

SIEMENS

SIMATIC

Embedded Automation S7-modular Embedded Controller EC31-HMI/RTX

Operating Instructions

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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.

⚠ DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
⚠ WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
⚠ CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.
CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.
NOTICE
indicates that an unintended result or situation can occur if the corresponding 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 device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Proper use of Siemens products

Note the following:

⚠ WARNING
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

Conventions

- *EC31, EC31-RTX, EC31-HMI/RTX*
In the documentation, *Embedded Controller* or device are also used for the product labels *EC31, EC31-RTX, EC31-HMI/RTX* if the description does not refer to a specific delivery version.
- *S7 Modular Embedded Controller*
The entire *S7-modular Embedded Controller* system, consisting of an Embedded Controller, S7-300 modules and expansion modules is abbreviated to *S7-mEC*.

Purpose of the manual

This manual provides information you need to commission and operate the *EC31, EC31-RTX and EC31-HMI/RTX*. 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	6ES7677-1DD00-0BA0	01/2009 or later
Embedded Controller EC31-RTX	6ES7677-1DD00-0BB0	01/2009 or later
Embedded Controller EC31-HMI/RTX 128 PT	6ES7677-1DD00-0BF0	01/2009 or later
Embedded Controller EC31-HMI/RTX 512 PT	6ES7677-1DD00-0BG0	01/2009 or later
Embedded Controller EC31-HMI/RTX 2048 PT	6ES7677-1DD00-0BH0	01/2009 or later
Expansion module EM PCI-104	6ES7677-1DD40-1AA0	01/2009 or later
Expansion module EM PC	6ES7677-1DD50-2AA0	01/2009 or later

Note

Note that the label on the Embedded Controller always shows the designation **EC31** and order number 6ES7677-1DD00-0BA0, irrespective of ordering options.

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
- PC knowledge
- Windows XP/XP Embedded operating systems
- Programming with STEP 7
- PC-based automation with WinAC RTX

Changes since the previous version

The following products are new:

- Embedded Controller EC31-HMI/RTX
- Expansion module EM PCI-104 and EM PC

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 2008* 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>) System Manual
- Commissioning PC stations (<http://support.automation.siemens.com/WW/view/en/13542666>)
- Programming Manual *Software Development Kit for EC31*

Standards and certifications

In Chapter *General technical data*, you will find information about standards, certificates and approvals (Page 100)

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)

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

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Safety notes

1.1 General safety instructions

 CAUTION
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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.

 WARNING
--

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.

CAUTION

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

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 initial 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 2008, SOFTNET S7-Lean Edition 2008 and WinCC flexible 2008 RT.
- The "Microsoft Windows Product Key" is available on the "Certificate of Authenticity" label which is included with the device.
- The first MAC address is available underneath the module cover of the device.

See also

Scope of delivery EC31 (Page 13)

Scope of delivery EC31-RTX (Page 17)

Scope of delivery for EC31-HMI/RTX (Page 23)

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 XP Embedded SP2 Feature Pack 2007
- Restore DVD "SIMATIC S7-mEC EC31 01/2009" for restoring the image
- DVD "S7-mEC EC31, EC31-RTX, EC31-HMI/RTX Software and Documentation"
- Windows Certificate of Authenticity (CoA) with CoA sticker
- 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 a preinstalled Windows XP Embedded 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 expansion modules. A flash memory is used as storage medium for the operating system and any application data.
- EC31 can be expanded by installing S7-300 modules in the central rack or in the expansion rack.
- 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 is used, for example, to access S7-300 I/O.

Note

The behavior of EC31 depends on the user-specific application. That is, it can therefore differ from the behavior of an S7-300 CPU.

See also

Order numbers (Page 117)

