

# SIEMENS

## SIMATIC

### Embedded Automation S7 Modular Embedded Controller

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### Warning notice system

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 only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

<b>⚠ DANGER</b>
indicates that death or severe personal injury <b>will</b> result if proper precautions are not taken.
<b>⚠ WARNING</b>
indicates that death or severe personal injury <b>may</b> result if proper precautions are not taken.
<b>⚠ CAUTION</b>
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.
<b>CAUTION</b>
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.
<b>NOTICE</b>
indicates that an unintended result or situation can occur if the corresponding information 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 product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

### Proper use of Siemens products

Note the following:

<b>⚠ WARNING</b>
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

### Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

### Disclaimer of Liability

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.

# Introduction

## S7-modular Embedded Controller - Conventions

- *S7 Modular Embedded Controller*

The *S7-modular Embedded Controller* system consists of an Embedded Controller, S7-300 modules, and the optional expansion modules EM PC and EM PCI-104. The system is referred to for short as *S7-mEC*.

- *EC31, EC31-RTX, EC31-RTX F, EC31-HMI/RTX*

In the documentation, the terms *Embedded Controller* or *device* are also used for the product labels *EC31, EC31-RTX, EC31-RTX F, EC31-HMI/RTX* if the description does not refer to a specific version.

## Purpose of the manual

This manual contains all the information you need for commissioning and using the *S7-modular Embedded Controller* system.

It addresses programmers who commission the device.

## Scope

This manual is valid for the following components of the *S7-mEC*.

Table 1 Components of the *S7-mEC*

Component	Order no.:	Release
Embedded Controller EC31	6ES7677-1DD10-0BA0	08/2010 or later
Embedded Controller EC31-RTX	6ES7677-1DD10-0BB0	08/2010 or later
Embedded Controller EC31-RTX F	6ES7677-1FD10-0FB0	08/2010 or later
Embedded Controller EC31-HMI/RTX 128 PT	6ES7677-1DD10-0BF0	08/2010 or later
Embedded Controller EC31-HMI/RTX 512 PT	6ES7677-1DD10-0BG0	08/2010 or later
Embedded Controller EC31-HMI/RTX 2048 PT	6ES7677-1DD10-0BH0	08/2010 or later
Expansion module EM PCI-104	6ES7677-1DD40-1AA0	08/2010 or later
Expansion module EM PC	6ES7677-1DD50-2AA0	01/2009 or later

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### Note

#### Identification of the product variants

The Embedded Controller always has the label **EC31** with order number 6ES7677-1DD10-0BA0. The two letters above the power connector identify the product variant.

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**Note**

**Information relating to the Embedded Controller EC31-RTX F**

For operation of the Embedded Controller in combination with WinAC RTX F, observe the additional instructions in the chapter relating to WinAC RTX F in the Windows Automation Center RTX, WinAC RTX (F) 2010 manual. It is to be regarded as a separate component and, in case of doubt, overrides specification in the manuals and catalogs.

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**Basic knowledge required**

The *S7-mEC* system may only be implemented and operated by qualified personnel. Knowledge of the following is considered essential:

- SIMATIC S7-300 installation guidelines
- Programming with STEP 7
- PC-based automation with WinAC RTX
- If appropriate, fail-safe technology
- Basic knowledge of PC technology
- Operating system Windows Embedded Standard 2009

**Changes since the previous version**

- *EC31, EC31-RTX, EC31-RTX F, EC31-HMI/RTX* comes with pre-installed Windows Embedded Standard 2009 operating system.
- *EC31-RTX, EC31-RTX F, EC31-HMI/RTX* is supplied with pre-installed WinAC RTX (F) 2010.
- The Embedded Controller has 4 GB of integrated flash memory.

**Position in the information scheme**

For further information, refer to the following documents:

- S7-300 CPU 31xC and CPU 31x: Installation (<http://support.automation.siemens.com/WW/view/en/13008499>)
- *Windows Automation Center RTX, WinAC RTX (F) 2010* Manual
- SIMATIC S7 safety engineering in SIMATIC Industrial Software (<http://support.automation.siemens.com/WW/view/en/12490443>) System Manual
- *WinLC RTX EC* Online Help in STEP 7
- *SIMATIC HMI WinCC flexible 2008 Runtime* System Manual
- PROFINET system description (<http://support.automation.siemens.com/WW/view/en/19292127>)
- Commissioning PC stations (<http://support.automation.siemens.com/WW/view/en/13542666>)
- Programming Manual Software Development Kit for EC31 (<http://support.automation.siemens.com/WW/view/en/31885798>)

## Standards and certifications

In Chapter *General technical data*, you will find information about standards, certificates and approvals (Page 108)

## Recycling and disposal

All devices described in this manual can be recycled due to their ecologically compatible components. For environment-friendly recycling and disposal of your old equipment, contact a certified disposal facility for electronic scrap.

## Service & Support on the Internet

Information on the following topics is available on the Internet:

- Service & Support (<http://support.automation.siemens.com/>)
- Contact partners for SIMATIC (<http://www.siemens.com/automation/partner>)
- PC-based Automation Competence Center ([http://www.automation.siemens.com/simatic/pcbased/html\\_76/support/dienstleistungen.htm](http://www.automation.siemens.com/simatic/pcbased/html_76/support/dienstleistungen.htm))

You can contact Technical Support for all A&D products using the Support Request (<http://www.siemens.com/automation/support-request>) Web form

## Important note for maintaining the operational safety of your system

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### Note

The operators of systems with safety-related characteristics must adhere to particular operational safety requirements. The supplier is also obliged to comply with special product monitoring measures. To keep you informed, a special newsletter is therefore available containing information on product developments and properties that are important (or potentially important) for operating systems where safety is an issue. To ensure that you are always up-to-date and able to make changes to your system, it is necessary that you subscribe to the appropriate newsletter. To do so, go to the Internet ([http://www.siemens.de/automation/csi\\_en\\_WW/news](http://www.siemens.de/automation/csi_en_WW/news)).

There you can register for the following newsletters:

- Embedded/PC-based Automation
- SIMATIC S7-300/S7-300F
- Distributed I/O
- SIMATIC Industrial Software

Select the "Updates" check box for each newsletter.

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# Safety notes

# 1

## 1.1 General safety instructions

 <b>CAUTION</b>
--

Please observe the safety instructions on the back of the cover sheet of this documentation. You should not expand your device unless you have read the relevant safety instructions.
---

This device is compliant with the relevant safety measures to IEC, VDE, EN and cULus. If you have questions about the validity of the installation in the planned environment, please contact your service representative.

### Repairs

Only authorized personnel are permitted to repair the device.

 <b>WARNING</b>
--

Unauthorized opening of and improper repairs to the device may result in substantial damage to equipment or endanger the user.
--

### System expansions

Only install system expansion devices designed for this device. The installation of other expansions can damage the system and violate the radio-interference suppression regulations. Contact your technical support team or where you purchased your PC to find out which system expansion devices may safely be installed.

<b>CAUTION</b>
----------------

If you install or exchange system expansions and damage your device, the warranty becomes void.
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### **ESD guidelines**

Modules containing electrostatic sensitive devices (ESDs) can be identified by the following label:



Strictly follow the guidelines mentioned below when handling modules which are sensitive to ESD:

- Always discharge yourself of static electricity before handling modules which are sensitive to ESD (for example, by touching a grounded object).
- All devices and tools must be free of static charge.
- Always pull the mains connector and disconnect the battery before installing or removing modules which are sensitive to ESD.
- Handle modules fitted with ESDs only by their edges.
- Do not touch any connector pins or conductors on modules containing ESDs.

# Product overview

## 2.1 Unpacking the device

### When unpacking

Note the following when unpacking:

- Keep the documentation included with the package in a safe place. It is required for first commissioning and is part of the device.
- Check the package and contents for visible transportation damage.
- Check the shipment for completeness. Inform your local Siemens contact partner of any disagreement or transport damage.

### Identification data

The device can be identified unambiguously for repairs with the help of the ID data.

- The serial number is available on the rating plate of the device.
- Depending on the scope of delivery, the "Certificate of License" is enclosed as proof of license for WinAC RTX 2010 / WinAC RTX F 2010, SOFTNET S7-Lean Edition 2008 and WinCC flexible 2008 RT.
- The "Microsoft Windows Product Key" is specified on the "Certificate of Authenticity" that is attached as adhesive label to the device underneath the module cover.
- The first MAC address is specified underneath the module cover of the device.

### See also

Scope of delivery EC31 (Page 14)

EC31-RTX / EC31-RTX F scope of delivery (Page 19)

Scope of delivery for EC31-HMI/RTX (Page 25)

## 2.2 EC31

### 2.2.1 Scope of delivery EC31

The following components ship with the EC31:

- Embedded Controller EC31 with following pre-installations
  - Operating system Windows Embedded Standard 2009
  - Software Development Kit (SDK)
- Restore DVD "SIMATIC S7-mEC EC31 08/2010" for restoring the image
- DVD "S7-mEC Software and Documentation"
- Windows Certificate of Authenticity (CoA), attached as adhesive label
- End User License Agreement (EULA)
- Product Information

## 2.2.2 Embedded Controller EC31

### Properties

- The Embedded Controller EC31 is a PC with S7-300 design that runs on the pre-installed Windows XP Embedded 2009 operating system.
- EC31 can be installed in horizontal position on a mounting rail and can be expanded into a modular *S7-mEC* system by installing S7-300 modules and the EM PC and EM PCI-104 expansion modules. A flash memory is used as storage medium for the operating system and any application data.
- EC31 provides high-level industrial performance:
  - Fanless operation
  - High degree of endurance



Figure 2-1 Embedded Controller EC31

### User-specific functionality

EC31 is an open platform for user-specific applications and can be used, for example, to access S7-300 I/O.

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#### Note

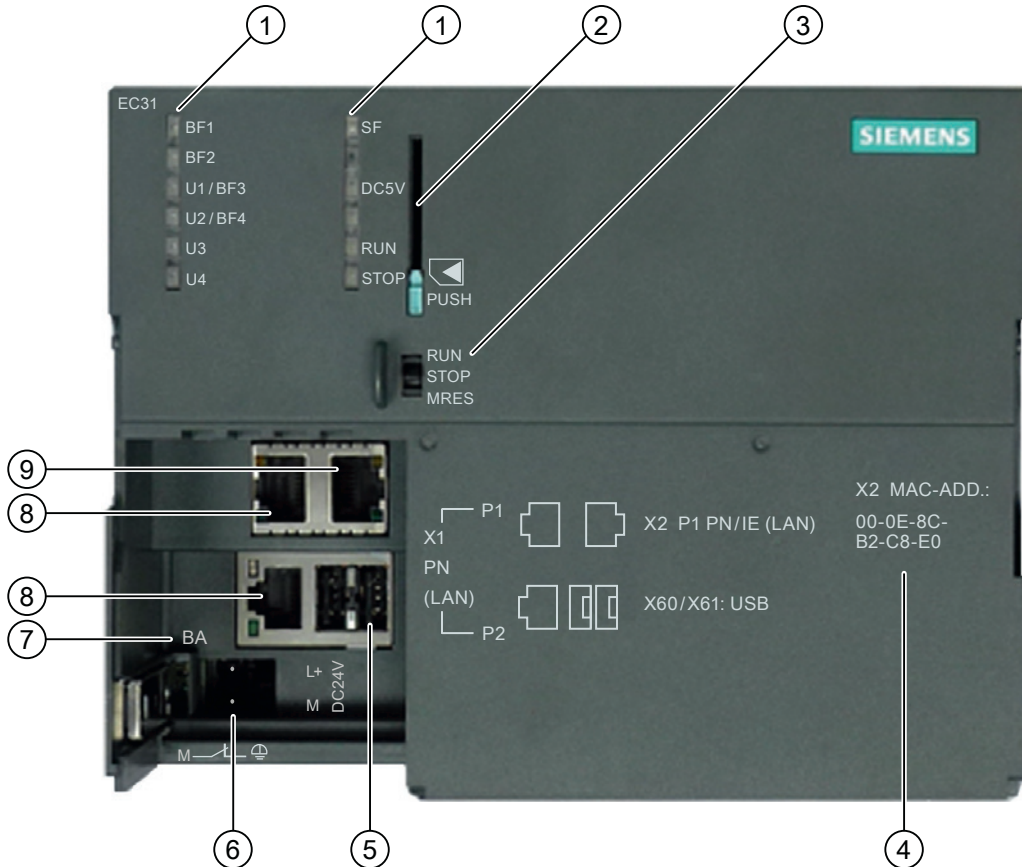
The behavior of EC31 depends on the user-specific application. Compared to a CPU S7-300, it can differ in terms of its response.

---

### 2.2.3 EC31 display elements and interfaces

#### Display elements and interfaces

The figure below shows the display elements and interfaces of EC31.



- 1 LED displays
- 2 Slot for the Multi Media Card, including the ejector
- 3 Mode selector switch
- 4 MAC address of the standard Ethernet controller (X2 P1 PN/IE (LAN))
- 5 USB 2.0 ports
- 6 Power supply connection
- 7 Identification of the product variant: **BA** for EC31
- 8 PROFINET IO connection (for operation with WinAC RTX(F) only)
- 9 Ethernet connection



## MMC slot

You can use an MMC memory module, for example, as backup medium.

### NOTICE

#### Overwriting the S7 formatting

The S7 formatting is overwritten if a SIMATIC Micro Memory Card is used in the Embedded Controller. This prevents any further use of the SIMATIC Micro Memory Card in SIMATIC-S7 modules!

## Power supply connection

The Embedded Controller is equipped with a 2-pin socket for the power supply. The connector with screw terminals is already plugged onto this socket contact in the delivery condition.

## Mode selector switch

### Note

#### User-specific applications

The behavior of EC31 depends on the user-specific application. Compared to a CPU S7-300, it can differ in terms of its response.

The switch can be assigned user-specific functions in the SDK user program. It can be used for example, to switch the rear panel bus on and off.

Table 2- 1 Mode switch positions

Position	Default	Meaning
RUN	No function	Can be programmed in the SDK user program
STOP	No function	Can be programmed in the SDK user program
MRES	<b>During power up:</b> You can also activate the backup function in the power up phase of EC31 by pressing MRES.	Can be programmed in the SDK user program

## LED displays

The LED displays EC31, with exception of LED DC5V, can be assigned user-specific functions in the user program for the phase following the power up of EC31.

For further programming information, refer to the documentation for the SDK on the included DVD.

Status and error displays during power up and backup / restore

Table 2- 2 Status and error displays during power up and backup / restore

LED				Meaning
U1/BF3	U2/BF4	U3	U4	
On	On	On	On	Power ON (all LED displays are lit)
-	-	Off	Flashes	Booting from flash memory (power up)
		Off	On	Windows boot operation completed, Embedded Controller ready for operation / ready for remote desktop connection
On	On	Off	Off	The LED displays light up if a bootable USB device was detected in the power up sequence. In this case, you can also press MRES to start the backup / restore functions.
-	-	Flashes	Off	Initializing backup / restore.
-	-	Flashes	On	Backup is being executed
-	-	Flashes	Flashes	Restore is being executed
-	Flashes	Flashes	Flashes	Backup / Restore error

## 2.3 EC31-RTX / EC31-RTX F

### 2.3.1 EC31-RTX / EC31-RTX F scope of delivery

The scope of delivery of the EC31-RTX and EC31-RTX F encompasses the following components:

- Embedded Controller with the following pre-installations:
  - Windows Embedded Standard 2009 operating system
  - SIMATIC NET 2008 (with SIMATIC NET Softnet-S7 Lean Edition 2010)
  - WinAC RTX 2010, or WinAC RTX F 2010
- Restore DVD "SIMATIC S7-mEC EC31-RTX 08/2010", or Restore-DVD "SIMATIC S7-mEC EC31-RTX F 08/2010" for restoring the image
- DVD "S7-mEC Software and Documentation"
- Windows Certificate of Authenticity (CoA), attached as adhesive label
- End User License Agreement (EULA)
- Product Information
- USB stick with SIMATIC License Keys
- Certificate of License (CoL)

#### In addition for the EC31-RTX F:

- Yellow TÜV label identifying the EC31-RTX F for fail-safe operation.



Figure 2-2 EC31-RTX F

---

#### Note

The Embedded Controller is always attached the **EC31** label with order number 6ES7677-1DD10-0BA0, independent of ordering options. The two letters above the power connector identify the product variant:

**BB** for EC31-RTX

**FB** for EC31-RTX F

---

### 2.3.2 EC31-RTX / EC31-RTX F Embedded Controller

#### Properties

- The Embedded Controller EC31-RTX / EC31-RTX F is a PC in S7-300 design, with Windows Embedded Standard 2009 operating system, with SIMATIC NET 2008 and WinAC RTX 2010 or WinAC RTX F 2010. The software is preinstalled and preconfigured.
- EC31-RTX / EC31-RTX F can be installed in horizontal position on a mounting rail and can be expanded into a modular *S7-mEC* system by installing S7-300 modules and the EM PC and EM PCI-104 expansion modules. A flash memory is used as storage medium for the operating system and application data.
- The EC31-RTX F can furthermore be expanded with fail-safe signal modules.
- The EC31-RTX / EC31-RTX F can be operated as a PROFINET IO controller. PROFINET IO devices are connected by means of the ports of the integrated X1 PN (LAN) interface.
- EC31-RTX / EC31-RTX F provides high-level industrial performance:
  - Fanless operation
  - High degree of endurance

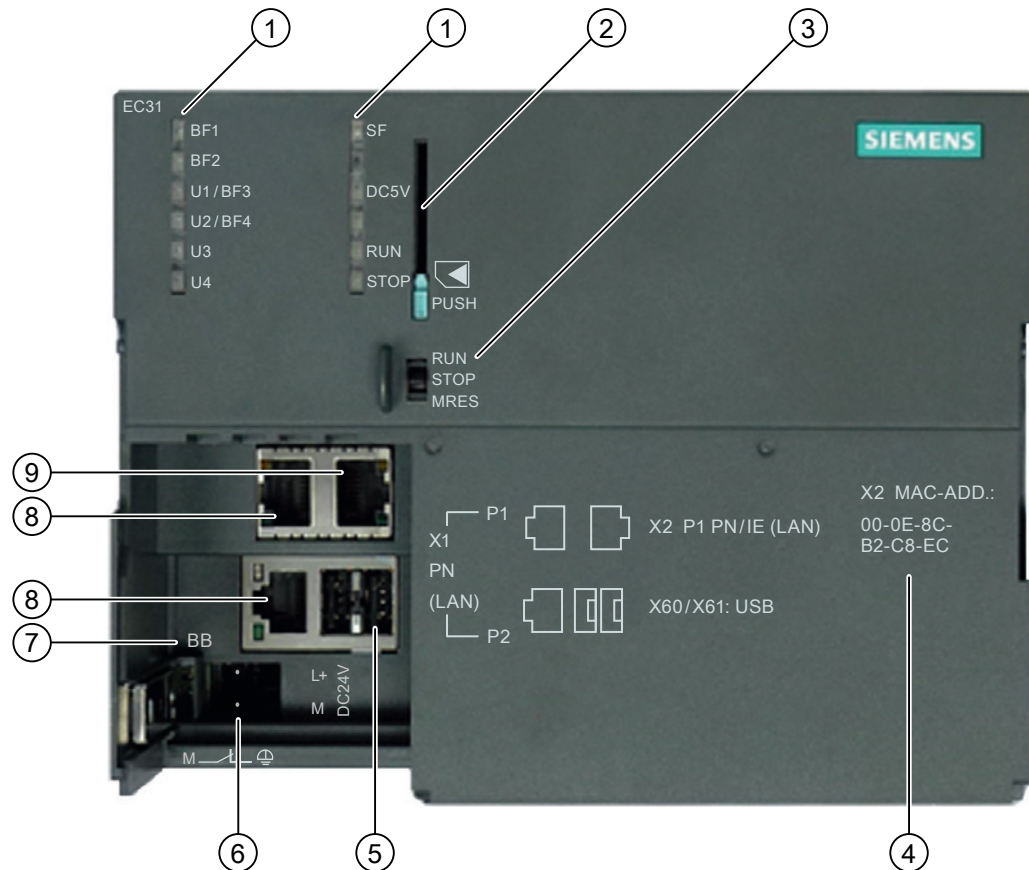


Figure 2-3 Embedded Controller EC31-RTX / EC31-RTX F

### 2.3.3 Display elements and interfaces of the EC31-RTX / EC31-RTX F

#### Display elements and interfaces

The figure below shows the display elements and interfaces of the EC31-RTX / EC31-RTX F.



- 1 LED displays
- 2 Slot for the Multi Media Card, including the ejector
- 3 Mode selector switch
- 4 MAC address of the standard Ethernet controller (X2 P1 PN/IE (LAN))
- 5 USB 2.0 ports
- 6 Power supply connection
- 7 Identification of the product variant:  
BB: EC31-RTX  
FB: EC31-RTX F
- 8 PROFINET IO connection (as submodule of WinAC)
- 9 Ethernet connection with basic PROFINET services

**MMC slot**

You can use an MMC memory module, for example, as backup medium.

<b>NOTICE</b>
The S7 formatting is overwritten if a SIMATIC Micro Memory Card is used in the Embedded Controller. This prevents any further use of the SIMATIC Micro Memory Card in SIMATIC S7 modules!

**Power supply connection**

The Embedded Controller is equipped with a 2-pin socket for the power supply. The connector with screw terminals is already plugged onto this socket contact in the delivery condition.

**Mode selector switch**

Meaning of the mode selector switch settings:

Table 2- 3 Settings of the selector switch at the EC31-RTX / EC31-RTX F

Position	Meaning	Notes
RUN	The controller processes the STEP 7 user program.	The RUN and STOP settings of the mode selector switch indicate the <b>selected</b> operating mode. The RUN and STOP LED displays indicate the <b>actual</b> operating mode of the EC31-RTX / EC31-RTX F.
STOP	The controller does not process the STEP 7 user program. The outputs are set to a "safe" state.	
MRES	<b>During power up:</b> Backup / Restore can be activated in the power up phase of the EC by pressing MRES.	-
	<b>With active WinAC: Memory reset</b> <b>Caution!</b> During memory reset (Page 96) the <b>project and program</b> (SDB, DB, OB, FB, etc.) are deleted from the WinLC RTX EC. All the configuration information of the EC31-RTX / EC31-RTX F is lost!	<b>Difference compared to S7-300:</b> A memory reset on an S7-300 CPU triggers a re-initialization. This means that the user programs or configuration data are not deleted.

## Status and error displays with active WinAC

The following LED displays indicate the status of the EC31-RTX / EC31-RTX F with active WinAC:

Table 2- 4 Status and error displays with active WinAC

LED designation	Color	Meaning
BF1*	Red	Bus fault at interface X1 PN LAN P1 or X1 PN LAN P2
BF2*	Red	Reserved for WinLC submodules (for more information, refer to the <i>WinAC RTX 2010</i> manual).
U1/BF3*	Red	
U2/BF4*	Red	
U3**	Yellow	Status of Windows Embedded Standard 2009 and Backup / Restore (see the next table).
U4**	Green	
SF	Red	Group error
DC5V	Green	5 V supply for the backplane bus
RUN	Green	Embedded Controller in RUN mode.
STOP	Yellow	Embedded Controller in STOP mode

\* The LED displays correspond to the IF slots of WinLC RTX.  
The slots are preconfigured in the Station Configuration Editor.

\*\* The LED displays are not visible in the WinLC RTX EC / WinLC RTX F EC Controller Panel.

