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Modifying the System during Operation via CiR

Manual

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Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring to property damage only have no safety alert symbol. The notices shown below are graded according to the degree of danger.

Danger
indicates that death or severe personal injury **will** result if proper precautions are not taken.

Warning
indicates that death or severe personal injury **may** result if proper precautions are not taken.

Caution
with a safety alert symbol indicates that minor personal injury can result if proper precautions are not taken.

Caution
without a safety alert symbol indicates that property damage can result if proper precautions are not taken.

Notice
indicates that an unintended result or situation can occur if the corresponding notice is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel.** Within the context of the safety notices in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

Warning
This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.
Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Preface

Purpose of the Manual

This manual gives you a complete overview about modifications to plants during an operation via CiR. It conveys the required background knowledge as well as the operating procedure in HW Config.

It is intended for persons working in the configuration, commissioning and automation system service field.

Basic Knowledge Required

In order to understand this manual, general knowledge of automation technology is required.

Prequisite is experience in using S7-400 systems connected to a PROFIBUS-DP I/O.

Since Modifying the System During Operation via CiR is based on the STEP 7 software, you should also know how to operate it, especially HW Config. This is provided in the manual "Programming with STEP 7 V5.4".

Scope of the Manual

This manual is valid for release 5.4 of the STEP 7 programming software package. The hardware requirements are described in chapter 1 "Requirements and Overview"

You can find the latest information on the service packs:

- in the "readme.wri" file
- in the updated STEP 7 online help.

The topic "What's new?" in the online help offers an excellent introduction and overview of the newest STEP 7 innovations.

STEP 7 Documentation Packages

This manual is part of the documentation package "STEP 7 Basic Information.“

The following table displays an overview of the STEP 7 documentation:

Documentation	Purpose	Order Number
STEP 7 Basic Information with • Working with STEP 7, Getting Started Manual • Programming with STEP 7 • Configuring Hardware and Communication Connections, STEP 7 • From S5 to S7, Converter Manual	Basic information for technical personnel describing the methods of implementing control tasks with STEP 7 and the S7-300/400 programmable controllers.	6ES7810-4CA08-8BW0
STEP 7 Reference with • Ladder Logic (LAD)/Function Block Diagram (FBD)/Statement List (STL) for S7-300/400 manuals • Standard and System Functions for S7-300/400 Volume 1 and Volume 2	Provides reference information and describes the programming languages LAD, FBD, and STL, and standard and system functions extending the scope of the STEP 7 basic information.	6ES7810-4CA08-8BW1

Online Helps	Purpose	Order Number
Help on STEP 7	Basic information on programming and configuring hardware with STEP 7 in the form of an online help.	Part of the STEP 7 Standard software.
Reference helps on STL/LAD/FBD Reference help on SFBs/SFCs Reference help on Organization Blocks	Context-sensitive reference information.	Part of the STEP 7 Standard software.

Online Help

The manual is complemented by an online help which is integrated in the software. This online help is intended to provide you with detailed support when using the software.

The help system is integrated in the software via a number of interfaces:

- There are several menu commands which you can select in the **Help** menu: The **Contents** command opens the index for the Help on STEP 7.
- **Using Help** provides detailed instructions on using the online help.
- The context-sensitive help offers information on the current context, for example, an open dialog box or an active window. You can open the context-sensitive help by clicking the "Help" button or by pressing F1.
- The status bar offers another form of context-sensitive help. It displays a short explanation for each menu command when the mouse pointer is positioned on the menu command.
- A brief explanation is also displayed for each icon in the toolbar when the mouse pointer is positioned on the icon for a short time.

If you prefer to read the information from the online help in printed format, you can print out individual help topics, books, or the entire online help.

This manual, as well as the manual "Programming with STEP 7" is an extract from the HTML-based Help on STEP 7. For detailed procedures please refer to the STEP 7 help. As the manuals and the online help share an almost identical structure, it is easy to switch between the manuals and the online help.

You can find the electronic manuals after installing STEP 7 via the Windows Start menu: **Start > SIMATIC > Documentation.**

Further Support

If you have any technical questions, please get in touch with your Siemens representative or responsible agent.

You will find your contact person at:

http://www.siemens.com/automation/partner

You will find a guide to the technical documentation offered for the individual SIMATIC Products and Systems here at:

http://www.siemens.com/simatic-tech-doku-portal

The online catalog and order system is found under:

http://mall.automation.siemens.com/

Training Centers

Siemens offers a number of training courses to familiarize you with the SIMATIC S7 automation system. Please contact your regional training center or our central training center in D 90327 Nuremberg, Germany for details:

Telephone: +49 (911) 895-3200.

Internet: http://www.sitrain.com

Technical Support

You can reach the Technical Support for all A&D products

- Via the Web formula for the Support Request
  http://www.siemens.com/automation/support-request
- Phone: + 49 180 5050 222
- Fax: + 49 180 5050 223

Additional information about our Technical Support can be found on the Internet pages http://www.siemens.com/automation/service

Service & Support on the Internet

In addition to our documentation, we offer our Know-how online on the internet at:

http://www.siemens.com/automation/service&support

where you will find the following:

- The newsletter, which constantly provides you with up-to-date information on your products.
- The right documents via our Search function in Service & Support.
- A forum, where users and experts from all over the world exchange their experiences.
- Your local representative for Automation & Drives.
- Information on field service, repairs, spare parts and more under "Services".

Contents

1 Requirements and Overview

Introduction

Some plants may not be switched off when they are in operation. This may be due to a complex automation processes or high restart costs, for example. A removal reconfiguration might still be required.

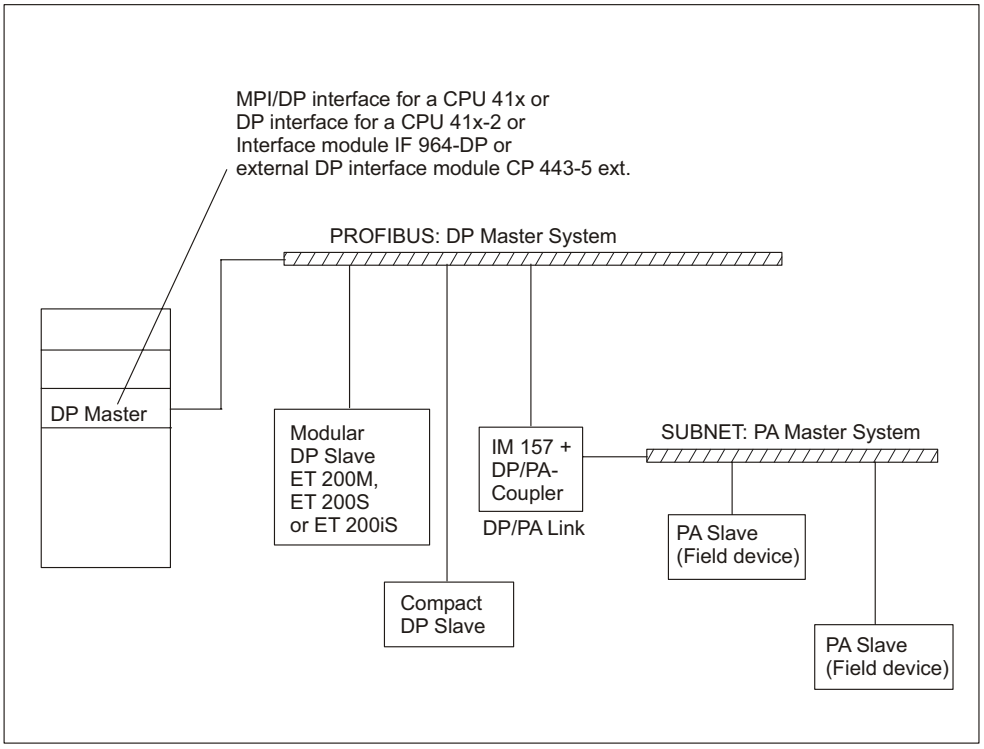
Hot change via CiR lets you perform certain modifications of your configuration in RUN mode. This operation will interrupt processing for a small period of time. The upper limit for this time period is preset at a default value of 1 second, but you can change this value if necessary. During this interrupt, the hardware outputs will retain their last value.

Note

The term "CiR" stands for "Configuration in RUN". In this documentation it is used to describe a method used for changing the system configuration in RUN mode. Prerequisite for this operation are the conditions listed below.