2.2.3 Display elements and interfaces of EC31

Display elements and interfaces

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

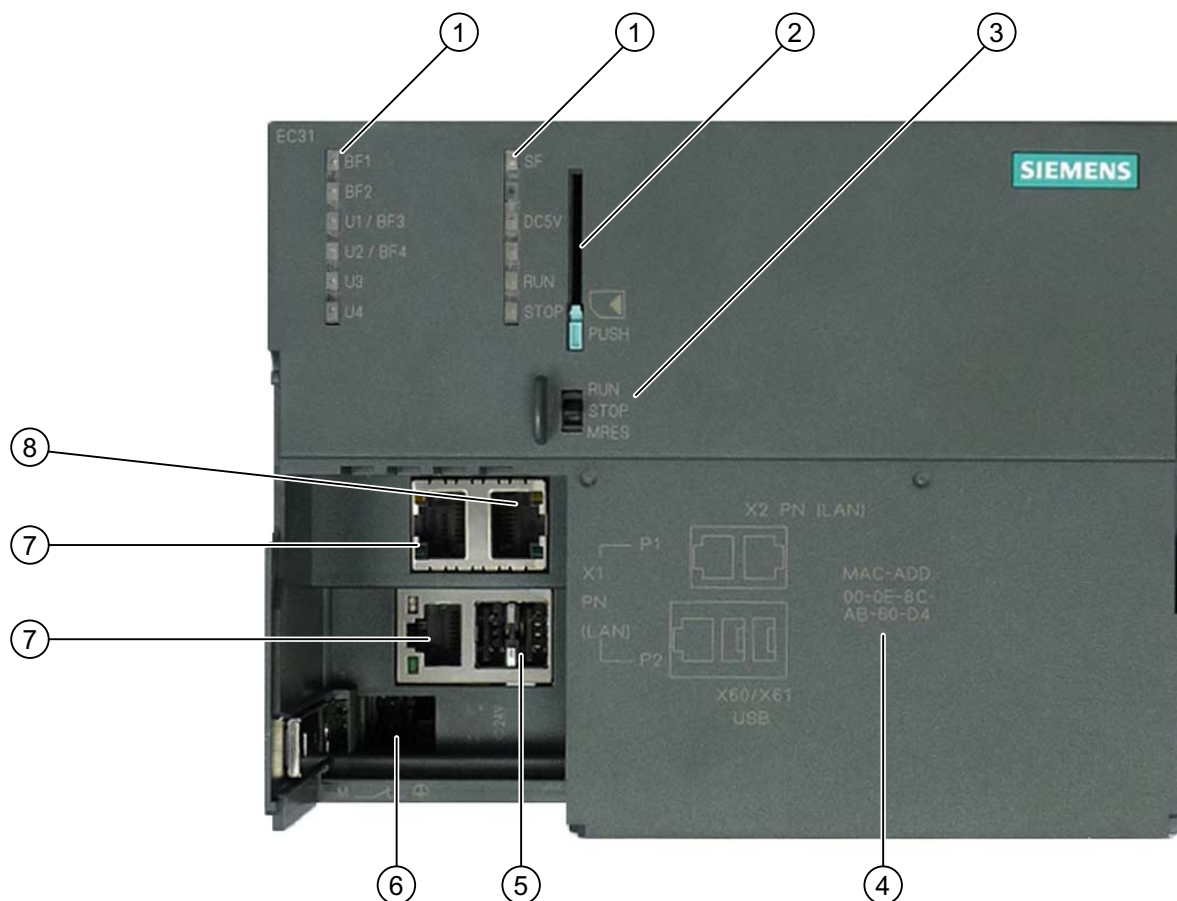


Figure 2-2 Display elements and interfaces of EC31

Table 2- 1 Display elements and interfaces of EC31

Number	Element
1	LED displays
2	MMC slot, including the ejector
3	RUN/STOP switch
4	MAC address of the standard Ethernet controller (X2 PN LAN)
5	USB 2.0 ports
6	Power supply connection
7	PROFINET IO connections
8	Ethernet connection

MMC slot

An MMC can be used as memory module, for backup purposes, for example.

NOTICE

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 double-pole power inlet. The connector with screw terminals is inserted into this inlet for shipping.

RUN/STOP switch

Note

User-specific applications

The behavior of EC31 depends on the user-specific application. That is, it can differ from the the behavior of an S7-300 CPU.

The switch can be assigned user-specific functions in the user program (SDK) for example for switching the backplane bus on and off.

Table 2- 2 Positions of the RUN/STOP switch

Position	Default	Meaning
RUN	No function	Can be programmed in the user program
STOP	No function	Can be programmed in the user program
MRES	During startup: Backup / Restore can be activated in the startup phase of the EC by pressing MRES.	Can be programmed in the 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 startup of EC31. The LED displays can be activated separately. You can also synchronize the LED displays to enable their simultaneous flashing.

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

Status and error displays during startup and backup / restore

Table 2- 3 Status and error displays during startup and backup / restore

LED				Meaning
U1/BF3	U2/BF4	U3	U4	
On	On	On	On	Power ON
-	-	Off	Flashes	Booting from Flash memory (startup)
		Off	On	Windows boot operation completed, EC ready for operation / ready for remote desktop connection
On	On	Off	Off	MRES can be pressed to start Backup / Restore operations if the LED displays are lit.
-	-	Flashes	Off	Backup / Restore is being initialized.
-	-	Flashes	On	Backup is being executed
-	-	Flashes	Flashes	Restore is being executed
-	Flashes	Flashes	Flashes	Backup / Restore error

2.3 EC31-RTX

2.3.1 Scope of delivery EC31-RTX

The following components ship with EC31-RTX:

- Embedded Controller EC31-RTXS with following pre-installations
 - Operating system Windows XP Embedded SP2 Feature Pack 2007
 - SIMATIC NET 2008 (with SIMATIC NET Softnet-S7 Lean Edition 2008)
 - WinAC RTX 2008 SP1
- Restore DVD "SIMATIC S7-mEC EC31-RTX 01/2009" for restoring the image
- DVD "S7-mEC EC31, EC31-RTX, EC31-HMI/RTX Software and Documentation"
- Windows Certificate of Authenticity (CoA) with CoA sticker
- End User License Agreement (EULA)
- Product Information
- USB stick with SIMATIC License Keys
- Certificate of License (CoL)

Note

Note that the label on the EC31-RTX shows the designation "EC31" and order number 6ES7677-1DD00-0BA0, as the hardware is identical with EC31.

2.3.2 Embedded Controller EC31-RTX

Properties

- The Embedded Controller EC31-RTX is a PC in S7-300 design with the operating system Windows XP Embedded, SIMATIC NET 2008 and WinAC RTX 2008 SP1. The software is preinstalled and preconfigured.
- EC31-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 expansion modules. A flash memory is used as storage medium for the operating system and any application data.
- EC31-RTX can be expanded by installing S7-300 modules in the central rack or in the expansion rack.
- EC31-RTX can be operated as PROFINET IO controller. PROFINET IO devices are connected via the ports of the integrated interface.
- EC31-RTX provides high-level industrial performance:
 - Fanless operation
 - High degree of endurance



