



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

SIMATIC PCS 7 V9.0 – CPU 410-5H Firmware V8.2

https://support.industry.siemens.com/cs/ww/en/view/96839331

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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 system (AS 410-5H and AS 410E)
- 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.

AS 410 automation systems are the preferred choice for all new plants with SIMATIC PCS 7. For applications with a small quantity structure the CPU 410E is appropriate, for all other applications there is the versatile CPU 410-5H.

The automation performance of the CPU 410-5H is scaled without having to change the CPU and is effected by means of the number of SIMATIC PCS 7 process objects. In this case the best performance is always available regardless of the area of application. The type reduction to a single CPU offers numerous advantages. It considerably simplifies the selection, configuration and planning of the automation system as well as spare parts inventory 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. The CPU 410E behaves like a CPU 410-5H with limited quantity structures, so that the scenarios described in this application example apply to the CPU 410-5H as well as to the CPU 410E.

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

- General information on the CPUs of the AS 410
- Advantages of the CPU 410-5H
- Configuring the communications interface and establishing the connection between the ES and the AS
- Type Change in RUN (TCiR) and Configuration in Run (CiR/H-CiR)
- Configuration of the PN/Ethernet interfaces
- Upgrade with CPU 410 Expansion Packs (process objects and PN Red License)

### Validity

This application example is valid for:

- CPU 410-5H Process Automation and CPU 410E Firmware version 8.2
- SIMATIC PCS 7 V9.0

# **Table of Contents**

Legal	informat	ion	2		
Prefa	се		3		
1	1 Overview of AS 410 automation system				
	1.1 1.1.1 1.1.2 1.1.3 1.2 1.2.1 1.2.2	CPU 410-5H – the "all-rounder" for process automation Introduction Enhanced functions - Firmware V8.2 Advantages of the CPU 410-5H CPU 410E – for applications with up to 200 process objects Introduction Restrictions compared with the CPU 410-5H	6 8 9 10 10		
2	Applicat	ion scenarios	11		
	2.1 2.1.1 2.1.2 2.2	Configuring the communications interface and Establishing the connection between the ES and the AS Establishing a connection using an additional CP in the AS Establishing a connection via internal PN/Ethernet interfaces of the CPU Loading interface changes from AS blocks in RUN mode (TCiR)	11 11 21 26		
	2.3 2.4	Configuring the PN/Ethernet interfaces of the CPU 410	31		
	2.4.1	Standard Automation System – Configuring the interfaces for connection to the plant bus and the field bus without using an external CP	33		
	2.4.2	Standard Automation System – Configuring two separate PROFINET interfaces for connection to the field bus	39		
	2.4.3	High-availability automation system – Configuration of the interfaces	45		
	2.5	Configuration modifications in operation – CiR/H-CiR	51		
	2.5.1	Change parameter assignment of a submodule	52		
	2.5.2	Adding a device	57		
	2.6	Upgrade with CPU 410 Expansion Packs	65		
	2.0.1	Overview of work stops	60		
	2.0.2	Order the CPU 410 expansion packs	60		
	2.6.4	Creating the activation file using the Automation License Manager (ALM)	70		
	2.6.5	Sending the activation file via a Support Request	73		
	2.6.6	Transferring the release file to the SEC of the CPU	75		
	2.7	Further functions of the CPU 410	76		
	2.7.1	Field Interface Security	76		
	2.7.2	Security Event Logging	77		
	2.7.3	Remaining load memory	78		
	2.7.4	Firmware update in two steps	78		
	2.8	Additional information	80		
	2.8.1	Replacing an existing CPU with the CPU 410-5H	80		
_	2.8.2	Extending availability	80		
3	Appendi	х	81		
	3.1	References	81		
	3.2	Change documentation	81		

# 1 Overview of AS 410 automation system

The rugged AS 410 automation system is a modern, future-oriented, all-round system for the process industry. It forms the basis for future developments and can be deployed in all areas of application with versatility. AS 410 is thus the system of choice for all new plants with SIMATIC PCS 7.

The use of the AS 410 is particularly useful for PCS 7 systems with PROFINET as it is the only automation system that supports the following PROFINET functions in conjunction with PCS 7 V9.0:

- Redundant PROFINET R1 configuration
- Configuration in Run (CiR)
- High-precision time stamping (SoE Sequence of Events))

Two versions of the CPU are available for the AS 410:

- CPU 410-5H scalable performance for all applications
- CPU 410E fixed quantity structure for applications with few process objects

An AS 410 with CPU 410-5H or CPU 410E can be configured as a standard highavailability or safety-oriented automation system, depending on your requirements. Technically speaking, the CPU 410E program and system behave like those of a CPU 410-5H with limited quantity structures. This means that the statements made in this application example concerning the CPU 410-5H also apply to the CPU 410E.

# **Benefits**

- A hardware platform for all application uses, application sizes and performance ranges
- Specially developed for process automation
- Conformal coating
- Extended temperature range (0 °C to +70 °C)
- PROFINET functions (R1, CiR and SoE)
- Reduction of plant downtime thanks to the possibility of type updating of AS blocks in RUN mode (TCiR) and configuration modifications in Run for PROFINET and PROFIBUS (CiR/H-CiR).
- Integrated remaining load memory

# 1.1 CPU 410-5H – the "all-rounder" for process automation

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

# 1.1.1 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 quantity structure

The quantity structure 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 (process objects) to 2k + PO (unlimited), at which point other performance data of the CPU act 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 uninstall 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 <a href="http://www.siemens.com/industrymall">http://www.siemens.com/industrymall</a>
- Through your Siemens contact person (<u>www.siemens.com/automation/partner</u>)

### Communication

The CPU 410 has two PROFINET/Ethernet interfaces with an integrated 2-port switch. As a standard automation system, these enable the simple connection (S1) of PROFINET devices and, configured as an H system, the connection of devices via system redundancy S2. From FW V8.2, in its expansion as an H system the CPU 410 additionally supports the redundant connection (R1). Per PROFINET interface a maximum of 250 devices can be connected. Consequently, per AS 410 as many as 500 devices can be operated via PROFINET. It is not possible to use the CP 443-1 for PROFINET.

The CPU 410-5H provides a peripheral address range of 8 kB per PROFINET interface.

In addition, the CPU has a PROFIBUS interface with 12 MBit/s and allows the connection of up to 96 PROFIBUS nodes.

The distributed process periphery can thus either be linked directly with PROFINET, PROFIBUS DP or via a subordinate bus system, such as PROFIBUS PA.

The connection to the plant bus can be made either via the communication module CP 443-1 or via the PROFINET/Ethernet interfaces integrated in the CPU. If an integrated interface is used to connect to the plant bus, it cannot be used for PROFINET.



# **Note** For further information on the use of PROFINET in SIMATIC PCS 7, please refer to the application example: "PROFINET in SIMATIC PCS 7 – Guidelines and Blueprints" https://support.industry.siemens.com/cs/ww/en/view/72887082

## **Process safety functions**

The 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.

The PROFIsafe profile allows safety-related communication between the automation system (controller) and the process periphery via either PROFIBUS or PROFINET.

### **High availability**

To reduce the risk of production downtime and ensure maximum availability, the AS 410 can be configured as a high-availability automation system. A highly available automation system AS 410 is constructed from two redundant, electrically isolated controllers (CPU 410). These 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. Synchronization modules can be connected in pairs by means of fiber-optic cables. The modules can be exchanged during operation.

# 1.1.2 Enhanced functions - Firmware V8.2

The CPU 410's Firmware V8.2 makes numerous new functions available. Firmware V8.2 can be used with all CPU 410-5Hs or CPU 410Es.

# **PROFINET** extensions

- Support from PROFINET configurations (R1) as a complement to PROFINET system redundancy (S2). The CPU 410 Expansion Pack (PN Red) is necessary for the use of this configuration. The procedure for transferring the licenses of this expansion pack is identical to the procedure for expanding the PO volume of the CPU 410. See Chapter 2.6.
- Support from configuration changes in the operation of the CPU in the H system (H-CiR) and individual operation (CiR) See section <u>2.5</u>.
- Support of the highly precise time stamp Sequence of Events (SoE).

# Security extensions

- New protective function for PROFIBUS and PROFINET interfaces (Field Interface Security), see Chapter <u>2.7.1</u>.
- Support of SysLog in conjunction with SIEM (Security Incident Event Management) systems, see Chapter <u>2.7.2</u>.

# Other extensions

- The Load memory is maintained independent of a buffering by buffer batteries. The CPU can restart itself automatically after power failures even without buffer batteries. See Section <u>2.7.3.</u>
- The possibility for firmware updates in two working steps for future firmware versions. See Section <u>2.7.4</u>.
- Note You can download the firmware updates in the entry: "Operating system update: CPU410-5H Process Automation" https://support.industry.siemens.com/cs/ww/en/view/109476571

For instructions on how to perform the update, please see: "Instructions for Updating the CPU 410 Operating System" https://support.industry.siemens.com/cs/ww/en/view/85196540

# 1.1.3 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.

# **Plant 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.

# 1.2 CPU 410E – for applications with up to 200 process objects

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

# 1.2.1 Introduction

The AS 410 automation system with CPU 410E Process Automation is a cost-saving alternative to the use of the CPU 410-5H for small applications. Based on CPU 410-5H hardware, the CPU 410E offers the same benefits for applications with up to 200 PO.

Technically speaking, the CPU 410E program and system behave like those of a CPU 410-5H with limited quantity structures. This means that the statements made in this application example concerning the CPU 410-5H also apply to the CPU 410E.

# 1.2.2 Restrictions compared with the CPU 410-5H

The table below gives an overview of the most important differences between the CPU 410-5H and the CPU 410E:

Table 1-1

		CPU 410-5H	CPU 410E
PCS 7 process objects (PO)		100 up to c. 2600 scalable with SEC	200
Work memory (program/data)		32 MB	4 MB
Derinher address area	PROFIBUS	6 KB	1536 bytes
Feripriery address area	PROFINET	8 KB	1536 bytes

Note

You will find further technical data on the CPU 410-5H and the CPU 410E in the following manual:

"SIMATIC PCS 7 Process Control System CPU 410 Process Automation" https://support.industry.siemens.com/cs/ww/en/view/109748473

# 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.

**Note** Communication in the plant bus is normally based on the ISO protocol. Alternatively, TCP/IP can be used, e.g. when using a common (combined) terminal and plant bus for smaller systems without an OS server or when using the internal Ethernet interface of an automation system.

