SIEMENS

Automation– and Drive technology- SCE

Training document for the company-wide automation solution

Totally Integrated Automation (T I A)

MODULE D4

PROFIBUS DP with

Master CPU 315-2DP / Slave ET 200M

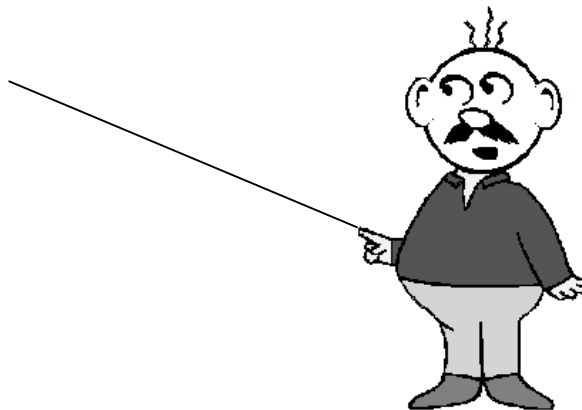**The following symbols stand for the specified modules:**
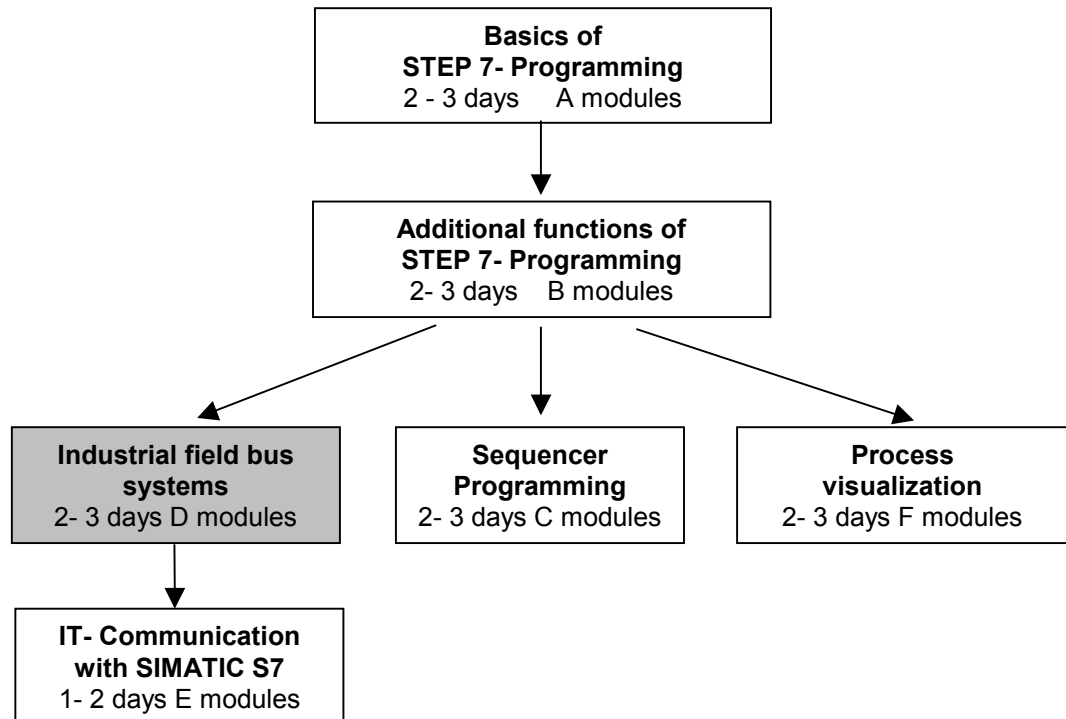
Information

Programming

Example exercise

Notes

1.   FORWARD

The module D4 is assigned content wise to **Industrial field bus systems**.

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                    ┌─────────────────────────────┐
                    │         Basics of           │
                    │   STEP 7- Programming        │
                    │   2 - 3 days   A modules     │
                    └─────────────────────────────┘
                                   │
                                   ▼
                    ┌─────────────────────────────┐
                    │  Additional functions of     │
                    │   STEP 7- Programming        │
                    │   2- 3 days   B modules      │
                    └─────────────────────────────┘
```

Industrial field bus systems 2- 3 days D modules	**Sequencer Programming** 2- 3 days C modules	**Process visualization** 2- 3 days F modules

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┌─────────────────────────────┐
│     IT- Communication        │
│    with SIMATIC S7           │
│    1- 2 days E modules       │
└─────────────────────────────┘
```

Learning goal:

In this module, the reader should learn how the PROFIBUS DP is taken into operation with the CPU 315-2DP as a master and the ET 200M as a slave. The module shows the principle procedure by means of a short example.

Requirements:

For the successful use of this module, the following knowledge is assumed:

- Knowledge in the use of Windows 95/98/2000/ME/NT4.0
- Basics of PLC- Programming with STEP 7 (e.g. Module A3 - 'Startup' PLC programming with STEP 7)
- Basics of the PROFIBUS DP (e.g. Appendix IV – Basics of field bus systems with SIMATIC S7-300)

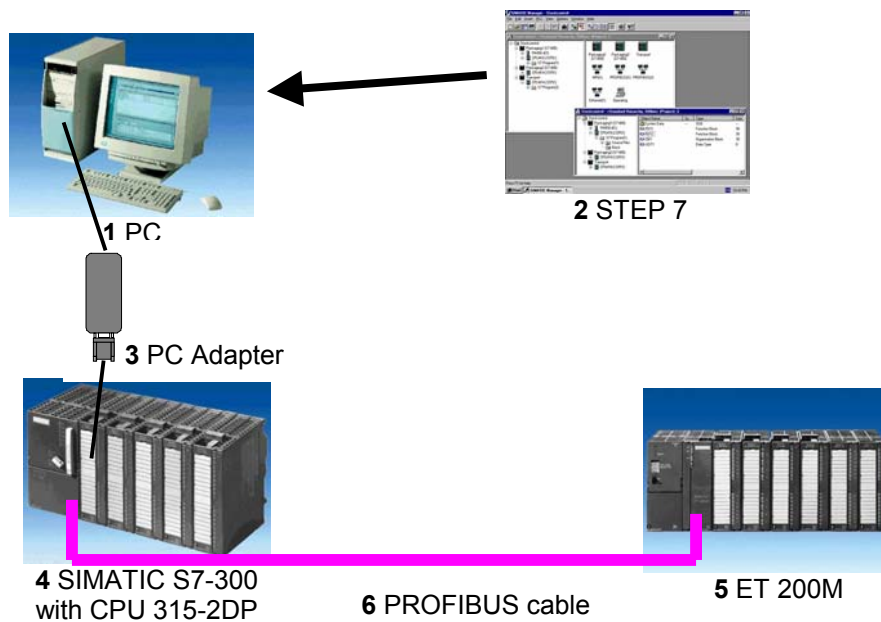| **Forward**	Notes	Commission

Required hardware and software

1 PC, Operating system Windows 95/98/2000/ME/NT4.0 with
- Minimal: 133MHz and 64MB RAM, approx. 65 MB free hard disk space
- Optimal: 500MHz and 128MB RAM, approx. 65 MB free hard disk space