Figure 2-3 Embedded Controller EC31-RTX

2.3.3 Display elements and interfaces of EC31-RTX

Display elements and interfaces

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

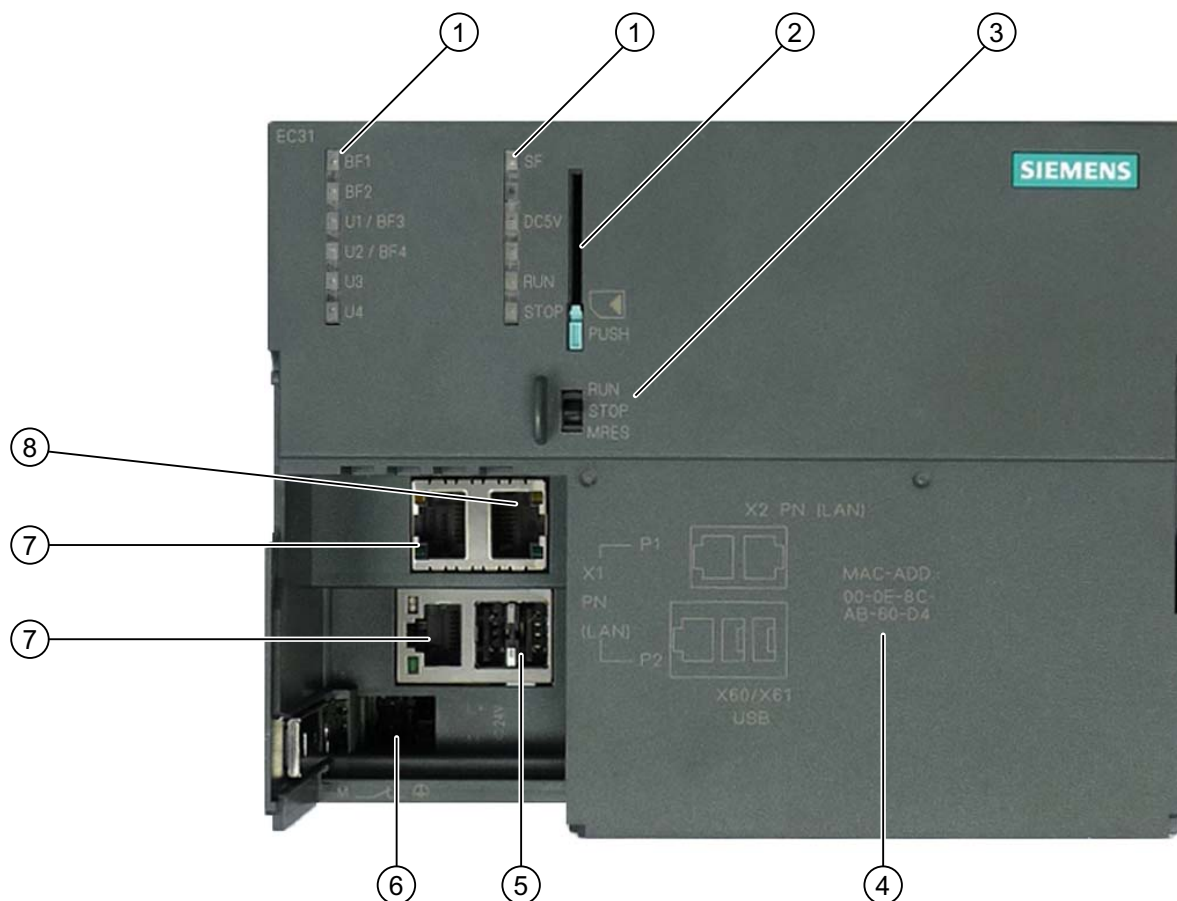


Figure 2-4 Display elements and interfaces of EC31-RTX

Table 2- 4 Display elements and interfaces of EC31-RTX

Number	Element
1	LED displays
2	MMC slot, including the ejector
3	Mode selector switch
4	MAC address of the standard Ethernet controller X2 PN (LAN)
5	USB 2.0 ports
6	Power supply connection
7	PROFINET IO connections (as submodule of WinAC)
8	Ethernet connection with basic PROFINET services

MMC slot

An MMC can be used as memory module, for backup purposes, for example.

NOTICE
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 double-pole power inlet. The connector with screw terminals is inserted into this inlet for shipping.

Mode selector switch

Meaning of the mode selector switch settings:

Table 2- 5 Settings of the mode selector switch on EC31-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 selected operating mode. The RUN and STOP LED displays indicate the actual operating mode of EC31-RTX.
STOP	The controller does not process the STEP 7 user program. The outputs are set to a "safe" state.	
MRES	During startup: Backup / Restore can be activated in the startup phase of the EC by pressing MRES.	-
	With active WinAC: Memory reset Caution! During memory reset (Page 90) all data is deleted (SDB, DB, OB, FB...) from the WinLC RTX EC. All configuration information of the EC31-RTX is lost!	Difference compared to S7-300: A memory reset on an S7-300 CPU triggers a re-initialization. That is, neither the user programs nor configuration data are deleted.

Status and error displays with active WinAC

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

Table 2- 6 Status and error displays with active WinAC

LED designation	Color	Meaning
BF1*	Red	Bus error at interface X1 PN LAN P1 or X1 PN LAN P2
BF2*	Red	Reserved
U1/BF3*	Red	Reserved
U2/BF4*	Red	Reserved
U3**	yellow	Status of Windows XP Embedded and Restore / Backup (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.
STOP	Yellow	Embedded Controller in STOP

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

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

Status and error displays during startup and backup / restore

Table 2- 7 Status and error displays during startup and backup / restore

LED				Meaning
U1/BF3	U2/BF4	U3	U4	
On	On	On	On	Power ON
-	-	Off	Flashes	Booting from Flash memory (startup)
-	-	Off	On	Windows boot operation completed, EC ready for operation / ready for remote desktop connection
On	On	Off	Off	MRES can be pressed to start Backup / Restore operations if the LED displays are lit.
-	-	Flashes	Off	Backup / Restore is being initialized.
-	-	Flashes	On	Backup is being executed.
-	-	Flashes	Flashes	Restore is being executed.
-	Flashes	Flashes	Flashes	Backup / Restore error

See also

Controller Panel WinLC RTX EC (Page 87)

Backup / Restore - requirements and rules (Page 91)

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:

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

Differences of WinAC RTX in EC31-RTX / EC31-HMI/RTX compared to WinAC RTX on a PC-based platform

- EC31-RTX / EC31-HMI/RTX can be connected to central I/Os.
- The Embedded Controller contains a default configuration for all components.
- Configuration data can be archived in *.wld files for reuse and transfer. The wld files of WinAC RTX and of WinAC RTX with Embedded Controller are incompatible.

Additional information

The documentation for WinAC RTX 2008 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 ship with EC31-HMI/RTX:

- Embedded Controller EC31-HMI/RTX with following pre-installations:
 - Operating system Windows XP Embedded SP2 Feature Pack 2007
 - SIMATIC NET 2008 (with SIMATIC NET Softnet-S7 Lean Edition 2008)
 - WinAC RTX 2008 SP1
 - WinCC flexible runtime 2008 SP1
- Restore DVD "SIMATIC S7-mEC EC31-HMI/RTX 01/2009" for restoring the image
- DVD "S7-mEC EC31, EC31-RTX, EC31-HMI/RTX Software and Documentation"
- Windows Certificate of Authenticity (CoA) with CoA sticker
- End User License Agreement (EULA)
- Product Information
- USB stick with SIMATIC License Keys
- Certificate of License (CoL)

Note

Note that the label on the EC31-HMI/RTX shows the designation "EC31" and order number 6ES7677-1DD00-0BA0, as the hardware is identical with EC31.

