

OMC System Software

High-performanceHMI

DPCON

User Manual

IM41S94-E

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Symbol Definition	
	WARNING: Indicates information that a potentially hazardous situation which, if not avoided, could result in serious injury or death.
	RISK OF ELECTRICAL SHOCK: Indicates information that Potential shock hazard where HAZARDOUS LIVE voltages greater than 30V RMS, 42.4V peak, or 60V DC may be accessible.
	ESD HAZARD: Indicates information that Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices
	ATTENTION: Identifies information that requires special consideration.
	TIP: Identifies advice or hints for the user.

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DPCon User Manual

Section 1 Terms

Abbreviation/ Terms	Description
PROFIBUS	PROFIBUS is an international and open field bus standard.
DP	DP is a kind of communication protocol standard for finishing easier and faster configuration in research PROFIBUS. (FMS is one of it). (DP-V0, DP-V1, DP-V2)
PA	PA is one of PROFIBUS field bus, it used in process control field and could use serial bus to connect transmitter, valve, executor. PA uses PROFIBUS-DP protocol, it transmit electricity by bus.
GSD	GSD file is configuration file of PROFIBUS device.
DBM	DBM file is the final file of PROFIBUS configuration software which provides to hardware.
PBC	PBC file is the engineering configuration file generated by DPCon.
DP Master Station	DP master station in the software refers to type 1 master station (DPM1). It exchange message circularly with decentral slave station in the set message circle.
DP Slave Station	It is peripheral equipment such as I/O device, driver, HMI, valve, transducer and so on. They read in procedural information or interpose procedure with input message.
FDT	Field device tool (software interface standards).

Section 2 System Application Overview

The network device can be compartmentalized to master station and slave station on the basis of PROFIBUS-DP specifications. The master station can initiate communication with slave stations. The communication module connects standard PROFIBUS-DP slave station device into system. It can also connect PA device via link and DP/PA coupler or by means of DP/PA coupler only. Utilize SCnet II inter-station communication protocol, in-system control station and operation station can realize message both-way communication with other control system and intelligent device, make heterogeneity device as subsystem of SUPCON DCS.

2.1 System Structure

The structural diagram of the OMC system equipped with PROFIBUS device is shown in Figure 2-1.

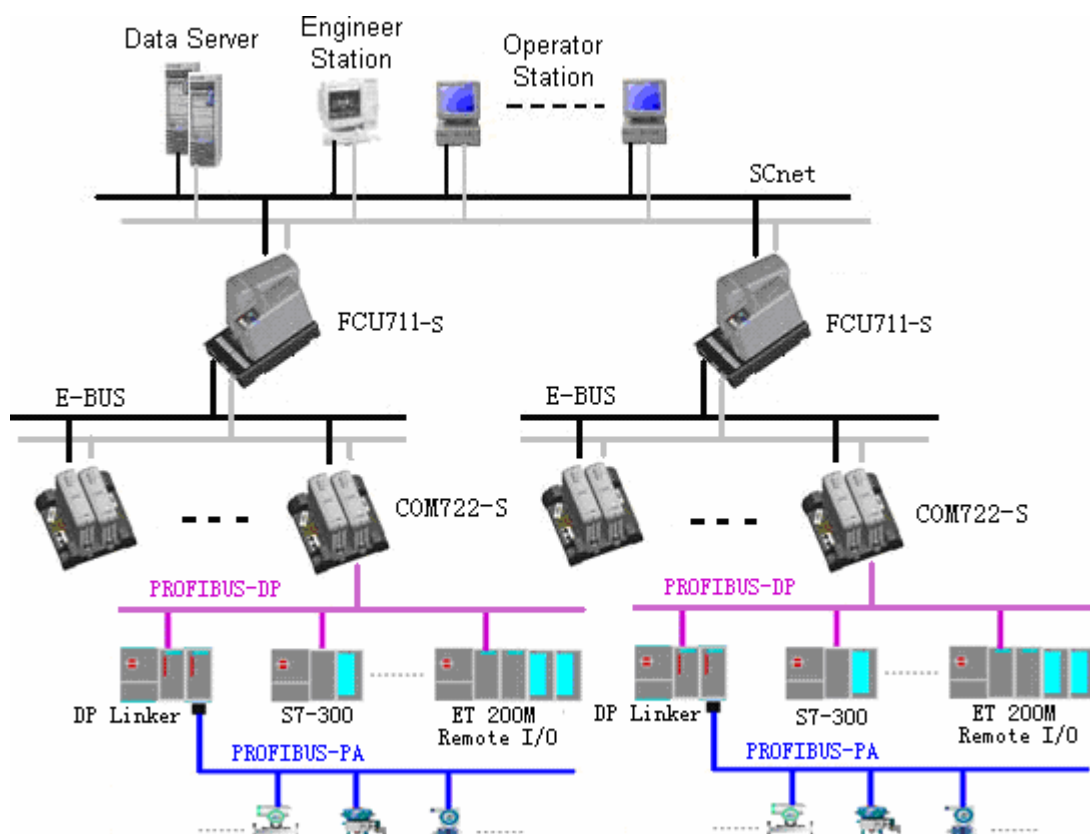


Figure 2-1 Structural Diagram of Network Equipped with PROFIBUS Device

2.1.1 System component

As shown in the figure above, this system is consisted of parts below:

- Master Controller

Master controller supports PROFIBUS protocol and collect data from PROFIBUS communication modules in real time and send them to the data server.

- **PROFIBUS Communication Module**

As a PROFIBUS-DP master station interface, which serves to connect standard PROFIBUS-DP slave station device to the DCS system and it can also connect to PROFIBUS-PA by Siemens couplers and linkers.

- **PROFIBUS Device**

It refers to devices supporting PROFIBUS protocol in the field by which the system can collect the on-site data and execute production and control.



- It refers to devices supporting PROFIBUS protocol in the field by which the system can collect the on-site data and execute production and control.
- Different DCS systems require different types of PROFIBUS communication module and configuration software:
- OMC system's PROFIBUS communication module is COM722-S and the complementary software is High-performanceHMI (V3.2 and above).
- ECS-100/JX-300XP system's PROFIBUS communication module is XP239-DP\FW239-DP, and the complementary is AdvanTrol-Pro (V2.80 and above).
- GCS-G5 system's PROFIBUS communication module is COM522-S and the complementary software is GCSContrix (V1.10 and above).

2.1.2 Introduction of Redundant Modes

The PROFIBUS states the two modes of slave redundancy: System Redundant Mode (SR) and Fast Redundant Mode (FR), while the master redundancy and its operation is not stated, as shown in following figure.

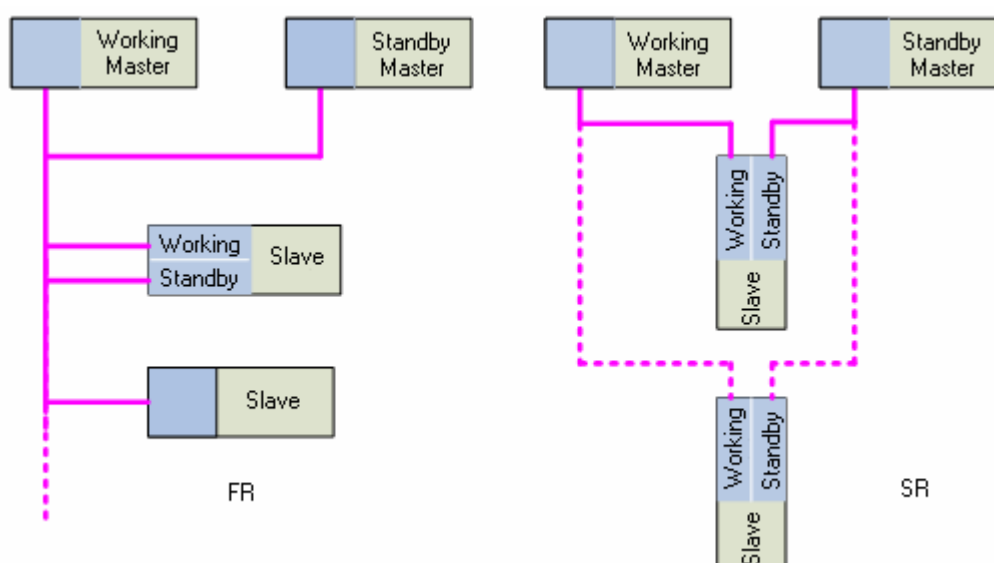


Figure 2-2 Diagram for PROFIBUS Redundant Modes

The difference between them is the redundancy.

- For FR structure, as the bus is not redundant, the masters and slaves can be redundant separately or together, and the structure can be redundant master connecting with non-redundant slave, non-redundant master connecting with redundant slave, or redundant master connecting with redundant slave.
- For SR structure, both the masters and slaves need to be redundant.

2.2 Configure Flow

When the PROFIBUS devices integrated in DCS system, you should configure by the following flow.

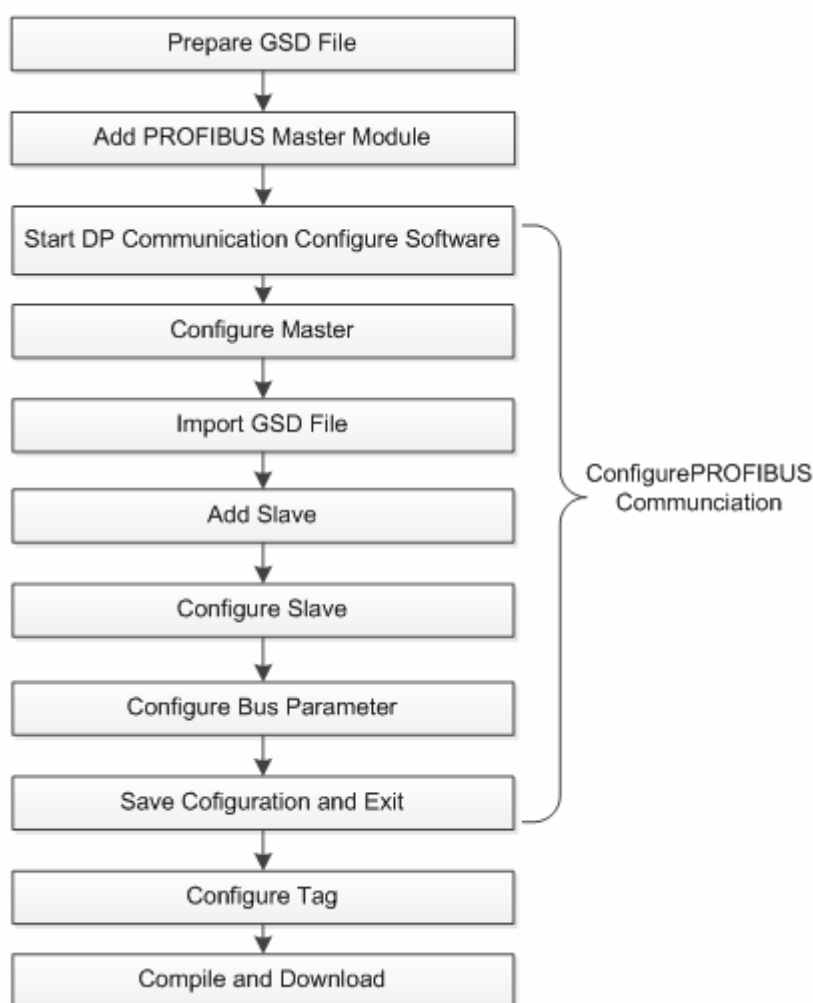


Figure 2-3 Configure Flow Chart

Section 3 Preparation before Configure

Before configure PROFIBUS, you should finish installed the DPCON software and prepared device files.

3.1 Install Instruction

DPCON software is installed with DCS software, and DPCON software cannot uninstall dependently.

For the DPCON software installation, refer to the DCS software installation guide.

3.2 Prepare GSD File and Device DTM Installation File

Before configuring the PROFIBUS-DP master interface module, please prepare the GSD files provided by the supplier of DP devices or PA devices, and carefully read the operation manuals about the DP/PA devices. The DPCON software package has GSD file of frequently-used device, which is stored in the [DPCON\ Profibus\ GSD_Backup] folder in the software installation directory. It can be imported by GSD file if necessary. Please refer to the 4.2.3 Import GSD File for details.

The device DTM of PA device should be installed if the DTM function is needed. DPCON software package has the DTM file of frequently-used device, which is stored in the [DPCON\ Profibus\ DTMSetup] folder in the installation directory.



Tips:

- If connected PROFIBUS-PA device by using link and coupler, refer to the appendix.
 - GSD file and DTM in software are only for reference, user should refer to the files provided by supplier.
-

Section 4 Configure

Before PROFIBUS device integrated in DCS, configure the devices in the DCS software.


4.1 Add PROFIBUS Master Communication Module

4.1.1 OMC

Click **Start > OMC > VFExplorer** to run system configuration software, or click the icon on the desktop to run the software directly.

After run the “configuration management software”, load the corresponding project, select the corresponding controller and double click “hardware configuration” to enter into hardware configuration interface.

There are two approaches to add “COM722-S”:

1. Select the main controller, right click and then select “add” or “operate (O)/add (A)” in the menu or directly click the  in the tool bar, then a dialogue box shown in Figure 4-1 will pop up. Select “COM722-S PROFIBUS master station communication module” and corresponding address, then click “add” to finish the adding process.

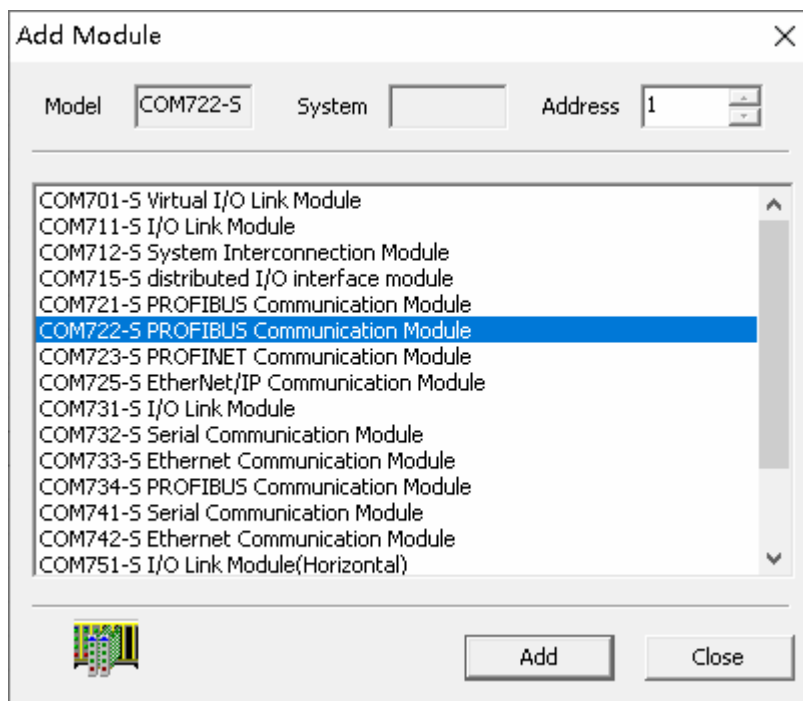


Figure 4-1 Add COM722-S

2. After selecting the controller, add the subordinate device at the subordinate device list at the right view as shown in Figure 4-2.

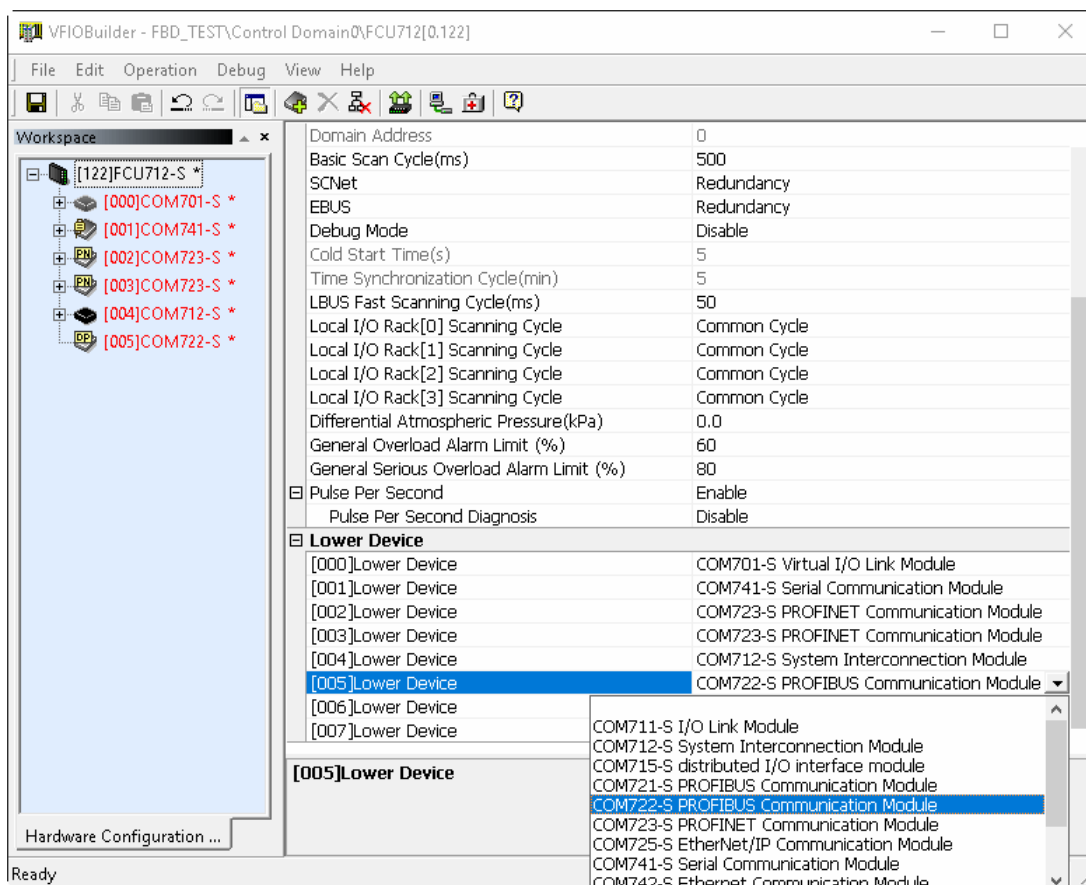


Figure 4-2 Add COM722-S



Attention:

The address set when adding COM722-S into hardware configuration, i.e. the address of COM722-S in the E-BUS node is the same as the address jumper in the base. The scope is 1~7.

4.1.2 GCS-G5

Under main interface of GCSContrix configuration software, double click the “Hardware Configuration” in the project tree, select controller, click “Add Device” function in the menu, toolbar or in the right click menu, the add device dialogue box will pop up, select “COM522-S” and name it according to actual needs. Then, select “Slot Number” according to the actual local bus address (slot address) of COM522-S installed on the rack. See Figure 4-3.

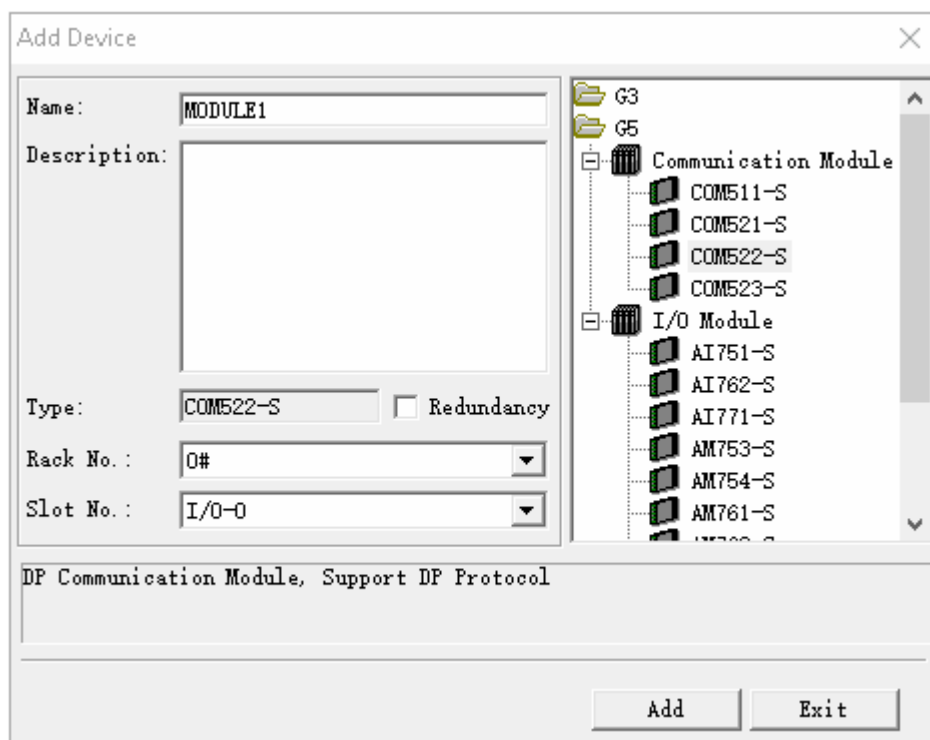


Figure 4-3 Add COM522-S Module

4.1.3 ECS-100/ JX-300XP

Add FW239-DP

Add FW239-DP by following steps:

1. Start AdvanTrol-Pro system builder software by clicking “Start/ All Programs/ AdvanTrol-Pro (V2.80)> System Builder”, or by clicking icon of “System Builder”.
2. Open configuration file by selecting “File/ Open” from menu or icon of “Open” in toolbar.
3. Add PROFIBUS-DP master interface module by selecting “Overall Information/ Local Host Information” or click icon of “Local Host Information” in toolbar.
4. Add new host in the popup “Local Host Setting” dialog box, select proper model (FW239-DP or XP239-DP).

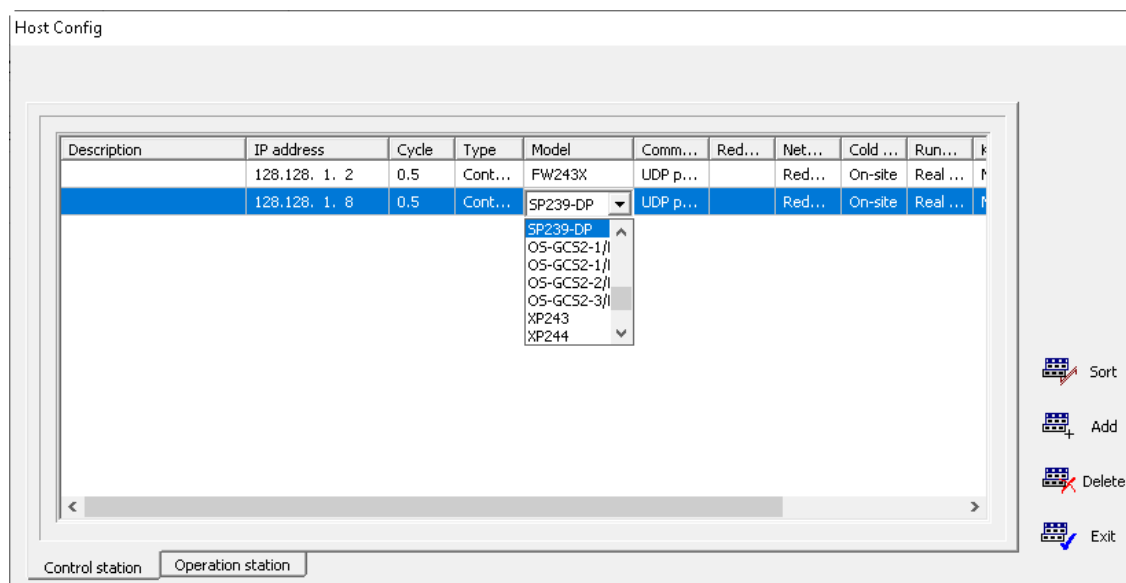


Figure 4-4 Host configuration interface

5. Configure “IP address” as 128.128.1.8, and configure “Cycle”, then click “Quit”.
6. After selected the new added PROFIBUS-DP master interface module in structure tree, the menu command “Configure DP”, “Download DP Configuration” and “View Controller Tag” in “Overall Information” dropdown menu list will be shown high light.

Start FW239-DP

1. Select FW239-DP (address is 128.128.1.8) in structure tree, and select “Overall Information/ Configure DP” to popup dialog box.

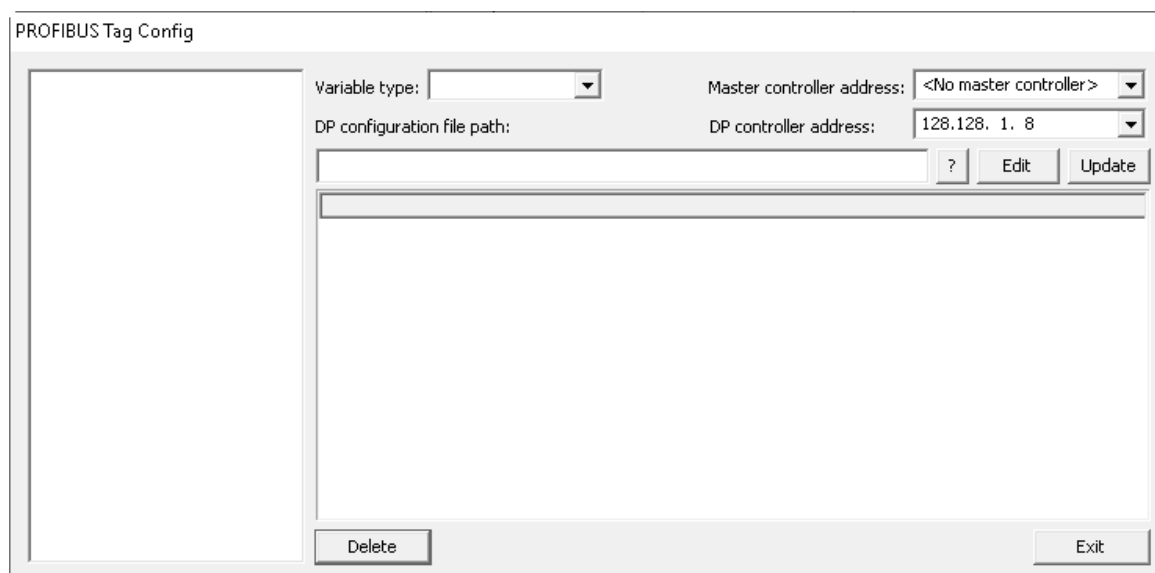



Figure 4-5 PROFIBUS tag configuration

2. Click  or input the right file path in “DP configuration file” to select existed DP configuration file (.pbc). And the DP configuration file is file with suffix of pbc. Or input DP file name and file path in “DP configuration file” and click “Edit” to create DP file. By default, DP file is saved in “Project path\Config” with suffix of “pbc”.

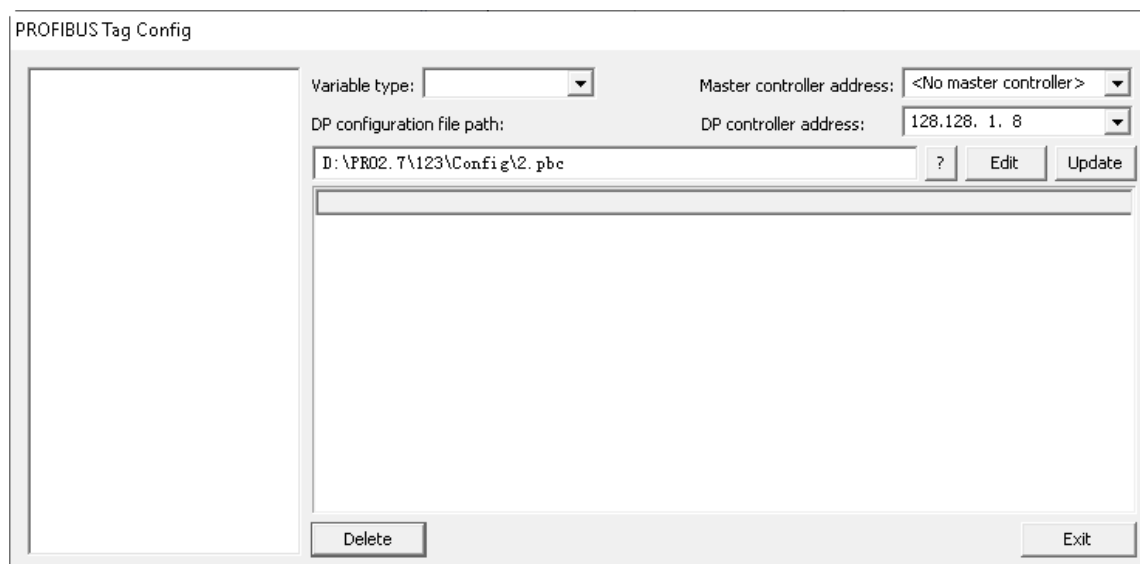


Figure 4-6 Add new DP files

Figure 4-7 shows the DP communication configuration main interface.

4.2 PROFIBUS Communication Configuration

This section will describe how to carry out PROFIBUS configuration by configuring one PROFIBUS Master Communication Module COM522-S to be PROFIBUS master, one modular slave of ET200M and one compact slave of VS130.

4.2.1 Start DP Communication Configuration Interface

In hardware configure software of OMC or GCS-G5, select the PROFIBUS-DP master interface module and select "Communication Configuration" in its right menu (or select "Operation/Communication Configuration" in menu) to login DPCon software shown as following figure.

