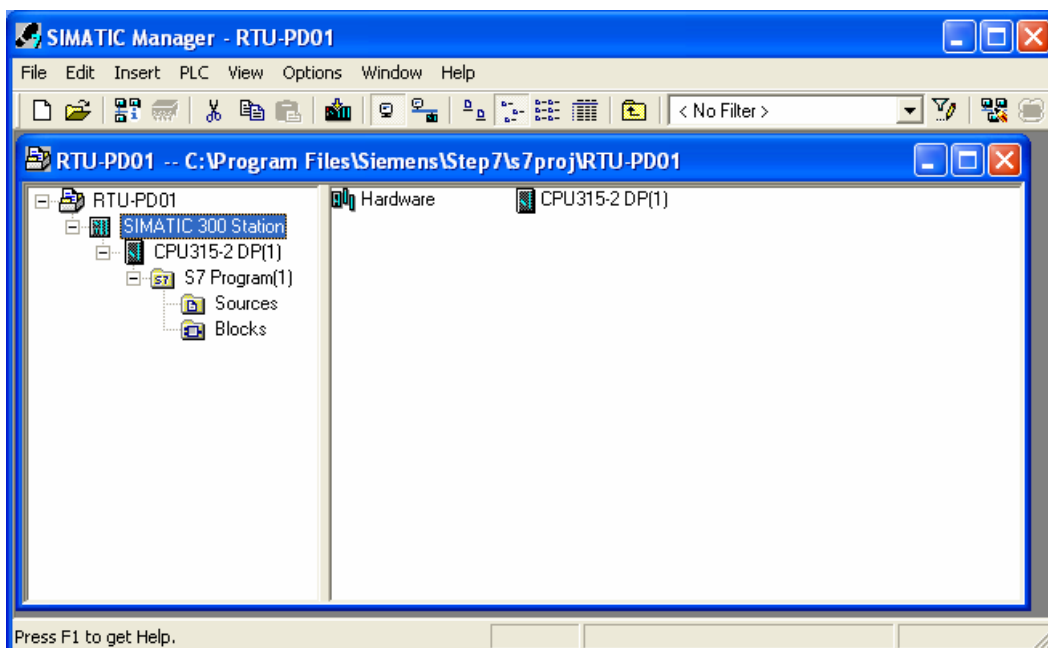
2. In the "HW Config" window, double click "DP" in the left-hand side column and a dialog box will appear.
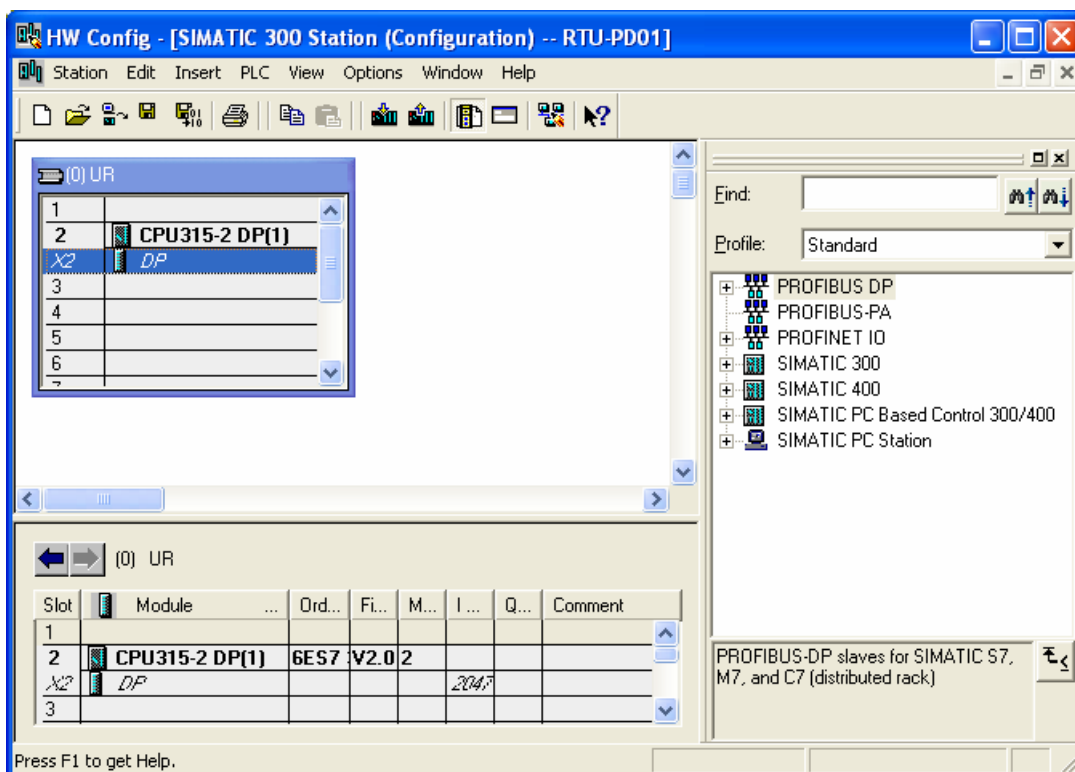
3. Click "Properties" in the dialog box, leading to another dialog box.
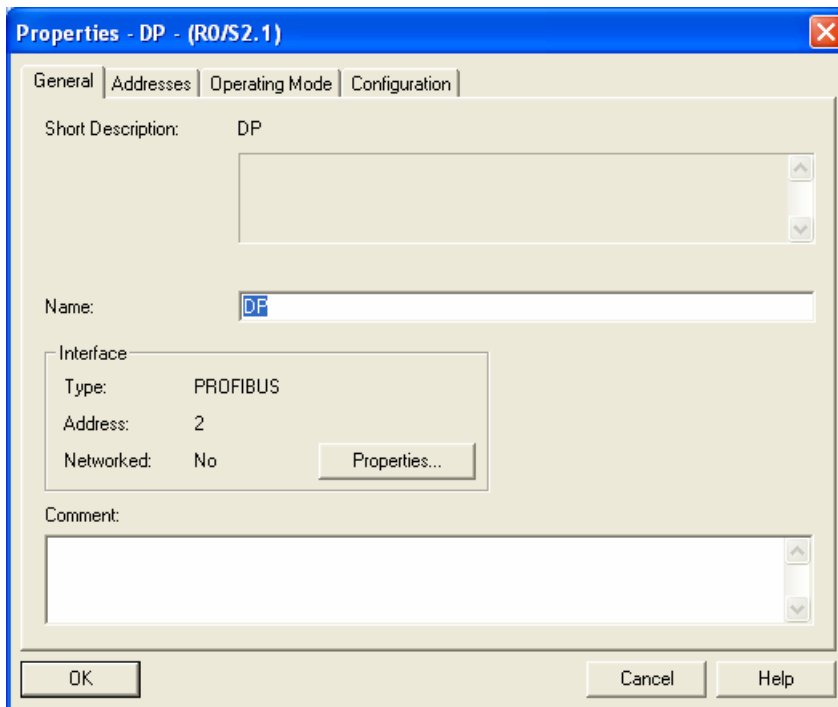
4. Select "Address" in the dialog box to be the address of the master. Then Click "New" to go to the next dialog box.
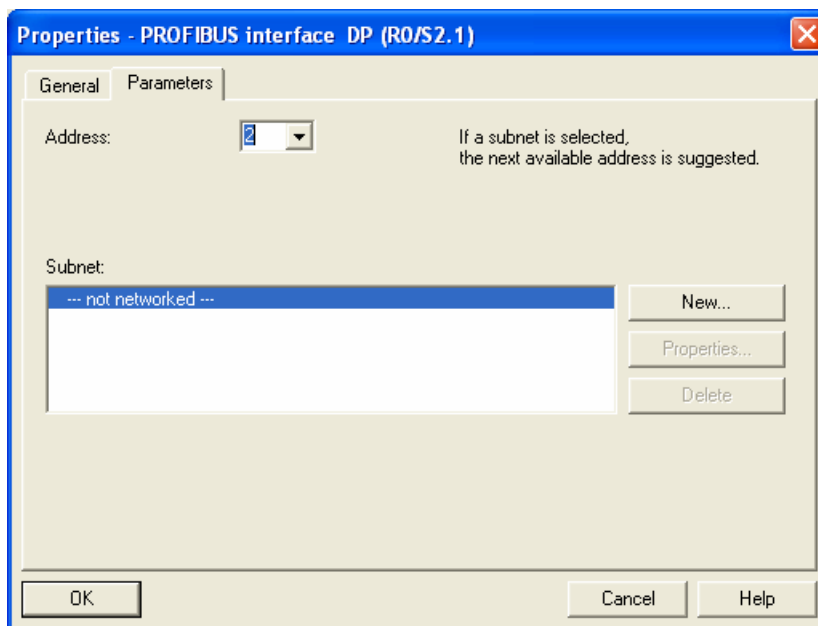