Range of Validity

You can change the configuration of a system which contains distributed I/O during runtime. The configuration shown in the figure below is prerequisite for such processes. In order to provide a clear view of the procedure, we shall base our topics only on a single DP master system and a single PA master system. This restriction does not apply to the real process.



Hardware Requirements

You require the following hardware configuration in order to be able to modify the configuration of a system in RUN mode via CiR:

- Implementation of an S7-400 standard-CPU (CPU 412, CPU 414, CPU 416 or CPU 417) as of Firmware V3.1.0 or an S7-400-H CPU (CPU 414-4H or CPU 417-4H) in stand-alone mode as of Firmware V3.1.0
- If you want to make modifications to the system during operation with an external DP master (CP 443-5 extended), your configuration must operate at least with Firmware V5.0.
- If you want to add modules to ET 200M: Implementation of an IM 153-2 as of MLFB 6ES7 153-2BA00-0XB0 or IM 153-2FO as of MLFB 6ES7 153-2BB00-0XB0. You must furthermore install the ET 200M with active bus elements and provide sufficient space for the planned expansion. You may not implement the ET 200M as DPV0 slave (via GSD file).
- If you want to add electronic modules for the ET 200iSP, install the ET 200iSP with reserve modules. The reserve modules can then be replace with electronic modules in the future.
- If you want to add complete stations: Provide corresponding bus connectors, repeaters etc.
- If you want to add PA slaves (Field devices): Implementation of IM 157 as of MLFB 6ES7 157-0AA82-0XA00 in the corresponding DP/PA-Link.
- Rack CR2 may not be used.
- The use of one or more of the following modules is not allowed in a station in which you want to make modifications to the system during operation via CiR: CP 444, IM 467.
- No multicomputing

Note

You can combine any components which are either capable or not capable of system modification via CiR during runtime. However, you can change system settings only for components which are capable of CiR.

Configuration Requirements

Constant bus cycle time must not be activated in DP master systems, in which you want to execute modifications in RUN via CiR.

If you want to add PA slaves (field devices), you have to operate the DP master in DPV1 mode. The IM 157 may not be used as DPV0 slave in this case.

You have to select storage on the CPU for all modules within the station, regardless of whether or not you are given the option of saving the configuration data on the module itself or on the CPU.

Software Requirements

To enable CiR, the user program must meet the following requirements: The program may not include elements that switch the CPU into STOP mode in the event, for example, of a station failure or module error.

The following OBs have to be on your CPU:

- Hardware interrupt OBs (OB 40 to OB 47)
- Timeout OB (OB 80)
- Diagnostics interrupt OB (OB 82)
- Removal/Insertion OB (OB 83)
- Program runtime error OB (OB 85)
- Module rack error OB (OB 86)
- I/O access error OB (OB 122)

Note

PCS7 always meets these requirements.

Overview of Permitted Configuration Changes

The process introduced here supports the following modifications of your PLC:

- Adding modules with modular ET 200M DP slave, provided you have not implemented it as DPV0 slave (via GSD file)
- Reconfiguration of ET 200M modules, e.g. selection of other interrupt limits or the utilization of previously unused channels
- Replacement of reserve modules with future electronic modules of the ET 200iSP
- Reconfiguration of ET 200iSP modules
- Adding DP slaves to an existing DP master system
- Adding PA slaves (field devices) to an existing PA master system
- Adding DP/PA couplers downstream of IM 157
- Adding DP/PA links (including PA master systems) to an existing DP master system

- Assignment of expansion modules to a process image partition
- Assignment of existing modules or compact slaves to process image partitions
- Modifying the assignment of the process image partition for existing modules or compact slaves
- Assigning new parameters to the modules installed in ET 200M stations (standard modules and fault-tolerant signal modules in standard operation).
- Undoing changes: Added modules, interfaces, DP slaves and PA slaves (Field devices) can be removed again.

Note

You can only add or remove slaves / modules, or modify existing assignments in a process image partition for a maximum of four DP master systems.

All system changes in RUN mode other than explicitly permitted (see above) are not allowed and will not be treated further in this documentation. Such actions are, for example,

- Modification of CPU properties
- Modification of the properties of modules inserted in the CPU rack
- Adding and removing DP master systems
- Modification of the properties of existing DP master systems, including bus parameters.
- Reconfiguration of fail-safe signal modules in safety mode.
- Modification of the following DP slave parameters: Bus address, assignment to the DP master, parameter assignment data, diagnostics address
- The removal of any modules from a modular DP slave, see Undo Changes.
- The removal of any DP slaves from an existing DP master system, compare Undo Changes.
- Reconfiguration of an I slave interface.
- Changing the sync/freeze group assignment of a slave

Recommendations for changing systems in RUN mode by means of CiR

Here are some tips for changing the system configuration in RUN mode.

- After changing your settings, be sure to make a backup copy of your current system configuration. This is the only way to guarantee further editing of the project without losing CiR functionality.
- When ever possible, carry out your re-configuration in several steps, and make only a few changes during each step. This method will help you keep a clear overview of the situation.
- To keep the CiR synchronization time (see CPU Response to Configuration Downloads in RUN Mode) as short as possible, we recommend that you make changes on only one DP master system during each re-configuration step.

2 CiR Objects and CiR Modules

2.1 Basics

Overview

A system modification during runtime is based on the provisions you have made in your initial configuration for an expansion of your PLC hardware. Define suitable CiR compatible elements that you can later replace step-by-step in RUN mode with real objects (slaves and/or modules). You can then download such a modified configuration to the CPU during runtime.

Procedure

The table below shows the procedures required for modification of the program and of the configuration, as well as the corresponding system phase.

Step	Action	CPU mode	System status
1	Configuration of your current (real) system configuration	STOP	Offline configuration
2	Defining CiR elements	STOP	Offline configuration
3	Configuration download	STOP	Commissioning
4	Conversion of CiR elements to real objects where required. System modifications are only possible on master systems which contain a CiR object or on ET 200M stations which are equipped with a CiR module.	RUN	Continuous operation

If required, execute several passes of the CiR sequence (step 4 of the table above). You merely have to provide a sufficient number of slaves or adequate I/O volume for all of your system expansions before you switch to continuous operation.

2.2 Types of CiR Elements

Overview

The following CiR elements are available:

Component	CiR Element
Existing DP master system	CiR object You can edit the number of additional DP slaves this object contains.
Existing PA master system	CiR object You can edit the number of additional DP slaves this object contains.
Modular DP slave of the type ET 200M / ET 200iSP	CiR module You can edit the additional I/O volume this object contains.

Note

When STEP 7 identifies the bus parameters, it takes the configured slaves as well as the CiR elements into account. When it converts CiR elements to real slaves and /or modules in CPU RUN mode, the bus parameter will therefore remain unchanged.

You can add CiR elements either automatically or individually (see Defining CiR Elements).

CiR Objects

Specify the following properties for a CiR object:

- The number of slaves that can definitely be added (Default: 15 per DP master system, 6 per PA master system)
- Volume of the I/O bytes for future use (Default: 1220 per DP master system, 80 per PA master system). These specifications refer to future user data addresses. You can configure diagnostics addresses regardless of these settings.

CiR Modules

Use a CiR module to define additional I/O volume for the modular ET 200M / ET 200iSP distributed I/O device by specifying the number of additional I/O bytes in SUM. These specifications refer to future user data addresses. You can configure diagnostics addresses regardless of these settings.

There is never any need to fully utilize user data volume. However, the currently existing user data volume may never be exceeded. STEP 7 ensures this.

2.3 CiR Elements and I/O Address Areas

CiR Objects

The following rule applies to the DP master system: The total configured number of real slaves and of the guaranteed number of slaves of a CiR object may not exceed the volume of dynamic project data in the corresponding DP master.

HW Config monitors compliance with this rule when you define the CiR objects.

I/O Volume for Future Use with CiR Objects and CiR Modules

For all DP masters, the following rules apply to future utilization of the I/O bytes:

I/O	Rule 1
Inputs	The total number of physical configured user addresses for inputs and for the input bytes that can be utilized in the future may not exceed the volume of dynamic project data in the corresponding DP master.
Outputs	The total number of physical configured user addresses for outputs and for the output bytes that can be utilized in the future may not exceed the volume of dynamic project data in the corresponding DP master.

HW Config monitors compliance with these rules immediately when you define CiR elements for a DP master system.