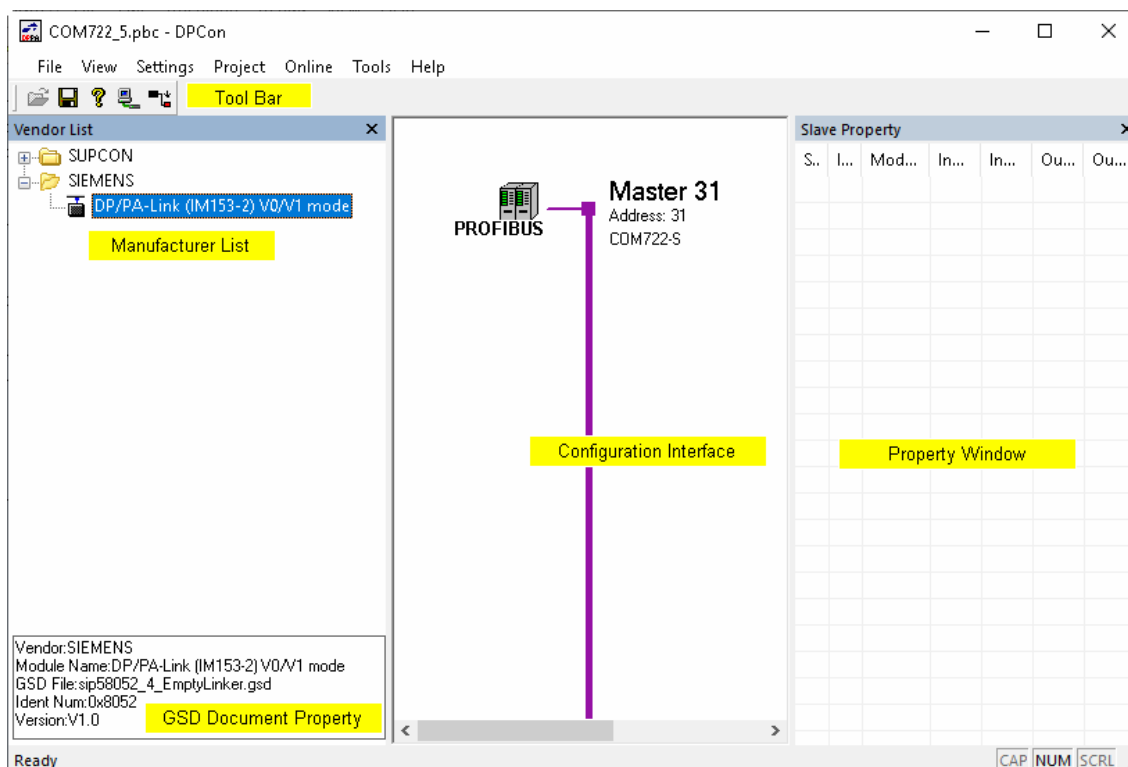


Figure 4-7 DP Communication Configuration Interface

4.2.2 Master Station Configuration

Double click master icon to open master configuration dialogue box. See Figure 4-8. The default master address is 31. If it needs to modify the master address, modify it in the “Station” in Figure 4-8.



Attention:

The address is default value is 31 and master setting range is 1~124.

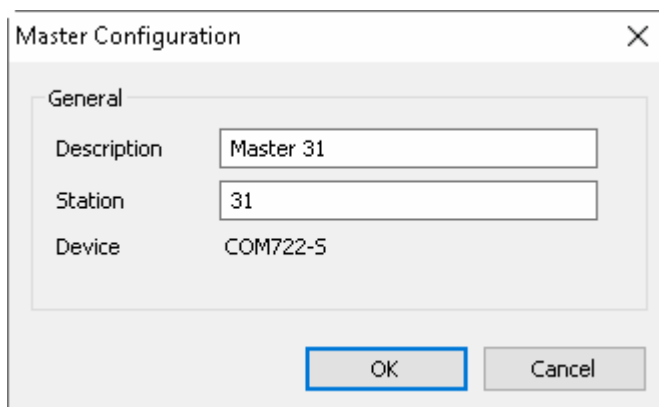


Figure 4-8 Master Configuration Dialogue Box

Configure “Description” and “Station”, and click “OK” to save the master configuration.

4.2.3 Import GSD File

Select command of **File/ Import GSD File** in menu of DPCon software, to pop up the import file select dialog to select the GSD file. DPCon software package has GSD file of frequently-used device, which is stored in the [DPCon\ Profibus\ GSD_Backup] folder in the installation directory of control system software.

For example, the GSD file siem801d.gsd of ET200M is stored in the SIEMENS/IO of GSD_Backup, GSD file siem8100.gsd of VS130 is stored in the SIEMENS/ General. After select GSD, as shown in Figure 4-9, click “Open” to import GSD file. If the imported GSD has existed, a prompt of whether to replace will pop up.

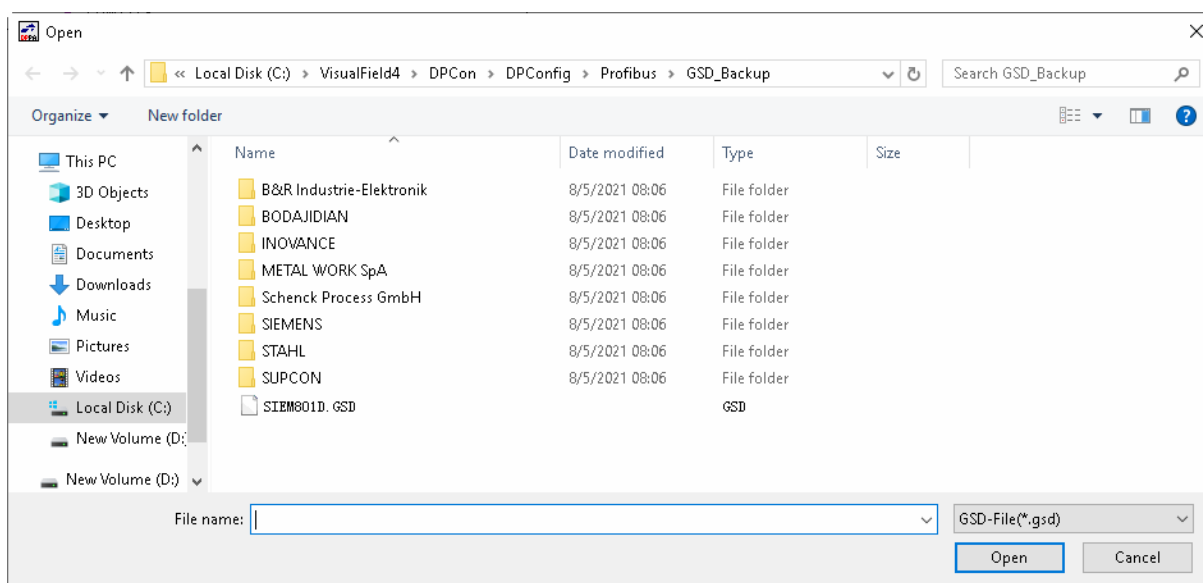


Figure 4-9 Select GSD File

Restart the DPCon software after import completed, to validate the GSD file just imported.




Tips:

During importing, a prompt of the interface icon dib bitmap file may not exist will pop up. Click “Cancel” and it will not affect the actual operation of the software.

4.2.4 Add Slave Station

Method 1

Click toolbar button , point to DP bus, and the mark which in the red circle below will be appearing.

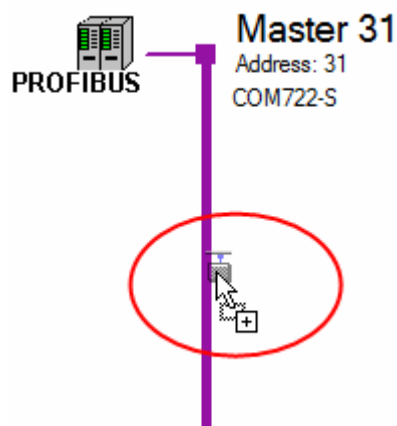


Figure 4-10 Add Slave Station

Click the mark to popup “Insert Slave” dialog box, and select “ET 200M (IM153-1)”. Click “Add” to add ET 200M (IM153-1) to “Select Slaves”. Configure “Station” of ET 200M as 3, and the “Description” of ET 200M as “Slave3_ET200M”, shown as following figure.

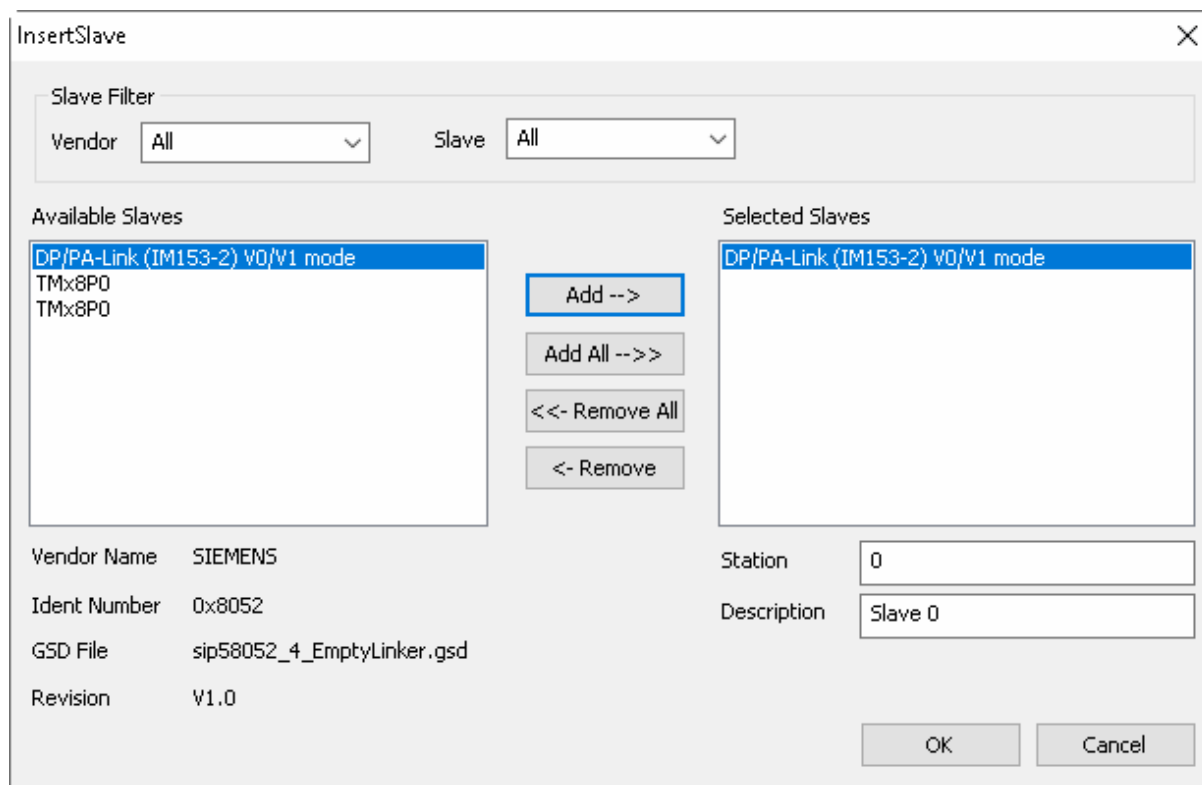


Figure 4-11 Insert Slave Station 1

Select VS130 and click “Add” to add it to “Select Slaves” list by same operations above. And configure its address as 4, input “Description” as “Slave4_VS130”.

DPCon configuration interface after adding slave station is shown below.

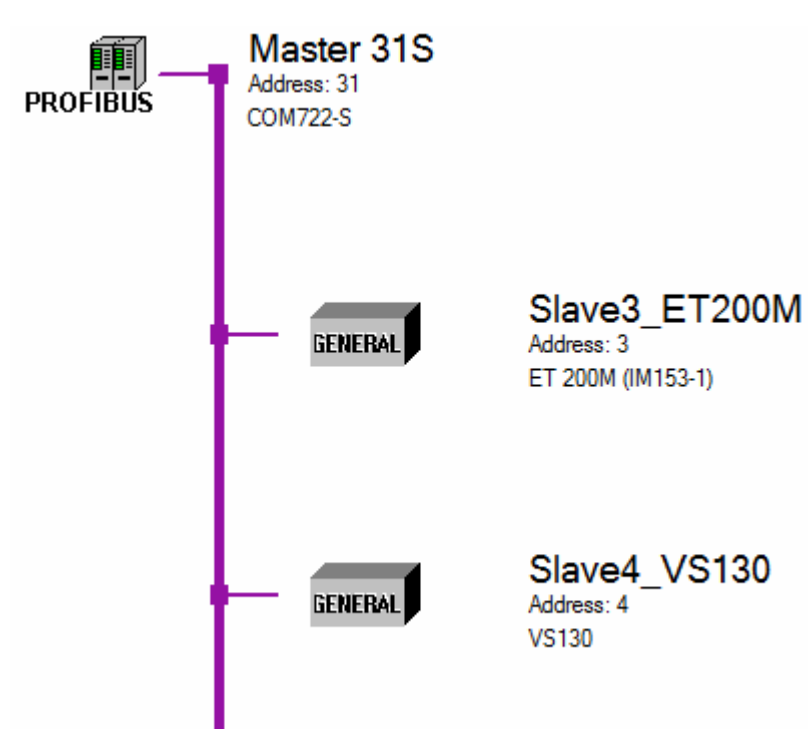


Figure 4-12 DPCon Configuration Interface after Added Slave Station

Method2

Right-click DP bus, and select “Insert Slave Station” to popup “Insert Slave Station” configuration interface.

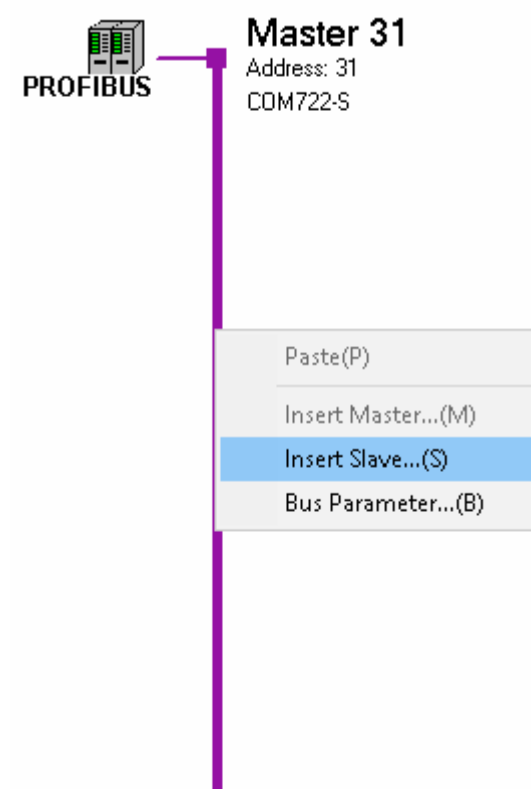
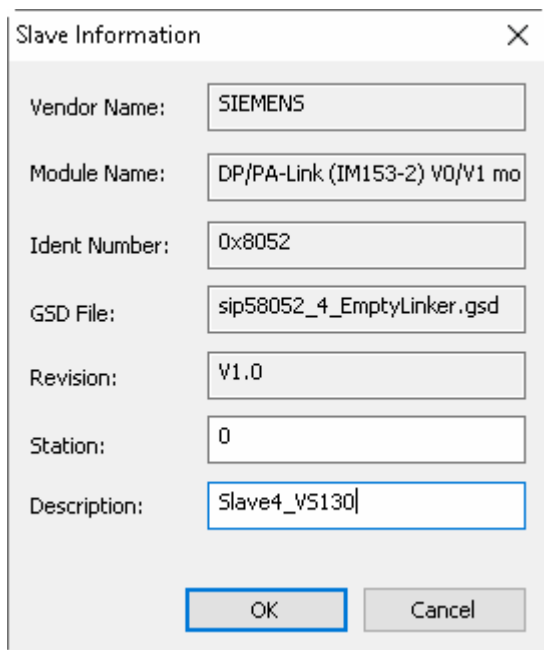


Figure 4-13 Select “Insert Slave Station”

Other operations are similar to operations in “**Method1**”.

Method3

Select slave needed to add from provider list, for example “DP/PA-Link(IM153-2)V0/V1 mode”. Push the mouse and drag the selected slave to DP bus, then popup “Slave Information” dialog box shown as following figure. Configure “Address” as 4, “Description” as “Slave4_VS130”. Click “OK” to add the selected slave.



The image shows a 'Slave Information' dialog box with the following fields and values:

Field	Value
Vendor Name:	SIEMENS
Module Name:	DP/PA-Link (IM153-2) V0/V1 mo
Ident Number:	0x8052
GSD File:	sip58052_4_EmptyLinker.gsd
Revision:	V1.0
Station:	0
Description:	Slave4_VS130

At the bottom, there are 'OK' and 'Cancel' buttons.

Figure 4-14 Dialog box of “Slave Information”

And the result is similar to the result of “**method1**”.

If the added slave is a link, there are two results:

- GSD file of the added link will be generated by initial GSD file of the added link and slave GSD file.
- The added link is a non link.

The added operation is similar to the method1, method2, and method3.



Figure 4-15 Add non link

Under non-debug status, orange bus is PA bus and every slave can be added to PA bus.

4.2.5 Slave Configuration

Attention:

For different DP slaves have different characteristics, when setting slaves, it is necessary to refer to the instructions of slave devices. For configuration methods of S7-300, CP342-5 and IM157 and so on devices as slaves, please refer to “Section 5 Application Examples of DP Slave”.

Take Slave_ET200M as an example:

Use left mouse button to select the Slave_ET200M, select menu **Settings\Slave Configuration**, or double click the slave icon to operation configuration interface.

Add Module one by one:

First select “Config for slot1”

Then select “Config for slot2”

Then select “Config for slot3”

Select specific module as per the order No. of I/O module carried by ET200M.

For the input module for 16 route digital tag with order No. 6ES7 321-1BH0*-0AA0, this module has 2-byte input data.

Moreover, the input module SM331for 16 route digital tag with order No. of 6ES7 331-7SF00-0AB0, this module has 8-word input data. As shown in Figure 4-16.

After selected one module, please click “Add module” to add the module to correspond slot.

Slave Configuration

General

Current Slave: 0 \ ET 200M (IM153-1)

Device: ET 200M (IM153-1) Station Address: 0

GSD File: SIEM801D.GSD Description: Slave3_ET200M

☒ Activate device in actual configuration ☒ Enable watchdog control

Parameter Data...

DPV1 Settings...

Input&Output Info

Max. Length of	256	Bytes	Length of in-/output	18	Bytes
Max. Length of input	128	Bytes	Length of input data	18	Bytes
Max. Length of output	128	Bytes	Length of output data	0	
Max. Number of Modules	11	Bytes	Number of modules	5	

Module	Inputs	Outputs	In/Out	Identifier
6ES7 331-7RD00-0AB0 ...	4 word			0x43,0x43,0x0...
6ES7 331-7SF00-0AB0 ...	8 word			0x43,0x47,0x0...
6ES7 331-7KF00-0AB0 ...	8 word			0x43,0x47,0x0...
6ES7 331-7KF01-0AB0 ...	8 word			0x43,0x47,0x0...
6ES7 331-7KF0*-0AB0 ...	8 word			0x43,0x47,0x0...
6ES7 331-7NF00-0AB0 ...	8 word			0x43,0x47,0x0...
6ES7 332-5HB00-0AB0 ...		2 word		0x83,0x41,0x0...

Append Module Remove Module Remove All Insert Module user define module

Slot	Idx	Module	Input Addr.	Inputs	Output A...	Outputs
Slot1	1	Config for Slot1				
Slot2	1	Config for Slot2				
Slot3	1	Config for Slot3				
Slot4	1	6ES7 321-1BH50-0AA0 ...	0	2byte		
Slot5	1	6ES7 331-7KF01-0AB0 ...	0	8word		


OK Cancel

Figure 4-16 Configure I/O module

4.2.6 Configure Bus Parameter

Click master icon, select menu **Settings\Bus Parameter** and set baud rate, such as 1.5Mbps. Click "OK" to complete the settings.

4.2.7 Save Configuration and Exit

After configuring the DP communication in DPCon software, select  button or menu **File\Save** to save configuration, close the DPCon software and go back to hardware configuration software

“VFIOBuilder”.

4.3 Tag Configuration

4.3.1 OMC

After the hardware configuration as mentioned in the previous paragraph, back to the “VFIOBuilder”.

Update Communication Configuration

In the VFIOBuilder software, select the corresponding “COM722-S”, and select “Update configuration” by right click or select **Operate (O)/ Update Configuration** to update the communication configuration. The figure below shows the updated configuration.

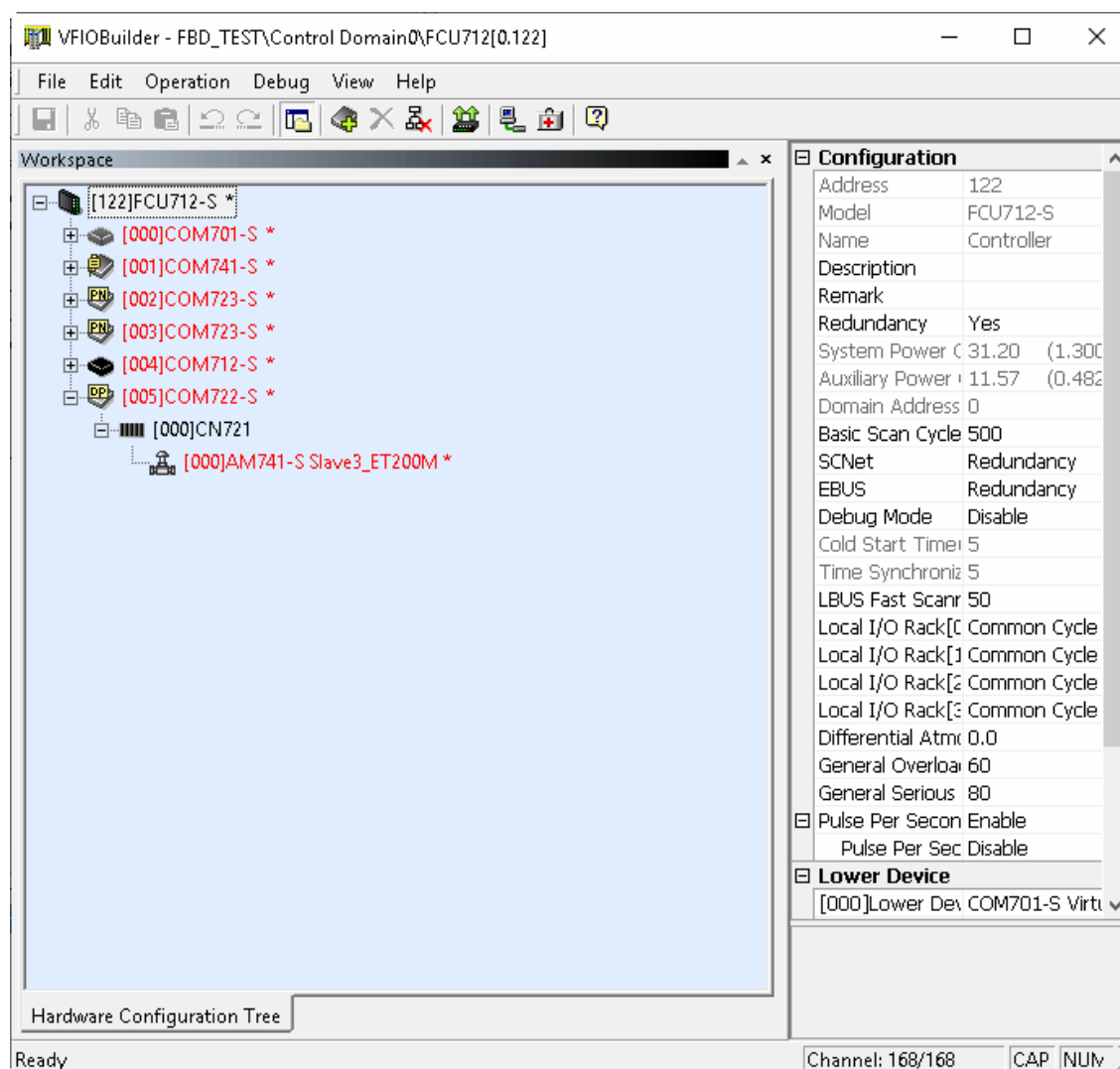



Figure 4-17 Interface shows the updated communication configuration

Save the Hardware Configuration

Click  button to save the hardware configuration.

After configuring the DP communication in above, close DPCon and go back to hardware configuration software.

After the hardware configuration as mentioned in the previous paragraph, back to the “Configuration Management Software” interface, double click “tag table” to enter the “Tag Configuration Software” interface.

1. Add Tags Automatically

In the “Tag Configuration Software” interface, select **Operate (O)/ Scan channel tag/ Communication tag strategy** to enter into the communication tag strategy configuration interface.

In the “Communication Tag Strategy” interface, unfold the tree type structure in the left view and find the slaves and slots to be added to the hardware configuration as shown in Figure 4-18.

Add tag strategy: select the tag strategy needs adding tag strategy, select corresponding tag type in “tag type” column in the lower window, select corresponding status code type in the “status code” column, and click “Add strategy” button to add the tag strategy.

Change the existing tag strategy: select the tag strategy needs to be changed, change the “tag type” or “status code” through pull down menu, and click “change strategy” button to finish change.

Delete the existing tag strategy: select the tag strategy needs to be deleted, and click “delete strategy” button to delete it.

After finishing configuration of all tag strategy, click “confirm” button to finish configuration of communication tag strategy and go back to “tag configuration software” interface.

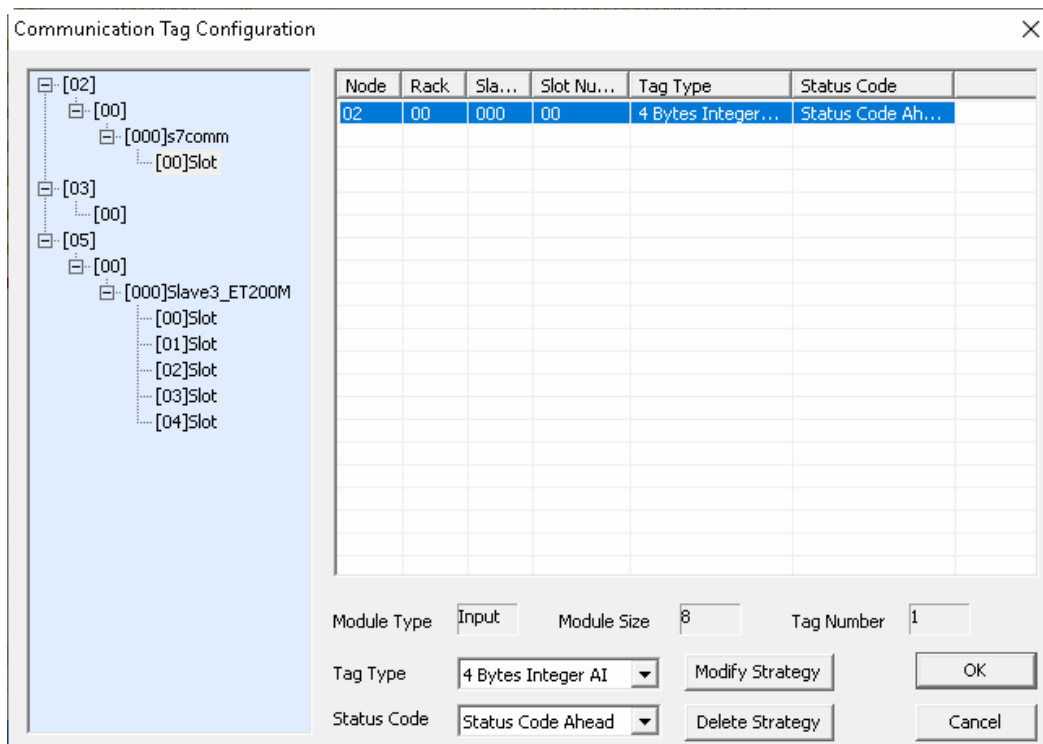


Figure 4-18 Configuration of the communication tag strategy

**Attention:**

One slot, one tag strategy.

Take slave ET200M configuration in the previous paragraph as example to add 2 tag strategies as shown in Figure 4-18.

When back to “tag configuration software”, select **operation/scan tags from channel**. Select “scan all” or “scan new added ”or” communication tag strategy”, after finishing scanning tag, the interface is as shown in Figure 4-19.

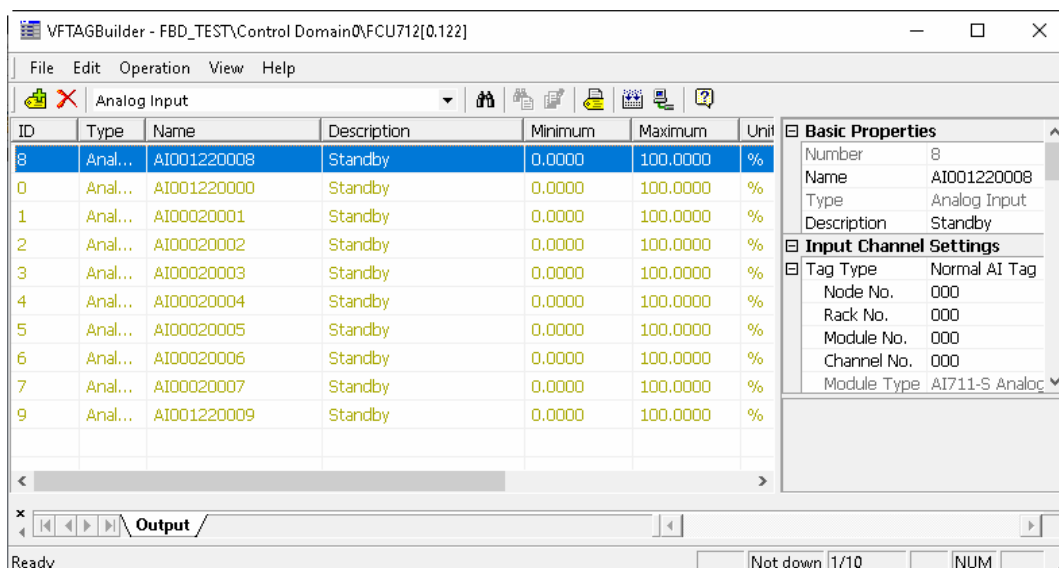



Figure 4-19 Interface after finishing scanning tag

2. Add and Modify Tags by Manual

Add new tags

In “tag configuration software” interface, select the corresponding tag type through the pull down menu in the upper window to switch to the window of the corresponding tag type as shown in Figure 4-20. For example, select “analog in” to enter AI tag window and

click  button to add a new AI tag.

