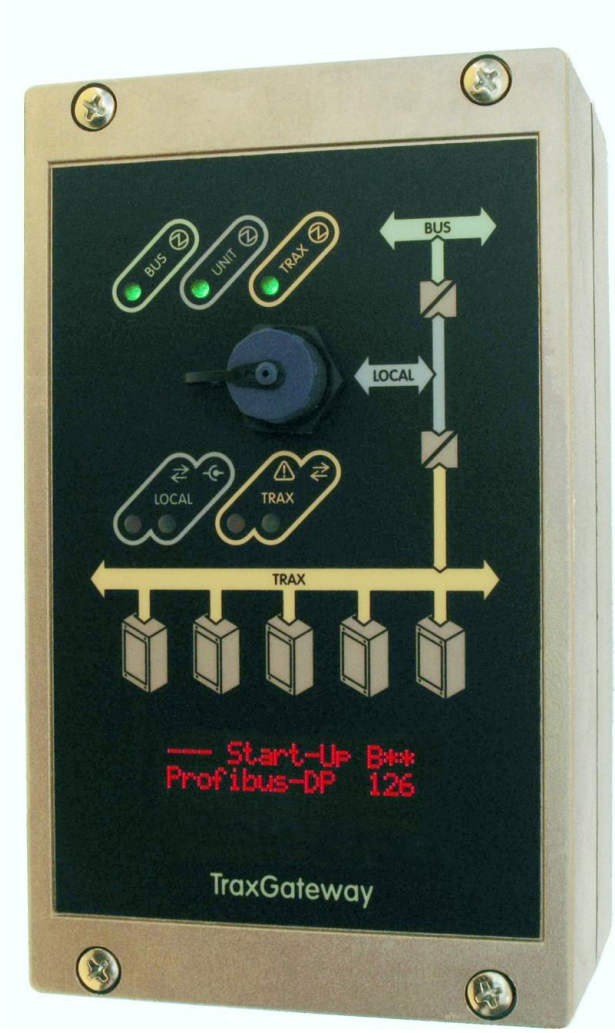

TraxGateway
PROFIBUS-DP

How to configure TraxGateway-PDP with a Siemens Step7 PLC

A1360.PDP
November 2008 – PRELIMINARY

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1. SOLUTION OVERVIEW

Below you find an overview of the system configuration that is described in this document. In this case the TraxGateway is used as an example. Other nodes may be attached to the network, but are not necessary.

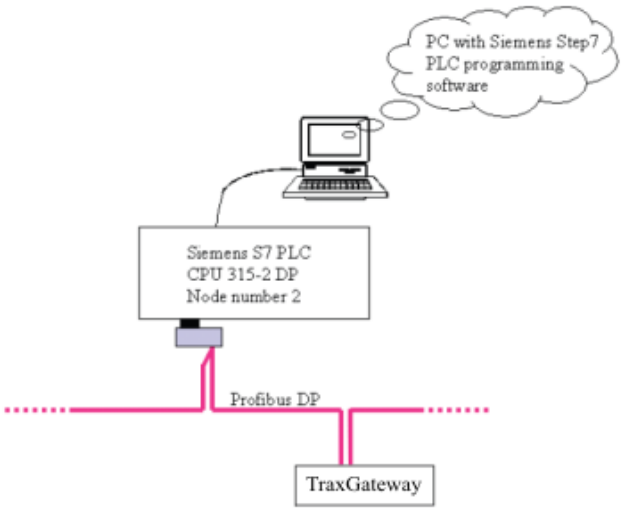


FIGURE 1 – HARDWARE CONNECTION OVERVIEW

2. PLC CONFIGURATION

The PLC system hardware configuration is done solely with the Siemens Step7 tool.
In order to configure the bus it is necessary to set up the PLC and master hardware first. In this example we are using an S7315-2 CPU. Start the Simatic software and start a new project. Right click on PROFIBUS and insert a Simatic 300 Station as shown below.

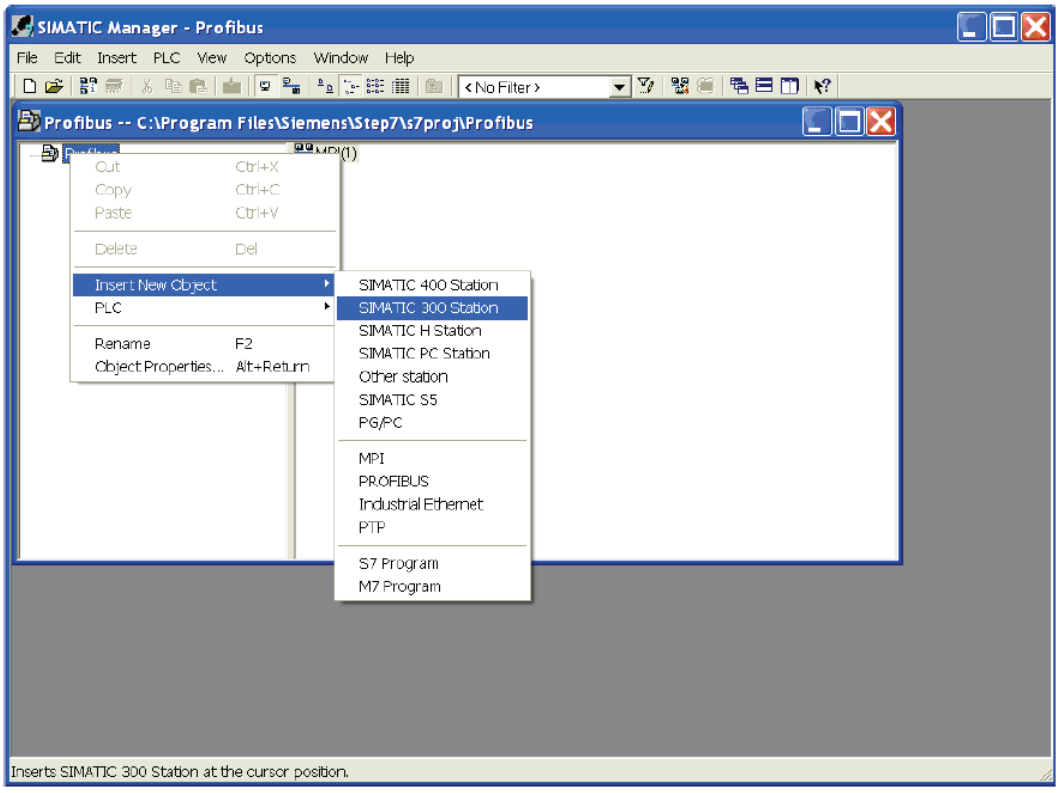


FIGURE 2 – INSERTING A NEW PLC

Then double click on the new SIMATIC 300 station and on Hardware to open the hardware configuration.