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 in S7-300 design, with the operating system Windows XP Embedded, with SIMATIC NET 2008, WinAC RTX 2008 SP1 and WinCC flexible Runtime 2008 SP1 for machine-related visualization tasks. The software is preinstalled and preconfigured.
- EC31-HMI/RTX is available in 3 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 expansion modules. A flash memory is used as storage medium for the operating system and any application data.
- EC31-HMI/RTX can be expanded by installing S7-300 modules in the central rack or in the expansion rack.
- EC31-HMI/RTX can be operated as PROFINET IO controller. PROFINET IO devices are connected via the ports of the integrated interface.
- EC31-HMI/RTX provides high-level industrial performance:
 - Fanless operation
 - High degree of endurance



Figure 2-5 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.

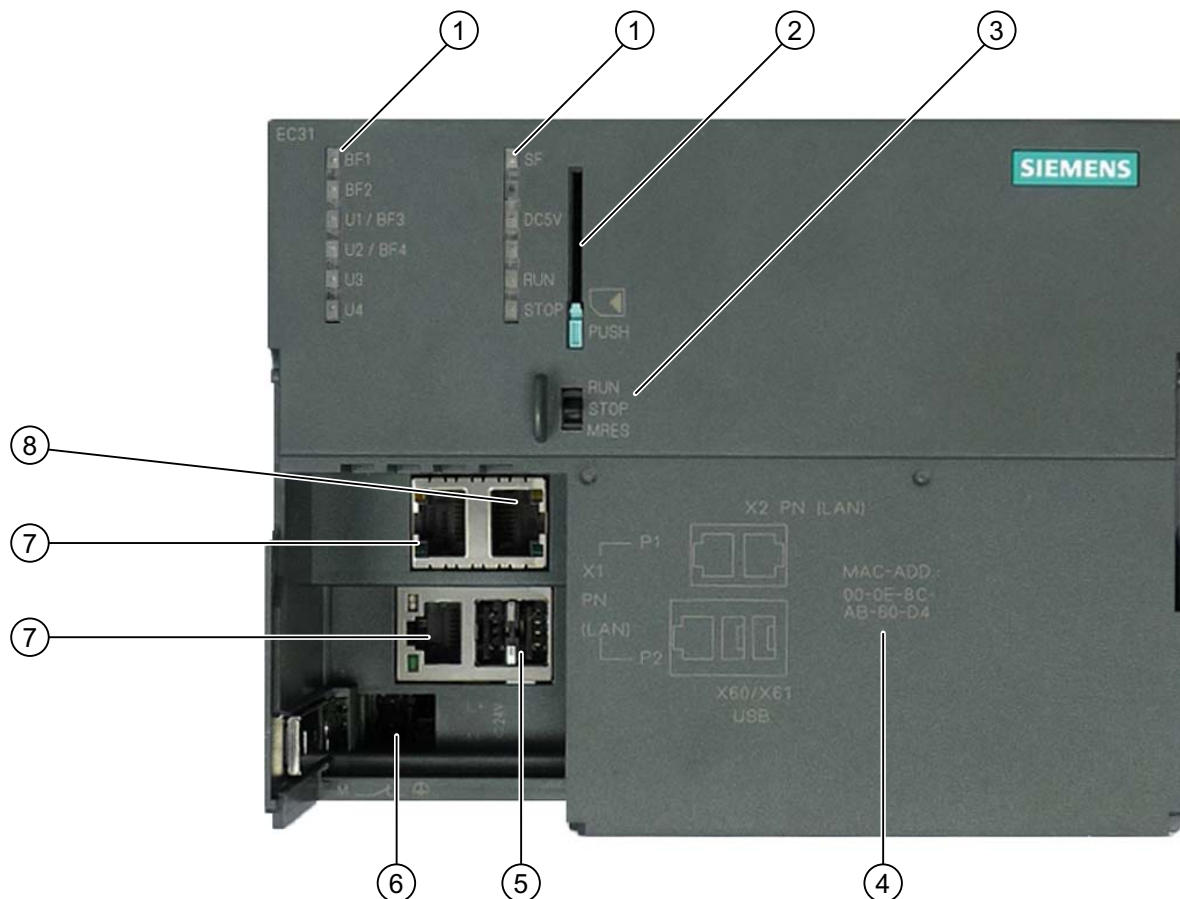


Figure 2-6 Display elements and interfaces of the EC31-HMI/RTX

Table 2- 8 Display elements and interfaces of the EC31-HMI/RTX

Number	Element
1	LED displays
2	MMC slot, including the ejector
3	Mode selector switch
4	MAC address of the standard Ethernet controller X2 PN (LAN)
5	USB 2.0 ports
6	Power supply connection
7	PROFINET IO connections (as submodule of WinAC)
8	Ethernet connection with basic PROFINET services

MMC slot

An MMC can be used as memory module, for backup purposes, for example.

NOTICE
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 double-pole power inlet. The connector with screw terminals is inserted into this inlet for shipping.

Mode selector switch

Meaning of the mode selector switch settings:

Table 2- 9 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 selected operating mode. The RUN and STOP LED displays indicate the actual 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	During startup: Backup / Restore can be activated in the startup phase of the EC by pressing MRES.	-
	With active WinAC: Memory reset Caution! During memory reset (Page 90) all data is deleted (SDB, DB, OB, FB...) from the WinLC RTX EC. All configuration data of EC31-HMI/RTX is lost!	Difference compared to S7-300: A memory reset on an S7-300 CPU triggers a re-initialization. That is, neither the user programs nor configuration data are deleted.

Status and error displays with active WinAC

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

Table 2- 10 Status and error displays with active WinAC

LED designation	Color	Meaning
BF1*	Red	Bus error at interface X1 PN LAN P1 or X1 PN LAN P2
BF2*	Red	Reserved
U1/BF3*	Red	Reserved
U2/BF4*	Red	Reserved
U3**	Yellow	Status of Windows XP Embedded and Restore / Backup (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.
STOP	Yellow	Embedded Controller in STOP

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

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

Status and error displays during startup and backup / restore

Table 2- 11 Status and error displays during startup and backup / restore

LED				Meaning
U1/BF3	U2/BF4	U3	U4	
On	On	On	On	Power ON
-	-	Off	Flashes	Booting from Flash memory (startup)
-	-	Off	On	Windows boot operation completed, EC ready for operation / ready for remote desktop connection
On	On	Off	Off	MRES can be pressed to start Backup / Restore operations if the LED displays are lit.
-	-	Flashes	Off	Backup / Restore is being initialized.
-	-	Flashes	On	Backup is being executed.
-	-	Flashes	Flashes	Restore is being executed.
-	Flashes	Flashes	Flashes	Backup / Restore error