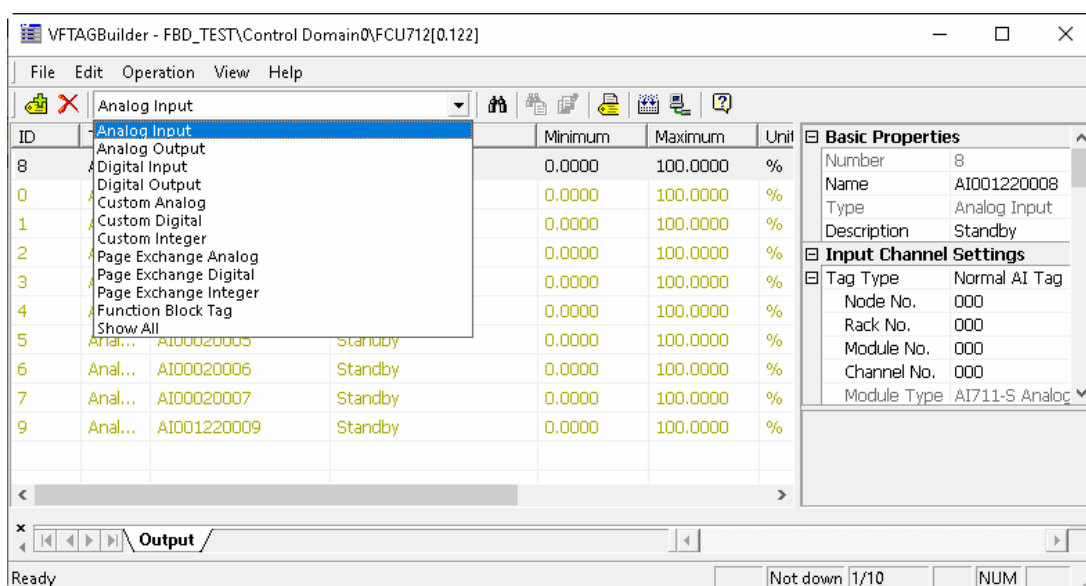


Figure 4-20 Select a type of tags

When carry out tag configuration of PROFIBUS communication module COM722-S, corresponding communication tag in “tag type”. Take AI tag as example as shown in Figure 4-21.

Input Channel Settings	
Tag Type	Communication AI Tag
Communication Node No.	000
Communication Rack No.	000
Slave Station Address	000
Data Block No.	000
The Offset Address of the Tag in the Data Block	200
Communication Parameter Settings	
Data Type	UINT
Signal Properties	Actual Value
Status Code Location	Status Code Ahead
Data Format	No Conversion
Signal Conversion Process	
Conversion Type	Linear Conversion
Linear Sqrt	Not Sqrt
Low Signal	Not Cut
Low Cut Value(%)	0.5000
Filter Time Constant(s)	0.0000
Output Range Settings	
Span Maximum	100.0000
Span Minimum	0.0000
High Overage Limit(%)	10.0000
Low Overage Limit(%)	10.0000
Overrange Maximum Alarm	Enable
Overrange Minimum Alarm	Enable
Unit	%
Input Original Code Settings	
Input Original Code Maximum	100.0000
Input Original Code Minimum	0.0000

Figure 4-21 Set the AI tag

Select corresponding tag and set the tag parameter in the parameter column at the right side of the tag window.

Instruction of Communication Tag

- Parameter instruction of AI/AO tags

“Input/output channel settings” column

Communication node number: the node address of COM722-S in the E-Bus, i.e. COM722-S address set in hardware configuration.

Communication rack number: corresponds to the bus number under COM722-S which is fixed at 0.

Slave address: DP slave or MPI slave address.

Data block number: slot number in hardware configuration.

The offset address of tag in data block: the offset address of analog tag in data block with byte as unit.

“Communication signal parameter settings” column

Signal types: “2 bytes integer (signed)”, “2 bytes integer (unsigned)”, “4 bytes integer (signed)”, “4 bytes integer (unsigned)” and “4 bytes floating-point number” three types. Select according to the actual signal type.

Communication signal status code settings: “no status code”, “status code at front” and “status code at back” three options. Select according to the actual signal. Generally,

select “no status code” and “status code at back” for DP slave signal and PA device signal respectively.

Communication data format conversion selection: determine whether convert the format of the big and small ends.

“Input/output original code settings” column: set the upper and lower limits of the original code of the communication signal in slave. The original code varies based on different slaves. For example, the upper and lower limit of the original code of Siemens S7-300 series is usually 0 and 27648.

- Parameter instruction of DI/DO tags

Basic Properties	
Number	1
Name	DI00020000
Type	Digital Input
Description	Standby
Input Channel Settings	
Tag Type	Normal DI Tag
Node No.	000
Rack No.	000
Module No.	001
Channel No.	000
Module Type	DI711-S Digital Input Module(16 Channels,24V)
Tag Running Cycle	Basic Scan Cycle
Signal Conversion Process	
Input Negate	Disable
Alarm Settings	
ON Status Alarm	Disable
OFF Status Alarm	Disable
Posedge Alarm	Disable
Negedge Alarm	Disable
Fault Alarm	Enable
Tag Fault Processing	
Fault Processing	HOLD
Supervision Settings	
Tag Group	Tag Group 0
Tag Level	Level 0
ON Description	ON
OFF Description	OFF
Color Config	Global Default Settings
Panel	*
SOE Settings	

Figure 4-22 Set the DI tag

“Input/output channel settings” column

Communication node number: the node address of COM722-S in the E-Bus, i.e. COM722-S address set in hardware configuration.

Communication rack number: corresponds to the bus number under COM722-S which is fixed at 0.


Slave address: DP slave or MPI slave address

Data block number: slot number in hardware configuration.

The offset address of tag in data block: the offset address of switch value tag in data block with bit as unit.

4.3.2 GCS-G5

Update the Communication Configuration

In the hardware configuration software, select corresponding COM522-S, click the **Configuration Update** in the right button or click  button. Successful configuration updating will be shown in Figure 4-23.

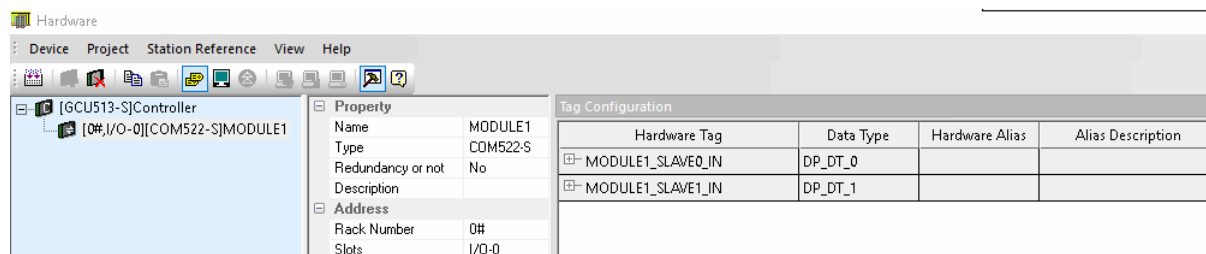


Figure 4-23 Update after Configuration

After updating configuration, the **Tag Configuration** interface at the right side will show tag information. See Figure 4-23.

In the **Tag Configuration** interface, set release cycle for each tag.



Attention:

COM522-S only supports periodic release but not change release.

Basic Information of Configuration Module

Select **COM522-S**, the basic configuration interface at the right side shows the basic configuration information of the module. Figure 4-24 this interface can be set as follow:

- Name: name of COM522-S.
- Redundant or not: whether COM522-S is redundantly configured.
- Local bus: address of COM522-S in local bus, i.e. slots number of COM522-S.

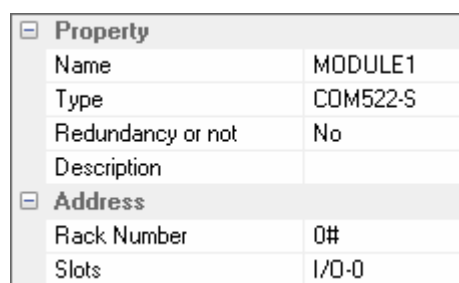



Figure 4-24 Basic Configuration Interface

Save Hardware Configuration

Click  button to save the hardware configuration.

Set DP Data Format

After adding I/O module in the slave, right-click COM522-S in Hardware Configuration in Figure 4-23, select **Set DP data format**, the interface is shown in Figure 4-25.

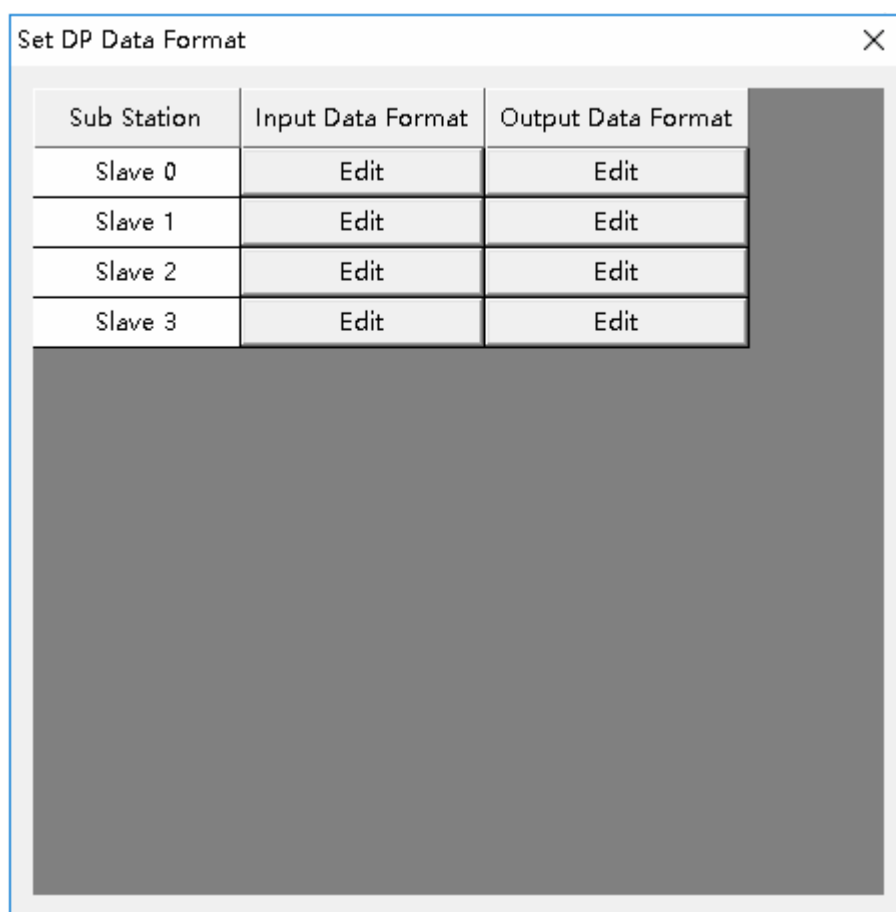


Figure 4-25 Set DP data format

For example, click Edit of Input Data Format in Slave 0, the Variable Edit interface is shown in Figure 4-26.

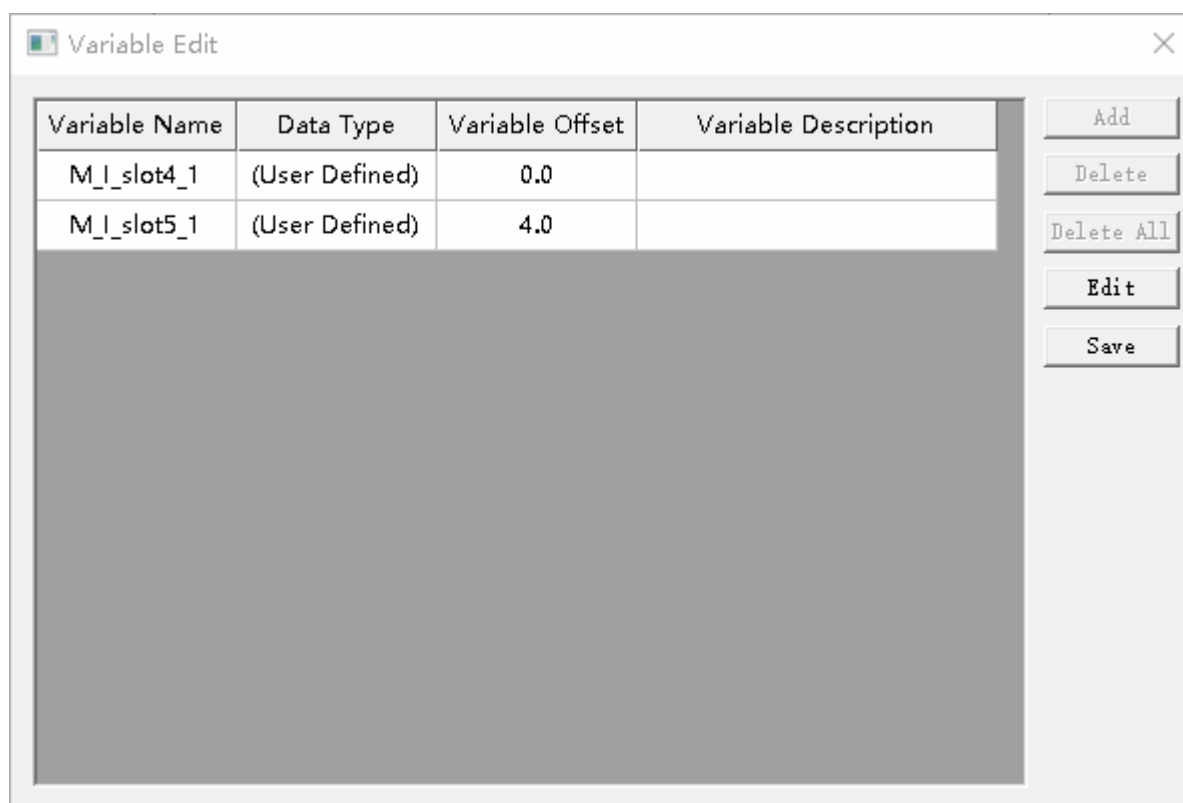


Figure 4-26 Variable Edit

Select M_I_slot1_2 and click Edit in right side in Figure 4-26. The DPCon software has generated tag as per default configuration, as shown in Figure 4-27.

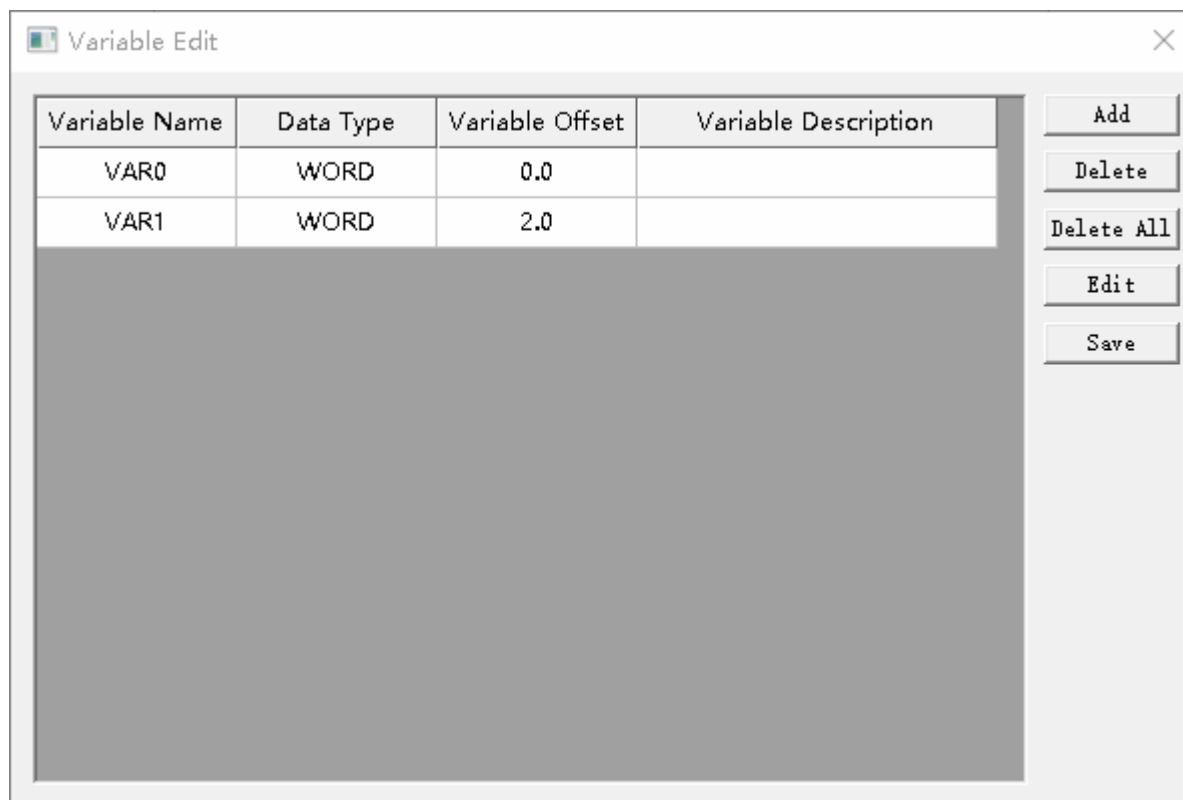


Figure 4-27 Tag Configuration Interface

For the input data type of the 6ES7 331-7SF00-0AB0 module of configuration in the Slave Configuration interface is WORD, the generated tag type is default type of WORD. Likewise, for another module ES7 321-1BH0*-0AA0 of the configuration, its default tag type is BYTE.

If it is to modify the tag, follow the following steps, for example, change the tag "VAR0" name to be "INPUT_DWORD_331" and tag type to be DWORD.

First, remove VAR1, for DWORD type tag is 4-byte, WORD type tag is 2-byte, so it is necessary to remove VAR1 for changing VAR0 type from WORD to DWORD. See Figure 4-28.

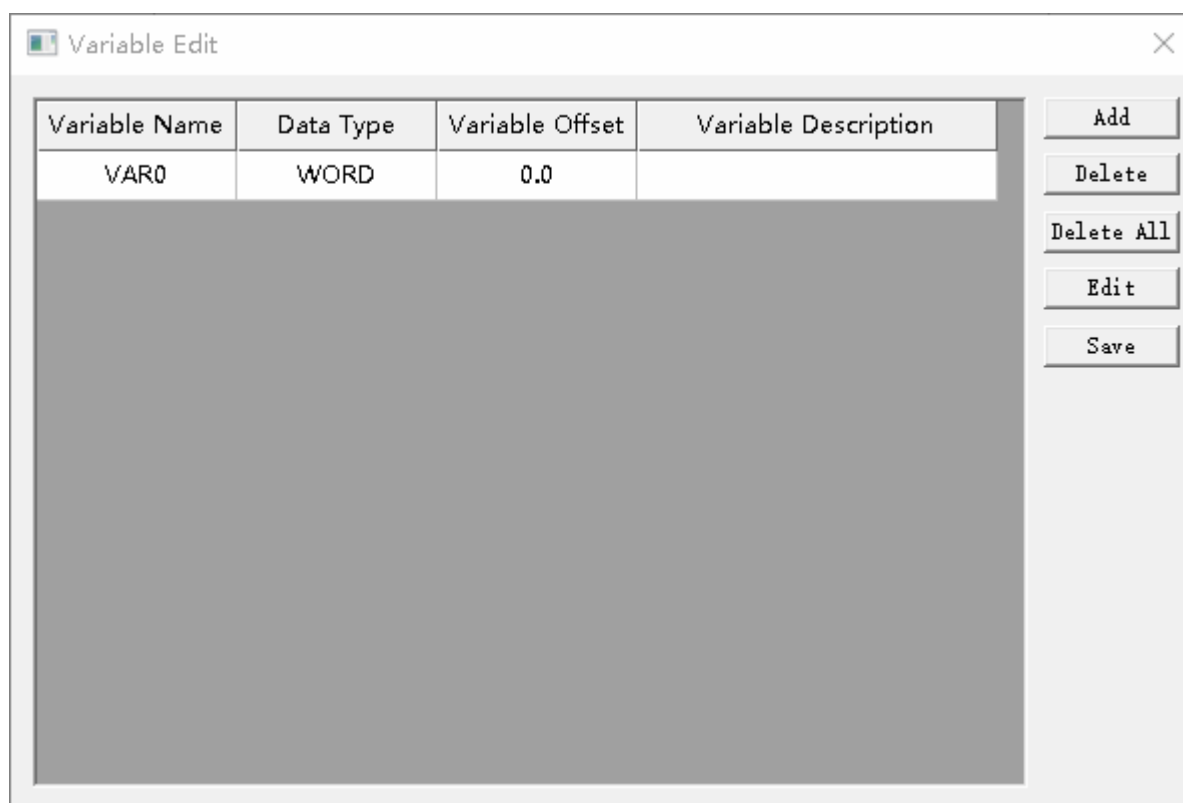


Figure 4-28 Software Interface after Removing VAR1

Then, double click **VAR0** or select VAR0, click **Edit** button to enter **Edit Variable** Interface. Change the **Name** to be "INPUT_DWORD_331", **Data Type** to be DWORD and do not change the offset address. See Figure 4-29.

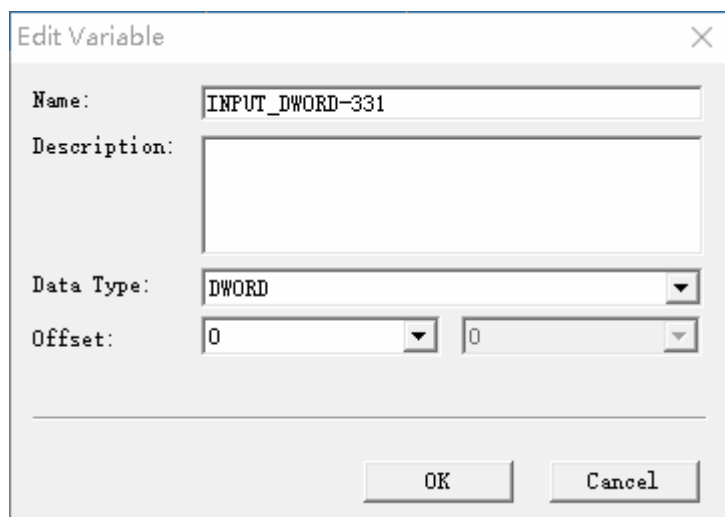


Figure 4-29 Tag Edit Interface

At last, click **OK** button to save modification to the tag.

**Attention:**

If modifying the configuration of a slave station in DPCon, the DP data format variable of the slave station in GCSContrix will be restored to default value.

4.3.3 ECS-100/ JX-300XP (Configure SCKey)

Configure (Update) DP

There are following functions of configure (update) DP:

- Analyze the PROFIBUS configuration file (.pbc file) configured by DPCon.
- Form a configuration tree and user can configure various tags.
- Set the IP address of the controlled controller that is used to control the PROFIBUS tags.

By following steps, you can configure or update DP:

1. Select PROFIBUS-DP master interface module (address is 128.128.1.8), and select “Overall Information/ Configure DP” to popup dialog box as shown in Figure 4-30.

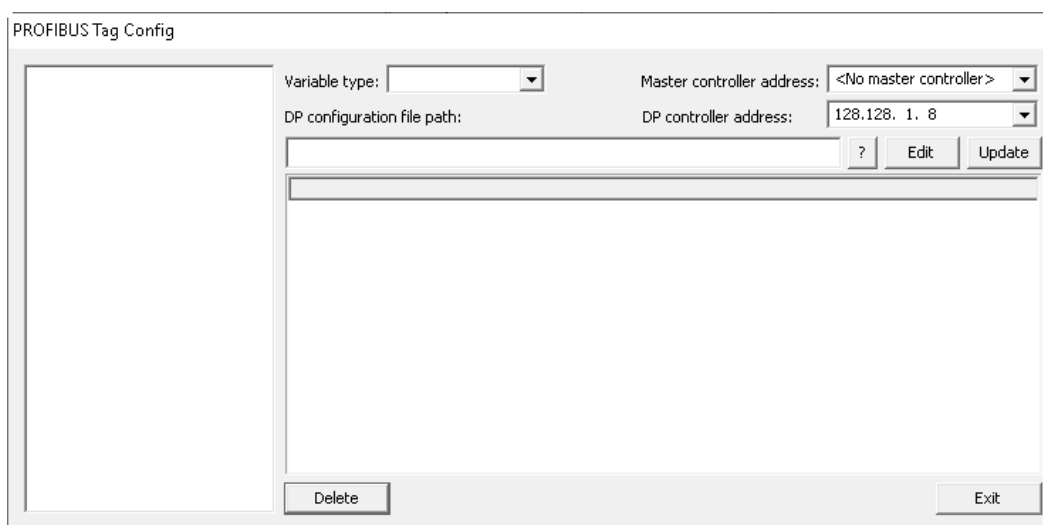



Figure 4-30 PROFIBUS Tag Edit Interface

2. Click , and select the configured DP file or input path of the DP file in “DP configuration file path” to open DP file.
3. Click “Update”, then the DP configuration tree will be generated in left according to the DP file, as shown in Figure 4-31.

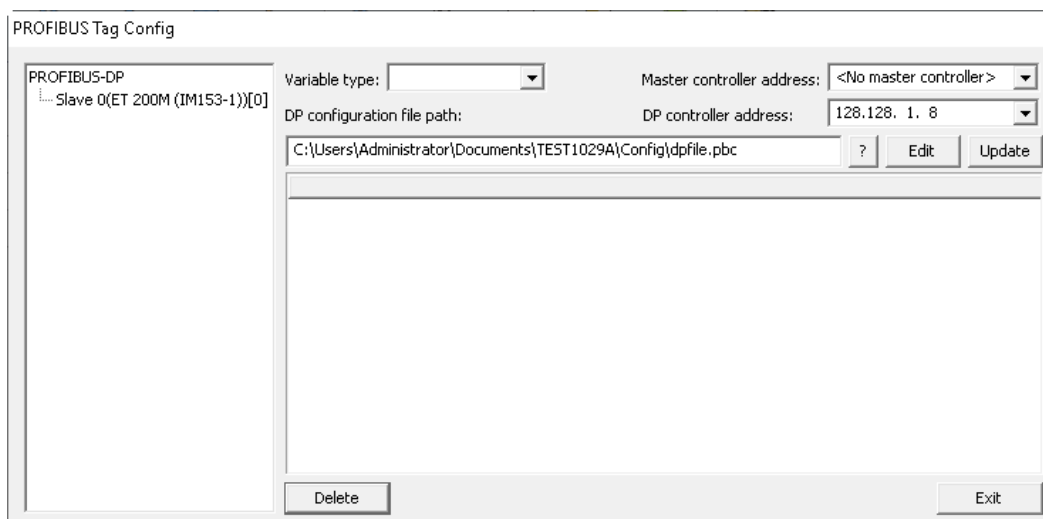


Figure 4-31 DP Configuration Tree

4. Perform the tag configuration for all modules as shown in Figure 4-32.

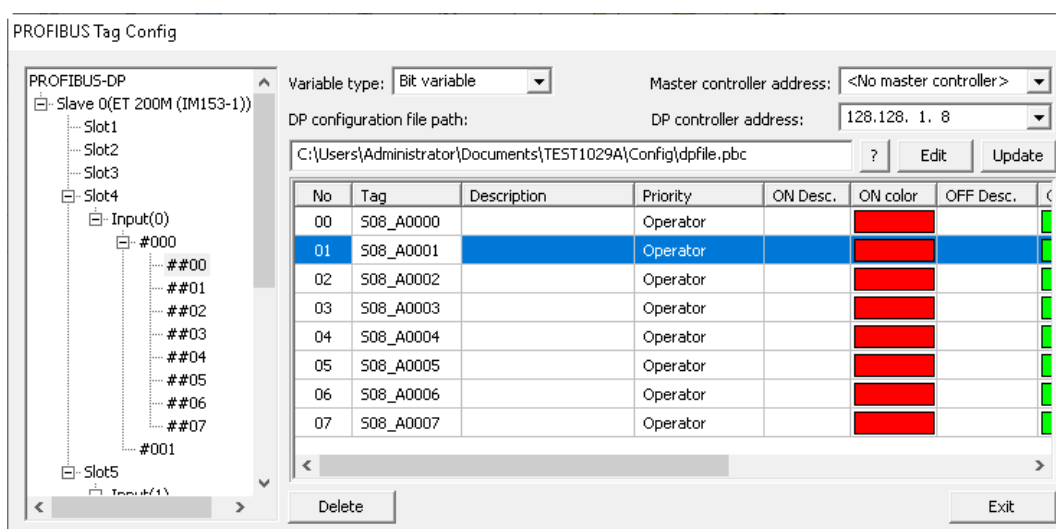


Figure 4-32 Tag configuration

Configuration Steps

5. Configure controlled controller.

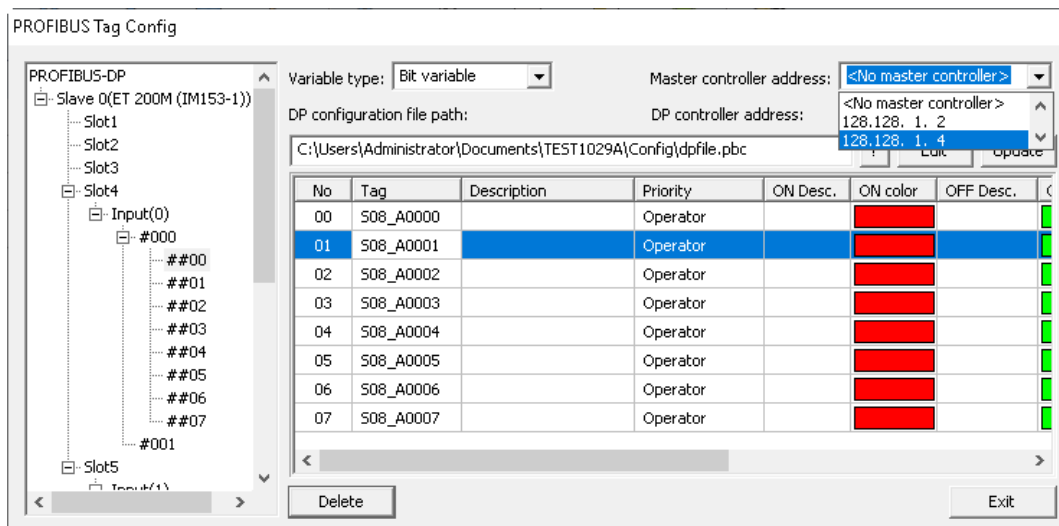


Figure 4-33 Configure Controlled Controller

As shown in Figure 4-33, all controlled controller (except PROFIBUS-DP master interface module) is listed in dropdown box. And the select one controlled controller, which control the control tags of the PROFIBUS-DP master interface module.