5. Select communication speed and bus type, then click "OK".
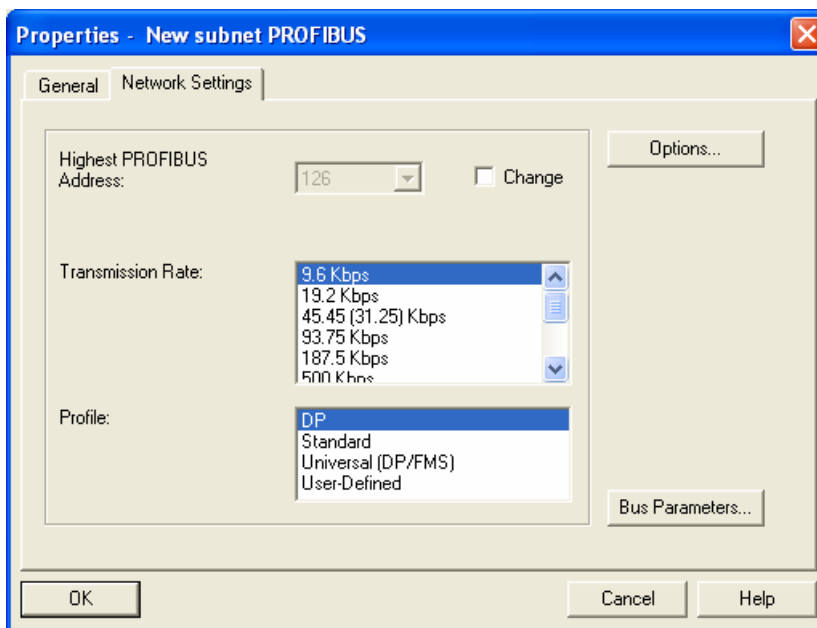
6. Confirm the communication speed and master address for PROFIBUS DP bus, then click "OK".
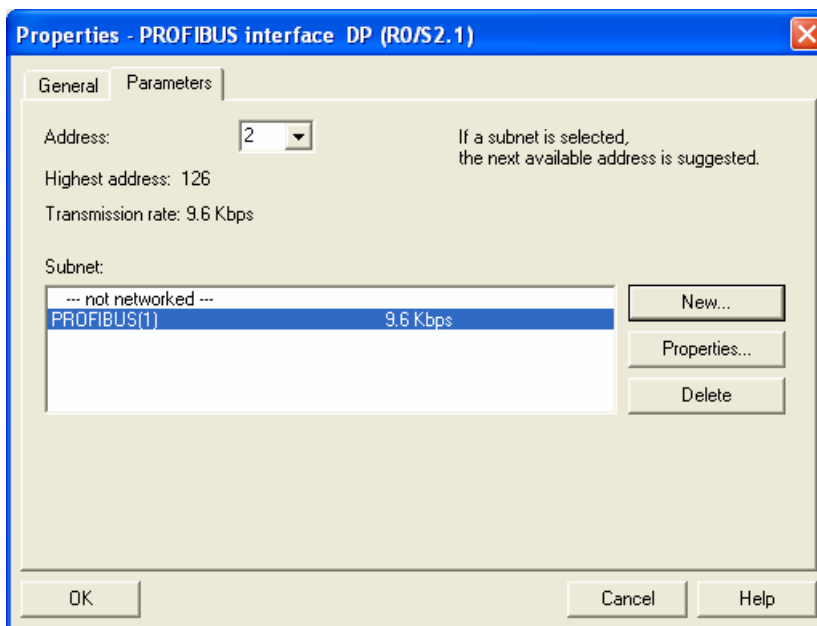
7. Confirm the information on the PROFIBUS DP bus in the dialog box and click "OK".
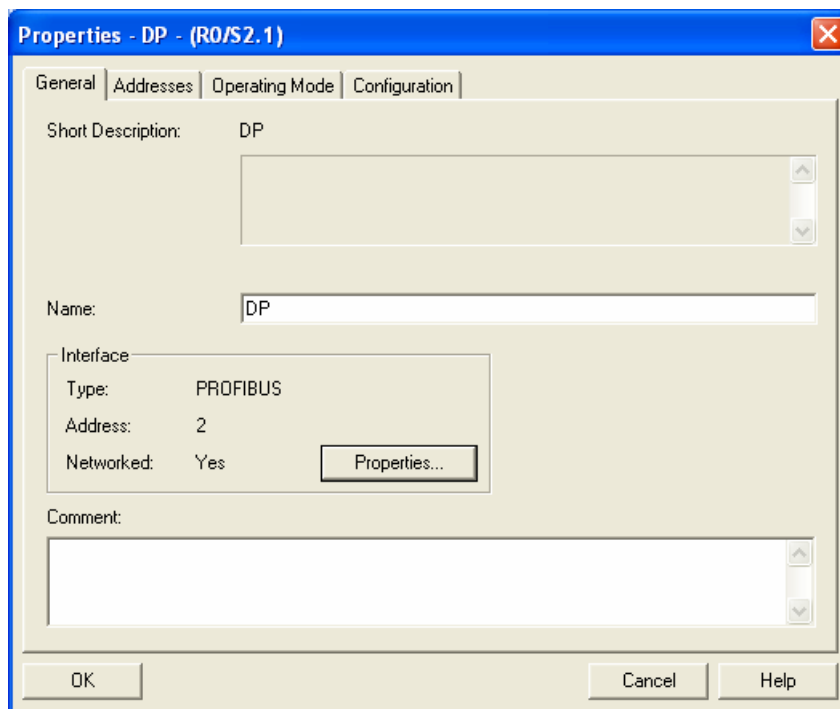
8. Once all the parameters are set, a PROFIBUS DP bus will appear after the UR window.
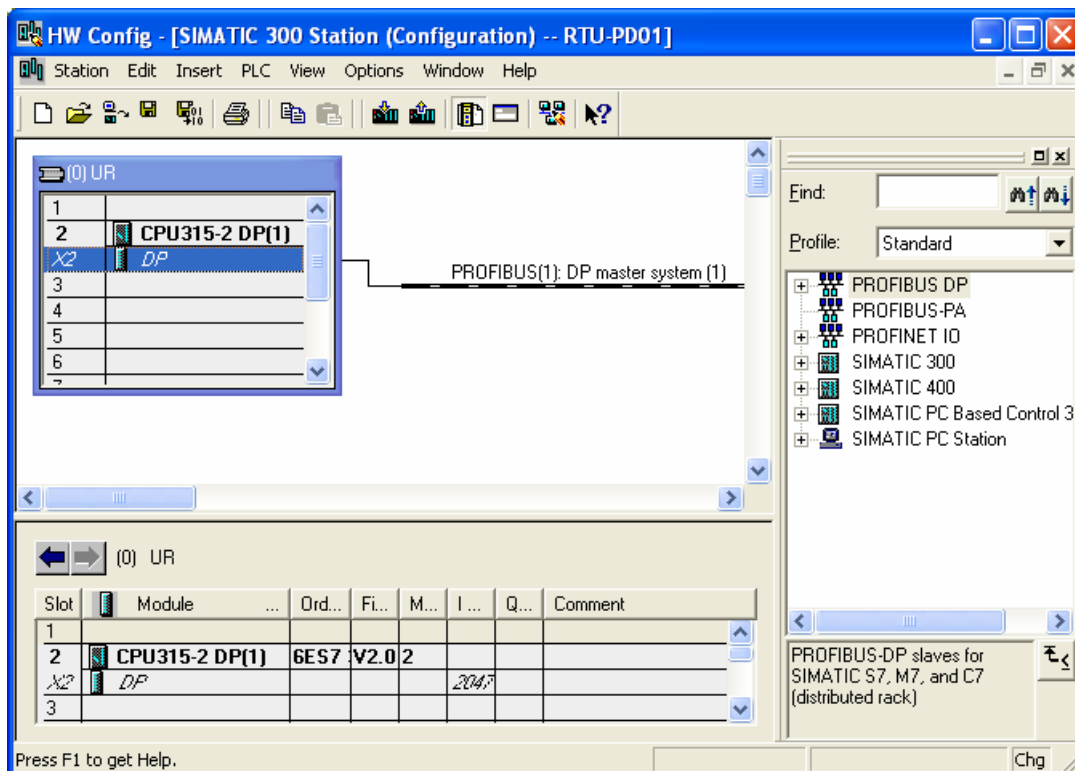
● Add GSD file