See also

Backup / Restore - requirements and rules (Page 91)

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 2-7 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 117)

2.5.2 Display elements and interfaces of EMI PCI-104

Display elements and interfaces

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

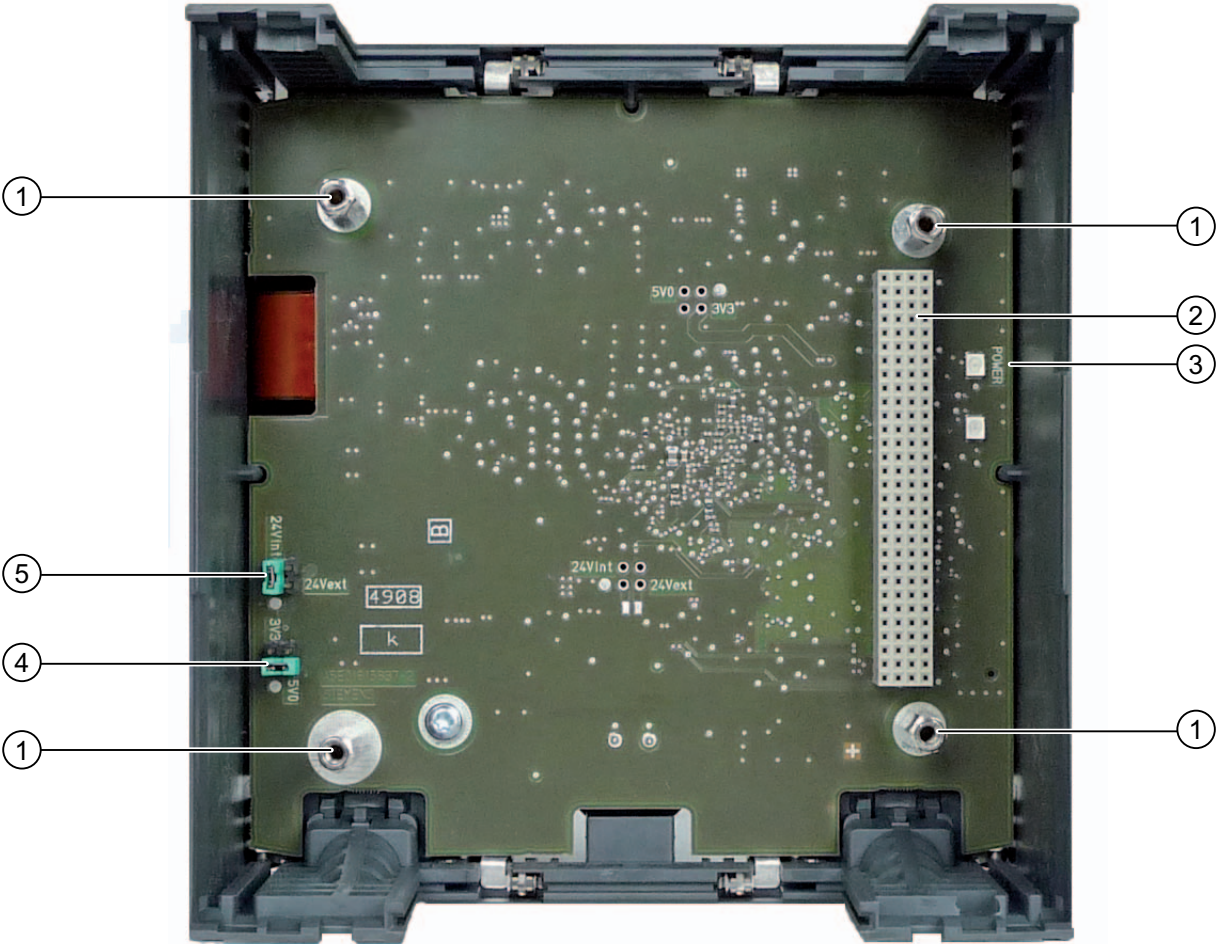


Table 2- 12 Elements, display elements and interfaces of the EMI PCI-104

Number	Element
1	Spacer pins for PCI-104 cards
2	PCI-104 interface
3	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- 13 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 2-8 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.

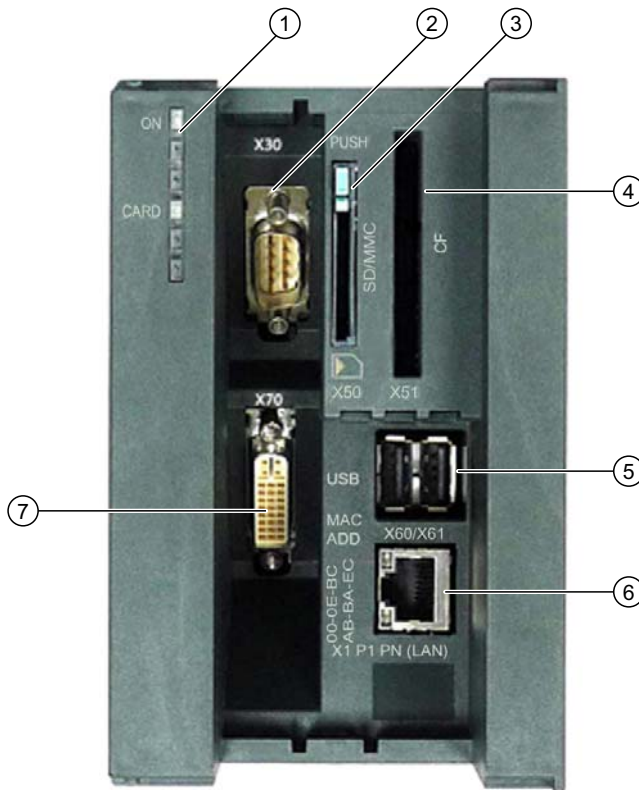


Figure 2-9 Display elements and interfaces of the EM PC

Table 2- 14 Display elements and interfaces of the EM PC

Number	Element
1	LED displays
2	Serial port V.24 (RS232)
3	Combination slot for SD/MMC with ejecter
4	Slot for Compact Flash cards (CF)
5	2 x USB 2.0 high-speed
6	Gigabit Ethernet connection
7	DVI-I graphics interface

Status displays

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

Table 2- 15 Status displays EM PC

LED designation	Color	Meaning
ON	Green	Power On
CARD	Green	Flashes when SD/MMC or CF card is active

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.