In order to provide an optimal flexibility for the use of CiR elements, however, the following applies to the CPU:

I/O	Rule 1
Inputs	The total number of physical configured inputs and of input bytes that can be utilized in the future may not exceed the volume of dynamic project data in the CPU.
Outputs	The total number of physical configured inputs and of input bytes that can be utilized in the future may not exceed the volume of dynamic project data in the CPU.

HW Config performs a check to verify that the CPU is equipped with sufficient address space resources for handling the number of added slaves and/or modules only after the CiR elements have been put into use.

3 User Interface

3.1 Basic Procedures in STOP Mode

3.1.1 Overview

Note

Save your current configuration after every download of the station configuration from HW Config (independent of CPU operating mode). This is the only way you can be sure that you will be able to continue to work on the saved project without losing CiR functionality if an error occurs (data loss).

Defining CiR Elements

You can define CiR objects for configured DP and PA master systems, and CiR modules for modular ET 200M / ET 200iSP DP slaves. For details on the procedure refer to Defining CiR Elements.

For the DP master systems you are also offered the function "Enable CiR compatibility". Select this function to generate a CiR object for the selected DP master system and for every sublevel PA master system that is CiR compatible. At the selected DP master system, a CiR module is inserted at every modular ET 200M / ET 200iSP slave.

Note

The function "Enable CiR compatibility" is only available for DP master systems for which a CiR object has not yet been defined.

Deleting CiR Elements

In STOP mode, you can delete previously defined CiR objects at DP and PA master systems or CiR modules at modular ET 200M / ET 200iSP DP slaves.

You can easily delete all CiR elements in a DP master system via the function "Disable CiR compatibility".

Note

The function "Disable CiR compatibility" is only available for DP master systems for which a CiR object has been defined.

Configuration Download

After you have defined new CiR elements or redefined existing ones, download the configuration to the CPU in STOP mode.

A variety of modules can be used in an S7-400 automation system. In order to ascertain whether the modules you are using interfere with a future CiR function, you have to follow this procedure: When you download the configuration to the CPU in operating mode STOP, immediately reload the configuration to the CPU in operating mode RUN. STEP 7 and the CPU then check CiR functionality. This is not possible offline for older modules or with modules not produced by Siemens.

3.1.2 Defining CiR Elements

Note

The definition of a CiR object at a master system specifies the maximum I/O volume for this master system and thus also its CiR synchronization time (see CPU Response to Configuration Downloads in RUN Mode). For this reason, it is absolutely necessary that you specify the properties of the CiR object so that the resulting CiR synchronization time for the associated master system is compatible with your process.

Adding CiR Elements Automatically

You can add CiR elements automatically to an existing DP master system as follows:

1. Highlight the icon of the corresponding DP master system in the upper part of the station window.
2. Select the command Master system > Enable CiR compatibility in the Edit menu.

STEP 7 will then add the following CiR elements to the selected DP master system:

- one CiR module to each CiR compatible modular ET 200M / ET 200iSP slave (if there are still available slots).
  The CiR module contains an appropriate number of I/O bytes for efficient future use at the modular slave.
- one CiR object to each CiR compatible sublevel PA master system.
  This CiR object contains 80 input and 80 output bytes.
- one CiR object to the selected DP master system.
  STEP 7 will try to guarantee 15 slaves for this CiR object and to provide 1220 input bytes and 1220 output bytes. (The number of guaranteed slaves is reduced accordingly in a master system where the highest previous address is > 111. The volume is reduced accordingly if less than 1220 input bytes and 1220 output bytes are available.).

Note

- It is only possible to add CiR elements automatically if no CiR object exists in the selected DP master system.
- Automatic insertion of CiR elements after an IM 157 is not supported by DP master systems

The default settings of the CiR objects are the same for all CPUs. Therefore, check the activation of the CiR compatibility of a master system for each corresponding CiR object. Verify whether the synchronization time of the master system specified in the properties window of the CiR object matches the upper limit of the CPU CiR synchronization time set in the CPU. (Example: When a CPU 412 is used, a CiR synchronization time of the corresponding master system larger than one will be obtained from the default values. The default value of the upper limit of the CPU‘s CiR synchronization time is however 1 only). If necessary, you have to reduce the number of guaranteed slaves for one or more CiR objects or use SFC 104 "CiR" to increase the upper limit of the CPU‘s CiR synchronization time.

How to add a CiR Object to the DP or PA Master System

Add a CiR object to a DP or PA master system as follows:

1. Highlight the icon of the corresponding DP master system in the upper part of the station window.
2. Open the "Hardware Catalog" window.
3. Drag and drop the corresponding CiR object from the hardware catalog to the master system. The CiR object then appears in the upper section of the station window as placeholder slave. The default values of the CiR object are:
   - Number of guaranteed additional slaves:
     15 per DP master system, 6 per PA master system
   - Maximum number of additional slaves:
     45 DP slaves, 36 PA slaves
   - Number of input bytes: 1220 for DP master system, 80 for PA master system
   - Number of output bytes: 1220 for DP master system, 80 for PA master system

The default settings of the CiR objects are the same for all CPUs. Therefore, check the activation of the CiR compatibility of a master system for each corresponding CiR object. Verify whether the synchronization time of the master system specified in the properties window of the CiR object matches the upper limit of the CPU CiR synchronization time set in the CPU. (Example: When a CPU 412 is used, a CiR synchronization time of the corresponding master system larger than one will be obtained from the default values. The default value of the upper limit of the CPU‘s CiR synchronization time is however 1 only). If necessary, you have to reduce the number of guaranteed slaves for the CiR object or use SFC 104 "CiR" to increase the upper limit of the CPU‘s CiR synchronization time.

Note

These values will be reduced appropriately if the master system is out of resources.

The Target Rotation Time, Target Rotation Time typical bus parameters which result and the watchdog will be displayed in the properties window of the CiR object.

4. You can change the number of additional slaves and/or the number of I/O bytes as follows:

   Open the properties window of the CiR object (double-click or highlight the CiR object, then right-click to select "Object properties..." or highlight the CiR object and select the menu item "Edit > Object properties...").

   You can now change the guaranteed number of additional slaves. The bus parameters relevant to this change, the Target Rotation Time and typical Target Rotation Time, as well as the watchdog will be displayed in the lower section of the station window.

   You can also change number of I/O bytes. Enable the check box "Extended settings". You can only reduce these values, since an increase would extend the CiR synchronization interval (see CPU Response to Configuration Downloads with CiR).

Adding a CiR Module to an ET 200M / ET 200iSP Modular Slave

Proceed as follows with a modular slave:

1. Highlight the corresponding slave in the upper section of the station window.
2. Open the "Hardware Catalog" window.
3. In the lower section of the station window, drag and drop the CiR module from the hardware catalog to the DP slave slot immediately after the last configured module. (This rule is automatically applied when you automatically insert CiR elements).The CiR module will then appear as placeholder module in the lower section of the station window.
   The properties window of the CiR module indicates the number of I/O bytes. For ET 200M stations these are:
   - Number of input bytes = Number of available slots * 16
     At an ET 200M station which contains only one CiR module, this value is therefore equal to 128 (if the CiR object at the DP master system still contains a sufficient number of available of I/O bytes).
   - Number of output bytes = Number of available slots * 16
     At an ET 200M station which contains only one CiR module, this value is therefore equal to 128 (if the CiR object at the DP master system still contains a sufficient number of available of I/O bytes).

Note

A maximum of 244 input and output bytes are available for the ET 200iSP. The input and output bytes of the individual electronic modules can be found in the ET 200iSP manual.

Configuration Download

The configuration is downloaded to the CPU in STOP mode, after the CiR elements have been defined.

A large number of modules can be used in the S7-400 Automation System. To ensure that none of your modules disturbs a future CiR process, you must adhere to the following procedure: If you downloaded the configuration when the CPU was in STOP mode, reload the configuration to the CPU immediately afterwards, however, do it in RUN mode this time. In the process, STEP 7 and the CPU will check the CiR compatibility. This is not yet possible offline for older modules or modules from external manufacturers.

3.1.3 Deleting CiR Elements

Deleting all CiR Elements

Delete all CiR elements of an existing DP master system as follows:

1. Highlight the icon of the corresponding DP master system in the upper part of the station window.
2. Select the context-sensitive menu command **Disable CiR compatibility** or select the command **Master system > Disable CiR compatibility** in the Edit menu.