You can find additional information on configuring the network connections in the manual:

"SIMATIC Process Control System PCS 7 Compendium Part A - Configuration Guidelines"

https://support.industry.siemens.com/cs/ww/en/view/109740190

# **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.

Properties - Ethernet interface CP 443-1 (R0	)/55)	×
General Parameters		
Set MAC address / use ISD protocol		
MAC address: 08-00-06-01-01-21		
□ IP protocol is being used		
<u>IP address:</u> 192.168.0.1	Gateway	
Subnet mask: 255.255.255.0	C Use router	
	Address:	
Subnet:		
Plantbus	<u>N</u> ew	
	P <u>r</u> operties	
	Delete	
,		
ОК	Cancel	Help

- 2. Save and compile the configuration.
- 3. In the SIMATIC Manager, use menu command "Tools > Set PG/PC interface..." 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...".

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

Select Target Module			×
Target modules:			
Module		Racks	Slot
CPU 410-5H		0	3
Select All			
OK	Cancel	н	lelp

 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.

Select Node Addres	5				×	
Over which station address is the programming device connected to the module CPU 410-5H?						
<u>R</u> ack:						
<u>S</u> lot:	3 -					
Target Station:	<ul> <li>Local</li> <li>C Can be reache</li> </ul>	ed by means of <u>c</u>	jateway			
Enter connection to	o target station:					
MAC address	Module type	Station name	Module name	Plant desig	nation	
08-00-06-01-01-21						
I						
Accessible Nodes						
J						
		⊻iew				
OK			Cano	el	Help	

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. Then click on the "OK" button.

Select Node Addres	55	×				
Over which station address is the programming device connected to the module CPU 410-5H?						
<u>R</u> ack:	0 -					
<u>S</u> lot:	3 🖛					
Target Station:	Local     Contained to the second se					
Enter connection to	Can be reached by means or gateway					
MAC address	Module type	Station name Module name				
08-00-06-01-00-00	CP 443-1					
•	GI HIST					
Accessible Nodes						
00-1B-1B-7E-95-DD	SIMATIC-PC					
08-00-06-01-00-00	CP 443-1					
08-00-06-01-01-22	CP 443-1					
08-00-06-9E-73-AE	INC					
	<u>U</u> pdate					
ОК		Cancel Help				

- 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.

# **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.

operties - Ethernet interface CP 443-1 (R0/S5)				
General Parameters				
Set MAC address / use ISO protocol				
MAC address:				
IP protocol is being used				
<u>IP address:</u> 172.10.1.31	Gateway			
Subnet mask: 255.255.255.0				
	<u>A</u> ddress:			
Subnet:				
Plantbus	<u>N</u> ew			
	Properties	s		
	Delete			
1				
ОК	Cancel	Help		

- 2. Save and compile the configuration.
- 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".

<ol><li>Click on the "Browse" button in the "Edit Ethernet N</li></ol>	de" dialog window
--	-------------------

dit Ethernet Node	×
Ethernet node	
	Nodes accessible online
MAC address:	Browse
Set IP configuration	
O Use IP parameters	
ID address	Gateway
IF address:	Do not use router
Subnet mas <u>k</u> :	○ <u>U</u> se router
	Addr <u>e</u> ss:
O Obtain IP address from a	DHCP server
_ Identified by	
Client ID	C MAC address C Device name
Client ID:	
,	
Assign IP Configuration	
Assign device name	
Device name:	Assign Name
Reset to factory settings	
	Heset
	Help

<ol> <li>In the "Browse Network" dialog window, select the CP by means of the MAC address and click on the "OK" button.</li> </ol>							
Browse Ne	twork - 13	Nodes			×		
<u></u>	tart	IP address	MAC address	Device type	Name SZ 400 C		
Sj I Fast s	search	172.10.0.209 172.10.0.208 172.10.0.203 172.20.66.202 169.254.210.195 172.10.0.204 172.10.0.201 172.10.0.201 172.20.66.201 172.10.50.201 192.168.0.21 172.10.0.206	08-00-06-9E-73-AE 00-1B-1B-46-40-79 00-1B-1B-06-1B-72 08-00-06-9A-6D-26 00-1B-1B-7E-95 00-1B-1B-06-1B-CC 00-1B-1B-89-02-3F 08-00-06-97-1B-BE 08-00-06-96-AE-AE 00-0E-8C-D3-63-AE 00-1B-1B-85-25-11 00-1B-1B-46-40-0D	INC SCALANCE SCALANCE INC SIMATIC-PC SCALANCE SCALANCE SCALANCE SCALANCE SCALANCE SCALANCE	OSM TPE h-rack-12 labor1-x2' UPD-Terr es13 labor1-x2' labor2-x2l labor2-x4l UPD-Terr platz50ar pn-io h-rack-10		
		·			•		
<u> </u>	ash	MAC address: 00-0	E-8C-9D-C8-9A				
OK				Cancel	Help		

Note

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

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.

t Ethernet Node		
Ethernet node		
	Nodes accessible online	e
MAC <u>a</u> ddress:	00-0E-8C-9D-C8-9A <u>B</u> rowse	
Set IP configuration-		
Use IP paramete	ers	
ID address	Gateway	
IP address:	172.10.1.32  O Do not use router	
Subnet mas <u>k</u> :	255.255.0.0 C Use router	
	A. 1.1.	
Obtain IP addres     Identified by	ss from a DHCP server	
Obtain IP addres     Identified by     Oijent ID     Client ID:	ss <u>from a DHCP server</u> O <u>M</u> AC address O De <u>v</u> ice r	name
Obtain IP addres     Identified by     Ojient ID     Client ID:     Client ID:	ss from a DHCP server O MAC address O Degice r	name
Obtain IP addres     Identified by     Ojient ID     Client ID:     Assign IP Config	ss from a DHCP server OMAC address ODeyjce r	name
Obtain IP addres     Identified by     Ojient ID     Client ID:     Assign IP Config  Assign device name	ss from a DHCP server MAC address guration	name
Obtain IP addres     Identified by     Client ID     Client ID:     Assign IP Config  Assign device name     Device name:	ss from a DHCP server       MAC address     Degice r       guration	name
Obtain IP addres     Identified by     Offent ID     Client ID:     Assign IP Config  Assign device name     Device name:     Reset to factory setti	ss from a DHCP server          MAC address       Degice r         guration	name gn Name
Obtain IP addres     Identified by     Offent ID     Client ID:     Assign IP Config  Assign device name:     Device name: Reset to factory setti	ss from a DHCP server       MAC address     Degice r       guration	ame gn Name

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

- 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".

Select Target Module			×
<u>T</u> arget modules:			
Module		Racks	Slot
CPU 410-5H		0	3
Select All			
	Consel	1 .	uu 1
UK	Lancel		

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.

Select Node Addres	Select Node Address						
Over which station address is the programming device connected to the module CPU 410-5H?							
<u>R</u> ack:							
<u>S</u> lot:	3 🗻						
Target Station:	<ul> <li>Local</li> <li>Can be reached by r</li> </ul>	neans of gatew	ay				
Enter connection to	o target station:						
IP address	MAC address	Module type	Station name	Module name			
192.168.1.1							
1/2.10.1.32							
Accessible Nodes							
	<u>}</u>	/iew					
ОК			Cancel	Help			

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.

### Requirement

In order to establish a connection between the ES and the AS using the internal interfaces of the CPU 410, the CPU 410 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.

# **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 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.

Properties - Ethernet interface PN-IO-X5 (R	)/53.5) 🛛 🗡
General Parameters	
<u>I</u> P address: <b>172.10.1.32</b> Subnet mask: 255.255.0.0	Gateway © Do not use router © Use router Address:
Subnet:	
Plantbus	<u>N</u> ew
	P <u>r</u> operties
	Delete
ОК	Cancel Help

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

- 2. Save and compile the configuration.
- In the SIMATIC Manager, use menu command "Tools > Set PG/PC interface... " 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".
- 6. Click on the "Browse" button in the "Edit Ethernet Node" dialog window.

t Ethernet Node		
Ethernet node		
MAC <u>a</u> ddress:	Nodes acces	sible online
Set IP configuration		
Use IP parameters		
IP address:	Gateway © Do not u	use router
Subnet mas <u>k</u> :	O <u>U</u> se rout	ter
	Addr <u>e</u> ss:	
Client ID     Client ID	C MAC address	) De <u>v</u> iće name
Assign IP Configuration		
Assign device name		
Device name:		Assign Name
Reset to factory settings		<u>H</u> eset
Close		Help

Browse Network - 12	Nodes			x		
<u>S</u> tart	! IP address	MAC address	Device type	Name		
	172.10.0.208	00-1B-1B-46-40-79	SCALANCE	h-rack-12		
Stop	172.10.0.203	00-1B-1B-06-1B-72	SCALANCE	labor1-x2		
	172.20.66.202	08-00-06-9A-6D-26	INC	UPD-Terr		
	169.254.210.195	00-1B-1B-7E-95	SIMATIC-PC	es13		
🔽 F <u>a</u> st search	172.10.0.204	00-1B-1B-06-1B-CC	SCALANCE	labor1-x2		
	172.10.0.202	00-1B-1B-89-02-3F	SCALANCE	labor2-x2l		
	172.10.0.201	08-00-06-97-18-BE	SCALANCE	labor2-x4i		
	172.20.66.201	08-00-06-96-AE-AE		UPD-Terr		
	172.10.50.201	00-0E-8L-D-3-63-AE	SUALANUE	piatzouar		
	172.10.1.22	00-00-06-01-00-22	57-FC \$7.400	eszz		
	172.100.0.21	00-1B-1B-46-40-0D	SCALANCE	brack-10		
	172.10.0.200	00101040404000		macking		
	•			<b>F</b>		
	<u></u>					
Flash	MAC address: Inn.1	B.1B.85.25.11				
	Joort	5-15-03-23-11				
OK			Cancel	Help		

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,...).