6. Choose variable types

- Contents in the pull-down dialog are decided by selected address and module free space. Choose a variable type; the relative tags will be generated automatically. Then, you can configure the properties of tags. However, if there are other tags occupying the address, there will be a prompt whether delete those tags and please do the following operations according to the prompts. As shown in Figure 4-34.

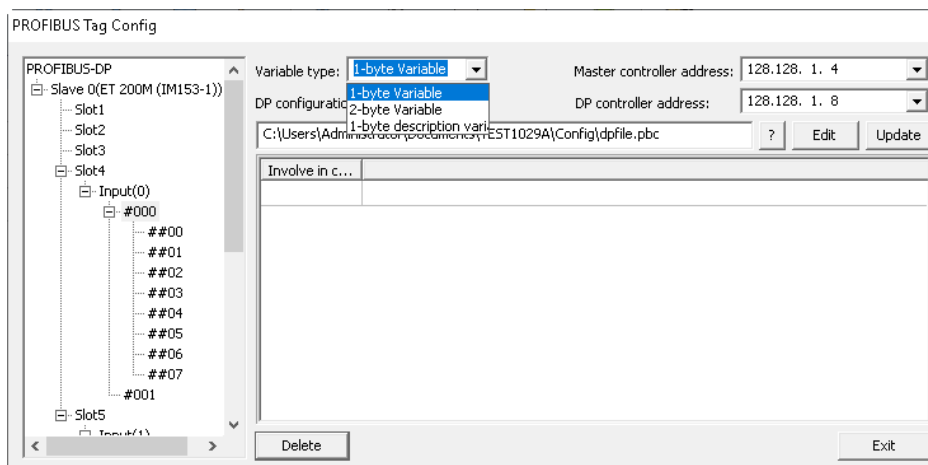


Figure 4-34 Choose a variable type

- When choosing the "1-byte variable", there will generate eight tag variables, as shown in Figure 4-35. You can configure the eight tags one by one.

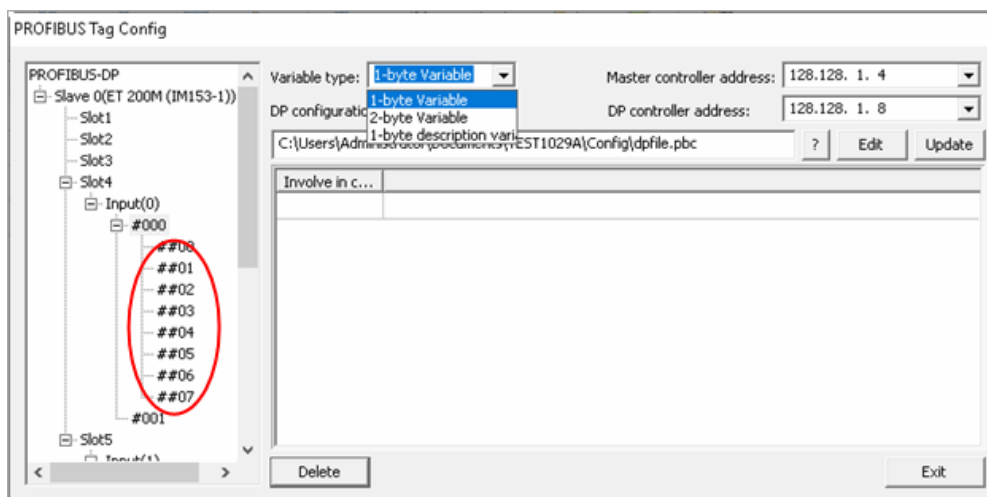


Figure 4-35 Tag configuration

Other types of variables configurations are similar to those of other Controllers. After finishing tag configurations, click “Exit”. And the configured tag will be shown under the PROFIBUS-DP master interface module as shown Figure 4-36.

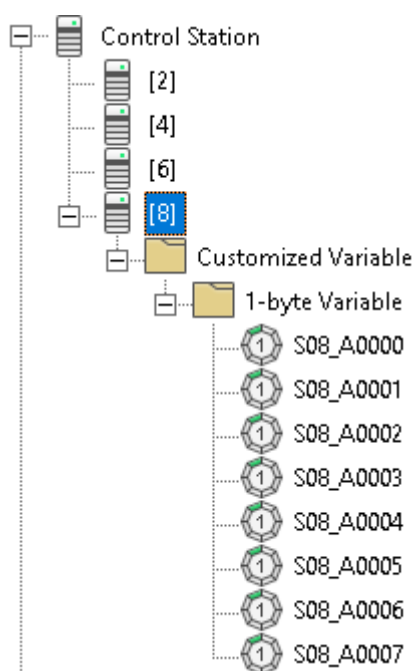


Figure 4-36 The result of tag configuration

1. Delete tag

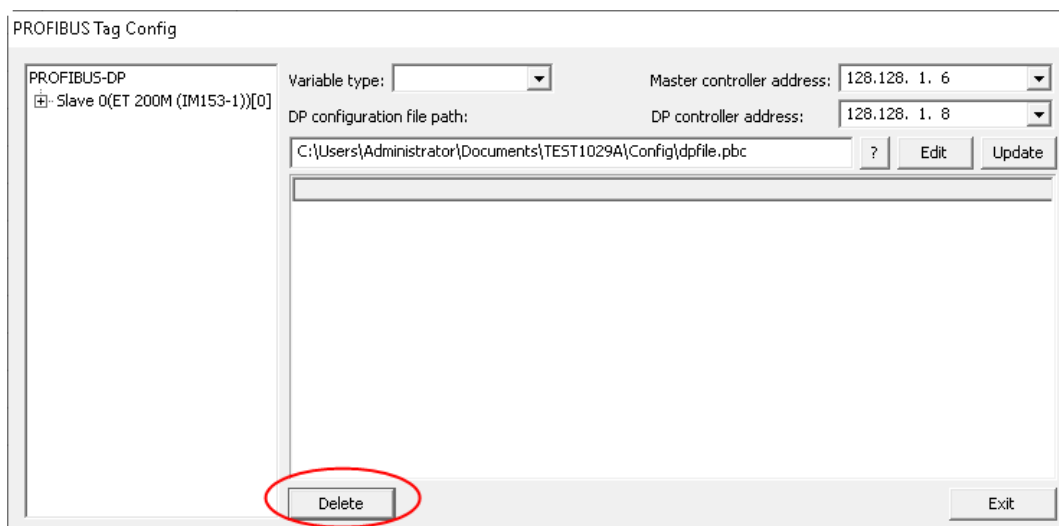


Figure 4-37 Delete tag

Delete configured tag: if one slave is deleted, its all tags will be deleted. If one PROFIBUS-DP master interface module is deleted, its all tags will be deleted. And so on. It is not permitted to delete one bit variable. If bit variable is selected to delete, prompt information of delete one byte variable will pop up.

2. Add DP tag

DP tag configuration has increased the following steps as the customize variables.

- Add “Involve in control” column: if the option is selected, the tag will participate in station communication control between controlled controller and PROFIBUS-DP master interface module. If “Involve in control” of byte variable has been selected, and the byte variable include the bit variable. “Involve in control” of the bit variable need not be selected, as shown in Figure 4-38.

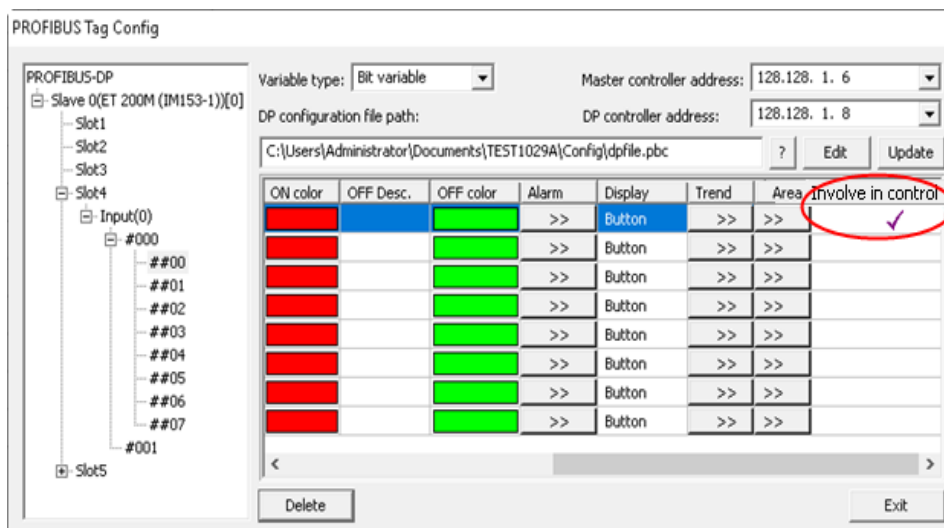


Figure 4-38 Involve in control

- 2-byte variable and 4-byte variable are added “Change Endian” for little-endian or big-endian, as shown in Figure 4-39.

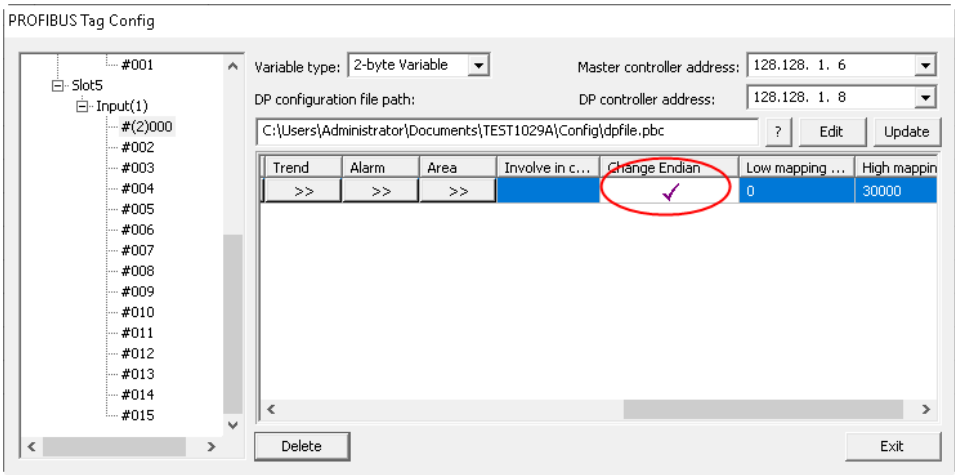


Figure 4-39 Change Endian

- “Low mapping limit of DP float” and “High mapping Limit of DP float”: refers to transfer 2-byte variable to a SFLOAT number, the high/ low limits should be set. PROFIBUS-DP master interface module transfers the code to SFLOAT number according to the high/ low limits, and transmits to the operation node and other controllers (if needs to be involved in control). As shown in Figure 4-40.

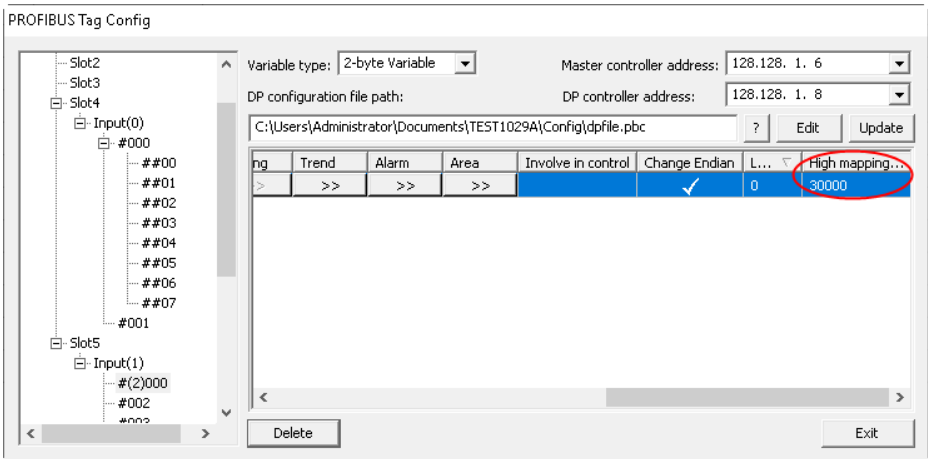


Figure 4-40 Low mapping limit of DP float and high mapping limit of DP float

3. Update

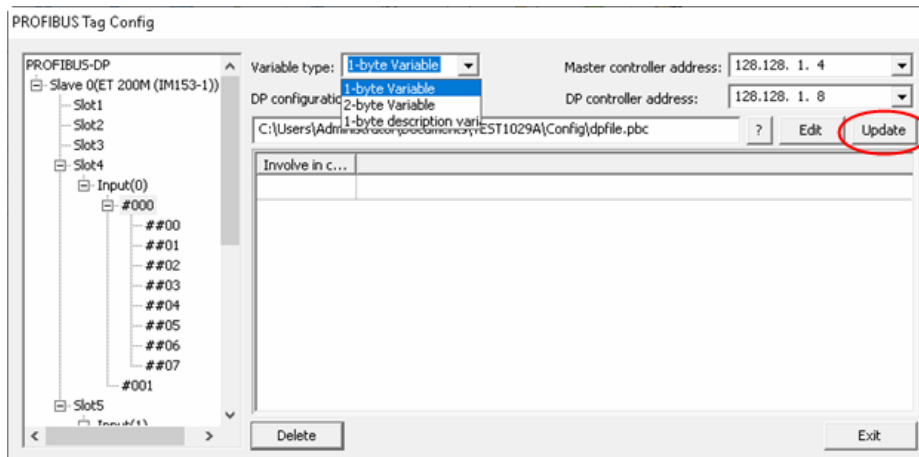


Figure 4-41 Update Settings

As shown in Figure 4-41, the updating function is used to update the configuration tree. However, if tags have been configured and DP files have not been changed, click “Update”, the below dialog box will popup.

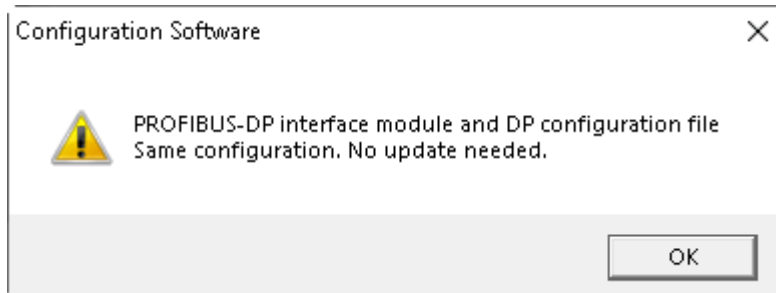
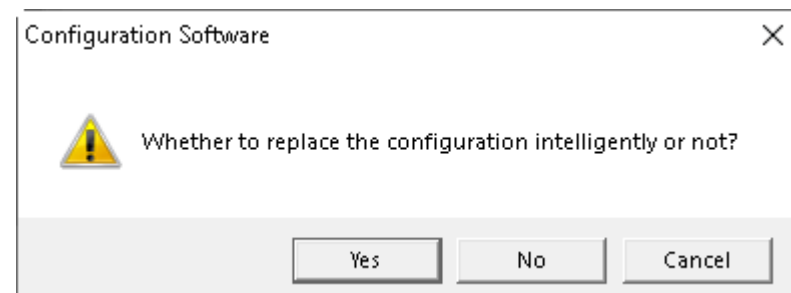


Figure 4-42 Update confirmation

Click “OK” to delete all tags and relative configurations of the PROFIBUS-DP module. Furthermore, if the DP file has been changed, click “Update” and the confirmation dialog box will pop up.



Click “No” to delete all tags and relative configurations of the PROFIBUS-DP module and form a new configuration tree with no tag. Click “Yes” the program will compare the old DP file with the new one. Then you should make a judgment and operate according to the prompts. It is recommended to save the configured tags so as to avoid work again.



Tips:

Judgment error may happen and need user to confirm it. When a new DP file is too large, the program will perform the full updating and all tags and relative configurations will be

updated.

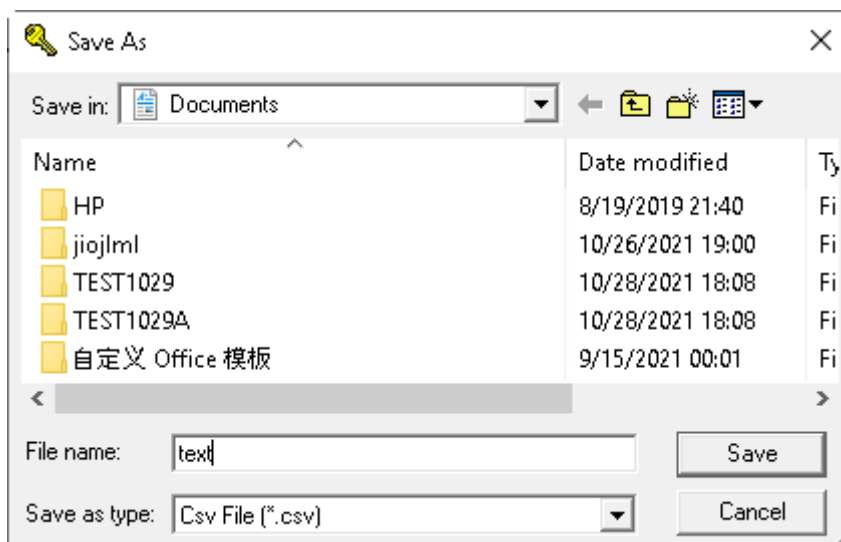
4. Updating Tag No.

It refers to update tag No. automatically when closing the “PROFIBUS Tag Configuration” interface or choosing another PROFIBUS-DP module. It corresponds to the configuration table download.

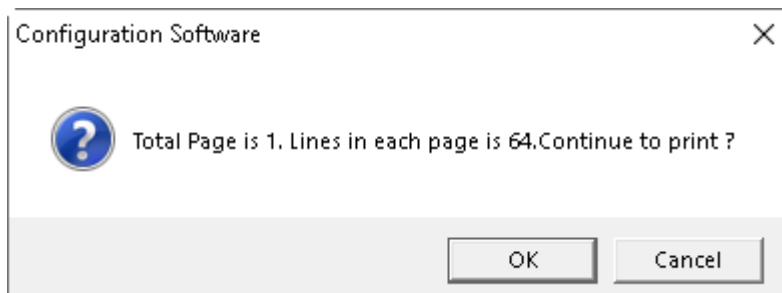
View Controlled Tags

1. Main functions

- View the tag configurations involved in control in DP configuration.
- Provide the inter-station communication address of the tag for project configuration engineer.
- Export the corresponding CSV files.



- Print the data from list.



2. Operation Steps

- Select a PROFIBUS-DP master interface module in SCKey software, and the command of “**Overall Information/ View Controlled Tags**” will be optional.
- Select “**View Tags of Control Scheme**” to view all input controlled tags. Click “Input/Output” to view the various types of controlled tags. As shown in Figure 4-43

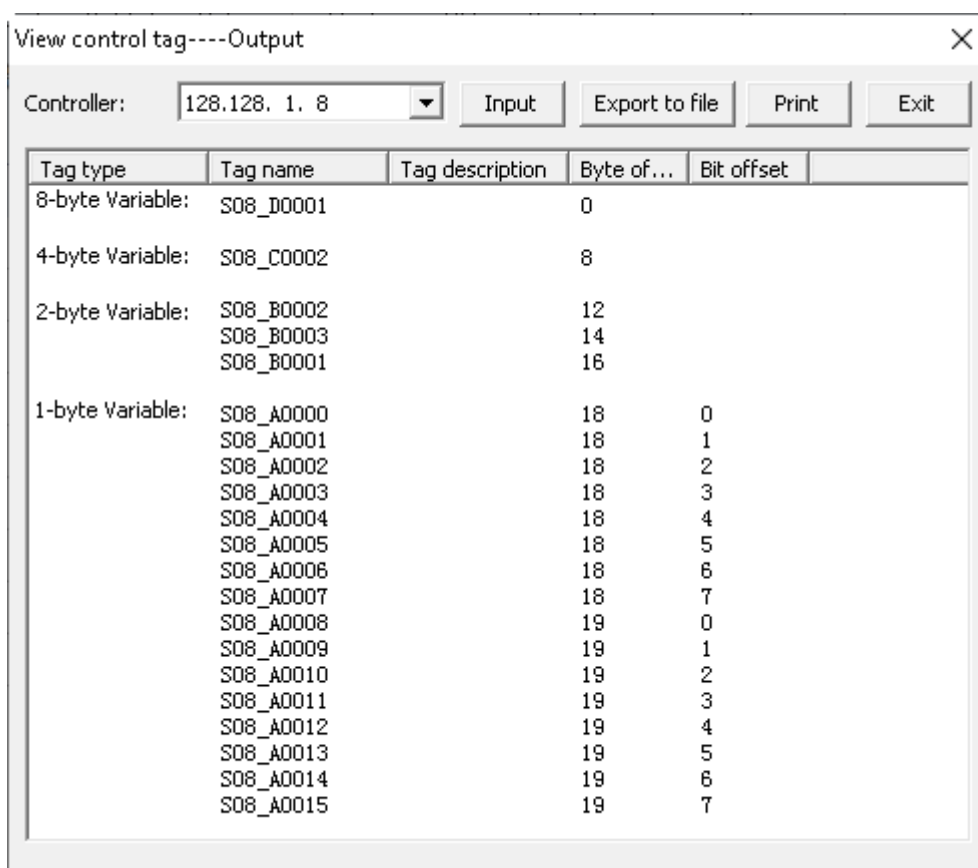


Figure 4-43 View controlled tags window

- Select different PROFIBUS-DP master interface modules in the drop-down menu, to show PROFIBUS tags participated in control or all tags.

Click **“Create CSV File”**, to pop up the dialog. Input the file name and click **“Save”**. And then a new csv file will be created and PROFIBUS tags will be output into this file. View these tags by Excel.

- Click **“Print”** to popup following dialog. Click **“OK”** to print the tags by the default printer. Please use A4 paper.

4.4 Compile and Download

4.4.1 OMC/GCS-G5

After completion of setting, close the hardware configuration window, go back to the software interface of the configuration management, save the configuration set, select to compile and download in proper order. The system configuration download can be divided into online and offline download:

Online download: When there is no major change in configuration and the online device is not modified, carry out online download. Online download can ensure that the unmodified device, its commands and relation between the commands and the tag remain unchanged.

Offline download: When there is major change in the configuration, for example, modification to the hardware structure of the system and the system forbids the user to carry out online download

to ensure site safety. When it is ensured that there will be no major problem, offline download can be selected.

4.4.2 ECS-100/ JX-300XP

Main Function

- Create configuration file in format of .dbm and can be download.
- Download the .dbm file to PROFIBUS-DP master interface module, then the underlayer PROFIBUS device and the PROFIBUS-DP master interface module can communicate.
- Create configuration table and download the configuration table to PROFIEBUS-DP master interface module.
- Download configuration ID, characteristics, and controlled controller cycle to PROFIEBUS-DP master interface module.

Configuration Steps

- The selected DP file while DP configuring cannot be deleted or modified, and cannot modify its path. The original DP file is required while downloading. And error of configuration conflict will happen, when the DP file is modified.
- Check the device to be downloaded, make sure that the device has been configured correctly, such as address.
- Select command of **Overall Information\ DP Download** in menu, dialog box shown as Figure 4-44 will popup.

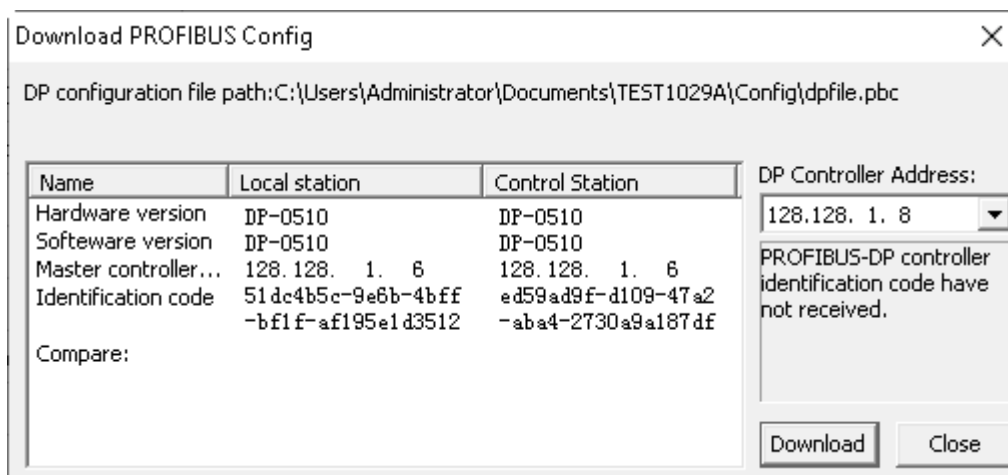


Figure 4-44 Download DP

System software get PROFIBUS-DP master interface module information, and display the information including hardware version, address of controlled controller, and characteristics letter. And the system software compares the information with local information.

Select the PROFIBUS-DP master interface module address from the drop-down menu in right, and click "Download" to download. However, if there is any error about configuration, the relative prompt will help you to correct it.

**Attention:**

- While editing DP tag, do not switch to other tags so as to avoid mis-operation.
- The calling of DP tag in DCS configuration and in user defined control scheme is similar to the calling of user defined variable.

4.5 PROFIBUS Online Diagnose and Device Management

Diagnose and Management in DPCon only can be valid in “Debug Mode Online”. The status can be achieved by select the command of **Online/ Debug Mode** or click . Take OMC as an example, the interface will be changed as Figure 4-45.

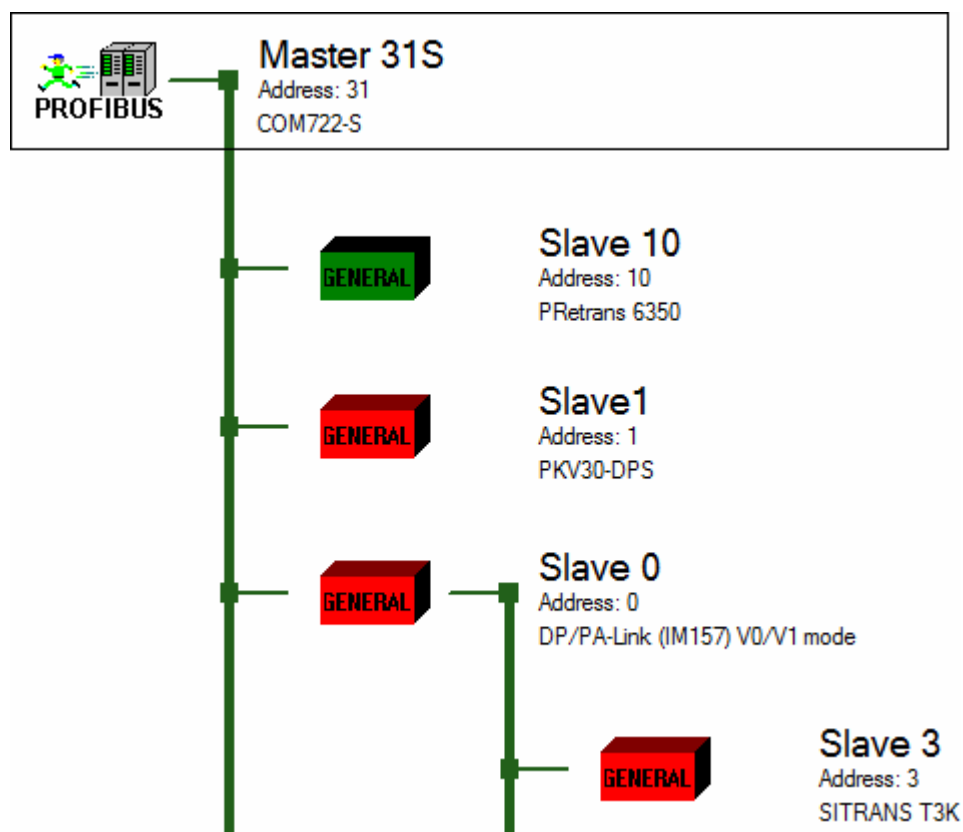





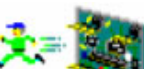



Figure 4-45 Debug Mode

Table 4-1 shows the instruction of icons in above figure.

Table 4-1 Icon Instruction

Icon	Description
	Slave icon in non debug mode.
	Slave icon in debug mode, and the slave is communicating normally.

Icon	Description
	Slave icon in debug mode, and the slave is communicating abnormally (slave dropped or instrument unmatched).
	Master icon in non-debug mode (OMC and G3&G5 systems).
	In debug mode, the PROFIBUS master communicates normally (OMC and G3&G5 systems).
	In debug mode, the PROFIBUS master communicates abnormally (master dropped) (OMC and G3&G5 systems).
	Master icon in non-debug mode (ECS-100 and JX-300XP systems).
	In debug mode, the PROFIBUS master communicates normally (ECS-100 and JX-300XP systems).
	In debug mode, the PROFIBUS master communicates abnormally (master dropped) (ECS-100 and JX-300XP systems).