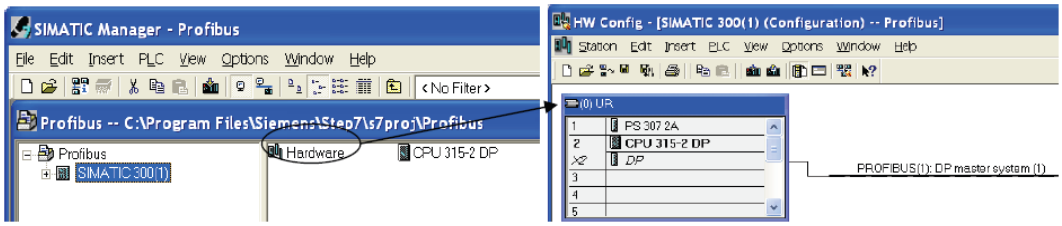


FIGURE 3 – OPENINGTHE HARDWARE CONFIGURATION

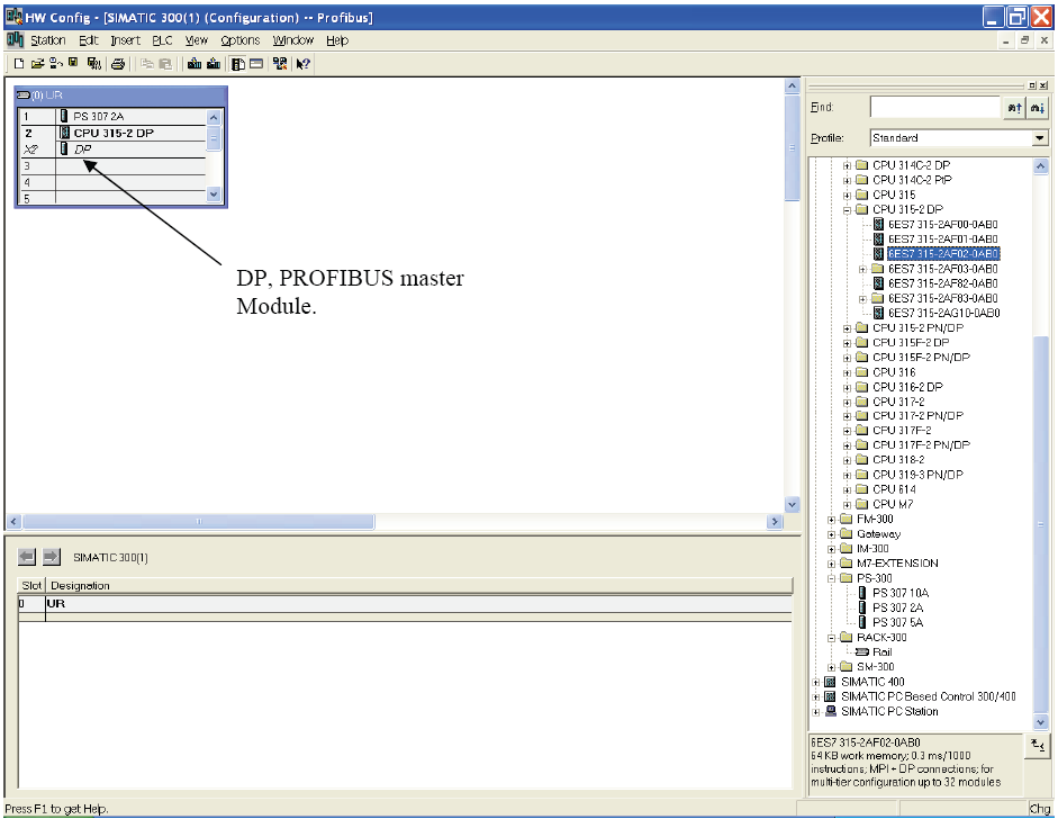


FIGURE 4 – ADDING THE HARDWARE TO THE CONFIGURATION

Add a rail, the power module and the PLC as shown above. The next step is to double click on the DP, PROFIBUS master, module to configure the PROFIBUS network. Click on properties in the dialogue as shown below.

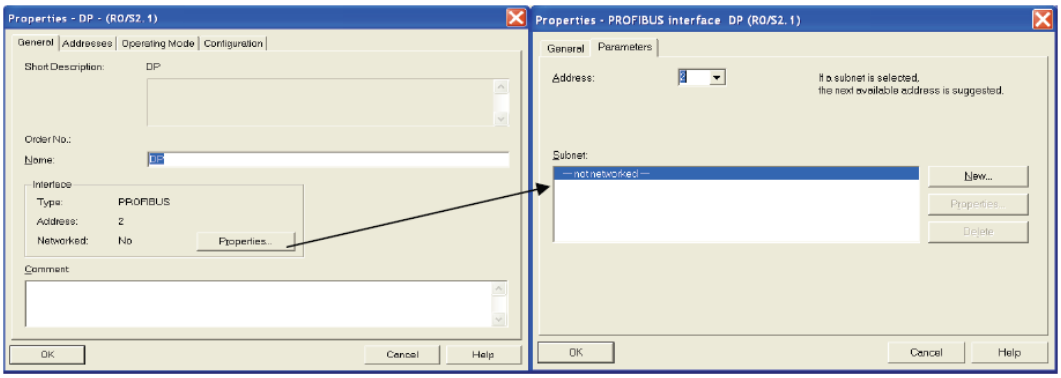


FIGURE 5 – CHANGING PROPERTIES OF THE PROFIBUS MODULE AND DEFINING A NEW NETWORK

Then click on new to define a new network.