STEP 7 will then delete

- all CiR objects in sublevel PA -master systems
- all CiR modules in modular slaves
- the CiR object at the selected DP master system.

Note

- You can only delete all CiR elements if a CiR object exists in the selected DP master system.
- Sublevel DP master systems do not support deletion of all CiR elements.

Deleting a Single CiR Element

You can delete the CiR object from a PA master system or ET 200M / ET 200iSP modular DP slave as follows:

1. Highlight the CiR element you want to delete.
2. Select "**Edit > Delete**" or the context-sensitive menu command **Delete**.

If no more CiR elements exist at the DP master system, save for the CiR object, you can use the same procedure to delete this CiR object.

3.2 Basic Procedure in RUN Mode

3.2.1 Overview

Note

All system modifications listed below required a CiR object in the corresponding DP master system.

Save your current configuration after every download of the station configuration from HW Config (independent of CPU operating mode). This is the only way you can be sure that you will be able to continue to work on the saved project without losing CiR functionality if an error occurs (data loss).

Adding Slaves or Modules

To add slaves or modules in RUN mode, follow these steps:

1. expansion and download of the configuration via HW Config
2. reconfiguration of the hardware
3. expansion, testing and download of the user program

Be sure to absolutely follow this sequence.

Note

Under STEP 7, always ensure that you have implemented the interrupt OBs on your CPU and programmed them to ignore interrupts triggered by unknown components before you download your modified configuration.
We recommend you use the following OBs: Hardware interrupt OBs (OB 40 to OB 47), timing error OB (OB 80), diagnostics interrupt OB (OB 82), insertion/removal OB (OB 83), program cycle error OB (OB 85), module rack failure OB (OB 86), I/O access error OB (OB 122)

Note the following rules when you add components:

- In a modular ET 200M / ET 200iSP DP slave, always insert a CiR module in the slot immediately following the last configured module (When you add a CiR element automatically, this rule will be automatically taken into account.).
- Within the master system you must assign the new slave a higher PROFIBUS address than any previously assigned.
- You can add or remove only one module per station and download for the ET 200iSP.

How to Reconfigure the Hardware when Adding a Slave

Equip the PROFIBUS DP and PROFIBUS PA bus cables with active bus terminals on both ends, so that the cables are correctly terminated during reconfiguration.

Always make sure not to disconnect any of the bus lines when you add a slave to a master system.

One way to achieve this is to install and wire up additional connectors in the corresponding expansion slot of the master system. You can then use these bus connectors to connect a new slave.

Another method is to install repeaters or diagnostics repeaters. In this case, add a slave as follows:

1. Switch off the repeater function.
2. Connect the new slave to the free side of the repeater. Note the current installation guidelines (see *Installation Manual: Installing S7-400, M7-400 PLCs)*.
3. Switch on the repeater function again.

How to Modify the Process Image Partition Assignment

You can change the assignment of a process image partition of an existing module or compact slave as follows:

1. Open the properties window of the module or slave. Specify the new process image partition in the "Addresses" tab.
2. Download the new configuration with HW Config.

Reconfiguring Existing Modules in ET 200M / ET 200iSP Stations

The procedure for using previously free channels is described under Using a Previously Unused Channel.

The procedure for reconfiguring already used channels of ET 200M / ET 200iSP modules is described under Reconfiguring a Previously Used Channel or under Removing a Previously Used Channel.

Undoing Previous Changes (Undo function)

To undo changes in RUN mode, take the following steps:

1. undo previous changes to the user program (as required) and then download the user program
2. remove added slaves and modules from the project and download this configuration in RUN mode
3. reconfigure the hardware if required

Note

When working with STEP 7, always modify the interrupt OBs after you have changed your hardware configuration and then download the changes to the CPU.

Note the following rules when you undo changes:

- In a modular ET 200M / ET 200iSP DP slave, always remove modules starting from the bottom (that is, with the highest slot number).
- In a master system, always start the removal of slaves at the highest PROFIBUS address. If required, you can then continue to remove the slaves at the next lower address.

Note

You can remove slaves or modules you have added across several downloads in a single download operation.
Removal of a slave or module from your configuration increases the I/O volume resources and, possibly, the guaranteed / maximum number of slaves available for future use.

Replacing Slaves or Modules

The following rule applies: You can either remove or add slaves by downloading a configuration.

Replacement of slaves / modules by means of a download operation is therefore not supported.

3.2.2 Using CiR Elements in RUN Mode

This section describes how you can expand and download an existing configuration.

Note

If you perform illegal operations while adding real slaves or modules to the configuration, you will not receive an error message until you download the configuration.

After every plant modification, check whether the CiR compatibility is still available (Menu command: **Station > Check CiR Capability** or the shortcut CTRL+ALT+F).

Adding a DP or PA Slave

Add a DP or PA slave as follows:

1. Open the "Hardware Catalog" Window.
2. Drag and drop the slave you want to insert from the hardware catalog to the corresponding CiR object in the upper section of the station window. The added slave will then appear in the upper section of the station window. The slave's name appears with an orange colored underlay in order to indicate that this slave has been generated from a CiR object.
3. If necessary, assign the added slave to an existing sync/freeze group.

Note

- When you add a slave, STEP 7 will update the guaranteed/maximum number of slaves and the volume of I/O bytes at the corresponding CiR object. We recommend that the station number for the added DP slave be selected as follows:
  Station number of the added DP slave = the highest station number of all previously configured DP slaves + 1
  If you select a higher number for the added DP slave, then under unfavorable circumstances, the guaranteed/maximum number of slaves that can still be added will be decreased by more than 1.
- If you add a CiR compatible ET 200M / ET 200iSP modular DP slave, this slave will always initially contain a CiR module.

Adding Modules to an ET 200M / ET 200iSP Modular Slave

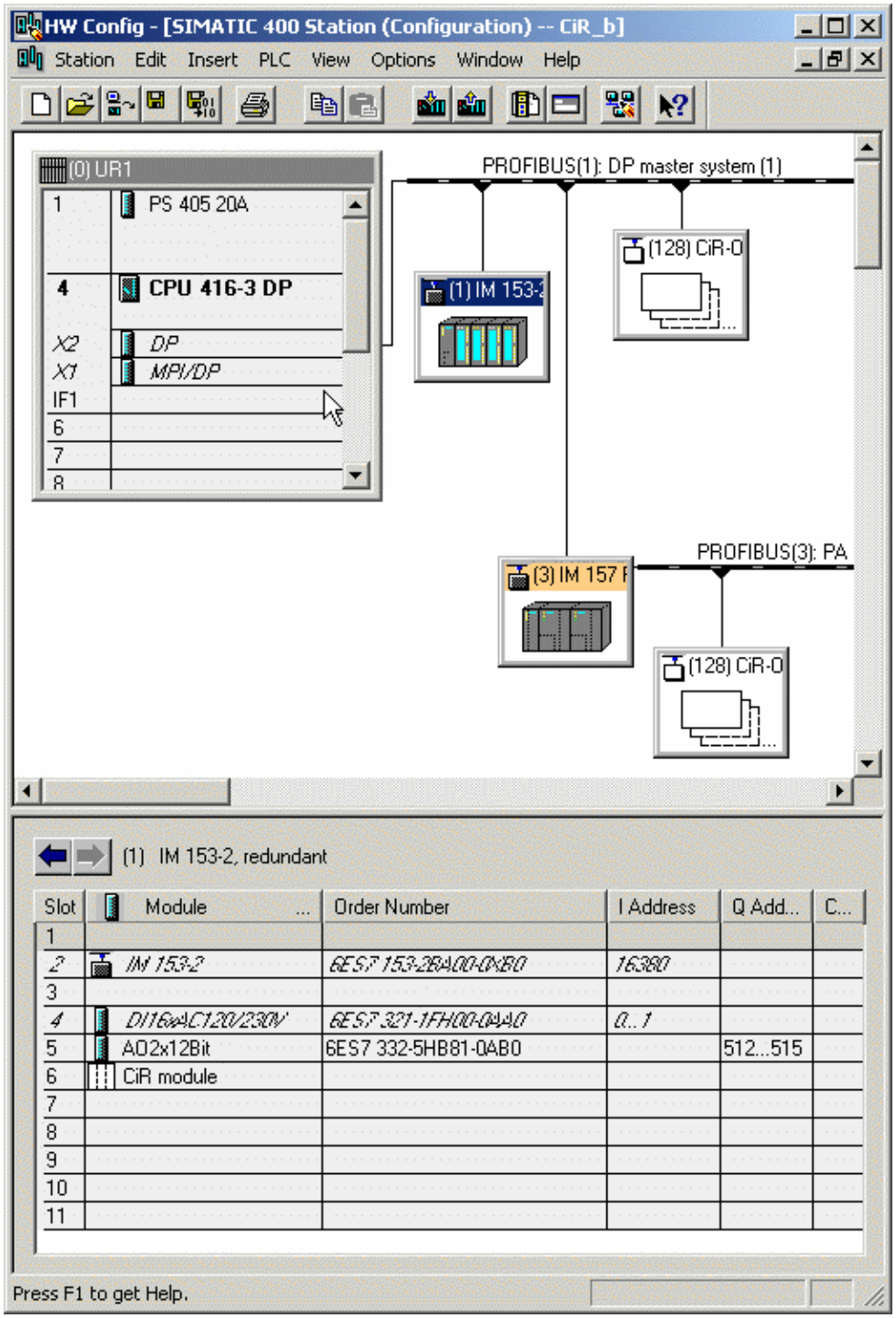
Add components to an ET 200M / ET 200iSP modular slave as follows:

1. Open the "Hardware Catalog".
2. Drag and drop the module you want to add from the catalog to the corresponding CiR module in the lower section of the station window. The new module will then appear in the lower section of the station window at the position previously occupied by the CiR module. The CiR module is shifted down by one slot position.

Note

When you add a module to an ET 200M / ET 200iSP station, STEP 7 updates the number of I/O bytes for the corresponding CiR module.

The figure below shows the HW Config view and what it looks like after you have placed a module onto the CiR module.



Configuration Download in RUN Mode

Perform the following steps to download a modified configuration with CiR:

1. Check whether the current configuration can be downloaded (Menu command **Station > Check CiR Capability**).
2. Download the configuration to the CPU (menu command **PLC > Download to Module ...**).

Note

When the configuration is being downloaded to the CPU, the INTF LED will turn on and then turn off; the EXTF LED will stay continuously lit. You can start adding the real stations or modules only after the INTF LED has gone out again. After this, the EXTF LED will go out. (see CPU Response to Configuration Downloads in RUN Mode).

Back up your current configuration after each download of the station configuration from the HW Config (independent of the CPU operating mode). This is the only way you can be sure of continuing your work with the backed up project without loss of the CiR compatibility in the event of an error (data loss).

3.2.3 Undoing Previous Changes

You can remove previously added slaves or modules to undo previous changes to configurations you have downloaded to the CPU.

The following rules apply:

- Remove slaves or modules at a maximum of four master systems.
- Always start the removal of slaves from a DP or PA master system at the highest PROFIBUS address. Continue with the slave at the next lower PROFIBUS address.
- Always start the removal of modules from a modular ET 200M / ET 200iSP DP slave at the highest slot number. In the HW Config view, this is the module at the lowest position. STEP 7 offers the following support: The module you can remove next is entered in the lower section of the station window in standard letters; all other modules are indicated in italic letters.
  Continue with the module at the next lowest slot number.

Removal procedure:

1. Highlight the object you want to remove.
2. Select the context-sensitive menu command **Delete** or select "**Edit > Delete**".
3. Repeat steps 1 and 2 until you have removed all objects previously inserted.
4. Download the modified configuration to your CPU.

Note

- When you delete a slave, STEP 7 will update the guaranteed / maximum number of slaves and the volume of I/O bytes for the corresponding CiR object.
- When you delete a module in a modular ET 200M / ET 200iSP slave, STEP 7 will update the guaranteed / maximum number of slaves and the volume of I/O bytes for the corresponding CiR module.

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4 Reconfiguration of Existing Modules in ET 200M/ET 200iSP Stations

4.1 Requirements for Reconfiguration

Note

You can either use channels not previously used or reconfigure previously used channels.

The addresses of available modules are not to be changed via CiR.

Configuration Requirements

In order to reconfigure the system, a CiR object must exist in the respective DP master system.

Hardware Requirements

Please refer to the About text in the "Hardware Catalog" window for information on which ET 200M modules (signal modules and function modules) / ET 200iSP you can reconfigure in CPU RUN mode.

The maximum number of modules you can reconfigure is 100.

Module Response During a Reconfiguration

During reconfiguration the input modules can respond in one of the three following ways:

- Channels not affected will continue to return the actual process value.
- Channels not affected will return the process value which was valid prior to the reconfiguration.
- All channels will return the value "0" (applies to digital modules and FMs) or W#16#7FFF (applies to analog modules).

Please refer to the technical data of the specific modules for information on their response.

Output modules respond as follows during reconfiguration:

The respective channels output the initial value which was valid before the parameter assignment.

4.2 CPU Response During a Reconfiguration

After you have modified the parameters under STEP 7 and downloaded the changes to the CPU in RUN mode, the CPU will perform the checks described in the section CPU Response to Configuration Download in RUN mode and start the OB80 with event W#16#350A. It will then start OB 83 via the startup event W#16#3367. This indicates to you that, as of now, I/O data of the corresponding modules may be inconsistent. At this time, SFCs which trigger new jobs for sending data sets to the respective modules (e.g. SFC 57 "PARM_MOD"), are no longer to be called, as this might cause conflicts in the data records to be transferred between the system and the user program.

Note

The I/O values of a PCS 7 will be assigned the status "BAD" after this OB 83 start.

After the CPU has executed OB 83, it transfers the parameter data records. That is, each respective module will receive all its data records (regardless of the number of data records affected by your changes).

OB 83 is then called again (with startup event W#16#3267, if the send operation was completed with success, or with W#16#3968 if failed). Processing of this OB 83 does not interrupt any other priority class.

Note

The I/O values of a PCS 7 will be assigned the status "OK" after this OB 83 with the start event W#16#3267.

You may only access process image values that belong to the process image partition of the currently executed OB.

After the successful transfer of data records, the DP master indicates availability of the modules with an entry in module status data. If the transfer has failed it indicates that the modules are not available. In the second case, an I/O access error will occur when you attempt a direct access to a module (during the update of the process image input table or during the transfer of the process image output table to the module. OB 85 or OB 122 will be called, depending on the type of access).

The I/O data of the modules respond as after an insertion interrupt, that is, presently they may still be inconsistent (possibly because the module has not yet evaluated your data records). However, the restriction that data record SFCs may not be active for the modules no longer applies.

Note

When the new module configuration disables the diagnostics interrupt, it may happen that the module will subsequently transmit an interrupt it had already prepared at this point.

Possible Errors During Reconfiguration

The same error events can occur as those occurring during the transfer of data records via SFCs:

- The module receives the parameter data records, but is unable to evaluate them.
- Fatal errors (especially protocol errors at the DP bus) may initiate the DP master to disable the corresponding DP slave completely, so that all modules of this station will no longer be available.

Reconfiguration Depending on CPU Operating Modes

Parameters are reassigned after SDBs have been evaluated (see CPU Response to Configuration Downloads with CiR) in RUN mode. The active INTF LED is lit during the reconfiguration.

A transition to HALT mode interrupts the assignment of new parameters. Assignment will be resumed if the CPU goes into STOP or RUN mode. The only difference in STOP: OB 83 will not be called.

The assignment of new parameters will be aborted if power is lost. After power is returned, all existing DP stations are assigned new parameters.

Coordination Between Master Systems

A situation may arise in which the sequence

- OB 83 start (Start event W#16#3567)
- Data record transfer
- OB 83 start (Start event W#16#3467 or 3468)

is performed in a parallel operation at all affected master systems.

4.3 Reconfiguration Procedure

4.3.1 Using a Previously Unused Channel

Proceed as follows:

1. Modify your hardware configuration and download it to the CPU.
2. Change the wiring.
3. Modify the user program and download it to the CPU.

4.3.2 Reconfiguring a Previously Used Channel

The procedure depends on the question whether or not it is required to modify the user program and the corresponding hardware. The specific situations are described below.

It is not required to modify the user program after a reconfiguration.

This may be the situation if you modify an interrupt limit or disable a diagnostic interrupt, for example.
Procedure: Modify the hardware configuration and download it to the CPU.

Due to the reconfiguration it is required to modify the user program.

This may be the situation if you modify the channel measurement range of an analog input module and then compare the corresponding analog value with a constant in your user program. In this case you must adapt the constant.