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.

t Ethernet Node		
Ethernet node		
		Nodes accessible online
MAC <u>a</u> ddress:	00-18-18-85-25-11	<u>B</u> rowse
Set IP configuration		
Use IP paramet	ers	
		Gateway
<u>I</u> P address:	172.10.1.32	Do not use router
Subnet mas <u>k</u> :	255.255.0.0	C Use router
		Add 102.103.0.21
C Obtain IP addre Identified by Client ID	ss from a DHCP server	C Device name
Obtain IP addre     Identified by     O[ient ID     Client ID	ss from a DHCP server	C De <u>v</u> ice name
Obtain IP addre     Identified by     Ojient ID     Client ID:     Agsign IP Confi	ss from a DHCP server	C De <u>v</u> ice name
Obtain IP addre     Identified by     Ojient ID     Client ID     Client ID:     Assign IP Confi  Assign device name	ss from a DHCP server	C De <u>v</u> ice name
Obtain IP addre     Identified by     Ojient ID     Client ID:     Assign IP Confi  Assign device name:     Device name:	ss from a DHCP server          Image: Stress server         Image: Stress server         guration         Image: Stress server         Image: Stress server	C Deyjce name
Obtain IP addre     Identified by     Ojient ID     Client ID:     Assign IP Confi  Assign device name     Device name:  Reset to factory set	ss from a DHCP server          © MAC address         guration         pn-io         tings	C Degice name
Obtain IP addre     Identified by     Ojient ID     Client ID:     Assign IP Confi  Assign device name     Device name:  Reset to factory set	ss from a DHCP server          © MAC address         guration         pn-io         tings	C De <u>v</u> ice name Assign Name <u>R</u> eset

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

- 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".

Select Target Module		×
<u>T</u> arget modules:		
Module	Ra	cks Slot
CPU 410-5H	0	3
Select All		
OK	Cancel	Help

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.

Select Node Addre	Select Node Address						
Over which station a	Over which station address is the programming device connected to the module CPU 410-5H?						
<u>B</u> ack: <u>S</u> lot:	0 ÷ 3 ÷						
Target Station:	€ Local C Can be reached by r	neans of gatew	ay				
Enter connection t	to target station:						
IP address	MAC address	Module type	Station name	Module name	P		
172.10.1.32 192.168.1.1	00-1B-1B-85-25-11	S7-400			► I		
Accessible Nodes					_		
•					<mark>ا ا</mark>		
	<u>y</u>	/iew					
ОК			Cancel	Help			

The configuration has now been loaded into the AS.

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

# Introduction

From firmware V8.1 and in conjunction with SIMATIC PCS V8.1 or higher, the CPU 410 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).

NOTICE	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.

NOTICE	The following changes to the block can only be loaded in STOP mode:
	<ul> <li>Changed name of an input with configured message ("Message Event ID")</li> </ul>

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 (V9.0)" function manual. https://support.industry.siemens.com/cs/ww/en/view/109748700

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 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.
- Loading of the automation program was carried out with a CFC of Version V8.1 (or above)
- The firmware status of the CPU 410 is V8.1 (or above)
- There is enough storage space on the CPU for modified blocks
- There are enough reserve POs on the CPU

# 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.



 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.

# 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.

Select the S7 program to be checked.				
	Download in RUN	Program	Resources	Status
		TUWAS\AS410 B\CPU 410-5H\S7-Programm(1)		Г
		TUWES_Lib\S7 Program(1)		
		TUWES_Prj\AS410\CPU 410-5H\S7 Program(1)	calculating	
		TUWES_Prj\AS417\CPU 417-5 H PN/DP\S7 Program(2)		
Log file:	D:\Project\TU\	WES\TUWE_Lib\@CentralBstActualize.TXT	<u></u> the	er file
Back	<u>N</u> ext		Cancel	Help

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.

Resource information
Temporary work memory and communication job instances are used when downloading a CPU 410-5 in operating mode. The required resources can only be estimated prior to the type import.
An exact calculation is possible only immediately prior to the download. In some cases, only a complete download is possible.
Please read the information in the help.
Temporarily required work memory in bytes: 744 Bytes
Temporarily required communication job instances: 2
Close Help

Note

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

- 4. Close the "Resource information" dialog.
- 5. In the "Update block types" dialog, click on the "Next" button. 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.

U	pdate b	lock types				
	د 🌂	Select the block type:	s to be updated.			2(3)
Γ		Block type	Program	Consequence		Status
	✓	seMOTOR	TUWES_Prj\AS410\CPU 410	S Download in RUN is possible after adapting all ins	tances	
1			_			
	<u>B</u> ac	ck <u>F</u> inish			Cancel	Help
1						

- 6. Click on the "Finish" button. Wait until the updating procedure has been 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: Loading successful!" is displayed.

- 8. Click on 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.

Compile Program / Dowr	nload to Target Sy	stem	×
Compile Charts as Program	S7 Download		
CPU:	CPU 410-5H		
Program name:	AS410\CPU 410-5	H\S7 Program(1)\	
Scope Entire program Changes only			
Generate module driv	ers	<u>B</u> lock Driver Set	tings
Generate SCL source	3		
ОК		Cancel	Help

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

	,	
Compile Charts as Progra	am S7 Download	
CPU:	CPU 410-5H	
Program name:	AS410\CPU 410-5H\S7 Program(1)	
Download mode		_
C Entire program		
Changes only		
O To test CPU (enti	re program)	
	Show Changes	
Include user data b	locks	]
Include user data b	llocks	
Include user data b     Download S7 program	locks ? online help about possible effects	
Include user data b     Download S7 program	locks ? online help about possible effects Versionsprojekt durchsuchen	
Include user data b     Download S7 program     Read the notes in the o     Auto-archiving     D:\Project\TUWES\	locks ? online help about possible effects Versionsprojekt durchsuchen	
Include user data b     Download S7 program     Read the notes in the o     Auto-archiving     D:\Project\TUWES\     Archive project al	locks ? online help about possible effects Versionsprojekt durchsuchen	]

11. Click on the "OK" button.

The interface changes are downloaded into the CPU 410 in RUN mode.

# 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.

NOTICENote that you must create new blocks (new number) for the instances of<br/>the changed block types that were loaded into the CPU by means of TCiR.<br/>The system deactivates the blocks in WinCC until the OS server has be<br/>been re-compiled and loaded.In the case of a redundant OS server, you can do this before loading AS<br/>TCiR and loading one of the servers. This means that the plant can be<br/>operated before and after AS TCiR loading.Note, however, that when doing this data can be lost in the area of<br/>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 (V9.0)" function manual. https://support.industry.siemens.com/cs/ww/en/view/109748700

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

## 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 will find detailed information on the PO count in the following FAQs: "How are the licenses for the AS and OS counted in PCS 7 V7.0 onwards?" https://support.industry.siemens.com/cs/ww/en/view/38855207 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.

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

NOTICE 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.

U	ownload in RUN	Program	Resources	Sta
7		TUWAS\AS410_B\CPU 410-5H\S7-Programm(1)		Г
⊽		TUWES_Lib\\$7 Program(1)		1
7 C		TUWES_Prj\AS410\CPU 410-5H\S7 Program(1)	calculating	
7		TUWES_Prj\AS417\CPU 417-5 H PN/DP\\$7 Program(2)		

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.

# 2 Application scenarios

Resource information
Temporary work memory and communication job instances are used when downloading a CPU 410-5 in operating mode. The required resources can only be estimated prior to the type import.
An exact calculation is possible only immediately prior to the download. In some cases, only a complete download is possible.
Please read the information in the help.
Temporarily required work memory in bytes: 744 Bytes
Temporarily required communication job instances: 2
Close Help

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.

# 2.4 Configuring the PN/Ethernet interfaces of the CPU 410

In this chapter you will find information about configuration options for the PN/Ethernet interfaces of the CPU 410. The configurations are explained using the example of the CPU 410-5H and can be applied in the same way for the CPU 410E.

# 2.4.1 Standard Automation System – Configuring the interfaces for connection to the plant bus and the field bus without using an external CP

Due to its two PN/Ethernet interfaces, the CPU 410 can provide the option of implementing a connection to the plant bus and the field 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
- Configure the interface for the field bus

The following figure shows the configuration schematically:

Fig. 2-1



# 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.
- 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.

# Configuring 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.

HW Config	- [SIMATIC 400(1) (Config	uration) AWB_CPU_2]
Station E	dit Insert PLC View Opti	ions Window Help
🗅 📂 🔓	9 🖫   🖨    Þa 🖻    I	🏜 🎰 📳 🗁 😤 😽
(0) UR1		
1	PS 405 20A	
3	CPU 410-5H	PROFIRIJS(2): DR master system (1)
X1	DP	
IF1		
X5	PN-10-X5	
X5 P1 R	Port 1	
X5 P2 R	Port 2	
X8 X8 P1 R	PIV-IU-X8	
X8 P2 R	Port 2	
5		
7		
1		

- 2. Enter an unequivocal device name in the "General" tab.
- 3. Click on the "Properties..." button

roperties - PN-IO-X	5 (R0/53.5)		
Media Redund	lancy	Time-of-Day Synchronization	Options
General	Addresses	PROFINET	Synchronization
Short description:	PN-IO-X5		
Device name:	AS01		
Interface Type: Device number: Address: Networked:	Ethemet 0 192.168.0.1 No	Properties	
Comment:			
			Ţ
ОК		(	Cancel Help

<ol><li>Enter a valid IP address and subnet mask for th</li></ol>	he plant bus
---	--------------

Properties - Ethernet interface PN-IO-X5 (R0/53.5)	×
General Parameters	
If a subnet is selected, the next available addresses are suggested.	
IP address:       192.168.1.1       Gateway         Subnet mask:       255.255.255.0       © Do not use router         C       Use router         Address:	
Subnet:	
not networked Properties	
Delete	
OK Cancel Help	

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.

Properties - Ethernet interface PN-IO-X5 (R0/53.5)	×
General Parameters	
If a subnet is selected, the next available addresses are suggested.	
IP address:       192.168.1.1       Gateway         Subnet mask:       255.255.255.0       © Do not use router         © Use router       Address:	
Subnet: not networked Plantbus Properties Delete	
OK Cancel Help	

6. Confirm your settings with "OK".

The interface is connected to the plant bus.

From PCS V9.0 a PROFINET IO system is also created for connecting the PROFINET IO modules. This is not needed and can optionally be deleted using the short cut menu
# Configuring the interface for the field bus

1. Open the properties for the "PN-IO-X8" interface of the CPU 410-5H in the HW Config.

🔣 HW Config	fig - [SIMATIC 400(1) (Configuration) AWB_CPU_2]	
Station E	Edit Insert PLC View Options Window Help	
🗅 😅 🔓	}~ ≅ 🐘   ⊕    h= n≥    🏜 🏜   <mark>  ]</mark> : ==   🎇   \?	
(0) UR1	81	
1	PS 405 20A	
3	CPU 410-5H	
X1	PROFIBUS(3): DP master system	em (1)
IF1		
X5	AS01 Planthus: PROFINET IO system	(100)
X5 P1 R	R Port 1 Handos Horne Ho system	(100)
X8	[ <b>₽</b> PN-iO-X8	
X8 P1 R X8 P2 R	R Port 1 R Port 2	
5		

2. Enter an unequivocal device name in the "General" tab.

#### 3. Click on the "Properties..." button

perties - PN-I(	)-X8 (R0/53.8)			
Media rec General	lundancy Addresses	Time-of-Day S PROFINET	Synchronization Security Events	Options Synchronization
ı Short description	PN-IO-X8			1
Device name:	AS01-PN-I	O-X8		
<ul> <li>Support devia</li> <li>Interface</li> <li>Type:</li> </ul>	ce replacement with Ethemet	out exchangeable medi	um	
Address:	0 192.168.1.1			
Networked:	no	Properties	J	
Comment:			-	
				*

4. Enter a valid IP address and subnet mask for the field 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 field bus and assigned to the interface.

