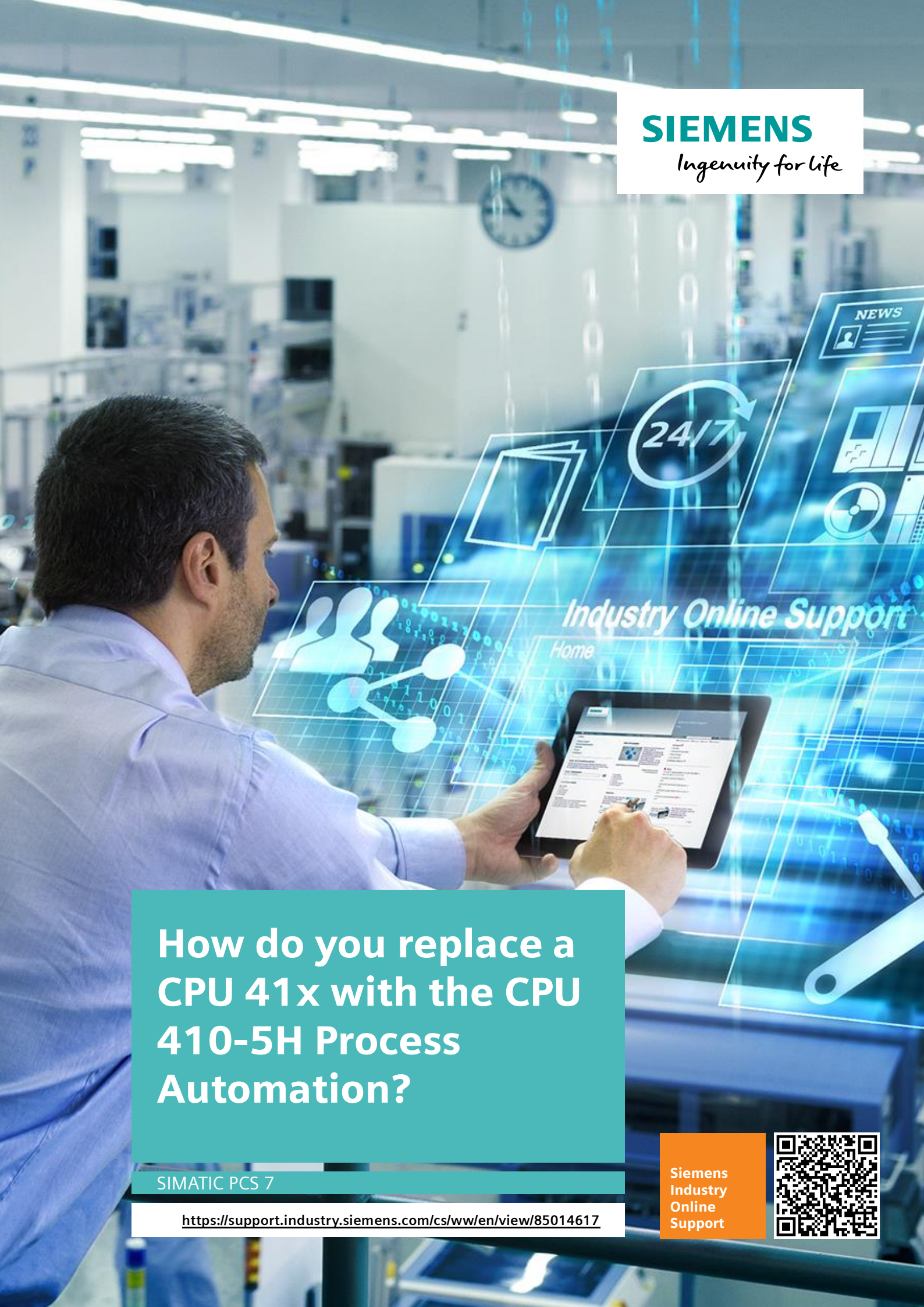

How do you replace a CPU 41x with the CPU 410-5H Process Automation?

SIMATIC PCS 7

https://support.industry.siemens.com/cs/ww/en/view/85014617

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Contents

1 Preparation

To configure the CPU 410-5H you need one of the two options below:

- PCS 7 V8.0 SP1 with the Hardware Upgrade Package "HUP CPU410-5H".
- PCS 7 V8.0 SP1 Upd1 or newer versions

Note

Information about upgrading a project is available here:
http://support.automation.siemens.com/WW/view/en/39980938

Additional information about the Hardware Upgrade Package "HUP CPU410-5H" is available here: http://support.automation.siemens.com/WW/view/en/68627630

Make a backup of your project before you start CPU replacement.

Note the following:

- Parameters of the existing CPU
  (Clock memory byte, changed cyclic interrupt settings etc.)
- Connections in NetPro
- Network addresses of the CPU or CP and their partner stations

Note

- It is not possible to make the conversion when the CPU is running.
- You have to reload all the systems connected to the CPU (controllers, servers, ...).
- When you convert the system, the CPU-relevant messages are lost.
- It might be necessary to reconfigure AS-AS, AS-OS, AS-BATCH and AS-RC communications, in particular when changing from CP443-1 to the internal interface of the CPU.
- Pay attention to the compatibility of CPU and CP. You may also have to replace the CP when replacing the CPU. See manual:
  "SIMATIC PCS 7 Process Control System CPU 410 Process Automation"
  https://support.industry.siemens.com/cs/ww/en/view/109801828

WARNING	**Book the process objects back before replacing the CPU.**

2 Procedure for up to PCS 7 V8.1

Note

The instructions below take the example of an H system but apply equally for single CPU stations.

The parameters of the CPU 410-5H are set to PCS 7 default values when the new configuration is made. Some previously variable parameters are fixed in the CPU 410-5H.

For example, you have to reconfigure the time synchronization and possibly recalculate the H parameters.