## Status and error displays during power up and backup / restore

Table 2- 5 Status and error displays during power up and backup / restore

LED				Meaning
U1/BF3	U2/BF4	U3	U4	
On	On	On	On	Power ON (all LED displays are lit)
-	-	Off	Flashes	Booting from flash memory (power up)
-	-	Off	On	Windows boot sequence completed. Embedded Controller ready for operation / ready for remote desktop connection.
On	On	Off	Off	The LED displays light up if a bootable USB device was detected in the power up sequence. In this case, you can also press MRES to start the backup / restore functions.
-	-	Flashes	Off	Initializing backup / restore.
-	-	Flashes	On	Performing backup.
-	-	Flashes	Flashes	Performing restore.
-	Flashes	Flashes	Flashes	Backup / restore error

## See also

Controller Panel WinLC RTX EC (Page 93)

Backup - requirements and rules (Page 97)

## 2.3.4 Differences compared to WinAC RTX

### Introduction

The PC-based WinLC RTX controller which is installed on the Embedded Controller corresponds with the WinLC RTX controller that is executed on standard PCs. The software is identical. However, compared to WinAC RTX on other platforms, there are certain differences in the usage of EC31-RTX / EC31-HMI/RTX with WinAC RTX or of the EC31-RTX F with WinAC RTX F:

- Layout and appearance of the panel
- Operation
- Preconfigured system

### Differences of WinAC RTX in the Embedded Controller compared to WinAC RTX on a PC-based platform

- Centralized I/Os can be connected to EC31-RTX / EC31-RTX F / EC31-HMI/RTX.
- The Embedded Controller contains a default configuration for all components.
- Configuration data and the STEP 7 user program can be archived in WLD files for reuse and transfer. The WLD files created on the Embedded Controller are incompatible with the WLD files created on other PC platform.

### Additional information

The documentation for WinAC RTX 2010 or WinAC RTX F 2010 included with your Embedded Controller provides a description of the functionality of the WinAC RTX standard product that runs on a PC with Windows XP / Windows XP Embedded operating system.



## 2.4 EC31-HMI/RTX

### 2.4.1 Scope of delivery for EC31-HMI/RTX

The following components are included in the scope of delivery of EC31-HMI/RTX:

- Embedded Controller EC31-HMI/RTX with following pre-installations:
  - Windows Embedded Standard 2009 operating system
  - SIMATIC NET 2008 (with SIMATIC NET Softnet-S7 Lean Edition 2010)
  - WinAC RTX 2010
  - WinCC flexible Runtime 2008 SP2
- Restore DVD "SIMATIC S7-mEC EC31-HMI/RTX 08/2010" for restoring the image
- DVD "S7-mEC Software and Documentation"
- Windows Certificate of Authenticity (CoA), attached as adhesive label
- End User License Agreement (EULA)
- Product Information
- USB stick with SIMATIC License Keys
- Certificate of License (CoL)

---

#### Note

The Embedded Controller is always attached the **EC31** label with order number 6ES7677-1DD10-0BA0, independent of ordering options. The two letters above the power connector identify the product variant:

**BF** for EC31-HMI/RTX 128 PT

**BG** for EC31-HMI/RTX 512 PT

**BH** for EC31-HMI/RTX 2048 PT

---

#### See also

Unpacking the device (Page 13)

## 2.4.2 Embedded Controller EC31-HMI/RTX

### Properties

- The Embedded Controller EC31-HMI/RTX is a PC with S7-300 design for machine-oriented visualization tasks. It is supplied with the following preinstalled and preconfigured software:
  - Windows Embedded Standard 2009 operating system
  - SIMATIC NET 2008
  - WinAC RTX 2010
  - WinCC flexible Runtime 2008 SP2
- The EC31-HMI/RTX is available in three versions: with 128, 512 and 2048 power tags.
- EC31-HMI/RTX can be installed in horizontal position on a mounting rail and can be expanded into a modular *S7-mEC* system by installing S7-300 modules and the EM PC and EM PCI-104 expansion modules. A flash memory is used as storage medium for the operating system and application data.
- EC31-HMI/RTX can be operated as PROFINET IO controller.  
PROFINET IO devices are connected via the ports of the integrated X1 PN (LAN) interface.
- EC31-HMI/RTX provides high-level industrial performance:
  - Fanless operation
  - High degree of endurance

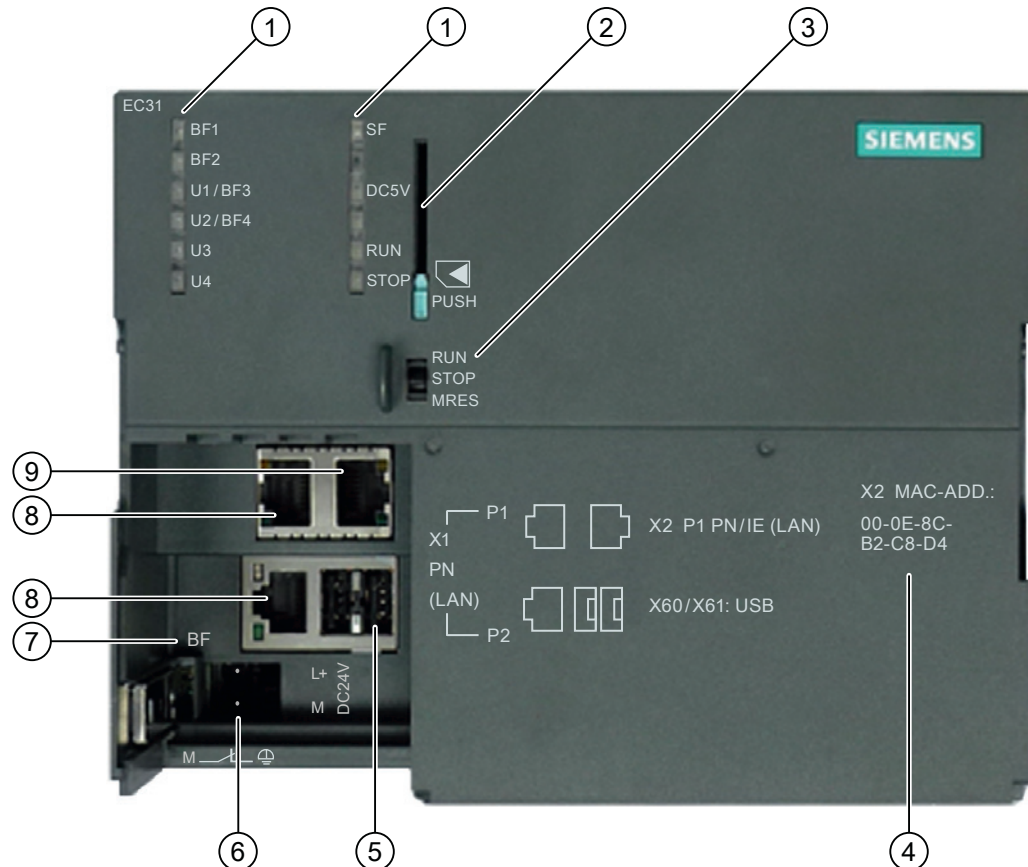


Figure 2-4 Embedded Controller EC31-HMI/RTX

## 2.4.3 Display elements and interfaces of EC31-HMI/RTX

### Display elements and interfaces

The figure below shows the display elements and interfaces of EC31-HMI/RTX.



- 1 LED displays
- 2 Slot for the Multi Media Card, including the ejector
- 3 Mode selector switch
- 4 MAC address of the standard Ethernet controller (X2 P1 PN/IE (LAN))
- 5 USB 2.0 ports
- 6 Power supply connection
- 7 Identification of the product variant:  
BF: EC31-HMI/RTX 128 PT  
BG: EC31-HMI/RTX 512 PT  
BH: EC31-HMI/RTX 2048 PT
- 8 PROFINET IO connection (as submodule of WinAC)
- 9 Ethernet connection with basic PROFINET services

**MMC slot**

You can use an MMC memory module, for example, as backup medium.

<b>NOTICE</b>
The S7 formatting is overwritten if a SIMATIC Micro Memory Card is used in the Embedded Controller. This prevents any further use of the SIMATIC Micro Memory Card in SIMATIC S7 modules!

**Power supply connection**

The Embedded Controller is equipped with a 2-pin socket for the power supply. The connector with screw terminals is already plugged onto this socket contact in the delivery condition.

**Mode selector switch**

Meaning of the mode selector switch settings:

Table 2- 6 Settings of the mode selector switch on EC31-HMI/RTX

Position	Meaning	Notes
RUN	The controller processes the STEP 7 user program.	The RUN and STOP settings of the mode selector switch indicate the <b>selected</b> operating mode. The RUN and STOP LED displays indicate the <b>actual</b> operating mode of EC31-HMI/RTX.
STOP	The controller does not process the STEP 7 user program. The outputs are set to a "safe" state.	
MRES	<b>During power up:</b> Backup / Restore can be activated in the power up phase of the EC by pressing MRES.	-
	<b>With active WinAC: Memory reset</b> <b>Caution!</b> During memory reset (Page 96) the <b>project and program</b> (SDB, DB, OB, FB, etc.) are deleted from the WinLC RTX EC. All configuration data of EC31-HMI/RTX is lost!	<b>Difference compared to S7-300:</b> A memory reset on an S7-300 CPU triggers a re-initialization. This means that the user programs or configuration data are not deleted.

## Status and error displays with active WinAC

The following LED displays indicate the status of EC31-HMI/RTX with active WinAC:

Table 2- 7 Status and error displays with active WinAC

LED designation	Color	Meaning
BF1*	Red	Bus fault at interface X1 PN LAN P1, or X1 PN LAN P2
BF2*	Red	Reserved for WinLC submodules (for more information, refer to the <i>WinAC RTX 2010</i> manual).
U1/BF3*	Red	
U2/BF4*	Red	
U3**	Yellow	Status of Windows Embedded Standard 2009 and Backup / Restore (see the next table).
U4**	Green	
SF	Red	Group error
DC5V	Green	5 V supply for the backplane bus
RUN	Green	Embedded Controller in RUN mode.
STOP	Yellow	Embedded Controller in STOP mode

\* The LED displays correspond to the IF slots of WinLC RTX.  
The slots are preconfigured in the Station Configuration Editor.

\*\* The LED displays are not visible in the WinLC RTX EC Controller Panel.

## Status and error displays during power up and backup / restore

Table 2- 8 Status and error displays during power up and backup / restore

LED				Meaning
U1/BF3	U2/BF4	U3	U4	
On	On	On	On	Power ON (all LED displays are lit)
-	-	Off	Flashes	Booting from flash memory (power up)
-	-	Off	On	Windows boot sequence completed. Embedded Controller ready for operation / ready for remote desktop connection.
On	On	Off	Off	The LED displays light up if a bootable USB device was detected in the power up sequence. In this case, you can also press MRES to start the backup / restore functions.
-	-	Flashes	Off	Initializing backup / restore.
-	-	Flashes	On	Performing backup.
-	-	Flashes	Flashes	Performing restore.
-	Flashes	Flashes	Flashes	Backup / restore error

### See also

Backup - requirements and rules (Page 97)

## 2.5 Expansion module EM PCI-104

### 2.5.1 EM PCI-104

#### Scope of delivery

The following components ship with the product:

- Expansion module EM PCI-104
- 2-pin jack for external power supply
- Product Information

#### Properties

You can use the expansion module EM PCI-104 to expand the functionalities of the S7-mEC. For example, you can add additional communication, memory, video, audio and high-speed metrology cards. The expansion module permits the mounting of 3 PCI-104 standard cards.

With the communications processor CP 5603, you have the option of connecting an existing PROFIBUS network to the S7-mEC.



Figure 2-5 Expansion module EM PCI-104



## PROFIBUS DP connection by means of CP 5603

A package with the communications processor and a prepared shelf for the EM PCI-104 is available for installing a CP 5603 in the EM PCI-104 (order no. 6GK1560-3AE00)

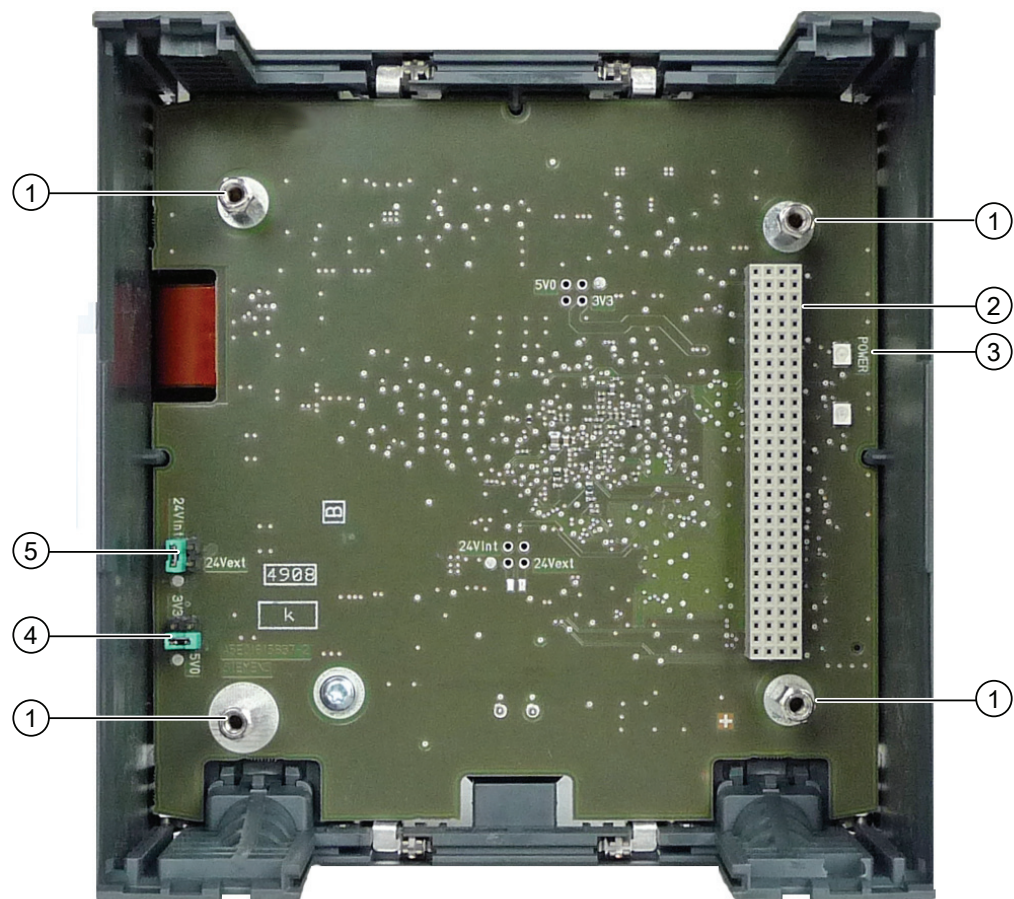
### See also

Order numbers (Page 126)

## 2.5.2 Display elements and interfaces of EM PCI-104

### Display elements and interfaces

The figure below shows the elements, display elements and interfaces of the EM PCI-104.



- 1 Spacer pins for PCI-104 cards
- 2 PCI-104 interface
- 3 POWER LED display
- 4 Jumper for I/O voltage on the EM PCI-104 connection
- 5 Jumper for external / internal power supply

### Power supply connection

On the underside, EM PCI-104 has a 2-pin connector for the power supply connection. The scope of delivery includes a connector with screw connection.

### Status displays

The following LED displays on the card show the status of the EM PC-104:

Table 2- 9 Status display EM PCI-104

LED designation	Color	Meaning
POWER	Green	Is lit when the power supply of the expansion module is OK.



## 2.6 Expansion module EM PC

### 2.6.1 EM PC

#### Scope of delivery

The following components ship with the product:

- Expansion module EM PC
- Product Information

#### Properties

The EM PC expansion module features standard PC interfaces. Additional memory slots and communication ports are available in addition to the connection options for a local operation and monitoring.

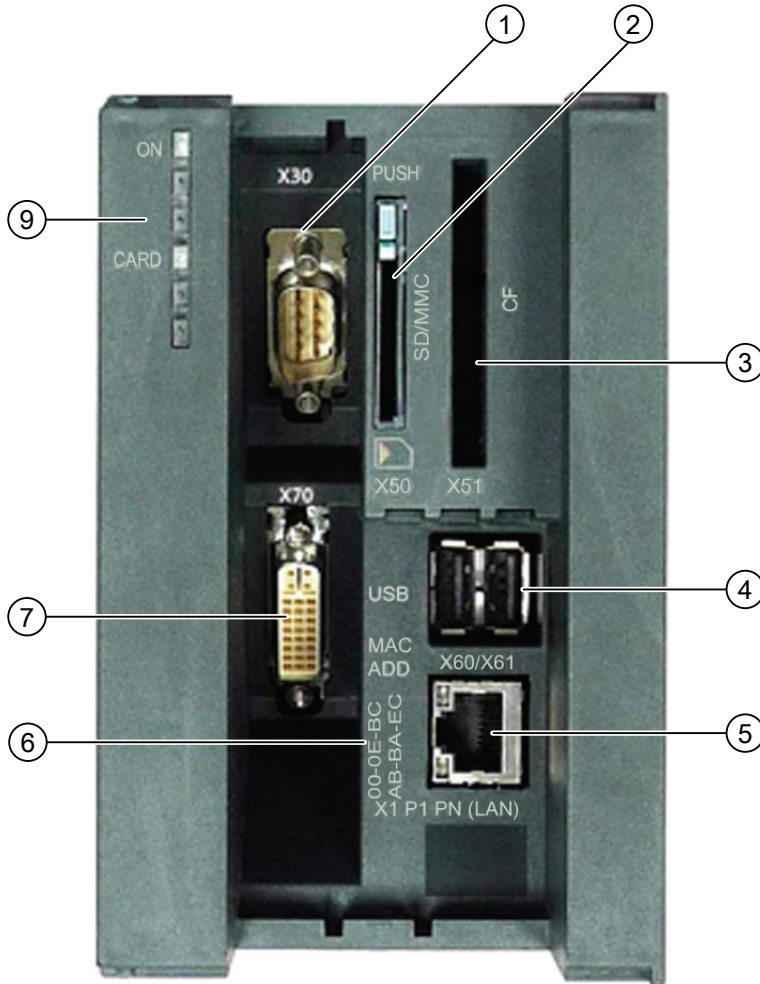


Figure 2-6 Expansion module EM PC

## 2.6.2 Display elements and EM PC interfaces

### Display elements and interfaces

The figure below shows the display elements and interfaces of the EM PC.



- |   |                |  |
|---|----------------|--|
| 1 | X30            | Serial interface V.24 (RS232)                            |
| 2 | X50 SD/MMC     | Combination slot for SD or Multi Media Card with ejector |
| 3 | X51 CF         | Slot for CompactFlash card                               |
| 4 | X60/X61 USB    | 2 x USB 2.0 high-speed                                   |
| 5 | X1 P1 PN (LAN) | Gigabit Ethernet connection                              |
| 6 |                | MAC address  |
| 7 | X70            | DVI-I graphics interface                                 |
| 8 |                | LED displays   |

## Status indicators

The following LED displays show the status of the EM PC:

Table 2- 10 Status displays EM PC

LED designation	Color	Meaning
ON	Green	Power On
CARD	Green	Flashes when SD/MMC or CF card is active. Lit if at least one memory medium is inserted.

## Serial interface

The serial interface at the EM PC is emulated via USB controller.

When developing your own applications, always use the latest Microsoft development tools and program design. For additional information, refer to the Microsoft documentation.



# Application planning

## 3.1 Operating options

### Operating options

You can operate the Embedded Controller as follows:

- Local
- Remotely - with access via *Remote Desktop Protocol*

### Local

On the Embedded Controller the input devices, e.g. keyboard and mouse, are directly connected via the USB ports. Output devices, e.g. monitors and printers, are connected via the DVI-I and USB ports of the EM PC expansion module.

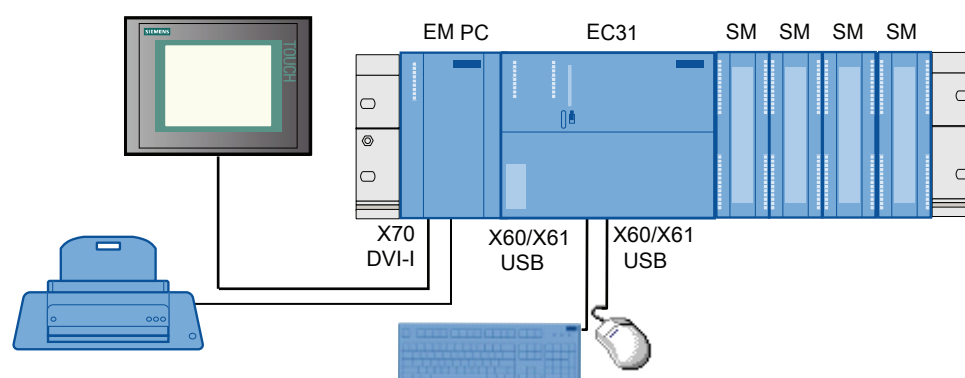


Figure 3-1 Embedded Controller - Local access

## Remote

The Embedded Controller is installed in an equipment cubicle (control cabinet) and is interconnected via Ethernet, for example with a Field PG, with a PC, or with a Thin Client . The Embedded Controller is accessed via *Remote Desktop Protocol*.

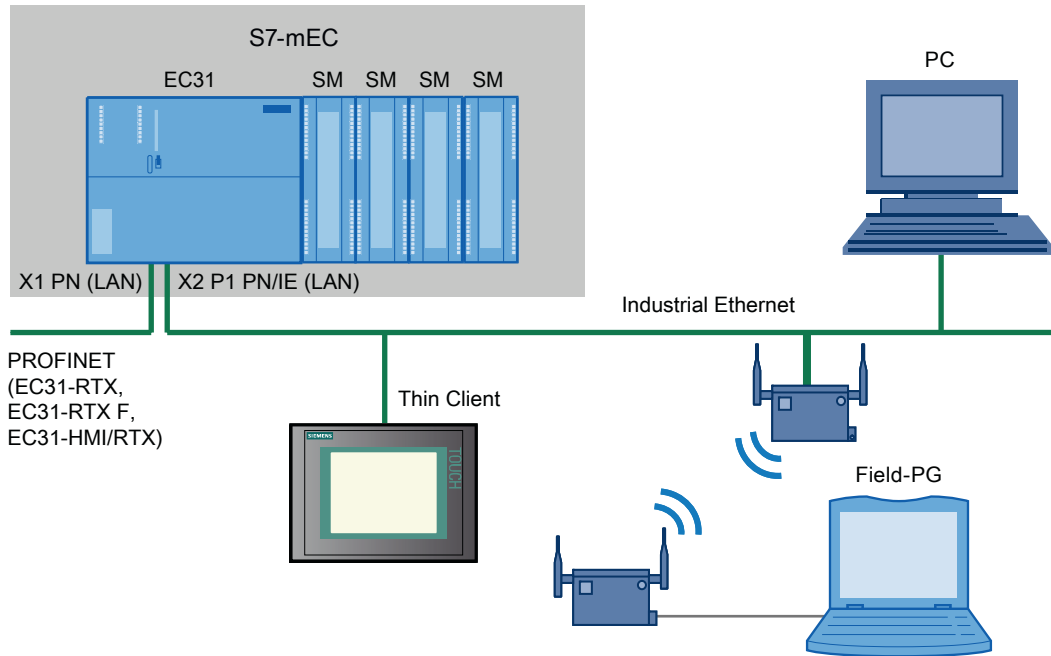


Figure 3-2 Embedded Controller - access via remote PC

## See also

Overview of initial commissioning (Page 83)

## 3.2 Configurations

### Possible hardware configurations

The Embedded Controller EC31-RTX / EC31-RTX F / EC31-HMI/RTX can be mounted in horizontal position onto a mounting rail and can be expanded to form a modular S7-mEC system by installing S7-300 modules and the EM PC and EM PCI-104 expansion modules.