Procedure:

1. STEP 7: In your user program, disable evaluation of the channel you want to reconfigure and download the program to the CPU.
   PCS 7: Set simulation mode for all values of the channel you want to reconfigure (at the corresponding driver).
2. Modify the hardware configuration and download it to the CPU.
3. Adapt the user program to the modified channel and download the program to the CPU.
   Additional for PCS 7: Disable simulation mode for the channel you want to reconfigure (at the corresponding driver).

Due to the reconfiguration it is required to modify both the user program and the hardware

This may be the situation when you reconfigure the input channel mode from "0 to 20 mA" to "0 to 10 V", for example.

Procedure:

1. STEP 7: In your user program, disable evaluation of the channel you want to reconfigure and download the program to the CPU.
   PCS7: Set simulation mode for all values of the channel you want to reconfigure (at the corresponding driver).
2. Change the corresponding hardware
3. Modify the hardware configuration and download it to the CPU.
4. Adapt the user program to the modified channel and download the program to the CPU.
   Additional for PCS7: Disable simulation mode for the channel you want to reconfigure (at the corresponding driver).

The address range of the electronic module (ET 200iSP) is modified

This is the case when IEEE values of a HART electronic module are used, for example.

Procedure:

1. STEP 7: In your user program, disable evaluation of the module you want to reconfigure and download the program to the CPU.
   PCS 7: Set simulation mode for the you want to reconfigure (at the corresponding driver).
2. Delete the module in the hardware configuration and download it to the CPU.
3. Reinsert the module and configure it as desired.
   Note: Do not save your hardware configuration at this time; otherwise, the CiR download capability will be lost.
4. Download the hardware configuration to the CPU.
5. Adapt the user program to the modified module and download the program to the CPU.
   Additional for PCS7: Disable simulation mode for the module you want to reconfigure (at the corresponding driver).

4.3.3 Removing A Previously Used Channel

If you no longer require a previously used channel there is no need to change the hardware configuration. The procedure in this case :

1. In your user program, disable evaluation of the channel you want to reconfigure and download the program to the CPU.
2. Change the hardware configuration and download it to the CPU.
3. Change the corresponding hardware (remove sensor or actuator etc.).

5 Notes on Reconfiguration in RUN Mode Depending on the I/O

5.1 DP or PA-Slaves

What do I Have to Take Into Consideration When Planning A System?

- Provide a sufficient number of branch points for tap lines or disconnect points (tap lines are not permitted for operation at a transmission rate of 12 Mbps).
- You must equip ET 200M stations and DP/PA links with an active backplane bus. As far as possible, install the maximum possible number of bus modules, as you may not insert or remove any bus modules during runtime.
- You have to install the ET 200iSP entirely with the terminal modules. Then equip all terminal modules assigned to the reserve area with reserve modules.
- Terminate the PROFIBUS DP and PROFIBUS PA bus lines with active bus termination elements at both ends to ensure proper bus termination also during system reconfiguration.
- PROFIBUS PA bus systems should be equipped with components of the SpliTConnect product family to avoid having to disconnect cables.

Rules for CiR

The new DP slave must be assigned a higher station number than all previously configured DP Slaves.

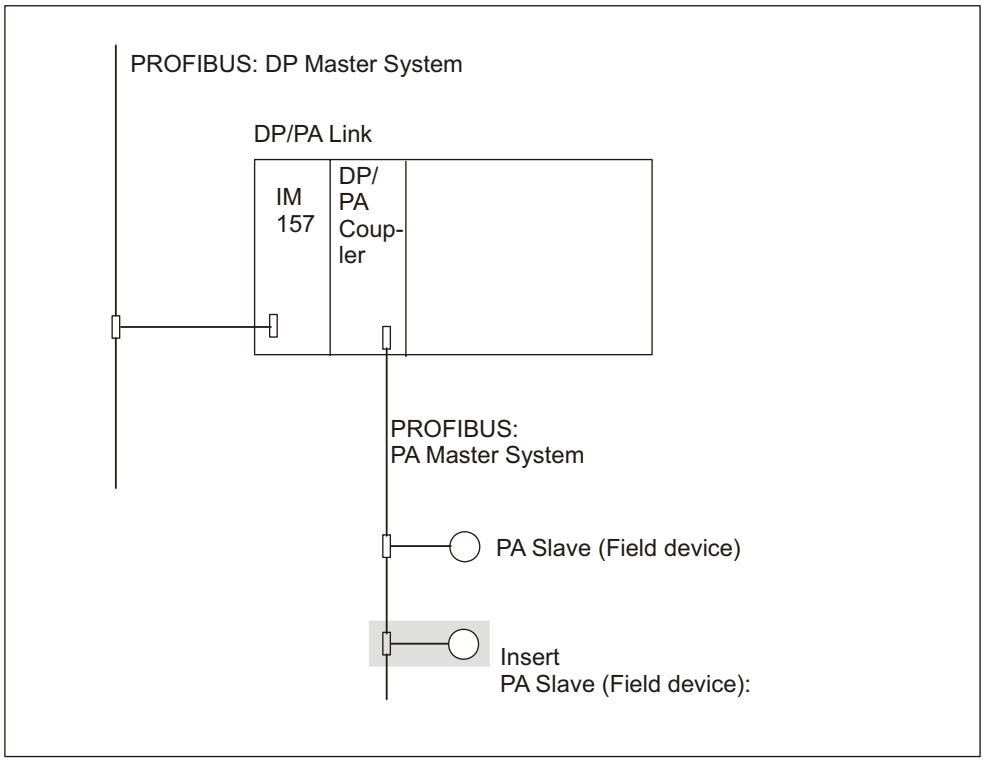
Since the total made up of the station number of the added DP slave and the number of slaves that can be added can be at most 125, we recommend that the station number for the added DP slave be selected as follows:

Station number of the added DP slave = the highest station number of all previously configured slaves + 1.

If you select a higher number for the added DP slave, then under unfavorable circumstances, the guaranteed/maximum number of slaves that can still be added will be decreased by more than 1. This is explained in the following example:

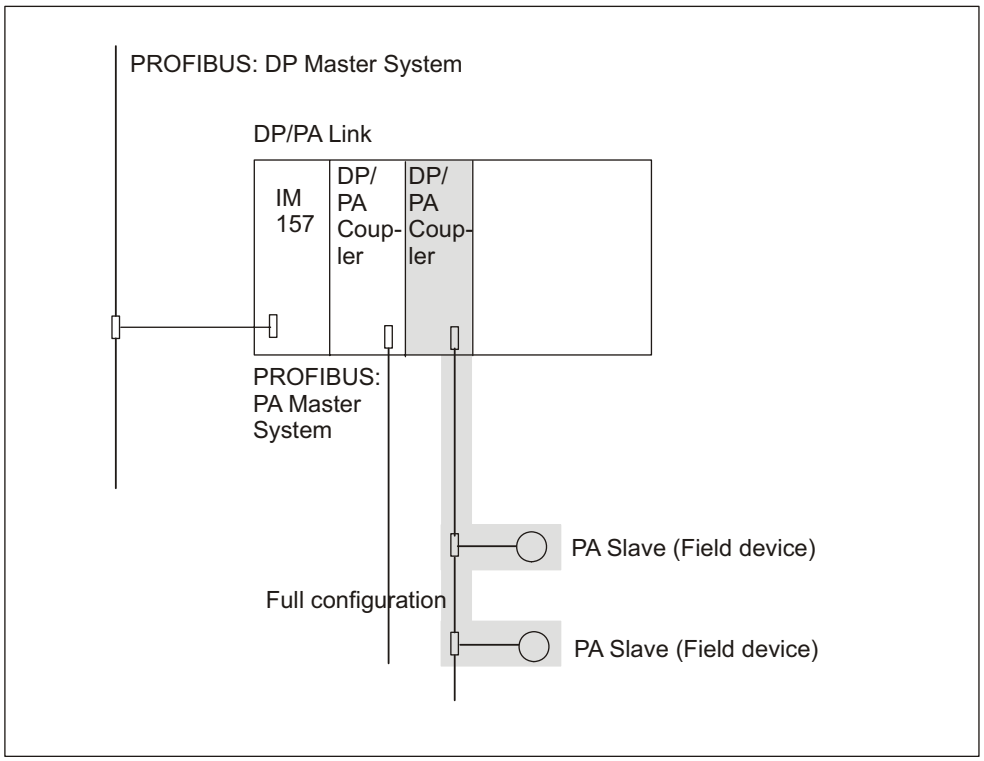
Let's assume that the highest station number of all previously configured slaves is 115 and that the number of slaves that can be added is at most 10. If you assign station number 118 to the added slave, the maximum number of slaves that can still be added will be 7.