Properties - Ethernet interface PN-IO-X8 (F	R0/53.8)
General Parameters	If a subnet is selected, the next available addresses are suggested.
IP address:         192.168.0.1           Subnet mask:         255.255.255.0	Gateway Do not use router Use router Address:
Subnet: not networked Fieldbus	New Properties
ОК	Cancel Help

6. Confirm your settings with "OK".

From PCS 7 V9.0 a PROFINET IO system is also created for connecting the PROFINET IO devices. With PCS 7 Version V8.2 and lower, right-click to select the interface and select the "Insert PROFINET IO system" command from the context menu.

#### Result

The interface X5 of the CPU is configured for connection to the plant bus and the interface X8 for the connection of PROFINET devices

🗃 🔓	8 🗣 🧉 🕼 🛍	I 🛍 📳 🔡 💦
1	PS 405 20A	
3	CPU 410-5H	
¥1	DP	PROFIBUS(3): DP master system (1)
IF1		
IF2		
X5	AS01	
X5 P1 R	Port 1	
X5 P2 R	Port 2	
X8	AS01-PN-IO-X8	Fieldbus: PROFINET IO system (101)
X8 P1 R	Port 1	noideda. Hier to ayatem (101)
X8 P2 R	Port 2	

Note

For further information on PROFINET in SIMATIC PCS 7, e.g. recommended PROFINET network configurations, see the application example: "PROFINET in SIMATIC PCS 7 – Guidelines and Blueprints" <u>https://support.industry.siemens.com/cs/ww/en/view/72887082</u>

# 2.4.2 Standard Automation System – Configuring two separate PROFINET interfaces for connection to the field bus

When there is a large number of devices, the CPU 410 offers the option of configuring two PROFINET interfaces for connection to the field 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 field bus

The following figure shows the configuration schematically:

Fig. 2-2



#### 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

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

- 1. Open a PCS 7 multiproject in the SIMATIC Manager.
- 2. Insert a new sub-project using the "File > New project" command.
- 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

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

0ł	HW Conf	ig - [SIMATIC 400(1) (Config	iguration) AWB_CPU_2]
00	Station	Edit Insert PLC View Opti	otions Window Help
] [	) 🖻 🖁	. • • • • • • • • • • • • • • • • • • •	🛍 🋍 📳 🖽 👷
	(0) UR1		
	1	PS 405 20A	<b>_</b>
	3	CPU 410-5H	
	XI	DP	PROFIBUS(3): DP master system (1)
	IF1		
	IF2		
	X5	PN-10-X5	
	X5 P1 R	Port 1	
	X5 P2 R	Port 2	
	X8	PN-IO-X8	
	X8 P1 R	Port 1	<b></b> _
	<u>X8 P2 R</u>	Port 2	
	5	HE CP 443-1	
	X1	PN-IO	
	XIPIR	Port 7	
	XTP2R	Port 2	
	-		<b>▼</b>

- 3. Open the "General" tab and enter an unequivocal device name.
- 4. Click on the "Properties..." button.

Properties - PN-IO (R	0/55.1)				×
General Addresses	IP Configuratio	n PROFINET	Synchronizati	on Media Redund	ancy
Short description:	PN-IO				
Device name:	AS02				
L					
Support device r	eplacement with	nout exchangeab	le medium		
Interface					
Type:	Ethemet				
Device number:	0				
Address:	192.168.0.1				
Networked:	No	Properties	i		
<u>C</u> omment:					
					<u> </u>
					<b>T</b>
,					
ОК				Cancel	Help

5. Activate the check box "Set MAC address/use ISO protocol" and assign the MAC addresses you wish.

Enter a valid IP address and subnet mask for the plant bus or deactivate the option box "use IP protocol".

6. Assign an existing subnet to the interface or create a new subnet for it.

Properties - Ethernet interface PN-IO (R0/9	55.1) <u>×</u>
General Parameters	
✓ Set MAC address / use ISO protocol         MAC address:       08-00-06-01-00-13         ✓ IP protocol is being used         IP address:       192.168.1.2         Subnet mask:       255.255.0	Gateway © Do not use router
	Address:
Subnet: not networked Plantbus	New Properties Delete
ОК	Cancel Help

 Confirm your settings with "OK". The interface of the CP443-1 is connected to the plant bus.

# Configuring the PROFINET interfaces for the field bus

When configuring interfaces X5 and X8, it must be borne in mind that the IP addresses of interfaces X5 and X8 must be located in different IP address areas.

- 1. Open the properties of the "PN-IO-X5" interface and enter an unequivocal device name in the "General" tab.
- 2. Click on the "Properties..." button.

Media redundancy     Time-of-Day Synchronization     Options       General     Addresses     PROFINET     Security Events     Synchronization       Short description:     PN-IO-X5       Device name:     AS02-PN-IO-X5       Image: Support device replacement without exchangeable medium       Interface       Type:     Ethemet       Device     0       Address:     192.168.0.1       Networked:     no	operties - PN-IO	X5 (R0/53.5)				
Short description:       PN-IO-X5         Device name:       AS02-PN-IO-X5         ✓       Support device replacement without exchangeable medium         Interface       Type:         Ethernet       Device         Device       0         Address:       192.168.0.1         Networked:       no         Properties	Media redu General	indancy Addresses	Time-of-Day Sy PROFINET	nchronization Security Events	Options	ation
Device name:     AS02-PN-IO-X5       Support device replacement without exchangeable medium       Interface       Type:     Ethernet       Device     0       Address:     192.168.0.1       Networked:     no	Short description:	PN-IO-X5				
Support device replacement without exchangeable medium Interface Type: Ethemet Device 0 Address: 192.168.0.1 Networked: no Properties	Device name:	AS02-PN-IO	X5			
Address: 192.168.0.1 Networked: no Properties	Interface Type: Device	Ethemet 0				
	Address: Networked:	192.168.0.1 no	Properties			
Comment:	Comment:	l				
	OK				Cancel	Help

- 3. Enter a valid IP address and subnet mask.
- 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 field bus and assigned to the interface.

Properties - Ethernet interface PN-IO-X5 (R0/S3.5)	×
General Parameters	
If a subnet is selected, the next available addresses are suggest	ed.
IP address: 192.168.2.1 Subnet mask: 255.255.255.0 Gateway © Do not use router O Use router Address:	
Subnet: not networked Plantbus Fieldbus1 Properties Delete	
OK Cancel	Help

5. Confirm your settings with "OK".

From PCS 7 V9.0, a PROFINET IO system for connecting the PROFINET IO modules is created automatically. If a PCS 7 in version V8.2 and lower is being used, select the interface with the right mouse button and select the "Insert PROFINET IO system" command in the context menu.



 Repeat steps 1-5 for "PN-IO-X8" interface. In this example, the device name "AS02-PN-IO-X8", the IP address "192.168.3.1" (IP address range different from that of interface X5) and the new subnet "Fieldbus2" are used.

#### Result

The CP 443-1 is used for connecting to the plant bus. The internal interfaces of the CPU X5 and X8 are both configured for the connection of PROFINET devices.



# Note For further information on PROFINET in SIMATIC PCS 7, e.g. recommended PROFINET network configurations, see the application example: "PROFINET in SIMATIC PCS 7 – Guidelines and Blueprints" https://support.industry.siemens.com/cs/ww/en/view/72887082

#### 2.4.3 High-availability automation system – Configuration of the interfaces

Highly available automation systems based on the CPU 410 enable the connection of PROFINET devices via simple S2 system redundancy as well as the configuration of redundant PROFINET configurations (R1).

For the segmentation of networks or when there is a large number of devices, the CPU 410 offers the option of configuring both PROFINET interfaces for connection to the field bus. In the following configuration the interface X5 is used for the connection of devices via simple system redundancy S2 and the interface X8 for the configuration of a redundant PROFINET configuration (R1). In the redundant PROFINET configuration (R1), the devices have two interface modules and are thus connected to the high-availability automation system via two separate PROFINET networks.

In this case, the connection to the plant bus is made via external CPs. Alternatively, the connection to the plant bus can also take place via the PROFINET/Ethernet interfaces integrated in the CPU. If internal interfaces are used to connect to the plant bus, these cannot be used for PROFINET.

The configuration procedure is carried out in the following steps:

- Adding a new AS station to the project
- Configuring the interface of the CPs for the plant bus
- Configuring the PROFINET interfaces for the field bus

The following figure shows the configuration schematically: Fig. 2-3



#### Adding a new AS station to the project

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

- 1. Open a PCS 7 multiproject in the SIMATIC Manager.
- 2. Insert a new sub-project using the "File > New project" command.
- 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 redundancy station (AS410-2H) with a CP 443-1.

#### Configuring the interface of the CPs for the plant bus

- 1. Open the AS station with the CPU 410-5H in the HW Config.
- 2. Open the properties for the "PN-IO" interface of the CP 443-1 ion Rack 0.

HW Confi	g - [SIMATIC H Station(1) (	Configuration) AV	WB_CPU]
Station	Edit Insert PLC View Opt	tions Window Help	
) 🖻 🔓	🛢 🗣   🚭    Pa 🔁	🏜 🏜   📳 📼   🖁	₩ N?
(0) LIR2			
l' -	PS 400 TUA	-	
3	CPU 410-5H		
ľ			
X1	DP		PROFIBUS(1): DP master system (1)
IF1	H Sync module		
IF2	H Sync module		
X5	PN-10-X5		
X5 P1 R	Port 1		
X5 P2 R	Port 2		
X8 X0.01.0	PN-IO-X8		
VODDD	Port 2		
5			
X1	PN-KO		
X1P1R	Port 1		
X1 P2 R	Port 2		
6		<b>•</b>	
(I) URZA	LU-H		
1	PS 405 10A	<b>_</b>	
3	CPU 410-5H(1)		
			PROFIBILIS(2): DP master system (2)
X7			Thomboo(z). Dr master system (z)
IF I IE2	H Sync module		
X5	PN-IO-X5		
X5 P1 R	Port 1		
X5 P2 R	Port 2		
X8	PN-IO-X8		
X8 P1 R	Port 1		
X8 P2 R	Port 2		
5	CP 443-1(1)		
X1	PN-IO	]	
XTPTR	Port 1		
XTP2R	Port 2		
0	1		

- 3. Open the "General" tab and enter an unequivocal device name.
- 4. Click on the "Properties..." button.