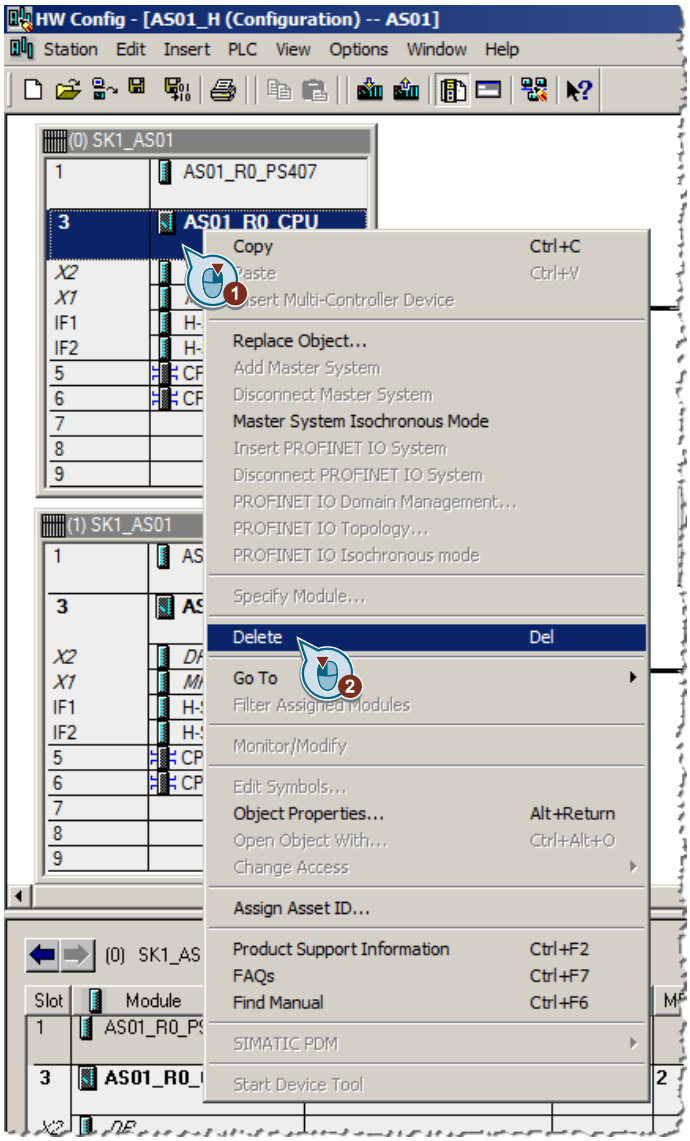
WARNING

Restriction with configurations with redundant F modules
When you delete an H-CPU in the HW Config and add another H-CPU, the redundancy settings of the F IO modules are lost.
When you execute "Compile CFC > Create Module Driver", errors are reported.

Remedy
Check/renew the redundancy settings of the F IO modules after adding the redundant controllers.

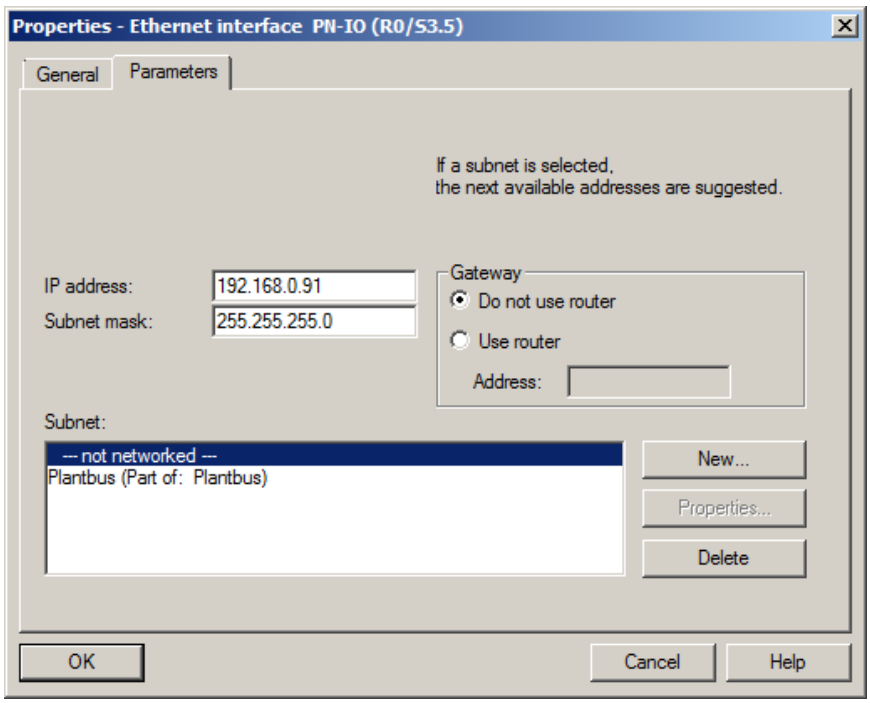
2.1 Removing the Old CPU from the Hardware Configuration

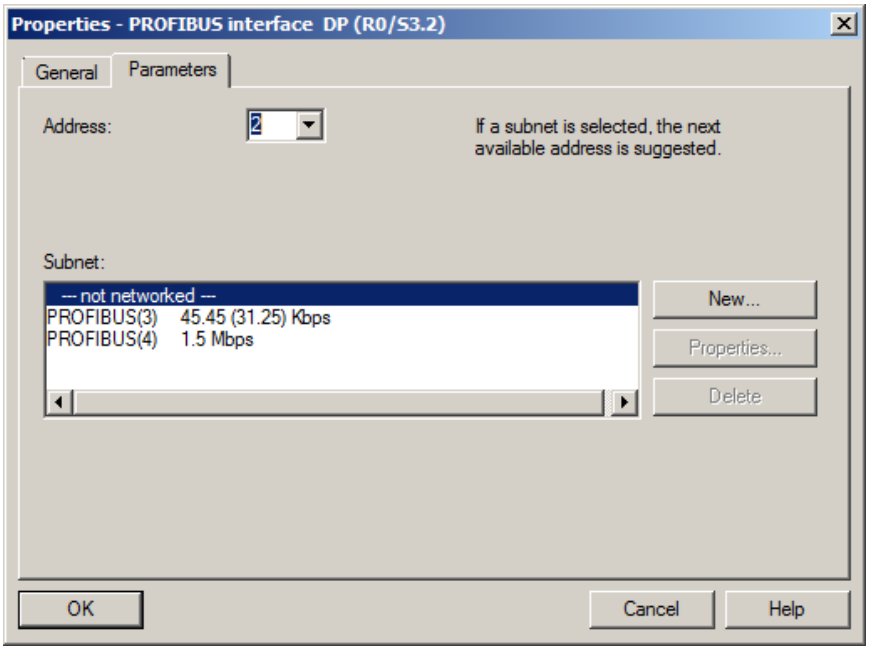
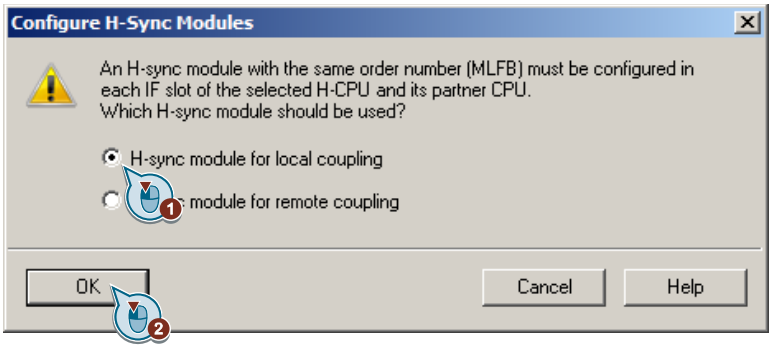
Table 2-1

Step	Action
1.	Open the HW Config of the CPUs to be replaced.
2.	Right-click the CPU to be exchanged and select the menu command "Delete". 
3.	Confirm with "Yes" the dialog "Do you really want to delete this object".
4.	Confirm with "Yes" the dialog "Connections are configured across the module. Do you really want to delete the module?".
5.	Confirm with "No" the dialog "Do you also want to delete the program belonging to the module". The system saves the user project for later use in the subproject.
6.	Repeat steps 2 to 4 for the second CPU.

