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Process automation with the SIMATIC PCS 7 CPU 410-5H controller

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Preface

Introduction

There are various automation systems available for the SIMATIC PCS 7 process control system which differ in performance, quantity structure, communications interfaces and scalability, among other things. These include:

- AS 410 automation systems
- Complementary S7-400 systems (AS 412 to AS 417)

Depending on the automation performance requirements, CPU 412 to CPU 417 may be used on the complementary S7-400 systems. If the performance limit of one of the CPUs being used is reached, e.g., as a result of necessary modifications to the user program, the hardware must be exchanged to increase the performance, or a higher performance S7-400 system used.

The AS 410 offers a CPU – the innovative CPU 410-5H Automation – which is versatile in use. The automation performance is scaled without having to change the CPU and is effected by means of the number of PCS 7 process objects. In this case the best performance is always available regardless of the area of application.
The reduction of types on the AS 410 to a single CPU brings numerous benefits.
It simplifies considerably the selection, configuration and planning of the automation system, as well as replacement parts holding and plant expansion.

Document contents

In this document, scenarios are described which explain relevant functions of the CPU 410-5H Process Automation in the AS 410 and illustrate advantages compared to the complementary S7-400 systems. Additionally you will gain an overview of important configuration steps and hints.

You will find information on the following topics in the document:

- General information on the CPU 410-5H Process Automation
- Advantages of the CPU 410-H
- Configuring the communications interface and establishing the connection between the ES and the AS
- Type Change in RUN (TCiR) function
- Configuration of the PN/Ethernet interfaces
- Online upgrade of process objects

Validity

This application applies to:

- CPU 410-5H Process Automation, Firmware Version 8.1
- SIMATIC PCS 7 V8.2

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1 CPU 410-5H at a glance

In this chapter you will find general information on the CPU 410-5H, its functions and areas of application.

1.1 Introduction

The CPU 410-5H is a controller specially designed for process automation which is versatile in use. With its robust, high performance hardware, the CPU 410-5H covers the entire performance spectrum of the AS 412 to AS 417 complementary systems.

Scalable performance

The performance range of the CPU 410-5H can be individually scaled according to the size and type of the PCS 7 applications. This is done by means of the PO volume, which is determined by the System Expansion Card (SEC). The volume extends from 100 PO to unlimited, at which point other performance data of the CPU acts as the limiting factor.

The PO quantity structure of an SEC can be conveniently extended from the PCS 7 V8.1 by means of CPU 410 expansion packs. It is not necessary to dismantle the CPU or the SEC. There are CPU 410 expansion packs available for 100 POs and 500 POs. You have the following options when ordering CPU 410 expansion packs:

- Online via http://www.siemens.com/industrymall
- Through your Siemens contact person (www.siemens.com/automation/partner)

Communication

The CPU has two 10/100 MBit/s PN/Ethernet interfaces, which can be configured as follows:

- 2x PROFINET, e.g., for redundant configurations without the use of external CPs
- 1x Industrial Ethernet and 1x PROFINET, e.g., for connecting to the plant bus and the process bus without the use of external CPs.
- 2x Industrial Ethernet, e.g., to design redundancy into the plant bus

Additionally, the CPU has a 12 MBit/s PROFIBUS interface and allows the connection of up to 96 nodes. The distributed process I/O can be linked either directly (PROFIBUS DP) or via a subordinate process bus (PROFIBUS PA).

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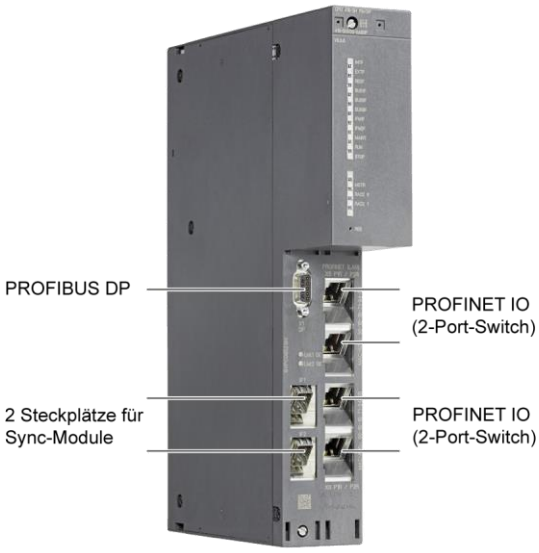
The PROFINET interfaces can be used for connecting or expanding the I/O devices. 250 devices can be connected for each PROFINET interface.



Process safety functions

The SIMATIC PCS 7 CPU 410 is set up as standard for integrated process safety functions and offers all the functions required for safety-oriented applications. The controller is TÜV certified and meets all safety requirements up to SIL 3. The CPU is capable of multitasking, meaning that several programs can run simultaneously - both Basic Process Control Applications (BPCS) and safety-oriented applications. The programs are also reaction-free, with the result that potential errors in the BPCS applications have no effect on the safety-oriented applications and vice versa.

General information

Two redundant, galvanically isolated controllers are used to guarantee maximum availability. They can be mounted on a common rack or also operated synchronously at a distance of up to ten kilometers from one another. In this case, one of the two CPUs functions as the master and the other as the reserve. In each case two synchronization submodules are used for redundant coupling, the two CPUs being synchronized by means of fiber-optic cables. The modules can be exchanged during operation.

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1.2 Advantages of the CPU 410-5H

General information

The CPU 410-5H offers, among others, the following advantages:

- A hardware platform for all application uses, application sizes and performance ranges.

  Consequently the selection, configuration and planning of the automation system are simplified.
- Lower costs for spare or replacement part inventories, as only one CPU type is used in the project.
- Flexible expansion of the automation performance without replacing hardware
- Lower investment costs and greater possibilities for use in regions with coating requirements, due to the protective coating of the CPU 410-5H
- Reduction of plant downtime due to the possibility of type updating of AS blocks in RUN mode (TCiR).

System planning

The advantages of the CPU 410-5H come into their own above all when planning a new plant:

- When planning the automation performance necessary for your plant, you will no longer have to consider different CPU variants, as the CPU 410-5H can be used for all purposes (e.g. as an H or an F system, as well as for all application sizes).
- The required automation performance (PO volumes) can be ordered according to the application size after the engineering phase is complete.
- The automation performance can be conveniently expanded as required at any time by means of the CPU System Expansion Card (SEC), without any exchange of hardware or plant downtime.
- The planning of the CPU spares is simplified considerably by the use of standardized hardware. In this case you will only need one CPU 410-5H without SEC as a replacement part, since the SEC can be transferred if the CPU is exchanged.
- Due to networking with PROFINET (PN), switchgear and drives can be reached by every CPU without expensive cabling. Should program relocations to another CPU arise in the course of the implementation, it will not be necessary to rewire the station or the device.

Note The PN communication which spans the CPUs can influence the performance capability of all the CPUs in the PN network.

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2 Application scenarios

2.1 Configuring the communications interface and establishing the connection between the ES and the AS

In order to implement the application scenarios described in this chapter, a connection must be set up between the Engineering Station (ES) and the Automation System. The configuration procedure depends on the communications interface used. A distinction is made between:

- AS with additional CP
- Internal PN/Ethernet interfaces of the CPU

2.1.1 Establishing a connection using an additional CP in the AS

The following will describe how to establish a connection between ES and AS using the CP 443-1.

Requirement

In order to establish a connection between the ES and the AS (via the CP), the modules must be fitted in the rack as shown in the operating manual.

Preliminary considerations

Before establishing communication, you must define whether you want to use TCP/IP or ISO. Addressing (IP address, MAC address) is carried out on the basis of the interface selection.

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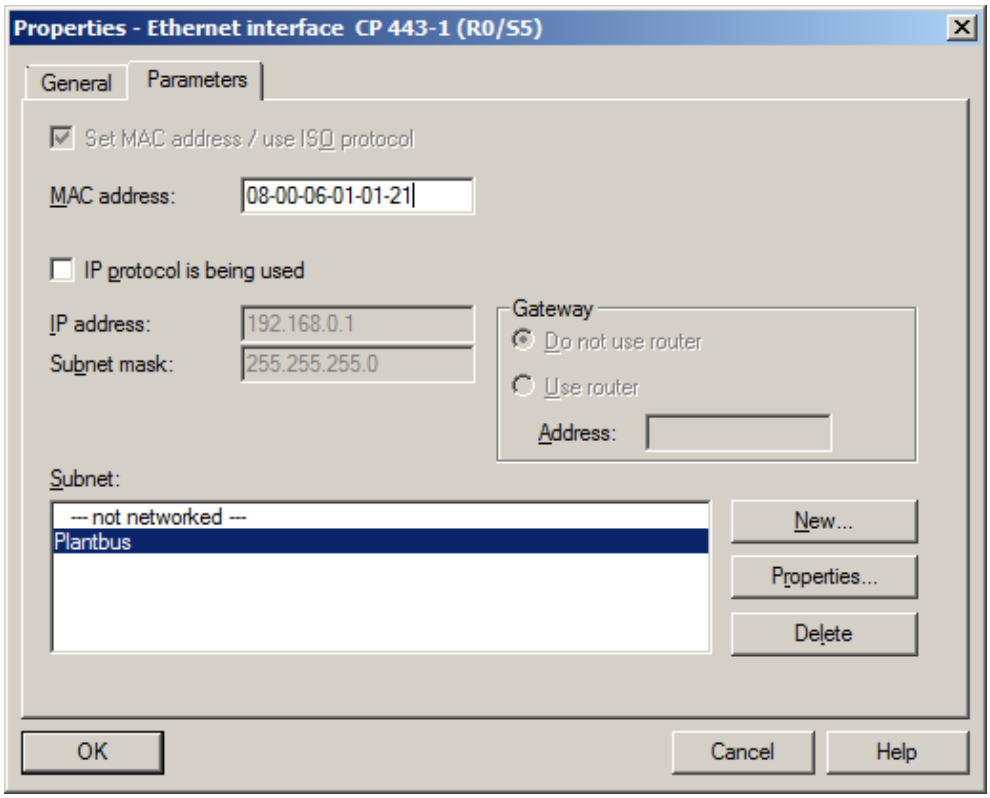
Connection via ISO interface

The following points are a step-by-step description of how to establish the connection between the AS and the ES.

1. Configure the AS in the HW Config. and assign the address for the CP (MAC address) accordingly.



2. Save and compile the configuration.
3. In the SIMATIC Manager, use menu command "Tools > Set PG/PC station..." to set the "Interface parameter setting used" to "ISO" (e.g., CP1623.ISO.1).
4. Switch back to the HW Config.
5. Execute the menu command "Target system > Load in module...".

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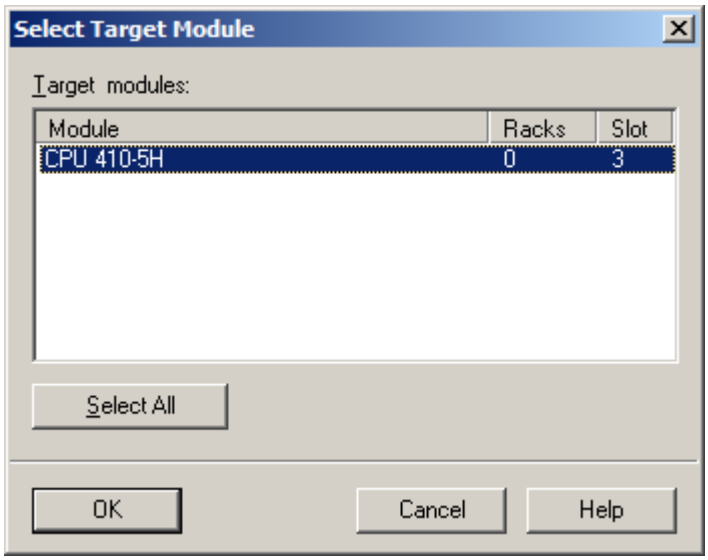
6. In the "Select Target Module" dialog window, select the relevant module and click on "OK".



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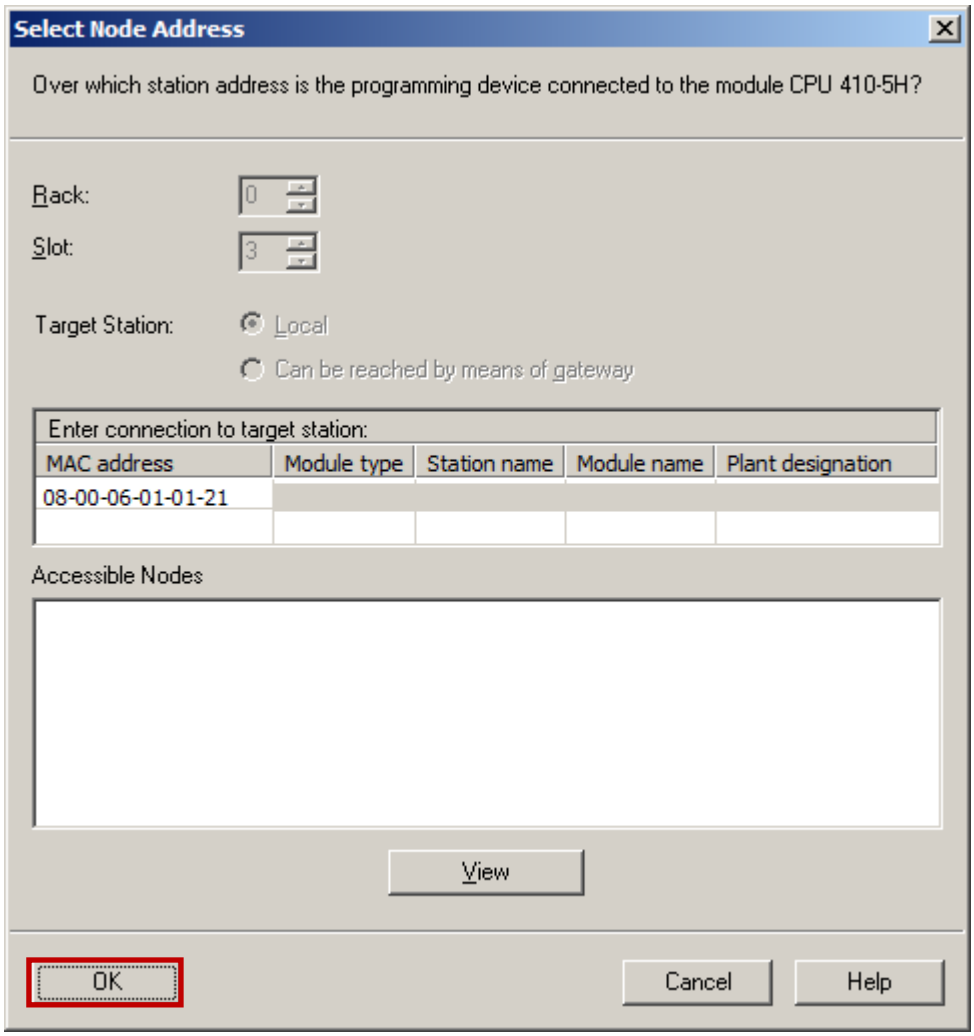
7. If you have not changed the MAC address for the CP (configured MAC address is the same as the factory-set MAC address), click on the "OK" button in the "Select Node Address" dialog window.



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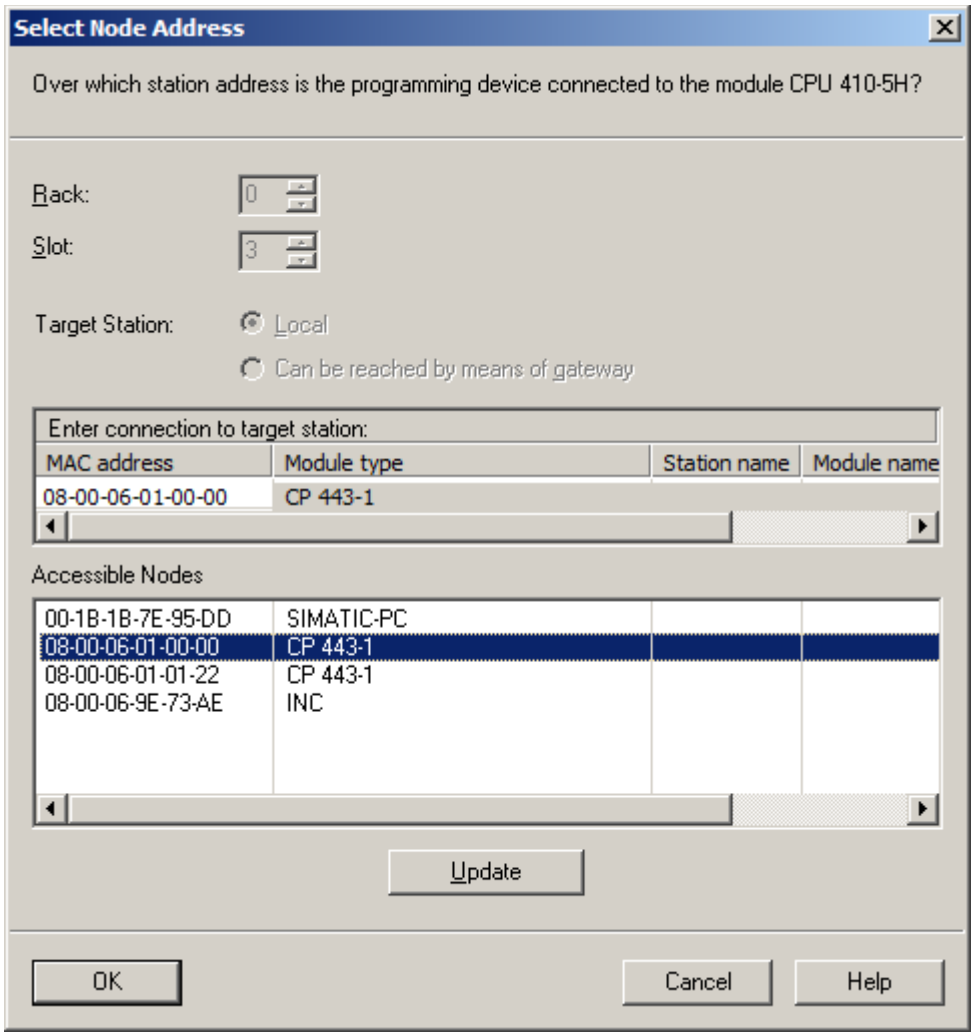
If you have configured a different MAC address, then click on the "View" button. Then in the "Accessible Nodes" box, select the CP from which you want to load the configuration. Now click the "OK" button.



8. The configuration has now been loaded into the AS.

Note

After an address change, always load the configuration via the HW Config or NetPro. The accessible nodes to which you can make assignments by loading a new address are only shown here. When loading from the SIMATIC Manager, an attempt will be made to load via the configured address. Since this cannot be accessed, the loading procedure will be aborted, accompanied by an appropriate message.