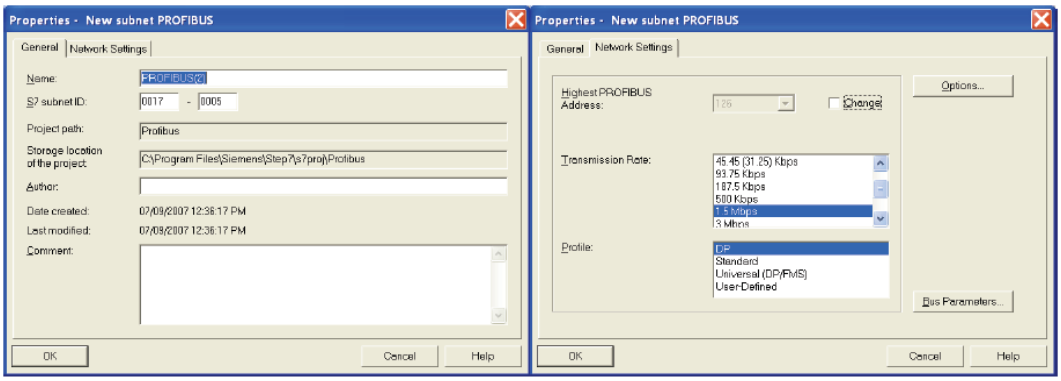


FIGURE 6 – CONFIGURING PROPERTIES OF THE PROFIBUS NETWORK

Select the desired settings and press OK.
When the PLC hardware is set up it will look like described in the figure below.

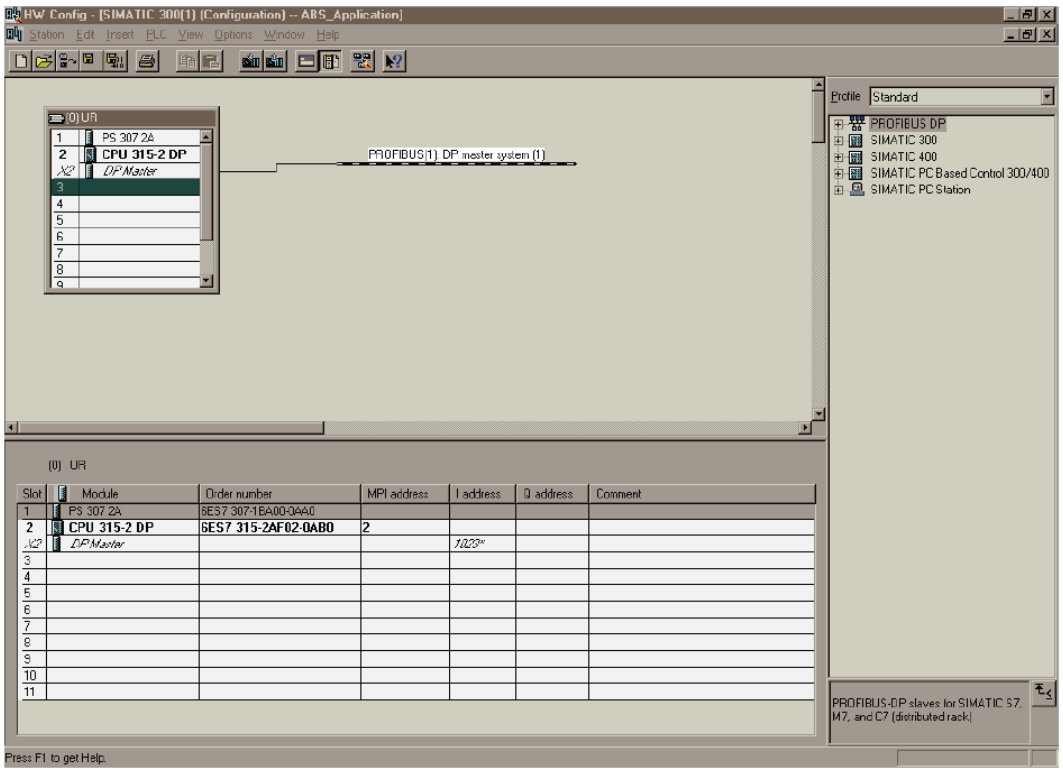


FIGURE 7 – PLC WITH EMPTY BUS

3. PROFIBUS CONFIGURATION

3.1 Importing the GSD file

It is necessary to import the GSD-file to the configuration tool in order to include the TraxGateway. In this case Anybus TraxGateway is added as a slave in the network.

NOTE
After downloading the GSD-file has to be renamed.
The SIMATIC software does not accept file names longer then 12 characters.

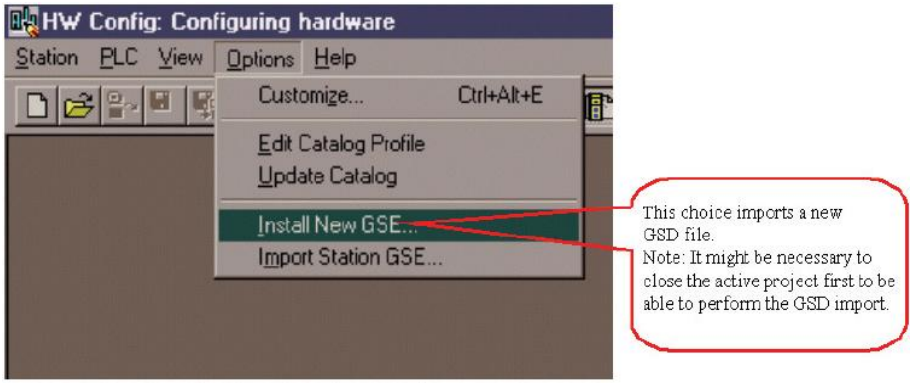


FIGURE 8 – INSTALLING A NEW GSD IN 'HW CONFIG'

3.2 Configuring the Anybus module

TraxGateway can be found in the hardware catalogue after the GSD file has been imported.