Optionally, distributed I/O can be connected via PROFINET IO and PROFIBUS:

- The EC31-RTX / EC31-RTX F / EC31-HMI/RTX can be operated as a PROFINET IO controller. PROFINET IO devices are connected by means of the integrated X1 PN (LAN) interface.
- PROFIBUS DP slaves can be connected by means of the CP 5603 in the EM PCI-104 expansion module.

### S7-mEC example configuration

The following figure shows an S7-mEC example configuration with the following components:

- Embedded Controller EC31-HMI/RTX with printer and PROFINET IO devices
- S7-300 signal modules
- EM PC expansion module with external PC I/O devices
- PROFIBUS DP connection via a CP 5603 in the EM PCI-104 expansion module

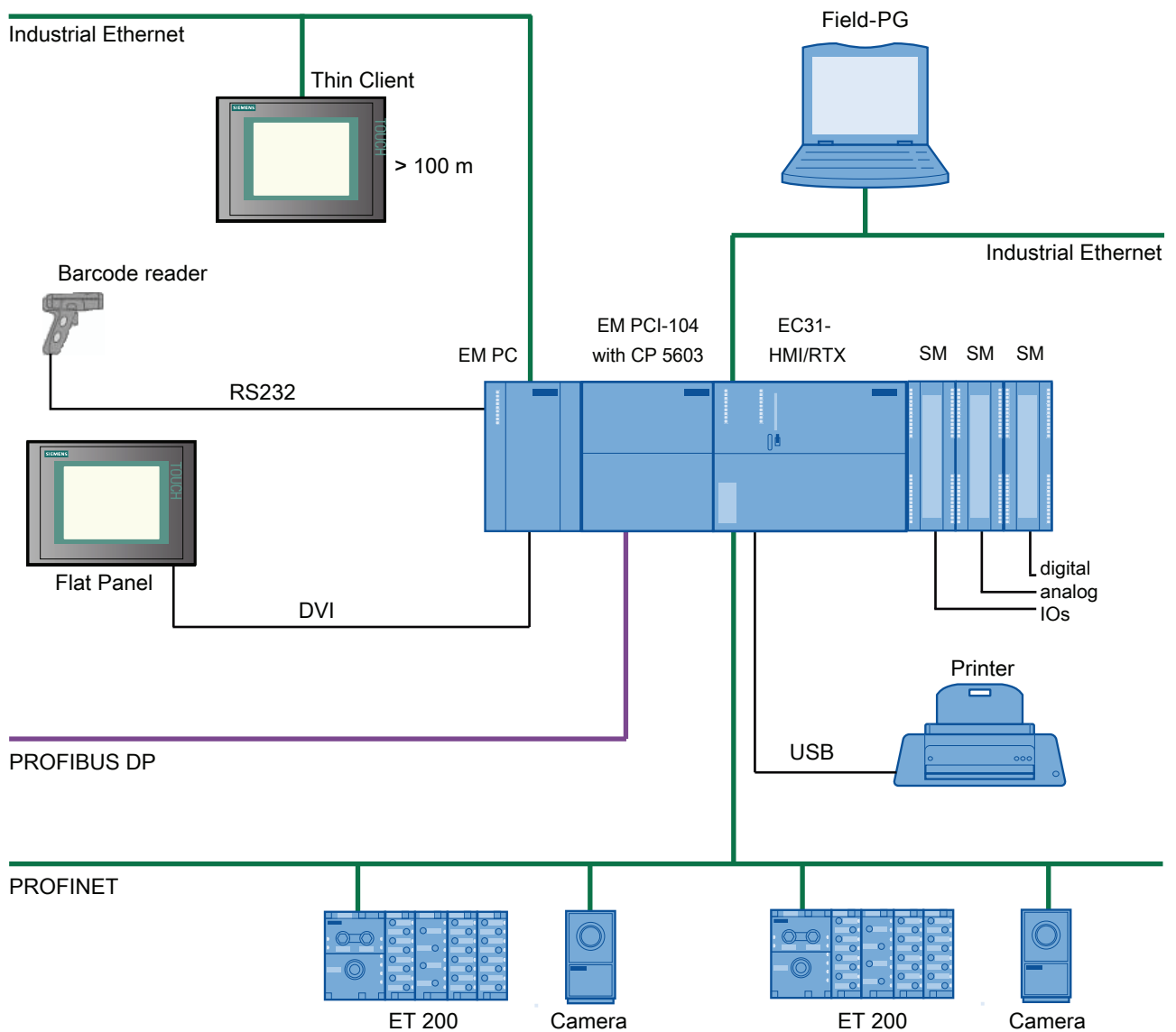


Figure 3-3 S7-mEC example configuration

### 3.3 Configuration with S7-300 modules

#### S7-mEC maximum configuration

An S7-mEC can consist of up to four racks, each one with 8 modules (SM/FM) of the S7-300 series. The Embedded Controller is connected to the interface module via a bus connector. The racks are interconnected by means of interface modules (IM). A PS 305 or PS 307 can be used to supply power.

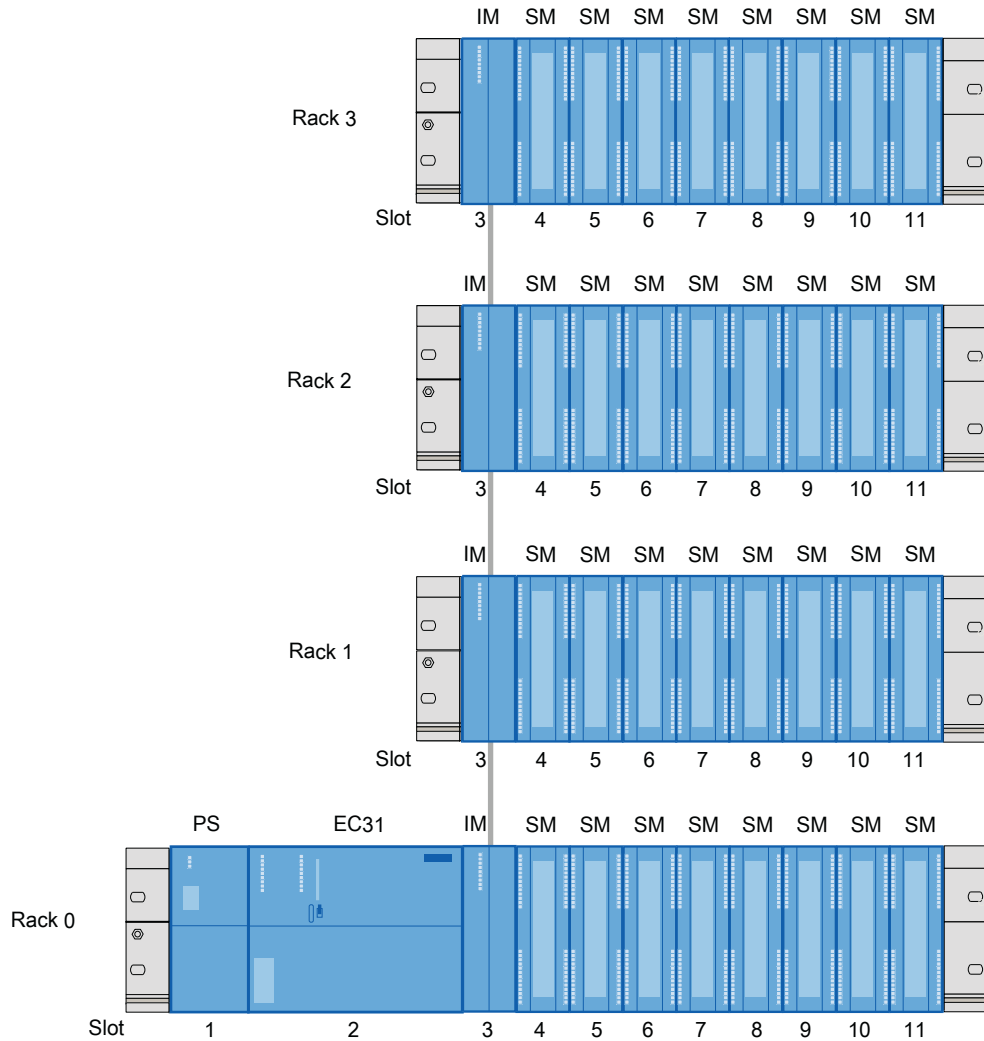


Figure 3-4 Maximum configuration with S7-300 modules

**Note**

The modules listed in the HW Config catalog under "S7-modular Embedded Controller > SM-300 / FM-300" are approved for operation with the EC31-RTX / EC31-RTX F / EC31-HMI/RTX.



## 3.4 Installation with expansion modules

### Rules

An expansion module is connected by means of the **Extension bus** bus connector with the Embedded Controller or a second expansion module.

- A maximum of 2 expansion modules are permitted in the central rack (Rack 0):
  - a) 1 x EM PCI-104, 1 x EM PC
  - b) 2 x EM PCI-104
- The EM PCI-104 expansion module is installed on the left-hand side of the Embedded Controller.
- The EM PC expansion module can be installed on the left-hand side of the Embedded Controller or EM PCI-104 expansion module.

### Maximum configuration with expansion modules

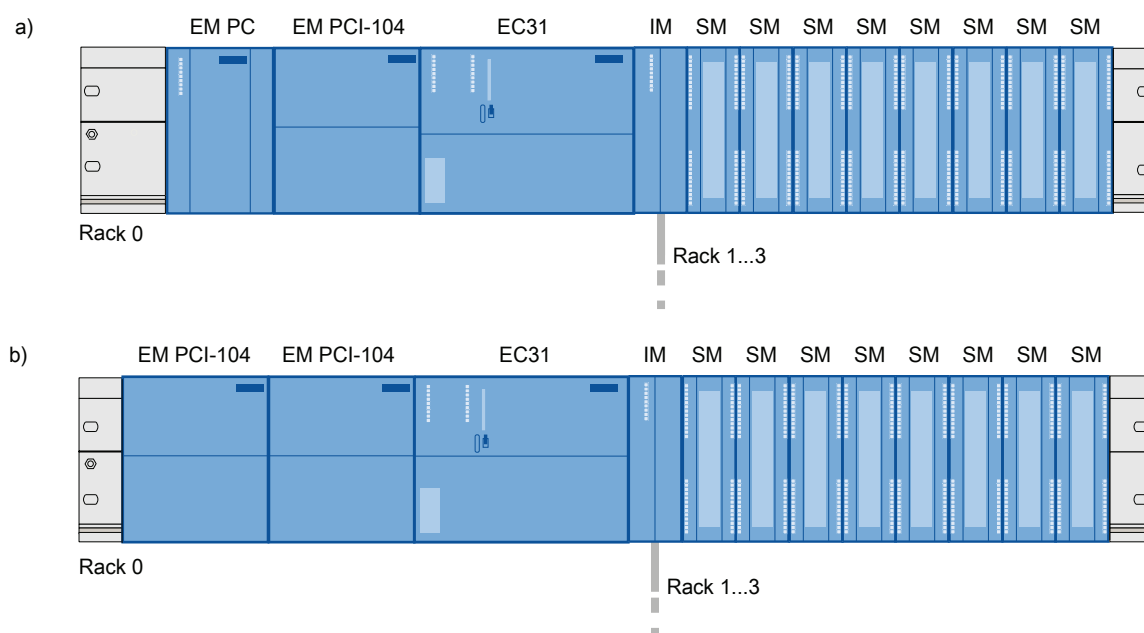


Figure 3-5 Maximum configuration with expansion modules

## **3.5 Ambient and Environmental Conditions**

Note the following aspects when planning your system application:

- Climatic and mechanical environmental conditions defined in the technical data section of the operating instructions.
- The device is only approved for indoor operation.
- Avoid extreme ambient conditions. Protect the device against dust, moisture and heat.
- Do not expose the device to direct sunlight.
- Do not obstruct the venting slots of the device.

# Installation

# 4

## 4.1 Setting up the S7-mEC

### Introduction

<b>NOTICE</b>
The device is approved for operation in closed rooms only. Always maintain a minimum clearance of 100 mm to components installed above or underneath the device, or to the walls of an enclosure.

### Rules

The *S7-modular Embedded Controller* system has to be mounted horizontally on the mounting rail.

Install the Embedded Controller, the expansion modules and the S7-300 modules in accordance with installation guidelines for the S7-300 automation system. Observe the corresponding information in the operating instructions *S7-300 CPU3xC and CPU 31x: Installation*, Chapter *Configuring* and *Installing*.

---

#### Note

#### Limitations

The following restrictions apply to the S7-mEC system in contrast to the S7-300 installation guidelines:

Permitted mounting position: Horizontal

Permissible operating temperature: 0 up to +50 °C

---

<b>CAUTION</b>
Modules may get damaged if exposed to excess ambient temperatures.

### **Installing the S7-mEC**

An expansion module is connected by means of the **Extension bus** with the Embedded Controller or a second expansion module.

1. Insert the bus connector of a S7-300 module on the Embedded Controller.
2. Mount the S7-mEC modules onto the mounting rail according to the specified sequence.
3. Slide the expansion modules from the left-hand side onto the Embedded Controller.
4. Swivel the connected module down into place.
5. Slide the first S7-300 module against the Embedded Controller and swivel them down into place.
6. Screw-tighten the modules.

### **Removing the S7-mEC**

When removing the S7-mEC, make sure to loosen the screws of the expansion module and the Embedded Controller and to swivel the modules jointly forward to detach the connection via the extension bus.

### **See also**

Installation with expansion modules (Page 41)

## 4.2 Installing PCI-104 cards in EM PCI-104

### 4.2.1 Requirements

#### Maximum configuration EM PCI-104

- An EM PCI-104 expansion module can be equipped with a maximum of three modules according to the specification of the PC/104 consortium:
  - PCI-104 modules: PCI compatible (120-pin plug)
  - PC/104 Plus modules that use only the 120-pin plug (PCI bus)
- Owing to the power loss, not more than two CP 5603 units can be operated in an EM PCI-104 expansion module.

#### CAUTION

##### Device can overheat!

For thermal reasons, the power loss for the EM PCI-104 expansion module should not exceed approx. 6.6 Watt.

Note the technical specifications in the manufacturer's documentation for the PCI-104 cards.

#### CAUTION

Use only EM PCI-104 cards that meet the SELV/PELV requirements!

#### Hardware configuration of the PCI-104 cards

#### CAUTION

##### Adverse effects on operations / PCI-104 card failure

Make sure that the cards used are compliant with the PCI-104 specification. When configuring the PCI-104 cards, always use the PCI bus signals which are approved in the PCI-104 specification.

Note the technical specifications in the manufacturer's documentation for the PCI-104 cards.

	IDSEL	IRQ	REQ	GNT	CLK
Combination 1	0	O	0	0	0
Combination 2	1	B	1	1	1
Combination 3	2	C	2	2	2
Combination 4	3	D	3	3	3

### Basic Procedure

<b>CAUTION</b>
<b>Damage to the EM PCI-104</b> Before starting work, disconnect the devices from the power supply.

The following steps are required to install PCI-104 cards in the expansion module:

1. Open expansion module EM PCI-104, remove shelves.
2. Set jumpers for the power supply of the PCI-104 cards on the card.
3. Optional: Punch the required cutouts for the connectors of the PCI-104 cards in the shelves.
4. Installing PCI-104 cards.
5. Optional: Fix the connectors of the PCI-104 cards in the cutouts.
6. Insert shelves, close expansion module EM PCI-104.
7. Connect shield connection to the mounting rail by means of the bonding screws.

### Reference

More information is available on the Internet at:  
PC-based Automation Competence Center (<http://www.siemens.de/west-apc>)

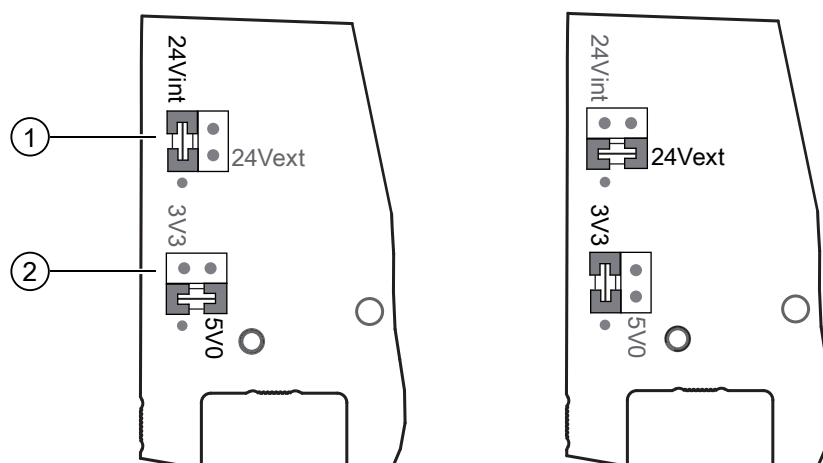
### See also

Installing the cards in the EM PCI-104 expansion module (Page 51)

## 4.2.2 Setting jumpers in EM PCI-104

### Setting the power supply and the I/O voltage

Before installing PCI-104 cards, check that the setting of the jumpers for the power supply and the I/O voltage for the PCI bus fits your application. Observe the manufacturer documented of the PCI-104 cards used in this regard.



- ① Power supply for the PCI-104 cards:  
**24Vint:** internal via EC31 (default)      **24Vext:** External power supply
- ② I/O voltage on the PCI-104 connection:  
**5V0:** 5.0 V (default)      **3V3:** 3.3 V

### Set the jumper

#### CAUTION

Before changing the jumper setting, switch off the power supply of the entire S7-mEC.

To change a jumper setting, uncover the pins and insert them carefully in the appropriate position.

If necessary, you can use a tweezers to set the jumper, even after the installation of the PCI-104 cards.

### External power supply of the EM PCI-104

---

#### Note

If the entire power consumption on the extension bus exceeds the 19 W that the EC31 provides, insert the jumper at position **24Vext** and connect it by means of the interface to the underside of the EM PCI-104.

---

#### WARNING

The device should only be connected to a 24 VDC power supply that meets the requirements of safe extra low voltage (SELV).

Use a power supply listed according to UL NEC class 2 or in the supply line a UL listed fuse with maximum 4 A.

#### CAUTION

To ensure that the Embedded Controller and EM PCI-104 are powered up simultaneously, always connect them to the same power supply.

### See also

Connecting the power supply for S7-mEC (Page 61)



## 4.2.3 Preparing shelves

### Introduction

The sockets / plug connectors of the PCI-104 card are routed out upward and/or downward through the shelves of the EM PCI-104 expansion module.



Figure 4-1 View of opened EM PCI-104

### Selecting PCI-104 cards

In selecting and combining the PCI-104 cards, pay attention to the position of the sockets / plug-in connectors to ensure that these can be routed out through the shelves and that the required ports are also accessible in installed state.

With the CP 5603 S7-mEC package (order number 6GK1560-3AE0) a shelf with cutout for the PROFIBUS DP socket is already present, an additional cutout is prepunched.

<b>NOTICE</b>
To avoid impairments in using the PCI-104 cards, observe the specified dimensions of the shelves and the technical data in the manufacturer's documentation for the PCI-104 cards used.

### Spacing between the PCI-104 cards

Use suitable spacing bolts to maintain the following spacing between the PCI-104 cards:

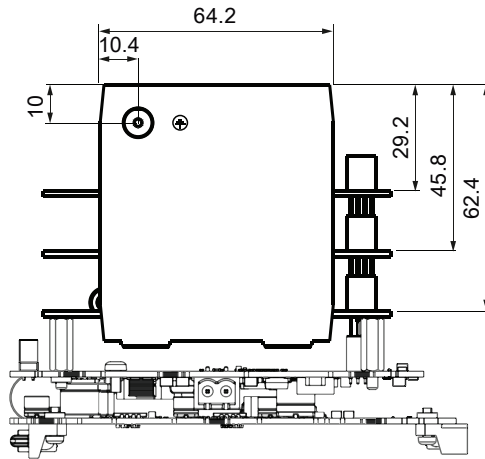


Figure 4-2 Spacing between the PCI-104 cards (dimensions in mm)

#### NOTICE

##### Narrow shelves

The narrow shelves on the underside of the expansion module deviate from the specifications of the PCI-104 standard. Therefore, make sure that sockets / plugs can be positioned in the shelf.

#### See also

EM PCI-104 (Page 124)

Dimension drawings (Page 123)

## 4.2.4 Installing the cards in the EM PCI-104 expansion module

### Tools

Use hexagon head screws (5 mm) to mount the spacing bolts of the PCI-104 cards. You can also fix the uppermost PCI-104 card with (M3) screws.


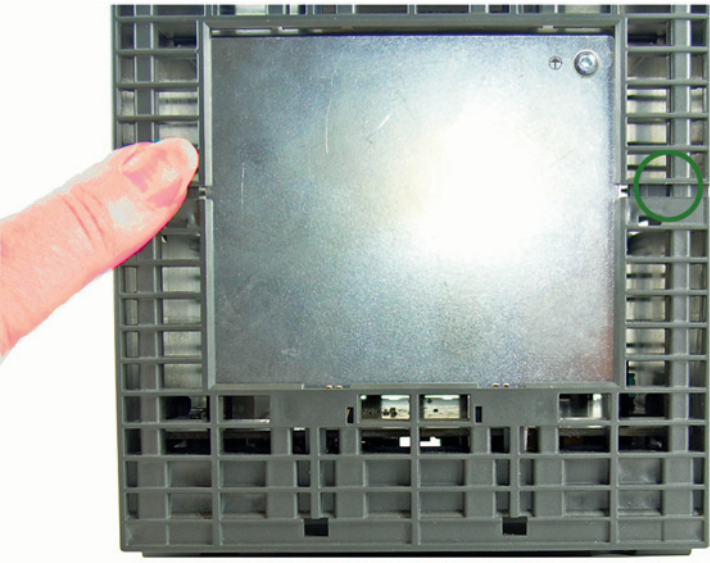
<b>CAUTION</b>
----------------

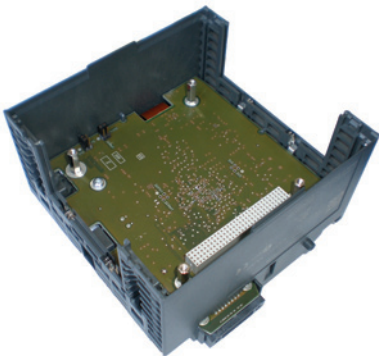
The electronic components on the cards are highly sensitive to electrostatic discharge. When handling these components, observe the precautions described in the guidelines for electrostatically endangered components.
--

### Requirements



- The EM PCI-104 expansion module is opened.
- The jumpers (Page 47) for the power supply of the PCI-104 cards on the printed-circuit board of the EM PCI-104 are set.
- The required cutouts for the plugs of the PCI-104 cards are present on the shelves (Page 49).
- The PCI-104 cards are configured (Page 45).

Opening the housing/enclosure

Step	Procedure	Figure
1	Using a screwdriver, carefully detach the retaining screws of the two plastic noses on the underside of the EM PCI-104.	
2	Carefully press with the thumbs on the indicated parts of the upper side to detach the fixing.	



Step	Procedure	Figure
3	Lift up the front hood of the EM PCI-104 and remove both shelves.	