2 Software STEP 7 V 5.x

3 MPI- Interface for the PC (e.g. PC- Adapter)

4 PLC SIMATIC S7-300 with the CPU 315-2DP
Example configuration:
- Network: PS 307 2A
- CPU: CPU 315-2DP

5 Distributed I/O ET 200M with at least one digital in- and output.
Example configuration:
- Power supply: PS 307 2A
- PROFIBUS terminal: IM 153-1
- Digital inputs: DI 16x DC24V
- Digital outputs: DO 16x DC24V / 0.5 A

6 PROFIBUS cable with 2 PROFIBUS slots

1 PC

2 STEP 7

3 PC Adapter

4 SIMATIC S7-300
with CPU 315-2DP

6 PROFIBUS cable

5 ET 200M

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2. NOTES FOR THE OPERATION OF THE CPU 315-2DP

The CPU 315-2DP is a CPU that is made available with an integrated PROFIBUS DP interface.
For the CPU 315-2DP, the following PROFIBUS protocol profiles are available at your disposal:

- DP- Interface as a master or slave in accordance with EN 50170. PROFIBUS-DP (Distributed I/O) is the protocol profile for the connection of distributed I/O/Field equipment with fast reaction time.

A further characteristic is that the addresses of the in- and output modules can be parameterized by this CPU.

The CPU capability is given with the following data:
- 16K Statements. 48Kbyte RAM (integrated) 80Kbyte RAM
- 1024 Byte DI/DO
- 128 Byte AI/AO
- 0.3 ms / 1K Instructions
- 64 Counters
- 128 Timers
- 2048 Memory bits

Note: The CPU 315-2DP is appointed here on the PROFIBUS as a master.

3. NOTES TO THE OPERATION OF THE ET 200M

The ET 200M is a distributed I/O system with a small, compact configuration. The modules are identical with the standard modules of the SIMATIC S7-300. By the actuators of the CPU, there is only one interface module (e.g. IM153-1) that functions as a slave on the PROFIBUS DP.
The PROFIBUS address is adjusted by a binary coded DIL- switch block.
Another possible adjustment of the PROFIBUS address is with the power recovery. Therefore, the ET 200M must be turned off and then back on.

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4. COMMISSIONING THE PROFIBUS (MASTER CPU315-2DP / SLAVE ET200M)

In the following example, the commissioning of a mono master system with the CPU315-2DP as a master and an ET 200M as a slave is described.
For the testing of the configuration, a program will be written in which a display lamp H1 is triggered by the simultaneous activation of two buttons S0 and S1.

Assignment list:

I0.0	S0	Button selection 1
I0.1	S1	Button selection 2
Q0.0	H1	Display lamp

1. The central tool in STEP 7 is the **SIMATIC Manager**, which is opened here with a double click (→ SIMATIC Manager).

SIMATIC Manager

2. STEP 7- Programs are administered in projects . Such a project will be created (→ File → New).

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Module D4
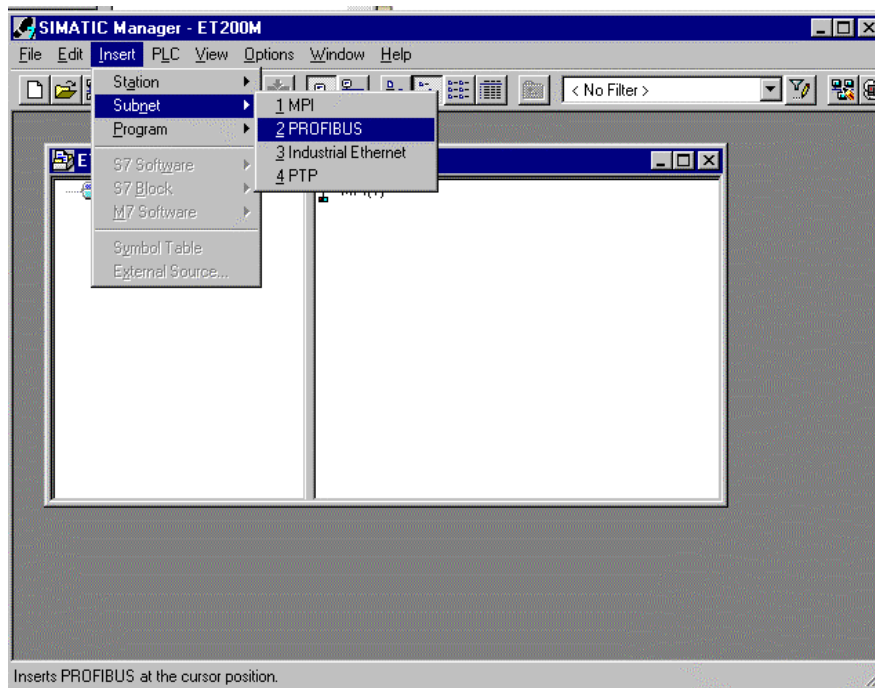PROFIBUS DP with Master CPU 315-2DP / Slave ET 200M
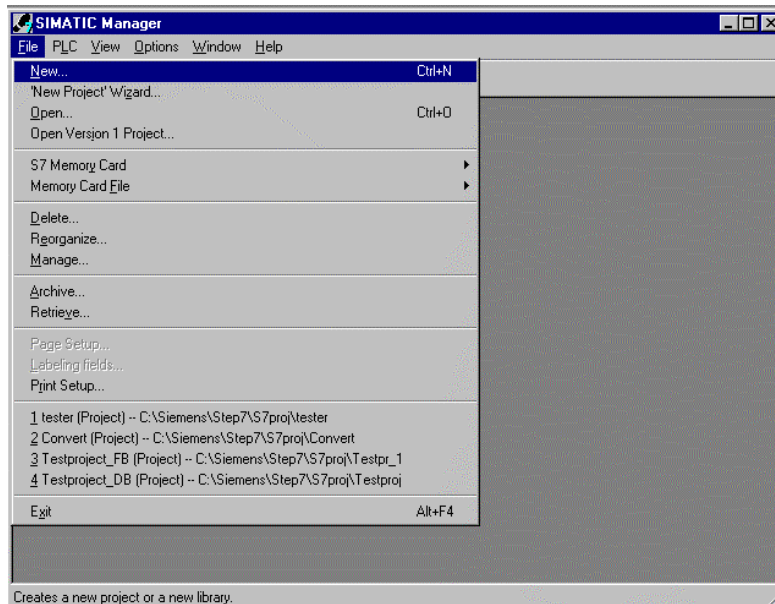
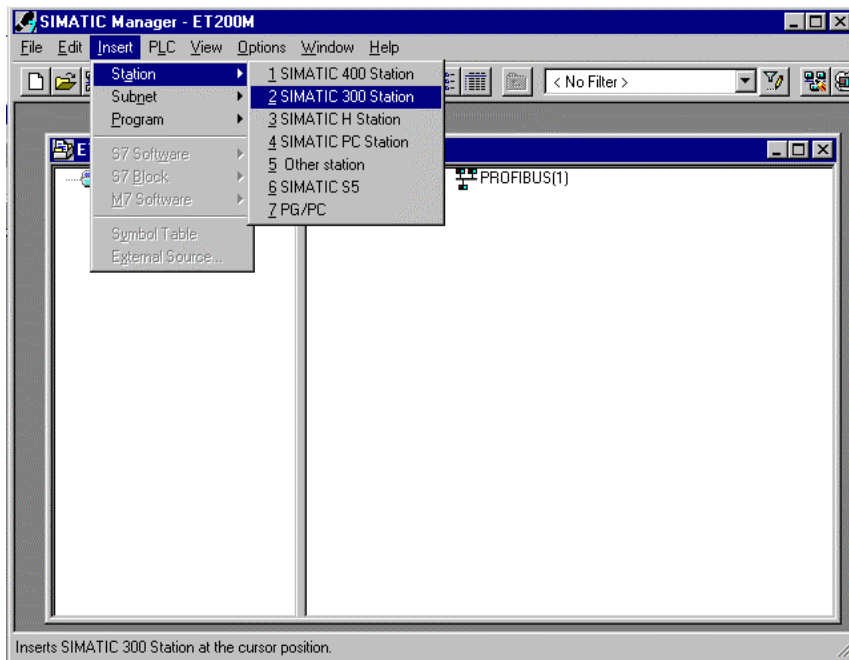3. Give the **Name ET200M** to the project (→ ET200M → OK).
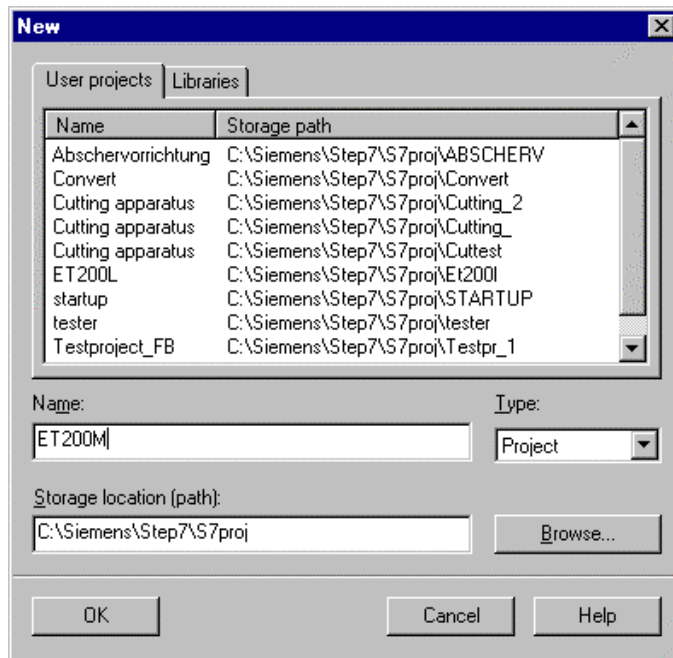
4. Highlight your project and insert a **PROFIBUS Subnet** (→ ET200M → Insert → Subnet → PROFIBUS).
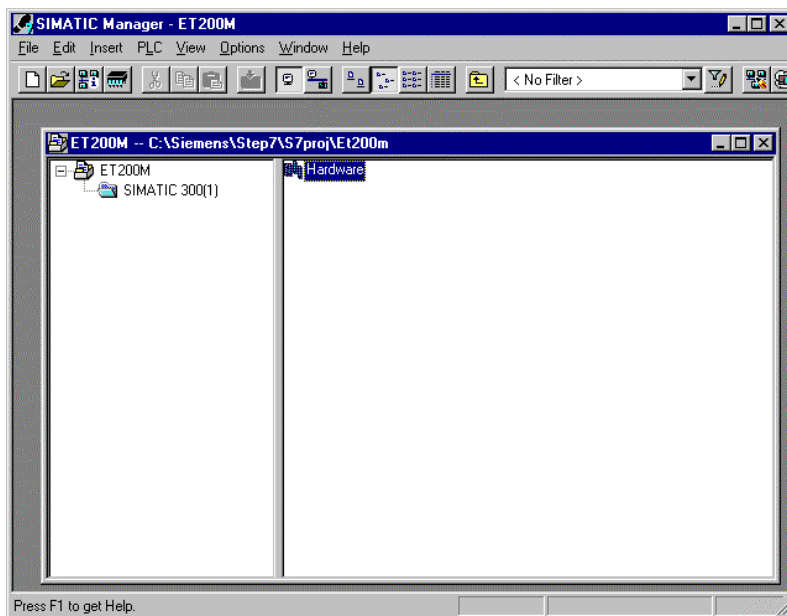

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5. Then insert a **SIMATIC 300-Station** ($\rightarrow$ Insert $\rightarrow$ Station $\rightarrow$ SIMATIC 300-Station).