1. Select "Options" => "Install New GSD" in the HW Config window.
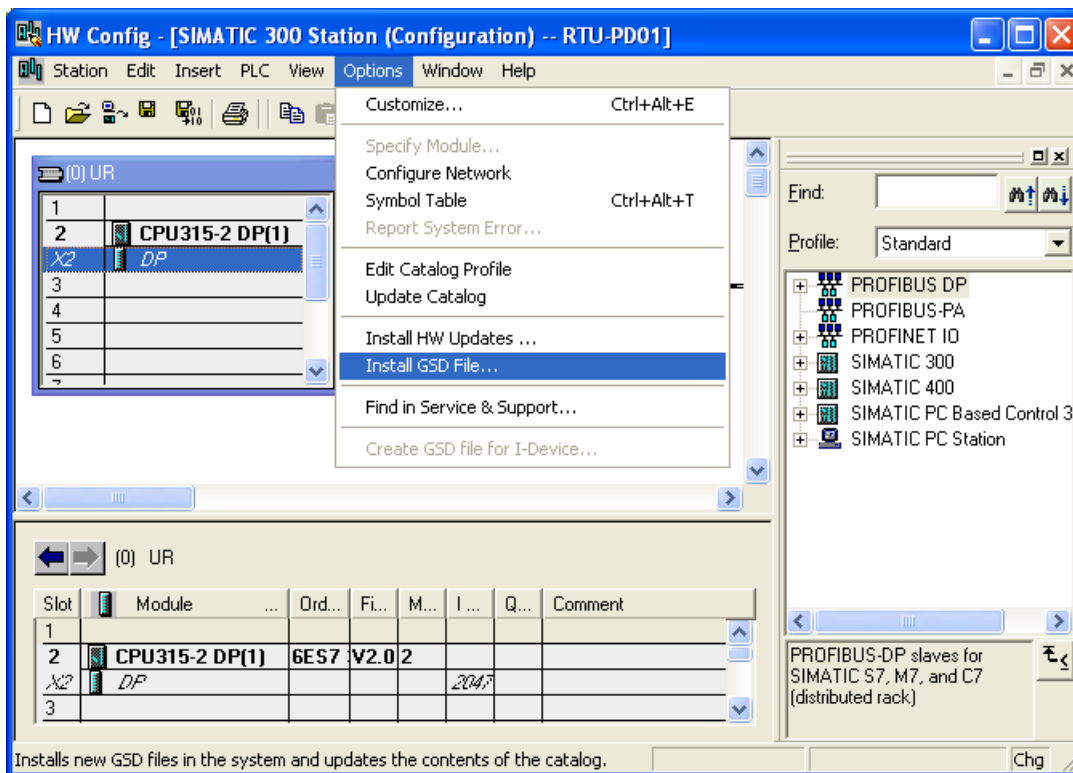
2. Find the path of the GSD file, select it and click "Install" to add the GSD file needed.
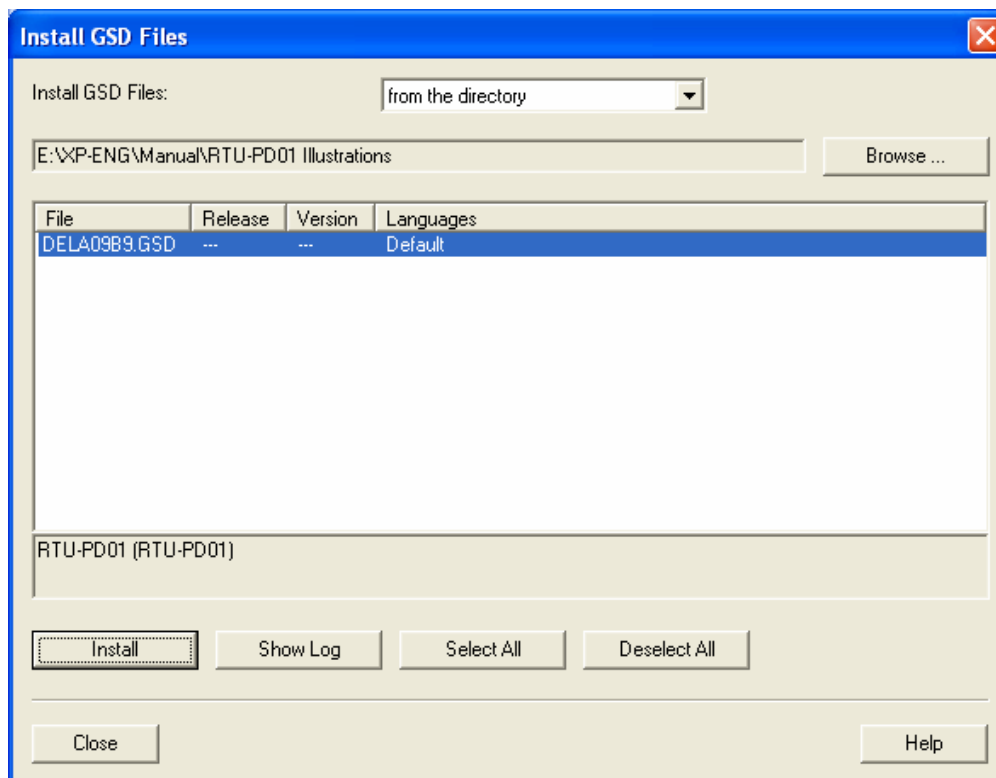
3. We can then see RTU-PD01 in the right-hand side column. RTU-PD01 is the module added.
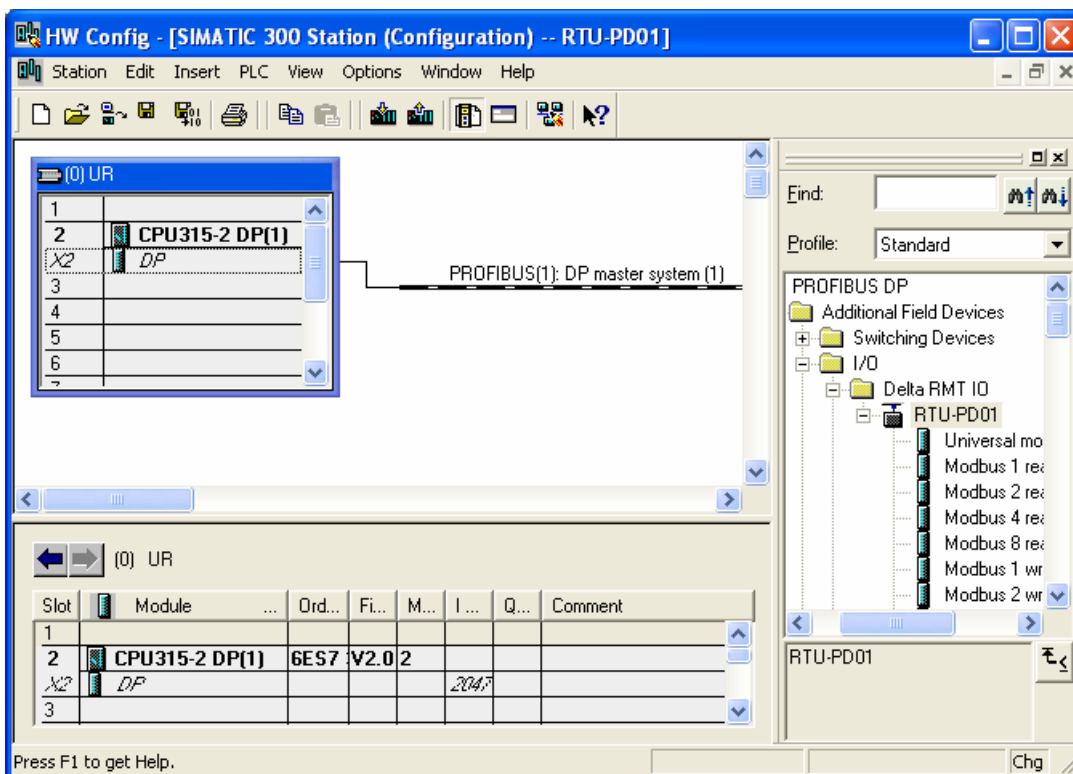
● Add RTU-PD01 slave and set up parameters