Adding a PA Slave (Field device) to an Existing PA Master System



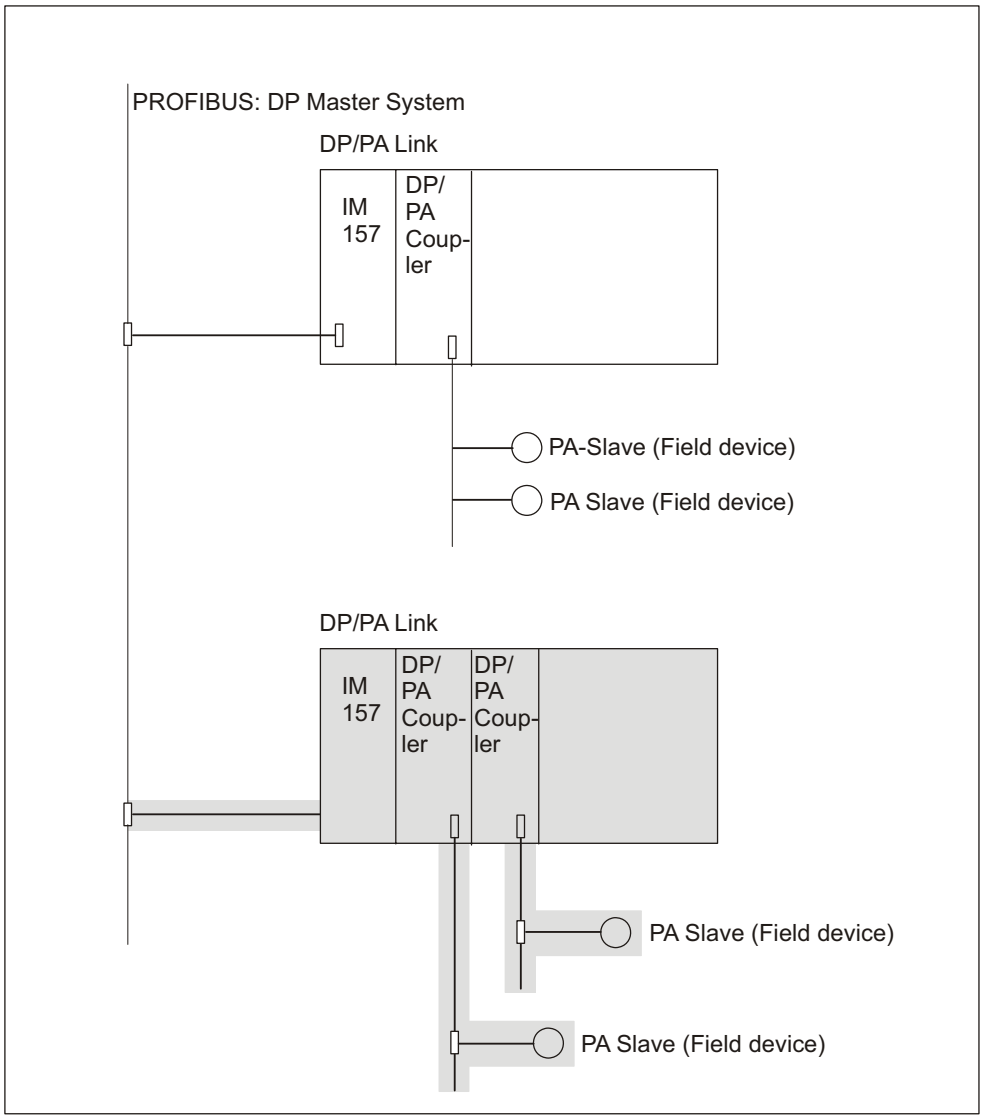
In your configuration, the addition of a PA slave downstream of an existing DP/PA link corresponds with the insertion of a module into a modular slave.

Adding a DP/PA Coupler with Corresponding PA Slaves to an Existing PA Master System



Adding a DP/PA coupler with corresponding PA slave system downstream of an existing DP/PA link corresponds with the insertion of multiple PA slaves (Field devices) in an existing PA master system.

Adding a DP/PA Link with PA Master System



Adding a DP/PA link and its corresponding PA master system corresponds with the insertion of a new DP slave in an existing DP master system.

5.2 Modules in ET 200M Modular Slaves

What are the points to remember when planning the ET 200M stations?

- Install the ET 200M station with an active backplane bus.
- Always try to equip the station with the maximum number of bus modules, as you can not insert or remove a bus module during runtime.

Rules for System Modification During Runtime

- You may only add or remove modules immediately after the last existing module. Always avoid gaps between modules.
- In order to replace a module with a module of a different type in an existing CPU configuration, you must perform at least two downloads to the CPU: First, download the CPU configuration that no longer contains the modules you are going to remove. Secondly, download the configuration that contains the new modules.

5.3 Modules in ET 200iSP Modular Slaves

What do I have to take into consideration when planning ET 200iSP stations?

- Install the ET 200iSP station entirely with terminal modules and a terminating module.
- Equip the ET 200iSP with the required electronic modules beginning with the interface module. Insert reserve modules in the remaining slots concluding with the terminating module.

Rules for System Modification During Runtime

- Replace the reserve modules by the planned electronic modules. Begin with the first reserve module in the lowest slot (to the right of the last electronic module). There should only be **one** gap, in other words, always replace only **one** reserve module with the electronic module.

6 How a Reconfiguration in RUN Mode Affects the Process

6.1 CPU Response to Configuration Downloads in RUN Mode

Overview

After the download of a modified configuration, the CPU first performs a consistency check of your changes. If the result is positive it then evaluates the affected system data.

This evaluation has a retroactive effect upon operating system functions, e.g. process image update and user program processing. We shall now discuss these effects in detail.

The time interval required by the CPU to interpret the system data (as of now referred to as CiR synchronization time) depends on the volume of I/O bytes at the affected DP master systems (for details, see below).

The CPU enters event W#16#4318 in the diagnostics buffer at the start of system data evaluation, on completion of the system data evaluation it enters event W#16#4319.

Note

If POWER OFF occurs during system data evaluation or if the CPU goes into STOP, only a restart (warm restart) or a cold restart will be possible.

It will then call OB80 with event W#16#350A and enter the CiR synchronization time in its startup information. This allows you to make provisions for this time in your cyclic interrupt OBs, for example.

Note

Always ensure that OB80 has been downloaded in your CPU. Otherwise, the CPU goes into STOP after an OB80 startup event.

The CPU Performs a Consistency Check of the Configuration Changes

First, the CPU determines the number of DP and PA master systems at which you want to add/remove slaves/modules or modify assignments in the existing process image partition. If the CPU finds a maximum of four affected master systems it continues the check. If more than four are found, the CPU will reject the modified configuration.

In the next test the CPU calculates the CiR synchronization time as follows:

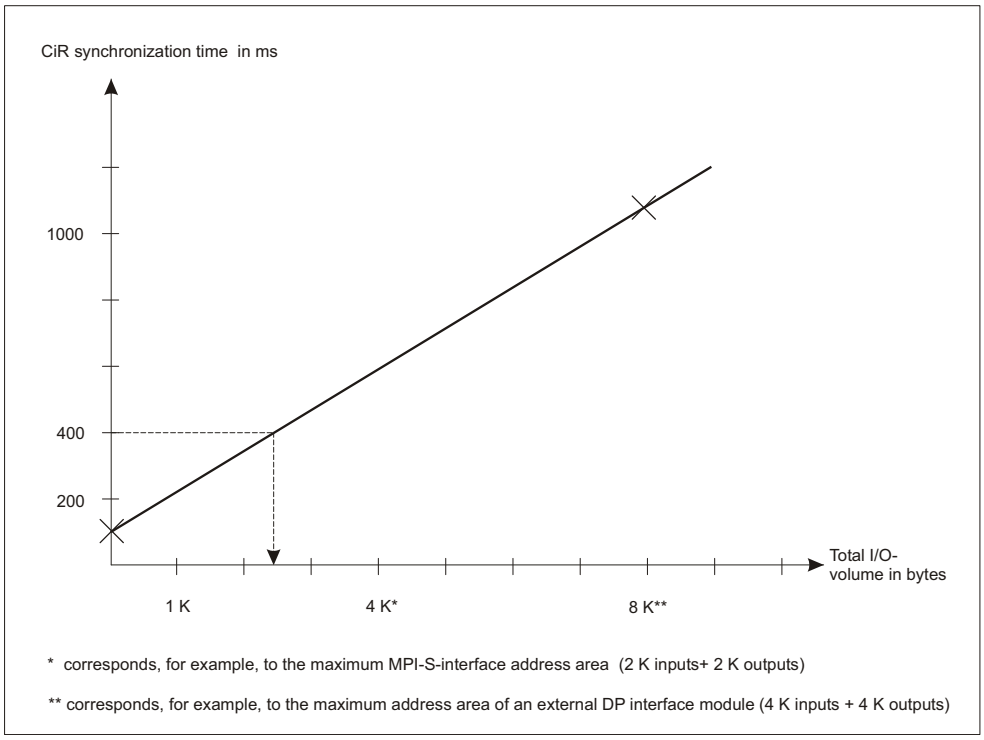
- If you only want to change the parameters of existing modules, then the following applies regardless of the type of CPU:
  CiR synchronization time for the CPU = 100 ms