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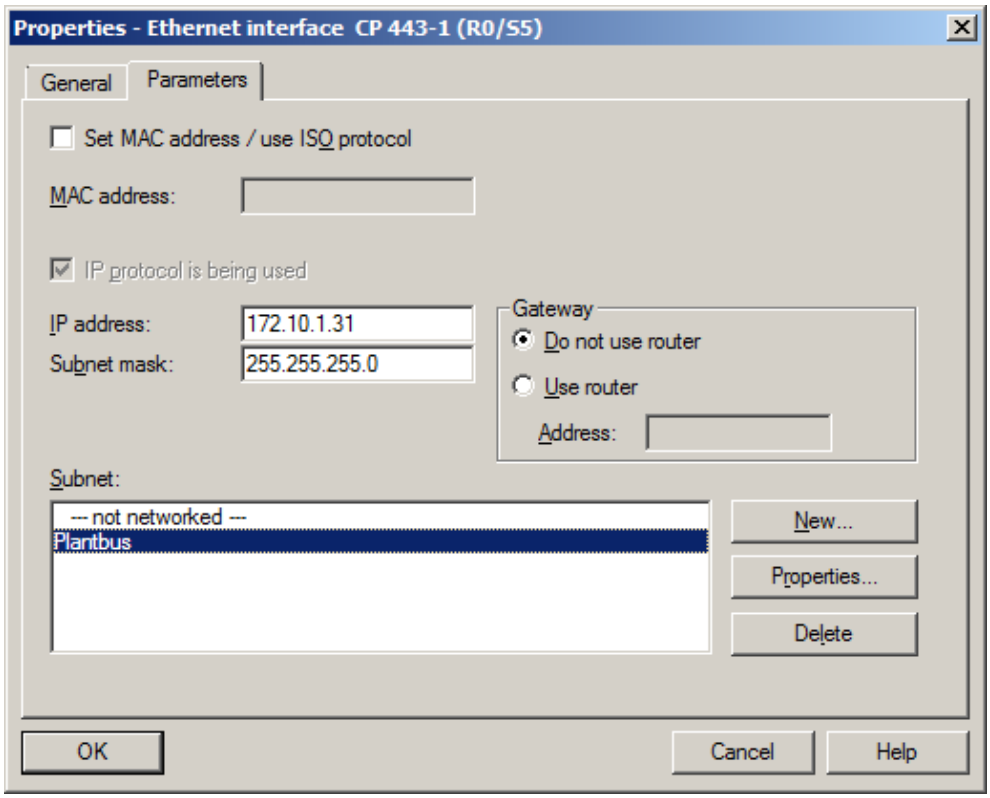
Connection via TCP/IP interface

The following points are a step-by-step description of how to establish the connection between the AS and the ES.

1. Configure the AS in the HW Config. and assign the IP parameters for the CP (IP address, subnet mask) accordingly.



2. Save and compile the configuration.
3. In the SIMATIC Manager, use menu command "Tools > Set PG/PC station..." to set the "Interface parameter setting used" to "RFC1006" or "TCPIP" (e.g., CP1623.RFC1006.1).
4. Switch back to the HW Config.
5. Execute the menu command "Target system > Edit Ethernet Node".

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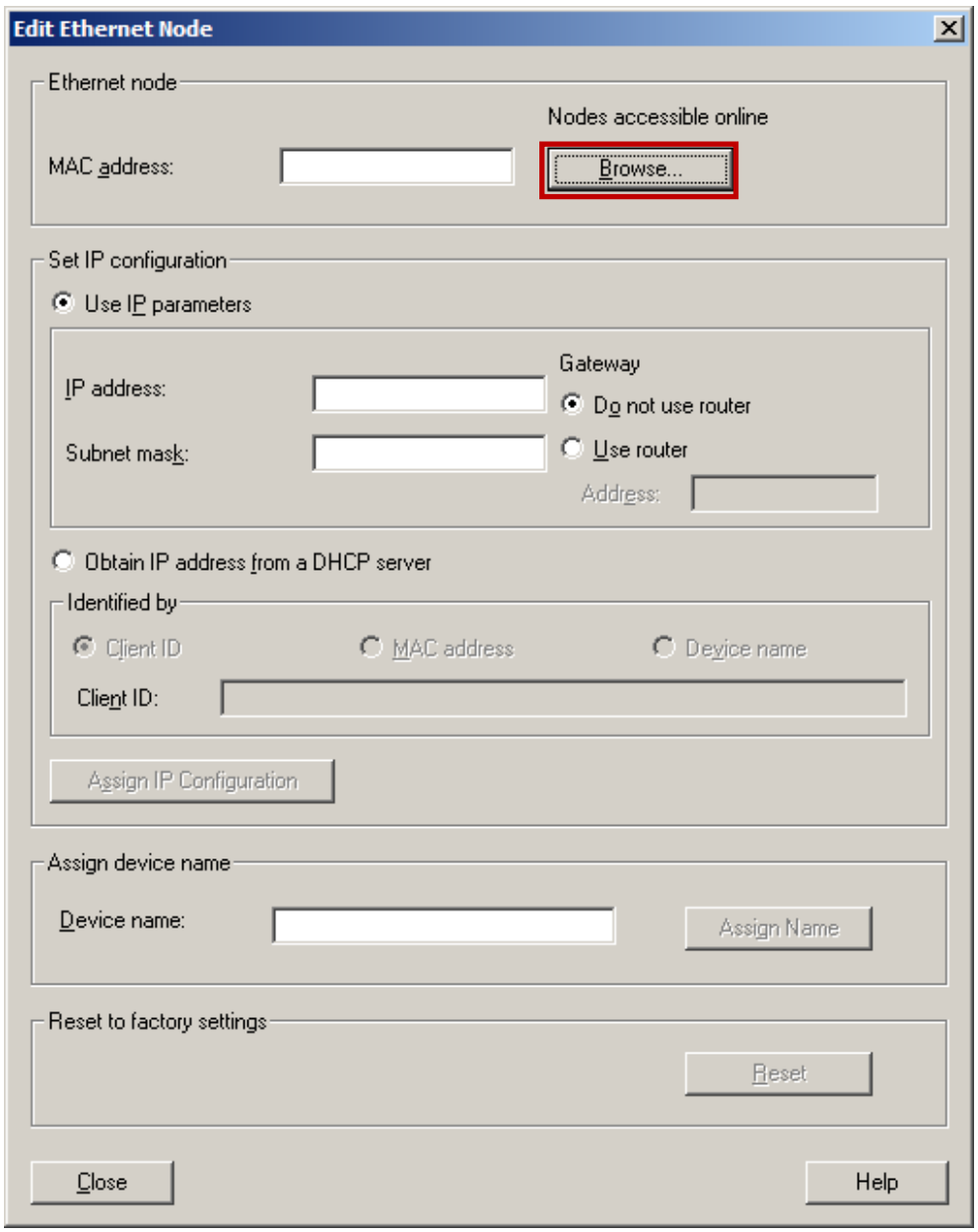
6. Click on the "Browse" button in the "Edit Ethernet Node" dialog window.



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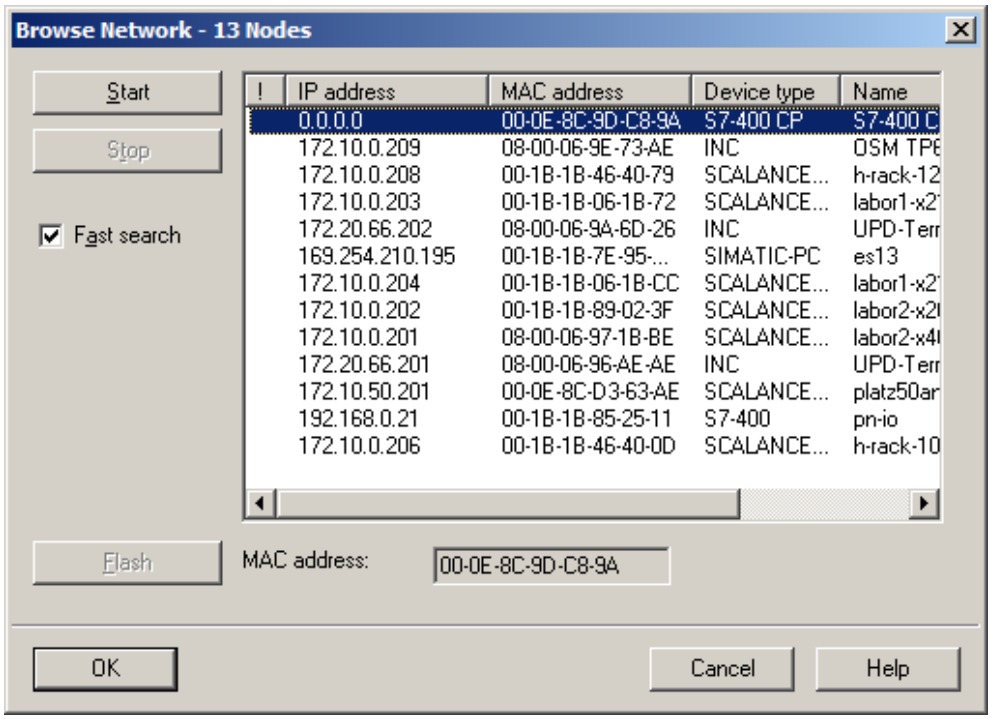
7. In the "Browse Network" dialog window, select the CP by means of the MAC address and click on the "OK" button.



Note If not all or none of the connected nodes are displayed, check the settings for the used network components (switches,...).

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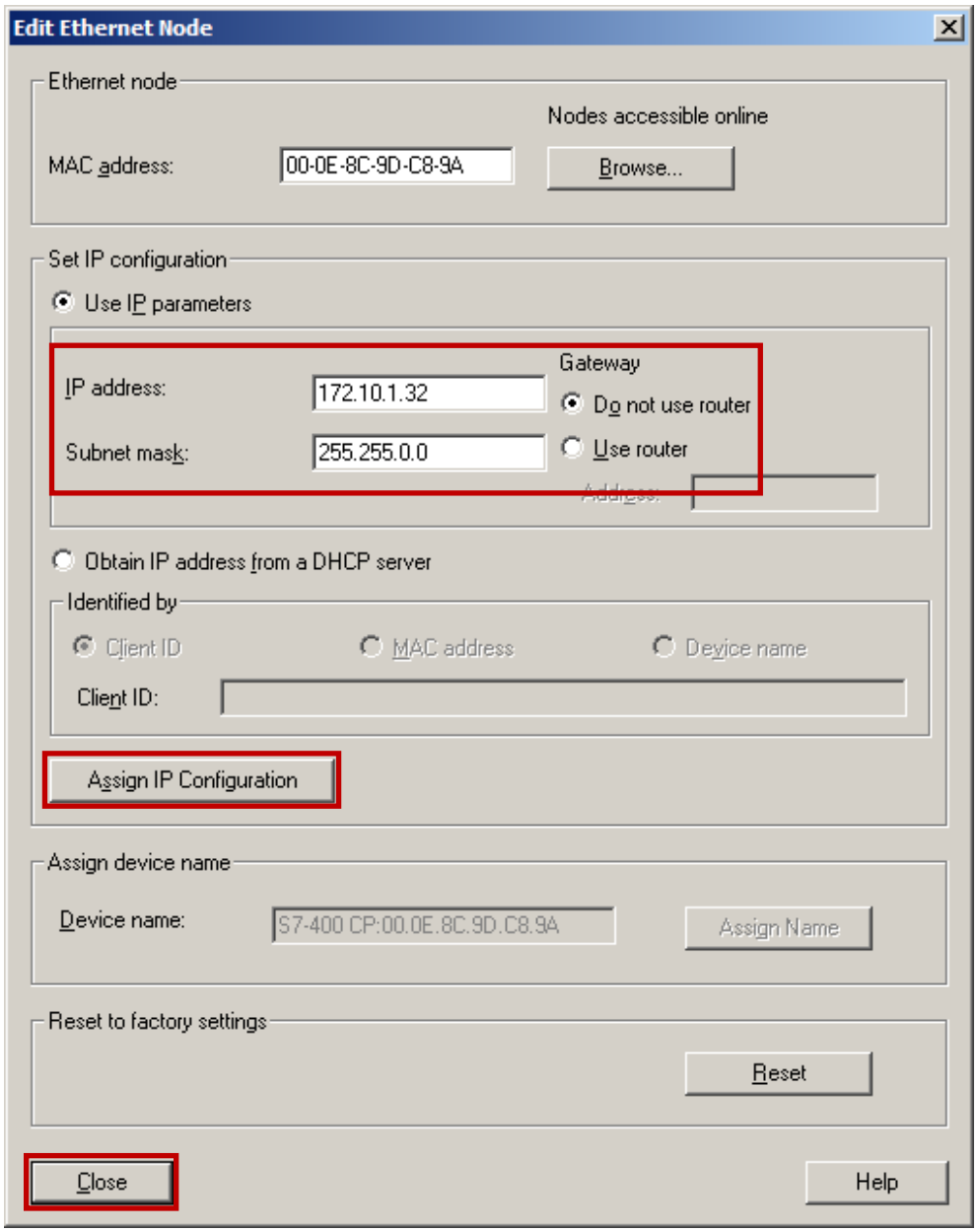
8. The MAC address and the IP parameters for the CP are entered in the "Edit Ethernet Node" dialog window. Adapt the IP parameters according to your configuration in HW Config (see Step 1). Next click on the "Assign IP Configuration" button and then on the "Close" button.



Note If you start the search again, you can check to see if the parameters have been correctly accepted.

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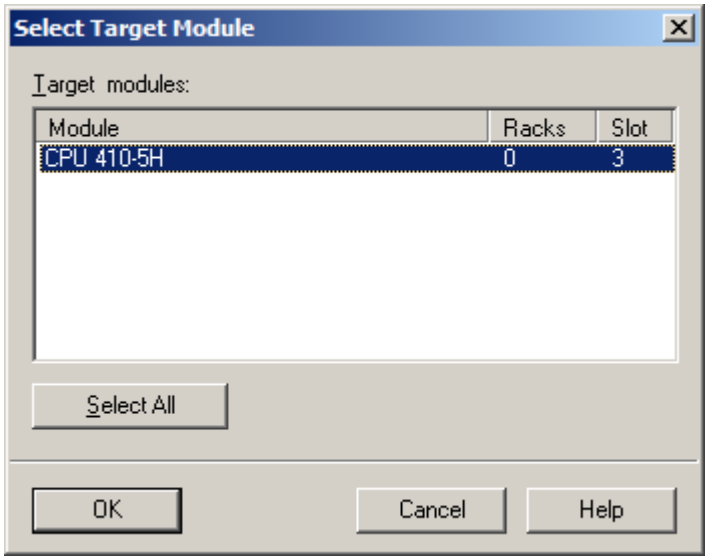
9. Execute the menu command "Target system > Load in module...".
10. In the "Select Target Module" dialog window, select the relevant module and click on "OK".



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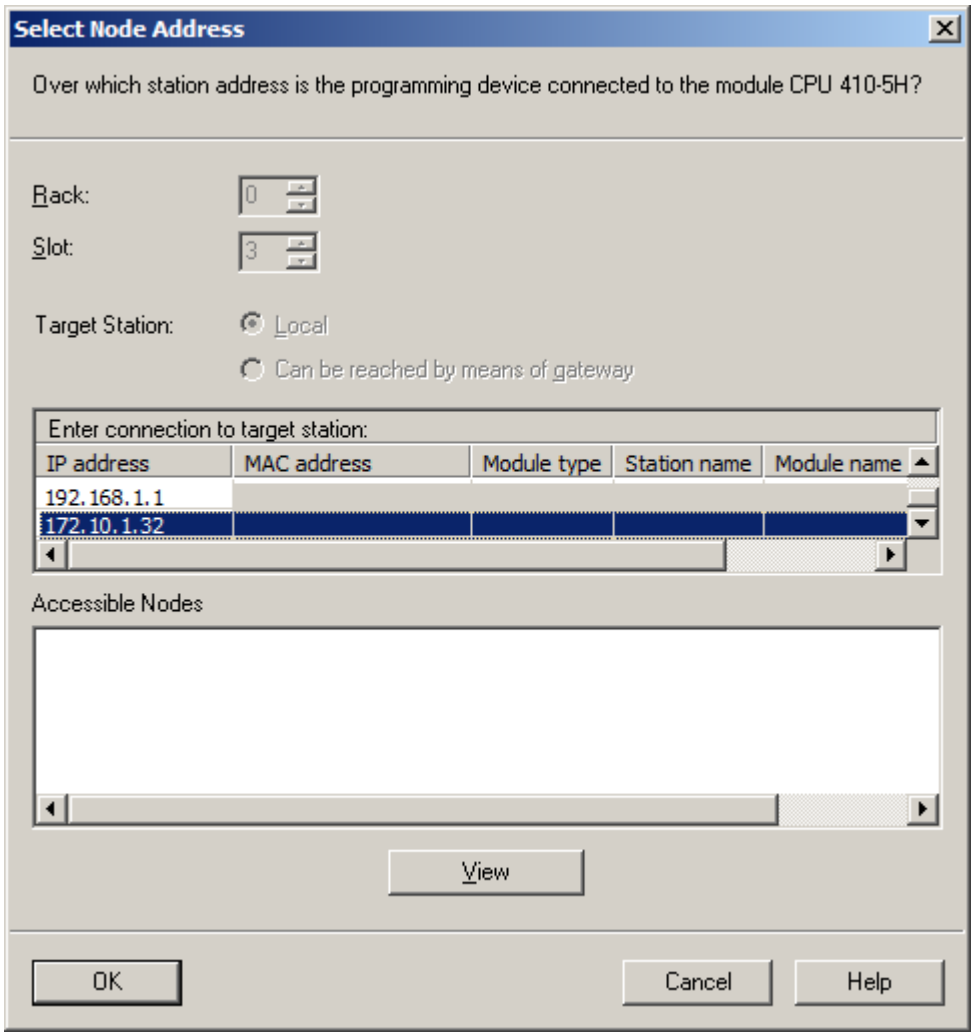
11. In the "Enter connection to target station" box in the "Select Node Address" dialog window, select the relevant IP address and click on the "OK" button.



12. The configuration has now been loaded into the AS.

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2.1.2 Establishing a connection via internal PN/Ethernet interfaces of the CPU

The following describes how to establish a connection between the ES and the AS using the internal PN/Ethernet interfaces of the CPU 410-5H.

Requirement

In order to establish a connection between the ES and the AS using the internal interfaces of the CPU 410-5H, the CPU 410-5H must be fitted in the rack as shown in the operating manual and be connected to the ES via the network (Ethernet).

Preliminary considerations

Before configuring, define which interface is to be used to connect the CPU to the plant bus. An IP address from the address range of the plant bus must be used for the interface.

Note The ISO protocol is not supported by the internal PN/Ethernet interfaces.