1. Select PROFIBUS DP on the right-hand side column and double click "RTU-PD01" to open a dialog box.
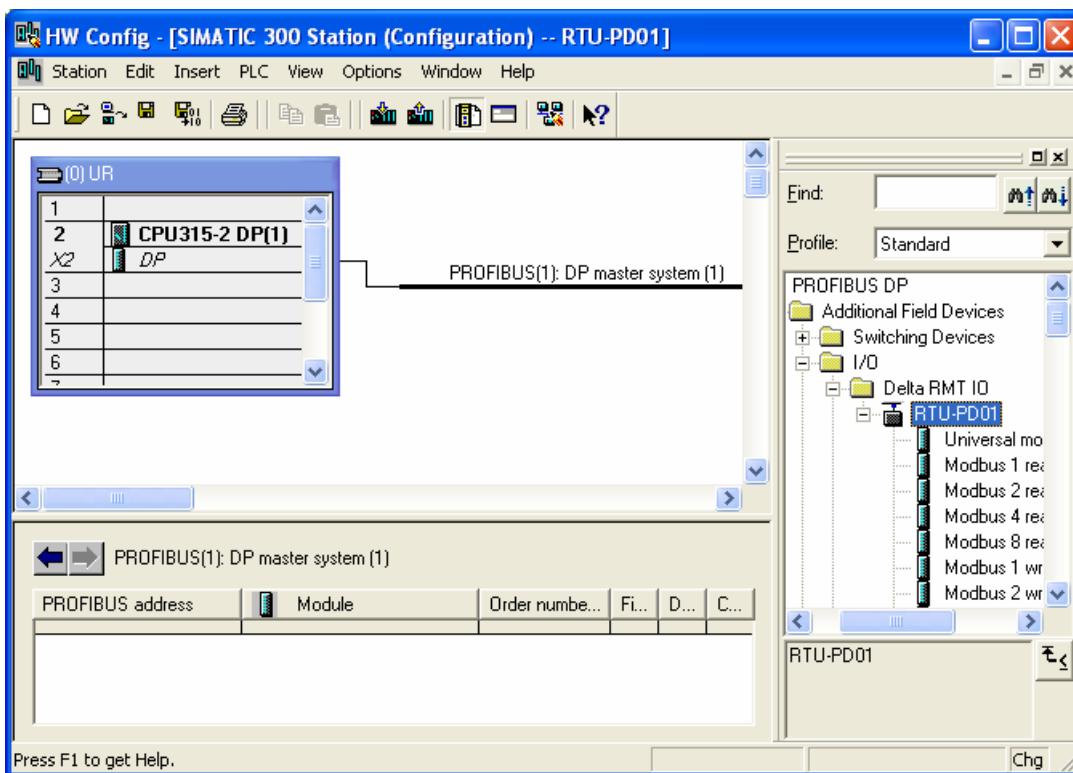
2. In the dialog box, select the address of RTU-PD01 slave. The address has to be the same as the setting of address setup switch on RTU-PD01. Click "OK".
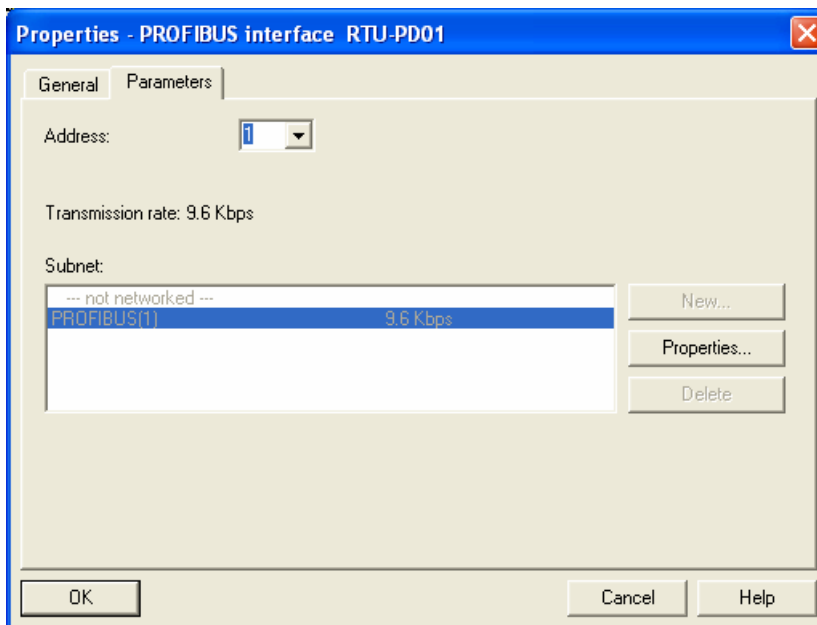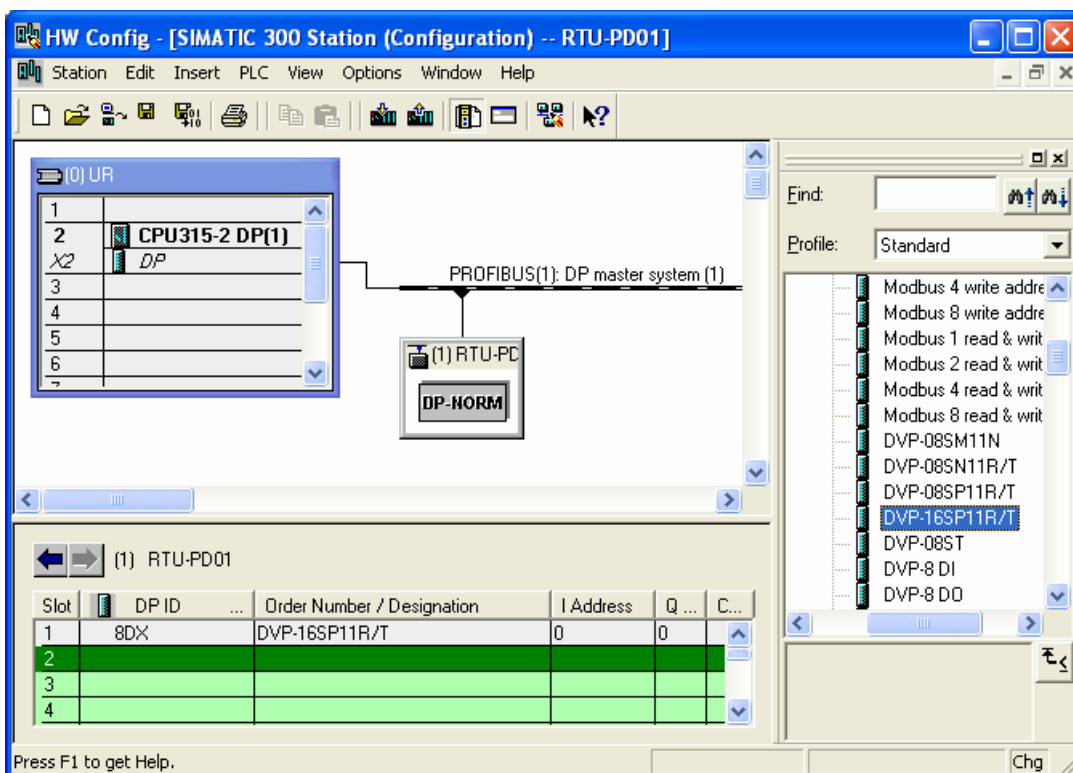