Properties - PN-	-IO (R0/55.1)	×
General Addre	esses   IP Configuration   PROFINET   Synchronization   Media redundan	cy
Short description	ion: PN-IO	
Device name:	AS03-R0	
Support de	evice replacement without exchangeable medium	
Interface		
Туре:	Ethemet	
Device	0	
Address:	192.168.0.1	
Networked:	no Properties	
Comment:		
		<b>_</b>
1		
ОК	Cancel	Help

 Activate the check box "Set MAC address/use ISO protocol" and assign the MAC addresses you wish.
 Enter a valid ID address and subnet mask for the plant bus or deactivate the

Enter a valid IP address and subnet mask for the plant bus or deactivate the option box "use IP protocol".

6. Assign an existing subnet to the interface or create a new subnet for it.

MAC address: 08-00-06-01-00-14  IP protocol is being used IP address: 192.168.1.3 Subnet mask: 255.255.255.0  Subnet: not networked Plantbus	Gateway
--	---------

- Confirm your settings with "OK". The interface of the CP443-1 is connected to the plant bus.
- Repeat steps 1-7 for CP443-1 in Rack 1. In this example, the device name "AS03-R1", the IP address "192.168.1.4" (the same IP address range as the CP443-1 in rack 0) and the existing subnet "Plant bus" are used.

#### Configuring the PROFINET interfaces for the field bus

In the following, the interface X5 is configured for the connection of devices via simple system redundancy S2 and the interface X8 is used to create a redundant PROFINET configuration (R1). No provision has been made for the incorporation of S2 devices into the redundant R1 network.

For the connection of devices via simple system redundancy S2, IP addresses in the same IP address area must be used for the corresponding interfaces of the CPU.

When configuring the interfaces of R1 networks, the following must be borne in mind in respect of the IP addresses:

- In a purely R1 configuration without a Y switch and without embedded S2 devices, the two subnets can be in the same IP address ranges or in different ones.
- In a mixed configuration (R1 and S2 devices), the two subnets must be in the same IP address range.
- When using high-precision time stamps (SoE), the subnets must use different IP address ranges.
- 1. Open the properties of the "PN-IO-X5" interface in Rack 0 and enter an unequivocal device name in the "General" tab.
- 2. Click on the "Properties..." button.

roperties - PN-IO	-X5 (R0/53.5)				l
Media redu General	undancy Addresses	Time-of-Day PROFINET	Synchronization Security Events	) C Sync	)ptions :hronization
Short description:	PN-IO-X5				
Device name:	AS03-R0-P	N-IO-X5			
Support devic	e replacement witho Ethemet 0	ut exchangeable med	lium		
Networked:	no	Properties			
Comment:					
					×
ОК				Cancel	Help

- 3. Enter a valid IP address and subnet mask.
- 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 field bus and assigned to the interface.

#### 2 Application scenarios

Properties - Ethernet interface PN-IO-X5 (R0/53.5)	×
General Parameters	
If a subnet is selected, the next available addresses are suggested.	
IP address: 192.168.0.1 Subnet mask: 255.255.255.0 Gateway C Do not use router C Use router Address:	
Subnet:	וו ר
not networked New	
Fieldbus_1 Properties	]
Delete	
OK Cancel He	elp

5. Confirm your settings with "OK".

From PCS 7 V9.0 a PROFINET IO system is also created for connecting the PROFINET IO devices. If a PCS 7 in version V8.2 and lower is being used, select the interface with the right mouse button and select the "Insert PROFINET IO system" command in the context menu.



6. Repeat steps 1-5 for configuring the interfaces "PN-IO-X5" in Rack 1, "PN-IO-X8" in rack 0 and "PN-IO-X8" in Rack 1, with the data from the following Table.

	Rack 0: X5	Rack 1: X5	Rack 0: X8	Rack 1: X8
Device name	AS03-R0-PN- IO-X5	AS03-R1-PN- IO-X5	AS03-R0-PN- IO-X8	AS03-R1-PN- IO-X8
IP address	192.168.0.1	192.168.0.2	192.168.3.1	192.168.4.1
Subnet mask	255.255.255.0	255.255.255.0	255.255.255.0	255.255.255.0
Subnet	Fieldbus_1	Fieldbus_1	Fieldbus_R1_1	Fieldbus_R1_2
	Joint s	subnet	Different	subnets

#### Result

Both CP 443-1 units are configured for connection to the plant bus. The internal interfaces of the CPU are configured for the connection of PROFINET devices in the following manner:

- X5: Joint subnet for the connection of S2 devices
- X8: Separate subnet for the connection of R1 devices



**Note** For further information on PROFINET in SIMATIC PCS 7, e.g. recommended PROFINET network configurations, see the application example: "PROFINET in SIMATIC PCS 7 – Guidelines and Blueprints" https://support.industry.siemens.com/cs/ww/en/view/72887082

# 2.5 Configuration modifications in operation – CiR/H-CiR

Configuration in Run (CiR) is a function that enables the system and configuration (e.g. the addition or modification of hardware) to be changed during operation without causing a plant standstill. This function is available to varying degrees for both standard automation systems and H-systems.

#### Configuration in Run in a standard automation system (CiR)

When CiR is used in a standard automation system, the process execution of the loading process is paused for a brief time interval (CiR synchronization time). The process inputs and outputs retain their last value during this time. When using the CPU 410-5H, the maximum CiR synchronization time is 60 ms.

#### Configuration in Run in a high-availability automation system (H-CiR)

Besides the modifications that are possible in a standard automation system, it is also possible to modify some CPU parameters in a high-availability automation system.

Sequence of an H-CiR process:

- Modify the hardware configuration offline
- When loading:
  - Stop standby CPU
  - Upload new hardware configuration to the standby CPU.
  - Switch over to the CPU with modified configuration
  - Update the second CPU
- The system works redundantly again

The changes that are possible as a CiR/H-CiR operation depend on whether the (changed) IO device has CiR functionality.

The following table gives an overview:

Table 2-1

CiR/H-CiR operation	Device without CiR	Device with CiR
Add IO device	~	~
Remove IO device	~	~
Add submodule	×	~
Remove submodule	×	~
Reassign submodule parameters	×	~
Interface configuration (e.g. enable/disable ports, topology configuration)	×	~

Note

Additional information on Configuration in Run is available in the following documents: "PROFINET in SIMATIC PCS 7 – Guidelines and Blueprints" <u>https://support.industry.siemens.com/cs/ww/en/view/72887082</u> "SIMATIC PCS 7 Process Control System CPU 410 Process Automation" <u>https://support.industry.siemens.com/cs/ww/en/view/109748473</u>

# 2.5.1 Change parameter assignment of a submodule

#### Scenario

In the PROFINET network of an AS 410 there is a distributed SIMATIC ET 200SP HA periphery with the configurable periphery module "AI-DI 16 / DQ 16x24VDC HART HA". The plan is in operation and channel 0, which has previously been used as a digital input, is to be made available as an analog input (0..24 mA HART) in the future. The procedure for changing parameterization and loading during operation is described below.

The following figure shows the configuration schematically:

Fig. 2-4



#### Procedure

Changing the parameterization is done as described in the following steps:

- Archiving the CiR load-capable project
- Changing parameterization
- Checking CiR capability
- Loading the hardware configuration during operation

#### Requirements

- The PCS 7 multiproject is open in SIMATIC Manager.
- The hardware configuration and the automation program have been compiled and loaded into the CPU 410.
- The firmware status of the CPU 410 is V8.2 (or above)
- The CPU 410 is in Run mode.
- The device whose submodule is to be re-parameterized, must be CiR-capable. ET 200SP HA supports CiR.

#### Changing parameter assignment of a periphery module

- 1. Archive the project before making any changes. This way, you may still be able to reject the changes, should CiR capability be lost.
- 2. Double-clicking on the periphery module to open "AI-DI16/DQ16 HART HA" the object properties.



 Switch to the "Parameters" tab and in the tree, open "channel 0 > AI". Until now, Channel 0 has been parameterized as a Digital Input, i.e. the Analog Input (AI) is deactivated.

neral Addresses Identification Parameters		
Parameters	Value	<b>_</b>
白-🔄 Channel 0		
þ-∰ AI		
—		
—		
—		
—		
—		
—		
— 🕮 Measuring type	Deactivated	
—		
—		
–≝) Smoothing		
—Ⅲ Interference frequency suppression		
—		
— Hardware interrupt high limit 1		
–≝ High limit 1		
—		
— Low limit 1		
— Hardware interrupt high limit 2		
–≝ High limit 2		
–III Hardware interrupt low limit 2		······

4. In the "Measurement type" drop-down list, select "Current (2wire)" and confirm the settings with OK.

Parameters	Value
- 🔄 Parameters	
Tross-channel	
🗄 🦳 Channel 0	
☐ Diagnostics Short-Circuit to L+	
— Diagnostics Overflow	
<ul> <li>— Diagnostics Underflow</li> </ul>	
– 🖺 Diagnostics Wire Break	
<ul> <li>— Diagnostics Sensor supply</li> </ul>	
— Diagnostics HART	
—	Current (2-wire)
—	420 mA HART
—Ⅲ Number of HART frame repeats	5
— 🕮 Smoothing	none
—Ⅲ Interference frequency suppression	10 Hz
–≝) Wire break limit	1.185 mA
—Ⅲ Hardware interrupt high limit 1	
–≝ High limit 1	
—Ⅲ Hardware interrupt low limit 1	
– III Low limit 1	

# **Checking CiR capability**

1. Select the menu command "Station > Check CiR capability" to check whether it is possible to load modifications during operation.