2.2 Adding the New CPU to the Hardware Configuration

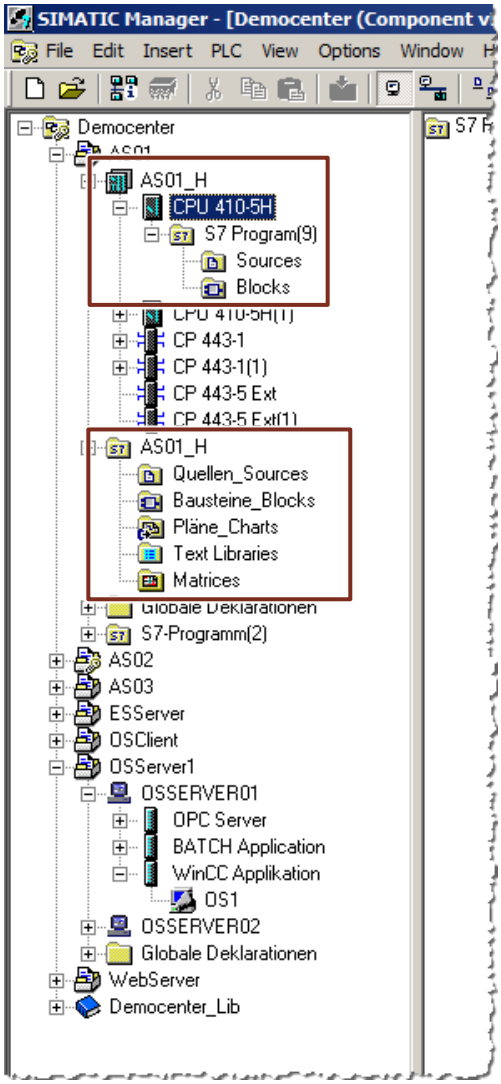
Table 2-2

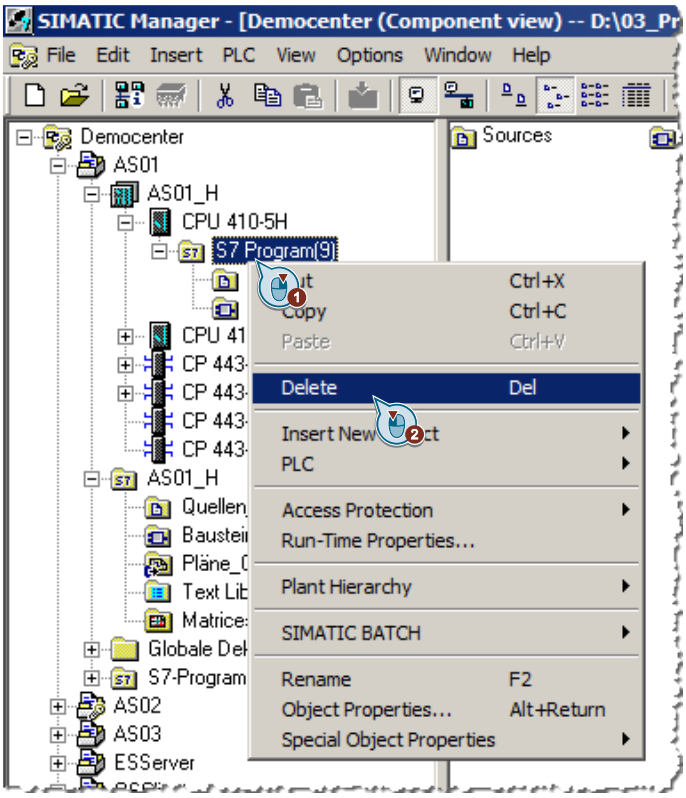
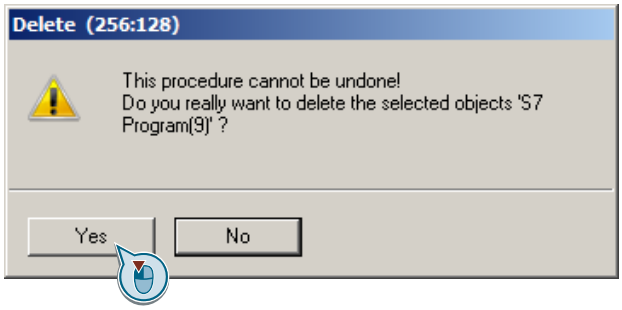
Step	Action
1.	Drag and drop the CPU 410-5H from the Hardware Catalog (Profile: PCS7_V8.0 or PCS7_V8.1) to the slot that has become free in the rack.
2.	The following window opens: "Properties – Ethernet Interface PN-IO (R0/S3.5)"  • If the distributed IO is not connected across the CPU, select "not networked". • If you want to use the Ethernet interface, assign the corresponding subnet and enter the IP address. Then confirm with "OK".

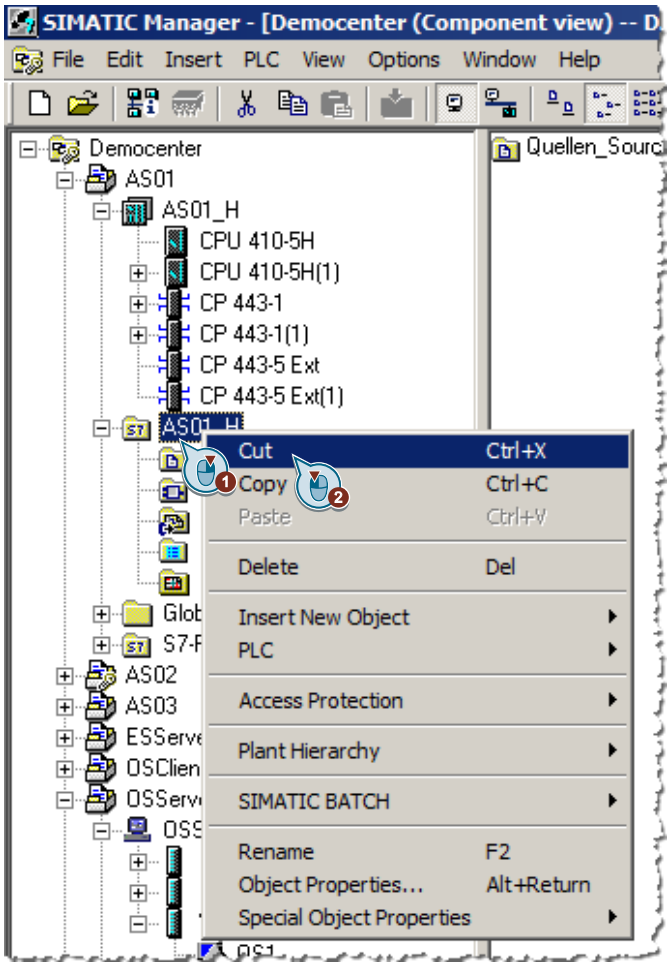
Step	Action
3.	The following window opens: "Properties – PROFIBUS interface DP (R0/S3.2)".  • If the communication is not made across the CPU, select "not networked". • If you want to use the PROFIBUS interface, assign the corresponding PROFIBUS segment. Then confirm with "OK".
4.	The "Configure H-Sync Modules" dialog opens.  Select the H-Sync module used and confirm with "OK".
5.	Repeat steps 1 to 3 for the second CPU.
6.	Check that all the available subnets are correctly connected again.
7.	Change the CPU parameters accordingly (previous setting).
8.	Save and compile the changes and close the HW Config.