6. Open the configuration tool for the **Hardware** with a double click ($\rightarrow$ Hardware).

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7. Open the hardware catalog with a click on the symbol ⬛ (→ ⬛).
   There you will see the directories are divided into the following:
   - PROFIBUS-DP, SIMATIC 300, SIMATIC 400 and SIMATIC PC Based Control,
   all module racks, modules and interface modules for the configuration of your hardware
   configuration are made available.
   Insert a **Rail** with a double click(→ SIMATIC 300 → RACK-300 → Rail).
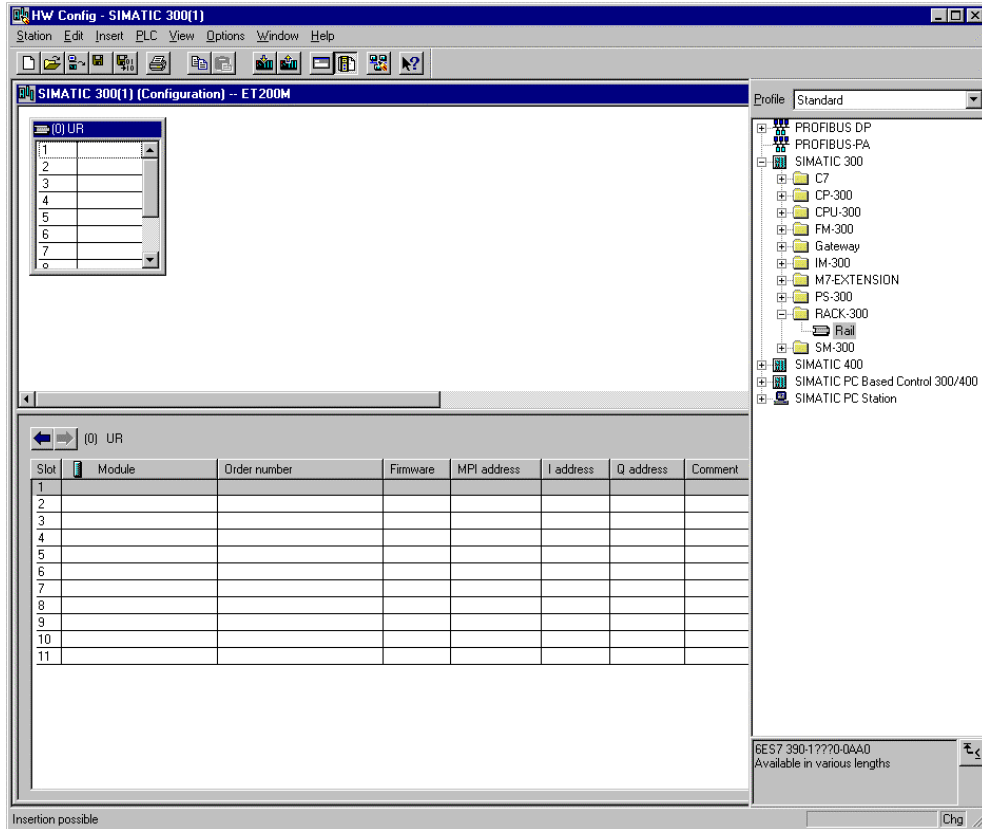
After the insert, a configurations table for the configuration of the Rack 0 appears automatically.

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8. Now all modules can be chosen out of the hardware catalog and inserted into the configuration table and are also inserted into your rack.
   To insert, you must click on the name of the respective module, hold the mouse button and Drag & Drop the module into a line of the configurations table. We will begin with the power supply **PS 307 2A** (→ SIMATIC 300 → PS-300 → PS 307 2A).
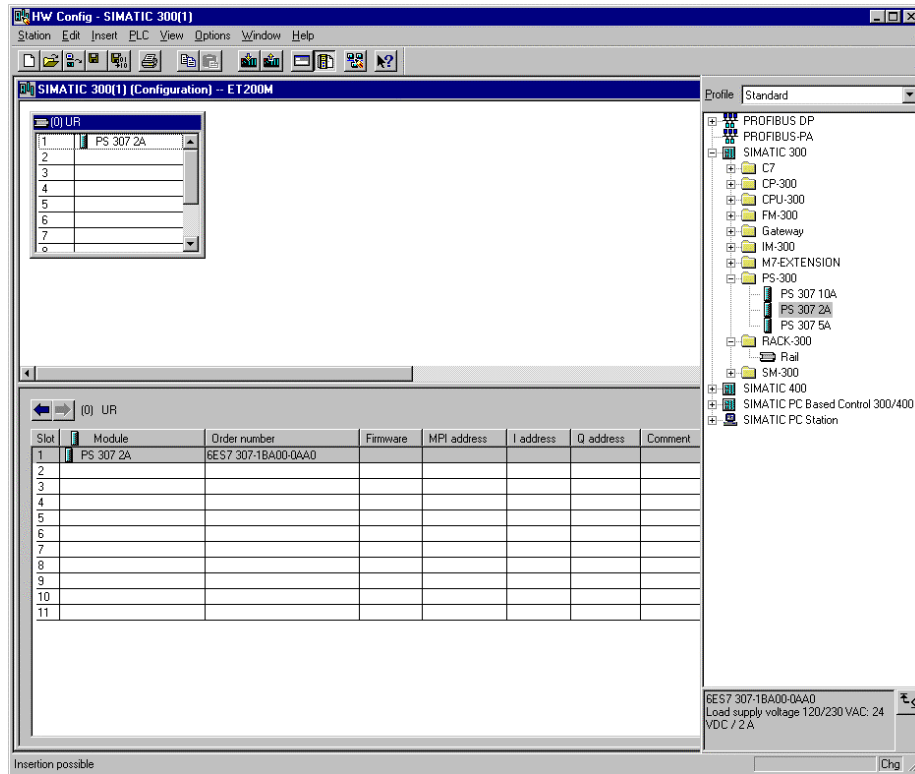

Note: If your hardware differs from what is shown above, then you must select the appropriate modules from the catalog and insert them into the rack. The part numbers of the individual modules, which are found on the components, are indicated in the footer of the catalog.