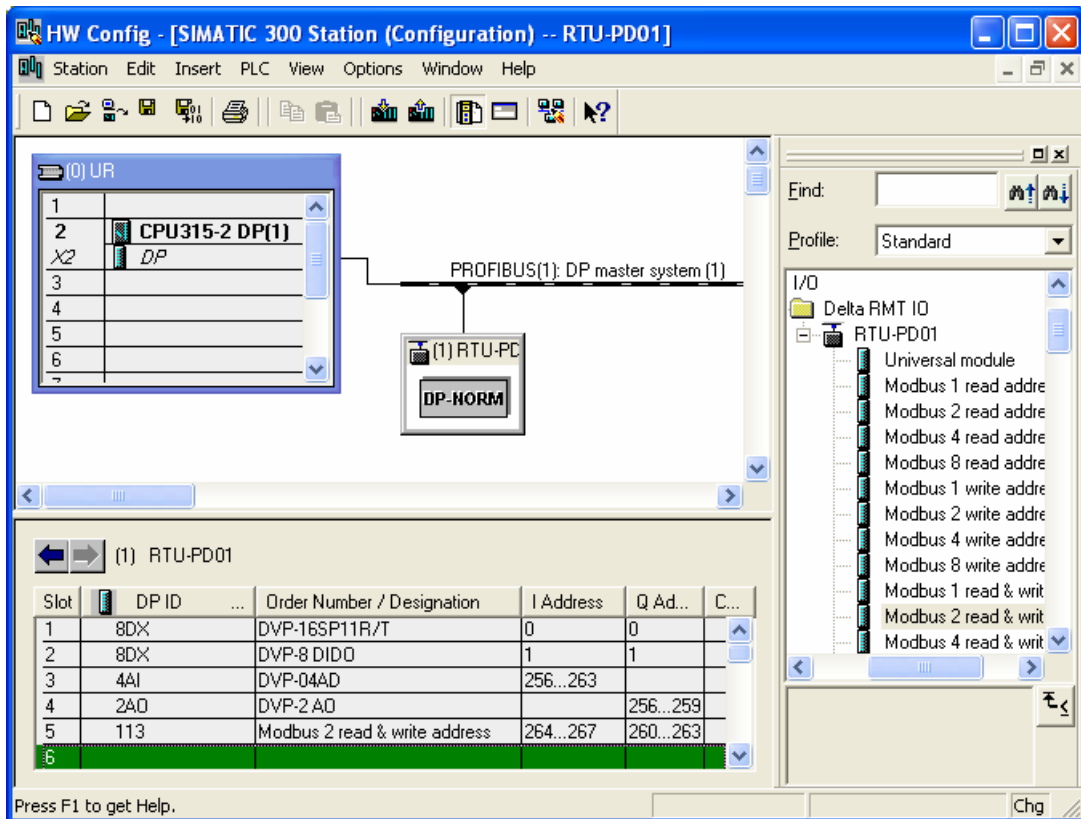3. Add PROFIBUS DP bus to RTU-PD01.
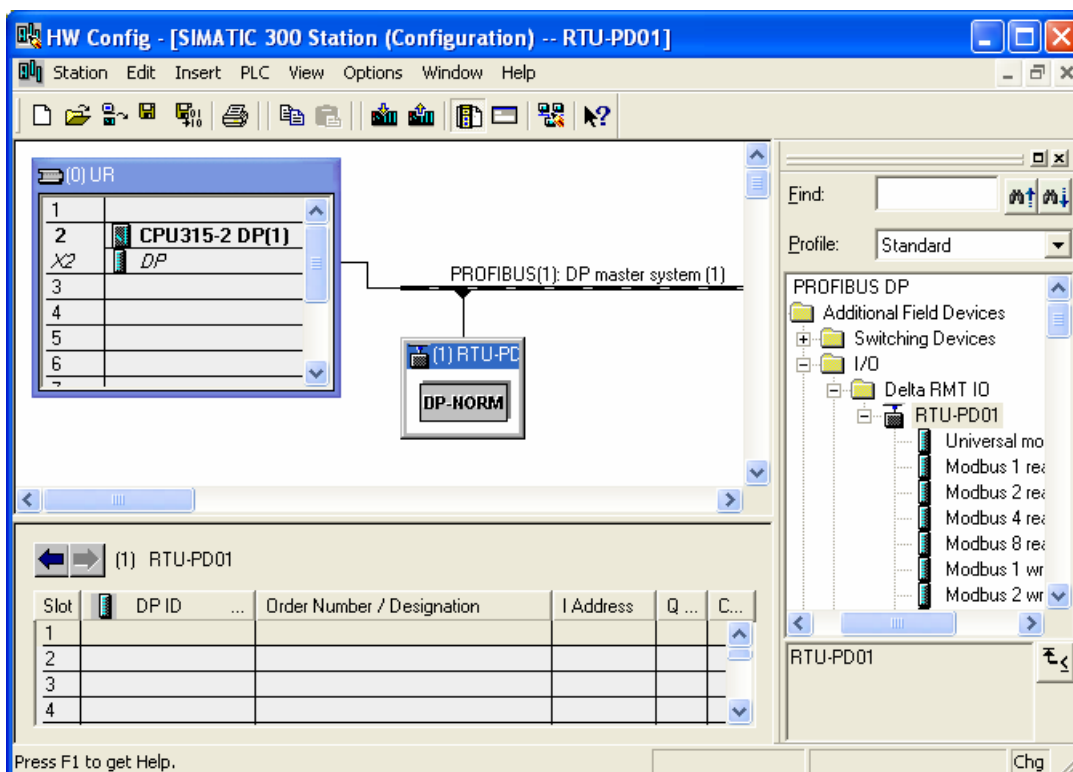
4. Select Slot 0 and double click "DVP16SP11R/T" in the right-hand side column.
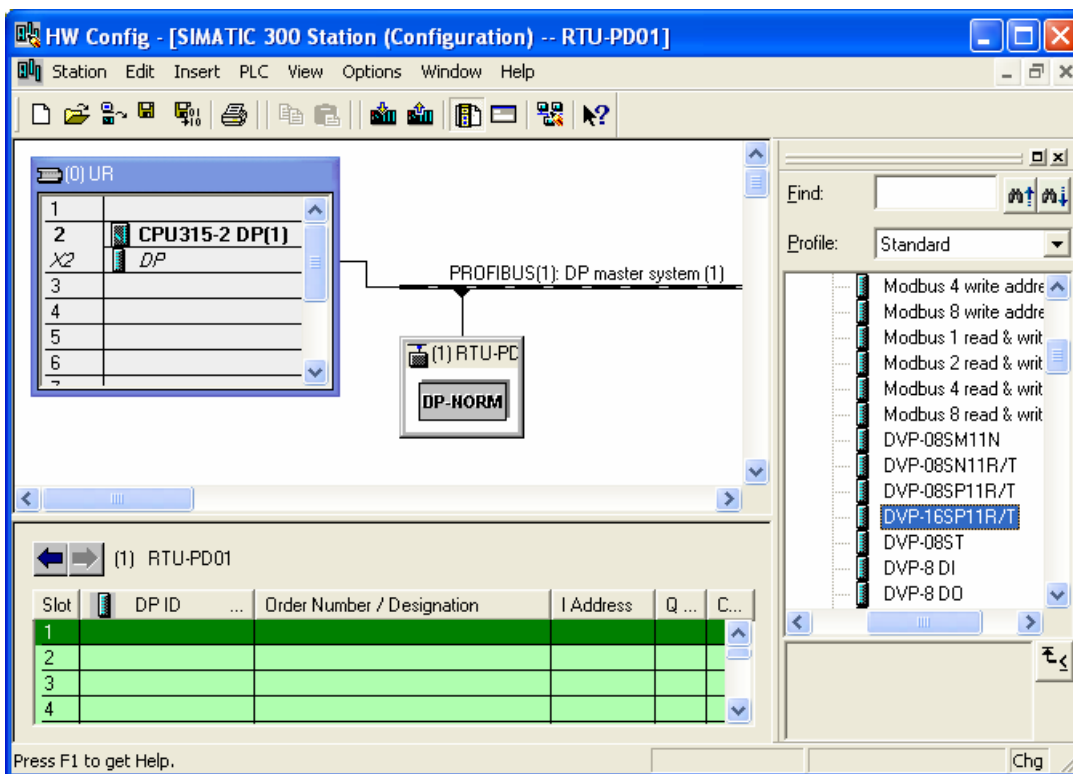