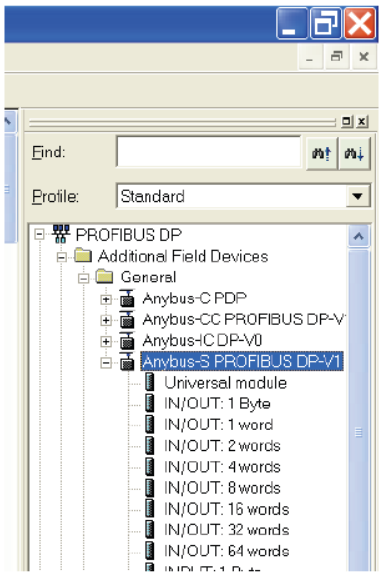


FIGURE 9 – THE NEW ANYBUS MODULE IN HARDWARE CATALOGUE

It is now possible to include the Anybus TraxGateway slave in the network.
Open up the "Anybus-S PDP" entry in the hardware catalogue and drag and drop the Anybus TraxGateway on to the network.

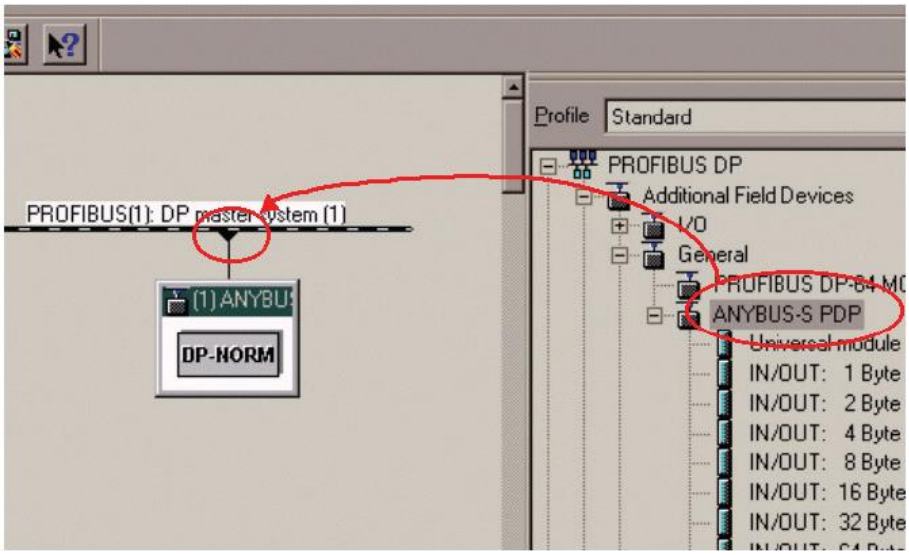


FIGURE 10 – DRAG AND DROP THE ANYBUS MODULE TO THE NETWORK

It is then necessary to configure the Anybus TraxGateway itself.
The only configuring to be done is setting up the node address, input and output data area sizes and offset address.
In Figure 12 it is shown how to edit the node address. The edit-window for the node address is opened by doing the click sequence 1, 2, 3. At 3 it is possible to set the desired node address. The address set here must equal the address set on the Anybus TraxGateway.

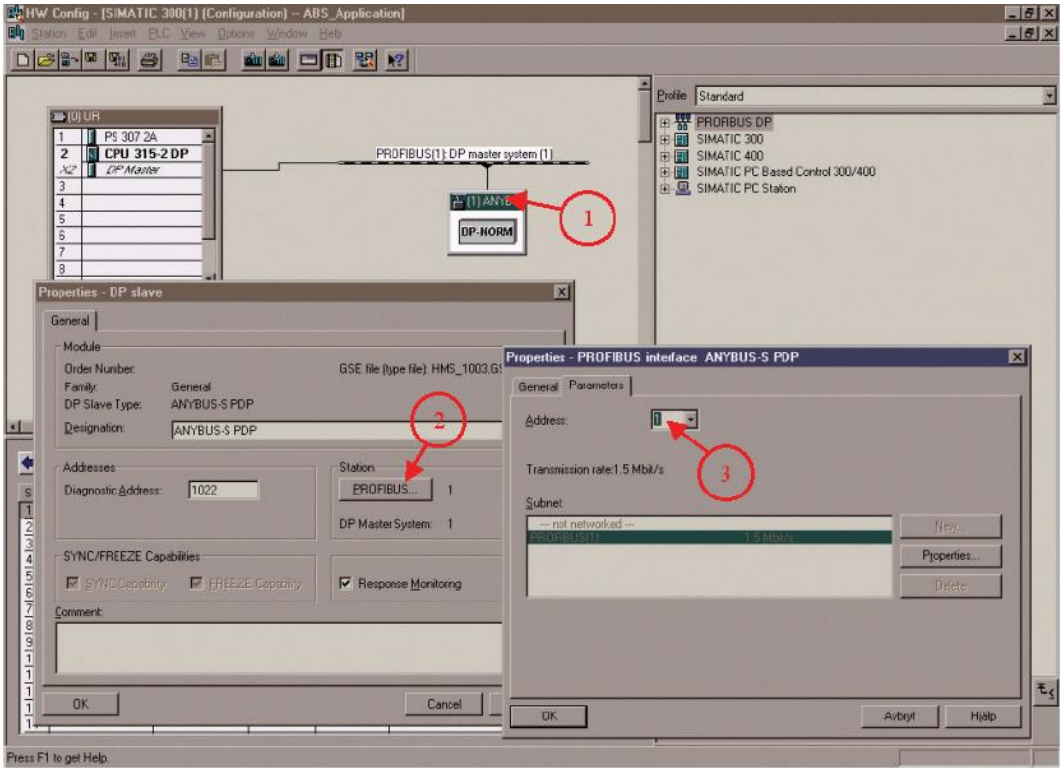


FIGURE 11 – ADJUSTING THE NODE ADDRESS IN ‘HW CONFIG’

3.3 I/O configuration

The choice of module(s) you like to use depends on what your application demand is. It is possible to choose these modules freely and to compose the I/O sizes needed

NOTE
Reading or writing more than four bytes consistent data from the I/O image, see the next chapter. More than 2 bytes of consistent data is only supported when using the Universal module. Expand the Anybus TraxGateway tree in the navigation list to the right.
The modules are then composed together in the “module list”.