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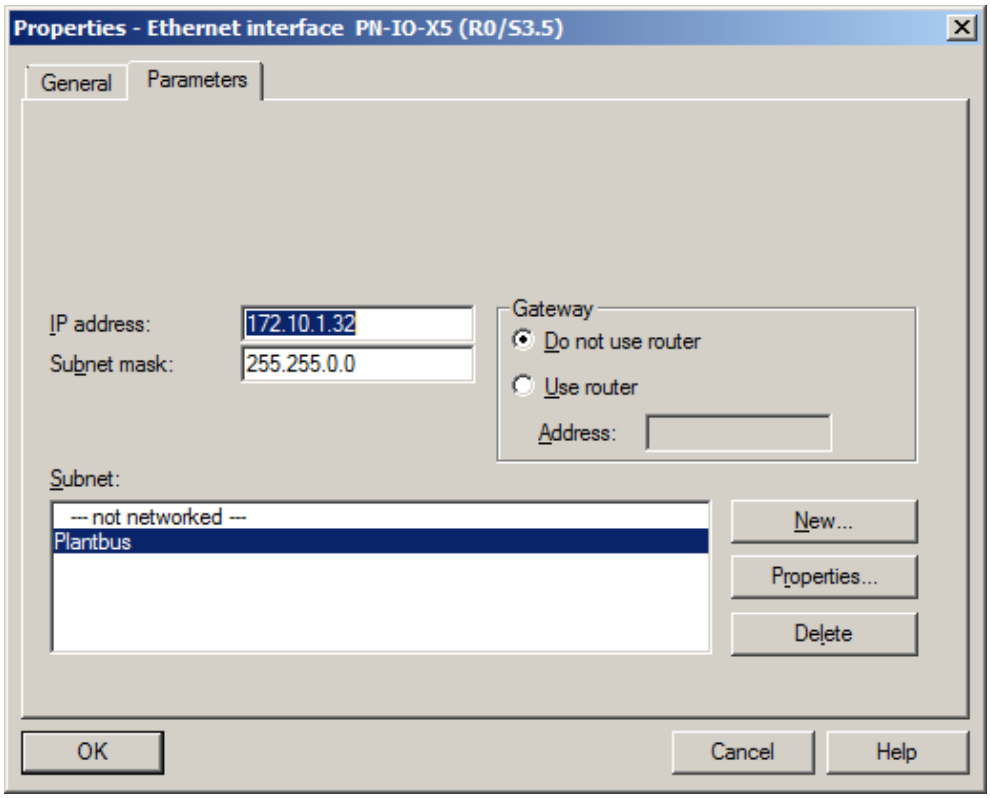
Connection via PN/Ethernet interface

The following points are a step-by-step description of how to establish the initial connection between the CPU 410-5H and the ES.

1. Configure the AS in the HW Config. and assign the IP parameters (IP address, subnet mask) on the PN/Ethernet interface.



2. Save and compile the configuration.
3. In the SIMATIC Manager, use menu command "Tools > Set PG/PC station..." to set the "Interface parameter setting used" to "RFC1006" or "TCPIP" (e.g., CP1623.RFC1006.1).
4. Switch to the HW Config.
5. Execute the menu command "Target system > Edit Ethernet Node".

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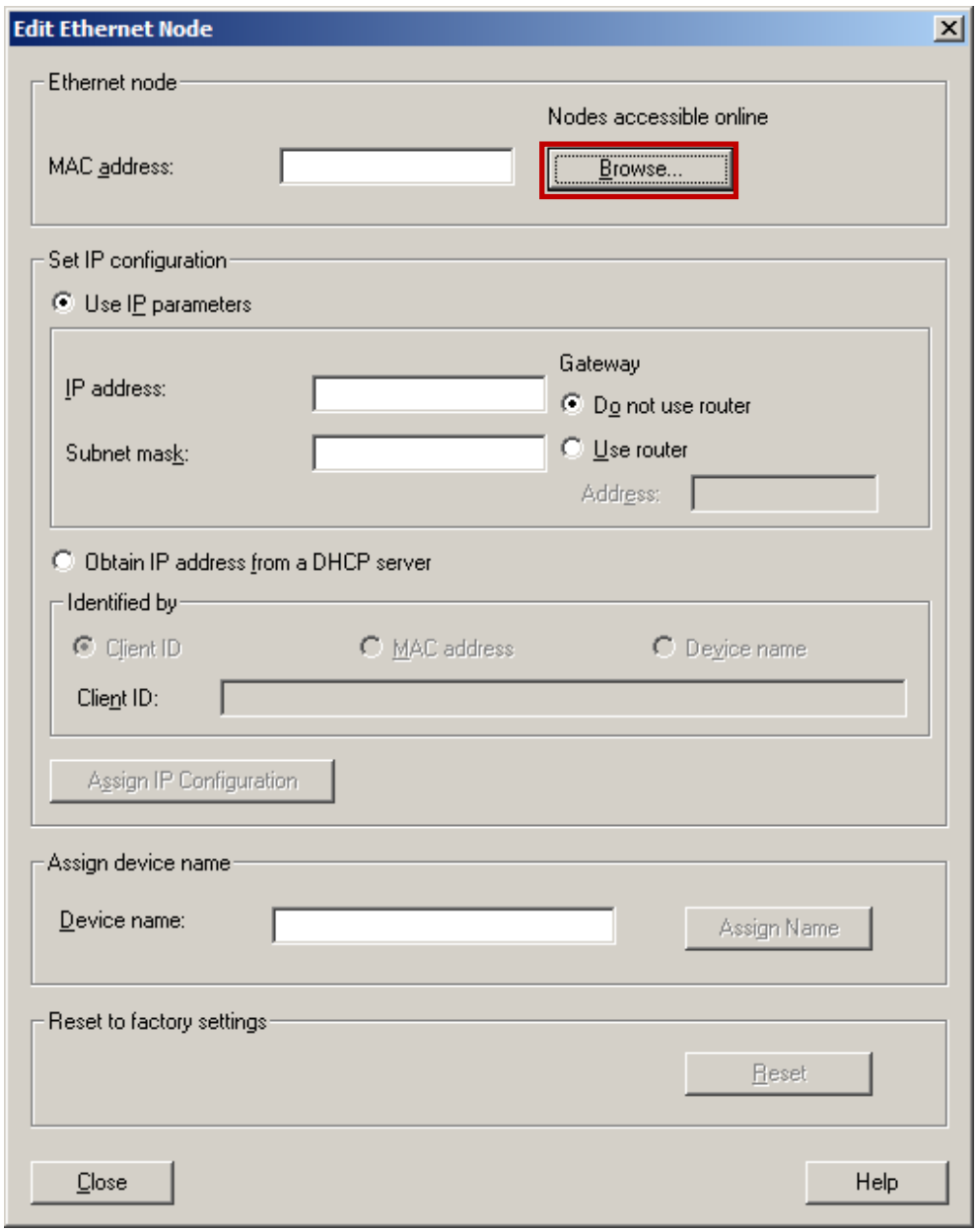
6. Click on the "Browse" button in the "Edit Ethernet Node" dialog window.



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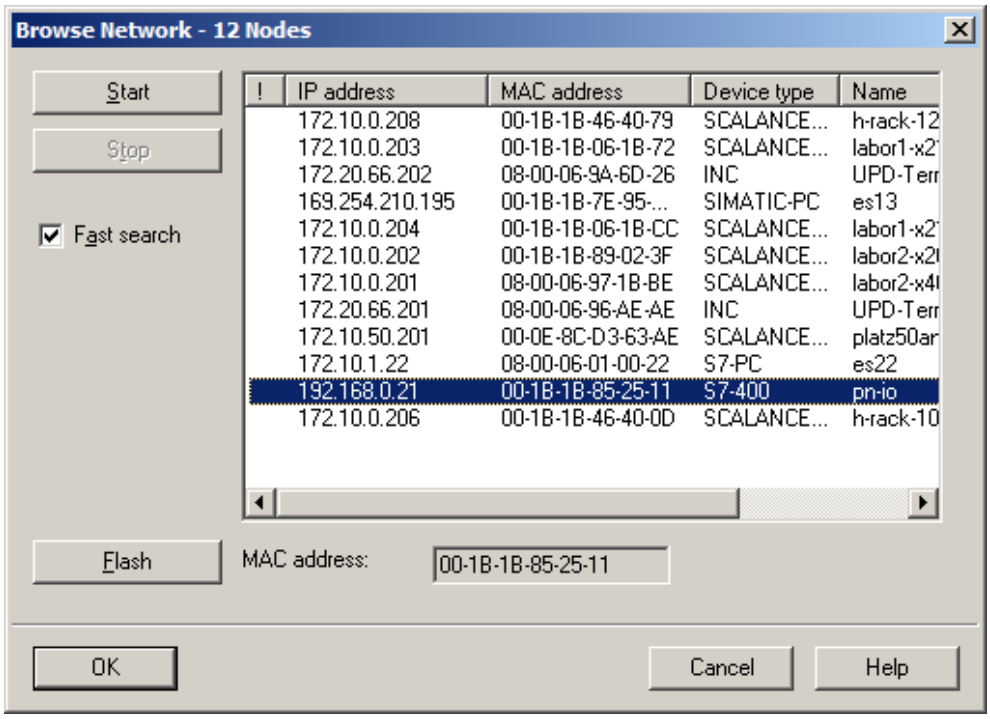
7. In the "Browse Network" dialog window, select the CPU by means of the MAC address and click on the "OK" button.



Note If not all or none of the connected nodes are displayed, check the settings for the used network components (switches,...).

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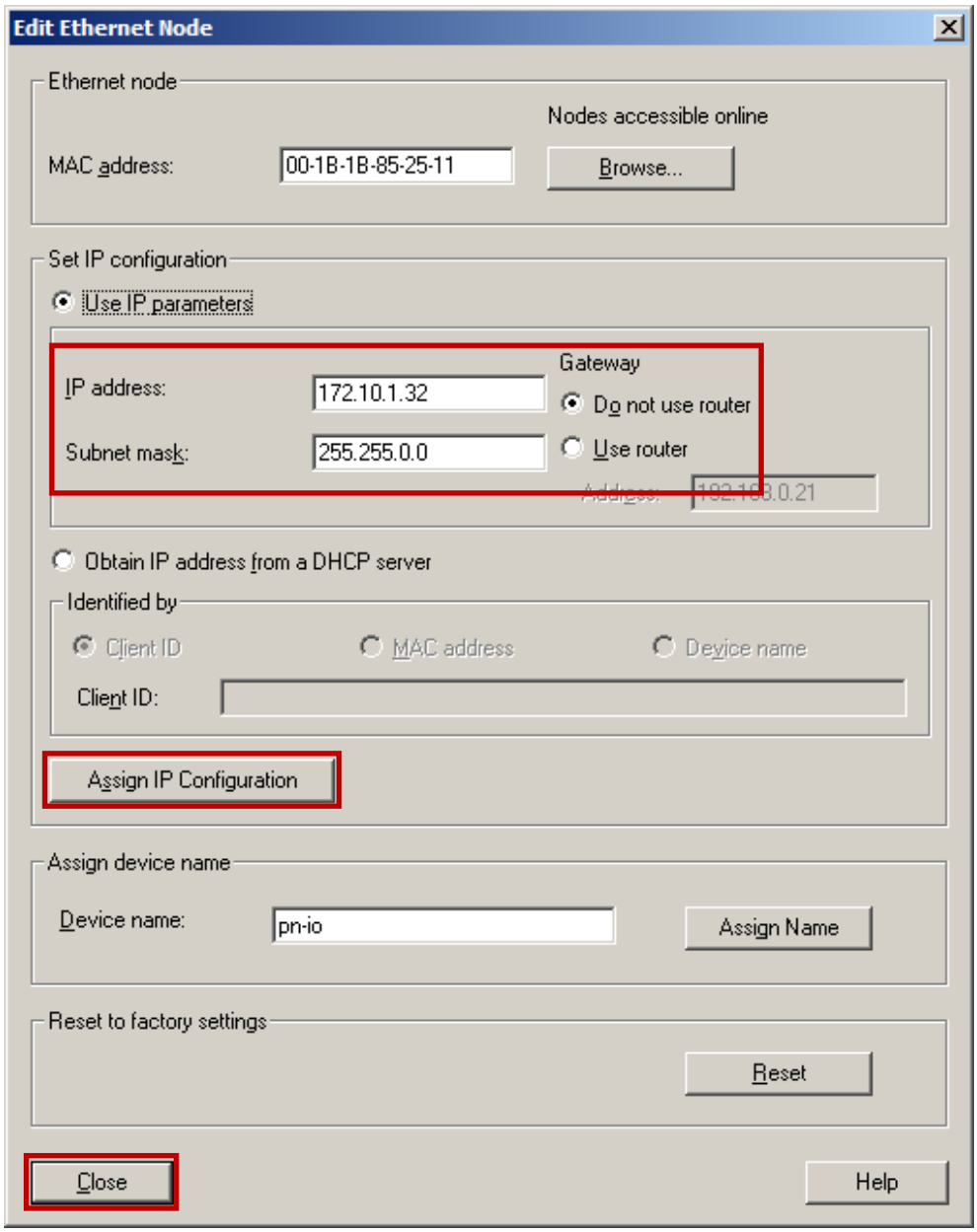
8. The MAC address and the IP parameters for the Ethernet interface are entered in the "Edit Ethernet Node" dialog window. Adapt the IP parameters according to your configuration in HW Config (see Step 1). Next, click on the "Assign IP Configuration" button and then on the "Close" button.



Note If you start the search again, you can check to see if the parameters have been correctly accepted.

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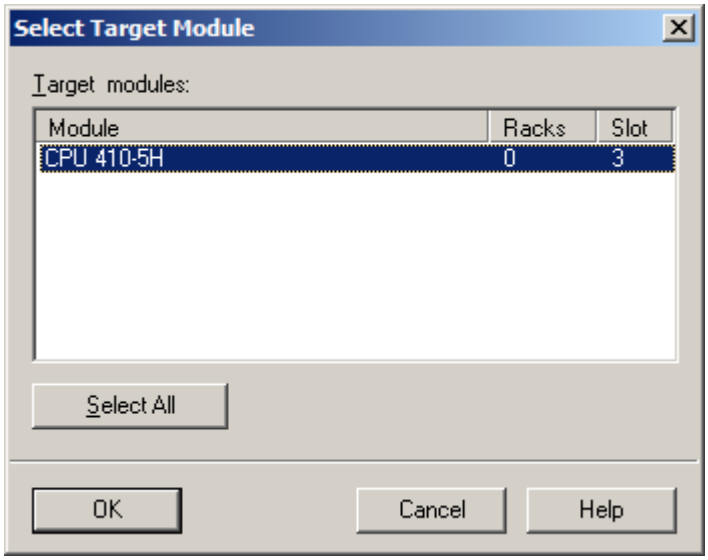
9. Execute the menu command "Target system > Load in module...".
10. In the "Select Target Module" dialog window, select the relevant module and click on "OK".



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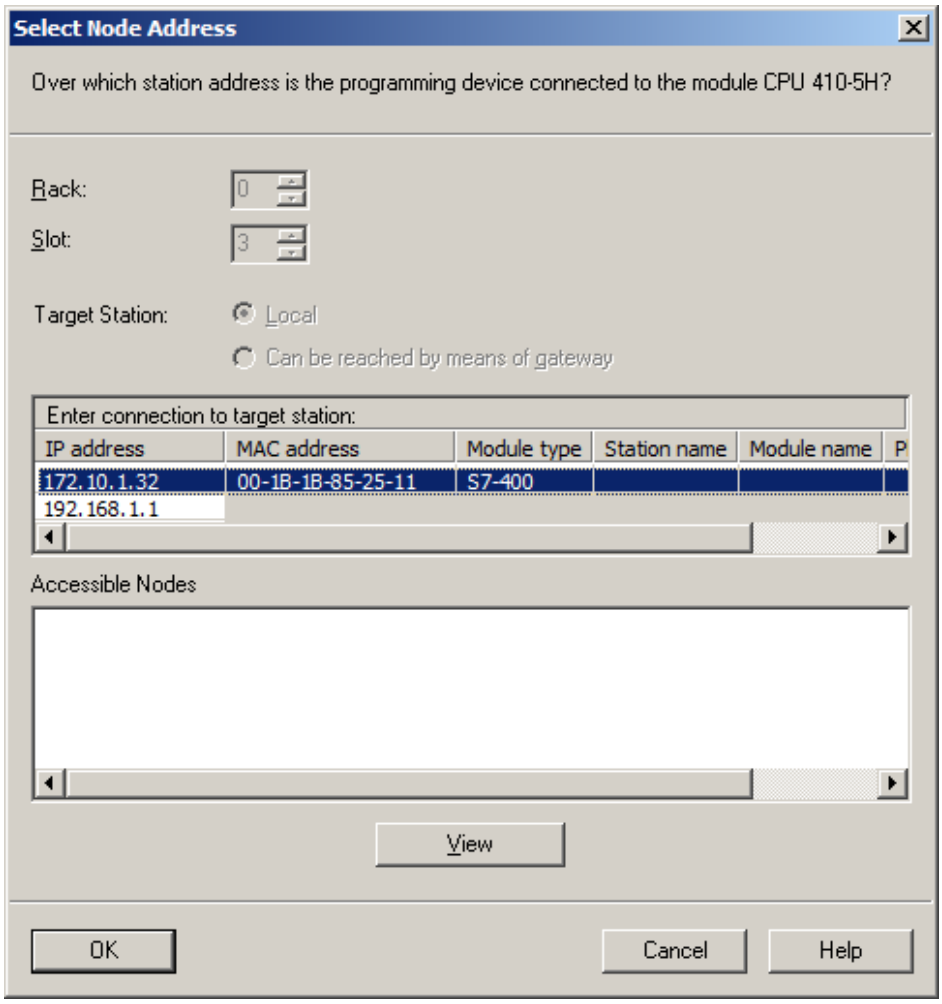
11. In the "Enter connection to target station" box in the "Select Node Address" dialog window, select the relevant IP address and click on the "OK" button.



12. The configuration has now been loaded into the AS.

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2.2 Loading interface changes from AS blocks in RUN mode (TCiR)

Introduction

The CPU 410-5H V8.1 supports type updating with interface changes in RUN mode (Type Change in RUN (TCiR)). It is thus possible to update the instances after an interface change to block types and load them into the target system in RUN mode. With the TCiR function you can, for example, also update a library without having to put the CPU in the STOP state (see Chapter 2.3).

CAUTION	**Note that you must create new blocks (new number) for the instances of the changed block types that were loaded into the CPU by means of TCiR. The system deactivates the blocks in WinCC until the OS server has be been re-compiled and loaded.** **In the case of a redundant OS server, you can do this before loading AS TCiR and loading one of the servers. This means that the plant can be operated before and after AS TCiR loading.** **Note, however, that when doing this data can be lost in the area of archiving.**

CAUTION	**The following changes to the block can only be loaded in STOP mode:** • **Changed name of an input with configured message ("Message Event ID")**

Note	You can find a detailed description of TCiR in the CFC online help system and in the “SIMATIC Process Control System PCS 7 CFC for SIMATIC S7 (V8.2)” function manual.

This chapter will describe as an example how to add a new connection to the block and then load this change into the CPU 410-5H in RUN mode.