### Inserting PCI-104 cards

Step	Procedure	Figure
1	Plug module into the slot and fix with four screws of spacing bolts (example: CP 5603).	
2	Optional: Insert additional cards. Secure the last card with four screws or spacing bolts.	
3	Fasten socket to the prepared shelf.	

*Installation*

*4.2 Installing PCI-104 cards in EM PCI-104*

Step	Procedure	Figure
4	Insert the shelves in the guides of the EM PCI-104, ensuring that they latch into place.	
5	Install front hood and ensure that it too latches into place.	

**Installing PCI-104 cards**

Additional adjustments may also be required to install the PCI-104 cards. For information on the installation, refer to the corresponding manufacturer documentation.

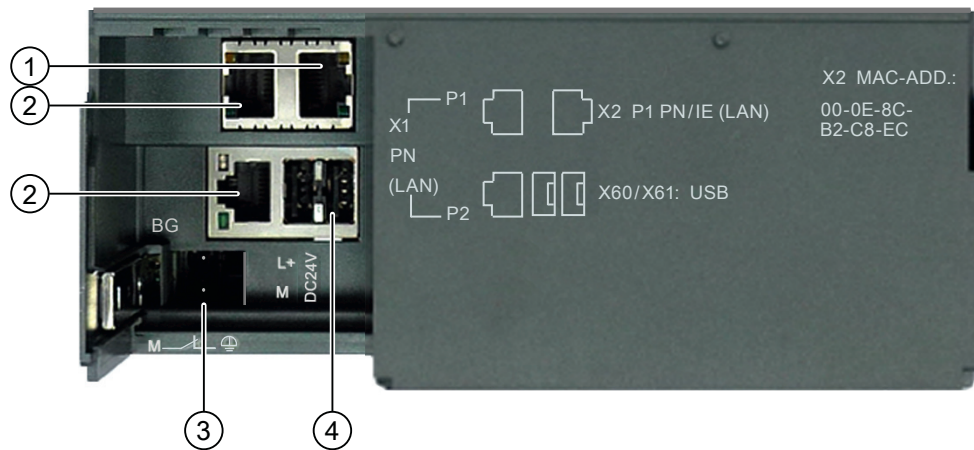
## Connecting

### 5.1 Connection elements

#### 5.1.1 Connection element Embedded Controller

##### Connection elements

The following connections are available on the Embedded Controller:



- |   |                                  |  |
|---|----------------------------------|--|
| 1 | X2 P1 PN/IE (LAN)                | One RJ45 Ethernet port, 10/100 Mbps; Interface for programming device / PC or Thin Client for commissioning with standard patch cable over RDP and for service purposes (not suitable for PROFINET IO -communication); Auto-crossover is not supported |
| 2 | X1 PN (LAN) P1<br>X1 PN (LAN) P2 | Two RJ45 PROFINET ports, 10/100 Mbps; 90° angle connector required; Auto-crossover supported   |
| 3 | DC24V                            | Connection for voltage supply (connector is included in the scope of delivery)   |
| 4 | X60/X61 USB                      | 2 x USB 2.0 ports, 500 mA, for USB devices, e.g. keyboard or mouse.  |

## **MAC addresses**

The MAC address consists of three bytes for the manufacturer ID and of three bytes for the device ID (consecutive number).


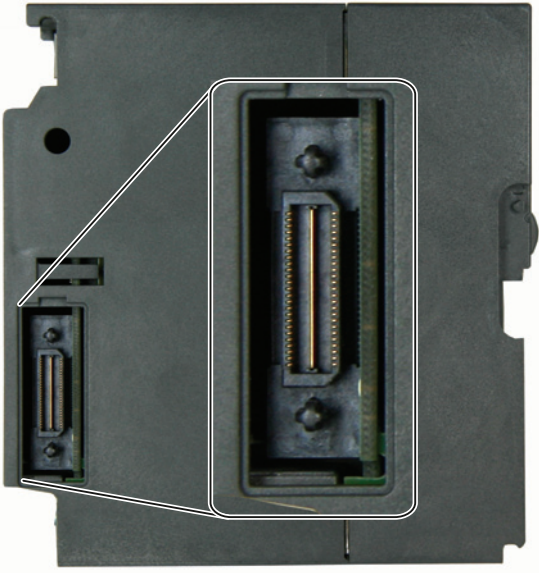
Each device is assigned four MAC addresses with consecutive device IDs at the factory. The first MAC address is positioned below the module cover on the device; for the other three address count up from the sequential number. If, for example, the first MAC address is 08-00-06-6B-80-C0, the second MAC address is then 08-00-06-6B-80-C1.

The first MAC address is assigned to interface X2 P1 PN/IE (LAN); the next MAC address is assigned to PROFINET interface X1 PN (LAN).



## Interfaces



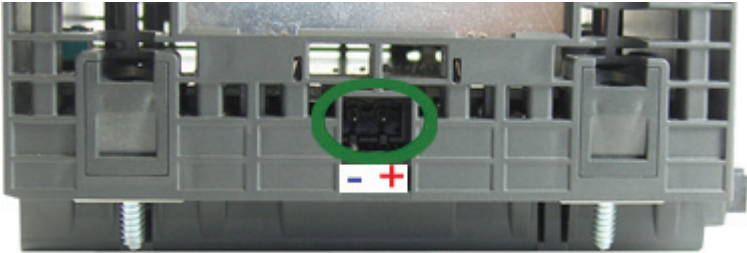
The following interfaces are available on the Embedded Controller:

Designation	Description
Rear panel bus	<p>Connection for the rear panel bus</p>  <p>The image shows the rear panel of the Embedded Controller. A white rectangular connector is highlighted with a white box on the left side of the panel. The panel also features several other connectors at the top and bottom, and a central circular port. Text on the panel includes a recycling symbol and the code '&gt; PPE + PS - GF 10 FR &lt;'. The panel is dark grey with various mounting holes and a fan grille at the bottom.</p>
Extension bus	<p>Connection for the expansion modules EM PCI-104 and EM PC (figure without interface cover)</p>  <p>The image is a close-up view of the extension bus connection point. It shows a large, rectangular connector with a gold-plated edge. The connector is mounted on a dark grey PCB. A white box highlights the connector, and a white line points to it from the left. The surrounding area includes mounting holes and other components of the PCB.</p>

5.1.2 Connection elements EM PCI-104

Interfaces to the Embedded Controller and the expansion modules

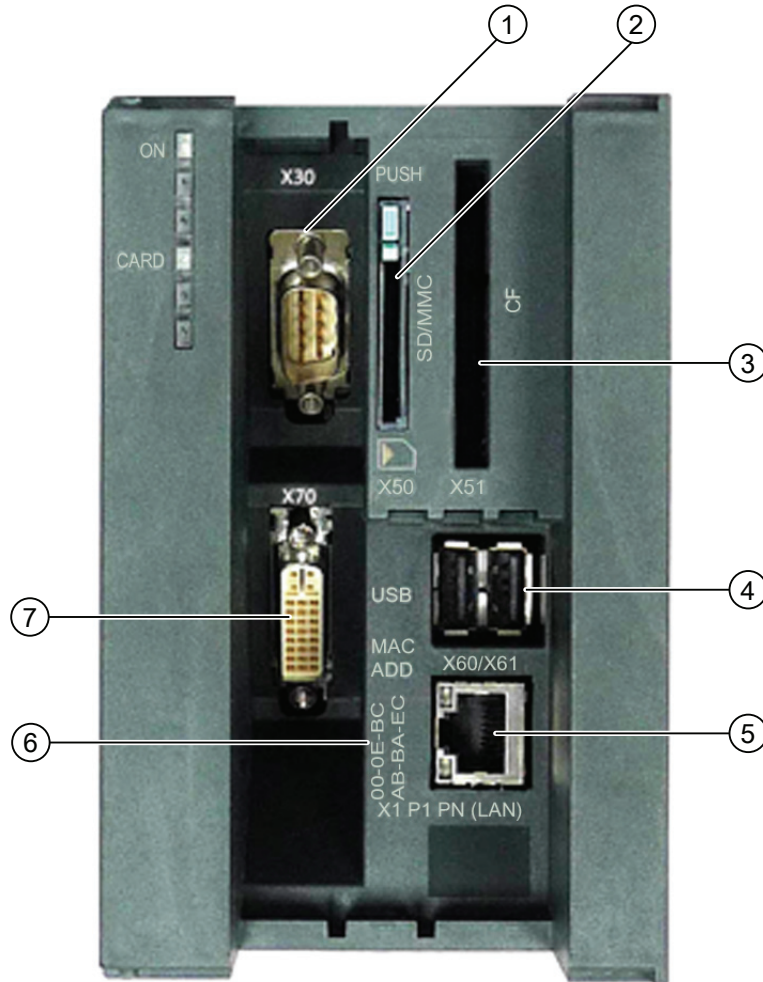
The following interfaces are available on the EM PCI-104:

Designation	Description
Extension bus	Connection for the Embedded Controller or the expansion module EM-PCI-104 (bus connector) 
Extension bus	Connection for the expansion module EM PC or the expansion module EM PCI-104 
DC 24 V	Connection for an external 24 VDC power supply 

### 5.1.3 Connection elements EM PC


#### Connection elements

The following connections are available on the EM PC:



- |   |                |  |
|---|----------------|--|
| 1 | X30            | Serial RS 232 port for barcode reader or barcode scanner   |
| 2 | X50            | Combination slot with ejector for SD or MMD as data memory, for example to exchange recipe and archive data.   |
| 3 | X51 CF         | Slot for Compact Flash card as data memory. Only use SIMATIC PC Compact Flash cards for industrial application (type I).   |
| 4 | X60/X61 USB    | 2 USB 2.0 ports, 500 mA, for USB devices, e.g. keyboard, mouse or data carrier. USB stick via USB cable or with maximum dimension (L x W x H, in mm): 64 x 18.5 x 7.8. |
| 5 | X1 P1 PN (LAN) | 1 RJ45-Ethernet for 10/100/1000 Mbps Gigabit Ethernet connection for a high-performance data connection  |
| 6 |                | MAC address  |
| 7 | X70            | DVI-I graphics connection to which DVI monitors can be connected; VGA monitors can also be connected via adapter. Use DVI cable with ferrites.                         |

Interfaces to the Embedded Controller and the expansion modules

Designation	Description
Extension bus	<p>Connection for the Embedded Controller or the expansion module EM-PCI-104 (bus connector)</p> 

## 5.2 Connecting the power supply for S7-mEC

### Connecting the power supply for S7-mEC

Connect the power supply and ground conductors in accordance with the installation guidelines for the S7-300 automation system. Observe the information in the operating instructions S7-300, CPU 31xC and CPU 31x: Installation (<http://support.automation.siemens.com/WW/view/en/13008499>)

### To be noted before you connect the device

Observe the following rules and regulations for safe operation of the device:

#### WARNING

The device should only be connected to a 24V DC power supply which satisfies the requirements of safe extra low voltage (SELV).

When the device is operated on a wall, in an open rack or other similar locations, an NEC Class 2 current source is required for the compliance of the UL requirements (in accordance with UL 60950-1). In all other cases (in accordance with IEC / EN / DIN EN 60950-1) either a power source of limited performance (LPS = Low Power Source), or a line-side fuse or a line-side power switch is necessary. Limit the current to a value of less than 8 A. Recommended fusing: 4 A.

Operation in closed cabinets or fireproofing cabinets (including the operation of a cabinet in accordance with UL508) there are no requirements for current limiting of the supply voltage.

#### NOTICE

Permissible conductor cross-section for the 24 VDC connecting cable: 0.75 mm<sup>2</sup> to 2.5 mm<sup>2</sup>.



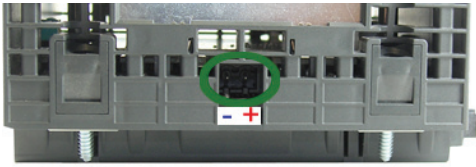
### External power supply of the expansion module EM PCI-104

If the total power consumption on the extension bus exceeds the 19 W that the EC31 provides, connect an external power supply to the EM PCI-104.

#### CAUTION

To ensure that the Embedded Controller and EM PCI-104 are powered up simultaneously, always connect them to the same power supply.

Connecting the S7-mEC

Step	Procedure	
1	Switch off the 24 V DC power source.	
2	Connect power supply by means of plug-in connector on the Embedded Controller (plug-in connector is included in scope of delivery).	
<b>Optional when using an expansion module EM PCI-104:</b>		
3	On the board of the EM PCI-104, insert jumper on <b>24Vext</b> .	
4	Connect power supply by means of plug-in connector on the underside of the EM PCI-104 (plug-in connector is included in scope of delivery).	
5	Switch on the 24 VDC power source.	

See also

Setting jumpers in EM PCI-104 (Page 47)

## 5.3 Connecting PC I/O

Observe the specifications provided in the documentation for the I/O devices used.

<b>NOTICE</b>
---------------

Connect only I/O devices that are approved for industrial applications in accordance with EN 61000-6-2:2005.
--

### Ethernet devices

Use standard patch cables to connect Ethernet devices (for example, SIMATIC Thin Client, Industrial Ethernet Switches SCALANCE X) to the X2 P1 PN/IE (LAN) interface.

<b>CAUTION</b>
----------------

Do not terminate the patch cable shield at the shield connecting element of the Embedded Controller.
--

### Regenerative feedback from USB devices

<b>CAUTION</b>
----------------

<b>Damage to the Embedded Controller</b>
--

In accordance with USB specification 2.0, chapter 7.2.1, USB I/O devices may not generate any feedback current to the Host . Such currents can lead to damage to the Embedded Controllers.
--

Always use certified USB devices.
-----------------------------------

### EC31: Hot-plug capable USB devices

Do not connect any hot-plug capable USB devices unless all applications are closed on the EC31.

<b>CAUTION</b>
----------------

The automatic device detection in Windows could have a negative impact on active automation applications if you insert or remove USB devices at runtime.
--

Therefore, do not insert or remove hot-plug USB devices unless all automation applications are closed.
--



### USB devices which are not hot-plug capable

<b>CAUTION</b>
Shut down power to the Embedded Controller before you connect USB devices which are not hot-plug capable.

### Safely removing USB devices

<b>NOTICE</b>
<b>Data loss</b>
To avoid data loss, always select the Windows "Safely Remove Hardware" function to disable or remove USB devices.

## 5.4 EC31-RTX / EC31-RTX F / EC31-HMI/RTX: Connecting PROFINET IO devices

### Connecting PROFINET IO

Connect PROFINET IO devices to the X1 PN (LAN) interface.

PROFINET IO devices must be connected to the Embedded Controller in accordance with PROFINET IO guidelines.

### Additional information

For information about connecting, configuring, and commissioning PROFINET IO devices, refer to the "CPU 31xC and CPU 31x: Installation (<http://support.automation.siemens.com/WW/view/en/13008499>)", in the Chapter "Commissioning PROFINET IO".

Detailed information about addressing of the PROFINET IO interface and on the configuration of its properties and ports is provided in the following documentation:

- STEP 7 Online Help
- "PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>)" system manual.



## **5.5 Connecting PROFIBUS**

### **Requirements**

- Expansion module EM PCI-104
- CP 5603 communications processor

### **Connecting PROFIBUS**

Connect PROFIBUS in the expansion module PCI-104 using CP 5603.

Connect PROFIBUS stations to S7-mEC according to the PROFIBUS DB guidelines.

### **Additional information**

For information about the connection, configuration and commissioning of PROFINET stations, refer to the CPU 31xC and CPU 31x: Installation Operating Instructions, in the Chapter "Commissioning PROFIBUS DP".

For information on assigning addresses, refer to the following documentation:

- STEP 7 Online Help



# Configuring EC31-RTX / EC31-RTX F / EC31-HMI/RTX

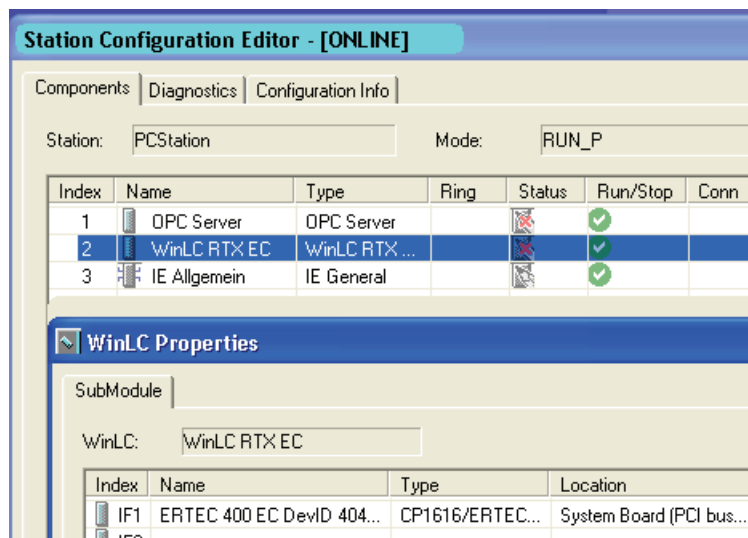
# 6

## 6.1 Preconfigured systems

### Configuration for EC31-RTX / EC31-RTX F in the Station Configuration Editor

The default configuration includes the following components:

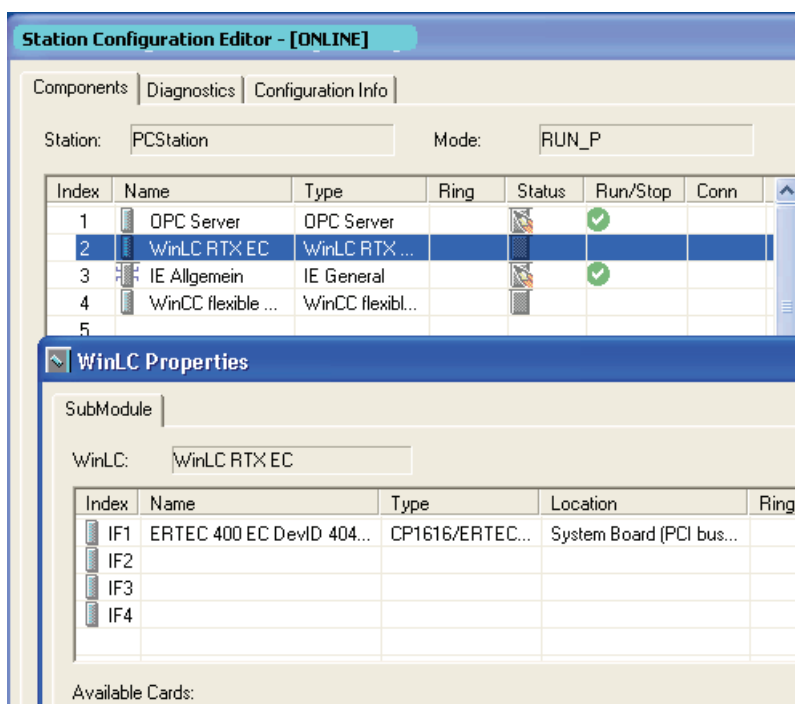
- Index 1 of the PC station: "OPC Server"
- Index 2 of the PC station:
  - "WinLC RTX EC" for EC31-RTX (Windows Logic Controller of WinAC RTX 2010)
  - "WinLC RTX F EC" for EC31-RTX F (Windows Logic Controller of WinAC RTX F 2010)
- Slot IF1 of WinLC RTX: Integrated PROFINET interface ("ERTEC 400...") configured as submodule (corresponds to X1 PN on the Embedded Controller)
- Index 3 of the PC station: Integrated Industrial Ethernet interface, configured as "IE General" (corresponds to X2 P1 PN/IE on the Embedded Controller)



### Configuration for EC31-HMI/RTX in the Station Configuration Editor

The default configuration of EC31-HMI/RTX encompasses the following components:

- Index 1 of the PC station: "OPC Server"
- Index 2 of the PC station: "WinLC RTX EC" (Windows Logic Controller of WinAC RTX 2010)
- Slot IF1 of WinLC RTX: Integrated PROFINET interface ("ERTEC 400...") configured as submodule (corresponds to X1 PN on the Embedded Controller)
- Index 3 of the PC station: Integrated Industrial Ethernet interface, configured as "IE General" (corresponds to X2 P1 PN/IE on the Embedded Controller)
- Index 4 of the PC station: WinCC flexible RT

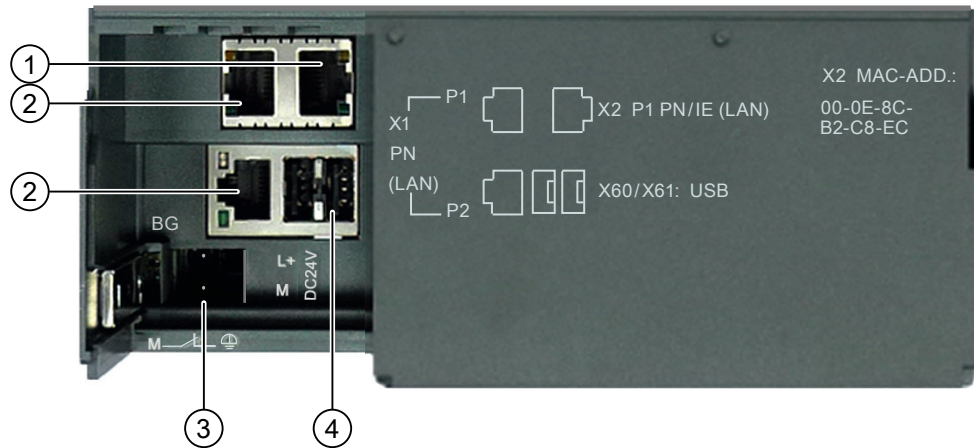


### Optional expansions

Optionally, you can expand the PC station to include additional components, such as a PROFIBUS CP 5603 in the EM PCI-104 expansion module.

### Interfaces of the EC31-RTX / EC31-RTX F / EC31-HMI/RTX

The following figure shows the interfaces of the EC31-RTX / EC31-RTX F / EC31-HMI/RTX. The table provides corresponding descriptions and shows how to integrate the Ethernet interfaces in the Station Configuration Editor.

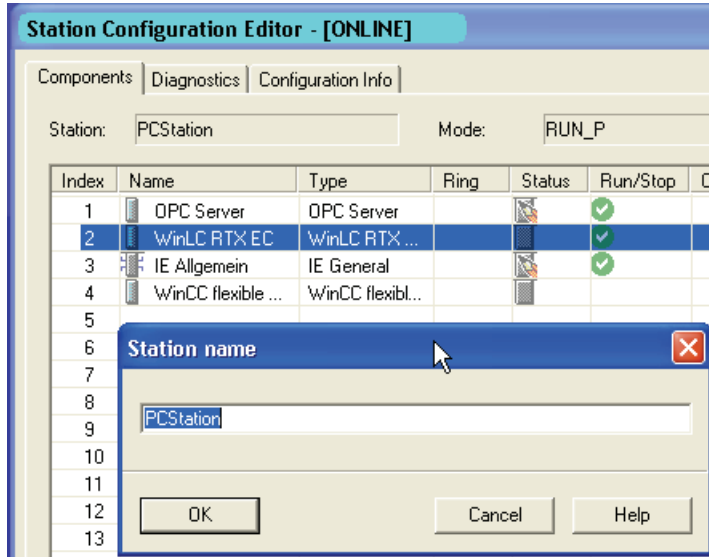


Number	Element	Preconfigured in the Station Configuration Editor
1	X2 P1 PN/IE (LAN) connection	IE General at Index 3 of the PC station
2	X1 PN (LAN) P1 X1 PN (LAN) P2	ERTEC 400 at slot IF1 as submodule of WinLC RTX The interface can be used after WinLC RTX has been started.
3	Power supply connection	-
4	USB 2.0 connections	-

### Particularities when configuring the PC station in STEP 7

Observe the following rules when configuring the PC station in STEP 7:

- The naming of the PC station must be identical both in the STEP 7 project and in the Station Configuration Editor. The default is "PCStation".