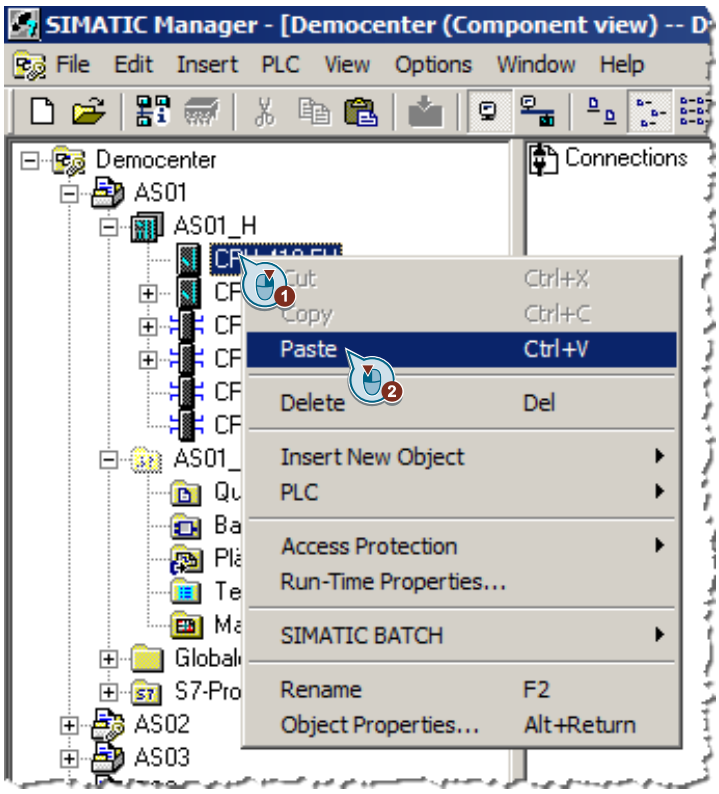
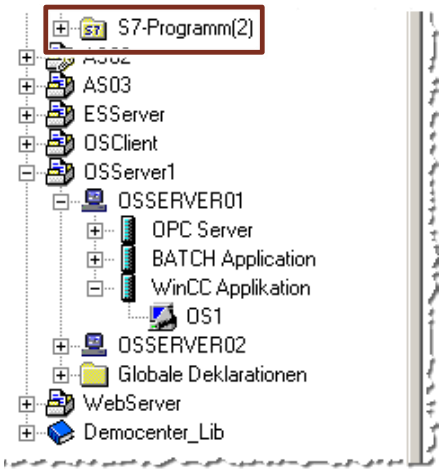
2.3 Assigning the User Program

Table 2-3

Step	Action
9.	Open the Component View of the SIMATIC Manager. The new CPU with new user program and the user program of the previous CPU are in the project. 

Step	Action
10.	Mark the new CPU and delete the user program. 
11.	Click the "Yes" button in the "Delete" dialog. 

Step	Action
12.	Right-click the user program of the previous CPU and select the menu command "Cut". 

Step	Action
13.	Right-click the CPU and select the menu command "Paste". The previous user program is now assigned to the new CPU. 
14.	When you delete the second CPU, another user program is created in the project folder, which is no longer needed. Right-click the program and select the menu command "Delete". 

3 Procedure for PCS 7 V8.1 and newer versions

Note

The instructions below take the example of single CPU station but apply equally for an H system.

The parameters of the CPU 410-5H are set to PCS 7 default values when the new configuration is made. Some previously variable parameters are fixed in the CPU 410-5H.

For example, you have to reconfigure the time synchronization and possibly recalculate the H parameters.

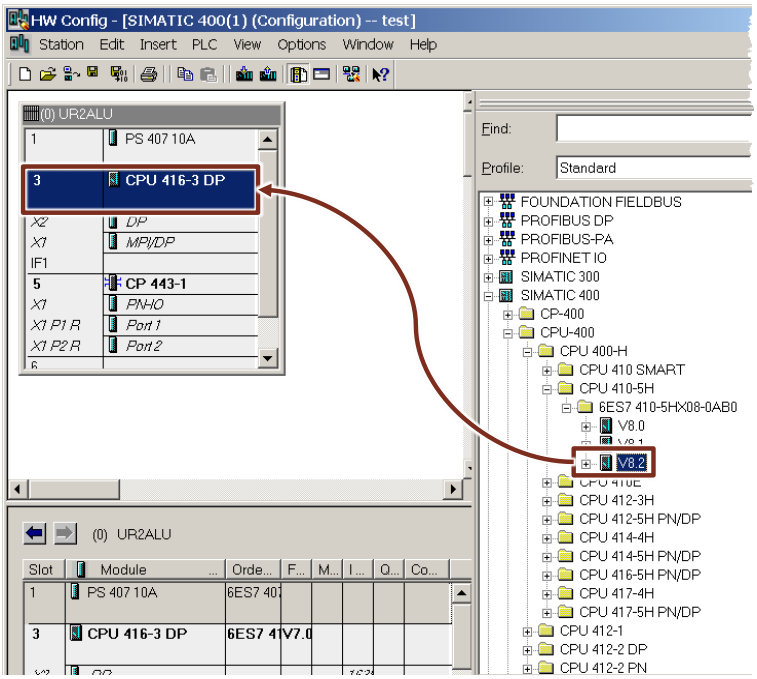
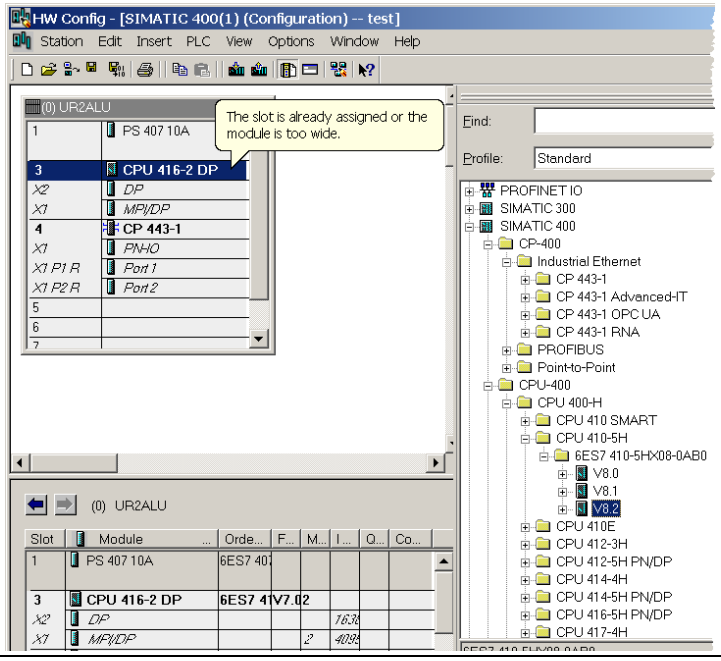
WARNING