Requirements

The following requirements apply:

- A PCS 7 multiproject is open in the SIMATIC Manager.
- The automation program has been compiled and loaded into the CPU 410-5H PA.
- Loading of the automation program was carried out with a CFC of Version V8.1 (or above)
- The firmware of the CPU 410-5H PA is V8.1 (or above)
- There is enough storage space on the CPU for modified blocks
- There are enough reserve POs on the CPU

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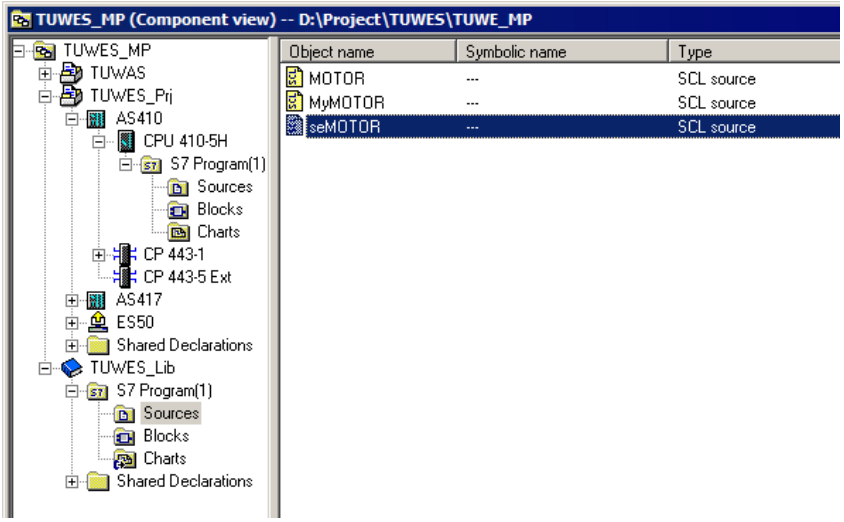
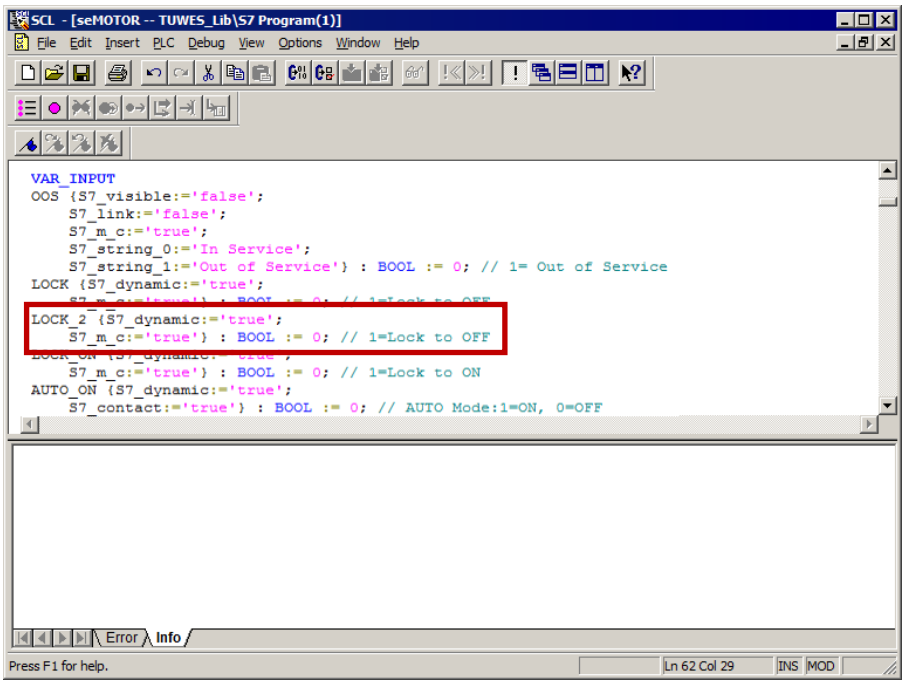
Making interface changes

Open the master data library for the project in component view.

1. Open the "Sources" folder.
2. Open the SCL source for the desired block type.



3. Carry out the desired changes.
   In this example, the connection "LOCK_2" will be added for an additional interlock on the block.



4. Save the changes and compile the SCL program.
5. Close the SCL source.

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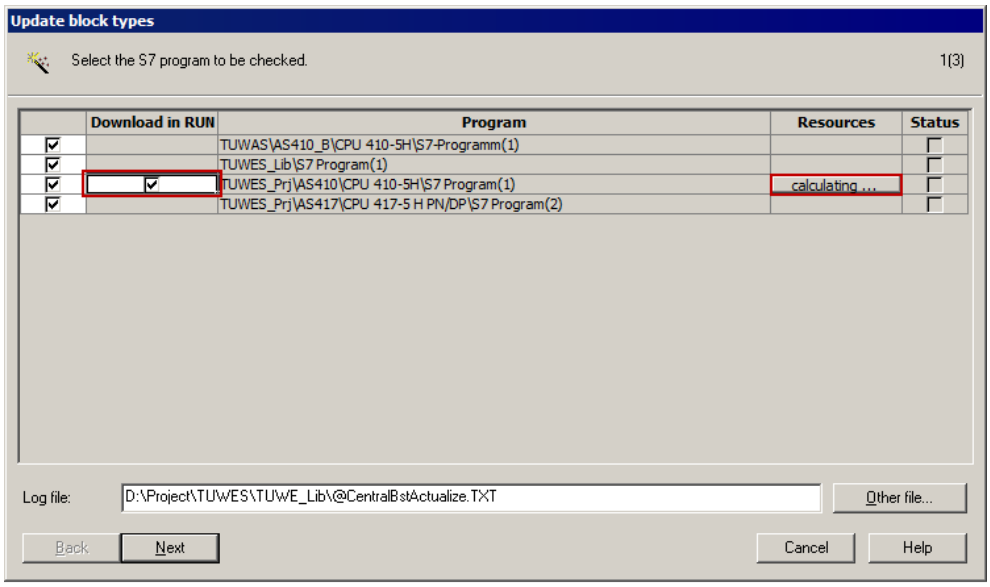
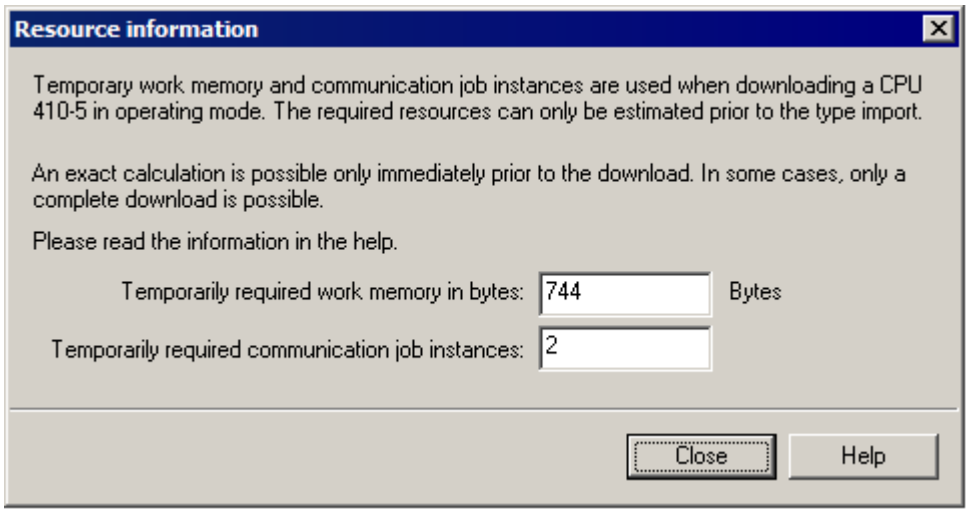
Loading interface changes in RUN mode

1. Select the "Blocks" folder in the master data library.
2. Carry out command "Extras > Charts > Update block types".
   The "Update block types" dialog opens.
3. Select the check box in the "Download in RUN" column and click on the "Calculate" button in the "Resources" column.



The "Resource information" dialog opens. This contains information about resource requirements for type changing in the automation system in which the type change is carried out.



Note If not enough resources are available, loading is only possible via STOP.

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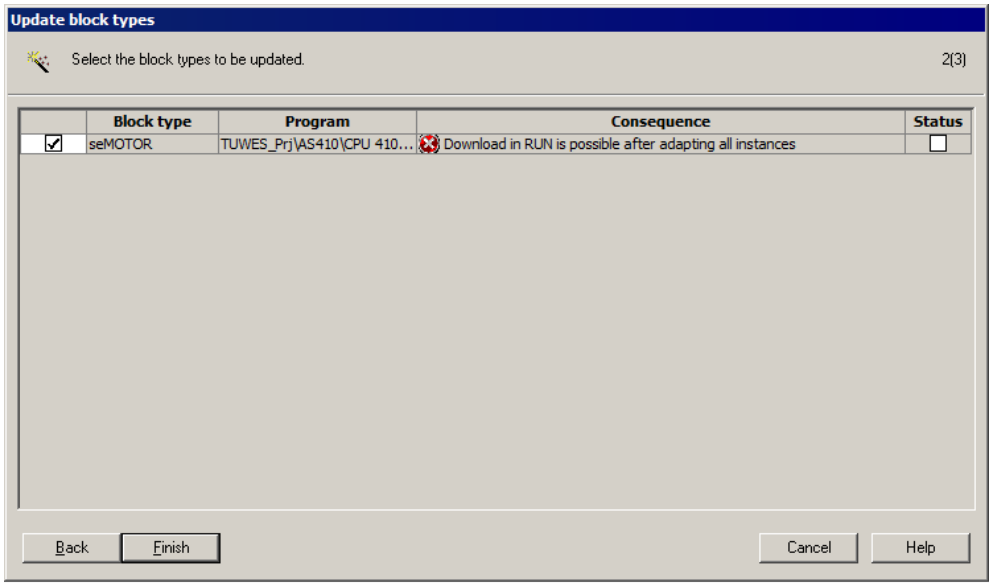
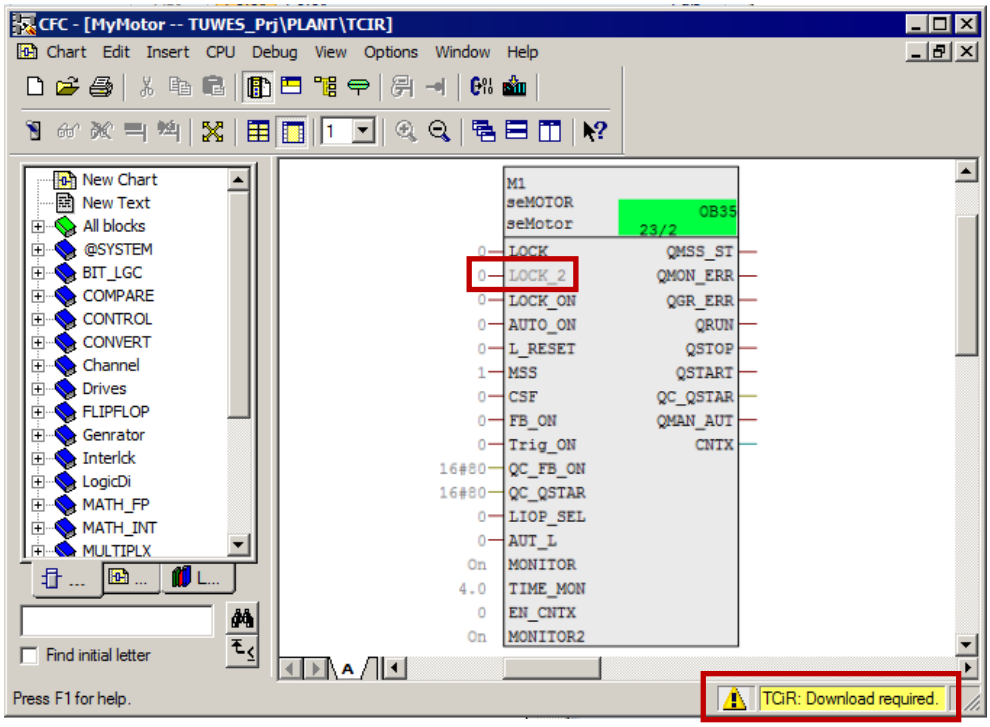
4. Close the "Resource information" dialog.
5. In the "Update block types" dialog, click on the “Next” pushbutton.
   In this step, the display shows whether the type change can be carried out in the RUN state on the basis of the calculation in the "Consequence" field.



6. Click "Finish". Wait until the updating procedure has completed successfully.
   A log file is displayed at the end of the procedure.
7. Select the "Charts" folder for the AS program and open a CFC chart.

The message "TCiR: Download required!" is displayed on the status bar.



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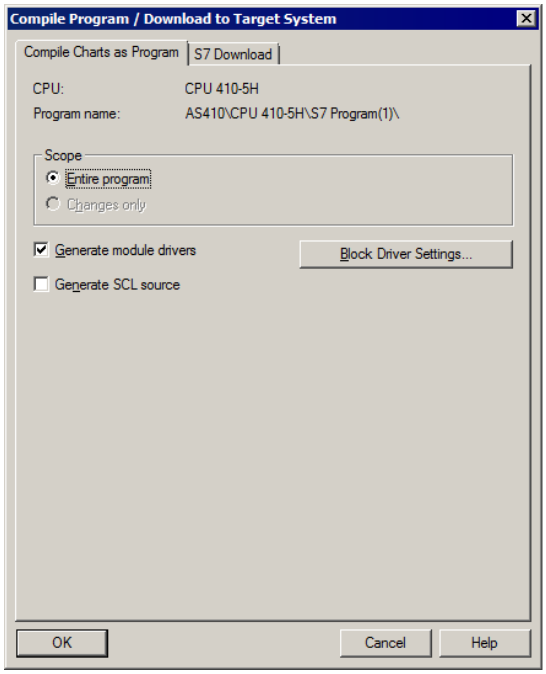
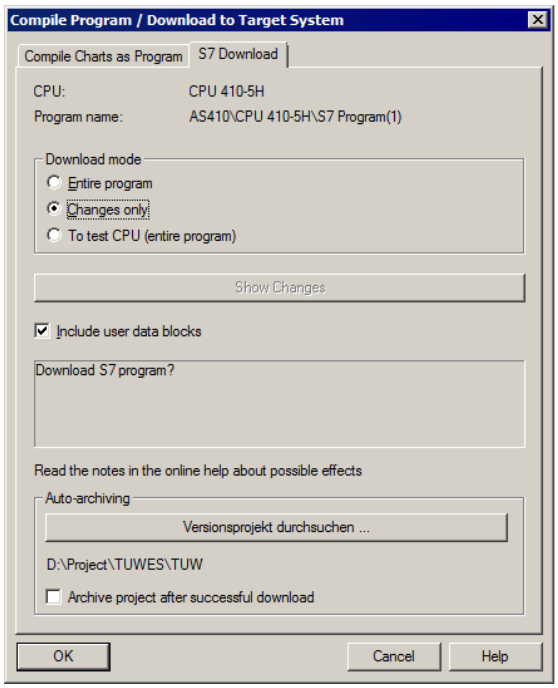
8. Click the "Load" button on the toolbar.
   The "Compile program/Download to target system" dialog opens.
9. Select the "Entire program" option on the "Compile charts as program" tab.



10. Open the "S7 download" tab and select the "Changes only" option.



11. Click the "OK" button.
    The interface changes are downloaded into the CPU 410-5H in RUN mode.

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2.3 Using TCiR to update a library

Requirements

When updating an entire library, the same conditions and rules apply as to updating of an individual block.

Note In general, upgrading using TCIR should have the aim of not stopping the AS but not demand migration of the project (the plant) to Run Time.

CAUTION **Note that you must create new blocks (new number) for the instances of the changed block types that were loaded into the CPU by means of TCiR. The system deactivates the blocks in WinCC until the OS server has be been re-compiled and loaded.**

In the case of a redundant OS server, you can do this before loading AS TCiR and loading one of the servers. This means that the plant can be operated before and after AS TCiR loading.

Note, however, that when doing this data can be lost in the area of archiving.

Note You can find a detailed description of TCiR in the CFC online help system and in the “SIMATIC Process Control System PCS 7 CFC for SIMATIC S7 (V8.2)” function manual.

The procedure for updating a library is described in the “Information and brief instructions for updating/upgrading PCS 7 software” manuals (https://support.industry.siemens.com/cs/ww/en/view/39980937).

License check

Note that at updating, more AS RT POs may be needed temporarily. This is the case if counting of AS RT PO is carried out in the CPU by the assigned memory.

To ensure that enough POs are available, proceed as described below.

1. Right-click the multiproject.
2. Select the “PCS 7 license information” menu item.
3. Make a note of the number of configured and booked POs and the maximum number of POs.
4. Check whether the AS RT counts the POs according to the assigned memory.

Note You can find detailed information on PO counting in the FAQ entitled “How are the licenses for the AS and OS counted in PCS 7 V7.0 onwards?“ in the Industry Online Support system.

If AS RT POs are not counted according to the assigned memory or if adequate spare POs are available, continue with “Resource Checking” in this chapter.

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If the AS RT counts the POs according to the assigned memory, load the program via STOP.

CAUTION	**If not enough AS RT POs are available on the CPU, downloading is not carried out. It is then only possible to update the user program by overall loading in STOP mode.**

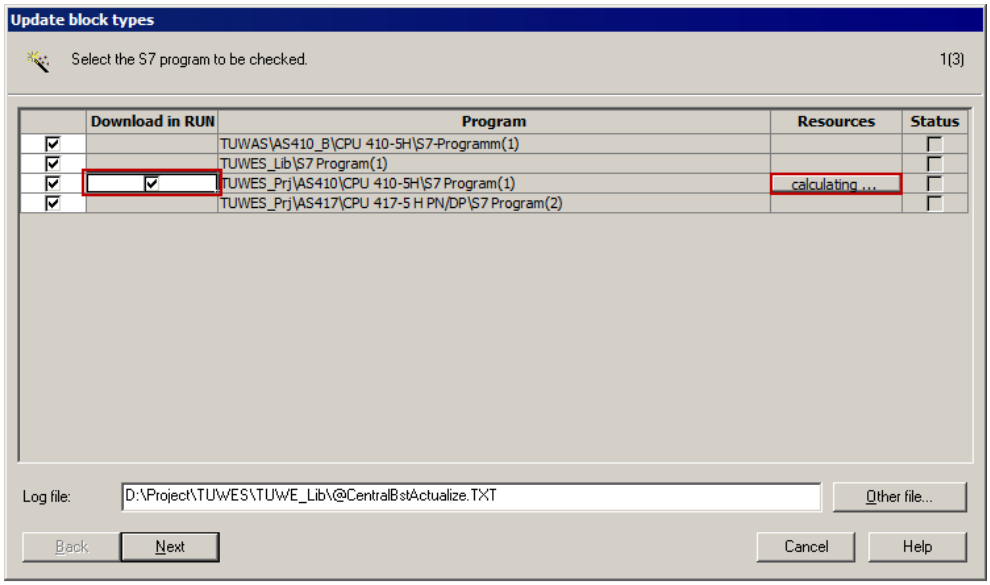
Resource checking

After updating the blocks in the master data library, proceed as described below.

1. Select the "Blocks" folder in the master data library.

   Carry out command "Extras > Charts > Update block types".
   The "Update block types" dialog opens.

2. Select the check box in the "Download in RUN" column and click on the "Calculate" button in the "Resources" column.



The "Resource information" dialog opens. This contains information about resource requirements for type changing in the automation system in which the type change is made.