B	H	W Con	fig - [S	IMATI	C 400	(1) (Co	onfigurat	tion) S	7Pro	_1_P	rj]	
800	5	Station	Edit	Insert	PLC	View	Options	Window	Hel	р		
		New. Open	 	-			Ctrl- Ctrl-	+N +O	Þ	22	<b>N?</b>	
	-	Close		<b>_</b>					-			
	_	Save Save	and Co	mpile			Ctrl	+S	_			
Ш	_	Prope	erties						Ŀ			
		Impo Expo	rt rt									
		Consi	istency	Check			Ctrl	+Alt+K		L		PROFIBUS(I): DP master system (I)
		Ched	k CiR C	ompatibi	ility		Ctrl	+Alt+F				
		Print. Print Page	 Previev Setup.	v			Ctrl	₩₽				Fieldbus: PROFINET IO system (100)
		1 S7F 2 S7F 3 Inn 4 Inn	Pro_1_F Pro_1_F ovation	rj\SIMA rj\SIMA TourV9 TourV9	TIC 4( TIC P( \\$741( \\$513	00(1) C Station DH	n(1)					
		Exit					Alt+	F4				

 The CiR capability test returns the result that the station is consistent, i.e. the changes can be loaded during operation. Confirm the dialog with "Close".

Check CiR Compatibility	×
List of Messages:	
The station is consistent.	
Message Check CB Compatibility (1230-5060)	Holp Tout
[Check Cirr Company (1200.0000)	
The station is consistent.	
	Go To
Close Save	Help

#### Loading the hardware configuration during operation

1. Save and compile your configuration, and then click on "load to module".



2. Select the "Load station configuration in operating mode RUN" and confirm with the "OK" button.

Download to Module		×
You have configured CiR objects.		
Download station configuration in RUN	mode	
O Download in STOP mode		
ОК	Cancel	Help

#### Result

Channel 0, which has previously been used as a digital input, is now available as an analog input (0..24 mA HART).

## 2.5.2 Adding a device

#### Scenario

As part of a function expansion, the periphery of a system is expanded by a Compact Field Unit (CFU). Since the process must not be interrupted, the CFU is to be integrated into the PROFINET network of the AS 410 during operation. The following figure shows the configuration schematically:

Fig. 2-5



The connection of the CFU should be linear to the free port 2 of the ET 200SP HA. According to the recommendations for PCS 7, the topology is configured for the use of the device replacement function without removable media and unused ports are deactivated for security reasons This means that port 2 of the ET 200SP HA must be activated for the integration of the CFU and the topology configuration must be adapted.

#### Procedure

Adding a device during operation is carried out in the following steps:

- Archiving the CiR load-capable project
- Adding a device in the HW Config
- Adjusting the topology configuration and interface parameterization
- Checking CiR capability
- Loading the hardware configuration during operation
- Connection of the CFU (real plant)

#### Requirements

- The PCS 7 multiproject is open in SIMATIC Manager.
- The hardware configuration and the automation program have been compiled and loaded into the CPU 410.
- The firmware status of the CPU 410 is V8.2 (or above)
- The CPU 410 is in Run mode.
- All neighboring devices of the new device must support CiR (necessary for the adaptation of the topology configuration and the interface parameterization)

#### Adding a device

- 1. Archive the project before making any changes. This way, you may still be able to reject the changes, should CiR capability be lost.
- 2. Drag&drop the Compact Field Unit from the module catalog to the PROFINET IO system



3. Open the "Object Properties..." via the context menu of the CFU and adapt the device name and the IP address according to the plant planning.

#### Activating Port 2 of the ET 200SP HA

For security reasons it is recommended that ports which are not needed be deactivated. In order to use them later, they have to be re-activated. This is only possible with CiR-capable devices. ET 200SP HA supports CiR.

1. Select the ET 200SP HA and open the properties of the port by double-clicking ON the port "X1 P2 R".

HW Config - [SIMATIC 400(	1) (Configuration) S7Pro_1 View Options Window Help	_Prj]					× ם ـ_ × اھ ـ_
D 🚅 🐎 🛢 🗞   🚭   I	6 C    🟜 🏜   🗗 🗆   4	<b>₿ №?</b>					
(0) UR2ALU 1 PS 405 10A 3 CPU 410-56		·				<u>•</u>	Eind: nt nt Profile: Standard
X1 IF1 IF2 X5 P1R X6 P1R X6 P1R X6 P1R X6 P1R Port 1 X6 P1R Port 1 X6 P1R Port 1 X8 P1R Port 1 X8 P1R Port 1 X8 P1R Port 2 <b>5</b> <b>5</b> <b>4</b> CP 443-1 X1 X1 P2R Port 2 <b>5</b> <b>6</b> CP 443-1 X1 Port 2 <b>6</b> 7 8 8			PROF Fieldbus: PRO DIMI556	BUS(1): DP m	aster s em (100	))	FOUNDATION FIELDBUS     FOUNDATION FIELDBUS     PROFIBUS PA     PROFINET IO     Additional Field Devices     Gateway     Gateway     Compact Field Unit     Gateway     FOUNDATION FIELDBUS     FOUNDATION      FOUNDATION      FOUNDATION      F
							Ident Svstems
(1) IM155-6-PN-HA				P	ack <u>A</u> o	idresses	Network Components
Slot Module	Order number	I address	Q address	Diagnost	R	C	Sersors     Sersors     Sersors     Sersors
1 📑 IN 155-6-PN-	HA GDL1 155-GAUOO-OPMO			16368*		<u> </u>	E SIMATIC 300
X1 FN-10				16367*			SIMATIC PC Based Control 300/400
X1 P2R Byt 2 R 145	60/11936JE00.0MA			16369*	-		6ES7 655-5PX11-0X0
2 AI-DI16/DU1 20	6 H/6DL1 133-6EW00-0PH1	512551	512513	170203		<b>_</b>	Interface with PROFINET interface V2.3 (RT) with cycle time as of 250 microseconds; media redundancy(MRP); ↓
Press F1 to get Help.							

- 2. Switch to the "Options" tab and activate the port by selecting "Automatic settings" in the "Transfer media/duplex" drop-down list.
- 3. Confirm the properties by clicking on the "OK" button.

Transmission medium / dupley:	Automatic	eettinge		
	Automatic	settings		
Monitor				
Disable autonegotiation				
-Boundaries				
End of sync domain				
End of detection of accessible r	odes			
End of topology discovery				

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# Deactivating the unrequired CFU port

For security reasons it is recommended that ports which are not required be deactivated.

1. Select the CFU and open the properties of the port by double-clicking on the port "X5 P2 R".



- 2. Change to the "Options" tab and deactivate the port by selecting "Disable" in the "Transfer media/duplex" drop-down list.
- 3. Confirm the properties by clicking on the "OK" button.

Connection	
Transmission medium / duplex: Disable	•
🗖 Monitor	
Disable autonegotiation	
Boundaries	
🗖 End of sync domain	
End of detection of accessible nodes	
End of topology discovery	

#### Adjusting the topology planning

Topology planning is a precondition for the device replacement function without removable media or automatic commissioning. If the function is active, the CPU can automatically assign to new, as yet unnamed devices, the name configured in HW Config.

- 1. Right-click on the PROFINET IO system and select the "PROFINET IO Topology..." command from the shortcut menu.
- 2. Switch to the "Graphic view" tab.

Topology Editor	×
Table view Graphic view Offline/online comparison	
SIMATIC 400(1)       IM155-6-PN-HA         ASI3PHIO (ASI3(CP)       IM155-6-PN-HA         MS(CPU 149-1)       Image: CPU-PN-V1.0         Image: CPU-PN-V1.0       Image: CPU-PN-V1.0         Move picture mode deactivated       Image: Object Properties         Online       Update         Object Properties       Options         Print	Miniature View
OK	Cancel Help

- 3. Drag&drop Port 2 of the ET 200SP HA to connect with Port 1 of the CFU.
- 4. Confirm the dialog "Interconnection properties" with the "OK" button to establish a connection.

Partner port:	CFU-PN	I-V1.0 \ Port 1 RJ45 (X5	P1 R)			
Medium:	Port:	Copper	Partner port:	port: Copper		
	Copper					
Cable Data						
🖸 Cable length:		Not specified	(Signal delay time:	)		
C Signal delay tim	e [µs]:	0.00				
Comment						

5. Confirm the adaptations in the topology editor by clicking on the "OK" button.



# **Checking CiR capability**

1. Select the menu command "Station > Check CiR capability" to check whether it is possible to load modifications during operation.

Шł	H١	N Con	fig - [S	SIMATI	C 400	(1) (Co	onfigurat	tion) S	7Pro	_1_P	rj]	
0	S	tation	Edit	Insert	PLC	View	Options	Window	Help	p		
		New. Open Open Close	  ONLIN	١E			Ctrl- Ctrl-	+N +O			<b>k</b> ?	
	_	Save Save Prope	and Co	ompile			Ctrl	+S	-			
	_	Impor Export	rt rt	Check			Ctrl	+Alt+K				PROFIBUS(1): DP master system (1)
	Γ	Chec	k CiR C	ompatib	ility		Ctrl	+Alt+F	1			
		Print. Print Page	Preview Setup	w			Ctrl	ŧ₽	Fieldbus: PROFINET IO system (10		Fieldbus: PROFINET IO system (100)	
		1 S7F 2 S7F 3 Inn 4 Inn	Pro_1_F Pro_1_F ovation ovation	Prj\SIMA Prj\SIMA hTourV9 hTourV9	(TIC 4 (TIC P (\$741) (\$513	00(1) C Statio DH	n(1)					
		Exit					Alt+	F4				

 The CiR capability test returns the result that the station is consistent, i.e. the changes can be loaded during operation. Confirm the dialog with "Close".

Check CiR Compatibility	×
List of Messages:	
The station is consistent.	
Message Check CiR Compatibility (1230:5060)	Help Text
The station is consistent.	Go To
Close Save	Help

#### Loading the hardware configuration during operation

1. Save and compile your configuration, and then click on "load to module".



2. Select the "Load station configuration in operating mode RUN" and confirm with the "OK" button.

Download to Module	×
You have configured CiR objects.	
Download station configuration in RUN mode	
O Download in STOP mode	
OK Cancel Help	

#### Connection of the CFU (real plant)

Thanks to the topology configuration, the automatic commissioning for the CFU can be made use of. As a prerequisite for automatic commissioning, the CFU used must be reset to factory settings and the actual topology (physical connection) must match the target topology (topology editor). If these requirements are met, the CFU is automatically addressed as soon as the hardware configuration has been loaded.

Connect Port 2 of the ET 200SP HA with Port 1 of the CFU.

#### Result

The Compact Field Unit has been integrated in the PROFINET network during operation and is now available as a periphery.