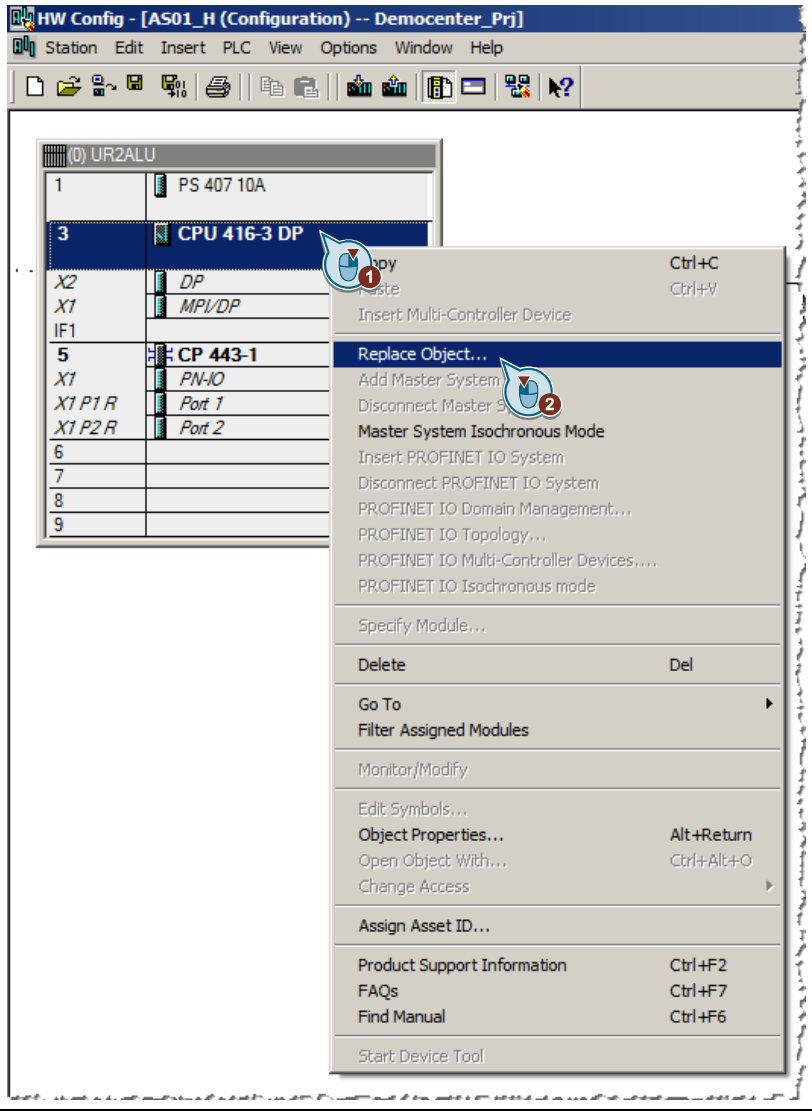
Restriction with configurations with redundant F modules
When you delete an H-CPU in the HW Config and add another H-CPU, the redundancy settings of the F IO modules are lost.
When you execute "Compile CFC > Create Module Driver", errors are reported.

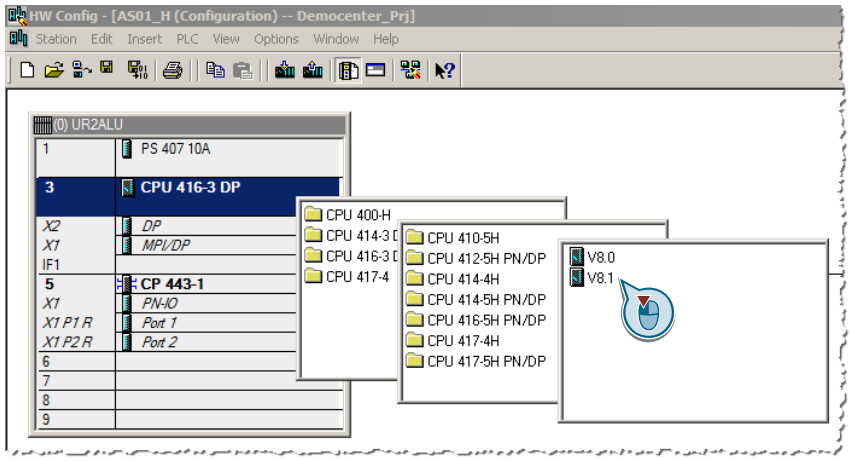
Remedy
Check/renew the redundancy settings of the F IO modules after adding the redundant controllers.

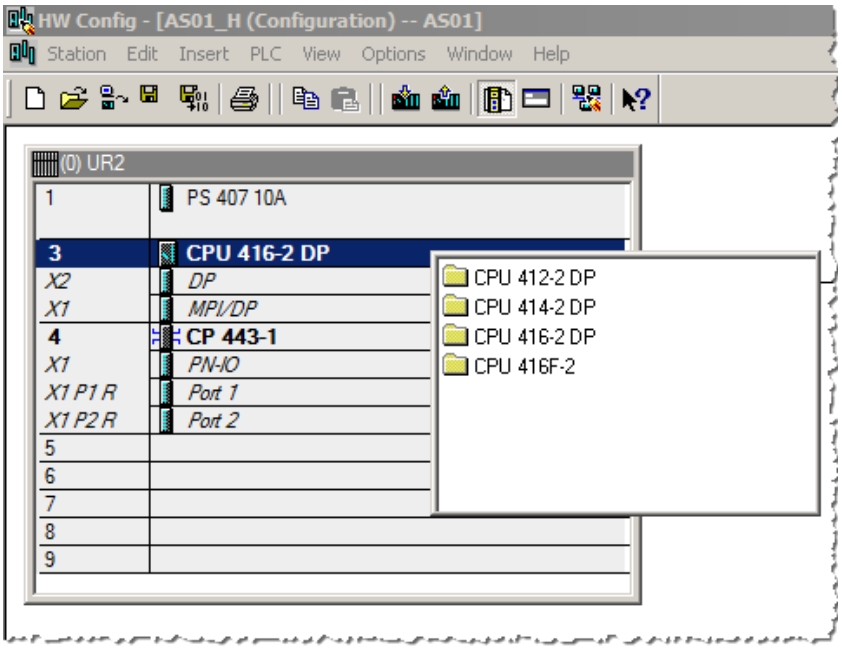
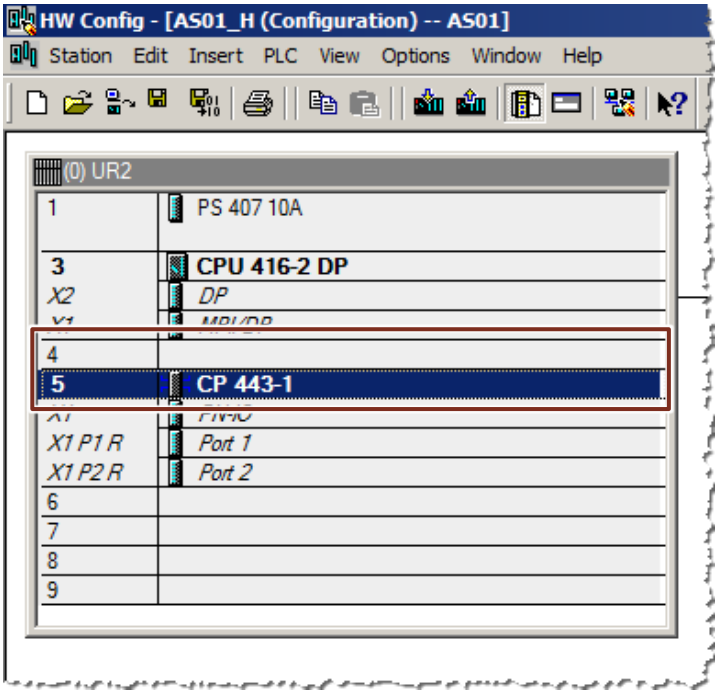
3.1 Replacing CPUs