- The components of PC stations configured in HW Config must be located at the same IF slots and Index positions as in the Station Configuration Editor.
- **Configuring the Ethernet interface**
  - When configuring the Industrial Ethernet interface in the PC station, use the IP address and subnet mask configured in the Windows Control Panel of the target device. The X2 interface is assigned the default IP address 192.168.2.1 / 255.255.255.0.
  - If using a different IP address or gateway, configure these values in the Windows Network Connections and in STEP 7.

## 6.2 Configuring and programming S7-mEC

### 6.2.1 Basic procedure

#### Requirements

The following configuration software is required in order to configure S7-mEC:

- EC31-RTX / EC31-HMI/RTX: STEP 7 V5.5 + SP4 or higher and HSP 212
- EC31-RTX F:
  - STEP 7 V5.5 or higher with HSP 135, HSP 178, and HSP 212
  - S7 Distributed Safety V 5.4 + SP5 add-on package (including S7 F Configuration Pack V5.6 SP6)
- EC31-HMI/RTX only: WinCC flexible 2008 SP2

#### Configuring and programming the S7-mEC in STEP 7

Because EC31-RTX, EC31-RTX F and EC31-HMI/RTX are preconfigured systems, you perform the following actions in STEP 7:

1. Create a project in SIMATIC Manager
2. Insert a PC Station
3. Configuring hardware
4. Create an S7 program in STEP 7
5. For EC31-HMI/RTX: Configure visualization in WinCC flexible
6. Download configuration data to WinLC RTX EC (download)

#### Special features

You can optionally add the following in HW Config:

- Connection of a PROFINET IO system with PROFINET IO devices to the integrated PROFINET interface
- PROFIBUS DP master system via a PROFIBUS CP 5603 in the EM PCI-104 expansion module
- S7-300 signal modules and function modules in the central rack and expansion rack

## 6.2.2 Configuring in HW Config

### Note

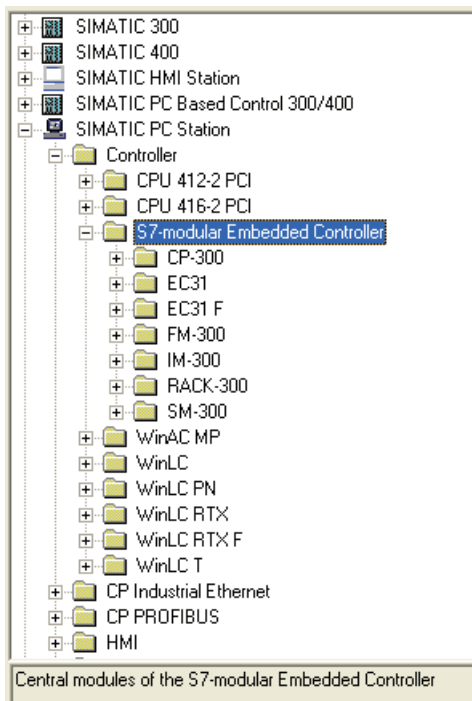
EC31-RTX, EC31-RTX F and EC31-HMI/RTX are preconfigured systems.

### Requirements

- The STEP 7 project contains a PC station.
- The name of the PC station in the STEP 7 project is identical to the name of the PC station in the Station Configuration Editor on EC31-RTX, EC31-RTX F, EC31-HMI/RTX.

### Configuring hardware

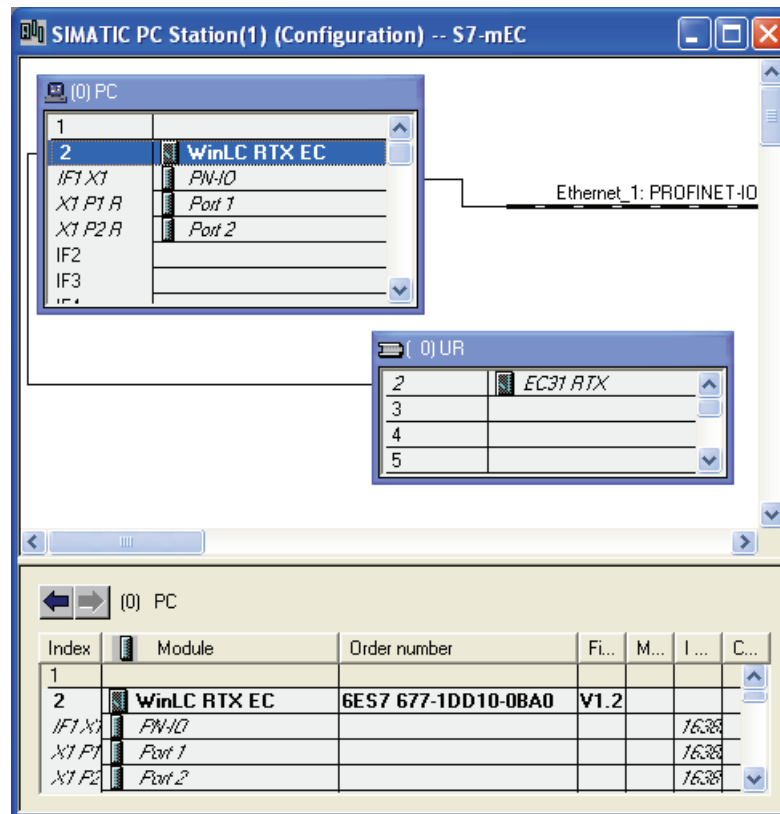
1. Select the PC station in SIMATIC Manager and then open HW Config.
2. Select EC31 from the hardware catalog and insert it into the rack. The module is available at **SIMATIC PC Station > Controller > S7-modular Embedded Controller**.





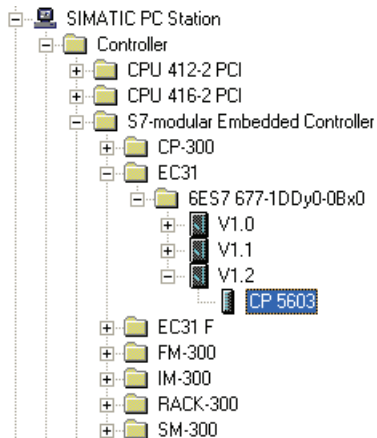
**Result:**

- The WinLC RTX EC module is displayed in the rack (0) PC of the PC station at slot 2.
- WinLC RTX EC is connected to the central rack of the EC31-RTX (0) UR . WinLC RTX EC and EC31-RTX represent the same module and have identical object properties.
- The configuration table displays the configuration of the selected rack.



1. In the hardware catalog, select **SIMATIC PC Station > User Application > OPC Server >** and insert it at slot 1 of PC station (0) PC.
2. In the hardware catalog, select **SIMATIC PC Station > CP-Industrial Ethernet > IE General >** and insert it at slot 3 of the PC station (0) PC.
3. Optional: Insert a PROFINET IO System at slot IF1 X1 (PN IO) of PC station WinLC RTX EC. Specify the properties of the PROFINET IO system and configure the PROFINET IO devices.

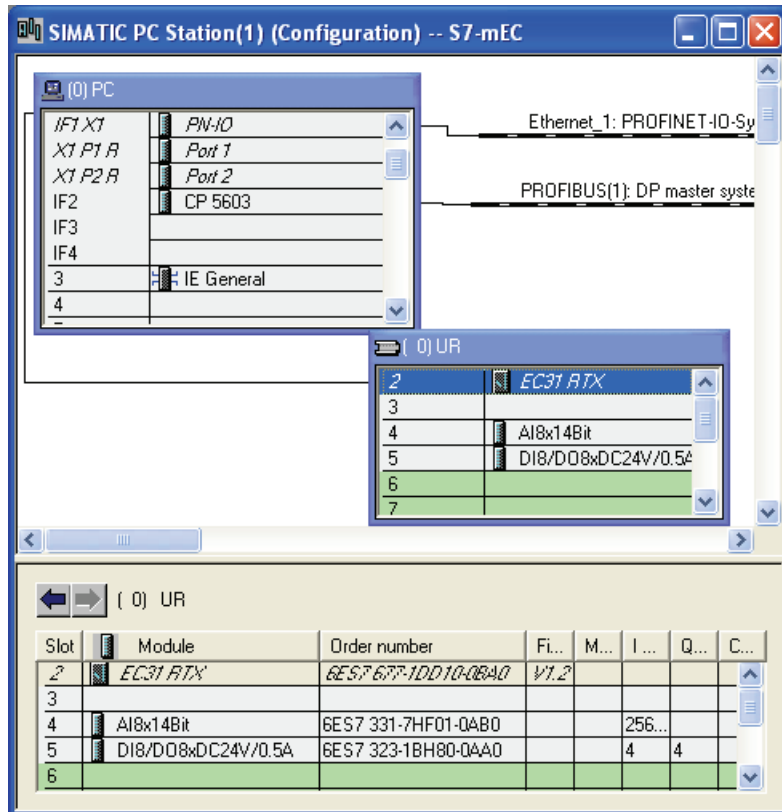
- 4. Optional: In the hardware catalog, select **SIMATIC PC Station > Controller > S7-modular Embedded Controller > EC31 ... CP 5603** and insert it at one of the free slots (IF2, IF3, or IF4) of PC station (0) PC.



- 5. Optional: Insert a DP master system at the CP 5603. Specify the properties of the DP master system and configure the DP slaves.

To install the CP 5603, you require an EM PCI-104 expansion module as a component of the S7-mEC system. This expansion module is not configured in STEP 7 HW Config.

6. Optional: Configure the hardware of the central rack.  
Signal modules (SM-300), function modules (FM-300), interface modules for the central/expansion racks (IM-300), as well as additional racks (Rack-300) are available in the hardware catalog at **SIMATIC PC Station > Controller > S7-modular Embedded Controller**.

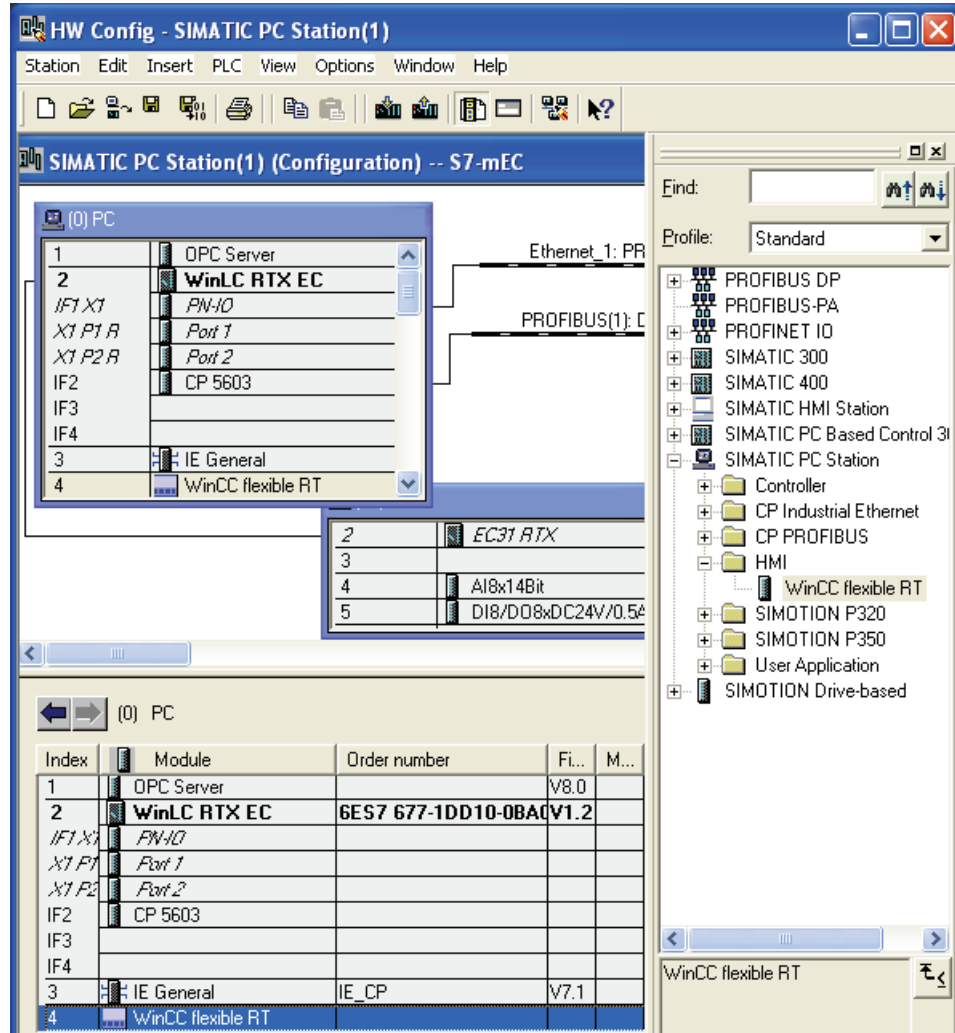


**Note**

Set up and configure the modules in the central/expansion racks in the same way as for S7-300 modules.

7. For EC31-HMI/RTX:

In the hardware catalog, select **SIMATIC PC Station > HMI > WinCC flexible RT** and insert it at slot 4.



8. Edit the object properties of the modules in the properties dialog as required.

### 6.2.3 Configuring the Ethernet interfaces

#### Ethernet interfaces of EC31-RTX / EC31-RTX F / EC31-HMI/RTX

EC31-RTX / EC31-RTX F / EC31-HMI/RTX has two integrated Industrial Ethernet interfaces:

- The X1 PN LAN P1 / X1 PN LAN P2 interface can be configured as a PROFINET interface.
- The X2 P1 PN/IE LAN interface is assigned to the PC station in index 3 at IE General and is preconfigured for Industrial Ethernet communication.

If S7-mEC contains an EM PC expansion module, IE General can be assigned alternatively to the Ethernet connection on EM PC.

---

#### Note

If accessing S7-mEC via Remote Desktop Protocol, ensure that S7-mEC and the Engineering PC/programming device are connected to the same Ethernet subnet.

To access S7-mEC via Remote Desktop protocol, you have to use the IE General network connection (usually X2 P1 PN/IE LAN interface).

---

#### IP addresses

Ethernet interface	Configuration		Application
X1 PN LAN P1 / X1 PN LAN P2	IP address	Must be assigned.	PROFINET IO with RT/IRT PROFINET CBA Support of PROFINET basic functions for commissioning and diagnostics
X2 P1 PN/IE LAN	IP address	Default 192.168.2.1 / 255.255.255.0 IE General preconfigured in Index 3 of the PC station	Support of PROFINET basic functions for commissioning and diagnostics Standard Windows Ethernet communication

## Configuring of the IP addresses

---

### Note

The user interface for the Windows operating system is available in English and German language; default is English. You can change the language setting under "Regional and Language Options".

The English language is always used for the Control Panel and all other dialogs.

---

Configure the Ethernet address for the X2 P1 PN/IE LAN interface of SIMATIC communication as follows:

1. Open the Windows Control Panel
2. In the Control Panel, select **Network Connections > Local Area Network**.
3. Click the "Properties" button in the "Local Area Connection Status" dialog box.
4. Select the "Internet Protocol (TCP/IP)" connection from the list and then double-click this entry.
5. Select the "Use the following IP address" option in the "Internet Protocol (TCP/IP) Properties" dialog box and enter the required IP address and subnet mask.
6. Confirm the "Internet Protocol (TCP/IP) Properties" and "Local Area Connection Properties" dialog boxes with "OK". Close all other dialogs.

## Entering the selected IP address in the STEP 7 project

If you select a different IP address, subnet mask, or gateway for the Ethernet interface, configure this IP address or the different parameters for EC31-RTX / EC31-RTX F / EC31-HMI/RTX and for the "IE General" properties in STEP 7.

Configure the IP address in STEP 7 as follows:

1. In the hardware configuration of your STEP 7 project, right-click "IE General" in Index 3 of the PC station.
2. Select the "Object properties" option from the context menu.
3. Click "Properties" in the "General" tab of the "Properties - IE General" dialog.
4. Enter the IP address in the "Parameters" tab of the "Properties - Ethernet Interface IE General" dialog. In this dialog box you can also define a subnet mask or a gateway address for a transition to a different subnet.

## See also

Connection element Embedded Controller (Page 55)

## 6.2.4 Configuring the PROFINET IO system

### Connecting PROFINET IO

1. Insert a PROFINET IO system at slot IF1 X1 (PN IO) of the PC station WinLC RTX EC.
2. Specify the properties of the PROFINET IO system and configure the PROFINET IO devices.

### Rule: Assigning device names

You must conform to the following rules when assigning names to PROFINET IO devices:

- The Embedded Controller, the PROFINET IO devices and the Engineering System are located on the same subnet.
- The Embedded Controller is connected to the Engineering System (programming device/PC) via the PROFINET IO interface.

### Additional information

For information about connecting, configuring, and commissioning PROFINET IO devices, refer to the "CPU 31xC and CPU 31x: Installation (<http://support.automation.siemens.com/WW/view/en/13008499>)", in the Chapter "Commissioning PROFINET IO".

Detailed information about addressing of the PROFINET IO interface and on the configuration of its properties and ports is provided in the following documentation:

- STEP 7 Online Help
- "PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>)" System Manual.

## 6.2.5 Creating an S7 program

### Requirements

You have created a project in SIMATIC Manager, inserted a SIMATIC PC station, and configured the PC station in HW Config according to the default configuration of EC31-RTX / EC31-RTX F / EC31-HMI/RTX.

To create the safety program the optional package *S7 Distributed Safety V 5.4 + SP5* (including *S7 F Configuration Pack V5.5 SP6 HF1*) has to be installed.

### Creating S7 programs for WinAC RTX EC

Create the S7 program for WinLC RTX EC in SIMATIC Manager similar to the S7 programs for SIMATIC PLCs.

For information on supported program blocks, refer to the documentation for WinAC RTX.

---

#### Note

##### Global access for I/O modules

In contrast to S7-300 central racks, WinAC RTX in S7-mEC does not support cross-module I/O access outside the process image.

---

## 6.2.6 EC31-HMI/RTX: Configuring visualization

### For EC31-HMI/RTX only

Create the visualization project for EC31-HMI/RTX on the Engineering PC, using SIMATIC WinCC flexible 2008 SP2.

### Requirements

- WinCC flexible 2008 SP2 is installed on the Engineering PC.
- A WinCC flexible RT object is inserted in the PC station (in HW Config).

### Procedure

In order to create a visualization project for EC31-HMI/RTX, follow these steps:

1. In SIMATIC Manager, open the PC station of EC31-HMI/RTX, select the WinCC flexible RT object, and select "Open object" from the shortcut menu.

**Result:** WinCC flexible is started.

2. Create and configure the necessary elements: pictures, alarms, tags, etc., using the WinCC flexible editors.
3. Save and test the visualization.
4. Transfer the project to the EC31-HMI/RTX target system.



## See also

Downloading the configuration data to the target system (Page 81)

## 6.2.7 Downloading the configuration data to the target system

### Download options

You can download the following configuration data from STEP 7 to the Embedded Controller:

- The entire PC station (including IE General, for example)
- Only the configuration data of WinLC RTX / WinLC RTX F
- Only the S7 program of the WinLC RTX / WinLC RTX F

For EC31-HMI/RTX, you transfer the configuration data from WinCC flexible.

### Requirements

- The enhanced write filter (EWF) must be deactivated on the Embedded Controller if the entire PC station is to be downloaded. (see Activating the Enhanced Write Filter at the command input line (Page 89) ).
- The S7-mEC is connected to the programming device / PC via Industrial Ethernet. The PG/PC interface must be set to TCP/IP.
- **EC31-HMI/RTX only:** The visualization project is created in WinCC flexible.

---

#### Note

The S7-mEC must be connected to the Engineering System at a port of the X1 PN LAN interface to enable the following functionality:

Assign PROFINET IO device names

PROFINET CBA: Interconnections download and online functions in SIMATIC iMAP

---

**Procedure**

1. Deactivate the EWF on the EC31-RTX / EC31-RTX F / EC31-HMI/RTX (if not yet deactivated). After the EWF has been deactivated, you have to switch off and restart S7-mEC.
2. Starting WinLC:
  - **EC31-RTX / EC31-HMI/RTX:** Start WinLC RTX EC
  - **EC31-RTX F:** Start WinLC RTX EC F.
3. Activate the PC station in the Station Configuration Editor ("Enable station" button).
4. Switch the EC31-RTX / EC31-RTX F / EC31-HMI/RTX to STOP mode.
5. Call the following menu command in STEP 7:
  - In HW Config: **PLC > Download to module** to download the hardware configuration.
  - In SIMATIC Manager: **PLC > Download** to download the S7 program and configuration data of WinLC RTX / WinLC RTX F.
  - In the block editor **PLC > Download** to download the S7 program of WinLC RTX / WinLC RTX F.
6. Several messages guide you until the download is completed.

**EC31-HMI/RTX only:**

1. On EC31-HMI/RTX, start the *WinCC flexible Runtime Loader* and click "Settings". Activate the desired connection mode and, if required, change the folders for configuration data and application start.
  2. In the *RT Loader*, click "Transfer".
  3. On the Engineering PC: Open the visualization project in WinCC flexible.
  4. Call the following menu command: **Project > Transfer > Transfer Settings**.
  5. Specify the necessary transfer settings, and click "Transfer".
- Result: The visualization project is downloaded to EC31-HMI/RTX.

**Getting EC31-RTX / EC31-HMI/RTX ready for operation**

Carry out the following steps:

- Set the enhanced write filter for drive C:\ to the "activated" state (see Activating the Enhanced Write Filter at the command input line (Page 89)).

<b>CAUTION</b>
<p><b>Flash memory failure</b></p> <p>If you leave the enhanced write filter in "deactivated" state, you risk an early failure of your flash memory due to the persistent write access of the operating system.</p> <p>When the enhanced write filter is activated, the number of write accesses to the operating system partition is minimized, thereby increasing the life of the flash memory.</p>

- Record all special settings (such as changes to the IP addresses) made in the course of application development. Save such settings alongside with your STEP 7 project.
- Create a backup copy of your settings (see Backing up and restoring data (Page 98)).

## Initial commissioning

### 7.1 Overview of initial commissioning

#### Initial commissioning

After **initial** power on, the preinstalled Windows XP Embedded operating system is set up automatically on the Embedded Controller.

<b>CAUTION</b>
<b>Damage to the Embedded Controller</b>
If condensation has developed on the Embedded Controller, wait at least 12 hours before you start to commission it.

#### Requirements

- The Embedded Controller is installed.
- 24 VDC supply is connected to the Embedded Controller.

#### Initial commissioning

Switch on the 24 VDC power supply to the Embedded Controller.

**Result:** The Embedded Controller performs the startup. LED U4 is flashing.

<b>CAUTION</b>
<b>Damage to the Embedded Controller</b>
Interruption of the setup can damage the Embedded Controller. The setup routine for initial commissioning can take up to 5 minutes.
Make sure to prevent execution of the following actions during setup:
Switching off of the device
Keyboard input
Connection of additional USB devices

**Result:** The operating system is installed. LED U4 is lit.

---

#### Note

On successful completion of initial commissioning, the file "Success.txt" with the following text is generated on the C:\Windows partition: "First Boot finished successfully ...".