4.5.1 Online Diagnose

In debug mode, click PROFIBUS master icon and select command of “Online/ Diagnose” or “Diagnose” in its right menu, “Diagnose Information” window will pop up. Click “Reset”, the statistics will update.

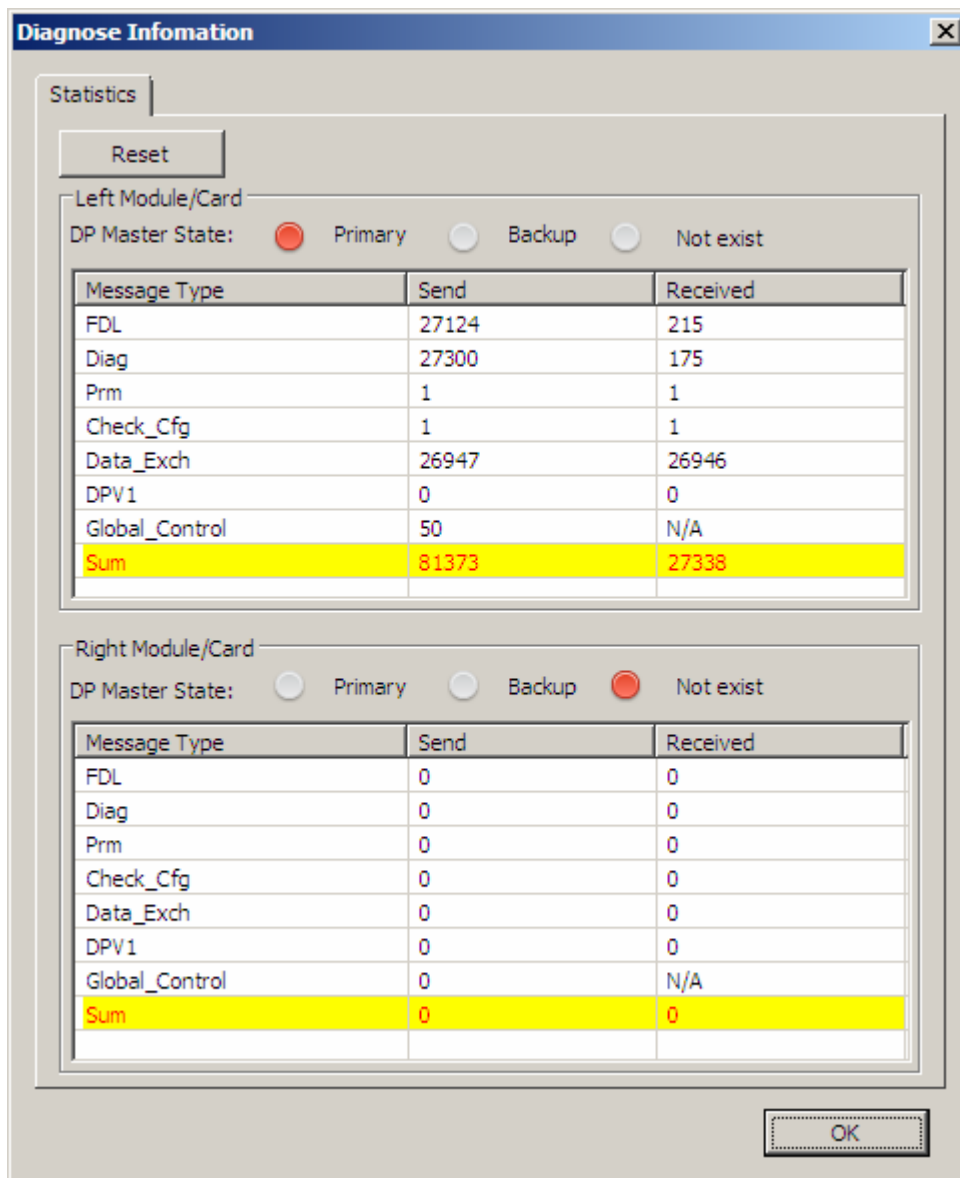


Figure 4-46 Master Statistics

In debug mode, click slave icon and select command of “Online/ Diagnose” or “Diagnose” in its right menu, “Diagnose Information” window will popup, as shown in Figure 4-47. The software can diagnose the information shown in the figure below. And the slave has the status that shown with read icon.

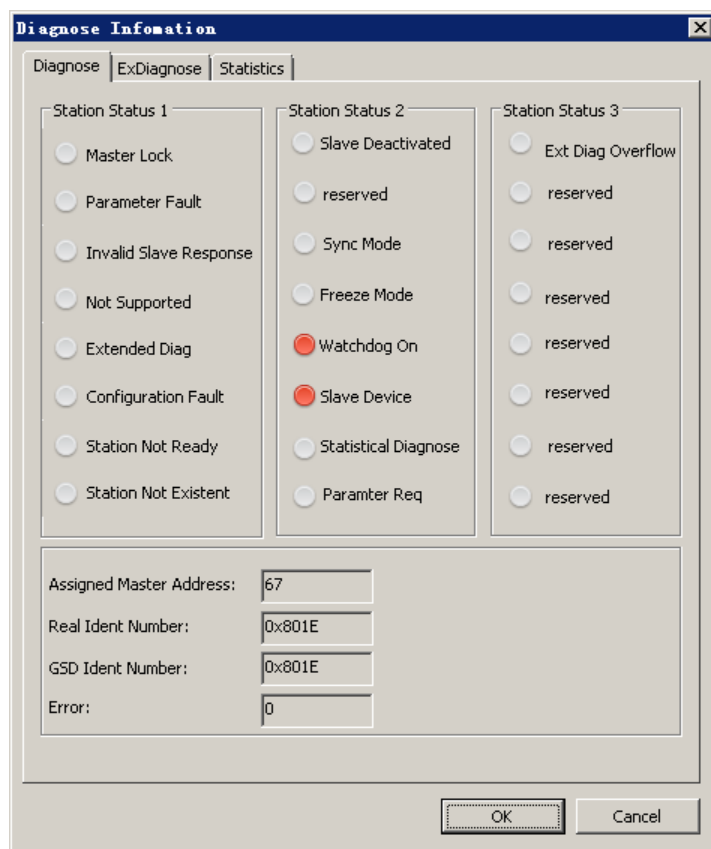


Figure 4-47 Slave Diagnose Information

If slave has the status, click “ExDiagnose” tab to view extended diagnose information, as shown in following figure.

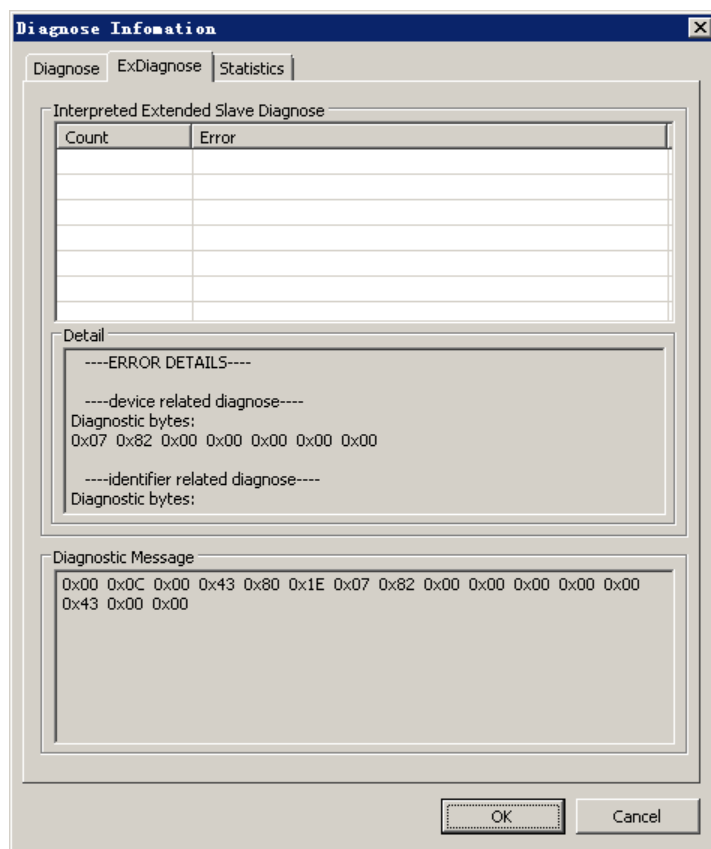


Figure 4-48 Extended Diagnose Information

4.5.2 Livelist

In debug mode, select master station icon, select “Online/Livelist” in menu bar, or right click master icon and select “Livelist”, pops up interface “LiveList for DP”. Click “Update” to update device, devices online will be displayed in “Device Address”. As shown below, it means a slave station's address is 124 and a master station that address is 31 online.

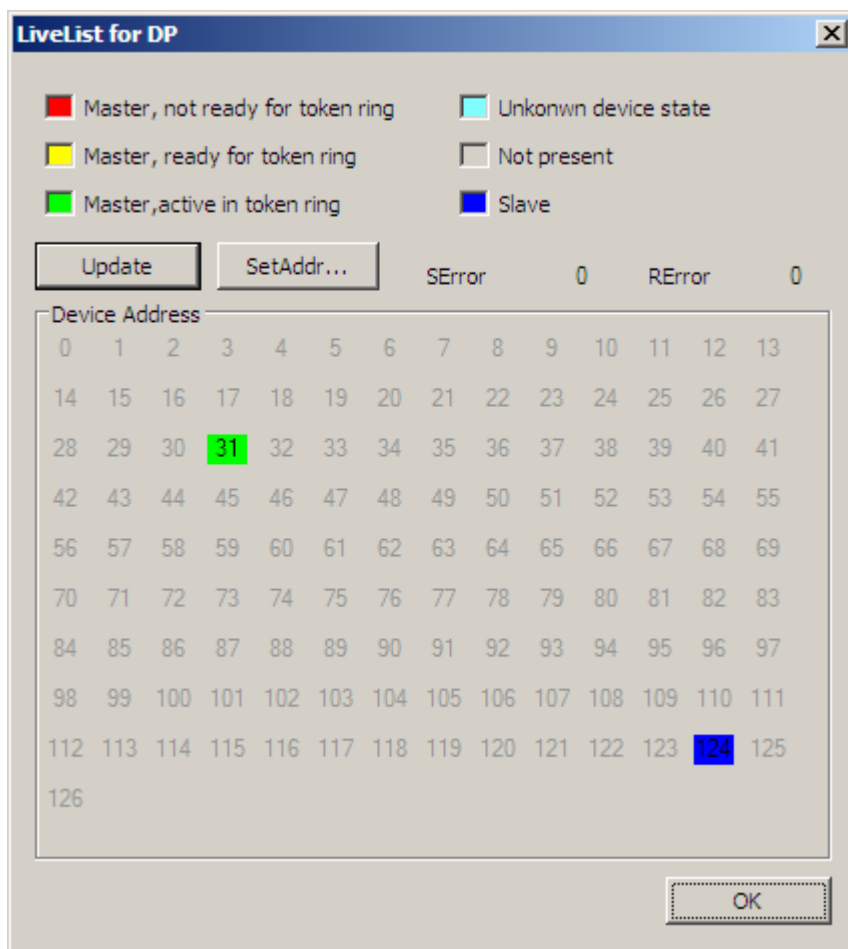


Figure 4-49 Livelist for DP interface

Click “Set Address” to pop up the “Slave Station Address Settings” interface, input the old address and new address, click “OK” to modify the slave station address. The bus type can only be DP bus, if set the slave station address in “PA Bus Act List”, the bus type is fixed as PA bus, and the linker address can be self-defined.

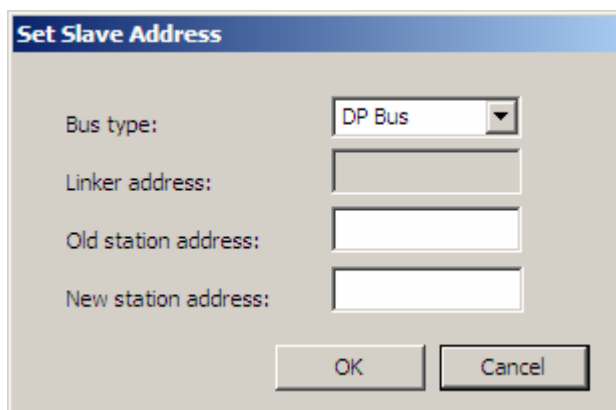


Figure 4-50 Slave station address settings

Following reasons may cause the fault when modifying address:

- Old address input fault.

- New address has already existed.
- Configuration has been downloaded to controller.

Select the master icon, and select “Online/ Slave Station Address Settings” in menu, to set the address for slave station, and the bus type is DP bus or PA bus optional.

4.5.3 I/O Real-time Data

In debug mode, select slave icon, select “Online/I/O Real-time Data”, or right click slave icon select “I/O Real-time Data”, pops up “I/O Real-time Data” interface below. Click “Update” button, the input and output data will be display real time. Click “hexadecimal” to transfer the decimal data into hexadecimal.

The screenshot shows the "I/O Monitor" window with two main sections: "Input Data" and "Output Data". Each section contains a table with 16 columns (labeled 1 to 16) and 16 rows (labeled dec 1 to dec 16). The "Input Data" table shows values: dec 1 has 0 in column 1, 0 in column 2, 0 in column 3, 0 in column 4, and 79 in column 5. The "Output Data" table is empty. To the right of each table is an "Update" button. At the bottom right of the window are buttons for "hex" and "OK".

dec	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	0	0	0	79											
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

dec	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

Figure 4-51 I/O Real-time Data

4.5.4 Network Scan

Select “Online/ Actual Network Scan” in menu bar, pops up interface below. Click “Update” button, software will detect the hardware connected, slave station information connected will be listed. Select one slave station, it could be configured. After configuration, click “**Accept Configuration**”, add slave station to bus. Therefore, user is no need to add slave stations one by one from manufacturers list by this method.

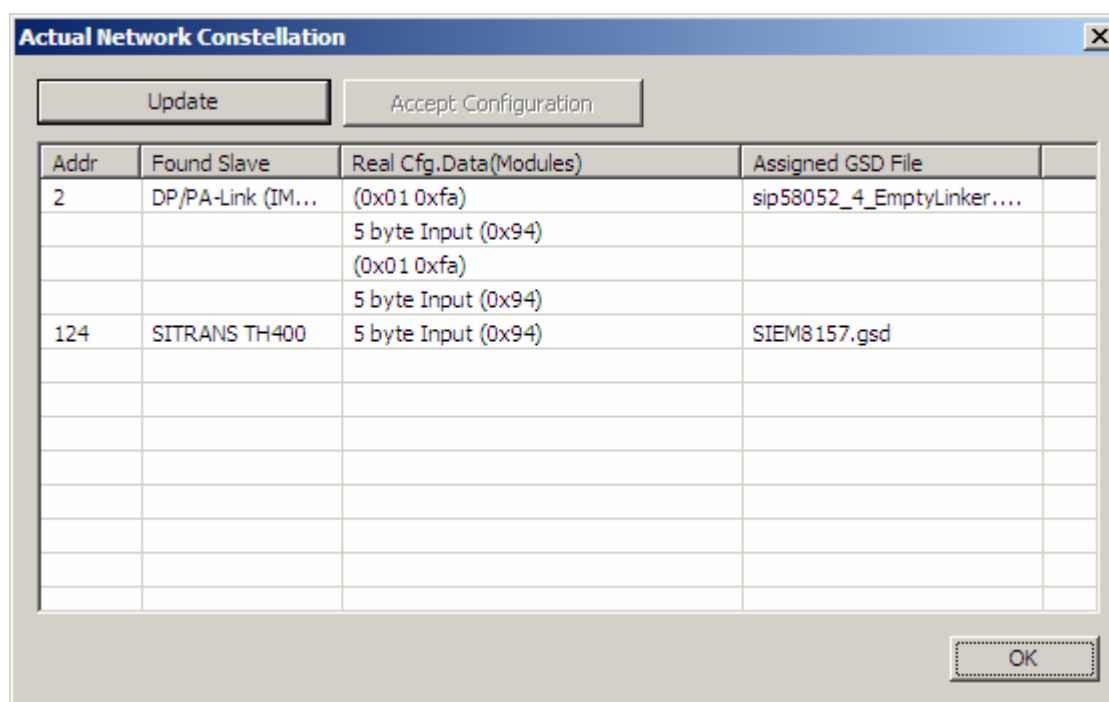


Figure 4-52 Network Scan

4.5.5 Open DTM

In debug mode, right click slave icon and select “Open DTM”, user could see the DTM device list corresponding to the slave station. Take the SITRANS TH400 below as an example.

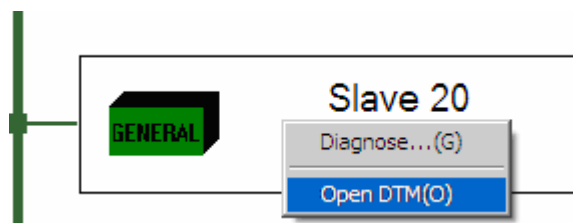


Figure 4-53 Open DTM

Open DTM normally and display the “Device Cfg” dialog box.

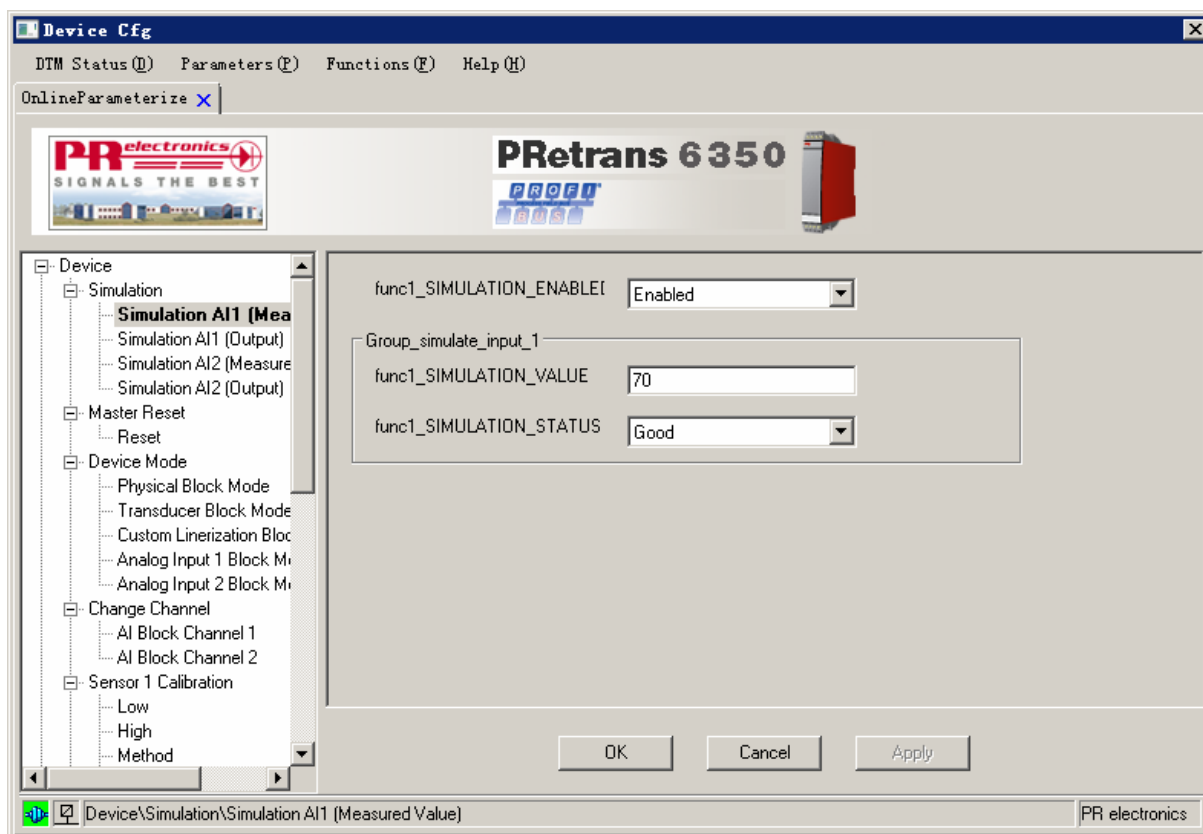


Figure 4-54 “Device Cfg” Window

DTM configuration menu instructions are shown below.

Table 4-2 DTM configuration menu

Menu Item	Subitem	Instruction
DTM Status	Online	Switch DTM to online status (real-time communication enabled).
	Offline	Switch DTM to offline status (real-time communication disabled).
Parameter	Upload Parameters from Device	Upload parameters from filed device to local device DTM.
	Download Parameters to Device	Download parameters configured in DTM to filed device.
Functions	Offline Parameterize	Offline parameter settings
	Online Parameterize	Real-time read and write online parameter
	Compare	Parameter comparison function
	Configuration	DTM configuration.
	Observe	Observe device real-time parameter in read-only parameter.
	Diagnosis	Device diagnosis function
	Additional functions	Other functions please refer to corresponding DTM user manual.
Help	DTM Info	View DTM basic information

**Attention:**

Please refer to specific user manual supplied by device manufacturer for specific DTM operation method and steps.

There may be 2 results after clicking “Open DTM” configuration.

- If the device has no matched DTM device, an error dialog will pop up which shows that the system cannot identify the device type.

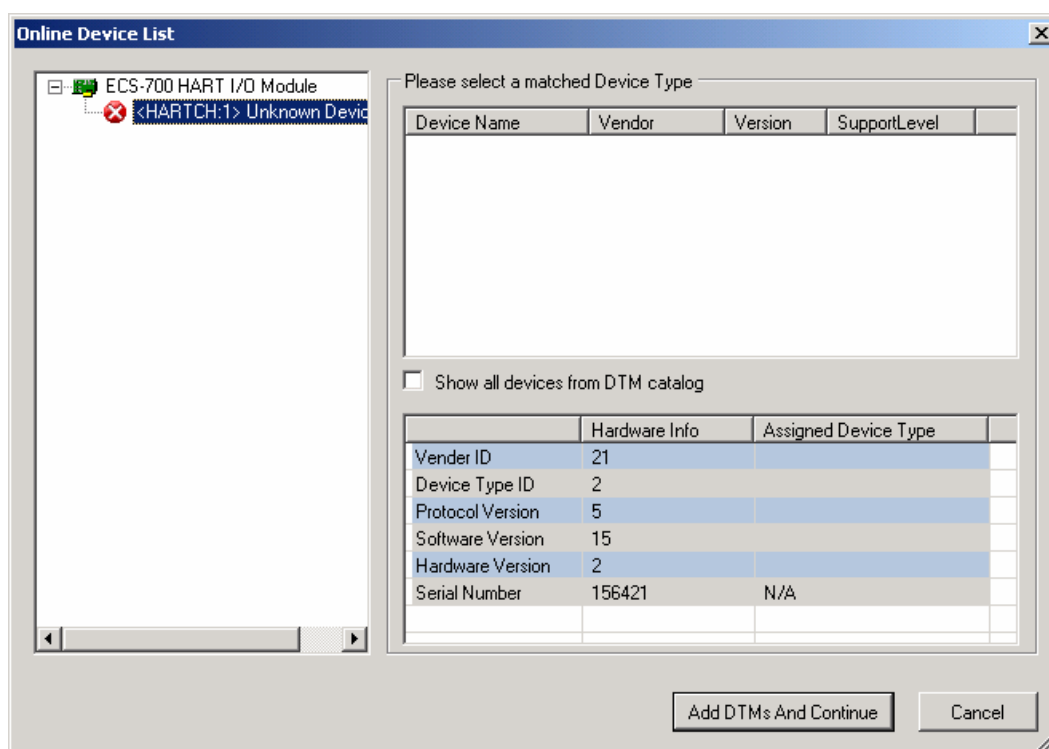


Figure 4-55 Has no matched DTM device

In Figure 4-55, the device has no matched device DTM and the structure tree shows that “Unknown Device Type”.

**Attention:**

- If the instrument has no matched device DTM, users need to install one. The installation steps should refer to the matched user manual which factories provided.
- After install new device DTM, user need to update (click “Tools/DTM Catalog” in menu bar), or it will lead to unusable of DTM, or display wrong information because of load unload DTM.
- If the interface shown in Figure 4-55 still displays after installing new device DTM, select “Show All Device Types in DTM Catalog” in interface and then select the DTM type to be installed.

- If the device has several matched device DTM, a dialog as shown in Figure 4-56. User

can choose the matched device DTM.

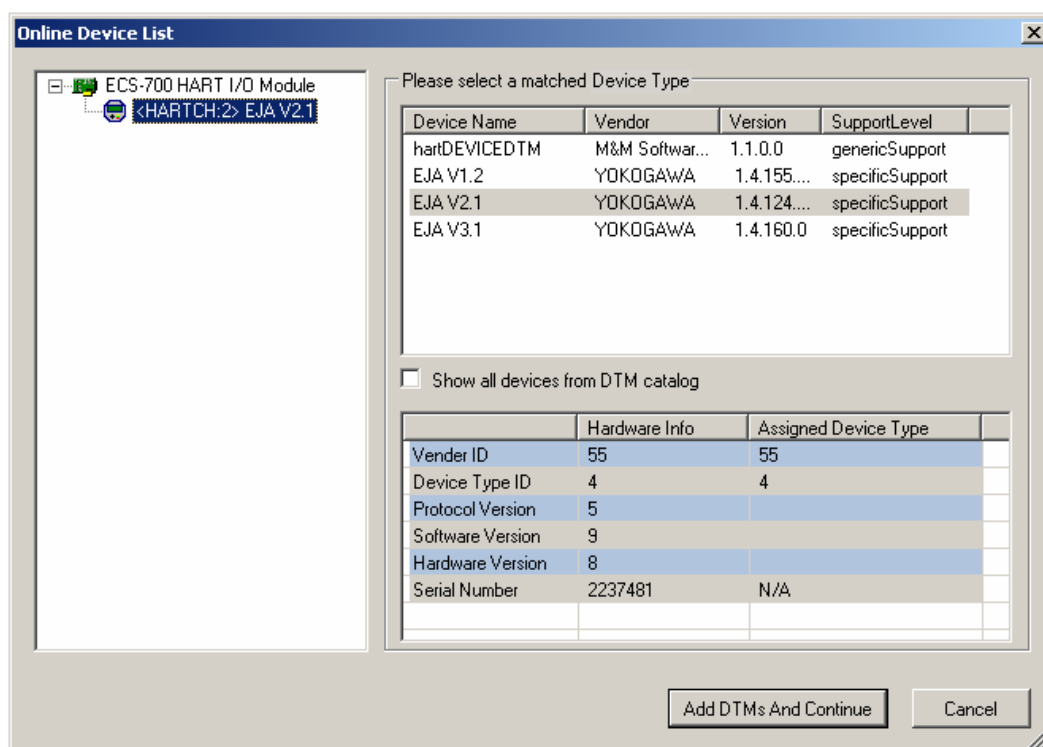


Figure 4-56 Has several matched DTM device

Item instruction of Figure 4-56 is shown in Table 4-3.

Table 4-3 Online device list instruction

Item	Instruction
Structure Tree	The root node is the communication DTM, only one type is supported currently. Each sub-node represents a real device, for example, <HARTCH:2> EJA V2.1, HARTCH means the channel of communication DTM, 2 means device address. Each time user opens the dialog, the matched device DTM is the one selected last time in default.
Please select a matched DTM	Show all DTMs may be matched with the actual device. Right-click the device and select DTM Info to pop up the DTM basic information dialog.
Show all devices from DTM catalog	Checked the box and all device DTMs will be shown in the display area.
Hardware Info and Assigned Device Type	Hardware Info: shows basic information of real device. Assigned Device Type: shows the matched information of the selected device type.

**Tips:****Method to select matched device DTM:**

1. Select according to the matching degree shows in Hardware Info and Assigned Device Type. For example, in Figure 4-56, the device type supported by DTM should match with device whose vender ID is 55 and device type ID is 4.
2. Check the device type, its name may have same part with the name of matched device DTM in SAMS Device Management interface.
3. If the matched device DTM still cannot be selected with the 2 methods above, user can choose to or select each DTM with probability to find out the best one.

Click “Add DTMs and Continue” to load the device and open the configuration interface.

Click “Cancel” to cancel the DTM configuration.

**Tip:**

When FDTFrame is not installed, it will prompt “FDTFrame Error” if select to “Open DTM”.

4.6 Other Functions

Table 4-4 shows the functions instruction of other menu items.

Table 4-4 Other Menu Functions introduction

Menus	Submenus	Function Description
Settings	Preference	Look over GSD file path and type.
Project	Property	Used to fill general property and communication property, communication property in different systems are different.
Tools	Device Table	Look over device list on DP, PA bus.
	Address Table	Look over device address list on DP, PA bus.
	GSD Viewer	Select one GSD file to open, user could look over relative information about GSD file.
	DTM Catalog	Display different kind of device which DTM supports, it supports catalog updating.
Help	About DPCon	Display matched system of software, revision of software, copyright of software etc. information.

4.6.1 Project Property

Select “Project/ Property” in menu bar, then popup “Project Property” window. Click “Communication” in configuration tree to view communication property. And the communication property is various in various systems.

OMC

Controller address and node address, as shown in following figure.

Controller addr:	172 . 20 . 0 . 2
Node addr:	3

Figure 4-57 Configure OMC Communication Property

GCS-G5

UCP address, as shown in following figure.

<div>Project Property</div> <div>General</div> <div>communication</div>	UCP Address: 08 16 00 08 80 10 00 00 00
---	---

Figure 4-58 GCS-G5 Project Property

4.7 Configuration of Connect PA Device Using DP/PA Coupler

This section describe the configuration of connect PA device using DP/PA coupler, taking ECS-100 as example. Configuration under other system will be similar.