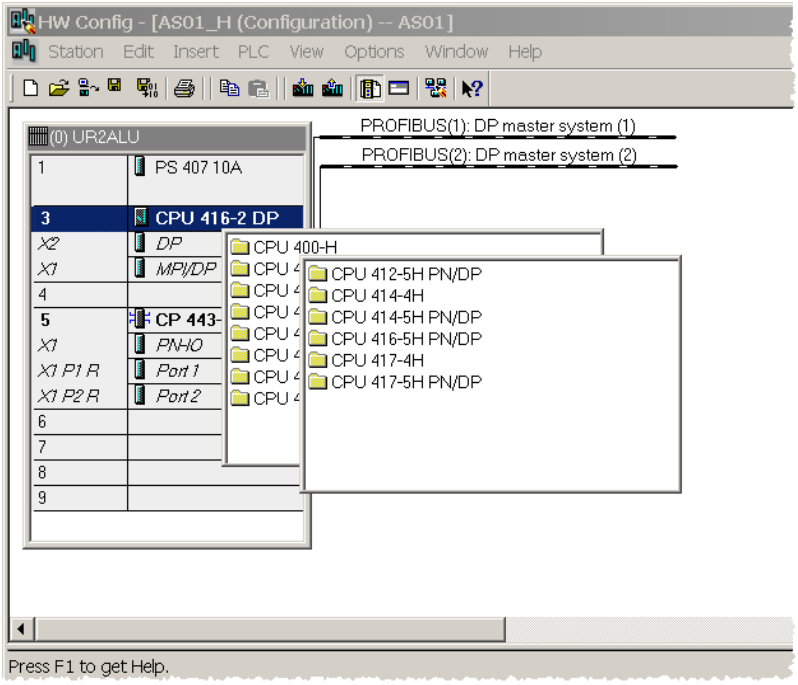
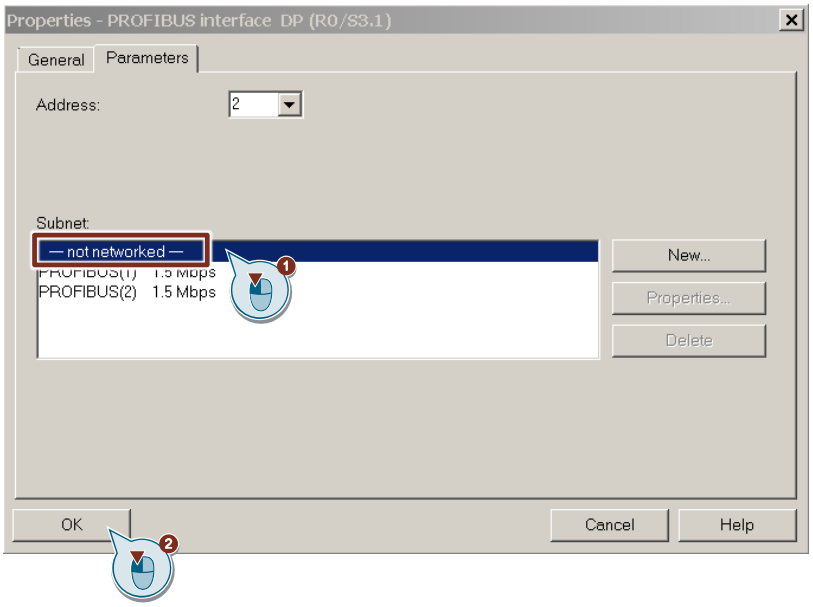
Table 3-1

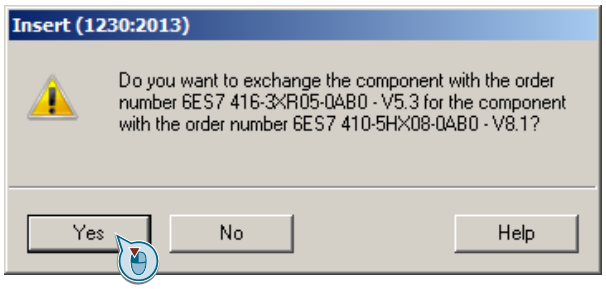
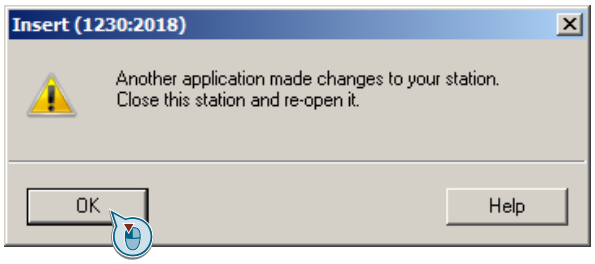
Step	Action
1.	Open the HW Config of the CPUs to be replaced.
2a.	Remove the 410-5H CPU from the catalog to the slot of the CPU that you want to replace.  If it is impossible to replace the CPU, a message is displayed giving the cause of the incompatibility. You have to remove this before you can replace the CPU. (See Step 2c). 

Step	Action
2b.	Alternatively, you right-click the CPU to be replaced and select the menu command "Replace Object...". 

Step	Action
2b.	Select the required CPU from the selection list that opens. 

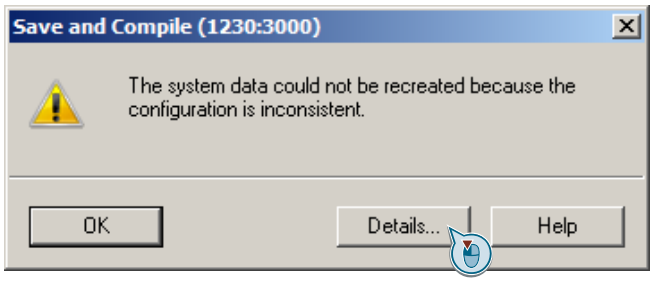
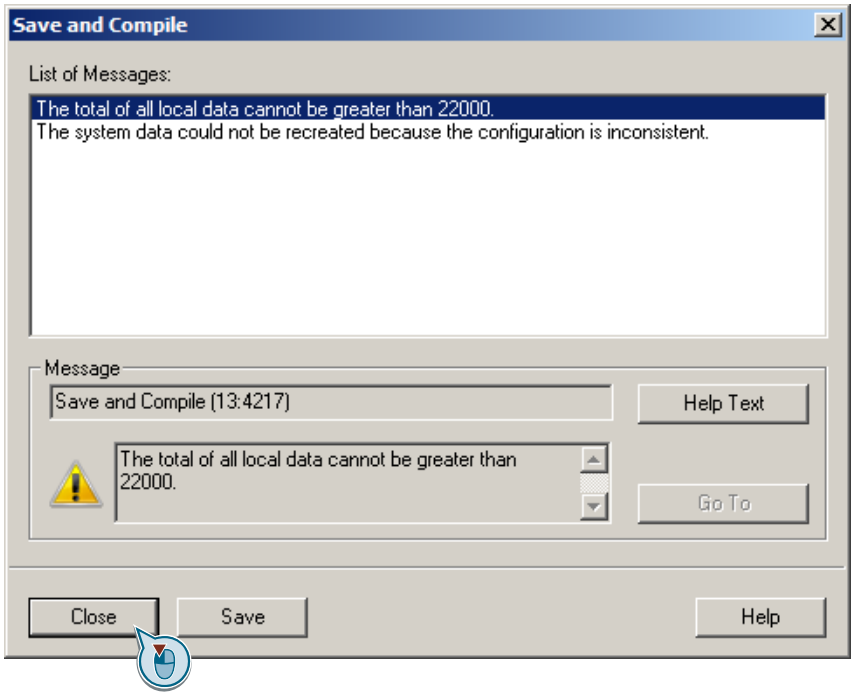
Step	Action
2c.	**Add slot** If the required CPU is not in the selection list, or you have received a message indicating that the module is too wide, this might be due to a lack of slots.  In this case you move the CP 443-1 to the next free slot and repeat 2a./b. 