---

**Restart after first commissioning**

The Windows logon dialog opens approx. one minute after each further restart. The default user name is "Administrator". The password is "admin".

**After first commissioning**

Once the operating system is installed, the Embedded Controller can be accessed in two ways:

- Using locally connected I/O devices (monitor, keyboard and mouse)  
see chapter Local access (Page 85)
- Remotely - using a PC / PG via *Remote Desktop Protocol*,  
see chapter Initial commissioning - Remote (Page 86)

Proceed as follows:

EC31	EC31-RTX / EC31-RTX F	EC31-HMI/RTX
After first commissioning of the EC31, you can load and start a user program created by the Software Development Kit (SDK).	After having completed initial commissioning, open <i>Automation License Manager</i> (ALM) to install all License Keys available on the USB stick, for example:  for WinAC RTX 2010 / WinAC RTX F 2010 SIMATIC NET Softnet-S7 Lean Edition 2010	After having completed initial commissioning, open <i>Automation License Manager</i> (ALM) to install all License Keys available on the USB stick, for example:  for WinAC RTX 2010 SIMATIC NET Softnet-S7 Lean Edition 2010 WinCC flexible 2008 SP2
–	The EC31-RTX / EC31-RTX F is ready.	The EC31-HMI/RTX is ready.
–	WinAC RTX 2010 / WinAC RTX F 2010 is already activated. You can open the panel of the WinLC RTX via the icon in the Start bar.	WinAC RTX 2010 is already activated. You can open the panel of the WinLC RTX via the icon in the Start bar.
–	–	WinCC flexible RT 2008 is ready.

**See also**

EC31-RTX / EC31-RTX F / EC31-HMI/RTX: Installing License Keys (Page 91)

## 7.2 Local access

### Requirements

- Initial commissioning was successfully completed.
- Keyboard and mouse are connected to the USB port of the Embedded Controller.
- The monitor is connected to the EM PC expansion module via DVI-I port.

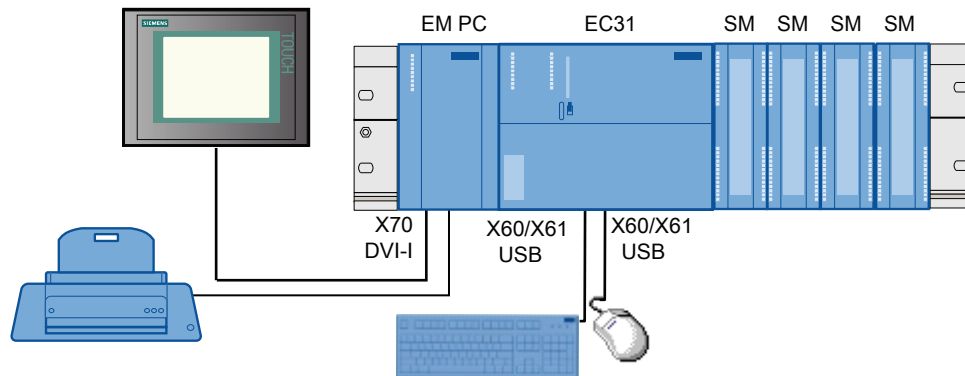


Figure 7-1 EC31 - Local access

### Local access

Proceed as follows:

1. Switch on the power supply to the Embedded Controller.

**Result:** The Embedded Controller performs the startup. LED U4 is flashing. The Windows logon dialog opens.

2. Enter the user name "Administrator" and the password "admin".

**Result:** The Windows user interface opens. You can now configure Windows.

## 7.3 Initial commissioning - Remote

### Introduction

A default IP address is set for access to the Embedded Controller via *Remote Desktop Protocol*. You can also assign the IP address via DCP (*Discovery and Basic Configuration Protocol*). The Embedded Controller is available if LED display U4 flashes.

### Requirements

- Initial commissioning was successfully completed.
- PC / PG or Thin Client (the term PC is used as synonym hereafter)
- Standard patch cable
- For IP address assignment via DCP, SIMATIC STEP 7 V5.4 SP4 or higher, or the *Primary Setup Tool/V4.0* must be installed on the PC. This software is available for download from the Internet (<http://support.automation.siemens.com/WW/view/en/19440762>).

### Preparation

1. Connect the PC to the Embedded Controller by means of the X2 P1 PN/IE (LAN) interface.
2. Switch on the 24 VDC power supply to the Embedded Controller.

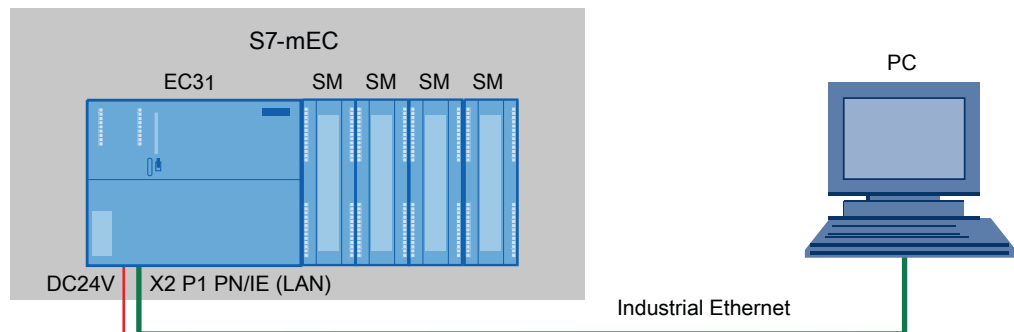


Figure 7-2 Access via remote PC

### Default IP address

The default IP address 192.168.2.1 / 255.255.255.0 can be used to set up a connection to the Embedded Controller.

### IP address assignment via DCP

The IP address is assigned to the Embedded Controller via DCP based on the device name that is stored in HW Config.

Proceed as follows:

1. Open *STEP 7* or the *Primary Setup Tool* to assign an IP address to the Embedded Controller. Follow the instructions of the program.

**Result:** The Windows logon dialog opens.

2. Type in the user name "Administrator" and the password "admin".

**Result:** The Windows user interface opens. You can now configure Windows.

### See also

Disclaimer (Page 129)

## 7.4 Startup / shutdown of the Embedded Controller

### Requirements

First commissioning was successfully completed.

### Switching on power to the Embedded Controller

Switch on the power supply of the Embedded Controller.

**Result:** Startup of the Windows OS.

### Setting up a Remote Desktop Connection

Proceed as follows in order to establish a connection to the Embedded Controller:

1. Select **Start > Programs > Accessories > Communication > Remote Desktop Connection** in the Windows Start bar.

**Result:** The Windows logon dialog opens. The lit LED U4 indicates that a connection to the Embedded Controller via Remote Desktop is available.

2. In the Windows logon dialog, type in the user name "Administrator" and the password "admin".

**Result:** The Windows user interface opens. You can now configure Windows.

### Closing Windows

To close Windows, click the "Restart EC" or "Shut Down EC" icon on the desktop.

## Switching off the Embedded Controller

### Note

If the Enhanced Write Filter is activated, the Embedded Controller can be switched off by disconnecting it from the power supply.

### See also

Activating the Enhanced Write Filter at the command input line (Page 89)

## 7.5 Activating safety mechanisms

### 7.5.1 Safety mechanisms for data carriers

#### CAUTION

##### Protection of the Embedded Controller

Systems which rely on flash media as data carrier require special protection due to the limited number of rewrite cycles.

Use the protective mechanisms, such as the write filter, to extend the operating life of the flash memory and to avoid a possible failure of the Embedded Controller.

### Write filters

There are two ways of setting write filters:

- By means of the EWFMGR.EXE program, as described in the following section.
- Using *SIMATIC EWF Manager* on the Embedded Controller. *SIMATIC EWF Manager* is installed on all EC31 product variants, except EC31-RTX F.



### Reference

Additional information is available in the *SIMATIC Industrial PC: EWF Manager* operating instructions on the Embedded Controller, as well as in "S7-mEC Software and Documentation" on the DVD included with the package.



## 7.5.2 Activating the Enhanced Write Filter at the command input line

### Activating the Enhanced Write Filter

The Enhanced Write Filter (EWF) allows you to write-protect individual partitions.

EWF is activated by default on the Embedded Controller.

Activate / deactivate the EWF using the EWFMGR.EXE program which is called at the Command Prompt.

The following functions are available:

Table 7- 1 Enhanced Write Filter functions

Function	Command
Write-protect drive C: Switching on	<code>ewfmgr c: -enable</code>
Write-protect drive C: disable (modified files are accepted)	<code>ewfmgr c: -commitanddisable</code>
Modified files on drive C: Accept	<code>ewfmgr c: -commit</code>
Display information about the EWF drive	<code>ewfmgr c:</code>
Display help	<code>ewfmgr /h</code>

---

#### Note

You must perform a restart to activate the write protection command.

---

### Special features of the EWF application

- If the EWF is active all changes made on drive C are lost after power failure. Use an UPS to prevent data losses after power failure.
- You can backup the files in the EWF RAM overlay to flash memory or to the hard disk before you shut down the device. To do so, enter the following command in the command prompt:

```
ewfmgr c: -commit
```

Restart the device

Or

```
ewfmgr c: -commitanddisable
```

Restart the device

```
ewfmgr c: -enable
```

Restart the device

<b>NOTICE</b>
<b>Data loss</b> Your data is lost if EWF is active and you discard a restart after having set the - commitanddisable or -commit option!

---

### Note

#### Disabling automatic daylight saving changes

At systems without central time management and with activated EWF, the time is advanced or set back by one hour in the daylight saving time or standard time period each time the system performs a cold or warm restart, due to the system-specific function for automatic daylight saving changes.

Reason for this behavior: Windows Embedded Standard 2009 sets a flag in a registry entry that indicates completion of the conversion to daylight saving time. Since this file is also protected against modification by the EWF, the marker is lost during the boot sequence and the adjustment is made again.

We therefore recommend that you deactivate the automatic adjustment and change the clock manually.

Proceed as follows:

1. Deactivate the EWF (ewfmgr c: -commitanddisable) and reboot the system.
  2. Deactivate automatic adjustment in the Control Panel.  
Select Start > Control Panel > Date and Time > "Time Zone" tab and clear the check mark at "Automatically adjust clock for daylight saving changes".
  3. Enable EWF again (ewfmgr c: -enable) and reboot the system.
-

## 7.6 EC31-RTX / EC31-RTX F / EC31-HMI/RTX: Installing License Keys

### Licensing the software

Install the product-specific License Keys that you need to run WinAC RTX 2010, SIMATIC NET Softnet-S7 Lean Edition 2010 and WinCC flexible Runtime 2008 prior to commissioning with the *Automation License Manager (ALM)*. The License Keys are available on the USB stick included in the package.

The licenses can be installed either directly using the EC31-RTX / EC31-RTX F / EC31-HMI/RTX, or using a programming device / PC.

### Requirements

- Initial commissioning was successfully completed.
- Windows Embedded Standard 2009 has started.
- The extended write filter (EWF) must be disabled on the Embedded Controller.

### Installing License Keys with local configuration

*Automation License Manager* is preinstalled on the EC31-RTX / EC31-RTX F / EC31-HMI/RTX and can be opened using the desktop icon or a menu command.

1. In the Windows Start bar select **Start > All Programs > Siemens Automation > Automation License Manager**.
2. Follow the instructions of *Automation License Manager*.

### Using a programming device / PC to install the License Keys

*Automation License Manager* is preinstalled on a programming device / PC with STEP 7 and the EC31-RTX / EC31-RTX F / EC31-HMI/RTX.

1. Connect the Embedded Controller to a programming device / PC using the X2 P1 PN/IE (LAN) interface.
2. Connect the supplied USB stick to the programming device / PC.
3. Select the **Start > SIMATIC > License Management > Automation License Manager** menu command.
4. Select the **Edit > Connect computer** command and type in the default IP address of the Embedded Controller: 192.168.2.1.
5. Drag the license keys from the USB stick to partition C: or D: of the Embedded Controller.

### Retrieving the License Keys

If your License Keys do not work properly on the Embedded Controller, contact your Siemens representative and have the "Certificate of License" (CoL) at hand.

**Before** creating a backup, uninstall the license keys. Transfer the License Keys to a USB stick and reinstall them after you have completed the Restore operation.



# Operating the EC31-RTX / EC31-RTX F / EC31-HMI/RTX

# 8

## 8.1 Controller Panel WinLC RTX EC

### Introduction to the controller panel

The WinLC RTX EC / WinLC RTX F EC Controller Panel serves on your PC as display window for the Embedded Controller. It contains the following elements:

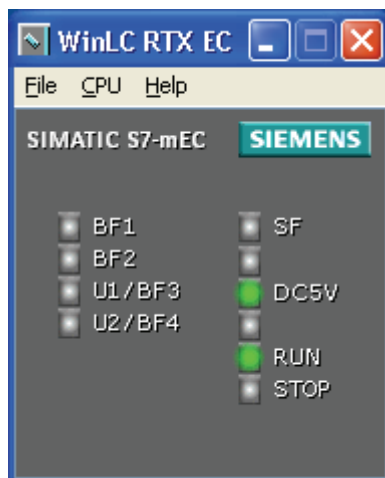
- Menus with EC functions

Not all menus are required for operating the Embedded Controller using WinLC. The active menus are grayed out and cannot be selected.

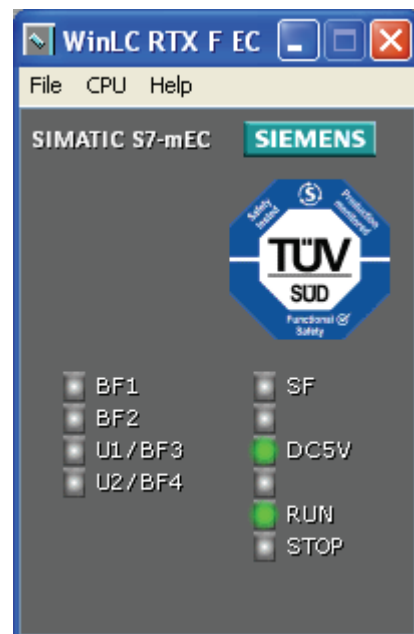
- Status display for the EC

The Embedded Controller specific LED displays U3 and U4 for backup / restore and power up monitoring are not displayed.

WinLC RTX EC Controller Panel



WinLC RTX F EC Controller Panel



### Opening the controller panel

The following icon on the Windows taskbar indicates that WinAC is in operation:



You can double-click this icon to open the controller panel after WinAC is in operation.

Opening and closing the controller panel does not influence the state of the Embedded Controller.

### See also

Display elements and interfaces of the EC31-RTX / EC31-RTX F (Page 21)

## 8.2 Status displays

### Status displays

The status displays on the Controller Panel indicate the current operating state and support troubleshooting.

---

#### Note

The RUN and STOP LEDs on the EC31-RTX and Controller Panel signal the **actual** operating mode.  
The RUN and STOP positions of the mode selector switch on EC31-RTX indicate the **selected** operating mode.

---

You cannot change the controller status by clicking in the status displays.

The RUN LED flashes and the STOP LED is lit during a transition from STOP to RUN. The STOP LED goes dark to indicate that the transition to RUN state was completed.

### Status displays of the Controller Panel

The table below provides a description of the status displays of the WinLC RTX EC / WinLC RTX F EC Controller Panel.

Table 8- 1 Status displays of the Controller Panel

Display	Description
BF1	Bus fault at the interface X1 PN LAN P1 or X1 PN LAN P2
BF2*	Reserved, for example bus fault at configured submodules CP 5603
U1/BF3*	
U2/BF4*	
SF	Group error
DC5V	5 V supply to the rear panel bus. (LED display switched off after you shut down the Controller by means of "Shutdown").
RUN	WinLC on the Embedded Controller is in RUN.
STOP	WinLC on the Embedded Controller is in STOP.

\* The LED displays correspond to the IF slots of WinLC RTX / WinLC RTX F. These are preconfigured in the Station Configuration Editor.

## 8.3 RUN/STOP status

### Permitted and forbidden functions in the RUN / STOP states

The operating state either allows or rejects access to specific functions on the Embedded Controller.

Table 8- 2 EC31-RTX / EC31-RTX F / EC31-HMI/RTX: Permitted and forbidden functions in the RUN / STOP states

Operating state	Description
RUN	<b>Permitted functions:</b> Download of a program to the controller Download of selected blocks to the controller Editing program tags in STEP 7 and changing the operating state of the controller
	<b>Functions which are not allowed:</b> Archiving and restoring of a STEP 7 user program
STOP	<b>Permitted functions:</b> Download of a program or of selected blocks to the controller Editing of program tags using STEP 7 Memory reset by means of STEP 7 / Memory reset by means of mode switch (MRES) Archiving and restoring of a STEP 7 user program

## 8.4 Memory reset using the mode selector switch

### Memory reset for active WinAC

<b>CAUTION</b>
During memory reset the <b>project and program</b> (SDB, DB, OB, FB, etc.) are deleted from the WinLC RTX EC / WinLC RTX F EC. All the configuration data of the EC31-RTX / EC31-RTX F / EC31-HMI/RTX are lost!

### Carrying out a memory reset at EC31-RTX / EC31-RTX F / EC31-HMI/RTX with the mode switch

1. Turn the key to STOP position
2. Turn the key to MRES position Hold the key in this position until the STOP LED lights up for the second time and remains on (this takes 3 seconds).  
Now release the key.
3. You must turn the key to MRES position again within 3 seconds and hold it there until the STOP LED flashes (at 2 Hz).  
Release the switch. When the Embedded Controller has completed the memory reset, the STOP LED stops flashing and remains lit.

**Result:** The Embedded Controller has completed the memory reset.



## Service and maintenance

### 9.1 Backup and Restore

#### 9.1.1 Backup - requirements and rules

##### S7-mEC Backup Preparation Tool

The *S7-mEC Backup Preparation Tool* is preinstalled on the Embedded Controller and supports you in preparing storage media for data backup. You can choose to run this backup operation immediately after having saved the data, or at a later time.

To run the *S7-mEC Backup Preparation Tool*, go to the Windows Start bar and select **Start > All Programs > SIMATIC > S7-mEC > EC31 > S7-mEC Backup Preparation**.

When preparing the data carrier, the tool scans the partitions C: and D: for sufficient free storage space. If insufficient storage space, or a faulty data carrier was found, the *S7-mEC Backup Preparation Tool* cancels the operation and outputs an error message.

The *S7-mEC Backup Preparation Tool* is available in English language.

##### Requirements

- You need Windows administrator rights to run the backup.
- Data carrier: USB stick or Multi Media Card with at least 4 GB.

---

##### Note

A backup to USB stick is considerably faster compared to an MMC.

---

##### Rules

Observe the following backup rules:

- Connect **only one** data carrier to the Embedded Controller.
- Do not use a USB hub.
- Remove all USB devices that are not required.
- To run the *S7-mEC Backup Preparation Tool*, the partitions must be formatted with FAT32 or NTFS file system.
- Deactivate the Enhanced Write Filter.
- Back up the license keys.

<b>NOTICE</b>
---------------

Before you run the backup, remove the License Keys again using <i>Automation License Manager</i> and then reinstall these after restart of the Embedded Controller.
---

### Safely remove data carriers

<b>NOTICE</b>
To prevent data loss on the data carriers, follow these steps: Use the "Safely Remove Hardware" function of Windows for USB devices only. Select the "Eject" shortcut menu to remove the following devices: <ul style="list-style-type: none"><li>- Multi Media Card</li><li>- SD cards and CF cards</li></ul>

### See also

Display elements and interfaces of EC31-HMI/RTX (Page 27)

Display elements and interfaces of the EC31-RTX / EC31-RTX F (Page 21)

Activating the Enhanced Write Filter at the command input line (Page 89)

## 9.1.2 Backing up and restoring data

### Introduction

Always backup the data to a storage medium so that you can quickly resume your work after the failure of an Embedded Controller.

For data backup, run the *S7-mEC Backup Preparation Tool* to write an image of your installation to a USB stick or Multi Media Card. This method lets you quickly restore your original partitions C: and D:.

---

#### Note

##### When do you back up data?

You should generate a backup copy of your EC data after having parameterized the modules and when making changes to the configuration.

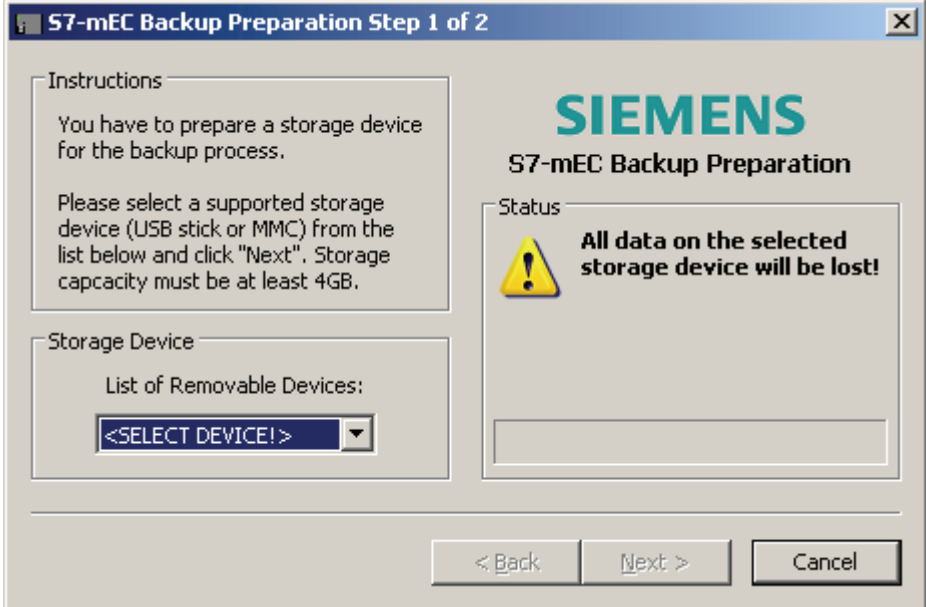
---


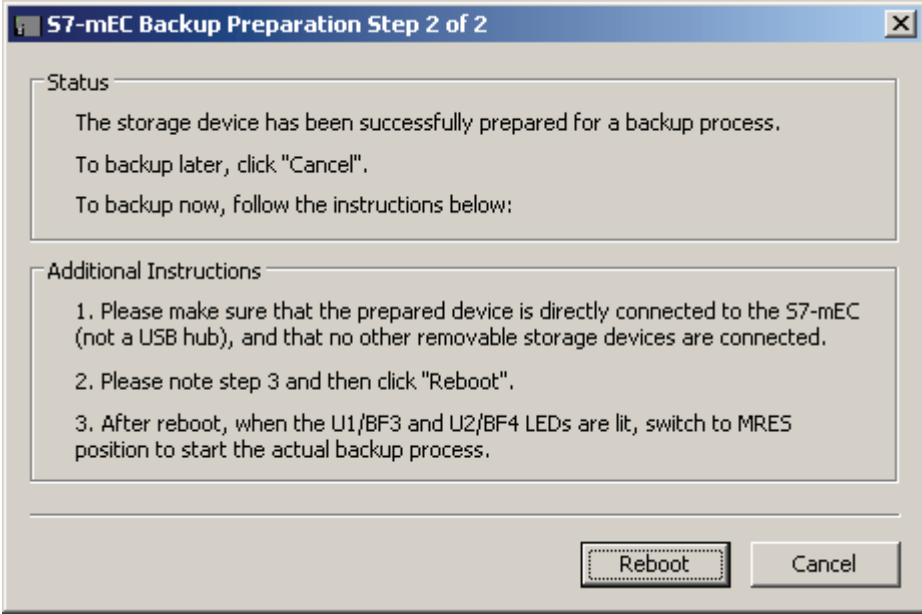
<b>NOTICE</b>
<b>Requirements and rules</b>
Observe the requirements and rules (Page 97) specified for backup.