4.7.1 Instruction of Connect PA Device

Figure 4-59 shows the structure of SUPCON DCS system after connected PROFIBUS-PA devices by using DP/PA coupler.

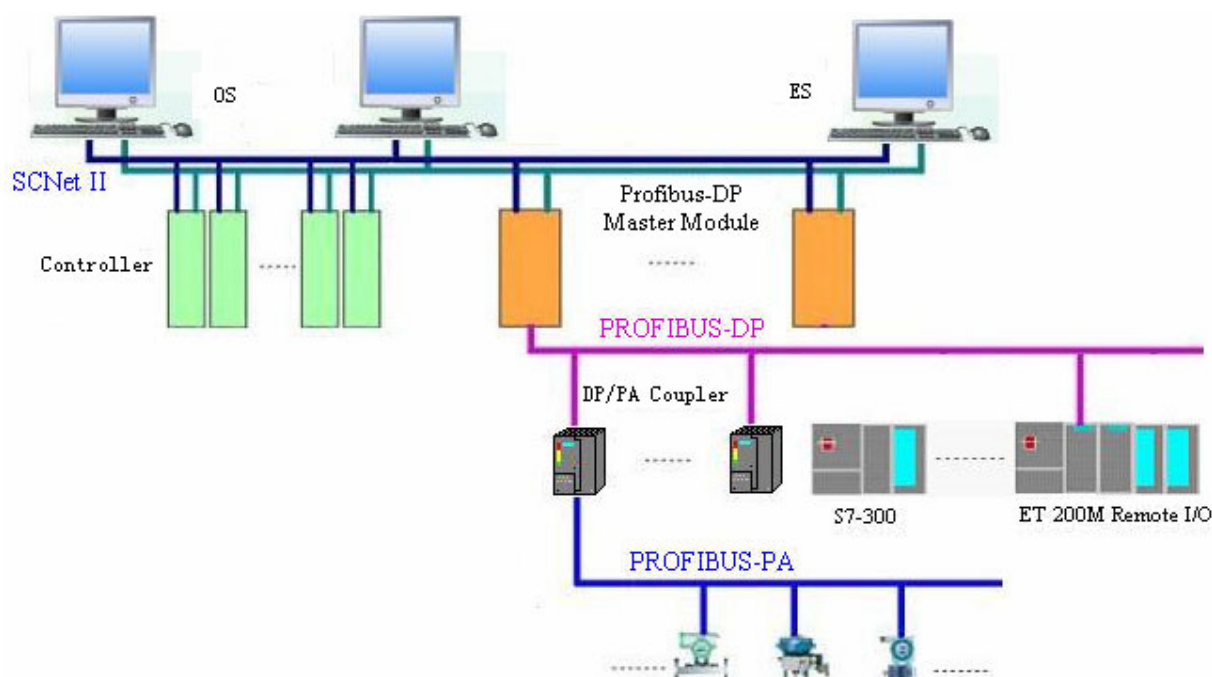


Figure 4-59 Connecting PROFIBUS-PA Device by Using Coupler Single

In addition, if there is no high speed requirement of PROFIBUS-DP bus, DP devices (such as ET 200M) with baud rate of 45.45Kbps can be connected to PROFIBUS-DP bus.

4.7.2 Configuration Instruction

PROFIBUS-DP nodes include master station and slave station. When system configuring, PROFIBUS-DP master interface module is configured as PROFIBUS master station, and when PROFIBUS-PA device is connected by coupler alone, PROFIBUS-PA device is configured as slave station.

There is not link connected, so GSD file is not need to generate by GSDTool.

4.7.3 Configure Device

This section describes the configuration of PROFIBUS PA devices connected without link in DPCon, taking example that FW239-DP configured as PROFIBUS master, SITRANS TH400 (PA device made by SIEMENS) and TF12 (PA device made by ABB) configured as PROFIBUS slave.

This section describes configuration of PROFIBUS-PA and bus parameters of master, for other information refer to “4.2 PROFIBUS Communication Configuration”.

4.7.4 Add GSD File of PA Device

Select “File/ Import GSD” to popup dialog box of “Open”. Select GSD need to be imported. For example, SIEM8157.gsd is the GSD file of SITRANS TH400 and ABB_04c4.GSD is the GSD file of ABB TF12 as shown in Figure 4-60.

Click “Open”.

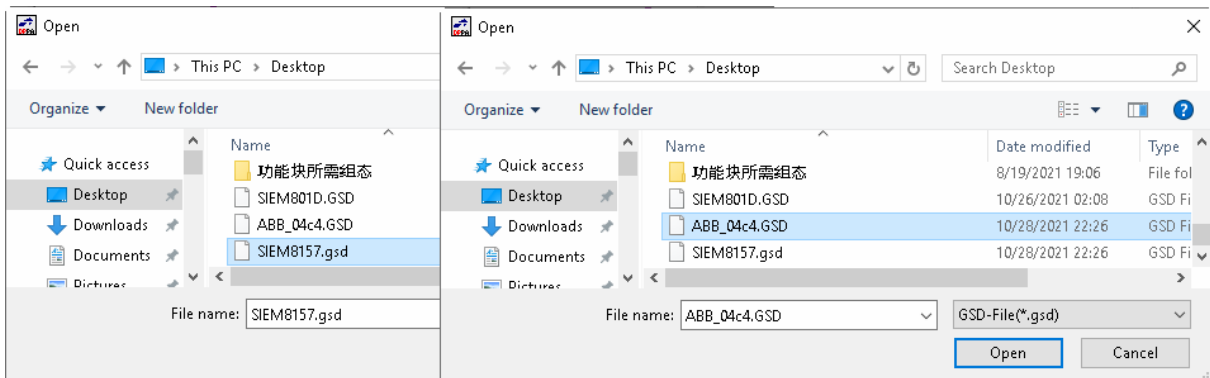


Figure 4-60 Select the GSD file to be imported



Tips:

Because dib file will not affect the software running, please ignore the prompt information of non-exist dib file while importing GSD file. Click “Cancel” to ignore the dib file.

4.7.5 Configure Master Station

For detail of master station configuration, please refer to “4.2.2 Master Station Configuration”.

4.7.6 Configure Bus Parameter

Click icon of master station, and select command of “Setting/ Bus Parameter” to set “Baud rate” as

45.45Kbps.



Attention:

In SyCon software, baud rate should be configured as 93.75Kbps, because there is no baud rate option of 45.45Kbps. XP/FW239-DP works in 45.45Kbps baud rate, although baud rate is configured as 93.75Kbps.

4.7.7 Add PA Devices

Configure ABB TF12 device address as 8 and SITRANS TH400 device address as 10. When adding slave, configure ABB TF12 device address as 8, add description as Slave8_TF12 for example. Configure SITRANS TH400 device address as 10, add description as Slave10_TH400 for example.

After PA devices added, DPCon window will show as following figure.

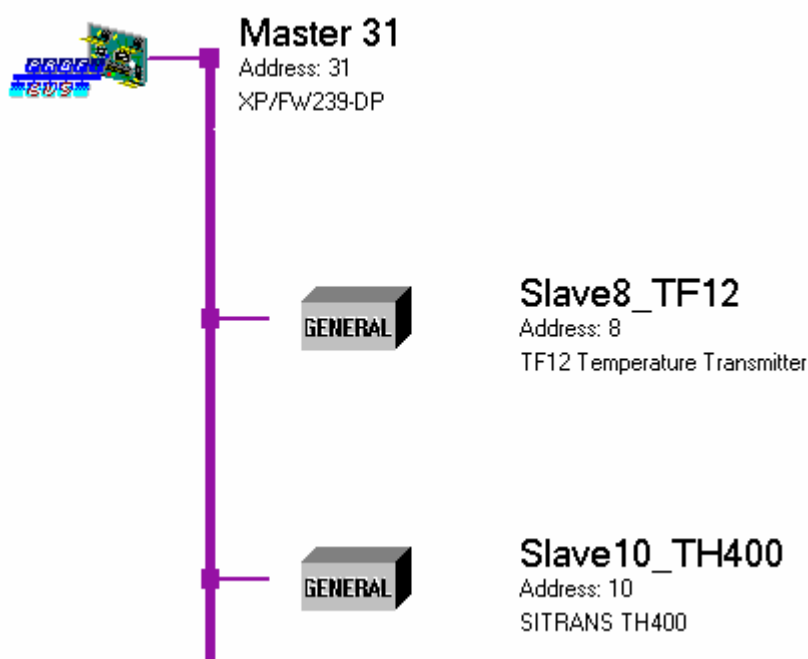


Figure 4-61 DPCon Window of Added Master and PA Devices

4.7.8 Configure PA Device

Because various PA devices have various properties, configure PA devices referring to instruction of PA devices.

Configuration of PA devices is similar to configuration of DP slave, here taking SITRANS TH400 as example of PA device.

Open configuration window, after click Slave10_TH400 and select command of “Settings/ Slave Configuration” or after double-click icon of slave.

Add module as shown in following figure.

Slave Configuration

General

Current Slave: 10 \ SITRANS TH400

Device: SITRANS TH400 Station Address: 10

GSD File: SIEM8157.gsd Description: Slave 10

☒ Activate device in actual configuration ☒ Enable watchdog control

Parameter Data...

DPV1 Settings...

Input&Output Info

Max. Lenth of	10	Bytes	Length of in-/output	10	Bytes
Max. Lenth of input	10	Bytes	Length of input data	10	Bytes
Max. Lenth of output	0	Bytes	Length of output data	0	
Max. Number of Modules	2	Bytes	Number of modules	2	

Module	Inputs	Outputs	In/Out	Identifier
Empty Module				0x00
Analog Input (AI) short	5 byte			0x94
Analog Input (AI) long	5 byte			0x42,0x84,0x0...

Append Module Remove Module Remove All Insert Module user define module

Slot	Idx	Module	Input Addr.	Inputs	Output A...	Outputs
Slot1	1	Analog Input (AI) short	0	5byte		
Slot2	1	Analog Input (AI) long	0	5byte		

OK Cancel

Figure 4-62 Configure PA Device

4.7.9 Diagnose

After DP configuration and download the configuration in SCKey. Open real-time supervision software of AdvanTrol-Pro, view diagnose information of PA device in diagnose interface. If PA device is connected by coupler and link, diagnose information of PA device will not be shown in diagnose interface. If PA device is connected by coupler, diagnose information of PA device will be shown in diagnose interface.

Module status information can be viewed by clicking the “Example” in the lower left corner of

software.

Section 5 Application Examples of DP Slave

5.1 Configuration Method of S7-300 PLC as DP Slave

This section takes Siemens S7-300 PLC CPU315-2DP as an example to introduce how to connect Siemens PLC as PROFIBUS-DP slave to the OMC system through COM722-S. The example uses configuration of 2 bytes input and 2 bytes output.

This section only introduces the configuration of the data exchange of PROFIBUS, and the programming of S7-300 PLC is not included.

Software requirement: Advantrol Pro (V2.80) software, Step 7 V5.0 or higher version.

5.1.1 Configuration Procedures of S7-300 PLC

- Create a new project

Open the Step7 system configuration software. As shown in Figure 5-1, select "**File/New**" and enter the project name, e.g. DPSlave.

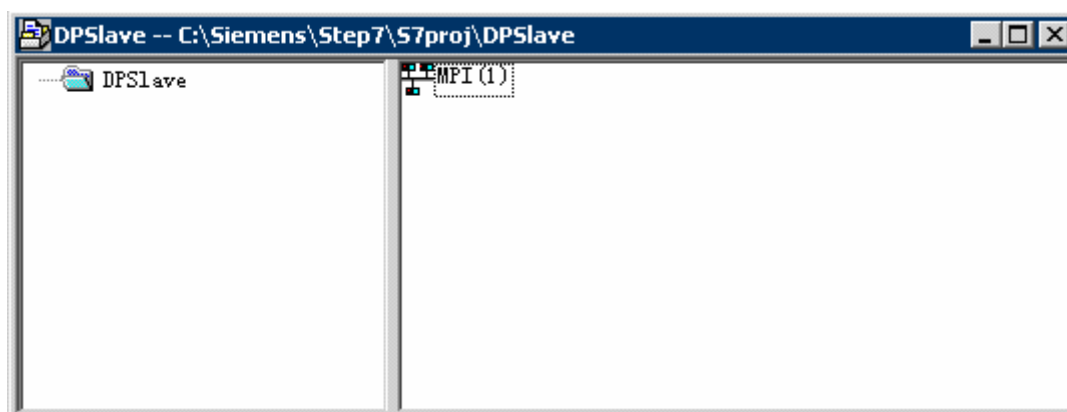


Figure 5-1 Create a new project

- Create DP slave
 - Add a S7-300 station "DummyDPMaster for Config". Select "**Insert/ Station/ SIMATIC 300 Station**" and rename it as "DummyDPMaster for Config". It is a virtual station which should be added in Step7 for configuring S7-300 PLC as DP slaves.
 - Add a S7-300 station "DPSlave". Select "**Insert/ Station/ SIMATIC 300 Station**" and rename it as "DPSlave". It is a PROFIBUS-DP slave.

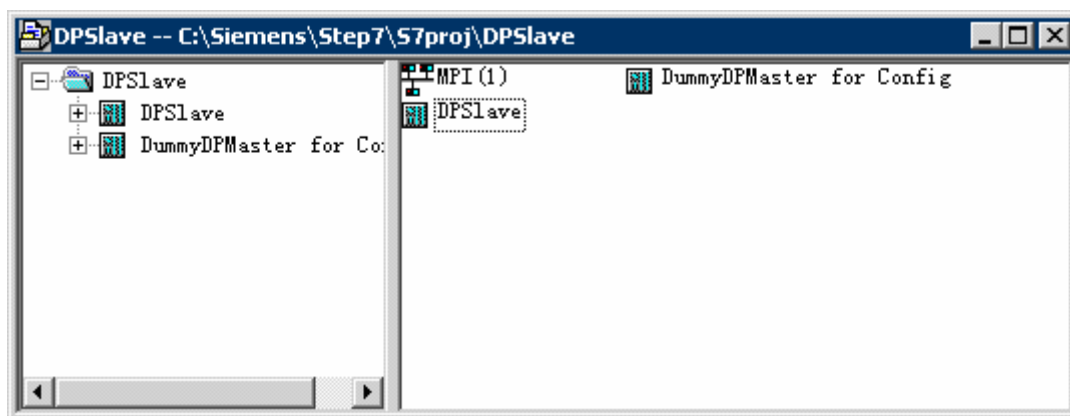


Figure 5-2 Add S7-300 station “DPslave”

- Hardware configuration (DummyDPMaster for Config)

Open the hardware configuration software of Step7, and configure the virtual master DummyDPMaster for Config.

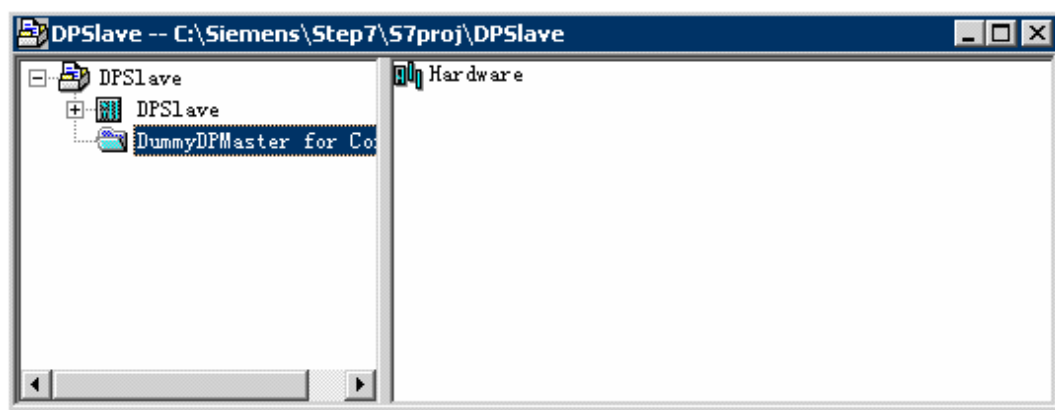


Figure 5-3 Configure the dummy DP Master

Select the icon “Hardware” and select “**Edit/Open Object**” or double click the icon to open the hardware configuration tool. Select “**View/Catalog**” to add various components of the S7-300 station.

- Rack

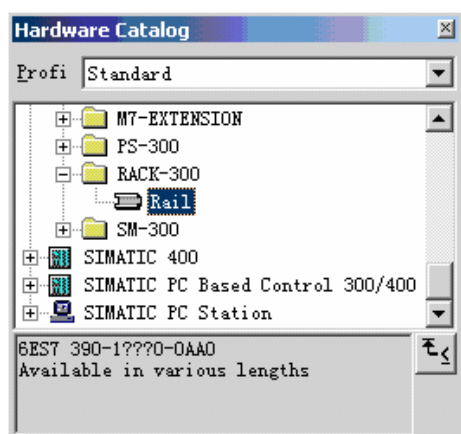


Figure 5-4 Add a rack

■ Power Supply

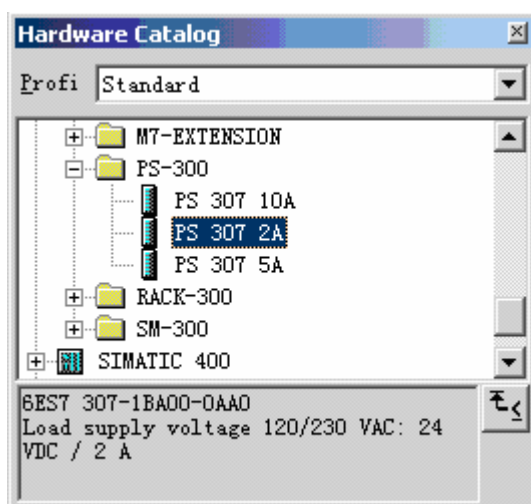


Figure 5-5 Add Power Supply

- CPU (DummyDPMaster for Config)
Select a kind of CPU, e.g. CPU315-2DP.

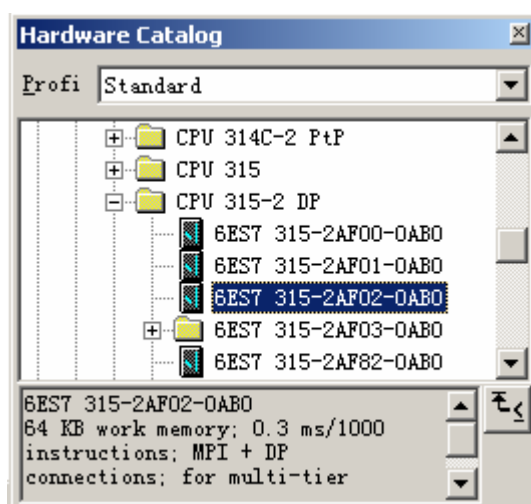


Figure 5-6 Add CPU

Since CPU315-2DP can be used for PROFIBUS communication, the interface as shown in following figure will be displayed.

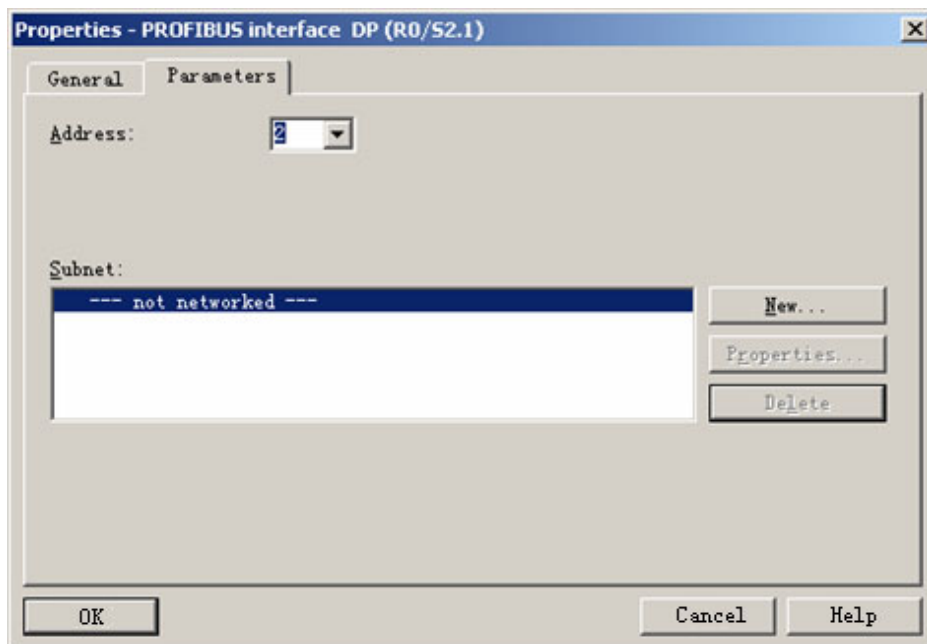


Figure 5-7 Configure the communication network

Click **"New"** and popup the following interface.

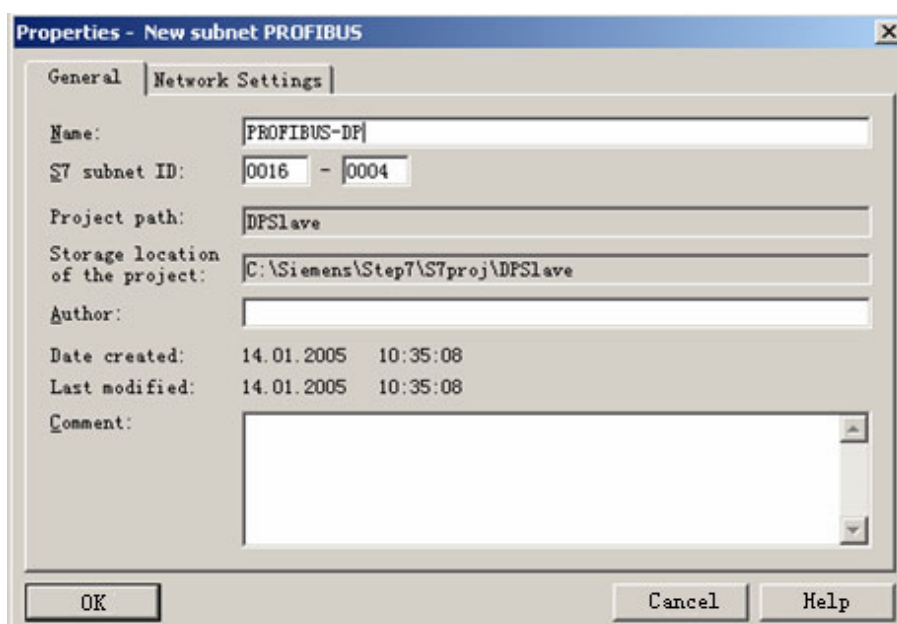


Figure 5-8 Name for the network bus

Name the network bus, e.g. PROFIBUS-DP and then select **"Network Settings"** to open the following interface.

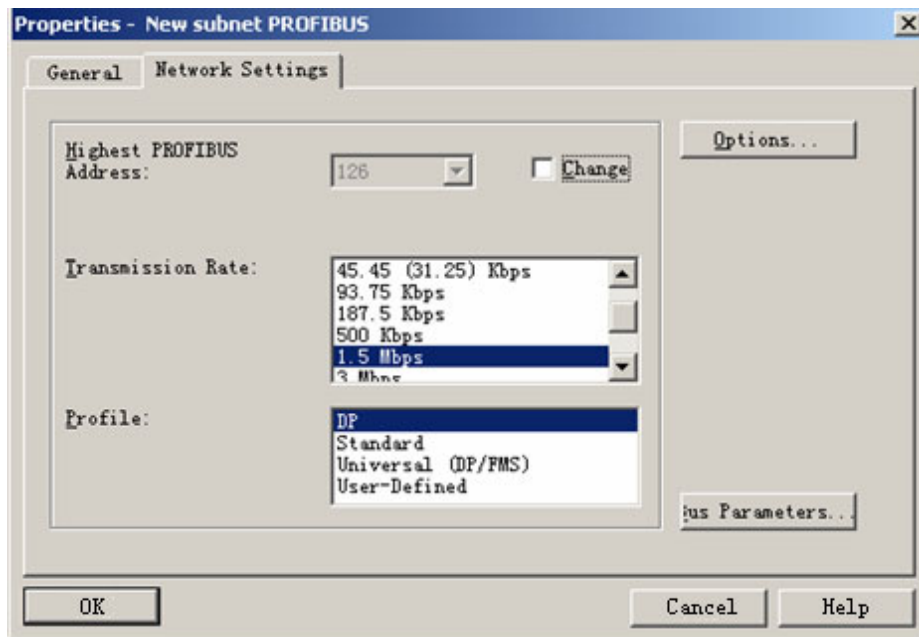


Figure 5-9 Network parameters settings

- Select Transmission rate, e.g. 1.5 Mbps
 - Select communication type, e.g. DP
- After configuration, click “OK” to close window.

Click “OK” for several times to logon following window.

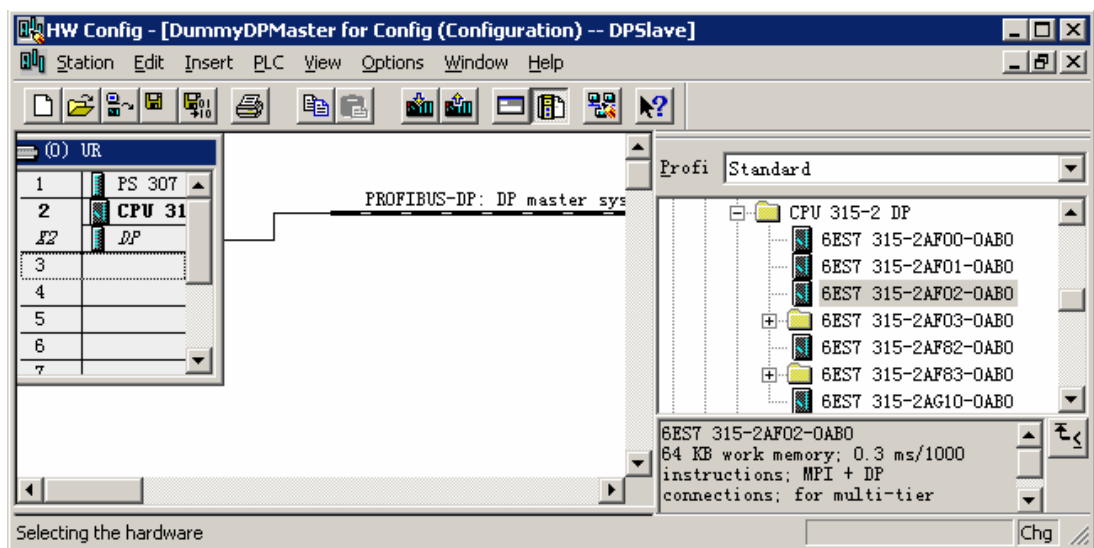


Figure 5-10 Configuration result

Select menu commands **Station/ Save** to save settings.

- Hardware configuration (DPSlave)

- Configuration

The configuration of DPSlave is similar to DummyDPMaster for Config. For the system has added a PROFIBUS-DP bus, only need to add bus and no need to add a bus when configuring DPSlave. After configuration, the following screen will display.

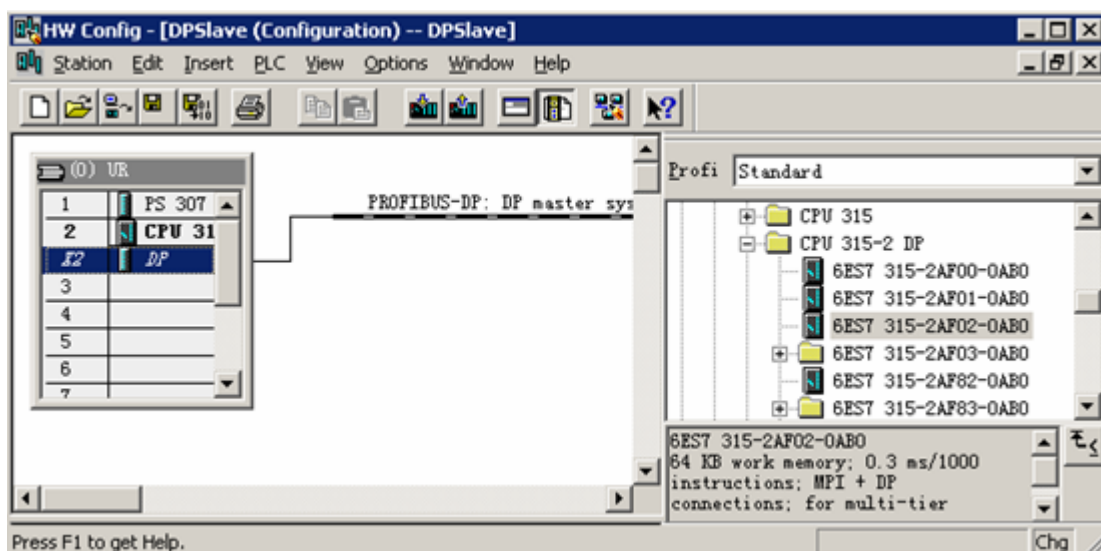


Figure 5-11 Select a bus

Double-click “X2 DP” to open the following interface.