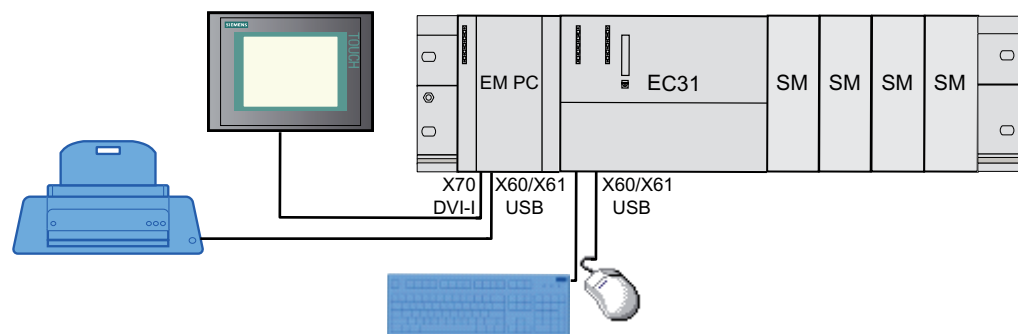


Figure 3-1 Embedded Controller - Local access

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*.

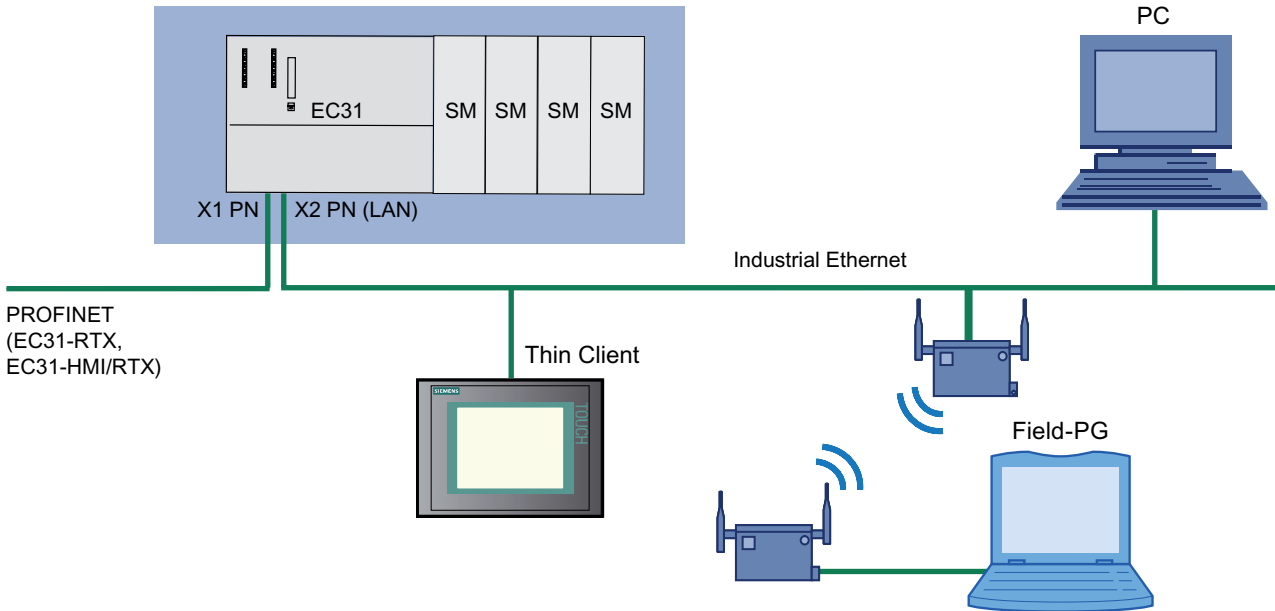


Figure 3-2 Embedded Controller - access by means of RDP

3.2 Configurations

Possible hardware configurations

The Embedded Controller EC31-RTX / 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 expansion modules.

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

- The EC31-RTX / 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.

Example configuration for EC31-HMI/RTX

The following figure shows a sample configuration for the EC31-HMI/RTX with S7-300 signal modules, expansion modules, PC expansion modules, PROFIBUS DP connection, and PROFINET IO Devices.