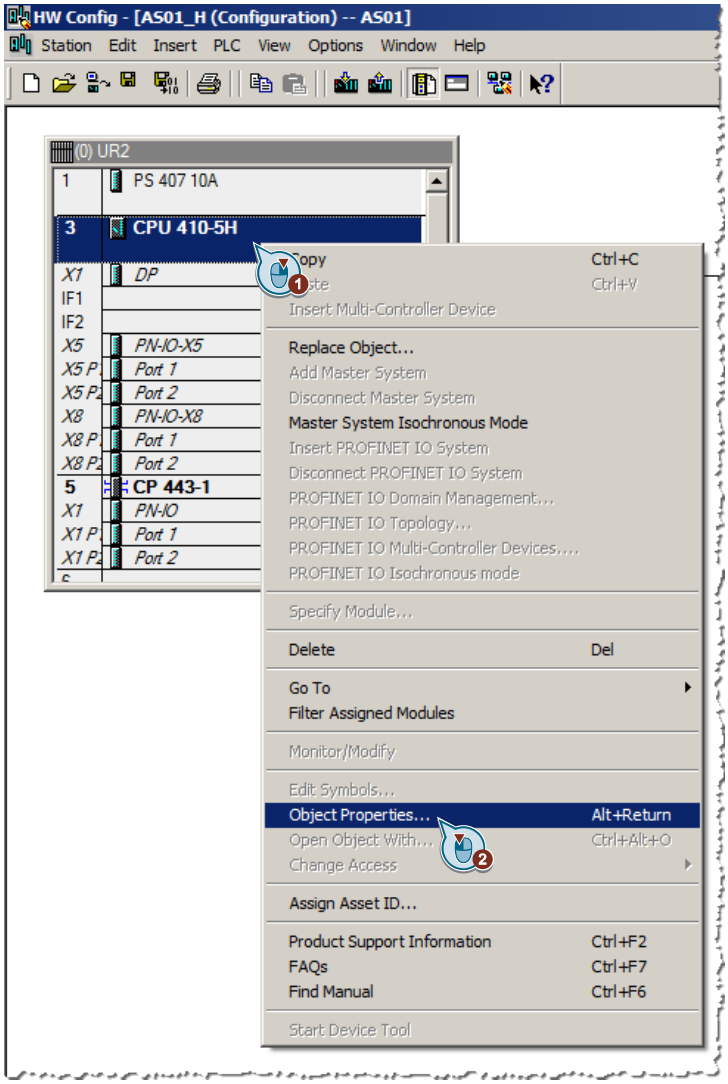
Step	Action
2c.	**Reassign interface connections** If the interfaces of the old CPU are configured in the HW Config (DP, PN, MPI), it might not be possible to incorporate the new CPU.  For this you must first resolve the assignment of the different subnetworks.  After you have done this for all the configured interfaces of the CPU, you can replace the old CPU with the new one. After replacing the CPU you can reassign the subnetworks.

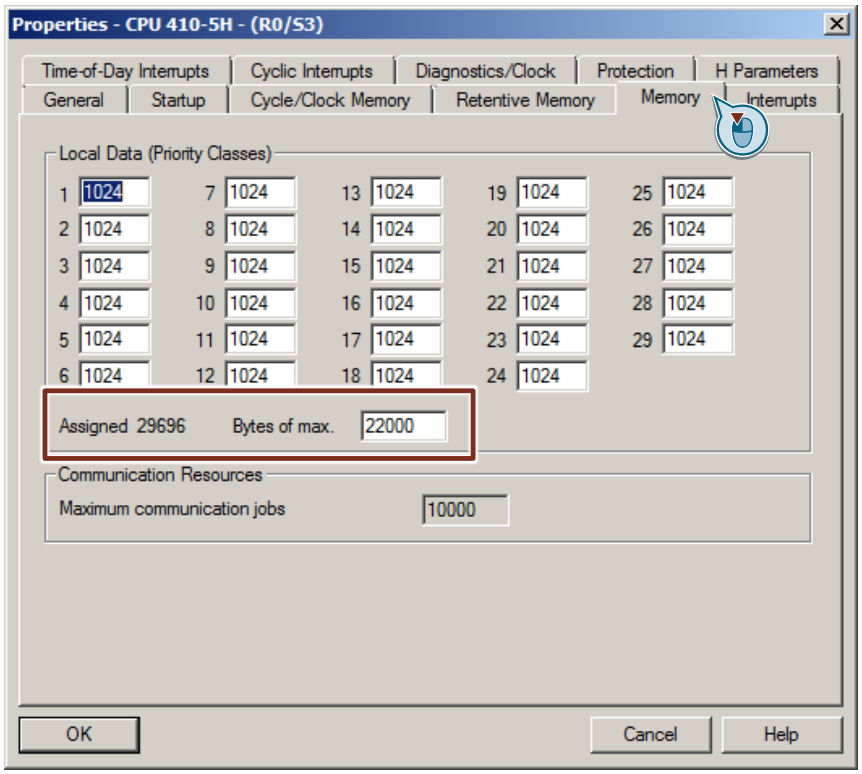
Step	Action
3.	When the message appears asking if you want to replace the old CPU with the new CPU, click the "Yes" button. 
4.	Acknowledge the next message by clicking the "OK" button. 