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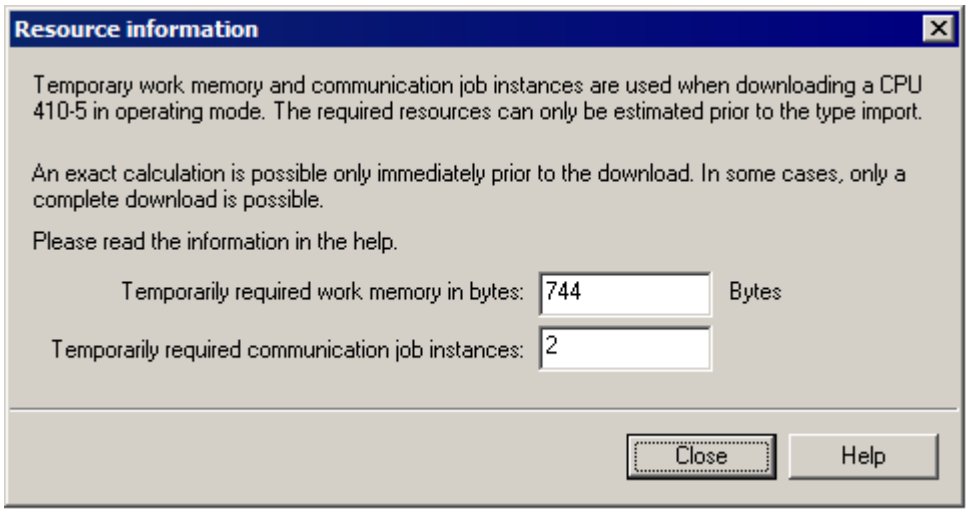

3. Check whether the there are adequate resources:
   If there are, proceed as described in chapter 2.2 from step 4 onward.

Note If not enough resources are available, loading is only possible via STOP.

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2.4 Configuring the PN/Ethernet interfaces of the CPU 410-5H

In this chapter you will find information about configuration options for the PN/Ethernet interfaces of the CPU 410-5H.

2.4.1 Configuring the interfaces for connection to the plant bus and the process bus without using an external CP

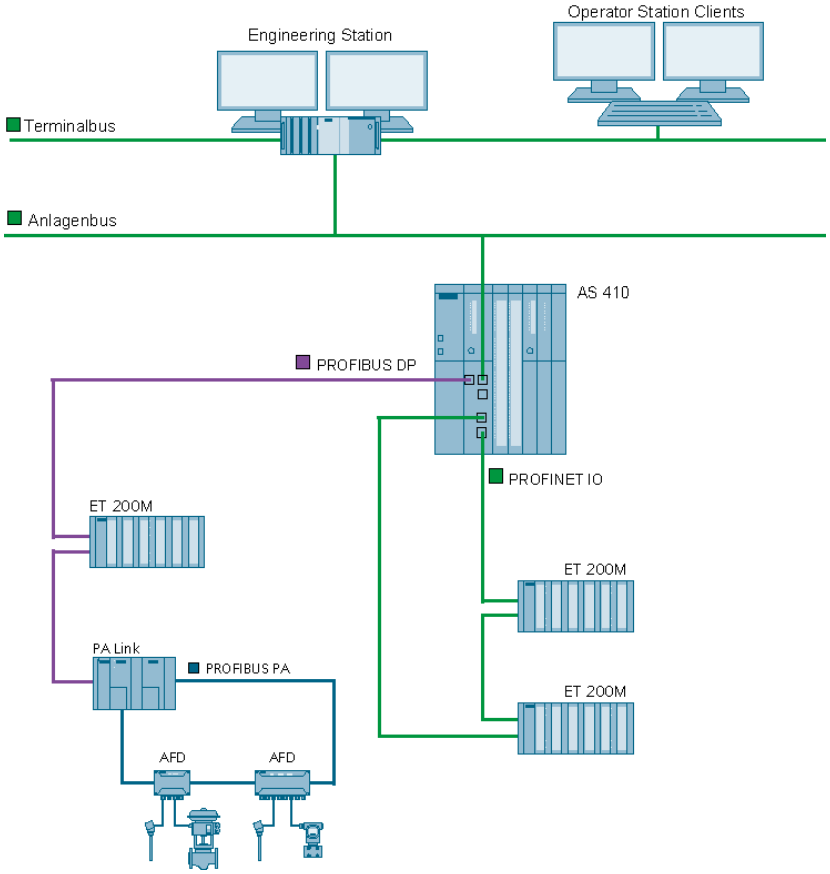
Due to its two PN/Ethernet interfaces, the CPU 410-5H can provide the option of implementing a connection to the plant bus and the process bus without using an external CP. This yields the following benefits:

- Reduction of hardware costs
- More space due to the use of compact mounting racks

The configuration procedure is carried out in the following steps:

- Adding a new AS station to the project
- Configure the interface for the plant bus
- Configuring the interface for the process bus

The following figure shows the configuration schematically:



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Requirements

The following requirements must be met:

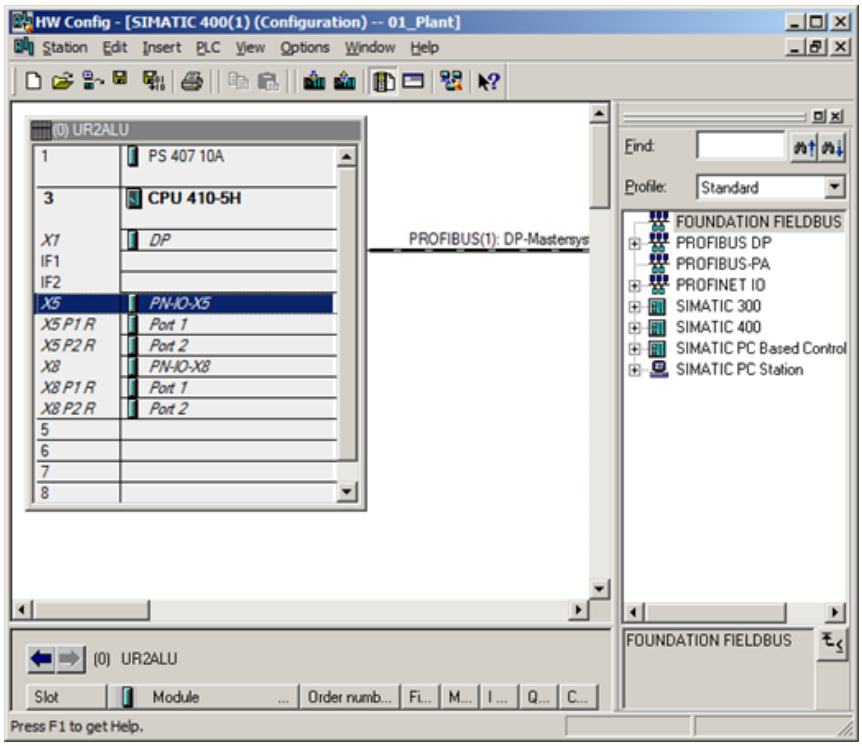
- There is a PCS 7 multiproject present.
- A CPU 410-5H is connected.

Adding a new AS station to the project

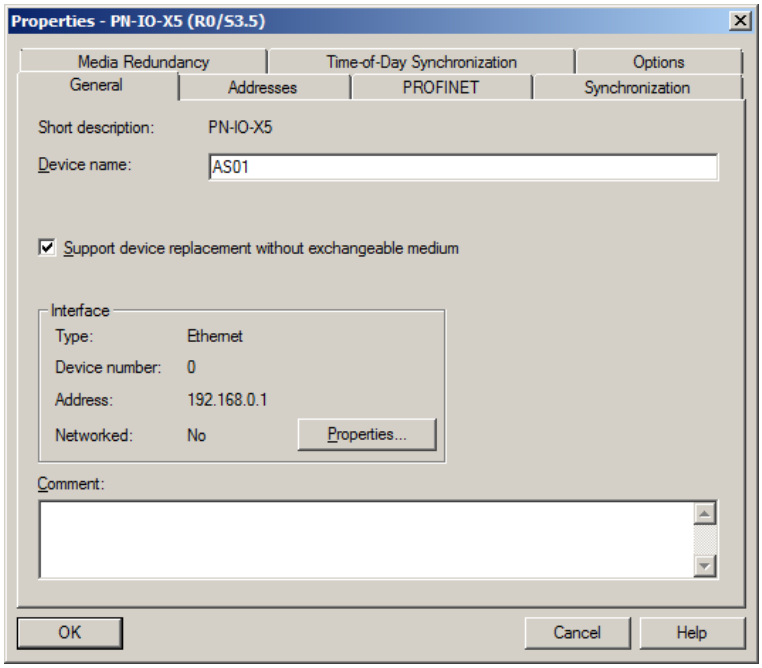
1. Open a PCS 7 multiproject in the SIMATIC Manager.
2. Insert a new sub-project using the "File > New project" command.
3. Right-click on the sub-project and choose the "Insert new object > Preconfigured station“ command from the context menu.
   The "PCS 7 Wizard: Expand project" dialog opens.
4. Select the CPU 410-5H without CP and insert the station. In this example, the procedure is explained using the example of a single station (AS410-Single (1H)).
5. Open the AS station with the CPU 410-5H in HW Config.

Configure the interface for the plant bus

1. Open the properties for the "PN-IO-X5" interface of the CPU 410-5H in the HW Config.



2. Enter a device name in the "General" tab.



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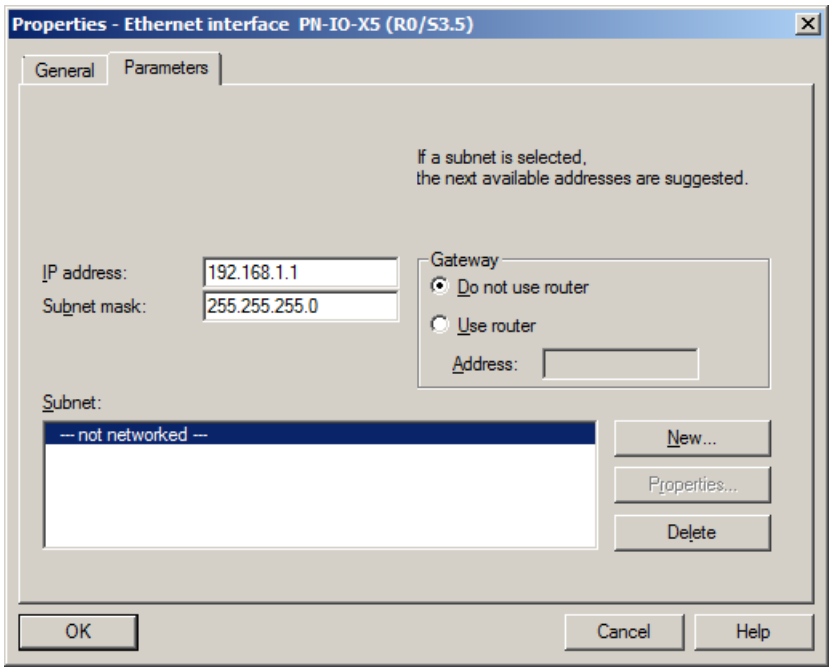
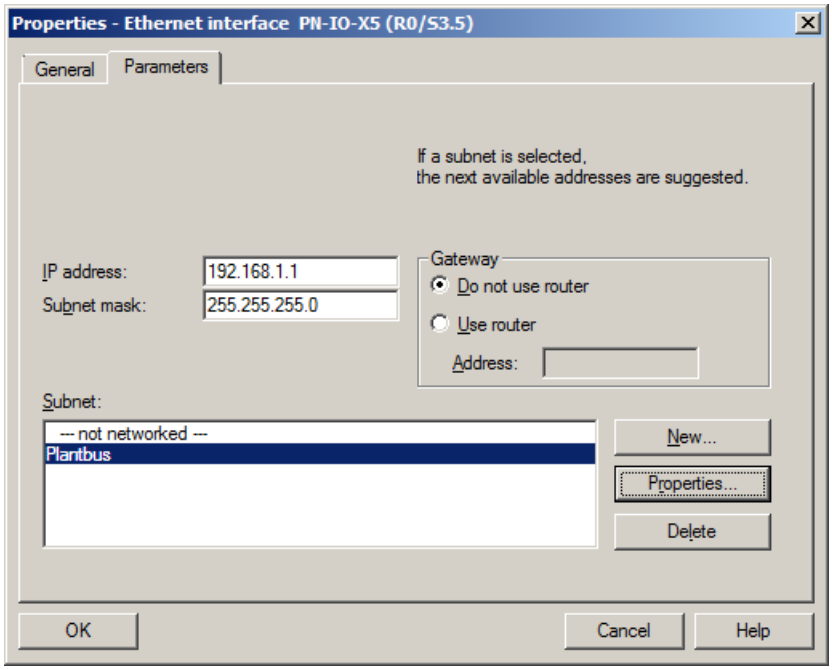
3. Click on the "Properties..." button.
4. Enter a valid IP address and subnet mask for the plant bus.



5. Assign an existing subnet to the interface or create a new subnet for it.
   In this example, a new subnet is created for the plant bus and assigned to the interface.



6. Click the "OK" button to confirm the settings.
   The interface is connected to the plant bus.

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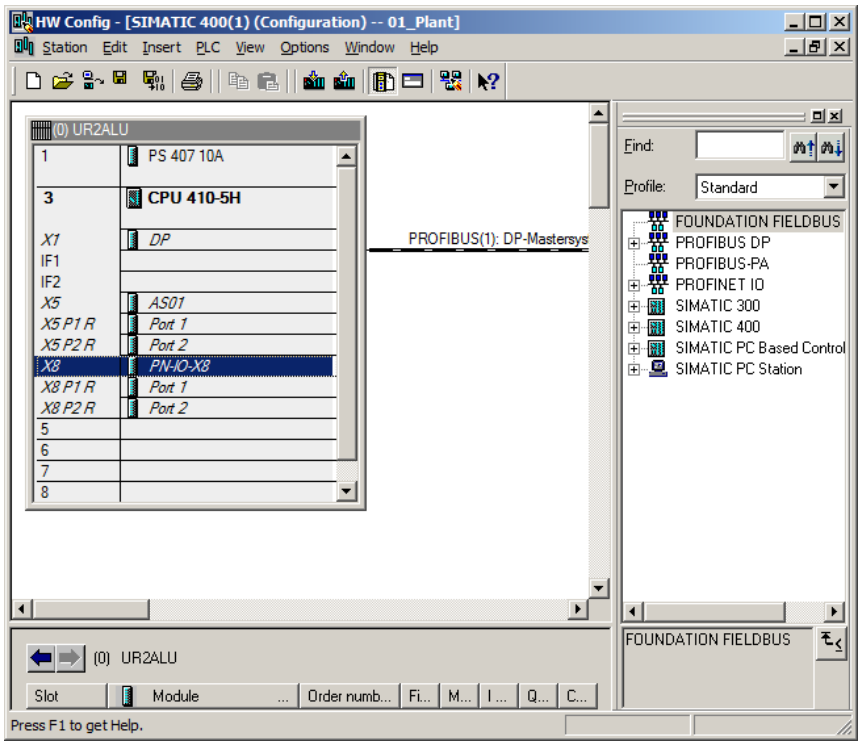
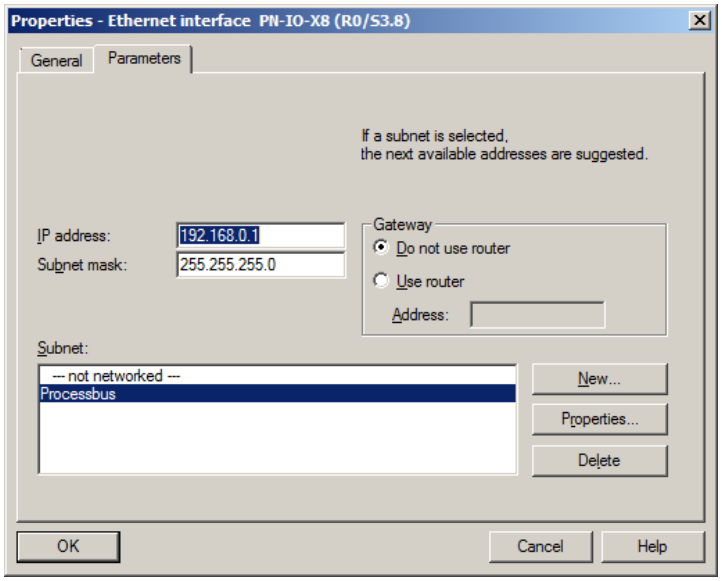
Configuring the interface for the process bus

1. Open the properties for the "PN-IO-X8" interface of the CPU 410-5H in the HW Config.
2. Right-click the "PN-IO-X8" interface and select the "Insert PROFINET IO system" command from the context menu.



The "Properties..." dialog opens.

3. Enter a valid IP address and subnet mask for the process bus.
4. Assign an existing subnet to the interface or create a new subnet for it.
   In this example, a new subnet is created for the process bus and assigned to the interface.



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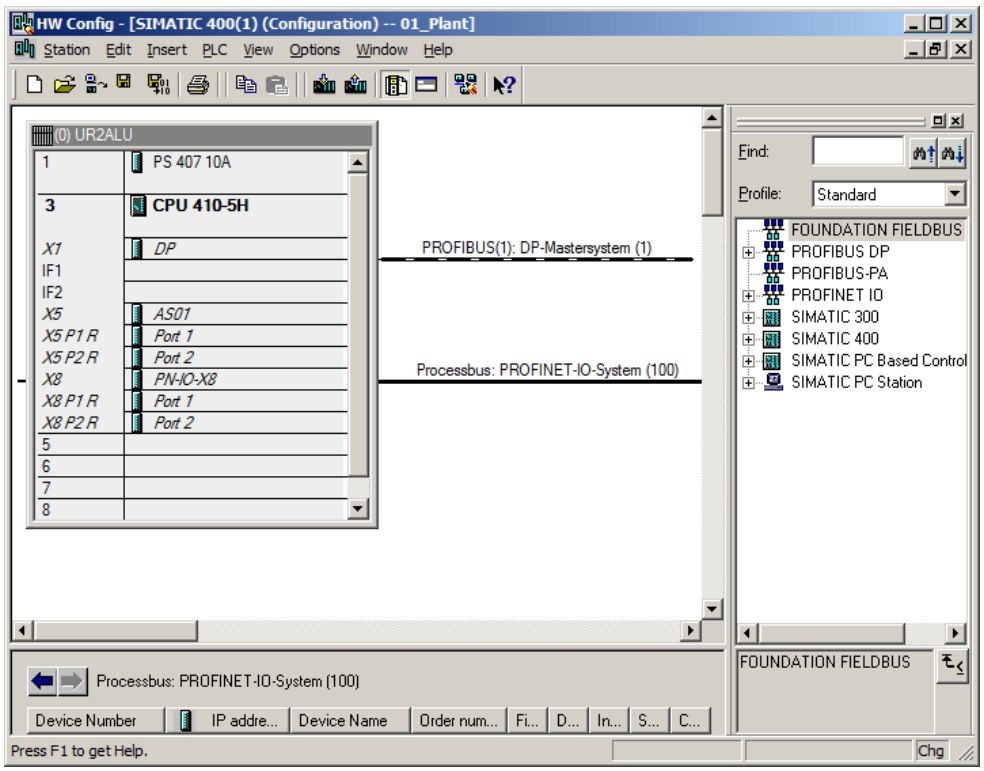
5. Click the "OK" button to confirm the settings.
   A PROFINET IO system for connecting the PROFINET IO modules is created.