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9. In the next step, we drop the CPU 315-2DP into the second card location. This allows for the part number and version of the CPU to be read off. ($\rightarrow$ SIMATIC 300 $\rightarrow$ CPU-300 $\rightarrow$ CPU 315-2DP $\rightarrow$ 6ES7 315-2AF03-0AB0 $\rightarrow$ V1.1).
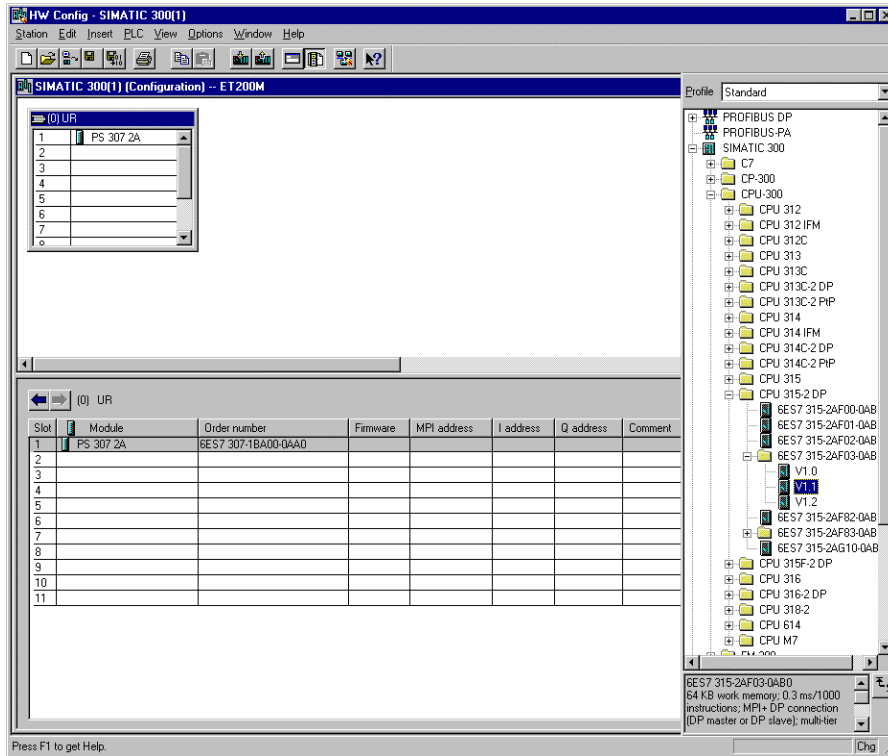

10. By the entering of the CPU, the following window appears, in which you assign a PROFIBUS address to the CPU 315-2DP and must already choose the first PROFIBUS net. When you want to alter the parameter of the PROFIBUS net, you must highlight it and then click on **Properties** ($\rightarrow$ Properties).

| Forward	Notes	**Commission**
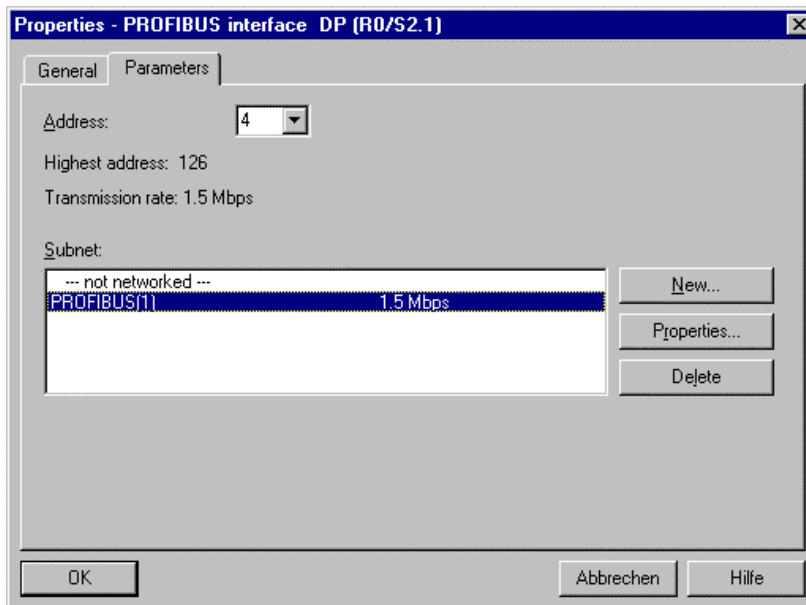
11. Now you can choose the **Highest PROFIBUS Address** (here → 126), the **Transmission Rate** (here → 1,5 Mbit/s) and the **Profile** (here → DP). (→ OK).
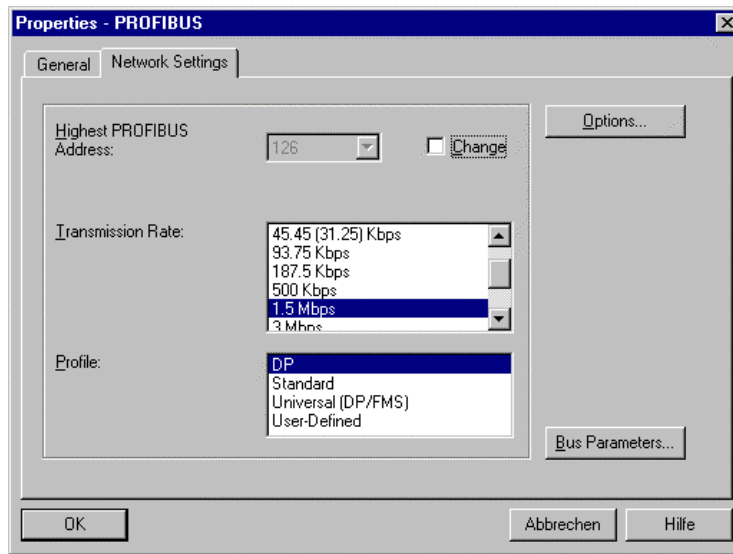

12. Then a bar chart for the **Master system** is shown to the right of the CPU315-2DP, in which you can arrange the PROFIBUS. This happens by clicking the desired module (Here the **IM 153-1**, an ET 200M interface module) from the hardware catalog in the path **PROFIBUS-DP**. By Drag & Drop click with the mouse, it can be dropped into the master system. (→ PROFIBUS DP → ET 200M → IM 153-1→ 6ES7 153-1AA83-0XB0).