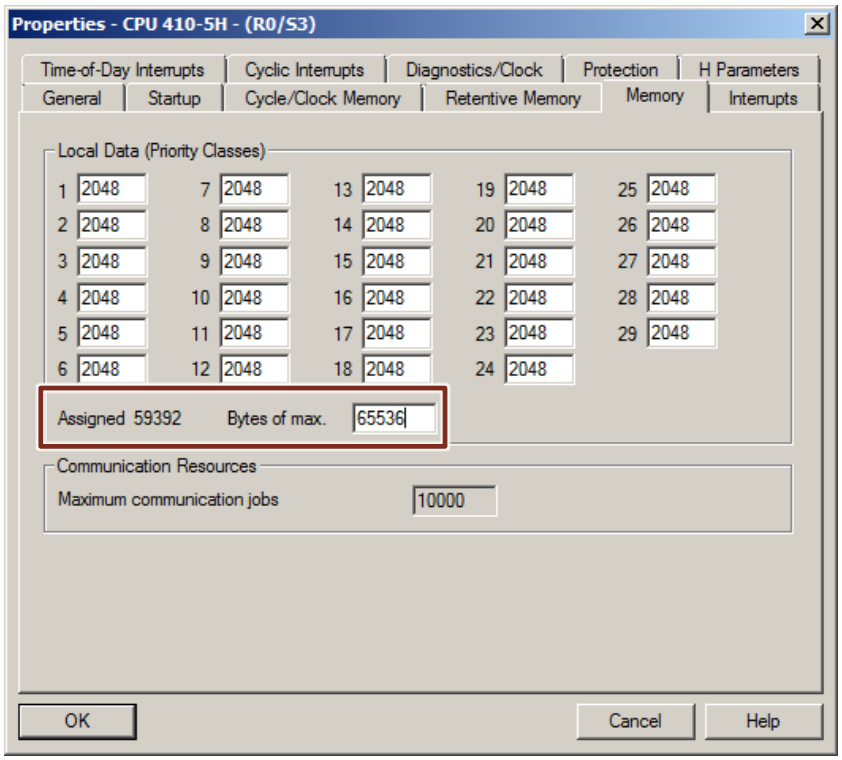
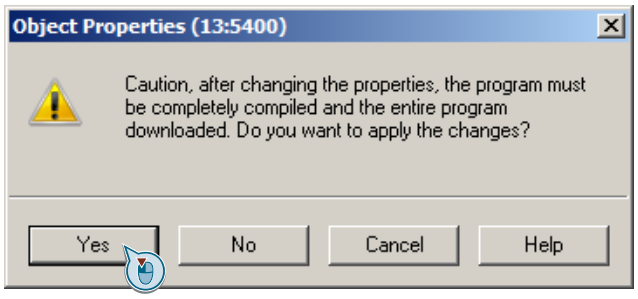
3.2 Modifying Local Data

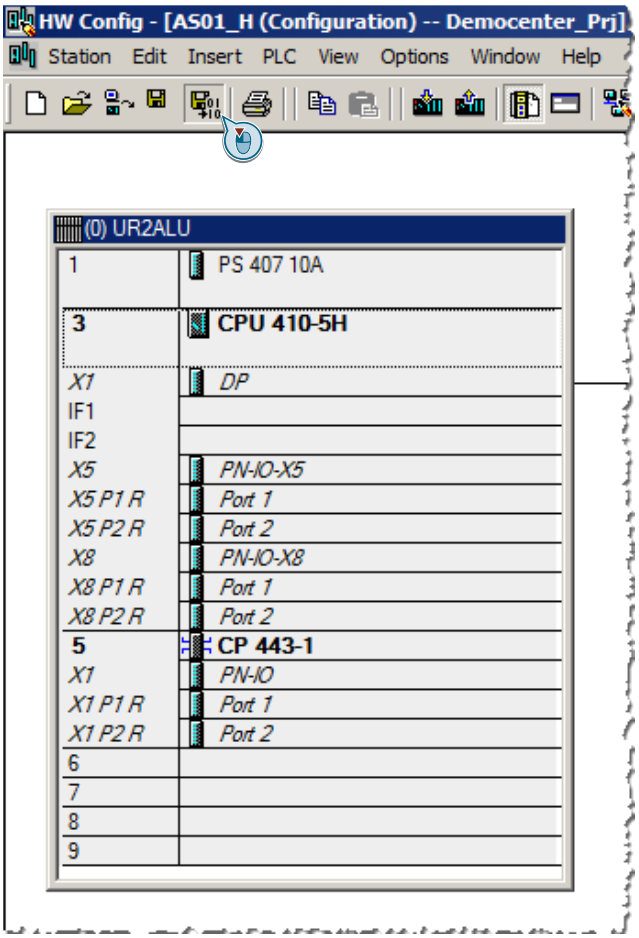
Table 3-2

Step	Action
1.	After successful replacement of the CPU, the following error might occur when executing the "Save and Compile" command: *Save and Compile (1230: 3000)* *The system data could not be recreated because the configuration is inconsistent.* Click the "Details..." button. 
2.	A message appears indicating that the total of the local data is too great. Click the "Close" button. 

Step	Action
3.	Open the Object Properties of the CPU via "Right-click > Object Properties...". 

Step	Action
4.	Click the "Memory" tab. Under "Local Data" you see that more local data is assigned than is available. 

Step	Action
5.	Change the Local Data values to suit the requirements of your CPU and click the "OK" button. **Note** The maximum value you can set for the local data of the CPU 410-5H is 65,536 bytes. 
6.	A message appears indicating that the complete program must be recompiled and downloaded in order to apply the changed settings. Click the "Yes" button. 

Step	Action
7.	In the HW Config you click the "Save and Compile" menu command. 

4 Creating the Connections in NetPro

Table 4-1

Step	Action
1.	Open NetPro.
2.	Recreate all the lost connections.
3.	Save and compile the changes and close NetPro.

Error when compiling the connections in NetPro

If, when saving and compiling the connections in NetPro, you get a message indicating that the available TSAPs (Transport Service Access Point) are no longer unique, you have two options to solve the problem:

Option 1

Open the connection concerned and close the window by clicking the "OK" button.

Option 2

Delete the connection concerned and configure it again.

Note Automatically created connections, for AS-Based Batch, for example, have to be recreated by running the application.

5 Commissioning the CPU

Table 5-1

Step	Action
1.	Cut off the power supply to replace the CPUs and then switch the power supply of the central rack back on again (please follow the attached instructions).
2.	Open the HW Config and load it into the AS.
3.	Open NetPro and load the configuration into the AS.
4.	Then load the configuration for all the partner stations.
5.	Compile and load the user program and start the AS. **Note** If you use the FB16 in your user program, the compilation is not error-free because the CPU410-5H needs the FB16 for additional Runtime functions. Change the block number of the FB16 in your user program as described in the following entries: How can you change the block number of a block (FC or FB)? https://support.industry.siemens.com/cs/ww/de/view/1023992 How do you merge blocks with the same name from different libraries in PCS 7? https://support.industry.siemens.com/cs/ww/en/view/82525512 This procedure holds generally for double FC or FB numbers in the user program.
6.	Carry out a complete OS load.

Note

When you start up for the first time or after a power failure, it takes up to 10 minutes until the CPU fully starts, because it runs an internal self-test.

Then check all the settings once again and run a function test.

CAUTION

Caution when replacing a CPU 410 with firmware versions from V8.2

If you reuse a CPU 410 with firmware version newer than V8.2 that has already been used elsewhere, then make sure that the content stored in the load memory cannot cause any dangerous plant states at the new place of use. Reset the CPU to the delivery state if you do not know the previous usage.

See system manual: SIMATIC PCS 7 Process Control System CPU 410 Process Automation, section 9.8 "CPU 410 Reset to Factory Setting"

6 History

Table 6-1

Version	Date	Change
V1.0	04/2014	First edition
V1.1	09/2014	Additional text
V1.2	07/2015	Update to SIMATIC PCS 7 V8.1
V1.3	01/2016	Additional text in chapter 5, Step 5
V1.4	01/2017	New note in chapter 4
V1.5	04/2017	New note in chapter 4
V1.6	07/2018	Chapter 3.1 revised Chapter 5: Warning added
V1.7	09/2021	Chapter 1: Added note about CPU-CP compatibility