5. Configure DVP16SP11R/T to Slot 0.

6. Configure other slots as configuring Slot 0. To configure, select one of the slots and double click on the items to be configured in the right-hand side column. Apply it to configure Slot 0 ~ Slot 4.

7. Slot 0 and Slot 1 are for the configuration of digital I/O modules. The configuration of digital I/O modules does not require other parameter settings. When you configure digital I/O modules by self-defined method, and if the number of I/O points is less than 8, the calculation will be based on the number 8. For example, Slot 1 is configured 8DIDO, and its corresponding digital I/O module is DVP08SP (4 input points and 4 output points). See the following paragraph for detailed corresponding relations between slots and I/O modules.

8. Double click the configured Slot 2 in "HW Config" window to open the dialog box in the figure below. Refer to 8.3.2 for the definition of every parameter in this dialog box.
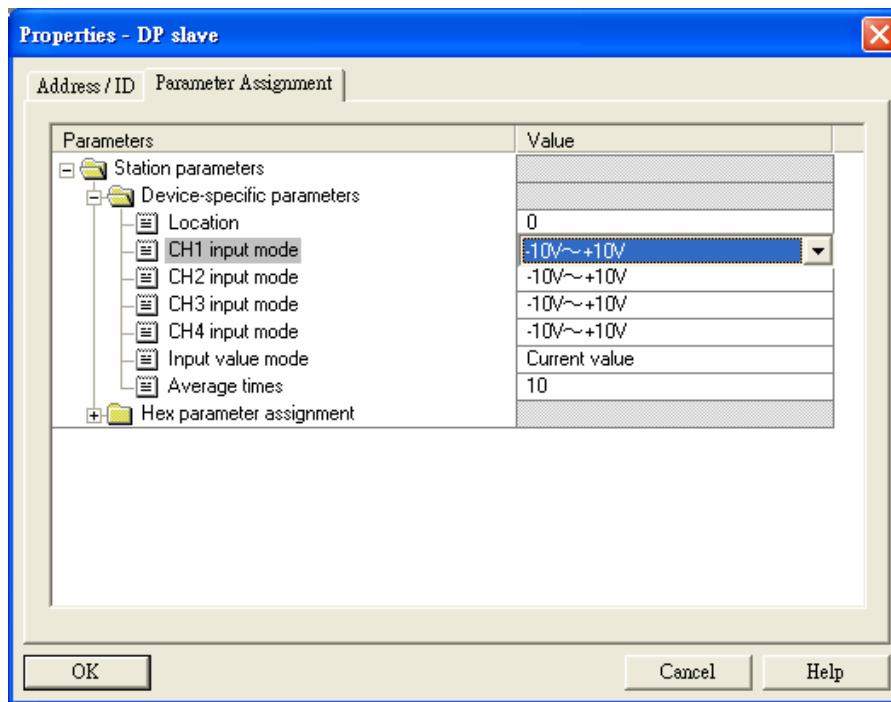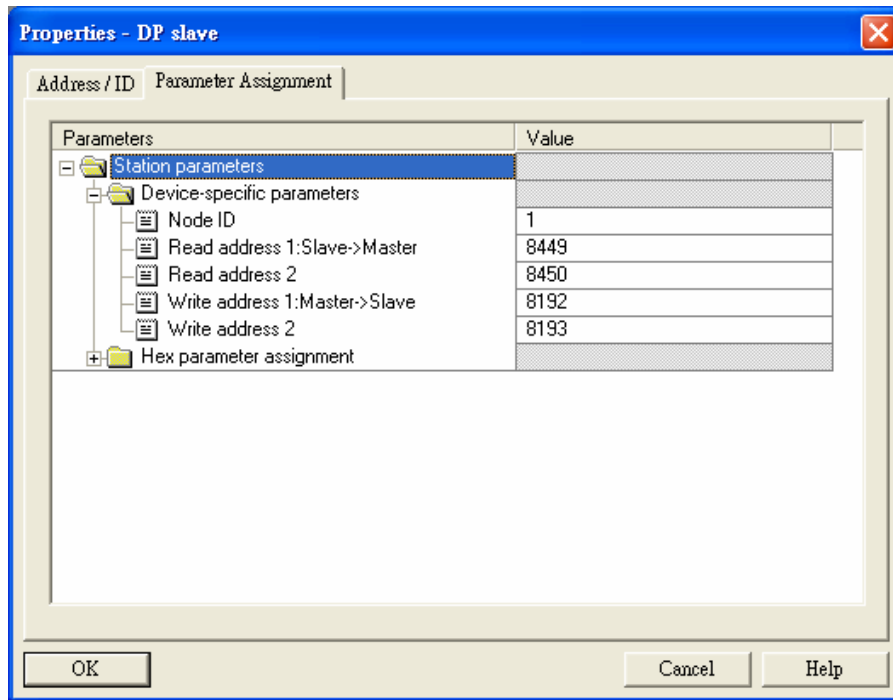
9. Double click the configured Slot 3 in "HW Config" window to open the dialog box in the figure below. Refer to 8.3.3 for the definition of every parameter in this dialog box.
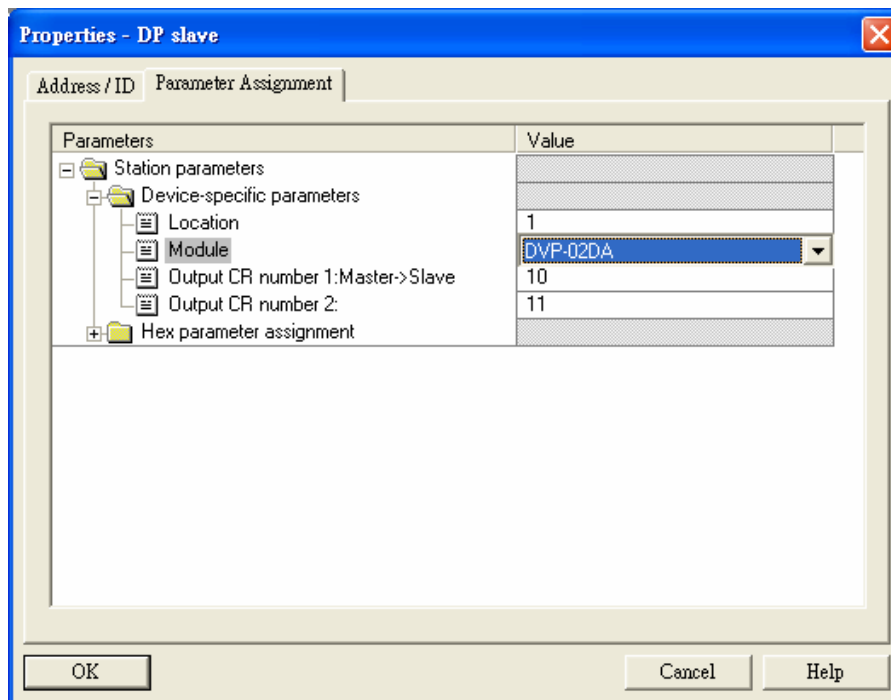

10. Double click the configured Slot 4 in "HW Config" window to open the dialog box in the figure below. Refer to 8.3.4 for the definition of every parameter in this dialog box.