### Backup with the *S7-mEC Backup Preparation Tool*

Start by preparing the data carrier using the *S7-mEC Backup Preparation Tool*. You can choose to backup your data immediately, or at a later time.

Proceed as follows:

Step	Procedure
1	Switch on the power supply of the Embedded Controller. <b>Result:</b> Restart of the Embedded Controller. All LED displays are lit.
2	On successful completion of the EC31 boot sequence, go to the Windows Start bar and select <b>Start &gt; All Programs &gt; SIMATIC &gt; S7-mEC &gt; EC31 &gt; S7-mEC Backup Preparation</b> to run the <i>S7-mEC Backup Preparation Tool</i> . <b>Result:</b> The following dialog box opens: 

Step	Procedure
3	<p>a) Select the data carrier from "Storage Device".</p> <p>b) Click "Next" to start preparation of the data carrier..</p> <p><b>Result:</b> The progress of the operation is indicated in the following message box:</p> 
	<p>The following dialog box opens:</p>
	
	<p><b>Result:</b> The data carrier is now prepared.</p>
4	<p><b>Direct backup:</b> Click "Reboot" to restart the Embedded Controller and for an immediate backup.</p> <p><b>Backup at a later time:</b> Click "Cancel".</p>

## Direct backup

Step	Procedure	Result
1	Do not disconnect the data carrier you prepared from the Embedded Controller. Remove all other data carriers from the Embedded Controller.	The <b>U1/BF3</b> and <b>U2/BF4</b> LEDs are lit if a USB/MMC data carrier is detected during the EC31 restart.
2	Press the MRES switch.	Backup is being initialized. <b>U1/BF3</b> and <b>U2/BF4</b> are no longer lit.
3	Release the MRES switch as soon as LED <b>U3</b> flashes.	Performing backup: <b>U3</b> flashes and <b>U4</b> is lit. On successful completion of the backup, the Embedded Controller shuts down automatically.
4	Switch the power supply on the Embedded Controller off and then on.	The Embedded Controller is restarted.

## Backup at a later time

Step	Procedure	Result
1	Connect the data carrier you prepared data directly to the Embedded Controller and the switch on power.	The <b>U1/BF3</b> and <b>U2/BF4</b> LEDs are lit if a USB/MMC data carrier is detected during the EC31 restart.
2	Press the MRES switch.	Backup is being initialized. <b>U1/BF3</b> and <b>U2/BF4</b> go dark.
3	Release the MRES switch as soon as LED <b>U3</b> flashes.	Performing backup: <b>U3</b> flashes and <b>U4</b> is lit. On successful completion of the backup, the Embedded Controller shuts down automatically.
4	Switch the power supply on the Embedded Controller off and then on.	The Embedded Controller is restarted.

### Note

The LED displays U2/BF4, U3 and U4 start flashing if the backup has failed.  
An error message is displayed if a monitor is connected via EM PC.

The data carrier must be prepared once again. Therefore, restart the operation.

## Preparing the data carrier for backup by means of command line input

It is also possible to prepare a data carrier (USB stick, or Multi Media Card) for backup on a PC by means of command line input. Proceed as follows:

Step	Procedure
1	Place the Restore DVD into the DVD-ROM drive of a PC.
2	Connect the data carrier to the PC.
3	Run cmd.exe from the command prompt window and then type in the following command at the command line: <drive letter>:\Restore_Tools\PREPARE_BACKUP.CMD <USB stick/MMC drive letter>:

### 9.1.3 Restoring to factory settings

#### Introduction

You can restore the original software of the Embedded Controller using the included Restore DVD. The operation restores the entire flash memory.

You have two options for restoring the content of the flash memory in the Embedded Controller:

- Using the Restore DVD and USB DVD-ROM
- Using a data carrier to which the data of the Restore DVD were transferred: USB stick or Multi Media Card with at least 4 GB.

Restoring is completed much quicker with a USB stick than with a Multi Media Card.

 <b>CAUTION</b>
--

<b>Data loss</b>
------------------

When restoring the system to factory settings, flash memory is going to be erased and formatted, and is then loaded with the original software. All subsequently modified or added data, programs, license keys and partitions on the flash memory will be lost!
--

You should generate a backup copy of your Embedded Controller data after having parameterized the modules and when making changes to the configuration.
---

#### Requirements

- You need Windows administrator rights to run the restore function.
- Restore DVD (included in scope of delivery)
- DVD-ROM drive

<b>NOTICE</b>
---------------

Before you run the restore operation, remove the License Keys again using <i>Automation License Manager</i> and then reinstall these after restart of the Embedded Controller.
--

## 1. Option: Using the Restore DVD and USB DVD-ROM to restore factory settings

Step	Procedure	Result
1	Switch off the power supply of the Embedded Controller.	-
2	Remove all the data carriers from the Embedded Controller.	-
3	Connect the DVD-ROM drive to the Embedded Controller; do not connect it to the EM PC expansion module!	-
4	Switch on power to the Embedded Controller.	The Embedded Controller performs a restart. <b>All LEDs are lit.</b>
5	Press the MRES switch as soon as only the LED displays <b>U1/BF3 and U2/BF4 are lit</b> . If those LEDs stay dark, the EC has not detected a bootable USB device.	Backup is being initialized. <b>U1/BF3 and U2/BF4 go dark.</b>
6	If the LED display <b>U3 flashes</b> , release the MRES switch.	The data is now being restored. <b>U3 and U4 flash.</b> After the factory settings have been restored, the Embedded Controller switches itself off.
7	Switch off the power supply of the Embedded Controller.	-

### Further procedures

- You can remove the USB DVD-ROM from the EC.
- Connect the USB devices again.
- Install the license keys.

## 2. Option: Using the USB stick / Multi Media Card to restore the factory settings

NOTICE
<p><b>Data loss</b></p> <p>For preparation of the data carrier, it is necessary to enter the command &lt;DVD-ROM drive letter&gt;: \Restore_Tools\CREATE_RESTORE.CMD (see step 3). With this command, you delete all data from the data carrier!</p> <p>Therefore, you should generate a backup copy of all data on the carrier before you execute this command.</p>

### Preparing a USB stick / Multi Media Card with PC

Proceed as follows in order to transfer the data of the Restore DVD to the USB stick / Multi Media Card:

Step	Procedure
1	Place the Restore DVD into the DVD-ROM drive of a PC.
2	Connect the data carrier to the PC.
3	When Windows is booted, type in the following command at the command prompt: <DVD-ROM drive letter>:\Restore_Tools\CREATE_RESTORE.CMD> <USB stick/MMC drive letter>:
4	On successful completion of the transfer of restore data to the USB stick/Multi Media Card: Remove the data carrier safely from the PC.

### Using the USB stick / Multi Media Card to restore the factory settings

Proceed as follows in order to restore the delivery condition of the Embedded Controller with the USB stick / Multi Media Card:

Step	Procedure	Result
1	Switch off power to the Embedded Controller.	-
2	Remove all data carriers from the Embedded Controller.	-
3	Connect the data carrier that contains the backed-up data directly to the Embedded Controller.	-
4	Switch on power to the Embedded Controller.	The Embedded Controller performs a restart. <b>All LEDs are lit.</b>
5	Press the MRES switch as soon as only the LEDs <b>U1/BF3 and U2/BF4 are lit</b> . If those LEDs stay dark, the EC has not detected a bootable USB device.	Restore is being initialized. The LED displays <b>U1/BF3 and U2/BF4 are no longer lit</b> .
6	If the LED display <b>U3 flashes</b> , release the MRES switch.	The data is now being restored. <b>U3 and U4 flash.</b> The Embedded Controller shuts down automatically after you restored the factory settings.
7	Switch off power to the Embedded Controller.	-

### Further procedures

- You can now remove the data carrier from the EC.
- Connect the USB devices again.
- Install the license keys.

### See also

Backup - requirements and rules (Page 97)



## 9.2 Windows Embedded Standard 2009

### Merkmale Windows Embedded Standard 2009

The Windows Embedded Standard 2009 with standard features is preinstalled on EC31.

You can always install additional updates. For latest information about the operating system, refer to [www.windows.com](http://www.windows.com).

## 9.3 Micro Memory Card

### Properties

<b>CAUTION</b>
<b>The S7-formatting will be overwritten</b>
The S7 formatting of a SIMATIC Micro Memory Card used in the Embedded Controller will be overwritten. This prevents any further use of the SIMATIC Micro Memory Card in SIMATIC S7 modules!

The SIMATIC Micro Memory Card behaves in the Embedded Controller as in a Windows file system.

Windows Embedded Standard automatically detects NTFS, FAT16 and FAT32 file systems. You should preferably use the NTFS file system.

## 9.4 Update software

You can find information on updating software on the Internet (<http://www.siemens.com/automation/service&support>).

---

### Note

#### HMI devices

Always install the latest drivers for your HMI devices (SIMATIC Flat Panels). To ensure troublefree operation, uninstall the old driver version before you run the driver update.

The latest driver updates are available for download from SIMATIC Product Support.

---

## 9.5 Returning an Embedded Controller

<b>NOTICE</b>
<b>Returning an Embedded Controller</b> If you are returning an Embedded Controller for repair, enclose the original bill of sale to ensure correct invoicing. This approach will prevent confusion of different models and ensures correct invoicing.

## Technical data

### 10.1 General technical data

#### General technical data

The general technical data of the S7-300 modules are always valid for the *S7-mEC*. Observe the relevant instructions in the manual S7-300 CPU 31xC and CPU 31x: Technical Specifications (<http://support.automation.siemens.com/WW/view/en/12996906>).

Corresponding deviations are described below.

#### Climatic ambient conditions

*S7-mEC* may be operated at the following climatic ambient conditions:


Ambient conditions	Valid range
Temperature range in horizontal mounting position	from 0 to 50 °C

## 10.2 Standards and certifications

### Introduction

Contents of general technical data:

- The standards and test values the S7-mEC system conforms to.
- Test criteria for the S7-mEC system.

 <b>WARNING</b>
<b>For operation in potentially explosive atmospheres: Explosion hazard!</b>
Do not use any PCI-104 cards without necessary approvals for the respective potentially explosive atmosphere.
PCI- 104 cards that you install in the EM PCI-104 must meet the necessary requirements individually or in combination for the respective potentially explosive atmosphere.
If one of these requirements is not met by one individual PCI-104 card or several PCI-104 cards in combination, then this approval will no longer be valid for the potentially explosive atmosphere.

#### Note

Currently valid approvals are specified on the rating plate of the corresponding module.

### CE label



The S7-mEC system meets the general and safety-related requirements of the following EC directives and conforms to the harmonized European standards (EN) for programmable controllers published in the official gazettes of the European Community:

- 2006/95/EC "Electrical Equipment Designed for Use within Certain Voltage Limits" (Low-Voltage Directive)
- 2004/108/EC "Electromagnetic Compatibility" (EMC Directive)
- 94/9/EC "Equipment and protective systems intended for use in potentially explosive atmospheres" (Explosion Protection Directive)

The EC Declaration of Conformity for the products is available to responsible authorities at:

Siemens Aktiengesellschaft  
Industry Sector  
I IA AS R & D DH A  
Postfach 1963  
D-92209 Amberg

## UL approval



Underwriters Laboratories Inc. complying with

- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 142 (Process Control Equipment)

or



HAZ. LOC.

Underwriters Laboratories Inc. complying with

- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 142 (Process Control Equipment)
- UL 1604 (Hazardous Location)
- CSA C 22.2 No. 213 (Hazardous Location)

APPROVED for use in  
Class I, Division 2, Group A, B, C, D Tx;  
Class I, Zone 2, Group IIC Tx

## FM approval



Factory Mutual Research (FM) to  
Approval Standard Class Number 3611, 3600, 3810  
APPROVED for use in Class I, Division 2, Group A, B, C, D Tx;  
Class I, Zone 2, Group IIC Tx

### ATEX approval



ATEX approval according to

- EN 60079-15:2005 (Electrical apparatus for explosive gas atmospheres; type of protection "n")
- EN 60079-0:2006 (Electrical apparatus for explosive gas atmospheres; general requirements)

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#### Note

Currently valid approvals are specified on the rating plate of the corresponding module.

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 II 3 G Ex nA II T4

### Tick-mark for Australia



The S7-mEC system fulfills the requirements of the standard AS/NZS CISPR 11 (Class A).

### IEC 61131

The S7-mEC system meets requirements and criteria to IEC 61131-2, (Programmable logic controllers, part 2: Equipment Requirements and Tests).

### Shipbuilding approvals

Classification societies:

- ABS (American Bureau of Shipping)
- BV (Bureau Veritas)
- DNV (Det Norske Veritas)
- GL (Germanischer Lloyd)
- LRS (Lloyds Register of Shipping)
- Class NK (Nippon Kaiji Kyokai)

## Use in industry

SIMATIC products are designed for industrial applications.

Table 10- 1 Use in industry

Fields of application	Noise emission requirements	Noise immunity requirements
Industry	EN 61000-6-4: 2007	EN 61000-6-2: 2005

## 10.3 EC31

### Technical data of EC31

Table 10- 2 Technical data of EC31

<b>Product version</b>	
Order no.:	6ES7677-1DD10-0BA0
Hardware version	01
Corresponding programming interface	Software Development Kit (SDK EC31)
Processor selection	Intel Core Duo 1.2 GHz
Main memory	1 GB RAM
Flash memory, integrated	4 GB
Partitioning	C:\ 2.5 GB, D:\ 1.5 GB
Operating system	Windows Embedded Standard 2009
Memory	256 KB non-volatile memory for retentive data
<b>Power supply</b>	
Rated value, 24 VDC	Yes
Valid range, lower limit	20.4 V
Valid range, upper limit	28.8 V
Input current	
Rated value at 24 VDC	Typically 0.8 A; without backplane bus and USB supply
<b>Supply voltages</b>	
Power and voltage failure backup	5 ms
Power loss	Typically 20 W; without backplane bus and USB supply
Reverse polarity protection	Yes; protection against destruction
<b>Potentials</b>	
Permitted potential difference (to the rail)	75 VDC, 60 VAC
Electrical isolation	
Between Ethernet and electronic circuits	Yes

<b>Isolation</b>	
Test voltage	500 VDC
For Ethernet	1500 Vrms (IEEE802.3)
<b>Module-specific data</b>	
Data transmission rate	100 Mbps full duplex
Transmission mode	100BASE-TX
Autonegotiation	Yes
MAC addresses	4
<b>Configuration</b>	
Racks, max.	4
Modules per rack, max.	8
<b>Monitoring functions</b>	
Status LEDs	Yes; the LED functions can be programmed via SDK
Transient voltage interruption	Up to 5 ms
<b>EMC</b>	
Limit class A, for use in industrial areas	Yes
<b>Environmental requirements</b>	
Operating temperature	
Min.	0 °C
Max.	50 °C
Storage/transport temperature	
Min.	-40 °C
Max.	70 °C
<b>Degree of protection</b>	
IP 20	Yes
<b>Standards, approvals, certificates</b>	
CE label	Yes
CSA approval	Yes, contained in cULus
cULus	Yes
FM approval	Yes
ATEX approval	Yes
<b>Interfaces</b>	
USB	2 x USB 2.0 high-speed / 500 mA
Ethernet	1 x 10/100 Mbps with RJ45
<b>Dimensions and weight</b>	
Width (mm)	160
Height (mm)	125
Depth (mm)	115
Weight (kg)	Approx. 1,5



## 10.4 EC31-RTX

### Technical data of EC31-RTX

Table 10- 3 Technical data of EC31-RTX

<b>Product version</b>	
Order no.:	6ES7677-1DD10-0BB0
Hardware version	01
Processor selection	Intel Core Duo 1.2 GHz
Main memory	1 GB RAM
Flash memory, integrated	4 GB
Partitioning	C:\ 2.5 GB, D:\ 1.5 GB
Operating system	Windows Embedded Standard 2009
Memory for program blocks	Max. 4 MB
Memory for data blocks	Max. 4 MB
Memory	512 KB non-volatile memory for retentive data
<b>Power supply</b>	
Rated value, 24 VDC	Yes
Valid range, lower limit	20.4 V
Valid range, upper limit	28.8 V
<b>Input current</b>	
Rated value at 24 VDC	Typically 0.8 A; without backplane bus and USB supply
<b>Supply voltages</b>	
Power and voltage failure backup	5 ms
Power loss	Typically 20 W; without backplane bus and USB supply
Reverse polarity protection	Yes; protection against destruction
<b>Potentials</b>	
Permitted potential difference (to the rail)	75 VDC, 60 VAC
<b>Electrical isolation</b>	
Between Ethernet and electronic circuits	Yes
<b>Insulation</b>	
Test voltage	500 VDC
For Ethernet	1500 Vrms (IEEE802.3)
<b>Module-specific data</b>	
Data transmission rate	100 Mbps full duplex
Transmission mode	100BASE-TX
Autonegotiation	Yes
MAC addresses	4

<b>Configuration</b>	
Racks, max.	4
Modules per rack, max.	8
<b>Monitoring functions</b>	
Status LEDs	Yes
Transient voltage interruption	Up to 5 ms
<b>EMC</b>	
Limit class A, for use in industrial areas	Yes
<b>Configuring software</b>	
STEP 7	Yes; STEP 7 V5.5 / iMap V3.0 SP1
<b>Installed software</b>	
Controller	SIMATIC WinAC RTX 2010
<b>Environmental requirements</b>	
Operating temperature	
Min.	0 °C
Max.	50 °C
Storage/transport temperature	
Min.	-40 °C
Max.	70 °C
<b>Degree of protection</b>	
IP 20	Yes
<b>Standards, approvals, certificates</b>	
CE label	Yes
CSA approval	Yes, contained in cULus
cULus	Yes
FM approval	Yes
ATEX approval	Yes
<b>Interfaces</b>	
USB	2 x USB 2.0 high-speed / 500 mA
PROFINET	2 x 10/100 Mbps with RJ45
Ethernet (PROFINET basic functions)	1 x 10/100 Mbps with RJ45
<b>Dimensions and weight</b>	
Width (mm)	160
Height (mm)	125
Depth (mm)	115
Weight (kg)	approx. 1.5

## 10.5 EC31-RTX F

### Technical data of EC31-RTX F

Table 10- 4 Technical data of EC31-RTX F

<b>Product version</b>	
Order no.:	6ES7677-1FD10-0FB0
Hardware version	01
Processor selection	Intel Core Duo 1.2 GHz
Main memory	1 GB RAM
Flash memory, integrated	4 GB
Partitioning	C:\ 2.5 GB, D:\ 1.5 GB
Operating system	Windows Embedded Standard 2009
Memory for program blocks	Max. 4 MB
Memory for data blocks	Max. 4 MB
Memory	512 KB non-volatile memory for retentive data
<b>Power supply</b>	
Rated value, 24 VDC	Yes
Valid range, lower limit	20.4 V
Valid range, upper limit	28.8 V
Input current	
Rated value at 24 VDC	Typically 0.8 A; without backplane bus and USB supply
<b>Supply voltages</b>	
Power and voltage failure backup	5 ms
Power loss	Typically 20 W; without backplane bus and USB supply
Polarity reversal protection	Yes; protection against destruction
<b>Potentials</b>	
Permitted potential difference (to the mounting rail)	75 VDC, 60 VAC
Electrical isolation	
Between Ethernet and electronic circuits	Yes
Insulation	
Test voltage	500 VDC
For Ethernet	1500 V r.m.s. (IEEE802.3)
<b>Module-specific data</b>	
Transmission rate	100 Mbps full duplex
Transmission mode	100BASE-TX
Autonegotiation	Yes
MAC addresses	4

<b>Configuration</b>	
Racks, max.	4
Modules per rack, max.	8
<b>Monitoring functions</b>	
Status LEDs	Yes
Transient voltage interruption	Up to 5 ms
<b>EMC</b>	
Limit class A, for use in industrial areas	Yes
<b>Configuring software</b>	
STEP 7	Yes; STEP 7 V5.5 / iMap V3 SP1
Distributed Safety	Optional package S7 Distributed Safety V 5.4 + SP5 (including S7 F Configuration Pack V5.5 SP6 HF1)
<b>Installed software</b>	
Controller	SIMATIC WinAC RTX F 2010
<b>Environmental requirements</b>	
Operating temperatures	
Min.	0 °C
Max.	50 °C
Storage/transport temperatures	
Min.	-40 °C
Max.	70 °C
<b>Degree of protection</b>	
IP 20	Yes
<b>Standards, approvals, certificates</b>	
CE label	Yes
CSA approval	Yes, contained in cULus
cULus	Yes
FM approval	Yes
ATEX approval	Yes
<b>Interfaces</b>	
USB	2 x USB 2.0 high-speed / 500 mA
PROFINET	2 x 10/100 Mbps with RJ45
Ethernet (PROFINET basic functions)	1 x 10/100 Mbps with RJ45
<b>Dimensions and weight</b>	
Width (mm)	160
Height (mm)	125
Depth (mm)	115
Weight (kg)	approx. 1.5

## 10.6 EC31-HMI/RTX

### Technical data of EC31-HMI/RTX

Table 10- 5 Technical data of EC31-HMI/RTX

<b>Product version</b>	
Order numbers	
EC31-HMI/RTX 128 PT	6ES7677-1DD10-0BF0
EC31-HMI/RTX 512 PT	6ES7677-1DD10-0BG0
EC31-HMI/RTX 2048 PT	6ES7677-1DD10-0BH0
Hardware version	01
Processor selection	Intel Core Duo 1.2 GHz
Main memory	1 GB RAM
Flash memory, integrated	4 GB
Partitioning	C:\ 2.5 GB, D:\ 1.5 GB
Operating system	Windows Embedded Standard 2009
Memory for program blocks	Max. 4 MB
Memory for data blocks	Max. 4 MB
Memory	512 KB non-volatile memory for retentive data
<b>Power supply</b>	
Rated value, 24 VDC	Yes
Valid range, lower limit	20.4 V
Valid range, upper limit	28.8 V
Input current	
Rated value at 24 VDC	Typically 0.8 A; without rear panel bus and USB supply
<b>Supply voltages</b>	
Power and voltage failure backup	5 ms
Power loss	Typically 20 W; without rear panel bus and USB supply
Reverse polarity protection	Yes; protection against destruction
<b>Potentials</b>	
Permitted potential difference (to the rail)	75 VDC, 60 VAC
Electrical isolation	
Between Ethernet and electronic circuits	Yes
Insulation	
Test voltage	500 VDC
For Ethernet	1500 Vrms. (IEEE802.3)