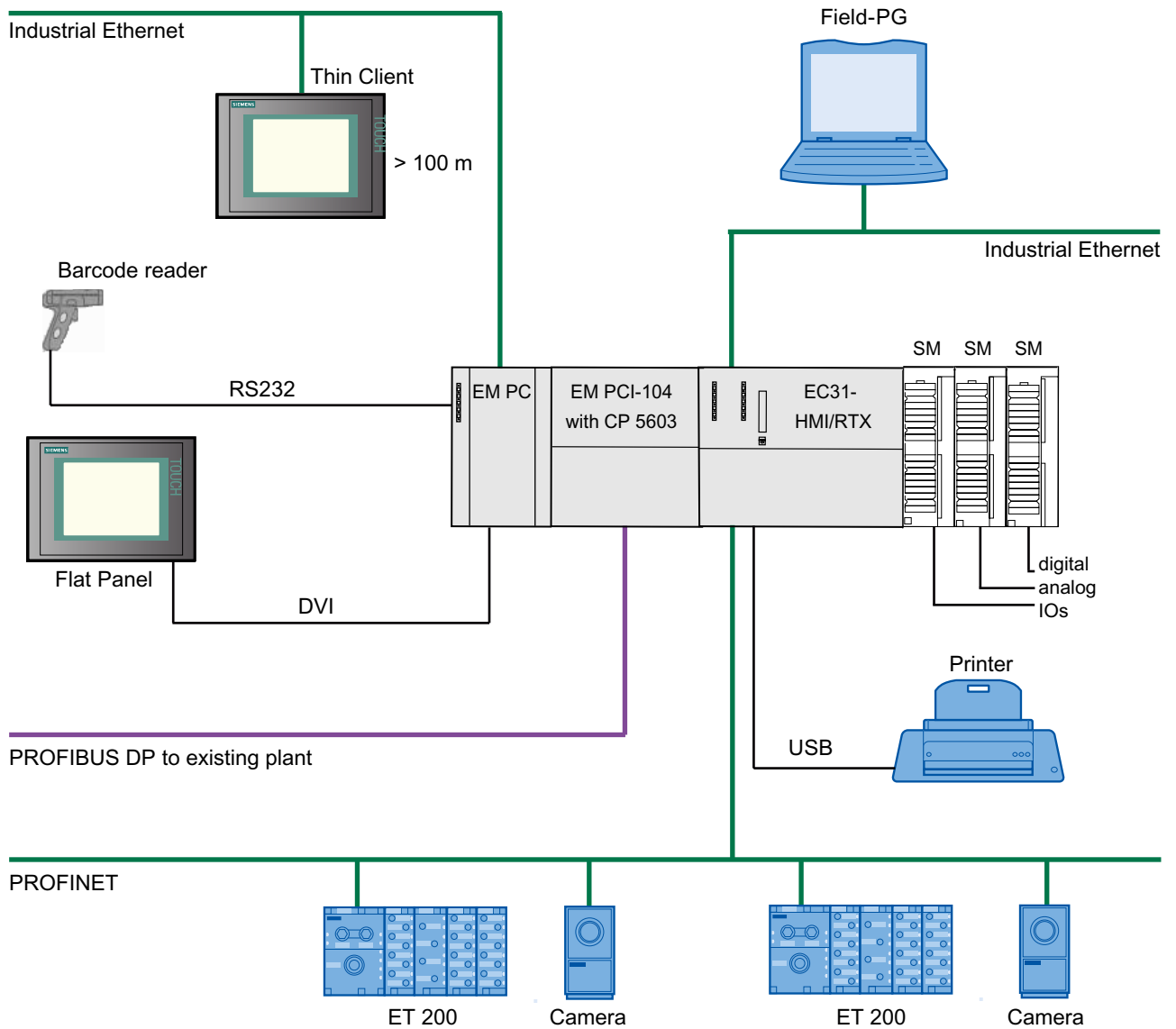


Figure 3-3 Example configuration for EC31-HMI/RTX

3.3 Installation 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.

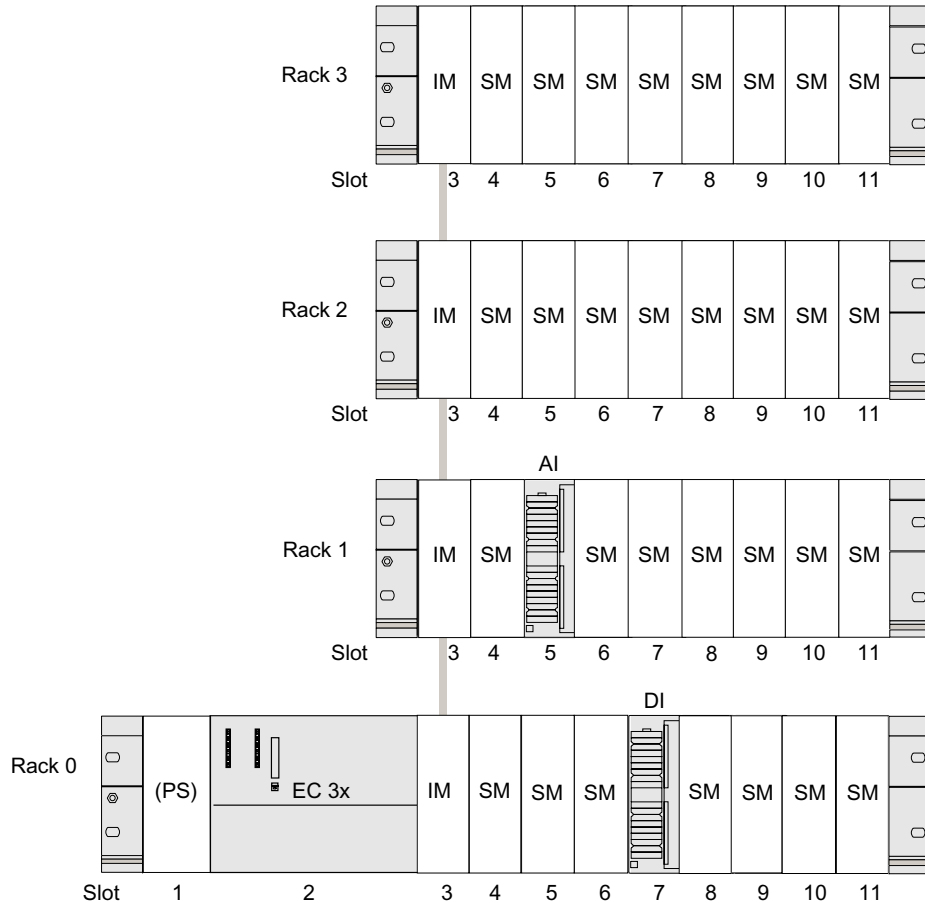


Figure 3-4 Maximum configuration with S7-300 modules

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-HMI/RTX.

3.4 Installation with expansion modules

Rules

An expansion modules 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 installation.
 - 1 x EM PCI-104, 1 x EM PC
 - 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 on the left-hand side of the EM PCI-104 expansion module.

Maximum configuration with expansion modules

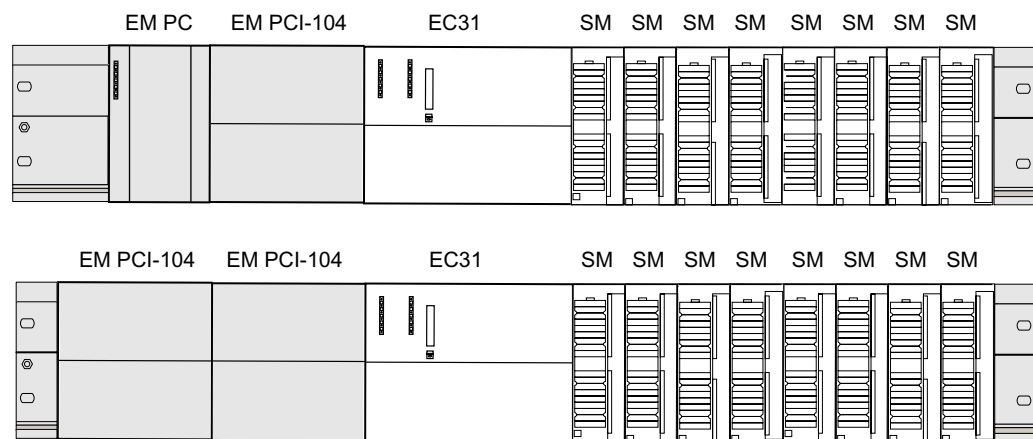


Figure 3-5 Maximum configuration with expansion modules

See also

Setting up the S7-mEC (Page 39)

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

4.1 Setting up the S7-mEC

Introduction

NOTICE
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 can 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

CAUTION
Modules may get damaged if exposed to excess ambient temperatures.