Further information on planning the PROFINET interface can be found in the application example "SIMATIC PCS 7 with PROFINET – Typical Configurations" (Chapter 4, "Configuration, Planning and Parameter Setting").

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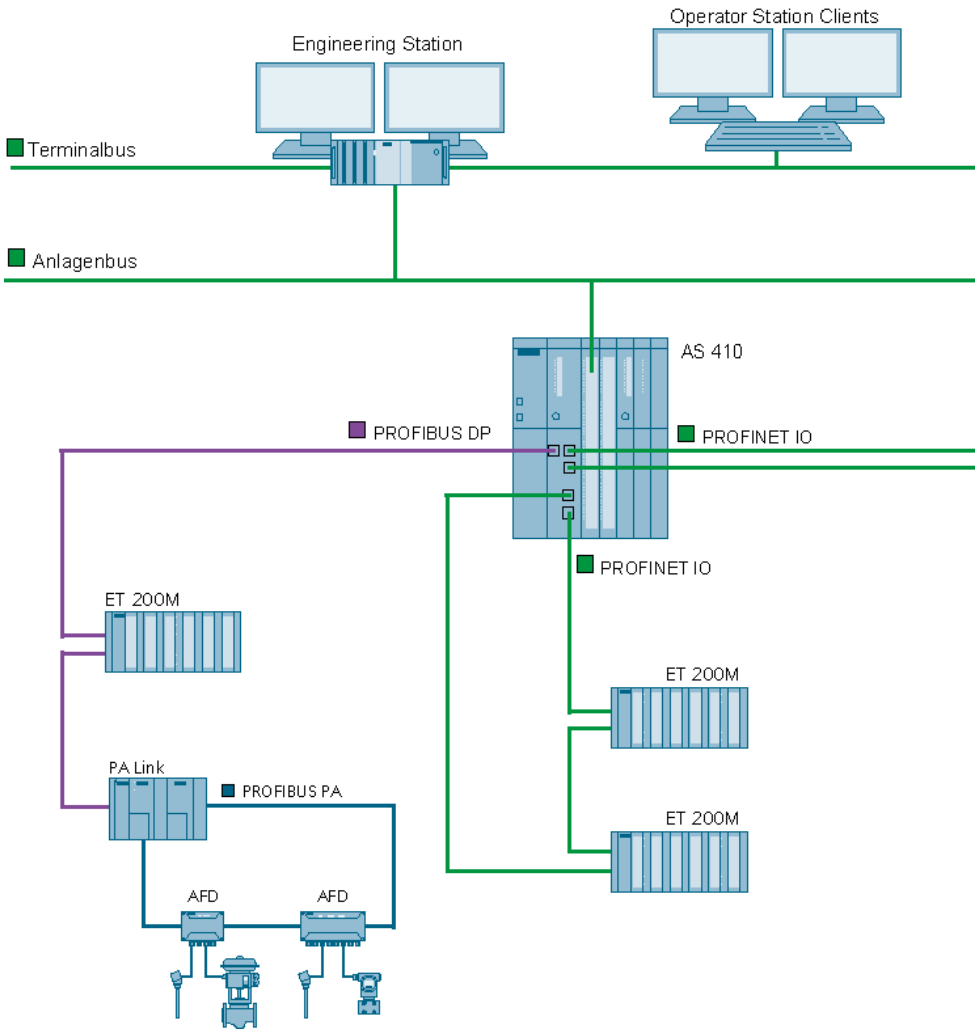
2.4.2 Configuring two separate PROFINET interfaces for connection to the process bus

When there is a large number of devices, the CPU 410-5 offers the option of configuring two PROFINET interfaces for connection to the process bus. In this case, the connection to the plant bus is made via an external CP.

The configuration procedure is carried out in the following steps:

- Adding a new AS station to the project
- Configure the interface for the plant bus
- Configuring two PROFINET interfaces for the process bus

The following figure shows the configuration schematically:



Requirements

The following requirements must be met:

- There is a PCS 7 multiproject present.
- A CPU 410-5H is connected.

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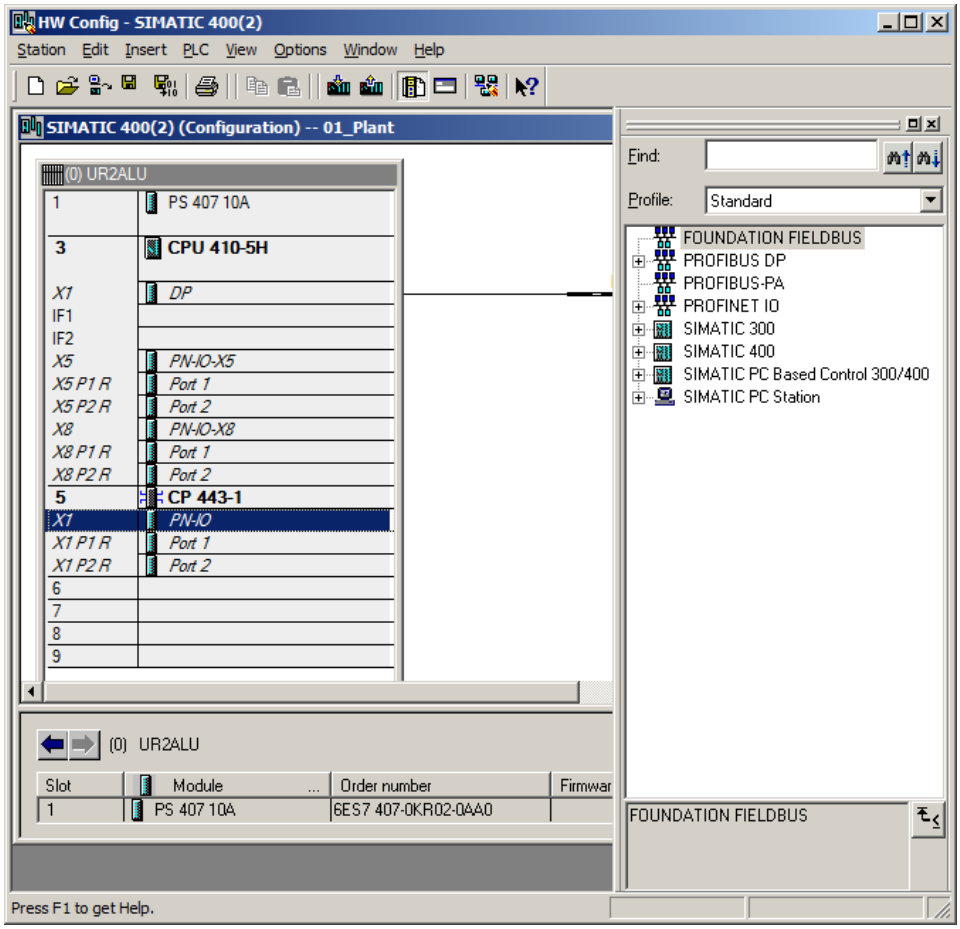
Adding a new AS station to the project

Proceed as follows to configure two PROFINET interfaces for the process bus:

1. Open a PCS 7 multiproject in the SIMATIC Manager.
2. Insert a new sub-project using the "File > New project" command.
3. Right-click on the sub-project and choose the "Insert new object > Preconfigured station“ command from the context menu.
   The "PCS 7 Wizard: Expand project" dialog opens.
4. Select the CPU 410-5H with a CP and insert the station. In this example, the procedure is explained using the example of a single station (AS410-Single (1H)) with a CP 443-1.

Configure the interface for the plant bus

5. Open the AS station with the CPU 410-5H in the HW Config.
6. Open the properties for the "PN-IO" interface of the CP 443-1.



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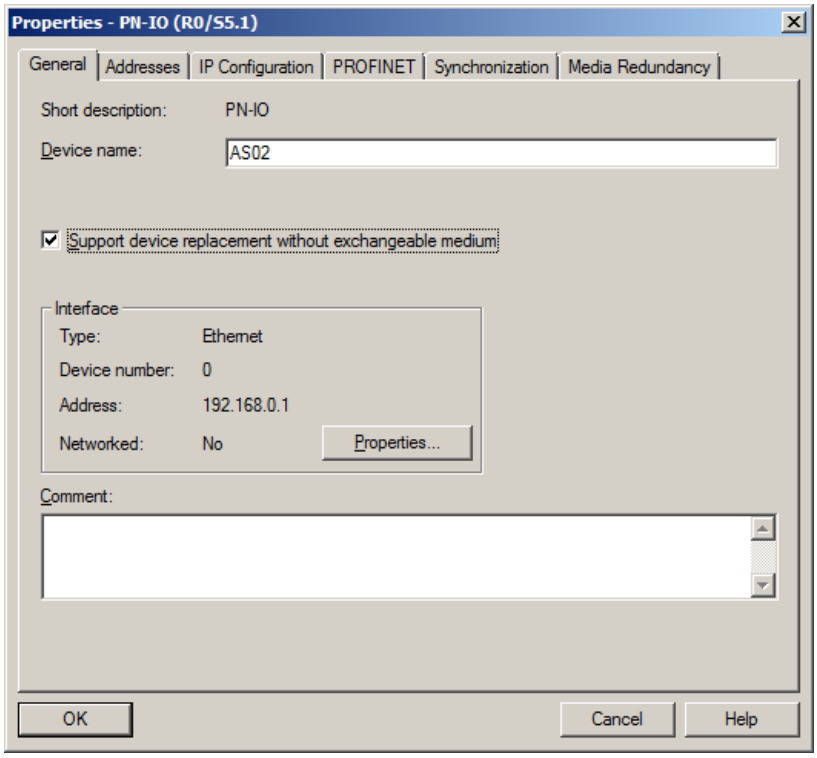
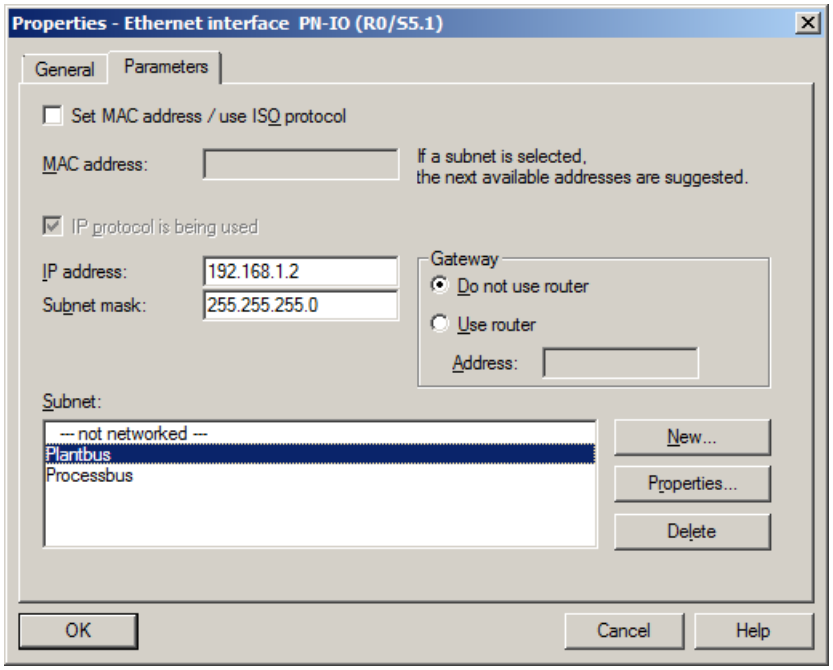
7. Open the "General" tab and enter a meaningful device name.



8. Click on the "Properties..." button.
9. Enter a valid IP address and subnet mask for the plant bus.
10. Assign an existing subnet to the interface or create a new subnet for it.



11. Click the "OK" button to confirm the settings.
    The interface of the CP443-1 is connected to the plant bus.

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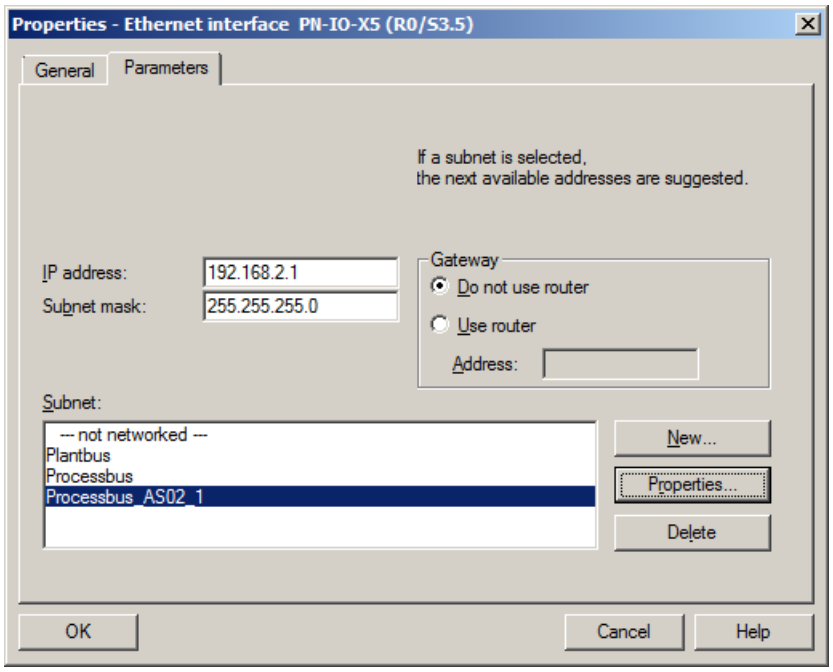
Configuring the PROFINET interfaces for the process bus

12. Open the HW Config.
13. Open the properties for the "PN-IO-X5" interface of the CPU 410-5H in the HW Config.
14. Right-click the "PN-IO-X5" interface and select the "Insert PROFINET IO system" command from the context menu.
    The “Properties” dialog of the interfaces opens.
15. Enter a valid IP address and subnet mask.
16. Assign an existing subnet to the interface or create a new subnet for it. In this example, a new subnet ("Processbus_AS02_1") is created for the process bus and assigned to the interface.



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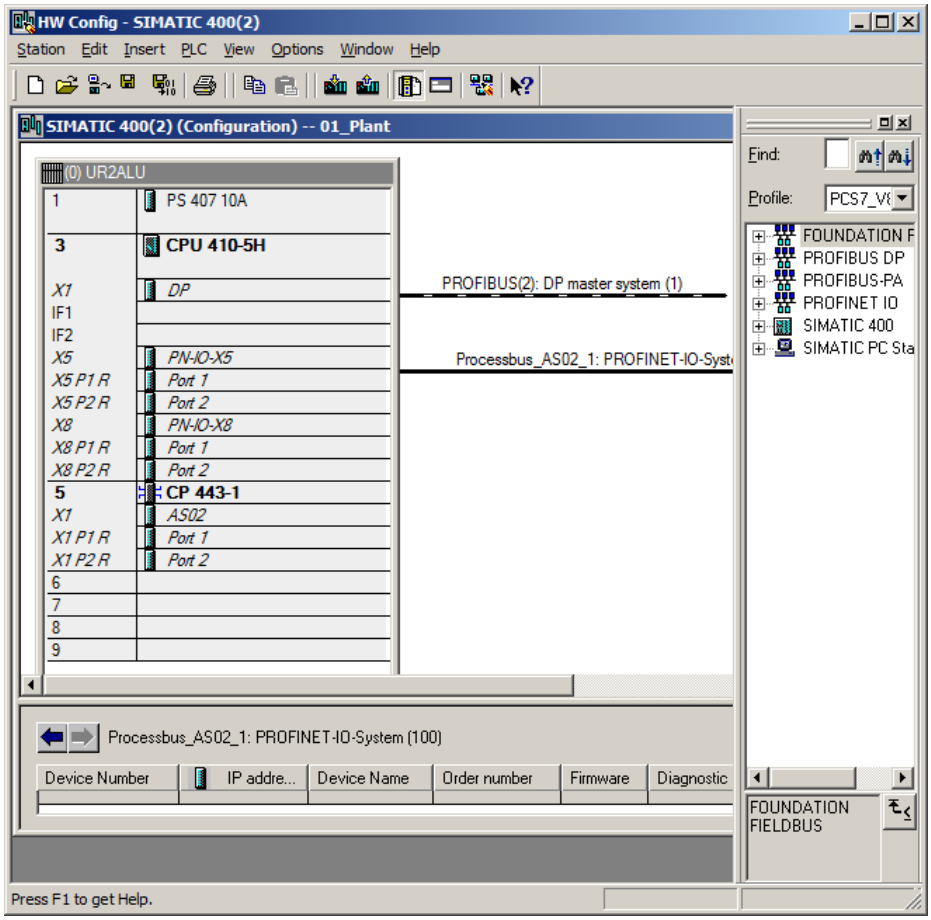
17. Click the "OK" button to confirm the settings.
    PROFINET IO system "Processbus_AS02_1" is assigned to the interface.



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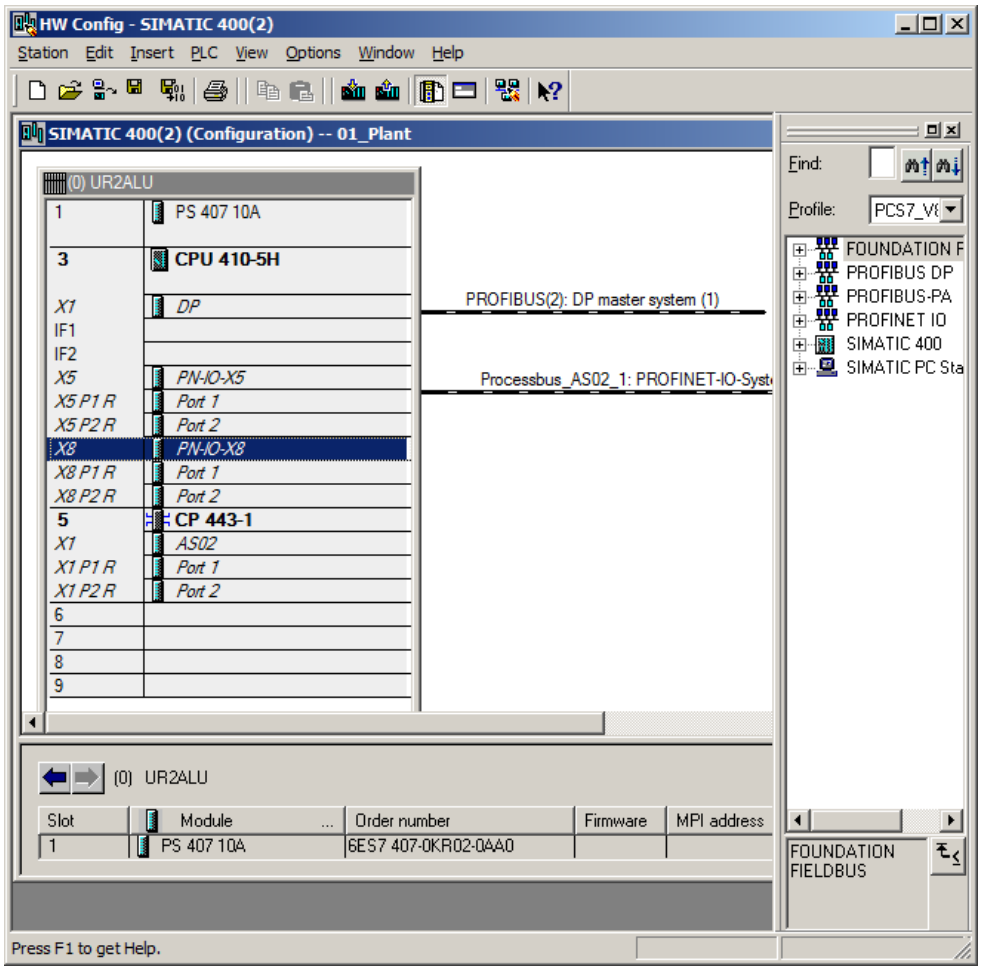
18. Right-click the "PN-IO-X8" interface and select the "Insert PROFINET IO system" command from the context menu.
    The “Properties” dialog of the interfaces opens.