<b>Module-specific data</b>	
Data transmission rate	100 Mbps full duplex
Transmission mode	100BASE-TX
Autonegotiation	Yes
MAC addresses	4
<b>Configuration</b>	
Racks, max.	4
Modules per rack, max.	8
<b>Monitoring Functions</b>	
Status LEDs	Yes
Transient voltage interruption	Up to 5 ms
<b>EMC</b>	
Limit class A, for use in industrial areas	Yes
<b>Configuring software</b>	
STEP 7	Yes; STEP 7 V5.5 / iMap V3.0 SP1
WinCC flexible	SIMATIC WinCC flexible 2008 Advanced + SP2
<b>Installed software</b>	
Visualization	WinCC flexible 2008 RT 128 / 512 / 2048
Controller	SIMATIC WinAC RTX 2010
<b>Environmental requirements</b>	
Operating temperature	
Min.	0 °C
Max.	50 °C
Storage/transport temperature	
Min.	-40 °C
Max.	70 °C
<b>Degree of protection</b>	
IP 20	Yes
<b>Standards, approvals, certificates</b>	
CE label	Yes
CSA approval	Yes, contained in cULus
cULus	Yes
FM approval	Yes
ATEX approval	Yes
<b>Interfaces</b>	
USB	2 x USB 2.0 high-speed / 500 mA
PROFINET	2 x 10/100 Mbps with RJ45
Ethernet (PROFINET basic functions)	1 x 10/100 Mbps with RJ45
<b>Dimensions and weight</b>	
Width (mm)	160
Height (mm)	125
Depth (mm)	115
Weight (kg)	approx. 1.5

## 10.7 Expansion module EM PCI-104

### Technical data of EM PCI-104

Table 10- 6 Technical data of EM PCI-104

<b>Product version</b>	
Order no.:	6ES7677-1DD40-1AA0
Hardware version	02
<b>Power supply</b>	
Rated value, 24 VDC	Yes, optional: External infeed
Valid range, lower limit	20.4 V
Valid range, upper limit	28.8 V
<b>Voltages and currents</b>	
I/O voltage for PCI-104 connection	5 V / 3.3 V
Power loss, max.	10 W; per EM PCI-104
Power loss, typically	2.4 W; without PCI-104 cards
<b>Interfaces</b>	
Free slots	max. 3 PCI-104 cards can be installed; 10 W total power loss, of which 6.6 W for all installed cards per EM PCI-104
<b>Diagnostics</b>	
Diagnostic Functions	Yes; POWER LED; LED display on the card
<b>EMC</b>	
Limit class A, for use in industrial areas	Yes
<b>Environmental requirements</b>	
Operating temperature	
Min.	0 °C
Max.	50 °C
Storage/transport temperature	
Min.	-40 °C
Max.	70 °C
<b>Degree of protection</b>	
IP 20	Yes
<b>Standards, approvals, certificates</b>	
CE label	Yes
CSA approval	Yes
cULus	Yes
FM approval	Yes
ATEX approval	Yes
<b>Dimensions and weight</b>	
Width (mm)	120; without bus connector extension bus
Height (mm)	125; without external voltage connecting terminal
Depth (mm)	115
Weight (kg)	Approx. 0.5

## 10.8 Expansion module EM PC

### Technical data of EM PC

Table 10- 7 Technical data of EM PC

<b>Product version</b>	
Order no.:	6ES7677-1DD50-2AA0
Hardware version	01
Power loss, typically	14 W from extension bus; incl. 2 x 0.5 A for USB = 5 W
<b>Diagnostics</b>	
Diagnostic Functions	Yes; ON LED, CARD LED for displaying accesses on SD/MMC, CF
<b>EMC</b>	
Limit class A, for use in industrial areas	Yes
<b>Environmental requirements</b>	
Operating temperature	
Min.	0 °C
Max.	50 °C
Storage/transport temperature	
Min.	-40 °C
Max.	70 °C
<b>Degree of protection</b>	
IP 20	Yes
<b>Standards, approvals, certificates</b>	
CE label	Yes
CSA approval	Yes
cULus	Yes
FM approval	Yes
ATEX approval	Yes
<b>Interfaces</b>	
Free slots	1 x slot for CF card; 1 x slot for SD/MMC
Graphics interface	1 x DVI-I
Serial interface	1 x V.24 (RS232)
USB	2 x USB 2.0 high-speed / 500 mA
Ethernet	Onboard, 10/100/1000 mbps, RJ45
<b>Dimensions and weight</b>	
Width (mm)	80; without bus connector extension bus
Height (mm)	125
Depth (mm)	115
Weight (kg)	Approx. 0.4



## **WinAC RTX 2010 / WinAC RTX F 2010**

You can find the technical data on the Internet:

- WinAC RTX 2010  
(<http://support.automation.siemens.com/WW/view/en/6ES7671-0RC08-0YA0>)
- WinAC RTX F 2010  
(<http://support.automation.siemens.com/WW/view/en/6ES7671-1RC08-0YA0>)



## Appendix

### A.1 Dimension drawings

#### A.1.1 EC31

##### Dimensional drawings EC31

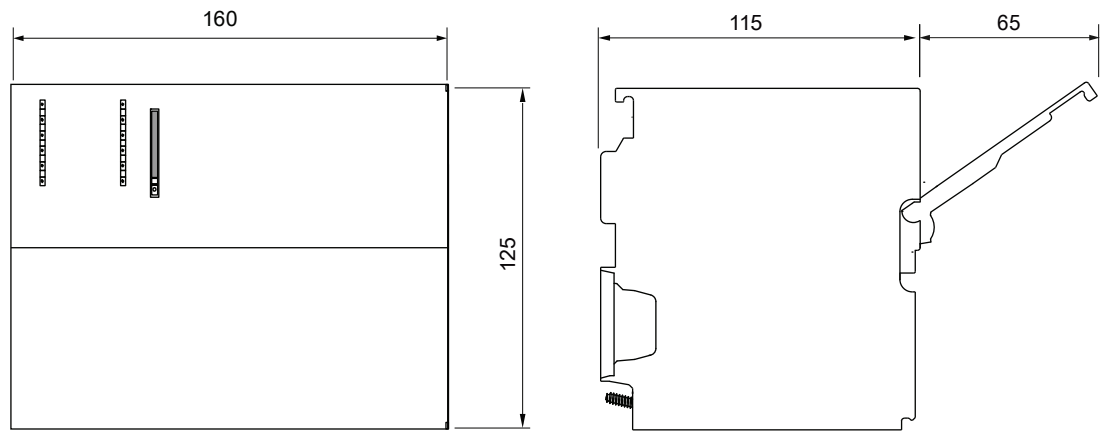


Figure A-1 Dimensional drawing EC31 (dimensions in mm)

### A.1.2 EM PCI-104

#### Dimensional drawings of expansion module EM PCI-104

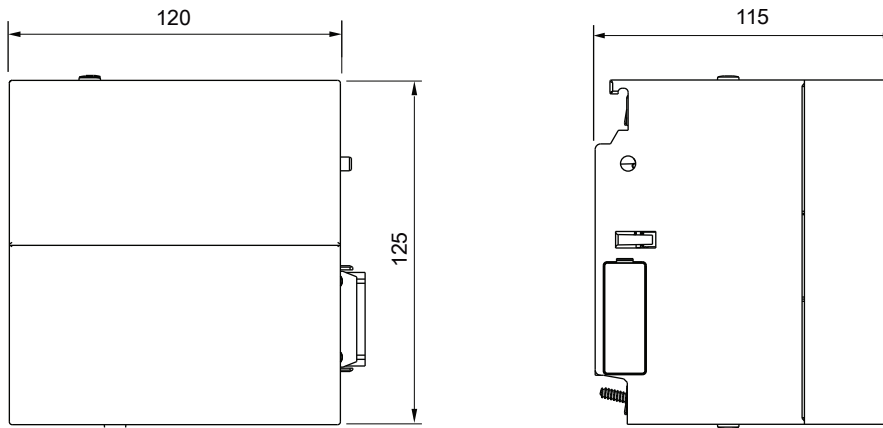


Figure A-2 Dimensional drawings EM PCI-104 interface module (dimensions in mm):

### Dimensional drawings of shelves

The shaded area indicates which parts of the shelves slot into the guides of the EM PCI-104.

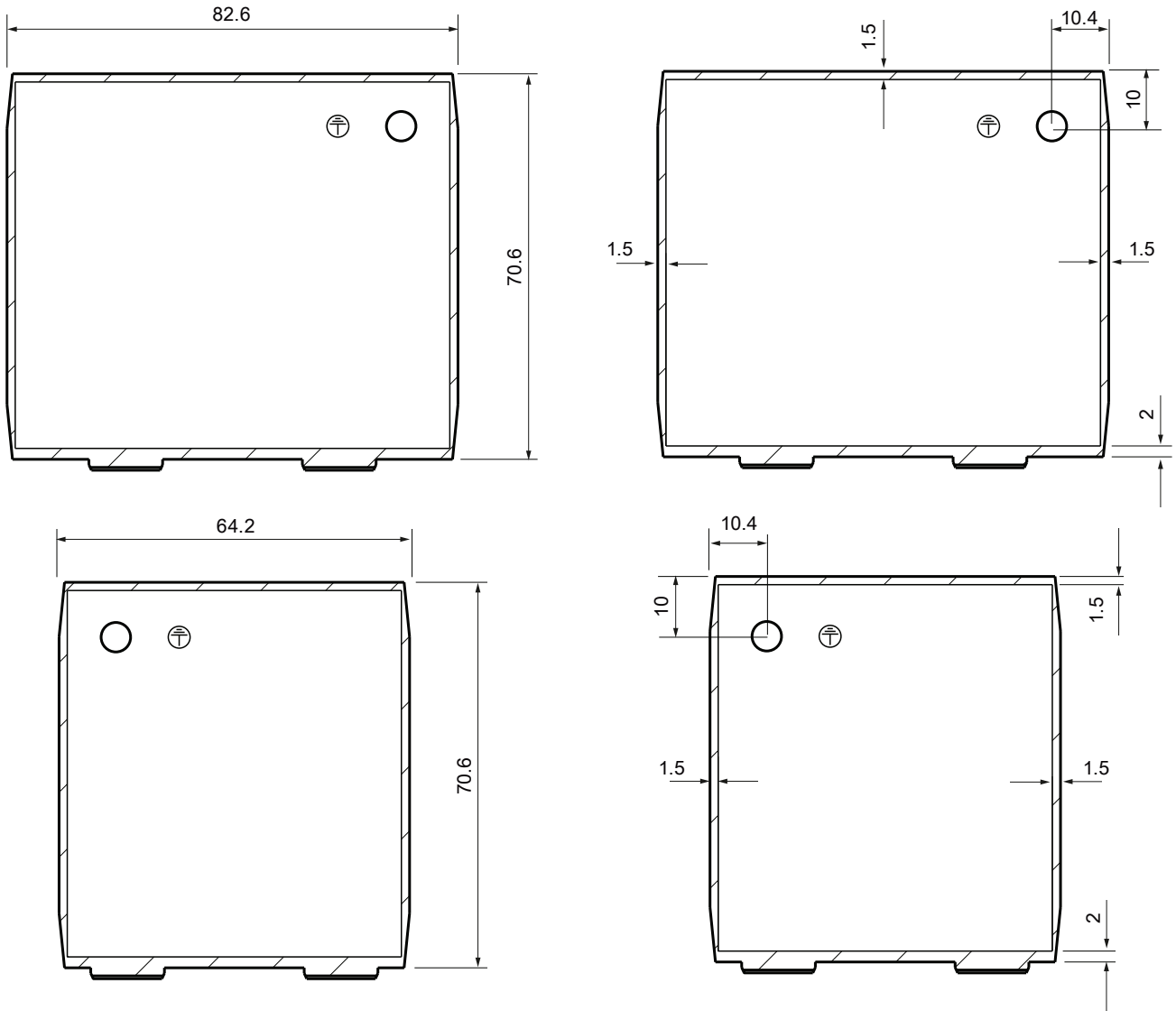


Figure A-3 Dimensional drawings of shelves (dimensions in mm)

### See also

Preparing shelves (Page 49)

### A.1.3 EM PC

#### Dimensional drawings of expansion module EM PC

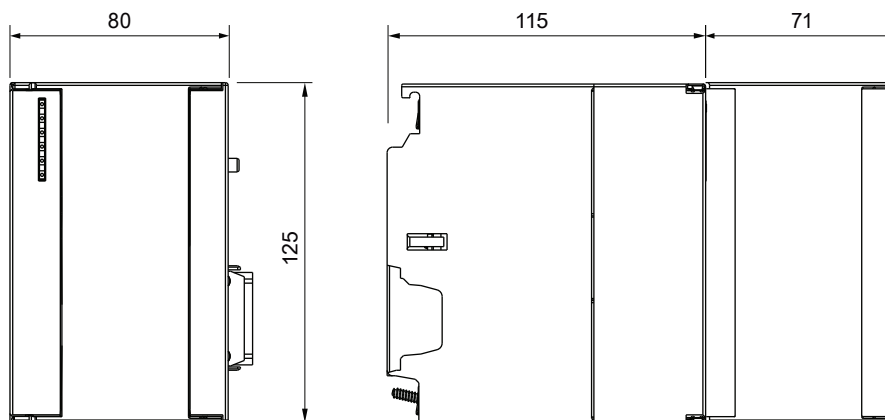


Figure A-4 Dimensional drawings EM PC (dimensions in mm)

## A.2 Order numbers

### Embedded controllers, expansion modules and accessories

Table A- 1 Order numbers of embedded controllers, expansion modules and accessories

Designation	Order no.:
EC31 Embedded Controller with Intel Core Duo 1.2 GHz processor, 1 GB RAM, 4 GB flash memory, interfaces: 2 x USB, 2 x PROFINET, 1 x Fast Ethernet, 1 MMC slot, with Windows Embedded Standard 2009	6ES7677-1DD10-0BA0
EC31-RTX Embedded Controller with Intel Core Duo 1.2 GHz processor, 1 GB RAM, 4 GB flash memory, interfaces: 2 x USB, 2 x PROFINET, 1 x Fast Ethernet, 1 x MMC slot, with Windows Embedded Standard 2009, WinAC RTX 2010, and SIMATIC NET Softnet-S7 Lean Edition 2010	6ES7677-1DD10-0BB0
EC31-RTX F Embedded Controller with Intel Core Duo 1.2 GHz processor, 1 GB RAM, 4 GB flash memory, interfaces: 2 x USB, 2 x PROFINET, 1 x Fast Ethernet, 1 x MMC slot, with Windows Embedded Standard 2009, WinAC RTX F 2010, and SIMATIC NET Softnet-S7 Lean Edition 2010	6ES7677-1FD10-0FB0

Designation	Order no.:
EC31-HMI/RTX Embedded Controller with Intel Core Duo 1.2 GHz processor, 1 GB RAM, 4 GB flash memory, interfaces: 2 x USB, 2 x PROFINET, 1 x Fast Ethernet, 1 x MMC slot; with Windows Embedded Standard 2009, WinAC RTX 2010, SIMATIC NET Softnet-S7 Lean Edition 2010, and WinCC flexible 2008 Runtime EC31-HMI/RTX 128 PT EC31-HMI/RTX 512 PT EC31-HMI/RTX 2048 PT	6ES7677-1DD10-0BF0 6ES7677-1DD10-0BG0 6ES7677-1DD10-0BH0
Expansion module EM PCI-104	6ES7677-1DD40-1AA0
Expansion module EM PC	6ES7677-1DD50-2AA0
SIMATIC NET IE FC RJ45 PLUG 90 (for connector X1) Connector with rugged metal shell and FastConnect terminating technology, 90° cable outlet 1 per pack, 1 pack 10 per pack, 1 pack 50 per pack, 1 pack	6GK1901-1BB20-2AA0 6GK1901-1BB20-2AB0 6GK1901-1BB20-2AE0
WinAC RTX 2010	6ES7671-0RC08-0YA0
WinAC RTX F 2010	6ES7671-1RC08-0YA0
SIMATIC PC adapter cable, DVI-I compliant with VGA, 250 mm	6ES7648-3AB00-0XA0
SIMATIC PC DVI-I Y graphics adapter cable; DVI-I according to VGA and DVI-D	6ES7648-3AE00-0XA0
CP 5603 S7-mEC Package CP 5603 communication processor Installation kit CP 5603 for S7-mEC	6GK1560-3AE00
CP 5603 communication processor	6GK1560-3AA00
Installation kit CP 5603 for S7-mEC Panel for installation with slots for PROFIBUS DP plug-in connectors	6GK1560-3AA00-0AE0

## Interface modules

Table A- 2 Interface module order numbers

Designation	Order no.:
IM 360	6ES7360-3AA01-0AA0
IM 361	6ES7361-3CA01-0AA0
IM 365	6ES7365-0BA01-0AA0

### Digital and analog electronic modules

- **EC31-RTX / EC31-RTX F / EC31-HMI/RTX**

The signal modules listed in the HW Config catalog under "S7-modular Embedded Controller > SM-300 / FM-300" are approved for operation with the EC31-RTX / EC31-RTX F / EC31-HMI/RTX.

- **EC31**

The following signal modules are approved for use with EC31 and for access via SDK user program:

Table A- 3 Order Numbers for electronic modules for EC31

Designation	Order no.:
SM 321; DI 16 x DC 24 V	6ES7321-1BH02-0AA0
SM 321; DI 32 x DC 24 V	6ES7321-1BL00-0AA0
SM 321; DI 16 x DC 24 V, sourcing	6ES7321-1BH50-0AA0
SM 321; DI 64 x DC 24 V; Sinking/Sourcing	6ES7 321-1BP00-0AA0
SM 322; DO 16 x DC 24 V/ 0,5 A	6ES7322-1BH01-0AA0
SM 322; DO 32 x DC 24 V/ 0,5 A	6ES7322-1BL00-0AA0
SM 322; DO 8 x DC 24 V/ 0,5 A; diagnostics interrupt	6ES7322-8BF00-0AB0
SM 322; DO 64 x DC 24 V/ 0,3 A; sourcing	6ES7322-1BP00-0AA0
SM 331; AI 8 x 13 bit	6ES7331-1KF01-0AB0
SM 331; AI 8 x 12 Bit diagnostic interrupt / process interrupt	6ES7331-7KF02-0AB0
SM 331; AI 2 x 12 Bit diagnostic interrupt / process interrupt	6ES7331-7KB02-0AB0
SM 332; AO 4 x 12 Bit diagnostics interrupt	6ES7332-5HD01-0AB0
SM 332; AO 2 x 12 Bit	6ES7332-5HB01-0AB0
SM 332; AO 8 x 12 Bit	6ES7332-5HF00-0AB0



## A.3 Tips and Tricks

### Software

Use only the software approved for Windows Embedded Standard 2009 on the Embedded Controller.

### Connecting I/O devices

---

#### Note

Always install the **latest software version** for connected I/O devices such as CD drives or monitors connected (included with the I/O devices, or available on the Website of the manufacturer).

---

### Windows Setup CD requested

The drivers for many devices have already been installed. If a driver is not found for operation of a device and the installation program requests the Windows Setup CD, navigate to the following path:

C:\Windows\System32\drivers

Most installation programs will then continue their setup. Contact the device manufacturer if this does not solve the problem.

## A.4 Disclaimer

### Disclaimer for the Primary Setup Tool

This software is freeware. It is provided to you free of charge. It may be copied, modified and used, and be passed on to third-parties. However, if passed to a third party, the software must be in its complete and unmodified form, and all copyrights must be observed. Any commercial distribution to third parties (e.g., for shareware/freeware distribution) is subject to the express written approval of Siemens AG. As the software is provided free of charge, the authors and copyright owners **disclaim any liability** for this software. Users of the software act at their own risk and responsibility. The authors and rights holders shall only be held liable for criminal intent and gross negligence. Any further claims are excluded. In particular, the authors and copyright holders shall not be deemed liable for any defects or subsequent damages. Please inform us of any software errors you might discover.



## List of abbreviations

### B.1 Abbreviations

Abbreviation	Term	Meaning
AC	Alternating current	Alternating current
ALM	Automation License Manager	
BIOS	Basic Input Output System	Basic Input Output System A set of vital software routines used to perform a hardware test after the startup of a computer, to load the operating system and to provide the routines for data exchange between hardware components.
CD-ROM	Compact Disc – Read Only Memory	Removable storage medium for large data volumes
CE	Communauté Européenne	CE label
CF	Compact Flash	Memory card
CLK	Clock	PCI bus signal
CoA	Certificate of Authentication	Microsoft Windows Product Key
CoL	Certificate of License	License Key
CP	Communications Processor	Communications processor
DC	Direct Current	DC current
DCP	Discovery and Basic Configuration Protocol.	Protocol that assigns the IP address stored in HW Config to a device on the basis of the device name.
DHCP	Dynamic Host Configuration Protocol	Protocol that assigns the network configuration to devices via a DHCP server.
DVD	Digital Versatile Disc	Digital versatile disk. Standard that describes a data carrier which is similar to a conventional CD, but allows read/write operations on both sides of the DVD; storage capacity up to 8.5 GB of data.
DVI-I	Digital Visual Interface	Interface for transmitting images and video data, includes combined signal with the DVI monitors and VGA monitors can also be connected (via adapter).
EC	Embedded Controller	
ESD	Components sensitive to electrostatic charge	
EM PC		Expansion module for PC components
EM PCI-104		Expansion module for PCI-104 cards
EN	European standard	
EWf	Enhanced Write Filter	
F	Failsafe	Safety-oriented technology
FAT 16 / FAT 32	File Allocation Table 16-bit / 32-bit	File allocation table The table is maintained and managed by the operating system; provides details of the distribution of hard disk data.

List of abbreviations

B.1 Abbreviations

Abbreviation	Term	Meaning
FM	Function module	Function modules execute time-critical and memory intensive tasks of process-signal processing, such as positioning or controlling.
GNT	Grant	PCI bus signal
HMI	Human Machine Interface	User interface
HSP	Hardware support package	
IEC	International Electrical Commission	
IF Slot	Interface Slot	
IM	Interface module	The interface module connects the ET 200S with the DP master and processes the data for the equipped electronic modules.
IDSEL	ID Select	PCI bus signal
IRQ	Interrupt Request	PCI bus signal
LAN	Local Area Network	Computer network that is limited to a local area.
LED	Light Emitting Diode	Light emitting diode
MMC	Multi Media Card	Memory card
NTFS	New Technology File System	File system that provides access at file level by contrast to FAT, for example.
OPC	OLE for Process Control	OPC designates a standardized, industry wide software interface
PC	Personal Computer	
PELV	Protective extra-low voltage	PELV, previously called "extra low voltage with safe isolation", is a protective measure against electrical shock. See EN 50178.
PG	Programming device	Compact programming device which meets the special requirements of industry. The PG is fully equipped for programming SIMATIC PLCs.
PLC	Programmable Logic Controller (PLC)	
PS	Power supply	Power supply
PST	Primary Setup Tool	Software for assigning IP addresses
PT	Power Tags	Hardware tags; tags enable the data exchange between the components of an automation process, e.g. between the HMI device and the PLC.
RAM	Random Access Memory	Main or work memory of a computer with direct access, allowing read access to data and editing.
RDP	Remote Desktop Protocol	Network protocol
REQ	Request	PCI bus signal
RT	Runtime	
RTX	Real-time extensions	
SD	Secure Digital card	Memory card
SDK	Software Development Kit	

Abbreviation	Term	Meaning
SELV	Safety Extra Low Voltage	Protective measure at which circuits with a rated voltage of up to 50 V alternating voltage or 120 V direct voltage are operated ungrounded and feeding of circuits with a higher voltage are separated from these by a safety transformer is not exceeded.
SM	Signal module	Signal modules interface the process and the automation system. There are input modules, output modules, input/output modules (in each case, digital and analog)
SNMP	Simple Network Management Protocol	Network protocol
UL	Underwriters Laboratories Inc.	
USB	Universal Serial Bus	Serial bus system for connecting a computer to external devices.
VDE	Verein deutscher Elektrotechniker (German Association for Electrical, Electronic and Information Technologies)	
VGA	Video Graphics Array	Video adapter which meets industrial standard; can be used for any commonly available software
WinAC	Windows Automation Center	
WinLC	Windows Logic Controller	



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