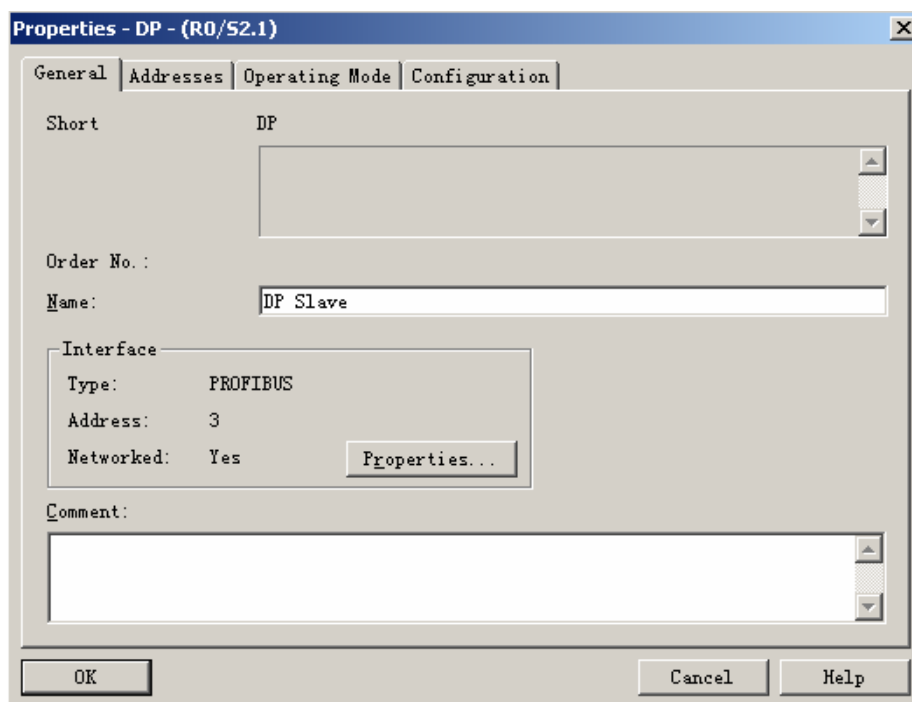


Figure 5-12 Property settings _ Name

Configure **Name** as “DP Slave”.

Select “**Operating Mode**” to open the following interface.

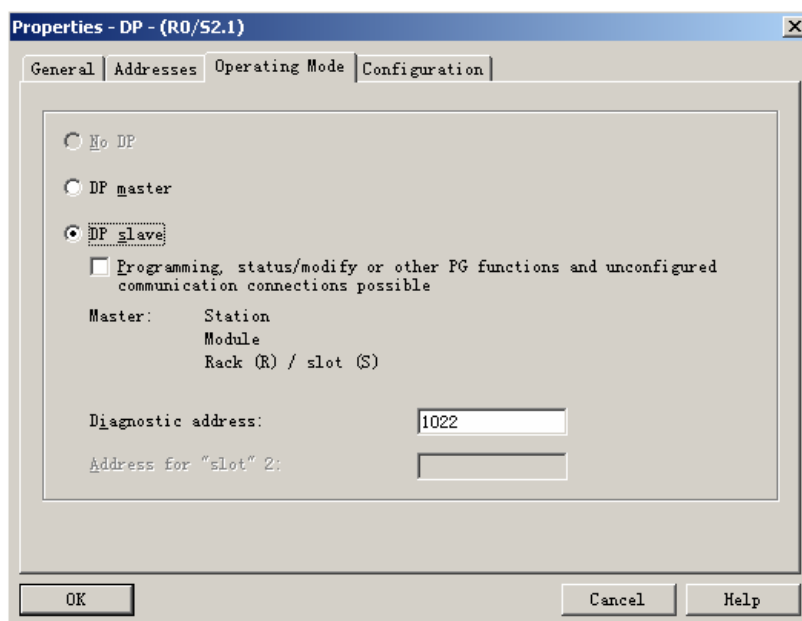


Figure 5-13 Property settings _ Operation Mode

Configure **Operation Mode** as “DP slave”.

Select “**Configuration**” and configure as the following figure.

Set Module 1: Input 2 bytes (unit).

Set Module 2: Input 2 bytes (unit).

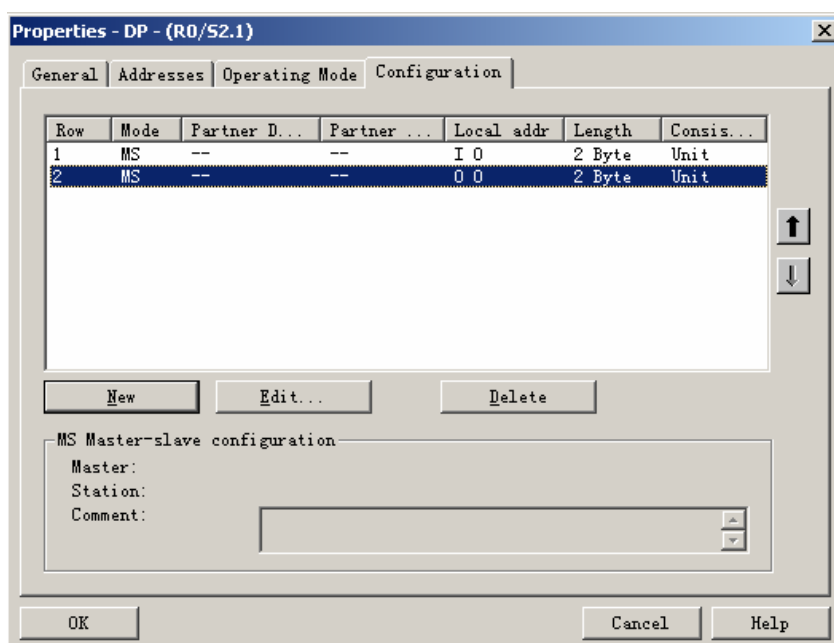


Figure 5-14 Configuration Tab of Property settings

Finally, click “**OK**”.



Tips:

The input and output address relates to the internal address of S7-300 PLC. As for input and output data, each module can configure maximum 32 bytes or 16 characters. The maximum configurable module number and maximum communication data depend on CPU types.

■ Download

Select **"PLC/Download to Module"** to download the configuration information.

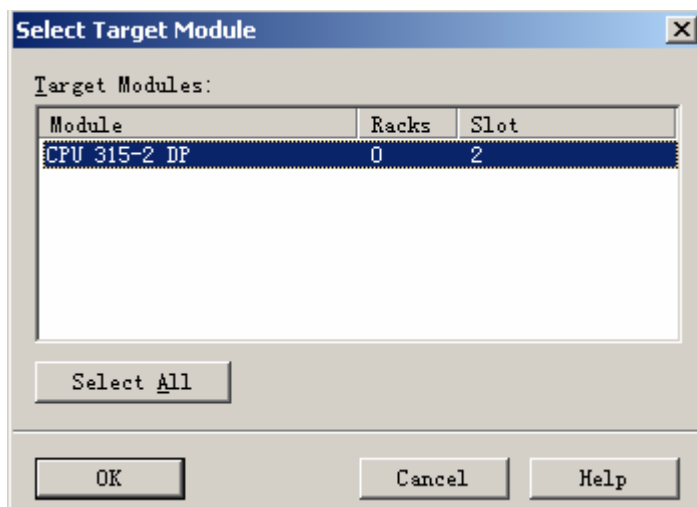


Figure 5-15 Select Target Module

Click **"Select All"** and then click **"OK"**.

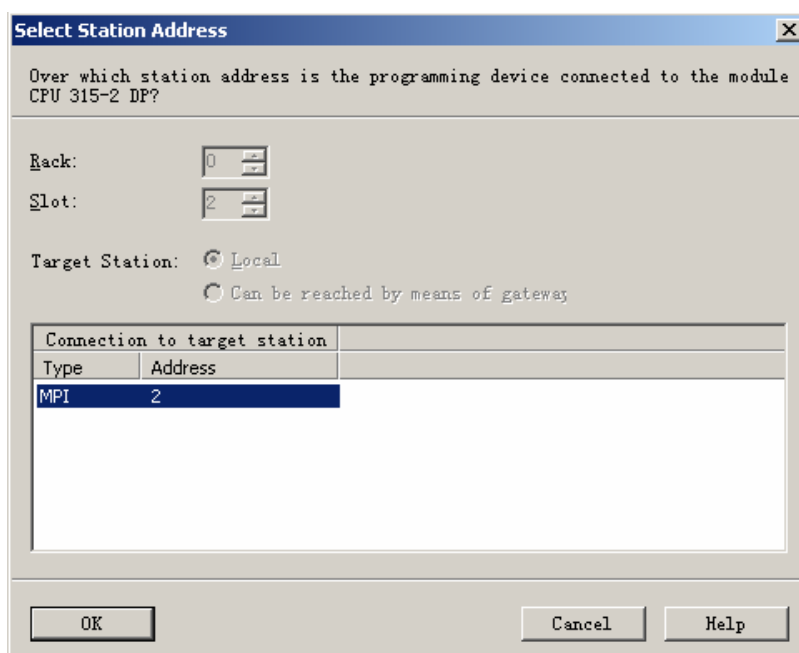


Figure 5-16 Select Station Address

Click **"OK"**.

■ Save the configuration

Select **"Station/Save"** to save the configuration. And then select **"Station/Exit"** to exit the program.

Configure PLC to running mode.

5.1.2 Configure PROFIBUS-DP Master Interface Module

Before configuration, please make sure you have prepared the right GSD files of S7-300 PLC, with the name of "sie3802f.gse", which you can download from the GSD library in www.profibus.com.

To ensure the GSD files matching the device, it is recommended to get GSD files from the suppliers.

Then, create a new file; add GSD files, master and slave according to “*PROFIBUS-DP Master Interface Module COM722-S User Manual*”.

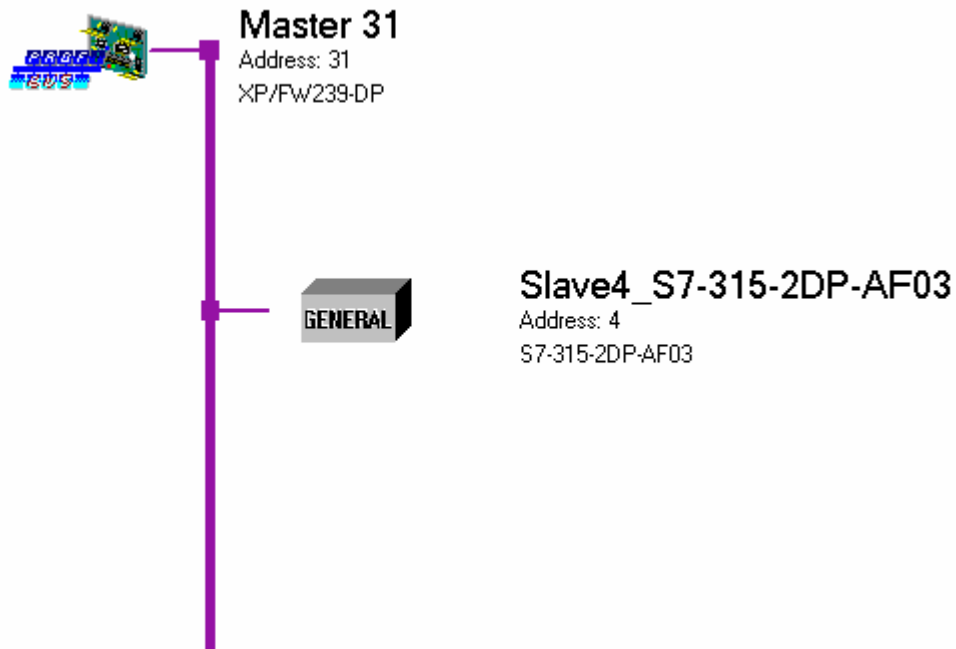


Figure 5-17 Add master and slave

Configure slave by following steps:

Select the slave, select “**Settings/Slave Configuration**” or double click the slave icon to open the “Slave Configuration” interface.

Add modules one by one as follows:

- Select “first ID in general”.
- Select “second ID in general”.
- Select “third ID in general”.
- Select “Master_O Slave_I 2 by unit” (2 Byte).
- Select “Master_I Slave_O 2 by unit” (2 Byte).

Slave Configuration

General

Current Slave: 4 \ S7-315-2DP-AF03

Device: S7-315-2DP-AF03 Station Address: 4

GSD File: sie3802f.gse Description: Slave4_S7-315-2DP-AF03

☒ Activate device in actual configuration ☒ Enable watchdog control

Parameter Data...

DPV1 Settings...

Input&Output Info

Max. Length of	488 Bytes	Length of in-/output	4 Bytes
Max. Length of input	244 Bytes	Length of input data	2 Bytes
Max. Length of output	244 Bytes	Length of output data	2
Max. Number of Modules	35 Bytes	Number of modules	5

Module	Inputs	Outputs	In/Out	Identifier
first ID in general				0x00
second ID in general				0x00
third ID in general				0x00
Master_I Slave_O 1 by unit	1 byte			0x10
Master_I Slave_O 2 by unit	2 byte			0x11
Master_I Slave_O 2 by ttl len	2 byte			0x91
Master_I Slave_O 4 by unit	4 byte			0x13

Append Module Remove Module Remove All Insert Module user define module

Slot	Idx	Module	Input Addr.	Inputs	Output A...	Outputs
Slot1	1	first ID in general				
Slot2	1	second ID in general				
Slot3	1	third ID in general				
Slot4	1	Master_O Slave_I 2 by u...			0	2byte
Slot5	1	Master_I Slave_O 2 by u...	0	2byte		

OK Cancel

Figure 5-18 Slave Configuration

When S7-300 PLC is used as the DP slave, the first three slots must be first ID in general, second ID in general and third ID in general; the configuration of the latter two slots are the same as in Step 7 configuration.

Refer to “PROFIBUS-DP Master Interface Module COM722-S User Manual” to finish the further configurations.

5.2 Configuration of CP342-5 as DP Slave

This section introduces how to connect S7-300 CPU to system through PROFIBUS communication module CP342-5 and FW239-DP; FW239-DP as PROFIBUS-DP Master and CP342-5 as PROFIBUS-DP slave.

This section only introduces the configuration of the data exchange of PROFIBUS, and the programming of S7-300 PLC is not included.

Software requirement: Advantrol Pro (V2.80), Step 7 V5.0 or higher version.

5.2.1 Configuration of CP342-5

Open the Step7 system configuration software. Add the corresponding rack, power module, CPU module etc. Add a CP 342-5 module into slot 4# as shown in Figure 5-19.

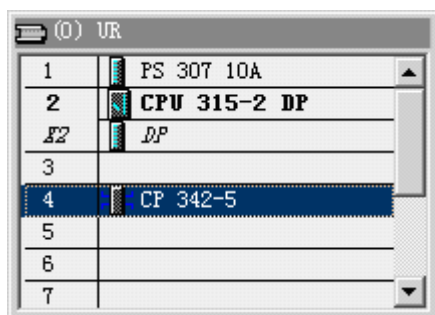


Figure 5-19 Add a CP342-5 module

Double click the CP342-5 module, and set its PROFIBUS address as shown in Figure 5-20.

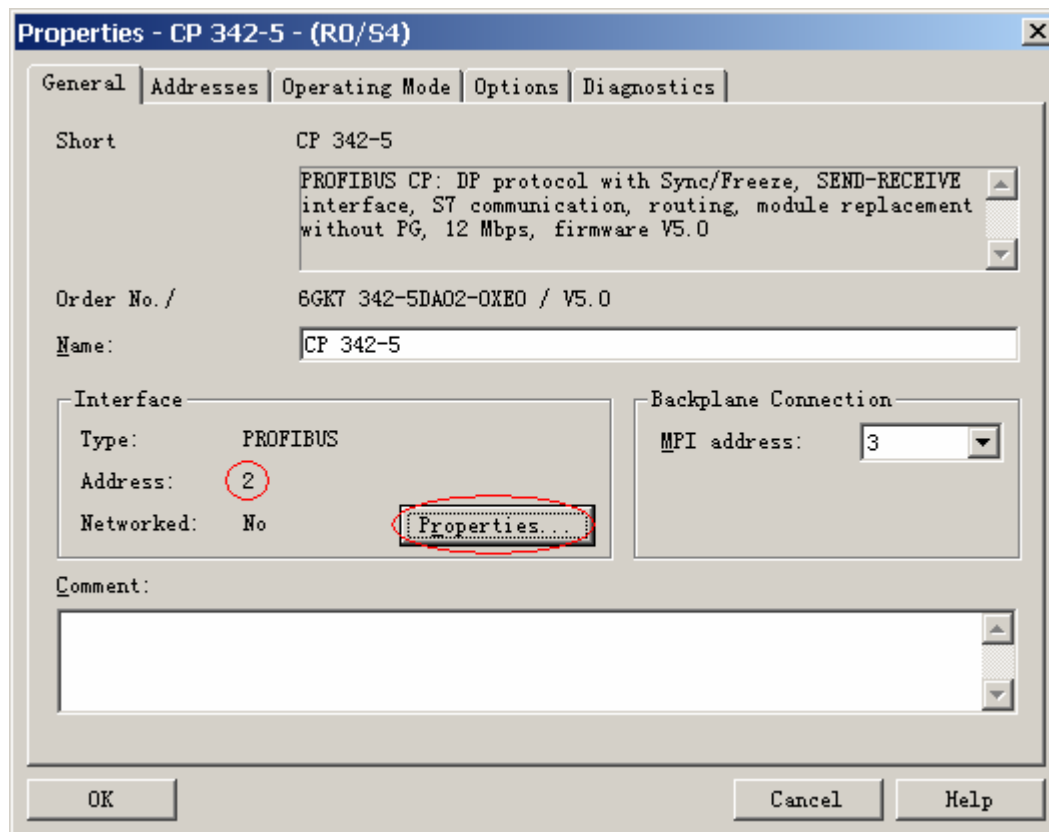


Figure 5-20 Set the address of CP 342-5

On “**Operating Mode**” interface, select “DP slave” as shown in Figure 5-21.

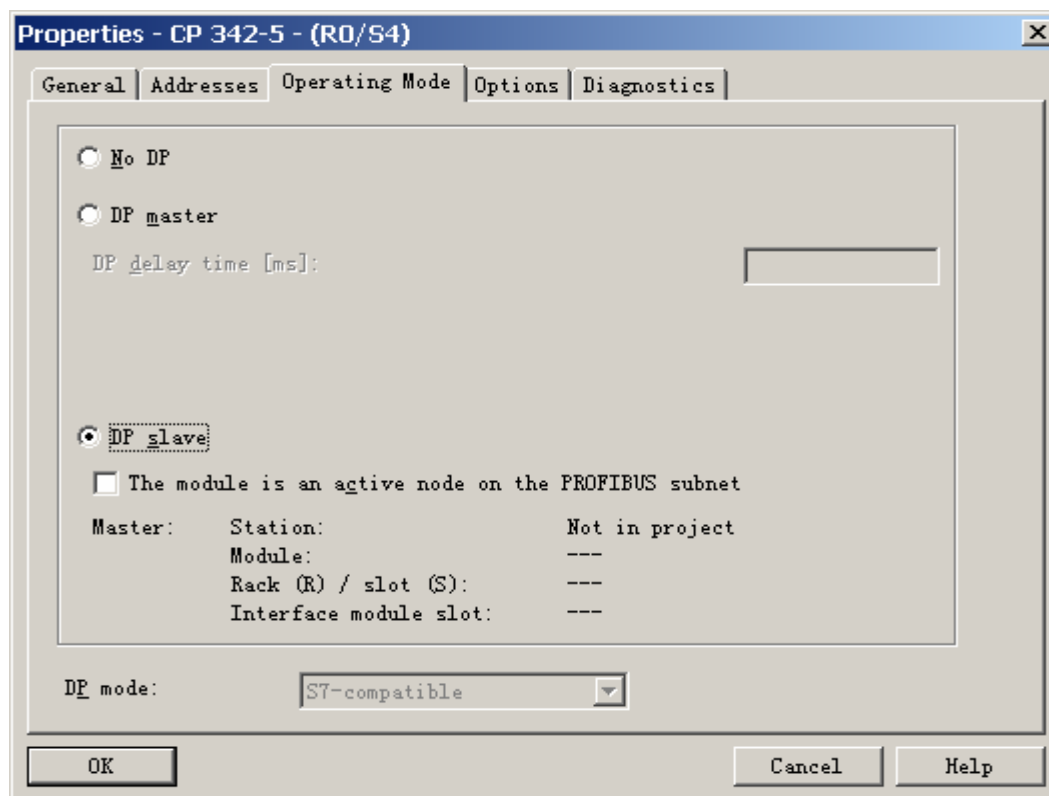


Figure 5-21 Select the operation mode

5.2.2 Programming for Communication

When using CP342-5 to connect PROFIBUS-DP, CP342-5 uses 16 bytes address area to exchange data with CPU. The address of 16 bytes hardware address is distributed to CP342-5 by CPU, which is the buffer memory for data exchange between CPU and CP342-5. CPU uses this hardware address to access CP342-5 module. There is another independent data storage area used for data exchange between CP342-5 and PROFIBUS node. The input area and output area are 2160 bytes respectively. When CP342-5 is used as DP slave, there can be max. 240 bytes input data and 240 bytes output data.

When using DP communication port of CP342-5 module to communicate, it cannot use Load/Transfer command (sentence table programming), Mov command (ladder diagram programming) to directly access I/O data of DP slave. Using CP342-5 to carry out PROFIBUS communication has two steps: 1. CPU transmits data to the data register of CP communication card; 2. Write data stored in data register of CP342-5 to the Output data area of PROFIBUS slave (the opposite process is CPU reading Input data from slave). The communication process between CP342-5 and the Input/Output data area is automatic, but function area FC1 ("SEND") and FC2 ("RECV") is transferred manually to finish the data exchange between CP342-5 and CPU.

1. FC1 and FC2 parameter

"SEND" parameter of DP_SEND(FC1) function area is a data area needs to be defined. This data area is the data source sent to COM722-S by CPU. "RECV" parameter definition of DP_RECV(FC2) function area is used to store the data sent by COM722-S in some data address area of CPU.

"SEND" and "RECV" parameter requires filling of a needle type data, e.g.

"P#DB1.DBX3.0 BYTE 37", its meanings are: 1. As for the "Send" parameter of sending function area, it means sending the data in data block DB1 from the 0 bit of the 3rd bytes and of 37 bytes long to CP342-5 module; 2. As for "RECV" parameter of "DP_RECV" receiving function area, it means storing the data received by CP342-5 in data block DB1 from the 0 bit of the 3rd bytes in a data area of 37 bytes long. Although needle type parameter allows other data type defined length (byte type and bit type etc.), e.g. P#DB1.DBX3.0 WORD 37. "SEND" and "RECV" parameter of "DP_SEND" and "DP_RECV" must be needle type defined by byte, i.e. "P#DB1.DBX3.0 BYTE 37".

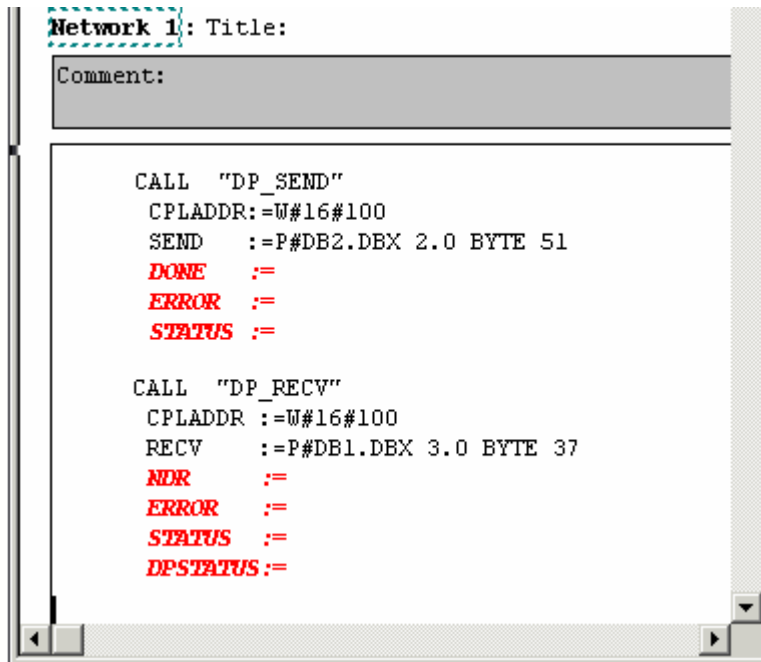


Figure 5-22 Fill parameter of "SEND" and "RECV"

2. Fill the return value of FC1 and FC2

"DP_SEND" function area include "DONE", "ERROR" and "STATUS" three parameters used to indicate the data transmission status and result. "DP_RECV" function area has "NDR", "ERROR", "STATUS" and "DPSTATUS" four parameters used to indicate the data transmission status and result. You can define corresponding data address area for storing these return values, analyzing them and evaluate the data exchange status of CPU and CP342-5. The return data is stored in M address area as shown in Figure 5-23.

Network 1: Title:

Comment:

```

CALL  "DP_SEND"
CPLADDR:=W#16#100
SEND  :=P#DB2.DBX 2.0 BYTE 51
DONE  :=M10.0
ERROR :=M10.1
STATUS :=MW11

CALL  "DP_RECV"
CPLADDR :=W#16#100
RECV   :=P#DB1.DBX 3.0 BYTE 37
NDR    :=M0.0
ERROR  :=M0.1
STATUS :=MW1
DPSTATUS:=MB5

```

Figure 5-23 Store the output return value of the function area in M zone.

As for these two function areas, when Error= False, STATUS=0, DONE=True and NDR=True, it means the data exchange between CPU and cp342-5 succeeds.

5.2.3 Configure PROFIBUS-DP Master Interface Module

Before configuration, please make sure you have prepared the right GSD files of CP 342-5, which you can download from the GSD library in www.profibus.com. To ensure the GSD files matching the device, it is recommended to get GSD files from the suppliers.

Then, create a new file, add GSD files, master and slave according to “*PROFIBUS-DP Master Interface Module COM722-S User Manual*”. Besides, the CP 342-5 slave configuration should match with the length of input/output data defined by FC1 and FC2 used in Step7.

5.3 Configuration Method of IM157 as DP Slave

Select IM157 slave by the left key of the mouse, select “**Settings/Slave Configuration**” or double click IM157 slave icon to open IM157 slave configuration interface.



Tips:

The configuration structure of IM157 depends on the number and type of PA slaves. It is composed of the configurations of a series PA slaves. The configurations of all PA slave is arranged in ascending order according to PA address. When configuring a PA slave, add a similar module “Begin of Device_XXXX” according to the actual connected PA slave type and then add module according to the property of PA slave.

Take a PA slave as example. Firstly, add a module “Begin of Device_8157” and add another module “Analog Input (AI) shor_8157” as shown in Figure 5-24.

Slave Configuration

General

Current Slave: 0 \ DP/PA-Link (IM157) VC

Device: DP/PA-Link (IM157) V0/V1 mo Station Address: 0

GSD File: si048052.gsd Description: Slave 0

☒ Activate device in actual configuration ☒ Enable watchdog control

Parameter Data...

DPV1 Settings...

Input&Output Info

Max. Length of	488 Bytes	Length of in-/output	5 Bytes
Max. Length of input	244 Bytes	Length of input data	5 Bytes
Max. Length of output	244 Bytes	Length of output data	0
Max. Number of Modules	236 Bytes	Number of modules	2

Module	Inputs	Outputs	In/Out	Identifier
SIEMENS AG				0x01,0xf9
SITRANS TH400				0x01,0xf9
Begin of Device_8157				0x01,0xfa
== Empty Module_8157				0x00
== Analog Input (AI) shor_8157	5 byte			0x94
== Analog Input (AI) long_8157	5 byte			0x42,0x84,0x0...

Append Module Remove Module Remove All Insert Module user define module

Slot	Idx	Module	Input Addr.	Inputs	Output A...	Outputs
Slot1	1	Begin of Device_8157				
Slot2	1	== Analog Input (AI) sho...	0	5byte		

OK Cancel

Figure 5-24 Add modules

Click **"Parameter Data"** to enter into the Parameter Data settings interface as shown in Figure 5-25.

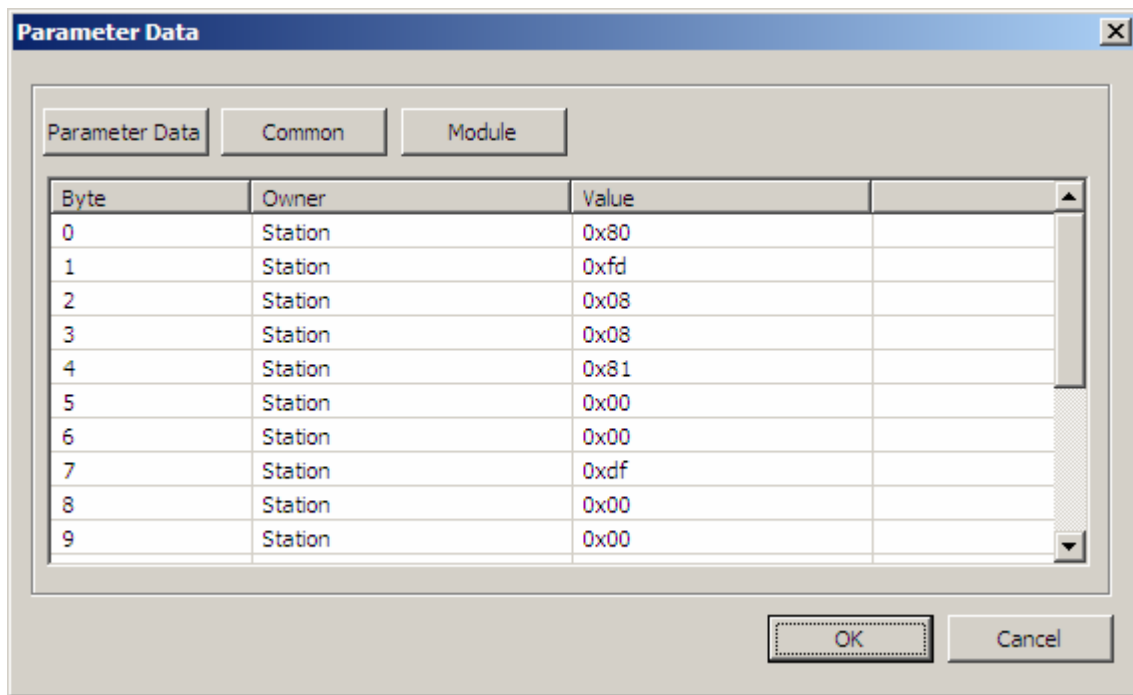


Figure 5-25 Parameter Data Settings Interface

Click **"Module"** and set the station address of PA slave in PROFIBUS-PA system as Figure 5-26.