# 2.6 Upgrade with CPU 410 Expansion Packs

#### 2.6.1 Introduction

There are two kinds of CPU 410 Expansion Packs:

- CPU 410 Expansion Pack (PO) Upgrade of the process objects of a CPU 410-5H
- CPU 410 Expansion Pack (PN Red) Activation of the function expansion for the support of redundant PROFINET subsystems (R1)

#### Enabling functional expansion to support redundant PROFINET subsystems (R1)

The "PCS 7 CPU 410 EXPANSION PACK (PN RED)" is required for the connection of PROFINET devices via redundant PROFINET R1 configurations. This is available in two variants:

- License on USB stick: 6ES7653-2CX01-0XE0
- License via Online software delivery (download): 6ES7653-2CX01-0XK0

A firmware version 8.2 or higher is a pre-requisite to be able to load CPU 410 Expansion Pack PN Red.

#### Online upgrade of CPU 410-5H process objects

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).

#### **CPU 410 Expansion Pack (PO)**

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 for PO are available in the following sizes:

- 100 PO
- 500 PO

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 of a process object upgrade

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.

#### Table 2-2



The table below co	ontains further	examples:
--------------------	-----------------	-----------

#### Table 2-3

PO expansion by	CPU 410 expansion packs needed		
	Single AS	Redundant AS	
400 POs	4 x 100 POs	8 x 100 POs	
500 PO	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	

#### **Unlimited PO volume**

The PO volume can be increased to "Unlimited", i.e. to an unlimited volume of POs. Thereafter as many POs can be loaded as the physical storage will admit and until it is completely used up. There are two ways to increase the PO volume to "Unlimited":

- New purchase of CPU410-5H in bundle with PO 2K+. (Article number 6ES7654-5CQ00-0XF0)
- With the CPU Expansion Packs 100 and 500, the existing number of POs is extended to a total of 2600 POs. 2600 POs on a SEC of a CPU410-5H corresponds to an "Unlimited" PO volume.

# 2.6.2 Overview of work steps

The online upgrade for PO and PN Red is carried out in the following main steps (using the increase of 300 POs as an example):

Table 2-4

Schematic representation	Step
A constraint of the constraint	1. Order the CPU 410 expansion packs.
Activation File	<ol> <li>In the SIMATIC Automation License Manager (ALM), transfer the CPU 410 expansion packs to the CPU and create a PO activation file.</li> </ol>
Activation File 700 PO Relase File 700 PO Relase File PO 700 700 PO Relase File PO 700 700 PO Relase File PO 700 700 PO	<ol> <li>Send the PO activation file for checking and activation by means of a support request.</li> <li>Within 48 hours, you will receive by e-mail a PO release file (for each PO activation file sent) as confirmation of checking.</li> </ol>
Relase File       700 PO       700 PO       700 PO       Online Activation	<ol> <li>Transfer the PO release file to the SEC of the CPU using the ALM.</li> </ol>

## Note

In a redundant AS only the CPU in Rack 0 is selected. The POs/PN Red license is automatically given to both CPUs.

# NOTICEWhen performing an online upgrade of the process objects, observe the<br/>information and notes in the manual:<br/>"SIMATIC PCS 7 Service Support and Diagnostics (V9.0)"<br/>https://support.industry.siemens.com/cs/ww/en/view/109746550

#### 2.6.3 Order the CPU 410 expansion packs

You have the following options when ordering CPU 410 expansion packs (PO and PN Red):

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

g. 2-6					
SIEM	IENS		the my	Register now     Industry Mall     Product catalogue and online ordering     Industry Automation and Drive Techn	→ Logm g system for the ology. ▶ Site Explorer
> Home >	Search for: cpu 410 expansion pack				🚺 Catalog
cpu 410 ex	pansion pack	Search	<table-cell> Help</table-cell>		
Product IDs/I	Descriptions (6)   Product Categories (0)   Documents	; (30)			
Product	No. / Product Description	Listorice / Your price	•		
	> 6E57663-2CA00-0XE0 SIMATIC PCS 7, SOFTWARE, CPU 410 EXPANSION PACK (PO 100) UPGRADE OPTION F.1 INSTALLATION R-SW, WITHOUT SW AND DOCU. LICENSE KEY ON USB STICK, CLASS A, REFERENCE HW. PCS 7 IPC BUNDLE		> Show prices	Filter your search results Safety-related automation sy (4) others (2) Reset all	filters Apply Filter
	> 6ES7653-2CA00-0XK0 SIMATIC PCS 7, SOFTWARE, CPU 410 EXPANSION PACK (PO 100) UPGRADE OPTION F.1 INSTALLATION R-SW, WITHOUT SW AND DOCU. LICENSE KEY DOWNLOAD, CLASS A, REFERENCE HW: PCS 7 IPC BINUBLE **************************** E-MAIL ADDRESS IS MANDATORY FOR DELIVERY		> Show prices		
<sup>⊙</sup> ↓ This article	number is downloadable only.				
	> 6E57653-2CC00-0XE0 SIMATIC PCS 7, SOFTWARE, CPU 410 EXPANSION PACK (PO 500) UPGRADE OPTION F-1 INSTALLATION R-SW, WITHOUT SW AND DOCU, LICENSE KEY ON USB STICK, CLASS A, REFERENCE HW: PCS 7 IPC BUNDLE		> Show prices		
	> 6E57653-2CC00-0XK0 SIMATIC PCS 7, SOFTWARE, CPU 410 EXPANSION PACK (PO 500) UPGRADE OPTION F.1 INSTALLATION R-SW, WITHOUT SW AND DOCU. LICENSE KEY DOWNLOAD, CLASS A, REFERENCE HW: PCS 7 IPC BUNDLE E-MAIL ADDRESS 15 MANDATORY FOR DELIVERY		Show prices		
☉4 This article	number is downloadable only.				
	> 6E57653-2CX01-0XE0 SMATIC PCS 7, SOFTWARE, CPU 410 EXPANSION PARTINE DIRECTION SAFETY FOR USING REDUNDANT PROFINET SUBNETS UPORADE OPTION PCR 1 INSTALLATION (1 X AS, 2 X CPU) R. SW, WITHOUT SW AND DOCU LICENSE KEY ON USB STOCK (LASS 4, FURTHER INFORMATION SEE PCS 7 V9 0 README REFERENCE-HW: PCS 7 IPC BUNDLE		> Show prices		

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.

# 2.6.4 Creating the activation file using the Automation License Manager (ALM)

#### Requirements

The CPU 410 must be accessible from the Engineering Station. A PCS 7 project (HW Config and program) must be loaded. Modifications in the project (e.g. name of CPU) are not allowed from creating the activation file until transferring the release file, since e.g. project name, name of the automation system and CPU are compared while transferring the release file.

Creating the activation file and transferring the release file must be carried out by the same user from the same ES, since the upgrade directory is only created for this user.

#### Procedure

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



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

	utomation Licens	e Man	ager	
File	Edit License Key	View	Help	
	Undo		Ctrl+Z	License keys 🔽 🚺 😥
	Redo		Ctrl+Y	
	Connect Compu	ter		
	New Folder			
	Connect target	system		Connect/disconnect AS 410
	Disconnect targ	et syste	m	
	Cut		Ctrl+X	
	Paste		Ctrl+∀	
	Rename		F2	
	Delete		Del	
	Delete Log			
	Select All		Ctrl+A	
	Reverse Selection	on		

The "Connect Target System" dialog opens.

Connect Target System	×
Set up access to the automation system and online connection to the automation system is established. The connection can be set up.	
Connected automation systems:	
Add	
Remove	
C Settings	
The security functions of the upgrade are deactivated in expert mode. Additional failed attempts could put the automation system into STOP.	
Enable expert mode	

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. Then click on the "OK" button.



The CPU is displayed in the ALM.

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 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.
  - 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.

**NOTICE** 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 SEC must not be changed between both CPUs (rack 0 and rack 1) until transferring the release file.



The license keys for the selected CPU 410 expansion packs are deleted and an activation file is created in the folder: "Documents > Siemens > Automation > PCS 7 > Activations"

("C:\Users\<USER>\Documents\Siemens\Automation\PCS 7\Activations"),\_with <USER> for your Windows username.

The ALM displays which expansions are involved in the activation files. In this example of an activation file for a volume expansion from 600 to 700.

Here Automation License Manager (pr	reliminary)
<u>File Edit License Key View Help</u>	
🕒 🞩 🖻 🐰 🗈 🗙 👫 🖬	🔐 License keys 🔽 🖸 🕄
My Desktop My Computer SYSTEM (C:) DATA (D:) Master License(s) KINGSTON (F:) SIMATIC PCS 7 AS 410 AS410CPU 410-5H Online	License keys - AS410C Product Vers Number Activation SEC PO 600 -> PO 700 - 1
····-↓ Web License Key Download	I
Press F1 for Help	1 License Key(s),
# 2.6.5 Sending the 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 2-7					
SIEMENS			Industry O	∞ <sub>Internet</sub> │	> Log out
Industry Online Support Germany	▶ Contact ▶ Help	Support Request	Site Explorer	Search in Online Support	Q
Home > mySupport > Support Request Create New Support Request			Product Sup	iport   🍠 Services   🍄 Forum	MySupport
Product search	Problem description	Summary and contact	data	> Confirmation	
Product search About which product do have a technical question?	Find		Creation of a Su With the "Suppor directly to the Te- steps, and while our comprehensit For contract cus make use of eade a More information A the moment in a More information	pport request Request*form you can transmit; hindia Stoport. Desorbe your iss hindia Stoport. Desorbe your iss doing a subard service your post ever range of information. tomers tomers with the option during med Stapport services. In hiere tratects o contract information is assigned in hiere	rour request ue in just a few solutions from your request to
Cancel					Next >

- 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).

Product search	Problem description	Summary and contact data	Confirmation
Product search	nical question?		Creation of a Support request With the "Support Request" form you can transmit your request
CPU 410	Find		directly to the Technical Support. Describe your issue in just a few steps, and while doing so already receive proposed solutions from our comprehensive range of information.
Authorization     CPU 410 Activation File		6ES7 653-2C	As a contract customer you have the option during your request to use of extended Support services.
SINUMERIK 8100     SIMATIC PCS 7 SMART     SIMATIC PCS 7 V8.2     SIMATIC PCS 7 V8.2			At the moment no contract information is assigned to you More information here
SIMATIC PCS 7 V9.x			
Cancel			2 Next

- 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).