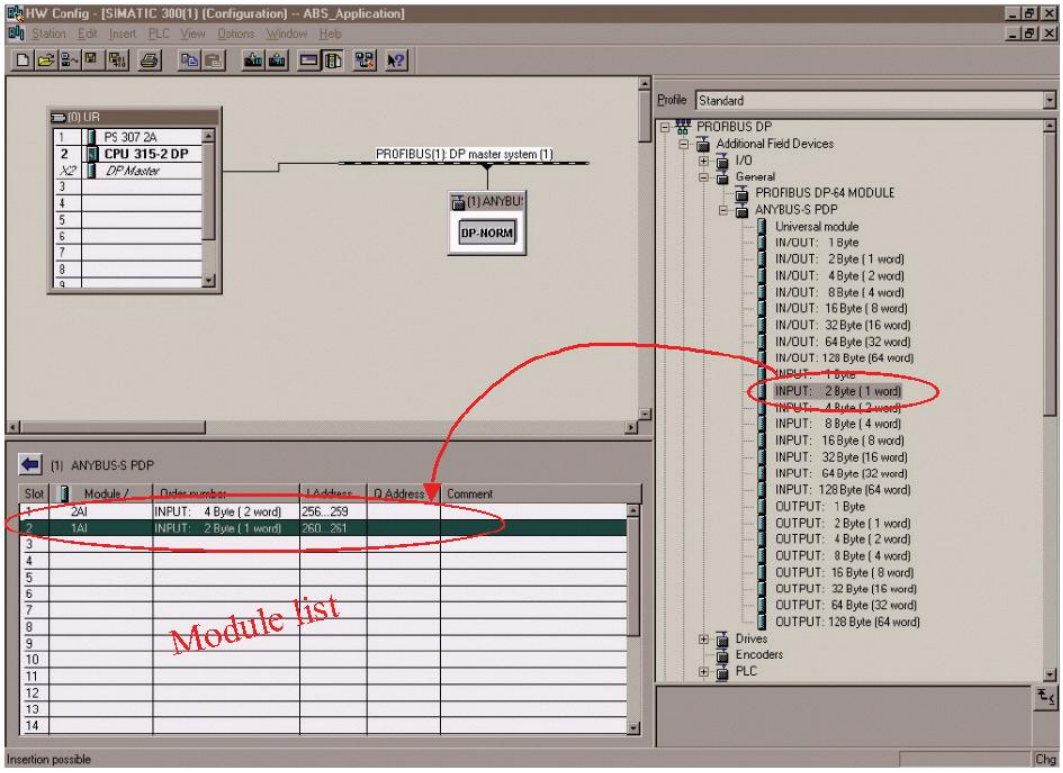


FIGURE 12 – SELECTING I/O MODULES WITH DRAG AND DROP

By double clicking on a module in the “module list” it is possible to set the offset addresses.

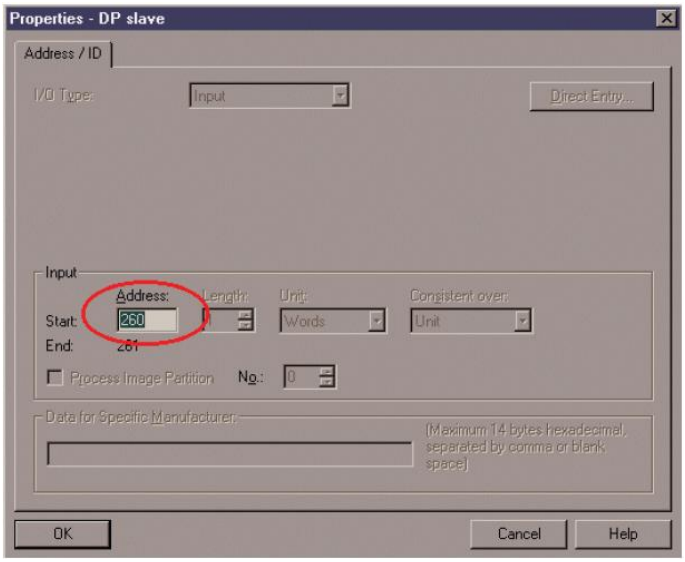


FIGURE 13 – ADJUSTING THE OFFSET ADDRESS

The offset addresses can be chosen freely but certain restrictions may apply depending on what CPU is used.
When all the above settings are done it is possible to perform a download of the configuration to the PLC.
Press the Save and Compile button and then the download button.

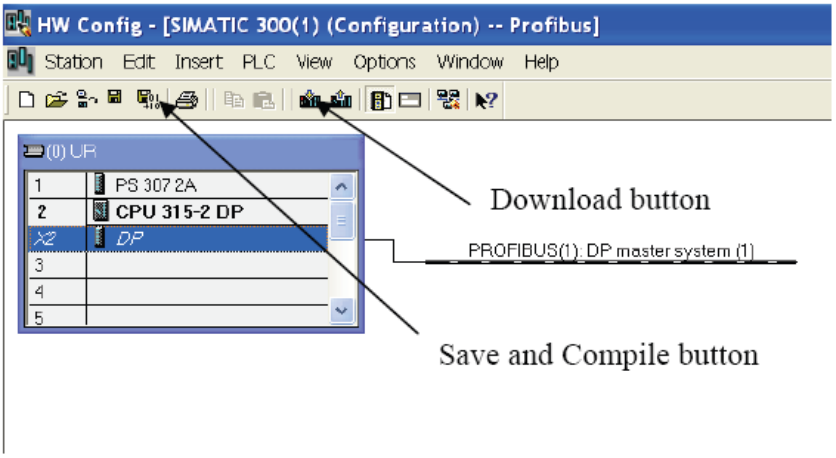


FIGURE 14 – DOWNLOADING THE CONFIGURATION TO PLC

The bus will then go online and start data exchange when the PLC is set to run mode.

4. I/O CONFIGURATION USING DATA CONSISTENCY

The S7 PLC can read out one, two or four bytes consistent from the I/O-image directly by accessing the data as a Byte, a Word or a Double Word as described in the previous chapter. This is the normal usage and fits most applications.
However if it is required to read out other consistent data areas it is necessary to use the System Function Blocks SFC14 and SFC15.
Below follows a description of these function blocks.
The first thing that has to be done is to specify the consistent data area in the hardware configuration. The “Universal Module” can be selected with “drag and drop”.