19. Enter a valid IP address and subnet mask.
20. Assign an existing subnet to the interface or create a new subnet for it.
    In this example, a new subnet ("Processbus_AS02_2") is created for the process bus and assigned to the interface.

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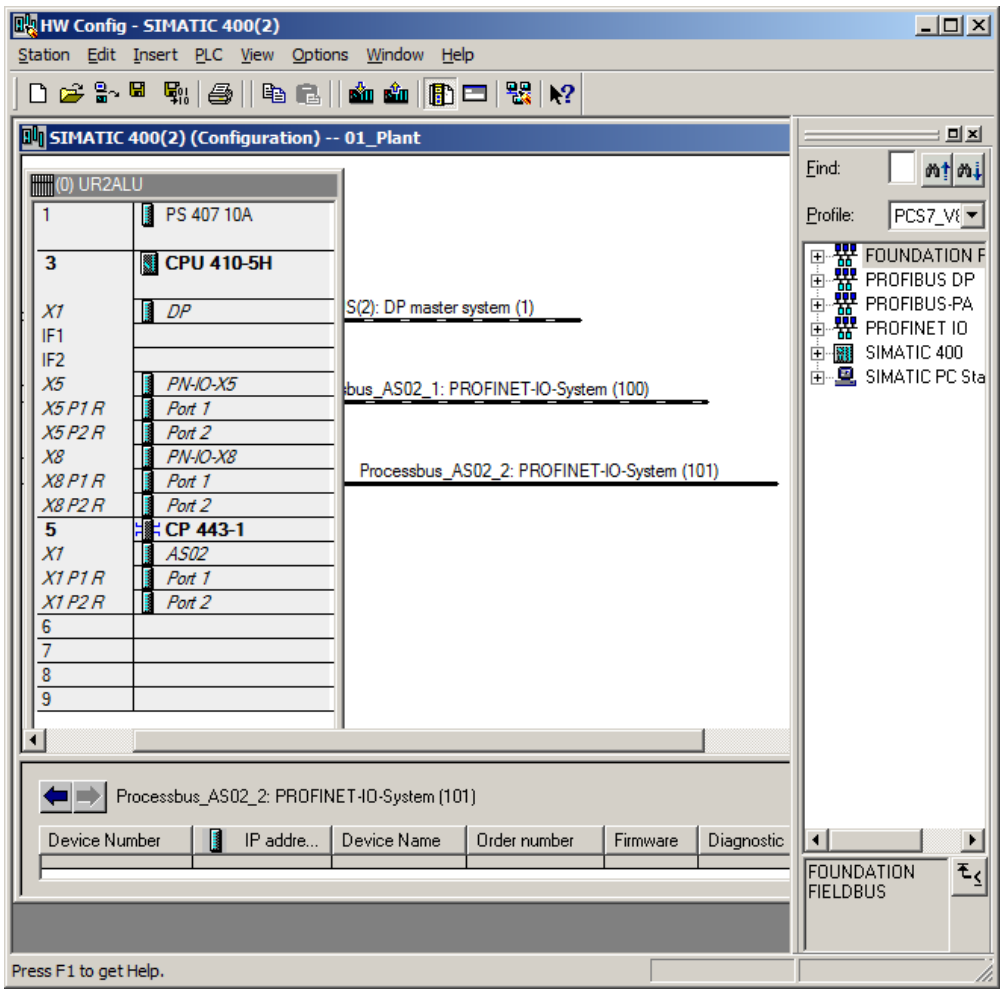
21. Click the "OK" button to confirm the settings.
    PROFINET IO-System “Processbus_AS02_2” is assigned to the interface.



Further information on planning the PROFINET interface can be found in the application example "SIMATIC PCS 7 with PROFINET – Typical Configurations" (Chapter 4, "Configuration, Planning and Parameter Setting").

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2.5 Online upgrading of CPU 410−5H process objects

2.5.1 Introduction

When you load a PCS 7 project into the CPU, the system checks that the project can run with the current number of process objects (POs) in the CPU.

If the number is not sufficient, starting with PCS 7 V8.1 you have the option of increasing the PO volume by means of an online upgrade of the CPU 410-5H system expansion card (SEC).

Prerequisites for an online upgrade

- SIMATIC PCS 7 V8.1 or higher
- CPU 410-5H firmware V8.1 or higher
- The CPU 410-5H is configured with firmware V8.1 or higher in the HW Config
- The SEC of the CPU 410-5H has the product version 2 or higher

CPU 410 expansion packs

You will need at least one CPU 410 expansion pack for the online upgrade of the process objects of a CPU 410-5H.

The CPU expansion packs are available in the following sizes:

- 100 POs
- 500 POs

The expansion packs can be combined in any way up to the maximum size. Note, however, that with a redundant system (2 CPUs), the CPU 410 expansion packs must be distributed symmetrically between the CPUs.

The volume of a CPU expansion pack must always be assigned in its entirety to a CPU or SEC of the CPU. Distribution between several CPUs or SECs is not possible.

After a PO upgrade, the POs that are assigned to an SEC/CPU can no longer be relocated.

Example

If the number of POs in the CPU is not sufficient to load the engineering project, you can increase the PO volume of the CPU by means of an online upgrade.

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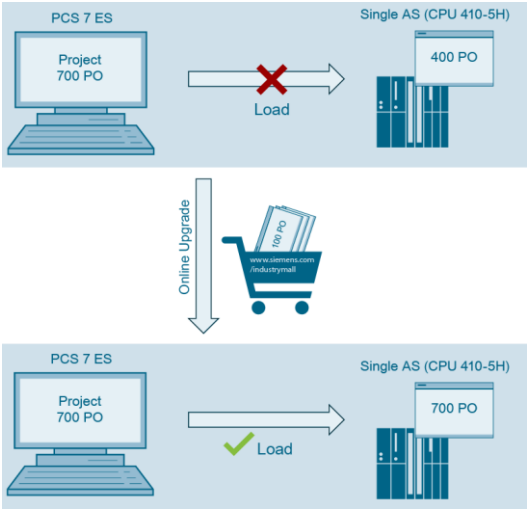
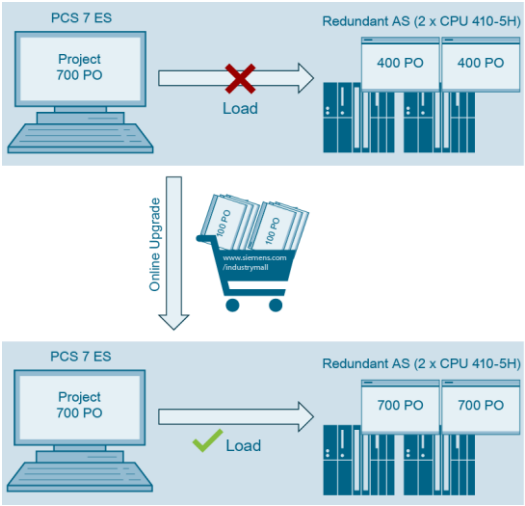
Table 2-1

Expanding by 300 PO (from 400 PO to 700 PO)	
	With a single AS, to increase the number of POs by 300 you need 3 CPU 410 expansion packs with 100 POs each.
	With a redundant AS (2 CPUs), to increase the number of POs by 300 you need 6 CPU 410 expansion packs, with 100 POs each. This is necessary, since both CPUs must be expanded by 300 POs. In this case, you cannot combine expansion packs with 500 POs and 100 POs, since the PO volume of an expansion pack cannot be subdivided.

The table below contains further examples:

Table 2-2

PO expansion by	CPU 410 expansion packs needed	
	Single AS	Redundant AS
400 POs	4 x 100 POs	8 x 100 POs
500 POs	1 x 500 POs or 5 x 100 POs	2 x 500 POs or 10 x 100 POs
600 POs	1 x 500 POs + 1 x 100 POs or 6 x 100 POs	2 x 500 POs + 2 x 100 POs or 12 x 100 POs
1000 POs	2 x 500 POs or 10 x 100 POs	4 x 500 POs or 20 x 100 POs

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Unlimited POs

The number of POs can be upgraded to unlimited. In this case you can load as many POs until the physical memory is reached. To upgrade the POs to an unlimited amount there are two ways:

- Purchase of a CPU410-5H bundle with 2K+ PO as license.
  (Article number: 6ES7654-5CQ00-0XF0)

- Upgrade the existing number of POs with CPU expansion packs 100 and 500 until there are 2600 POs on the SEC. With 2600 POs on a SEC you can load unlimited POs to a CPU410-5H.

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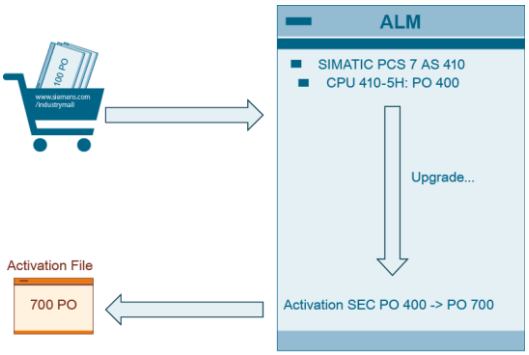
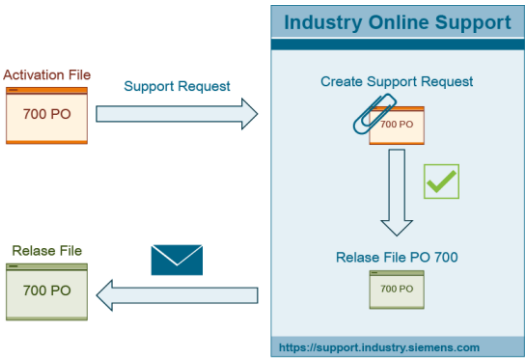
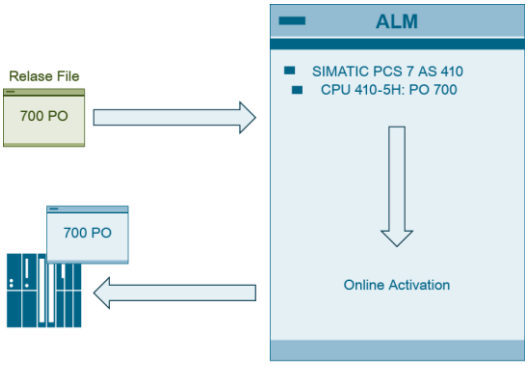
2.5.2 Overview of the steps

The online upgrade is carried out in the following main steps:

Table 2-3

Schematic representation	Step
	1. Order the CPU 410 expansion packs.
	2. In the SIMATIC Automation License Manager (ALM), transfer the CPU 410 expansion packs to the CPU and create a PO activation file.
	3. Send the PO activation file for checking and activation by means of a support request. Within 48 hours, you will receive by e-mail a PO release file (for each PO activation file sent) as confirmation of checking.
	4. Transfer the PO release file to the SEC of the CPU using the ALM.

NOTE With a redundant configured AS only one CPU is selected. The distribution of the POs on both CPUs automatically occurs.

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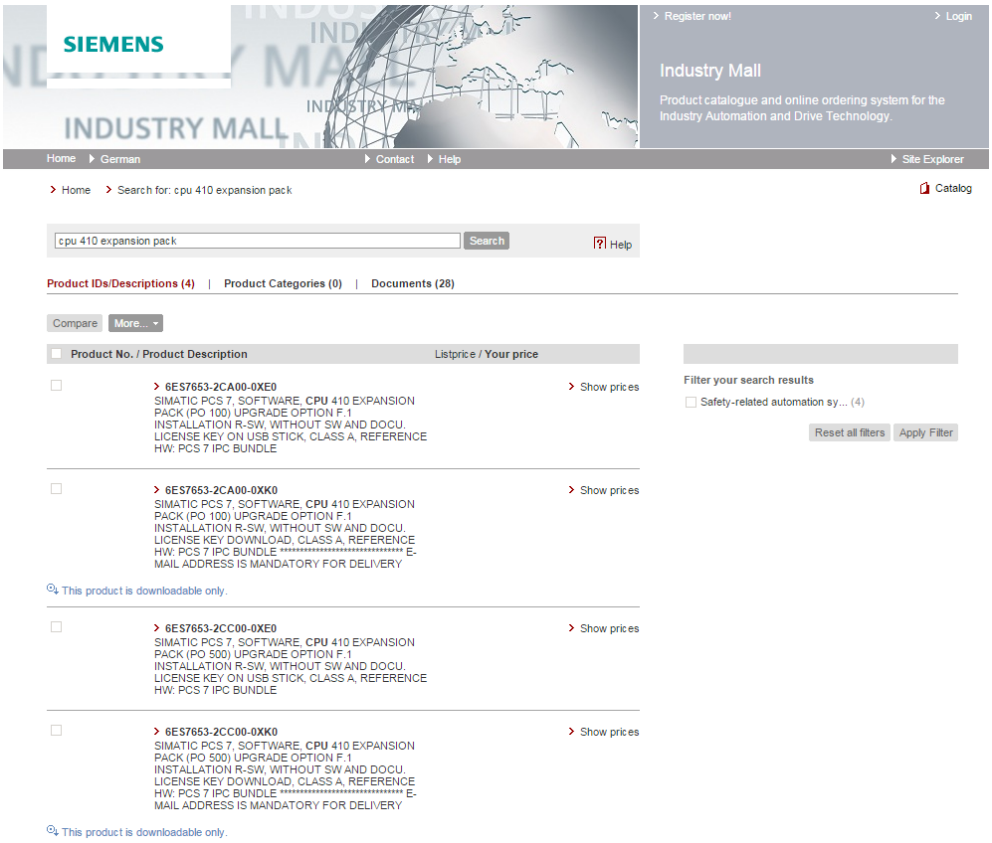
CAUTION	**When performing an online upgrade of the process objects, pay attention to the information and notes in the manual "SIMATIC PCS 7 Service Support and Diagnostics (V8.2)".**

2.5.3 Order the CPU 410 expansion packs

You have the following options when ordering CPU 410 expansion packs:

- Through your Siemens contact person (www.siemens.com/automation/partner)
- Online via www.siemens.com/industrymall



After you have received the CPU 410 expansion packs (by e-mail or USB stick), transfer them to a disk drive that can be accessed by the Engineering Station.

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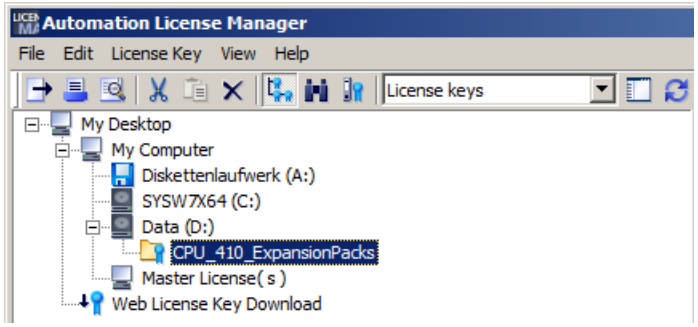
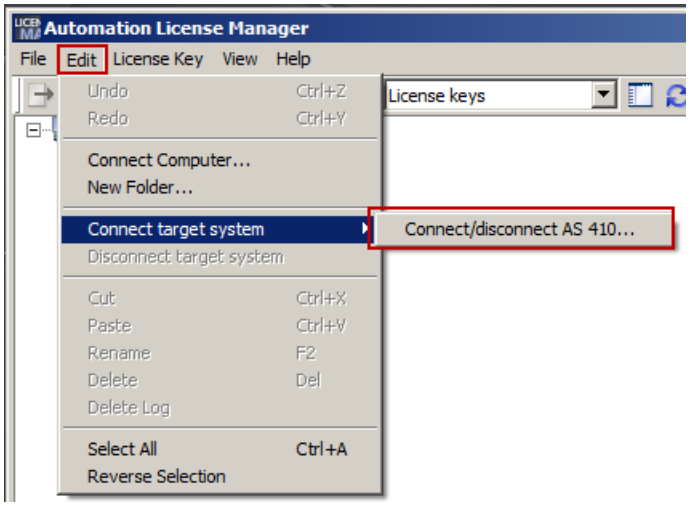
2.5.4 Creating the PO activation file using the Automation License Manager (ALM)

1. Store the CPU 410 expansion packs on a drive that can be accessed in the Automation License Manager (ALM).



2. Select menu command "Edit > Connect target system > Connect/disconnect AS 410...".



The "Connect Target System" dialog opens.

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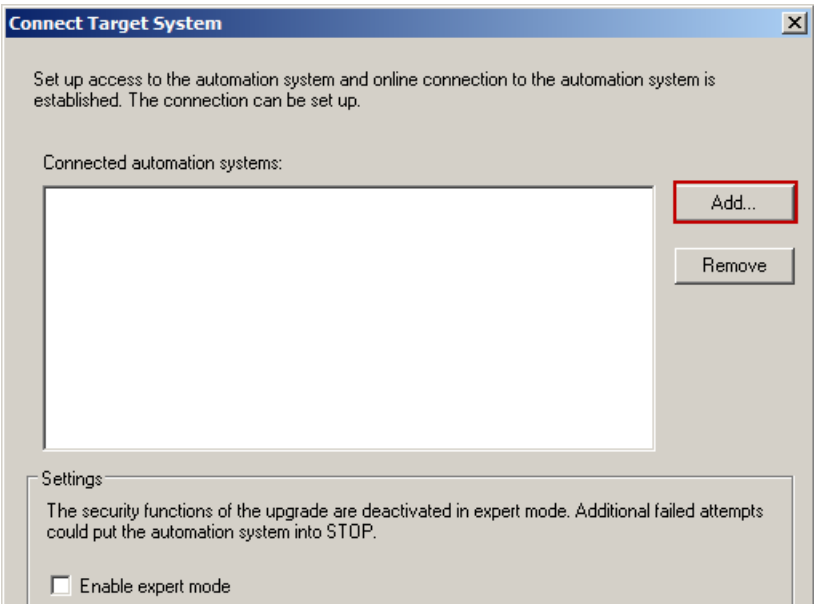
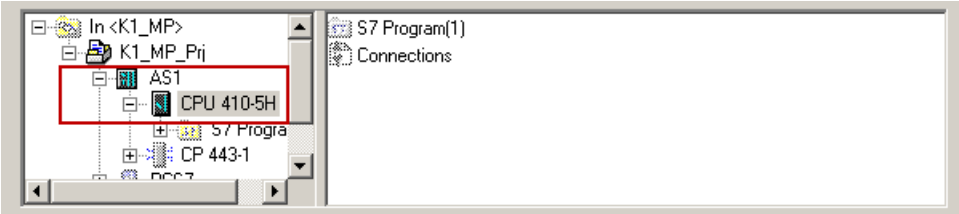
3. Click on the "Add" button to establish an on-line connection to a CPU 410-5H.