Product search	Problem description So	Immary and contact data Confirmation
irst help for the selected product	Description	Details and attachments
CPU 410 Activation File	Topic in some keywords *	Details of the request *
FAQs Manuals	Questions on the urgency	
Downloads	What is the impact on plant? *	
Forum entries	Please select	The second secon
Application examples		
Services	What is your urgency? "	- Remaining characters
	Provide additional information to describe the urgency.* Please fill in Specify the plant name & amp: location. * Please fill in	You can files to your request, for example screenshots, log files or proje Pack the files into a ZIP archive. The maximum size is 10 MBs. If you we to attach larger files, use our Fileshare Service. To do this activate the "Fileshare Service" option.
Cancel		< 5) Next

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.

# 2.6.6 Transferring the release file to the SEC of the CPU

#### Requirements

The CPU 410 must be accessible from the Engineering Station. The same PCS 7 project (HW Config and program) must be loaded which was loaded when creating the activation file. The reason is while transferring the release file some names are compared e.g. project name, name of the automation system and CPU. The transferring of the release file must be carried out by the same user from the same ES as creating the activation file, since the upgrade directory is only created for this user.

#### Procedure

- Transfer the received release files to the Upgrade directory in the Engineering Station: "Documents > Siemens > Automation > PCS 7 > Activations" ("C:\Users\<USER>\Documents\Siemens\Automation\PCS 7\Activations"), with <USER> for your Windows username.
- 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 release file. Then click on the "OK" button.



The CPU is displayed in the ALM.

4. Drag&drop the release file 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 (release file and activation file) that are used in the Upgrade directory are deleted.

The Automation License Manager shows the new number of POs for the updated SEC as well as any PN Red license that may be available (in this example there is no PN Red).

🐄 Automation License Manager (preliminary)								
<u>File Edit License Key View Help</u>								
🕞 🞩 🔍   X 🗈 🗙 🔼 🖬	License	keys	🗖 🗖 🚺	3 ?				
My Desktop     My Computer     SYSTEM (C:)	Licer	ise ke	ys - Or	line				<u> </u>
DATA (D:)	Product	V Nu	License key	License number	Standard li	License type	Validity	Artikelnu
Master License (s )	CPU 410-5H	x.0 1	SEC V00x00y	SECSVPXXXXX 190	Single	Countable objects	700 (2600)	-
•	•							► I
Press F1 for Help					[	1 License key(s)  🎆 Un	known	

**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".

# 2.7 Further functions of the CPU 410

### 2.7.1 Field Interface Security

Field Interface Security is a function for additional protection of the automation system and which is supported from Firmware V8.2 upwards. It can be activated if a CPU interface is used only for the connection of field devices. Activating Field Interface Security blocks access to the CPU through the interface concerned by impeding build-up of a communication incoming from external nodes. This means that all queries are rejected and that only the communications outgoing from the CPU, e.g. for IO operation, continue to be permitted.

#### Benefits

- For protection against unauthorized access from the field bus
- Separate activation for each interface
- No restrictions of performance for field bus communication

#### Configuration

The Field Interface Security function is supported for the PROFINET as well as for the PROFIBUS interface and can be activated or deactivated in the HW Config in the settings of the interface via a check box. For the PROFINET interfaces, the checkbox "Enable additional protection on the interface (Field Interface Security)" is located in the PROFINET tab.

# Fig. 2-8

Media redundancy			Time-of-Day Synchronization			ons
General	Addresses	PROFINET	Securi	ty Events	Synchro	nization
Send clock:			1.000	▼ ms		
IO communica	ation					
Communicatio	on allocation (PROFI	NET IO):	100.0	▼ %		
Max. IRT stat	tions in line:		0			
🔽 Use syste	m settings					
	ication	T. CD.4				
Use this r		I LBA communicatio	m In n			
Communication allocation (PROFINET CBA):		JU.U	%			
Possible QoS with cyclic interconnections:			1 - 200	ms		
	O FaultTack - call at	communications inte	muot			
	1/2211 DP mode	communications inte	nupt			
		at the interface (Pall	Interface Com	-t)		
Connection	on to external bus sta	tions is no longer po	ssible due to this	s action.		

**Note** For further information on the protection of the automation system and the characteristics of the block (Field Interface Security) please refer to the manual: "SIMATIC PCS 7 Process Control System CPU 410 Process Automation" https://support.industry.siemens.com/cs/ww/en/view/109748473

## 2.7.2 Security Event Logging

Security Event Logging is a function to register user activity on a CPU. Securityrelevant changes to the CPU are sent as SysLogEvents to one or more SIEM (Security Incident Event Management) systems, where they are interpreted and processed further. When using the CPU 410 Security Event Logging is supported from Firmware V8.2 and newer.

The following actions, for instance, are registered as SysLogEvents:

- Connection setup with correct legitimation
- Error in the legitimation (incorrect password)
- A configuration change has been made
- A PCS 7 user program change has been transmitted

#### Benefits

- Acquisition of safety-relevant changes on the CPU
- Detection of forbidden access and deviations from normal behavior
- Applicative assignment of user name by SIEM

#### Configuration

Further information on security event logging with SysLogEvents, including instructions for configuration and planning can be found in the application example: "Recording User Activity on a SIMATIC Controller Using a SIEM System" https://support.industry.siemens.com/cs/ww/en/view/109748211

# 2.7.3 Remaining load memory

From Firmware V8.2 the memory concept of the CPU 410 changes. With the new memory concept, the program is automatically stored in the remanent memory (FLASH) after every download and not in the battery-buffered RAM as before. This means that the program is preserved even in the absence of a buffer battery. This function is independent of the hardware version of the CPU, i.e. each CPU 410-5H is already prepared for the remanent memory.

It is to be noted that each CPU 410 which has already been used can contain a program that starts when the CPU is started. If the program does not start, the CPU must be reset to factory defaults.

The new memory concept does not affect dynamic data, e.g. diagnostics buffers, counters, process images and current process values. These continue to be stored in a non-remanent manner and are retained as before only when a buffer battery is used across the network.

If the current process values from selected blocks are to be transferred from the unbuffered memory to the remanent memory, this is possible with the "Read back program ..." function.

**Note** If you begin to use a CPU that has already been used elsewhere, make sure that the content stored in the load memory does not cause dangerous system conditions at the new location.

If the previous use of the CPU is unknown to you, reset it to its default settings.

The CPU 410 can be reset to factory settings by pressing the reset button when the power supply is switched on and then held until the STOP LED flashes.

#### 2.7.4 Firmware update in two steps

With CPU 410 firmware V8.2 and newer it is possible to update the firmware update in two working steps. This allows the firmware update of the CPU to be prepared in a first operating step (loaded into the CPU) during operation and to be activated in a later step in a second step.

Especially in the case of H systems, a significantly faster firmware update with less time is achieved in solo operation, since the firmware can be loaded first into both CPUs and the H system can then operate exclusively to activate the firmware in solo operation.

#### Benefits

- A Firmware update can be prepared during normal operation
- Optimized self-test after the Firmware update
- Reduced overall time required for firmware updates

#### Procedure

The firmware update in two steps can be started as until now via HW Config. In HW Config select the "Target system > Update firmware" menu command. A dialog for updating the firmware appears. In this dialog there are three options available from firmware V8.2 and upwards:

- (1) "Load and activate firmware"
- (2) "Load firmware only"
- (3) "Activate loaded firmware"

When a firmware is loaded via option (2), the files for the firmware update are transferred to the CPU. The loaded firmware can then be activated with option (3), updating the CPU to the new firmware.

late Firmware		
CPU 1		
Module article number:	6ES7 410-5HX08-0AB0	
Firmware version:	V8.2.0	
Loaded firmware version:		
	CPU 410-5H A	
Rack: 0	Slot: 3	
CPU 2		
Module article number:	6ES7 410-5HX08-0AB0	
Firmware version:	V8.2.0	
Loaded firmware version:	•	
Name:	CPU 410-5H B	
Rack: 1	Slot: 3	
Firmware version:	<u> </u>	Browse
Firmware version: Suitable for modules with:		Browse
 Firmware version: Suitable for modules with: Article number:	Firmware version	Browse
 Firmware version: Suitable for modules with: Article number:	Firmware version	Browse
Firmware version: Suitable for modules with: Article number:	Firmware version	Browse
Firmware version: Suitable for modules with: Article number:	Firmware version	Browse
Firmware version: Suitable for modules with: Article number:	Firmware version	Browse
Firmware version: Suitable for modules with: <u>Article number:</u>	Firmware version	Browse
Firmware version: Suitable for modules with: Article number:	Firmware version	Browse
Firmware version: Suitable for modules with: <u>Article number:</u>	Firmware version	Browse
Firmware version: Suitable for modules with: Article number:	Firmware version	Browse
Firmware version: Suitable for modules with: Article number:	Firmware version	Browse

Note For further information on updating firmware, please refer to the manual: "SIMATIC PCS 7 Process Control System CPU 410 Process Automation" https://support.industry.siemens.com/cs/ww/en/view/109748473

# 2.8 Additional information

### 2.8.1 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 <u>https://support.industry.siemens.com/cs/ww/en/view/85014617</u>.

# 2.8.2 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.

# 3 Appendix

# 3.1 References

### Table 3-1

	Topic area	Title
\1\	Siemens Industry Online Support	http://support.industry.siemens.com
\2\	Download page for this entry	https://support.industry.siemens.com/cs/ww/en/ view/96839331
3	SIMATIC PCS 7 Process Control System CPU 410 Process Automation	https://support.industry.siemens.com/cs/ww/en/ view/109748473
\4\	SIMATIC PCS 7 Service Support and Diagnostics (V9.0)	https://support.industry.siemens.com/cs/ww/en/ view/109746550
\5\	Security guidelines for PROFIBUS & PROFINET International (PI):	http://www.profibus.com/nc/download/specificat ions-standards/downloads/profinet-security- guideline/display/

# 3.2 Change documentation

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	<ul> <li>New Chapter 2.1 Configuring the communications interface and Establishing the connection between the ES and the AS</li> <li>Revision of Chapter 2.4 Configuring the PN/Ethernet interfaces of the CPU 410</li> </ul>	
V1.3	02/2016	<ul> <li>New Chapter 2.3 Using TCiR to update a library</li> <li>Revision of Chapter 2.2 Loading interface changes from AS blocks in RUN mode (TCiR)</li> </ul>	
V2.0	03/2016	Update for PCS 7 V8.2	
V2.1	11/2016	Description for the PO expansion to "Unlimited" added (Section 2.5.1).	
V3.0	08/2017	Update for PCS 7 V9.0	
V3.1	09/2017	Chapter 2.6 directory path updated and notes added	
V3.2	10/2019	Chapter 2.6.5 Updated procedure	

# Table 3-2