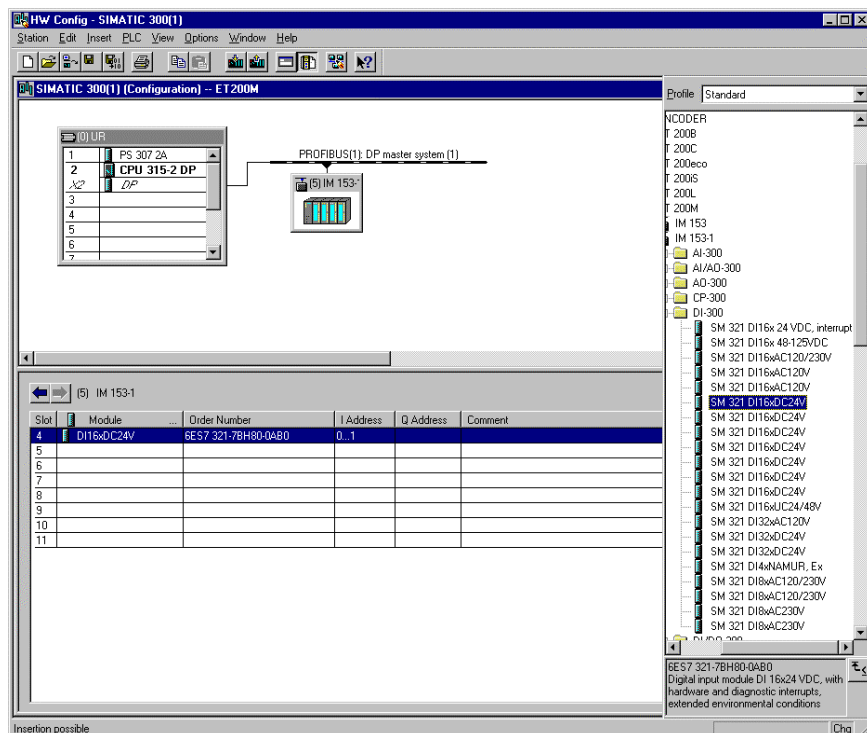| Forward	Notes	**Commission**
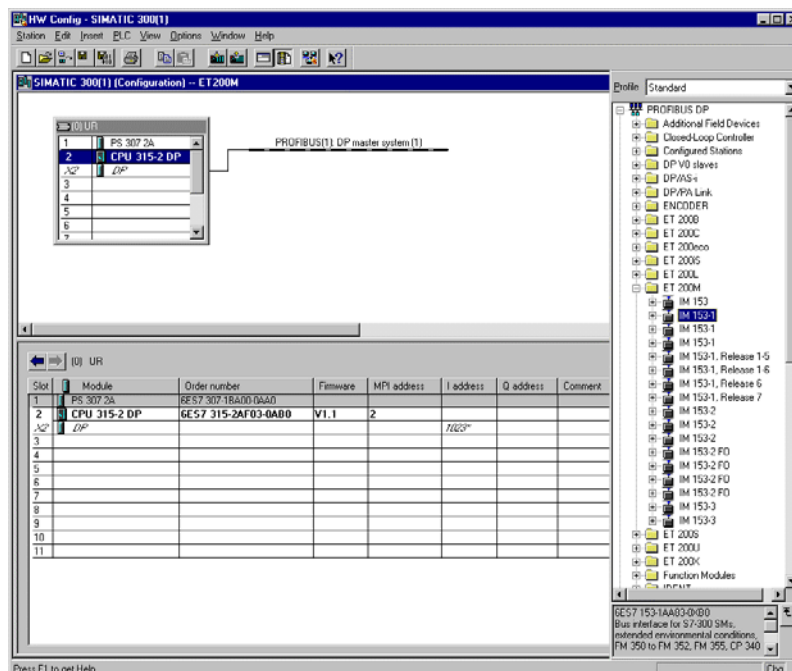
13. By the entering of the slave, the following window is displayed in which you must assign a PROFIBUS address to the slave. This address must be identical with the address that you created in the rotary switch of the IM 153-1 (→ 5 → OK).
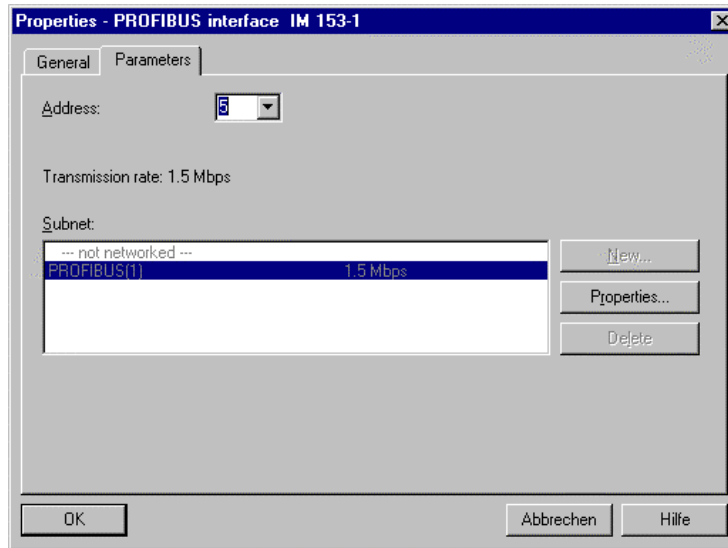
14. In the next step we see the input module for 16 inputs on fourth slot place of the ET 200M. There the order number of the module is read off the front (→ PROFIBUS DP → ET 200M → IM 153-1 → DI-300 → SM 321 DI16xDC24V).