  In all other cases the following applies:
  The CiR synchronization time of the CPU is proportional to the cumulative CiR synchronization times of all relevant master systems.
  Relevant master systems the systems at which you add/remove slaves or modules or modify the process image partition assignment.
- CiR synchronization time of a relevant master system = basic master system load + the total I/O volume of the master system in bytes * time per byte. The total I/O volume of the master system in bytes is composed of the sum of physically existing I/O bytes and the I/O bytes of the CiR elements at this master system. The system load for the each CPU type used to calculate the required load for the master system and the time per byte can be found in the technical data for your CPU.

Note

- In this case the calculation of the CiR synchronization time is based on a worst-case scenario. This means that during a CiR operation the actually incurred CiR synchronization time is always lower or equal.
- The CiR synchronization time for a master system is shown in HW Config in the properties window for the associated CiR object.

The following illustration shows the relationship between the CiR synchronization time for a master system and its overall I/O volume. This example is based on a CPU 417-4 with order number 6ES7 417-4XL00-0AB0.



Using this diagram, you can use the maximum CiR synchronization time as a basis for easily determining the maximum extent of the master system if you are only making changes to one DP master system. This will be explained using an example (see below).

The CPU now compares the calculated CiR synchronization time with the actual valid high limit of the CiR synchronization time. You can call SFC 104 "CiR" to modify the default high limit value of 1 second up or down as you see fit.

If the calculated value is smaller than or equal to the actual high limit, the CPU will accept the modified configuration. Otherwise, it will reject it.

The formula specified above shows that you can influence the CiR synchronization time as follows:

- The lower the volume of I/O bytes for a master system you select,
- the lower the number of guaranteed slaves you select at the master systems to be changed (The number of guaranteed slaves has an immediate effect on the volume of I/O bytes.),
- the less master systems you want to change in a CiR process,

the shorter the CiR synchronization time is. This effect is highly significant especially for F systems, since in this case the F-monitoring time must include the CiR synchronization time. Be sure to use the largest value for all DP master systems with the CiR object (if only one DP master system is being changed per CiR operation) or the total for all the master systems that are to be changed simultaneously.

The table below shows an example of a CPU 417-4 with order number 6ES7 417-4XL00-0AB0 with 6 DP master systems.

Assume that the maximum permitted CiR synchronization time amounts to 550 ms. This means that changes can be carried out on several master systems as long as the total CiR synchronization time for these master systems does not exceed 550 ms. The last column shows which DP master systems you may change in a single CiR operation.

DP-master system	Total I/O volume in bytes	CiR synchronization time for the master system	Distribution of changes on DP master systems
1	1500	100 ms + 1500 bytes * 0.12 ms/byte = 280 ms	Either 1 (280 ms) or (1 and 2) (500 ms)
2	1000	100 ms + 1000 bytes * 0.12 ms/byte = 220 ms	Either 2 (220 ms) or (2 and 1) (500 ms) or (2 and 3) (500 ms)
3	1500	100 ms + 1500 bytes * 0.12 ms/byte = 280 ms	Either 3 (280 ms) or (3 and 2) (500 ms)
4	2500	100 ms + 2500 bytes * 0.12 ms/byte = 400 ms	4 (400 ms)
5	3000	100 ms + 3000 bytes * 0.12 ms/byte = 460 ms	5 (460 ms)
6	7000	100 ms + 7000 bytes * 0.12 ms/byte = 940 ms	Cannot be changed!

Example of determining the extent of a DP master system

Assume a maximum CiR synchronization time of 400 ms. In this case, the diagram shows you a maximum of 2500 I/O bytes total volume for the DP master system (dashed line). If, for future use, you intend to have 250 input and 250 output bytes in the CiR object, then there are 2000 bytes available for the first configuration operation on the DP master system.

This example discusses the following two configurations:

- When using ET 200M stations in maximum expansion (128 byte inputs, 128 byte outputs, with some of this in CiR modules, if necessary) you can thus operate a total of 2000/(128 + 128), which yields approx. 8 ET 200M stations.
- If you typically need 48 bytes per ET 200M station (i.e. 6 analog modules, each with 4 channels at 2 bytes or a smaller expansion with a CiR module), you can thus operate a total of 2000/48, which yields approx. 24 ET 200M stations.

If the expansions here are not sufficient for your needs, you can manage this situation as follows:

- Install a more powerful CPU (CPU with less time per byte; for further information see the technical data).
- Select several smaller master systems instead of one large master system.
- Select one or more master systems with a very large expansion and a CiR object with no guaranteed slaves. For these master systems, you can use CiR only to change the parameters of already existing modules. In addition, select small master systems when you want to add or remove slaves or modules or make a change in the existing process image partition (part process image) assignment.

Error displays

The INTF LED is lit from the start of the consistency check until completion of SDB evaluation. The light will remain on if module parameters are being changed.

After the CiR operation, the preset configuration and the actual configuration will differ (the preset configuration is changed after you have downloaded a configuration change to the CPU) and the EXTF LED is lit. If your modified configuration includes added slaves, the BUS1F LED or the BUS2F LED will also flash. The BUS1F LED, BUS2F LED and EXTF LED will be switched off after you have made the corresponding hardware changes.

6.2 Effects on Operating System Functions During the CiR Synchronization Time

Operating system function	Effect
Process image update	Locked. The process input and output tables retain their last values.
User program processing	All priority classes are locked, that is, OBs are not executed. However, all outputs retain their current value. Existing interrupt requests will be retained. The CPU will not accept currently triggered interrupts until it has completed SDB evaluation.
Time system	The timers continue operation. Although the clock for the TOD, cyclic and delay interrupts continues operation, the interrupts themselves are disabled. They will be accepted again after SDB evaluation. This means that only one interrupt can be added per cyclic interrupt OB, for example.
PG operator control	Only the STOP command can be operated via the PG. Data record jobs are therefore not possible.
External SSL information, e.g. via MPI	Information services are processed with delay.

A Appendix

A.1 Compatibility

Prerequisite

In the following we shall presume that your are operating with a CiR compatible CPU.

The following applies to the DP master(s):

- The DP master system(s) of your CPU master will also be CiR compatible.
- Every external DP interface(s) at the DP master system you want to reconfigure must support system changes during runtime.

Rule

You can mix CiR compatible and CiR incompatible components in your system (with the exception of modules excluded in the Requirements and Overview).

In this case, the following configuration changes are permitted in RUN mode:

- Compact DP slaves can only be added or removed as a complete station at the DP master system.
- PA slaves (Field devices) can be added in RUN mode only if the header module of the corresponding DP/PA link supports CiR.
- A modular ET200M slave only supports the removal/insertion of modules if its header module supports system modification during runtime.
- Adding and removing electronic modules for the ET 200iSP.

A.2 Terminology

Term	Meaning
CiR	Configuration in RUN
CiR module	Dummy module for future insertion of modules in an ET 200M station
CiR element	General term for CiR object and CiR module
CiR object	Dummy object for future insertion of slaves at the DP or PA master system

Glossary

CiR

Configuration in RUN

CiR module

Dummy module for future insertion of modules in an ET 200M station

CiR element

General term for CiR object and CiR module

CiR object

Dummy object for future insertion of slaves at the DP or PA master system

Index