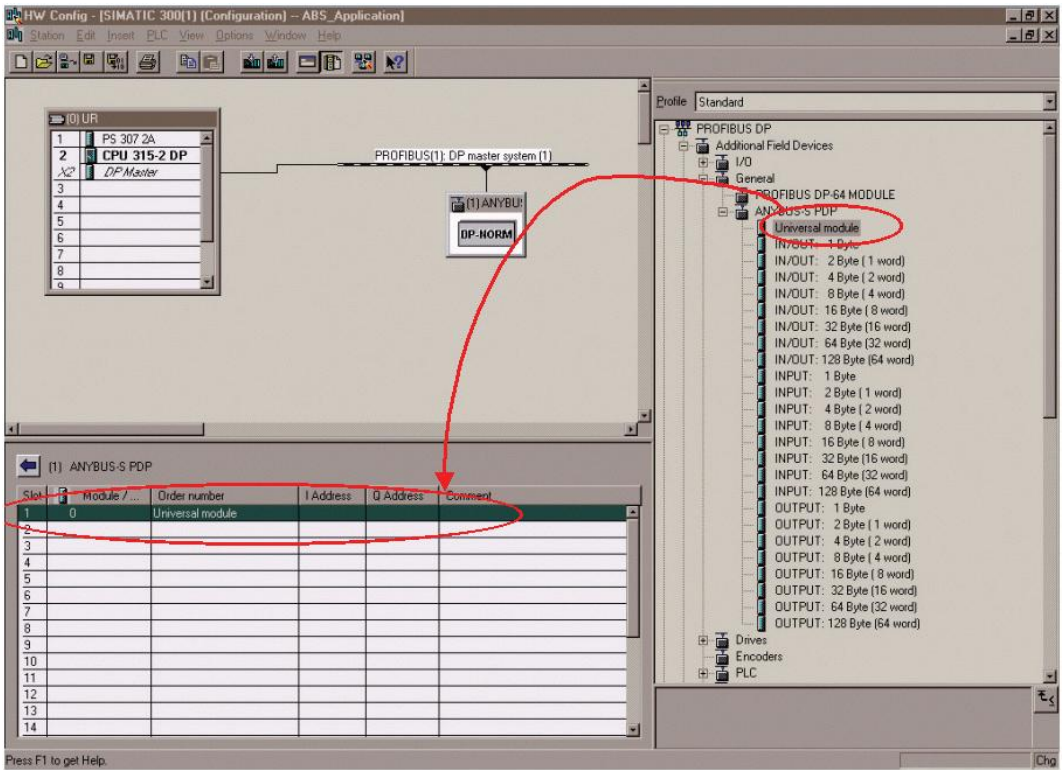


FIGURE 15 – SELECT THE UNIVERSAL MODULE FOR CONSISTENT DATA TRANSFER

In Figure 16 it is shown how to set the properties of the Universal Module.
This window is opened by double clicking on the Universal Module line in the list of selected modules.

The desired data type (In, Out, or In/Out) is set with the list box shown at **1**.

Then the offset, length, unit and consistency settings can be done as shown at **2**.

In the example below the output data length is set to 12 bytes and the input data length set to 38 bytes with consistency over the total length.
The address offsets are set to 46 respective 92.

The “Data for Specific Manufacturer” shown at **3** is not used.

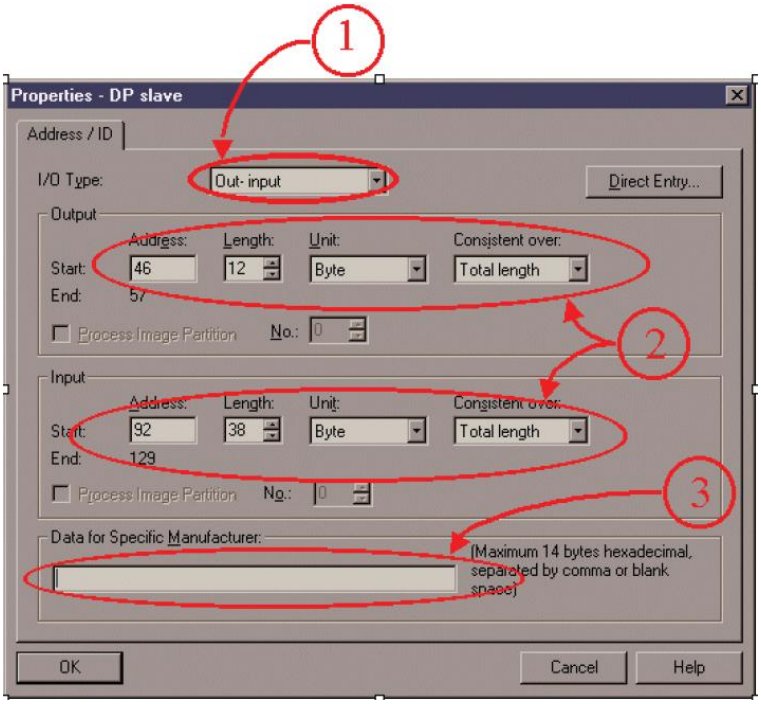


FIGURE 16 – SPECIFYING THE PROPERTIES FOR THE UNIVERSAL DATA MODULE

To read out the consistent data a PLC program has to be written that uses SFC14 and SFC15. An example of this is shown in Figure 18.
These two SFCs are included in the Step7 standard package and they also have to be imported into the active project. They can be copied from the “Standard Library” or from the CPU online. Refer to the Step7 documentation for details regarding this.
The function blocks ensure that data consistency is secured over the complete data length. Where the data is to be read or put in the process image is decided in the hardware configuration.

4.1 SFC14 Input data

The purpose of SFC14 is to read out the data from the In area of the process image and then copy the data to another storage location.

LADDR: specifies the start byte address of the data to be read. Value is entered in Hex. In this case the start byte address is 92 (=5C Hex) which can be found at **2** in Figure 16.