4. In the PCS 7 project, select the CPU to which you want to transfer the CPU 410 expansion packs or PO. Then click on the "OK" button.



The CPU is displayed in the ALM.

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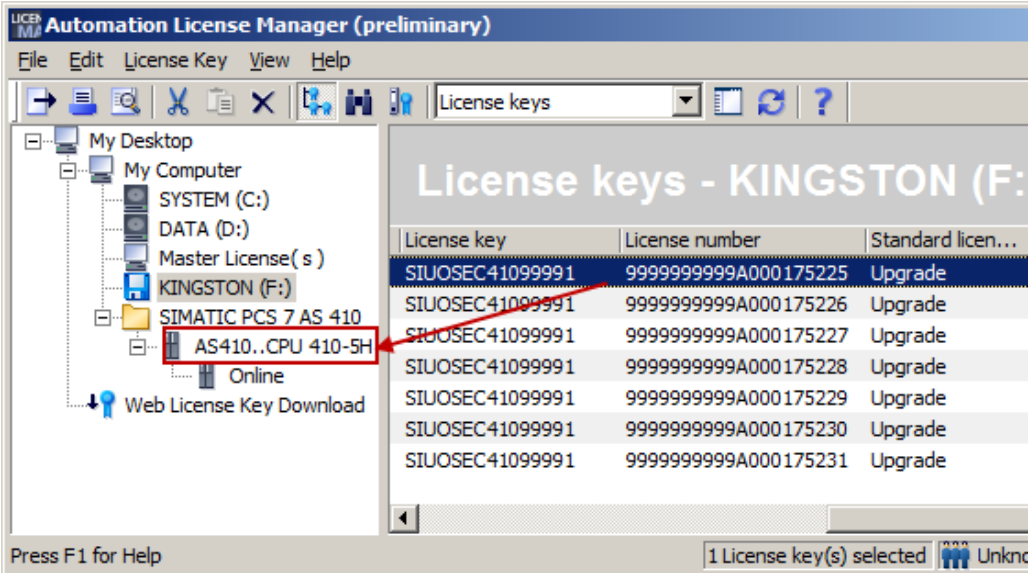
5. Drag the license keys for the CPU 410 expansion packs and drop them on to the automation system for which you want to perform the PO upgrade.



Note

If you have selected the wrong automation system, you can move the license keys for the CPU 410 expansion packs by dragging and dropping.

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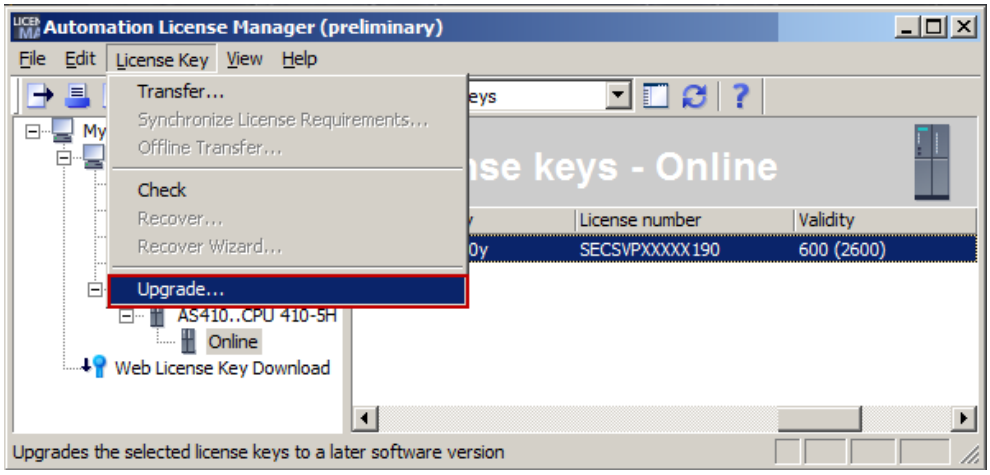
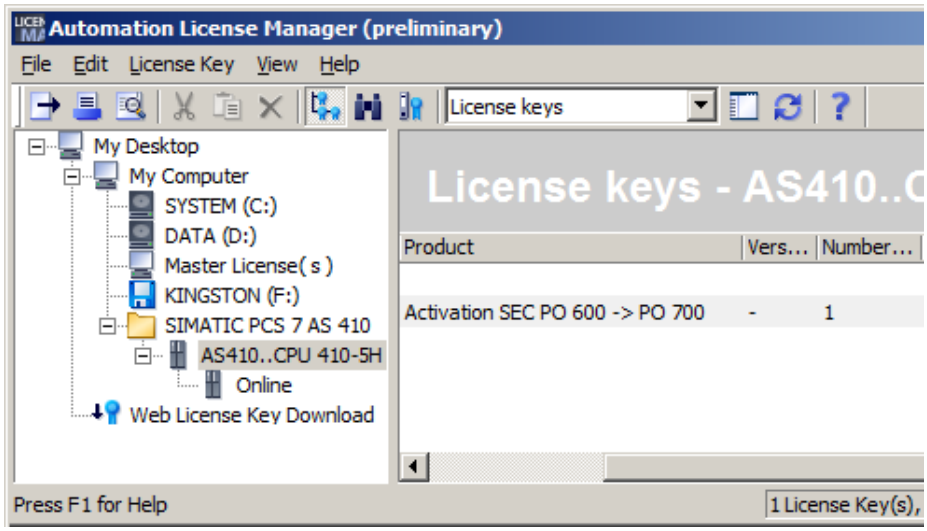
6. Open the "Online" folder in tree view for the automation system.
7. Select the license and then select the "License Key > Upgrade" menu command.

CAUTION	When you initiate the upgrade, the selected CPU 410 expansion packs are assigned to the SEC. Moving to another AS is no longer possible.



The license keys for the selected CPU 410 expansion packs are deleted and a PO activation file is created in the "Your document > Siemens > Automation > PCS 7 > Activations" folder.

The ALM indicates that the PO activation file contains a volume expansion (in this example, from 600 to 700).



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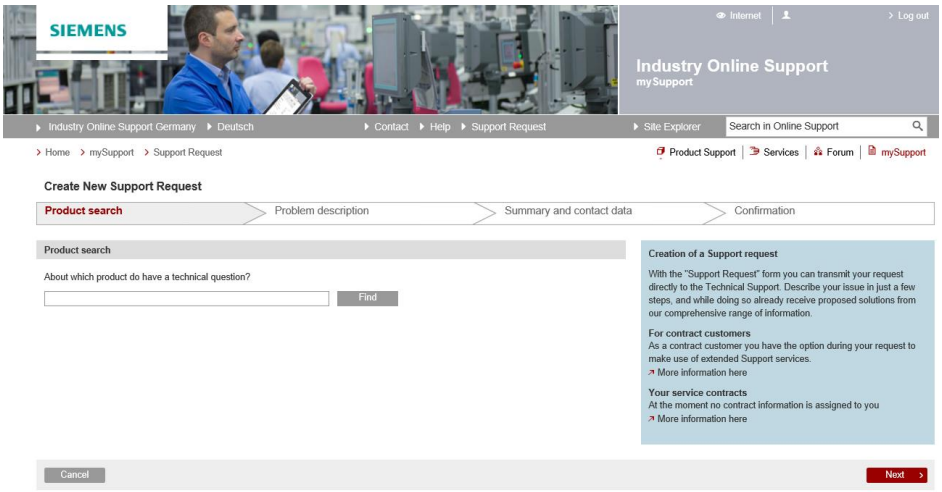
2.5.5 Sending the PO activation file via a Support Request

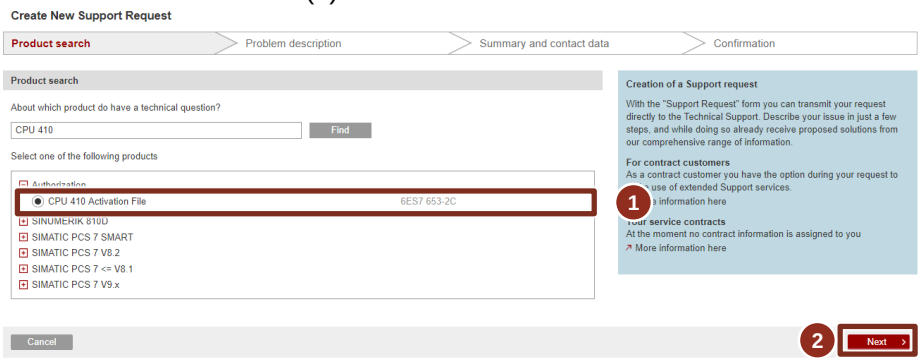
The Activation File is now sent to the Technical Support via Support Request in order to receive a Release File:

1. First start a Support Request via the website https://support.industry.siemens.com/cs/my/src?lc=en-WW.

Abbildung 2-1



2. Step "Search product":
   - Enter "CPU 410" in the entry field "Product/Order number" and click on the button "Find" (1).
   - Click on the "Next" button (2).



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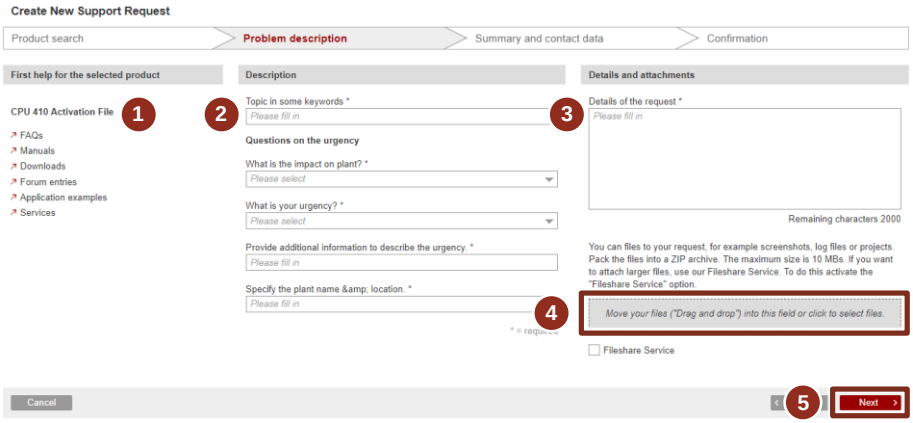
3. In the register "Problem description", in the area "First help for the selected product", you will find contributions which can help you with your problem (1).
4. Describe the problem.
   - Make the entries in the mandatory fields (2).
   - Enter the text "Request Release-File" in the entry field "Details of the Request" (3).
   - - Insert the activation file as a zip file by clicking or by dragging & dropping the activation file on the area "Move your files ("Drag and drop") into this field or click to select files" (4).
   - Click on the "Next" button (5).



Note

Activation files are automatically created in the following Upgrade directory in the Engineering Station:
"Documents > Siemens > Automation > PCS7 > Activations"
("C:\Users\\Documents\Siemens\Automation\PCS 7\Activations") stands for your Windows username

Note

You can send several activation files with one support request.

5. "Specify contact data" step: Specify your contact data, then click on the "Next" button.
6. "Summary and send" step: Check your details, then click on the "Send" button. Within 48 hours you will receive an e-mail containing a release file for each activation file sent.

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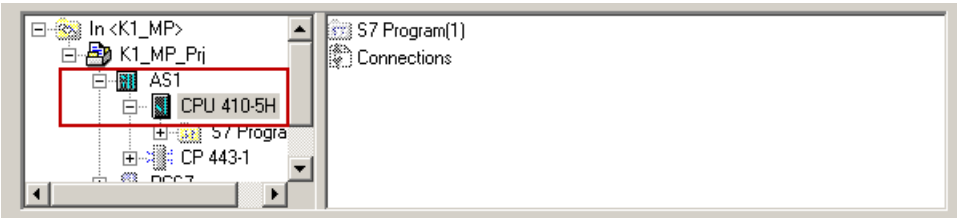
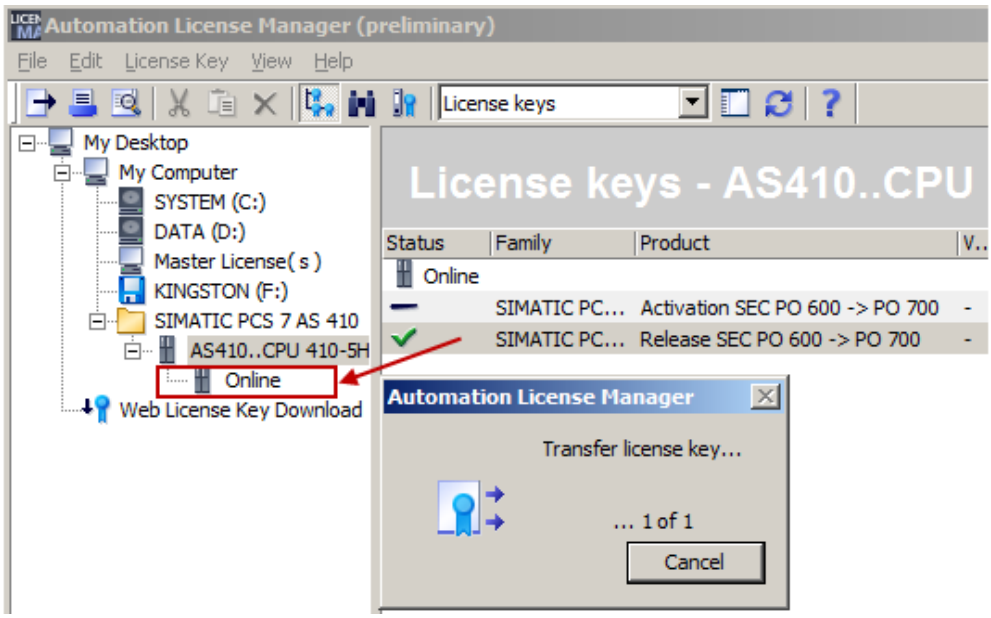
2.5.6 Transferring the PO release file to the SEC of the CPU

1. Transfer the received PO release files to the Upgrade directory in the Engineering Station:
   "Your documents > Siemens > Automation > PCS7 > Activations".
2. Open the Automation License Manager (ALM).
   The automation systems that are connected to the Automation License Manager are shown in the list in the "Connect AS 410" dialog box.
3. Click on the "Add" button to connect a further automation system. In the PCS 7 project, select the CPU to which you want to transfer the PO release file. Then click on the "OK" button.



The CPU is displayed in the ALM.

4. Drag the PO release file and drop it on to the "Online" folder of the desired automation system.



The upgrade is carried out. The time that is taken depends on the loading of the automation system.

After an upgrade is completed, the files (PO release file and PO activation file) that are used in the Upgrade directory are deleted.

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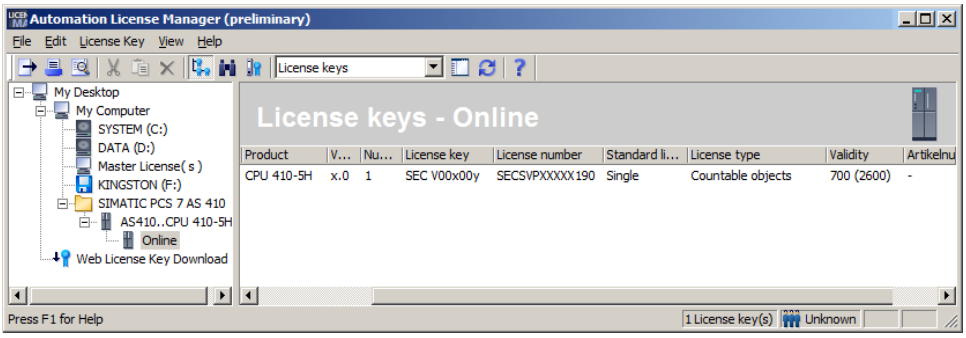
The Automation License Manager shows the new number of POs for the updated SEC.



Note

You can also call up the volume of the SEC, as well as the process objects that are subject to license, in the SIMATIC Manager under "Extras > PCS 7 license information".

2.6 Additional information

2.6.1 Replacing an existing CPU with the CPU 410-5H

An existing CPU in the S7-400 series can be replaced by the CPU 410-5H with little effort. In addition to the replacing the hardware, some adaptations must also be made to the hardware configuration of the PCS 7 project. You will find extensive information about this at
https://support.industry.siemens.com/cs/ww/en/view/85014617.

2.6.2 Extending availability

With the standard SIMATIC PCS 7 AS 410 automation system, you already have the option of selectively increasing the availability by means of redundant configuration of the Industrial Ethernet communications module.

With its redundant CPUs, the Type AS 410H redundancy station offers considerably greater availability. It works on the 1 of 2 principle, where the reserve system is switched in if there is a failure of the active subsystem. Starting from here, you can double the power supply or the Industrial Ethernet communications module for each subsystem and combine these measures.

You can find extensive information about the procedure for expanding a Single Station to a Redundancy Station at
https://support.industry.siemens.com/cs/ww/en/view/82523363.

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3 References

Table 3-1

	Topic	Title
\1\	Siemens Industry Online Support	http://support.industry.siemens.com
\2\	Process automation with the SIMATIC PCS 7 CPU 410-5H controller	https://support.industry.siemens.com/cs/ww/en/view/96839331https://support.industry.siemens.com/cs/ww/en/view/96839331
\3\	SIMATIC PCS 7 process control system CPU 410-5H Process Automation	https://support.industry.siemens.com/cs/ww/en/view/74736822
\4\	SIMATIC Process Control System PCS 7 Service support and diagnostics (V8.2)	https://support.industry.siemens.com/cs/ww/en/view/109485965

4 History

Table 4-1

Version	Date	Change
V1.0	10/2014	First edition
V1.1	12/2014	Revision of Chapter 2.2 Loading interface changes from AS blocks in RUN mode (TCiR)
V1.2	03/2015	• New Chapter 3.1 Configuring the communications interface and establishing the connection between the ES and the AS • Revision of Chapter 3.4 Online upgrading of CPU 410-5H process objects
V1.3	02/2016	• New Chapter 2.3 Using TCiR to update a library • Revision of Chapter 2.2 Loading interface changes from AS blocks in RUN mode (TCiR)
V2.0	04/2016	Update for PCS 7 V8.2
V2.1	11/2016	New text block “Unlimited POs” in section 2.5.1.
V2.2	11/2016	New text block “Prerequisites for an online upgrade” in section 2.5.1

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