11. After all the configuration items for RTU-PD01 are set, double click the RTU-PD01 slave on the PROFIBUS DP bus in "HW Config" window to open the dialog box in the figure below. Refer to 8.1 for the definition of every parameter in this dialog box.
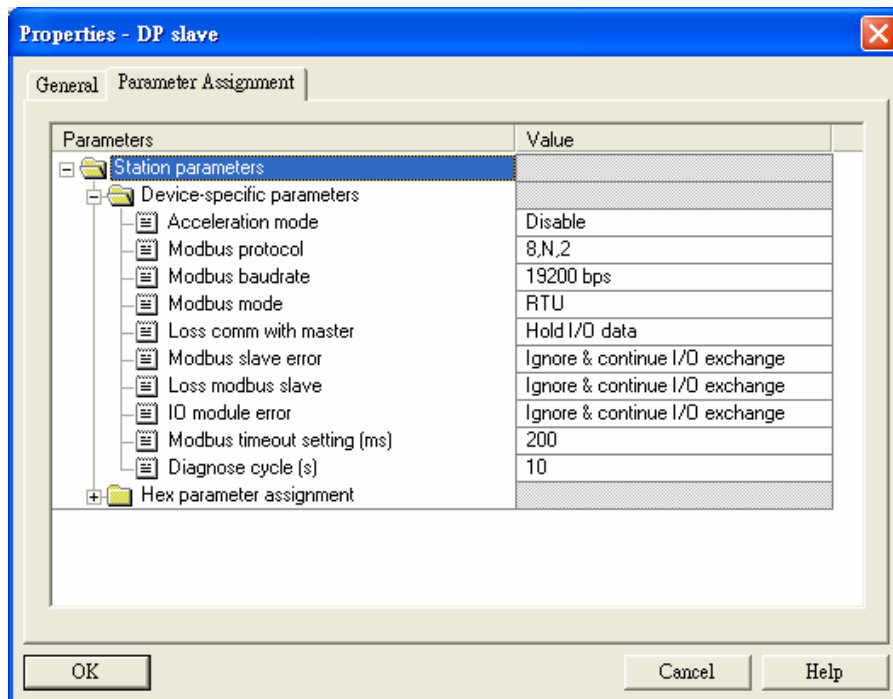
12. After all the parameters are set, download the parameters, and once the master is connected to RTU-PD01, the NET indicator on RTU-PD01 will constantly be On in green color.
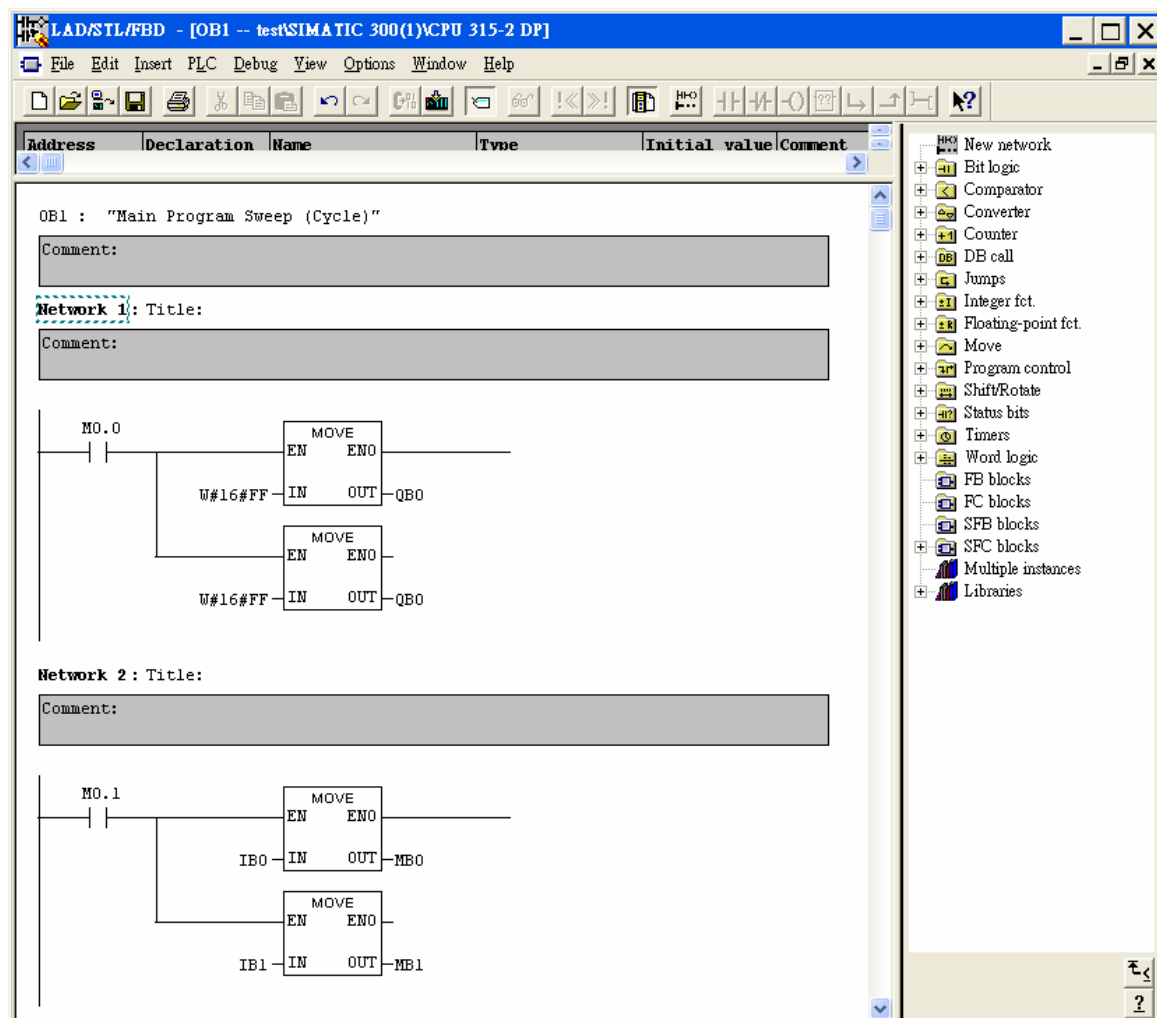
Data Mapping
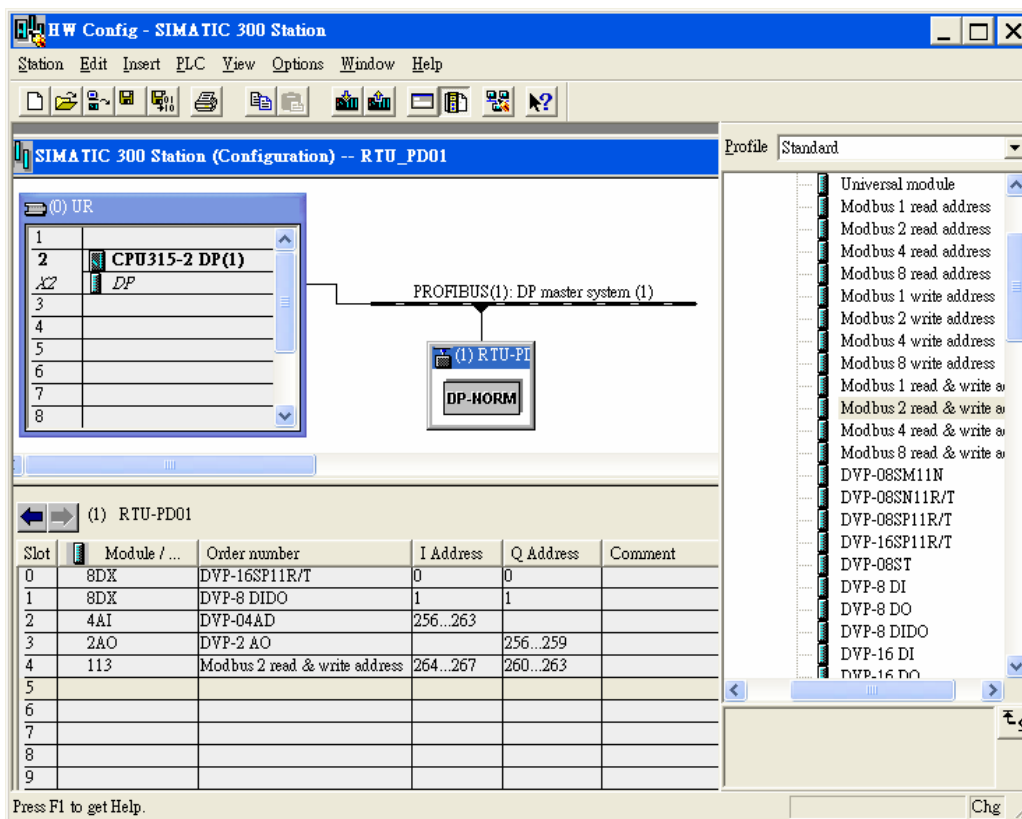
See the table below for the data mapping relations under the parameter settings.

Register in S7-300 master	Data transmission direction in PROFIBUS DP network	Slave devices and addresses connected to RTU-PD01
QB0 bit 0 ~ bit 7		Y0 ~ Y7 on DVP16SP
QB1 bit 0 ~ bit 3		Y0 ~ Y3 on DVP08SP
PQW256	⟹	Output value in CH1 on DVP02DA-S
PQW258		Output value in CH2 on DVP02DA-S
PQW260		Modbus address 8192
PQW262		Modbus address 8193
IB0 bit 0 ~ bit 7		X0 ~ X7 on DVP16SP
IB1 bit 0 ~ bit 3		X0 ~ X3 on DVP08SP
PIW256		Input value in CH1 on DVP04AD-S
PIW258		Input value in CH2 on DVP04AD-S
PIW260	⟸	Input value in CH3 on DVP04AD-S
PIW262		Input value in CH4 on DVP04AD-S
PIW264		Modbus address 8449
PIW266		Modbus address 8450

Program Example

● When M0.0 = ON, write 1 to Y0 ~ Y7 on DVP16SP and Y0 ~ Y3 on DVP08SP connected to RTU-PD01.

● When M0.1 = ON, read the status on X0 ~ X7 on DVP16SP connected to RTU-PD01 to MB0, and the status on X0 ~ X3 on DVP08SP to MB1.

● You can also read or write other devices connected to RTU-PD01 by using MOVE instruction.

MEMO