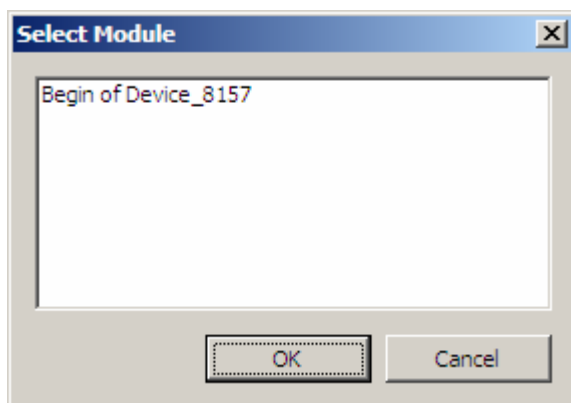
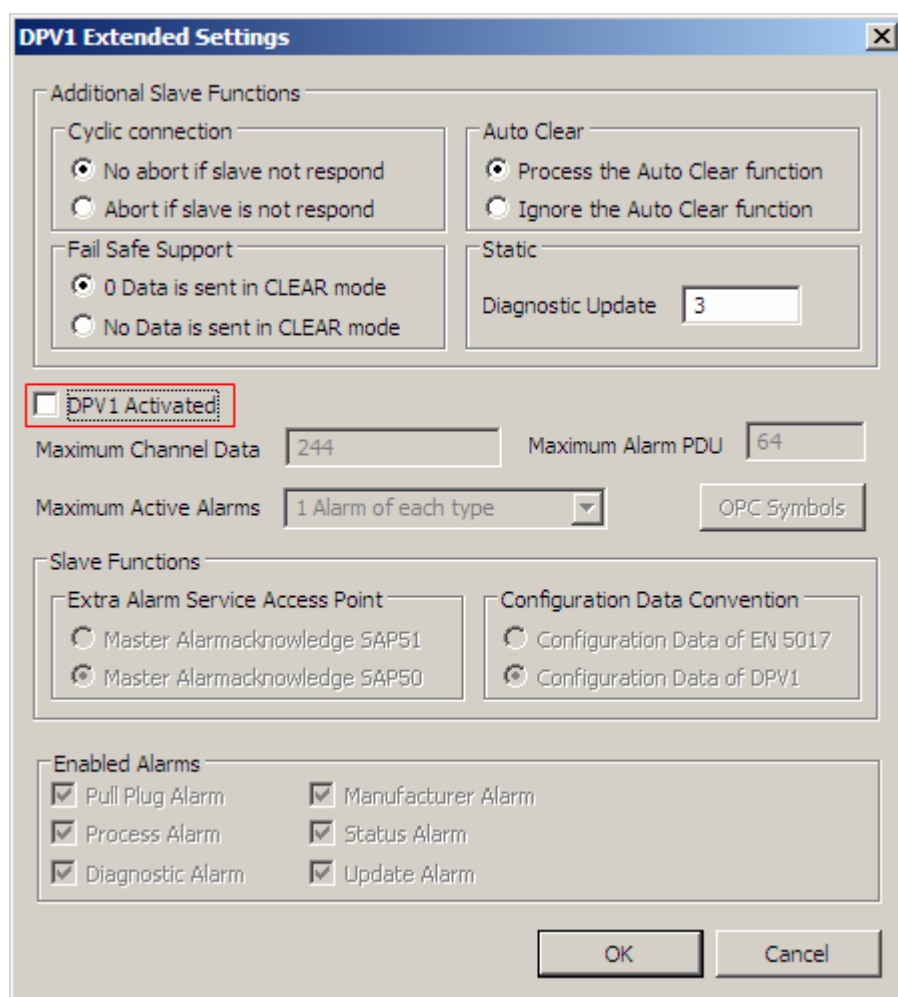


Figure 5-26 Set address of PA slave

Click **"OK"** for several times to return back the Slave Configuration interface of IM157 slave.

Click **"DPV1 Settings"** to enter into the DPV1 Extended Settings interface. Please make sure the "DPV1 activated" item is not selected, as shown in Figure 5-27.



The image shows a software dialog box titled "DPV1 Extended Settings". It contains several configuration sections:

- Additional Slave Functions:**
 - Cyclic connection:** Radio buttons for "No abort if slave not respond" (selected) and "Abort if slave is not respond".
 - Auto Clear:** Radio buttons for "Process the Auto Clear function" (selected) and "Ignore the Auto Clear function".
 - Fail Safe Support:** Radio buttons for "0 Data is sent in CLEAR mode" (selected) and "No Data is sent in CLEAR mode".
 - Static:** A "Diagnostic Update" field with the value "3".
- DPV1 Activated:** A checkbox that is currently unchecked and is highlighted with a red rectangle.
- Maximum Channel Data:** A text field containing "244".
- Maximum Alarm PDU:** A text field containing "64".
- Maximum Active Alarms:** A dropdown menu showing "1 Alarm of each type".
- OPC Symbols:** A button.
- Slave Functions:**
 - Extra Alarm Service Access Point:** Radio buttons for "Master Alarmacknowledge SAP51" and "Master Alarmacknowledge SAP50" (selected).
 - Configuration Data Convention:** Radio buttons for "Configuration Data of EN 5017" and "Configuration Data of DPV1" (selected).
- Enabled Alarms:** A group box containing six checked checkboxes: "Pull Plug Alarm", "Process Alarm", "Diagnostic Alarm", "Manufacturer Alarm", "Status Alarm", and "Update Alarm".

At the bottom right are "OK" and "Cancel" buttons.

Figure 5-27 Slave Configuration interface of IM157 slave

Click "OK" back the home interface and save the configuration.

Section 6 Engineering Application

6.1 Module Selection

The accessories list of DP Bus

- In JX-300XP system, XP239-DP, TB239A-DP, PROFIBUS-DP box, PROFIBUS-DP hook, and standard 35mm rail are required.
- In ECS-100 system, FW239-DP and TB239-DP are required.
- PROFIBUS Communication Module is COM722-S, and its base is MB724-S.
- PROFIBUS Communication Module is COM522-S, and its base is MB521-S or MB522-S.
- Bus connector. Each DP node should be equipped with one connector which can be Siemens product with two optional types: the order number of connector with bus terminal resistance is 6ES7972-0BA12-0XA0. It can be used in any node of the bus. The order number of connector with no bus terminal resistance is 6ES7972-0BA50-0XA0. It cannot be used in both end nodes of the bus.
- Bus cable: it is recommended to use Siemens products or SUPCON products.

The accessories list of PA bus in the general application

- Link: 6ES7 153-2BA82-0XB0
- Coupler: 6ES7 157-0AC83-0XA0
- Ordinary 24V power supply
- PA cable
- T-shaped connector: 6GK1 905-0AA00 (one for each instrument) (or distribution box, depending on detailed conditions)
- Terminal resistance: 6GK1 905-0AE00 (5 in one package, and one for each PA cable)
- Standard rail: 6ES7390-1AB60-0AA0 (160mm) or 6ES7390-1AE80-0AA0 (482mm)

The accessories list of PA bus in intrinsically safe area

- Link: 6ES7 153-2BA82-0XB0
- Coupler: 6ES7 157-0AD82-0XA0 (Ex[i])
- Ordinary 24V power source
- PA cable
- T-shaped connector: 6GK1 905-0AA00 (one for each instrument)
- Terminal resistance: 6GK1 905-0AE00 (5 in one package, and one for each PA cable)
- Standard rail: 6ES7390-1AB60-0AA0 (160mm) or 6ES7390-1AE80-0AA0 (482mm)

6.2 PROFIBUS-DP Bus Connection

PROFIBUS-DP Bus Topology

PROFIBUS-DP network adopts the following bus topology structure, as shown in Figure 6-1.

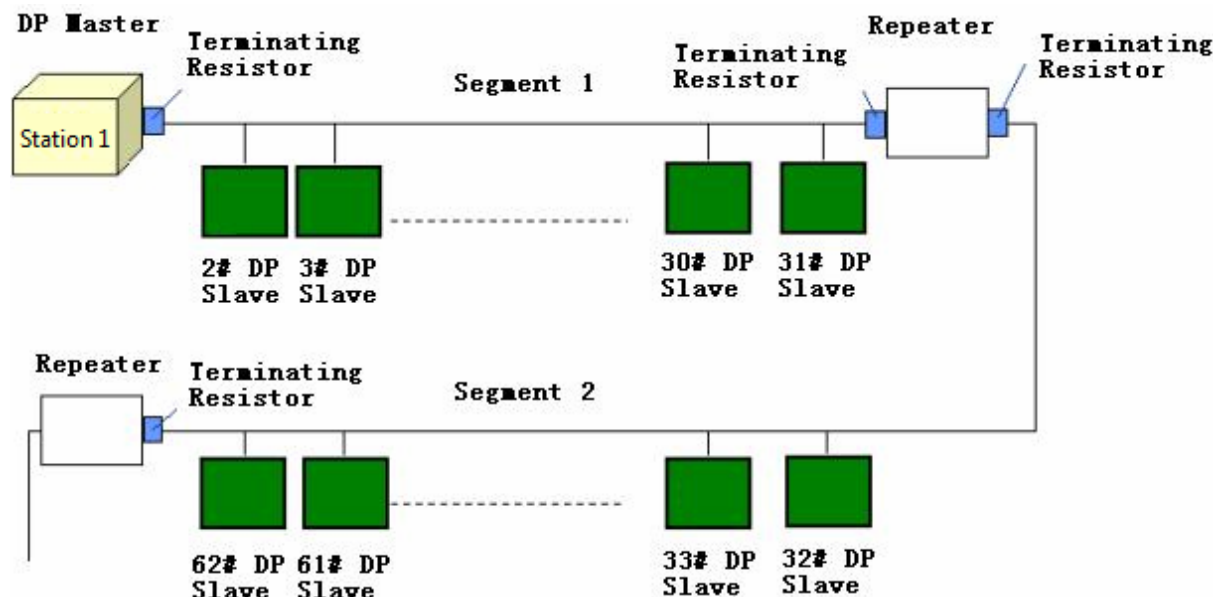


Figure 6-1 PROFIBUS-DP Bus Topology Structure

On one bus segment, it is necessary to have bus topology without star branch.

The communication rate of PROFIBUS-DP can be selected as 45.45kbps, 187.5kbps, 500kbps and 1.5Mbps. However, all stations on the same bus must have the same communication rate. Under different rates, the maximum distances of single bus segment are different as shown in Table 6-1.

Table 6-1 Transmission distance

Baud rate (Kbps)	45.45	187.5	500	1500
Length (m)	1200	1000	400	200

When one bus segment of PROFIBUS-DP exceeds the distances in the above table, use RS-485 repeater to expand the bus segment. One PROFIBUS-DP network can at most use 4 RS-485 repeaters.

We can select Siemens products for RS-485 repeater with order No. of 6ES7 972-0AA01-0XA0 (or the updated version).

When it is longer than the length of Table 6-1 or in environment with much electromagnetic interference, we can extend the PROFIBUS-DP bus segment by optical fiber cable. When using optical fiber to connect PROFIBUS-DP, optical link module is necessary. The system structure is shown in Figure 6-2.

We can select Siemens products for optical link module. The OLM with one –route optical fiber interface is model OLM/G11, OLM two–route optical fiber interface is model OLM/G12. (User can

contact the local Siemens supplier for latest product model and details.)

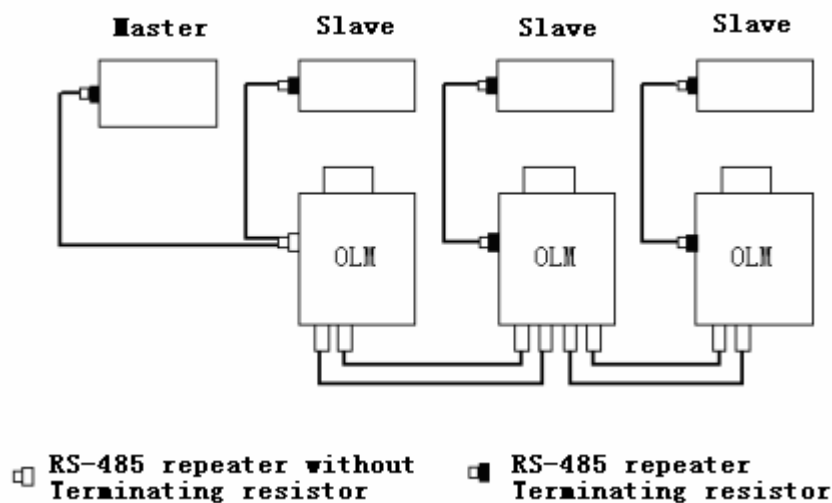


Figure 6-2 Use Optical Fiber to Connect PROFIBUS-DP

Shielding and Grounding

When connecting PROFIBUS-DP bus, it must strictly guarantee shielding and grounding. If possible, it is recommended that all devices have equipotential design; otherwise we will specify single-point grounding at the PROFIBUS Master Communication Module (Interface Module). Single-point grounding must ensure that there is no connection to the earth with any part of bus cable beyond PROFIBUS Master Communication Module.

When the repeater carries out bus expansion during practical application, the single-point grounding of the expanded bus segment is as close as the repeater of PROFIBUS Master Communication Module.

6.3 PROFIBUS-PA Bus Topology Structure

Tree Topology (Paw Shape)

Tree topology comprises of the single independent fieldbus that connected with the public junction box. This topology can be applied to terminal of the main cable. If the devices on the same bus segment are mutually separated but they are still within the junction box area, this topology is feasible. When adopting this topology, it is necessary to consider the maximum length of the spur, which will be discussed later. The tree topology structure is as in Figure 6-3.

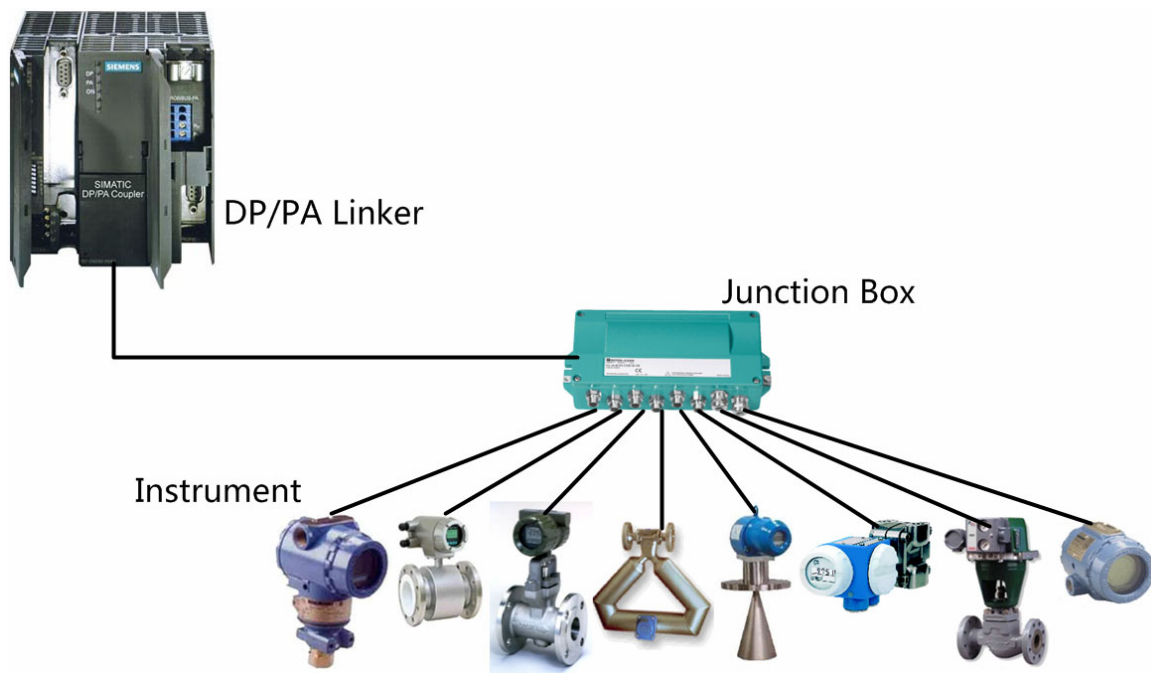


Figure 6-3 Tree Topology Structure of PA Bus (Paw Shape)

When applying tree topology structure, please select corresponding junction box as per quantity of spur.

The tree topology structure is applied to the following conditions:

- Reconstruction project
- Special rear with high density of field devices

Spur Topology

The fieldbus device connects with the multi-station bus segment with one cable with spur, forming the topology. Technically, this topology is feasible but is not economic solution.

For first installation, and in low-density of field devices, it should adopt bus topology with spur.

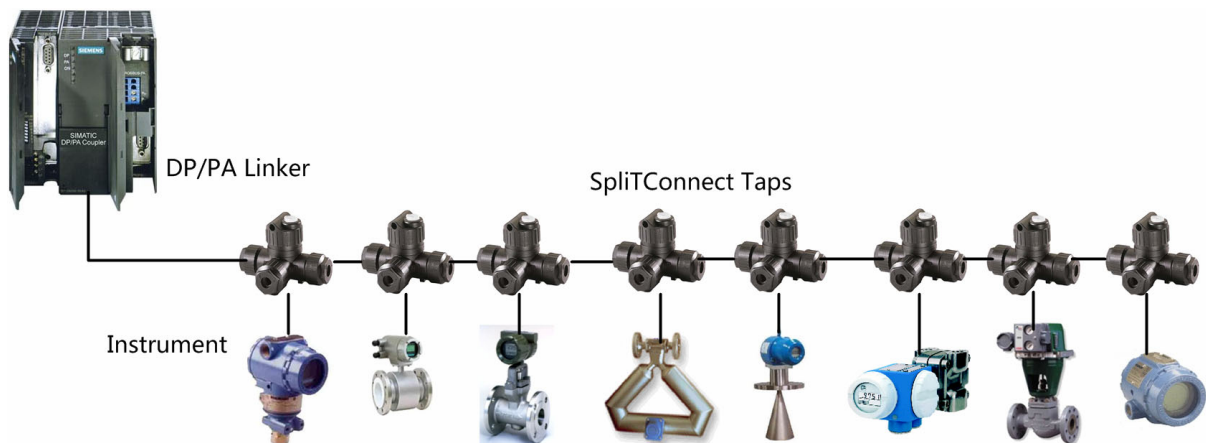


Figure 6-4 Multi-Station Spur Topology Structure of PA Bus

Mixed Topology

Combined topology comprises of tree and multi-station topologies. This topology can combine the advantages of the two topologies and overcome their limitations respectively.

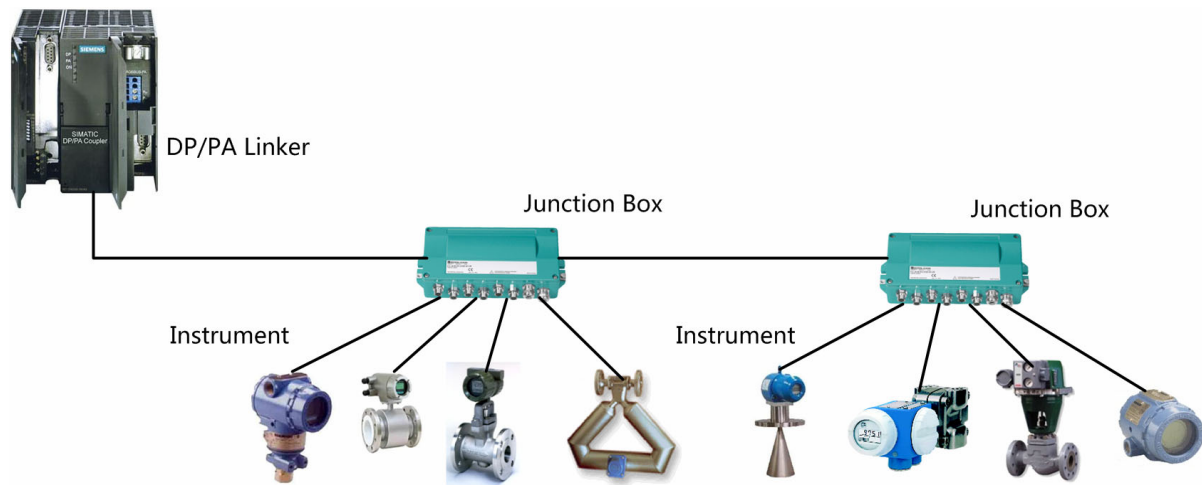


Figure 6-5 Combined Topology Structure of PA Bus

6.4 PROFIBUS-PA Device Connect

PROFIBUS-PA uses PROFIBUS-DP extended protocol, so PROFIBUS-DP master interface module can connect PROFIBUS-PA device to SUPCON DCS.

PROFIBUS-DP master interface module connects PROFIBUS-PA device by using connector and DP/PA coupler or by using DP/PA coupler singly. Link work as a DP slave and dispatch PA device, DP/PA coupler is used to transform type of physical signal and supply power for PA bus.

In application, according to following principle to specify the DP link (like IM157) number extended by one DP system, and specify the DP/PA coupler extended by one linker

There are following principle to configure PA device, taking IM157 as example.

Basic Principle

The configuration principles of using connector and DP/PA coupler are:

- In upper-layer DP system, link is used as DP slave station and gateway connected to under-layer bus system (i.e. PA field devices).
- Maximum of PA slave stations supported by link is 61, and maximum of slots is 236-PA slave stations.
- Maximum of DP/PA couplers connected to one IM157 is 5.
- Generally, one intrinsically non-safety DP/PA coupler supports 8~9 PA instruments, one intrinsically safety DP/PA coupler supports 3~4 PA instruments. Please connect after understand PA instrument and user requirements.
- PA system supply current can be increased by added coupler.

- Maximum configure data, maximum parameter data, and maximum I/O data supported by every IM157 is 240 bytes.

The configure principles of using DP/PA coupler are:

- PA instruments only can be connected when the baud rate of bus is 45.45bps.
- PROFIBUS-DP does not need high speed, and all DP devices support baud rate of 45.45Kbps.
- The count of all DP slave stations and PA instruments is less than 123, and the count is less than 64 in OMC system.
- Generally, one intrinsically non-safety DP/PA coupler supports 8~9 PA instruments, one intrinsically safety DP/PA coupler supports 3~4 PA instruments. Please connect after understand PA instrument and user requirements.
- PA system supply current can be increased by added coupler.

Spare Parts Principle

The principle is to provide capacity for further expansion.

- 25% spare capacity is designed or a control loop is reserved for a transmitter or a valve.
- The spare capacity should consider the bus energy drive capability, full load cable voltage and corresponding cable length etc.

Voltage Drop Principle of Bus Section

The working voltage of field instruments of PROFIBUS-PA is within the scope of (9-32) V DC. Therefore, to control voltage drop is to ensure all field instruments could get at least 9V DC working voltage.

The output voltage of the distribution ware affects the allowable voltage drop of the bus section. For example, if the output voltage is 24V DC, the allowable voltage drop is 15V; if the output voltage is 17V DC, the allowable voltage drop is 8V. The output voltage of the DP/PA Coupler used is 24V.

The resistance of field bus A-type cable is 44Ω/km.

The consuming current of the registered PA field instruments is within scope of (13-30) mA. When the branch has short circuit, the current in the branch is (40~60) mA (the short circuit protection device has clear stipulation of this index. The sum of the consuming current of all field instruments plus the supplementary current of at least one branch is the maximum working current of network section.

6ES7 157-0AD82-0XA0 (Ex[i]), Ex intrinsically safe DP/PA Coupler.

6ES7 157 0AC83-0XA0, Ex non-intrinsically safe DP/PA Coupler.

The maximum working current of the bus section × cable resistance = the maximum voltage drop of the bus section.

The maximum voltage drop of the bus section should be less than the allowable voltage drop.

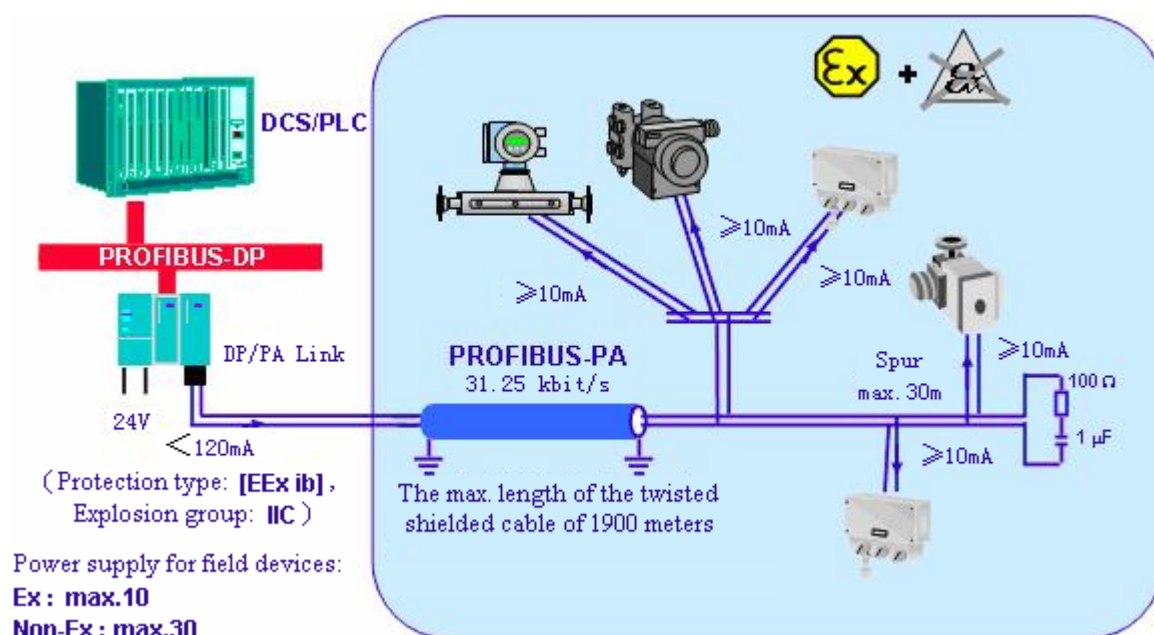


Figure 6-6 PROFIBUS-PA configuration and power supply

Max. cable length, connecting cable

If there is no repeater installed, the allowable total bus length is 1900m.

The bus section consists of trunk and branch. Trunk is the longest cable route by which the equipments connected to the bus section, and branch means other cable channel connected. The total length of the network section equals to the sum of the length of the trunk line and that of all branch lines. The maximum length of each branch is shown in the following table:

Table 6-2 Cable length

Instruments Connected	Length of Each Branch Cable (Intrinsically Safety)	Length of Each Branch Cable (Non-intrinsically Safety)
25~32	----	----
19~24	30m	30m
15~18	30m	60m
13~14	30m	90m
1~12	30m	120m

Shielding and Earthing

To acquire good electromagnetic compatibility, shield of connection lines of system is very important. This kind of shield provides a strong electric protective shell. As for the site bus, the ideal condition is to connect the cable shield layer to the shell (which is usually made of metal) of site equipment. Because the shells are usually connected to the earth or protective lead, the bus cable shield equals to several times several points (several instruments) earthing. This method provides optimal electromagnetic compatibility and protects personal safety (shown in Figure 6-7). It can be used in the system requiring realizing optimal equal electric potential earthing.

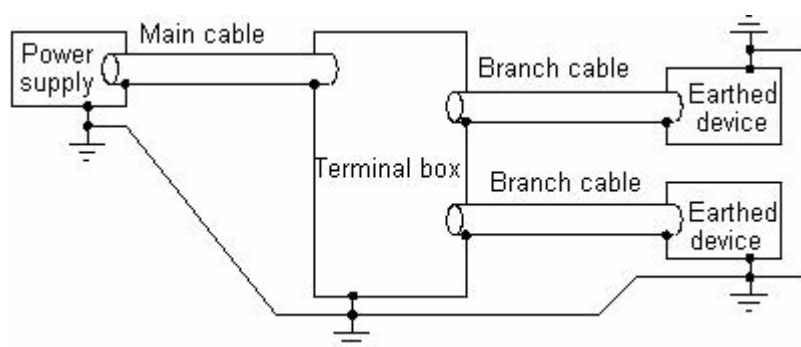


Figure 6-7 Earthed of cable shielded layers and shells of instruments

When the system cannot have equal electric potential earthing, if unfavorable condition causes current generated in the shielded layer, the frequency compensation current between two earthing points will damage cable. To avoid the system without equal electric potential shield earthing generating low frequency compensation current, it is recommended to one end of the cable earthing and capacity ground of other earthing points. A feasible solution is shown in Figure 6-8, but it cannot provide electric protection to the most extent.

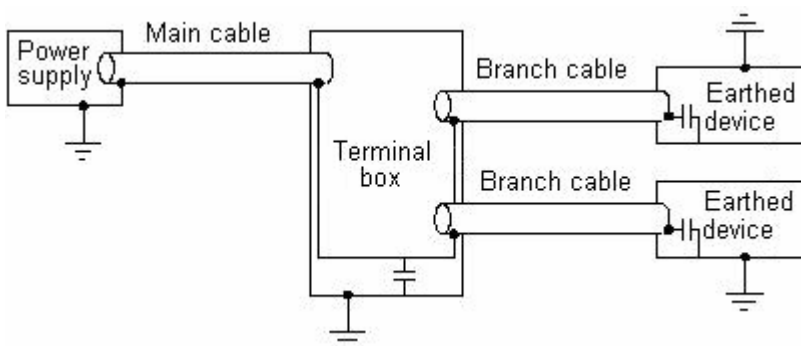


Figure 6-8 One end of shielded cable earthing and capacity ground of other earthing points

Section 7 Revision

Table 7-1 Retrofit list of the version

Document Version	Applicable Product Version	Remarks
V1.0 (20230306)	OMC High-performanceHMI V4.70.00.00	First release.
V1.1 (20230830)	OMC High-performanceHMI V5.10.00.00-M	Updated screenshots.