RET_VAL: Storage location for error messages. This is a Word, in this case MW4.

RECORD: This is where the data is copied to. In this case it is copied to memory byte 10 to 47. (i.e. MB10-MB47). The length must equal the length set at **2** in Figure.

4.2 SFC15 Output data

The Purpose of SFC15 is to read the data from any storage location and then copy it to the Out area of the process image.

LADDR: specifies the start byte address of the data to be sent. Value is entered in Hex. In this case the start byte address is 46 (=2E Hex) which can be found at **2** in Figure 16.

RET_VAL: Storage location for error messages. This is a Word, in this case MW6.

RECORD: This is where the data is read from. In this case it is read from memory byte 48-59. (i.e. MB48-MB59). The length must equal the length set at **2** in Figure 16.

The data can then be processed as desired (i.e. as byte, word, double word or bit wise) at the other storage location specified at RECORD.
In the example below (Figure 17) it is described how the PLC program can be done.

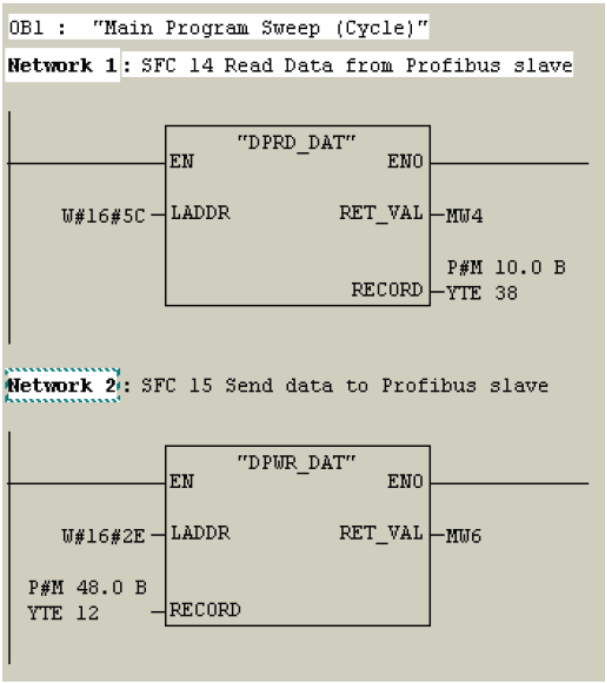


FIGURE 17 – THE USE OF SFC14 AND SFC15 IN THE PLC PROGRAM

By highlighting the SFC in the LAD-editor and then pressing “F1” the help function will start and display extended information such as error codes and syntax examples.

5. DIAGNOSTICS IN STEP7

Step7 provide diagnostic possibilities via the PROFIBUS master over the network.
Start with going online by clicking on the button **1** in Figure below. Then right-click on **2** and chose “Module Information” and the diagnostic function will be started.
The window **3** will be displayed and available diagnostics can be read out.
What diagnostics that is available depends on the application.
In standard mode there are no application specific diagnostics available.
All the standard PROFIBUS diagnostics are supported and information regarding this can be found in the online documentation of Step7.
If the message shown in the window **3** appears the reason can be the following:

- The TraxGateway Anybus module is not attached properly to the PROFIBUS network. Check cabling.
- The node address of the TraxGateway Anybus module does not match the address set in the Simatic Config program. Use USB Local port to program the TraxGateway
- The TraxGatewat Anybus module is faulty and does not start up properly. Use USB Local port to check the TraxGateway.

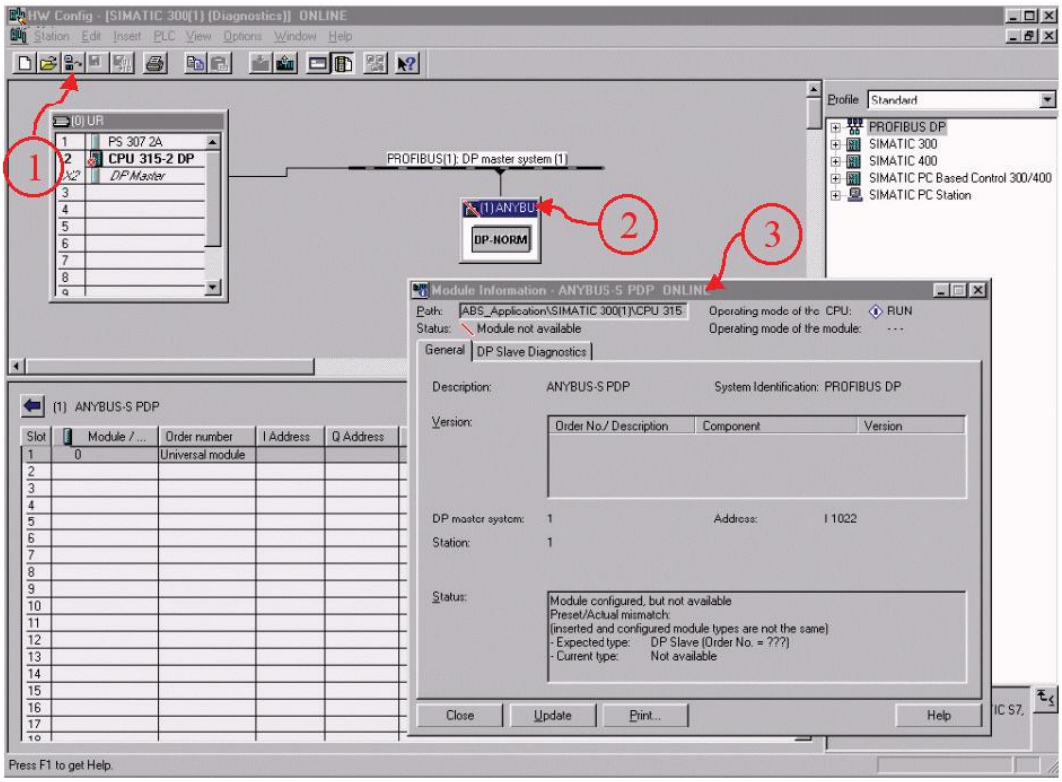


FIGURE 18 – STEP7 HARDWARE DIAGNOSTICS

6. TROUBLESHOOTING NETWORK PHYSICS

The most common failure when the diagnostic tool reports “nonsense” is physical errors on the network like cable connect errors, miss contact, wrong termination etc.
Some simple ways to find these errors will be mentioned here.