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15. In the next step we see the output module for 16 outputs on fifth slot place of the ET 200M. There the order number of the module is read off the front ($\rightarrow$ PROFIBUS DP $\rightarrow$ ET 200M $\rightarrow$ IM 153-1 $\rightarrow$ DO-300 $\rightarrow$ SM 322 DO16xDC24V/0.5A).
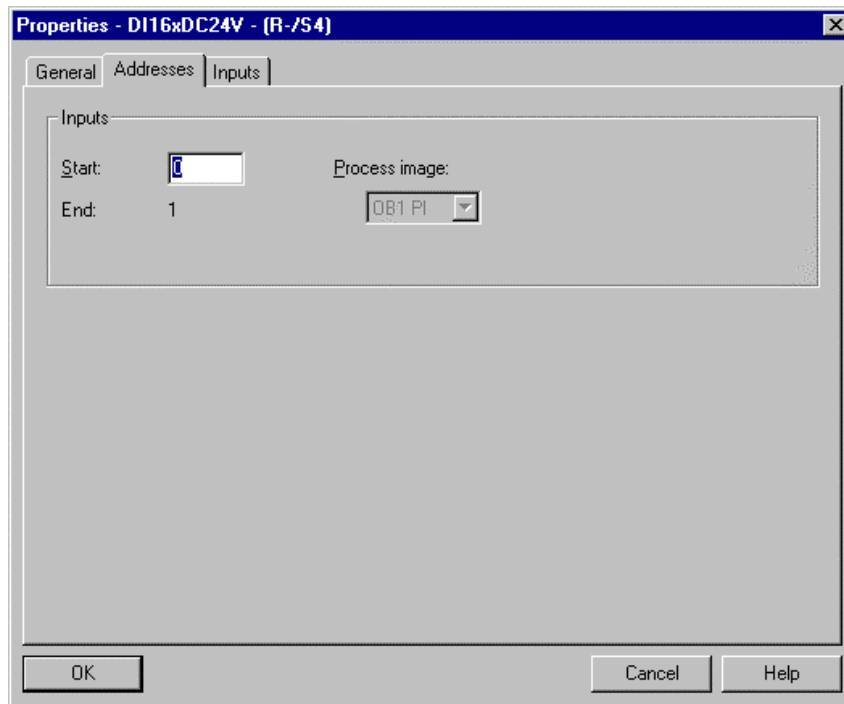

Note: The order number of the module is displayed in the footer of the catalog.

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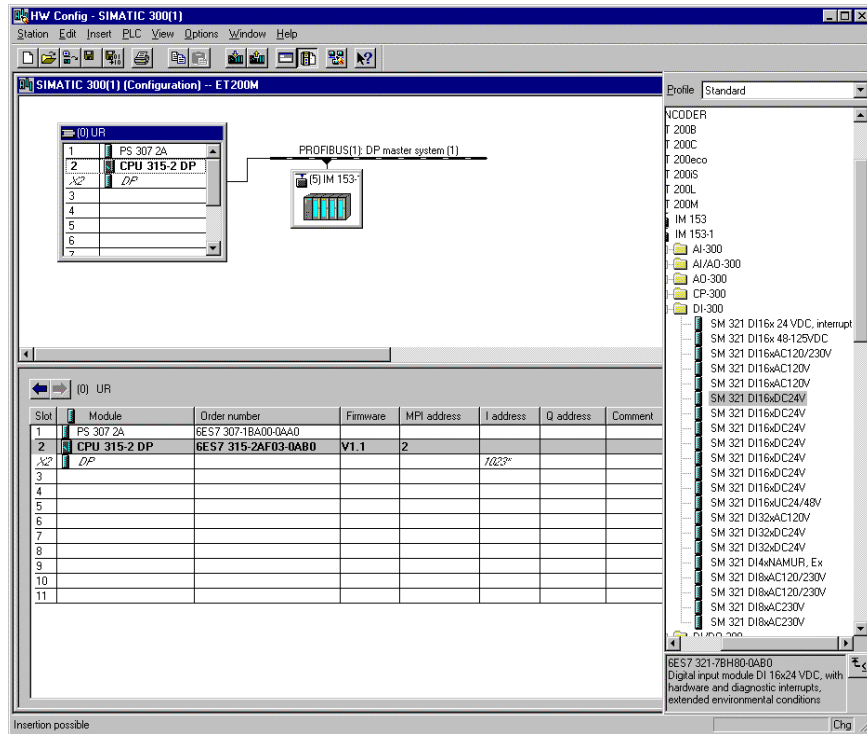16. The addresses of the I/O modules can now be modified.
This happens by a double click on the corresponding input and output modules in the ET 200M
and is adjusted in the register **Address**.
In any case these addresses should be required. An automatic address allocation takes place in
the sequence similar to how the slaves are entered ($\rightarrow$ DO 16xDC24V/0,5A $\rightarrow$ Adresses $\rightarrow$ OK).

Properties - DI16xDC24V - (R-/S4)

General | Addresses | Inputs

Inputs

Start: 0

End: 1

Process image:

OB1 PI

OK   Cancel   Help

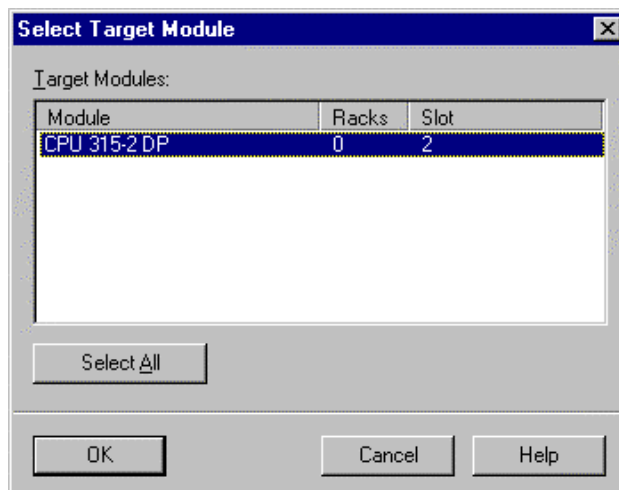|	Forward	Notes	**Commission**	

17. The configuration table should first be saved and compiled with a click on [icon] and then downloaded into the PLC with [icon]. The mode switch on the CPU must be on STOP! (→ [icon] → [icon])
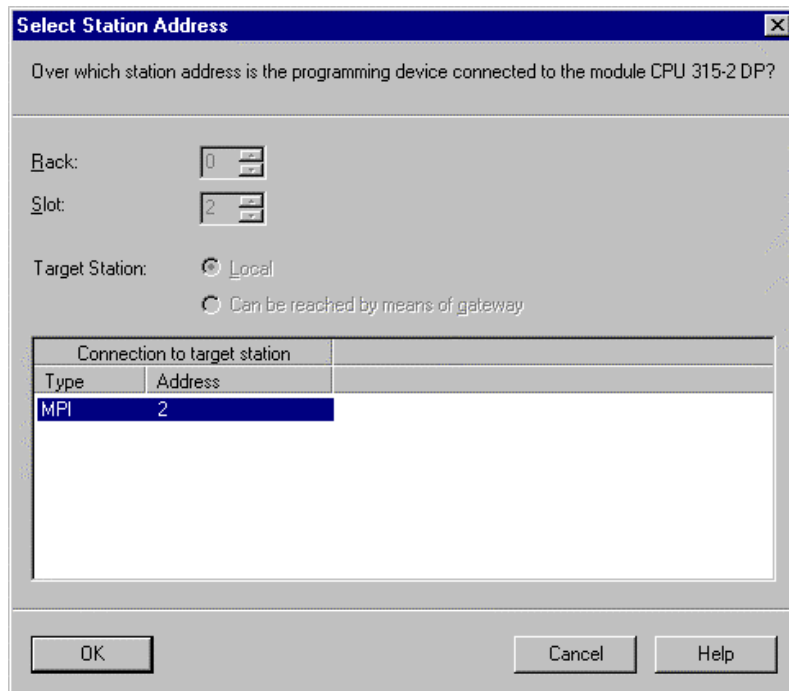