Data errors can occur if the PROFIBUS cable is incorrectly attached to the bus connectors. Such basic errors can be detected and remedied with the simple test method described below. The test method shown schematically in Figure below allows you to detect data wires which are swapped over in the bus connectors.
During the test, the bus connectors must not be connected to any PROFIBUS devices. In addition, all bus terminating resistors should be removed or disabled. The tests require two 9 pin female Sub-D test connectors.
Test connector 1 is provided with a single pole changeover switch, the moving contact of which is connected to the shield (case) of the test connector. The two fixed contacts are connected to pin 3 (data wire B) and pin 8 (data wire A), respectively.
Test connector 2 is used to connect an Ohmmeter to the bus. During the cable tests, the two test connectors 1 and 2 are initially plugged into the two bus connectors at each end of the bus segment.
Following tests can be made by taking measurements between the contacts 3 and 8 and the shield of test connector 2 while operating the changeover switch on test connector 1:

- Data cable swapped over
- Open circuit of one of the data cables
- Open circuit of the cable shield
- Short circuit between the data cables
- Short circuit between the data cables and the cable shield
- Additional bus terminating resistors inserted unintentionally

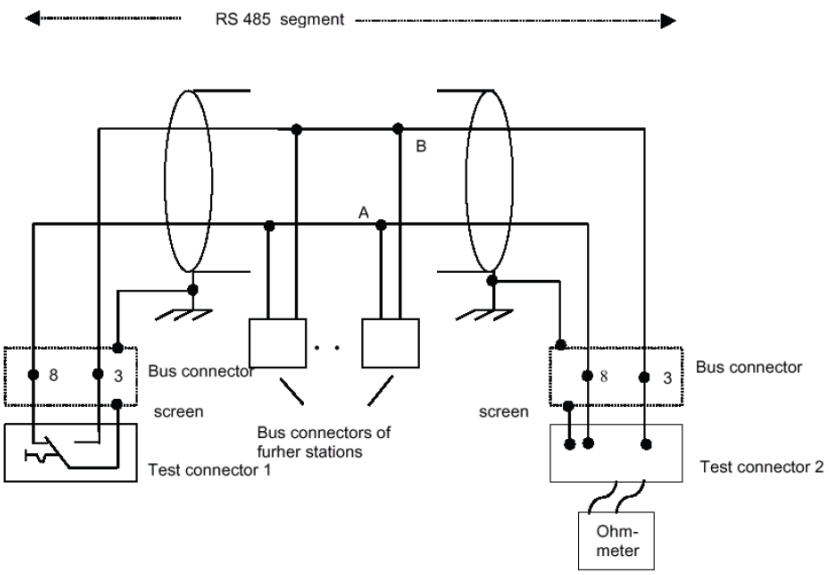
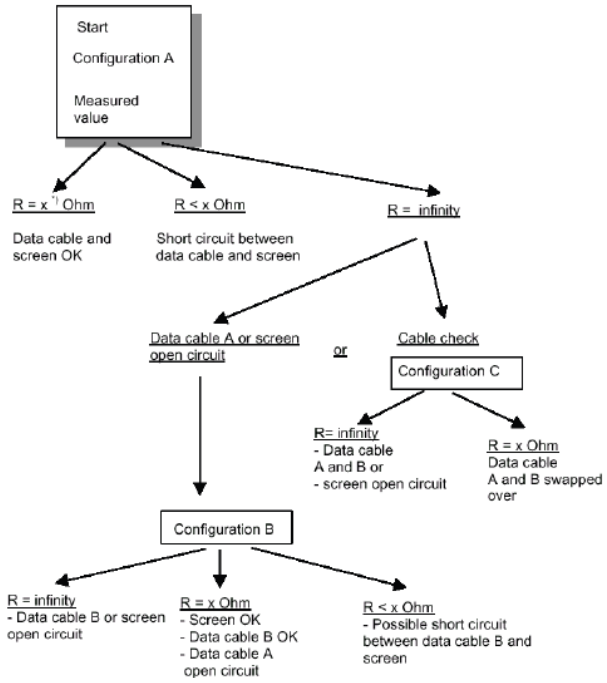


FIGURE 19 – TROUBLESHOOTING THE PHYSICAL NETWORK

6.1 Carrying out the tests

- Configuration A: Set switch of test connector 1 to position 3 (connects pin 3 to the screen). Connect ohmmeter to test connector 2 between pin 3 and the screen.
- Configuration B: Set switch of test connector 1 to position 8 (connects pin 8 to the screen). Connect ohmmeter to test connector 2 between pin 8 and the screen.
- Configuration C: Set switch of test connector 1 to position 3 (connects pin 3 to the screen). Connect ohmmeter to test connector 2 between pin 8 and the screen.
- Configuration D: Switch position of test connector 1 is not important. Connect ohmmeter to test connector 2 between pin 3 and pin 8.

TEST 1:



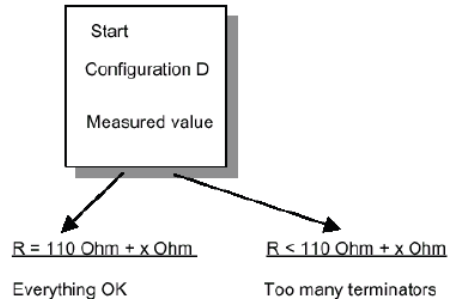
x=110ohm/km

TEST 2:

Same as test 1 except configuration A and configuration B are exchanged, i.e. start with configuration B.

TEST 3:

Too many bus terminating resistors inserted.



In order to assess the measurements you make, it is necessary to know the loop resistance of the bus cable segment. This is dependent on the cable type used and the installed cable length. The location of a fault can be determined without opening up the bus connectors by unplugging test connector 1 and plugging it into another bus connector which is closer to test connector 2 while carrying out repeated Ohmmeter measurements at test connector 2.

WARNING

The measured value can be falsified if the ohmmeter connections are touched.

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