18. The CPU 315-2DP is then activated as the target module for the download activity (→ OK).

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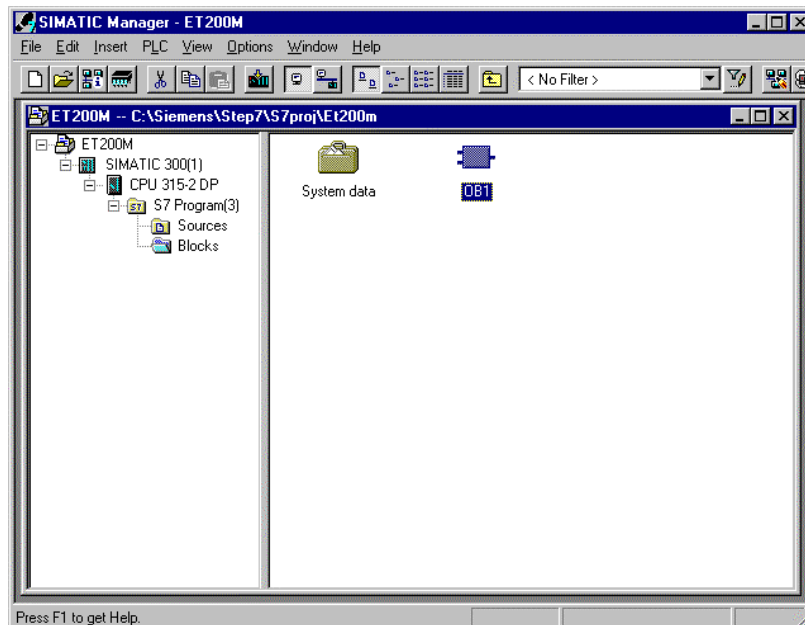Last revision: 02/2002   PROFIBUS DP with Master CPU 315-2DP / Slave ET 200M

19. The station address of the CPU in the MPI net is then chosen. You are only connected with the CPU so you can accept with **OK** ($\rightarrow$ OK).

20. From the **SIMATIC Manager**, you can open the block **OB1** with a double click in the editor **LAD, STL, FBD: Program blocks** ($\rightarrow$ OB1).

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21. Optional: Enter the properties of the OB1 for documentation and accept with OK (→OK).

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21. With **LAD, STL, FBD: Program blocks**, you now have an editor which gives you the possibilty to generate your STEP 7- Program. Here the organization block OB1 was already opened with the first network. In order to generate your first logical operation, you must highlight the first network. Now you can write your first STEP 7- Program. Several programs can usually be divided into

networks. Open a new network by clicking on the network symbol .
The STEP 7- Program to be tested can now be downloaded into the PLC.

In our case, the OB1 is the only block. Save the organization block with and click on

download . The mode switch of the CPU must be on STOP! (→ →)
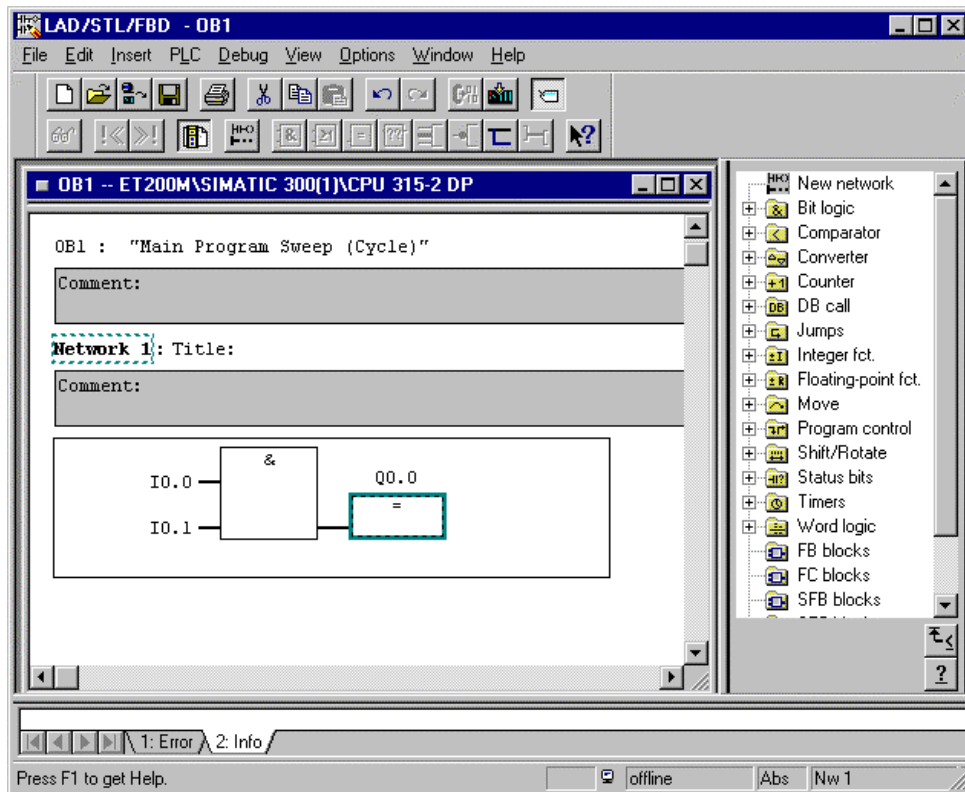
22. Through the switching of the mode switch to RUN, the program is started and after a click on the

symbol for monitoring, the program in the **OB1** can be monitored (→).

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