Installing the S7-mEC

An expansion modules 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 modules in the specified sequence on the mounting rail.
3. Slide the Embedded Controller from the right against the expansion module.
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-mECI, 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 37)

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 3 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 2 CP 5603 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 interrupt assignment

Use only the following hardware interrupt assignment for the PCI-104 modules:

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

CAUTION

Make sure that the hardware interrupts are not used multiply.

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

Basic Procedure

CAUTION
Switch off the supply voltage
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

For further information go to:

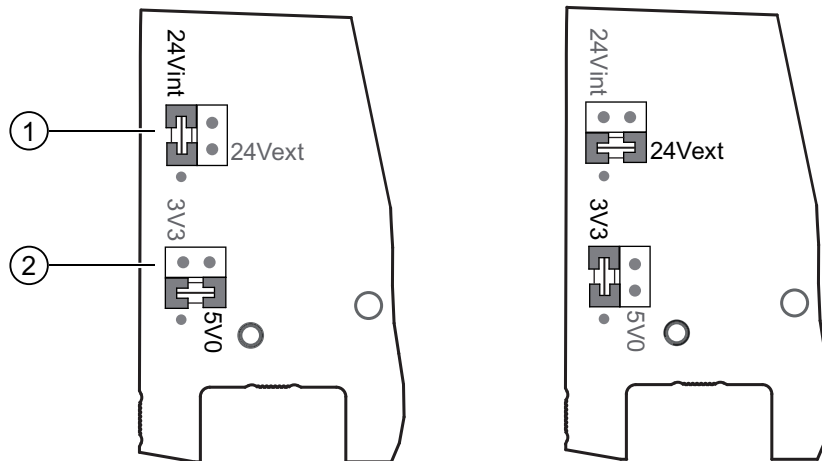
PC-based Automation Competence Center

(http://www.automation.siemens.com/simatic/pcbased/html_76/support/dienstleistungen.htm)

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.

NOTICE

Use the same power supply as for the Embedded Controller. This is necessary to ensure that the power supply for the Embedded Controller and the EM PCI-104 are switched on simultaneously. Otherwise the Embedded Controller might possibly not run.

See also

Connecting the power supply for S7-mEC (Page 55)

4.2.3 Preparing shelves

Introduction

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

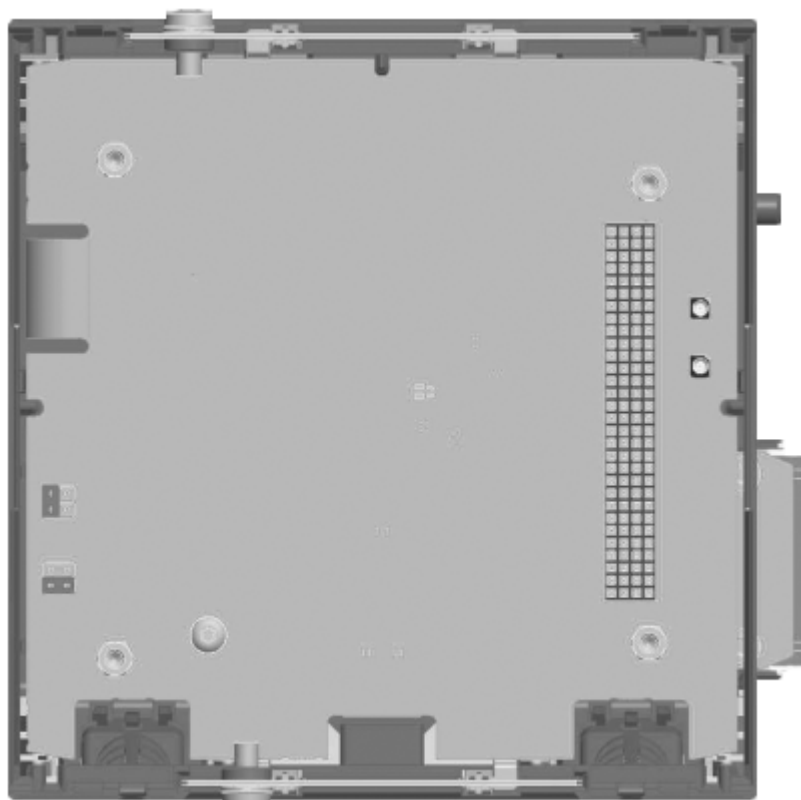


Figure 4-1 View of opened EM PCI-104

Selecting PCI-104 cards

In selecting and combining the PCI-104 cards, pay attention to the position of the 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 plug is already present, an additional cutout is prepunched.

NOTICE

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:

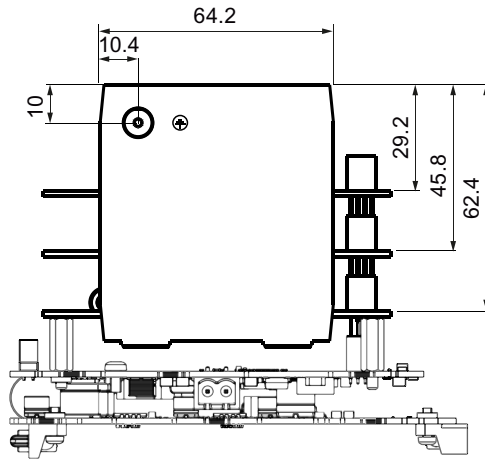


Figure 4-2 Spacing between the PCI-104 cards (dimensions in mm)

NOTICE

Narrow shelves

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

See also

EM PCI-104 (Page 114)

Dimension drawings (Page 113)

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.

CAUTION
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.
- Set jumpers for the power supply of the PCI-104 cards on the card of the EM PCI-104.
- The required cutouts for the plugs of the PCI-104 cards are present on the shelves.
- The PCI-104 cards are configured.

Opening the housing/enclosure

Step	Procedure	Diagram
1	Using a screwdriver, carefully detach 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.	
3	Lift up the front hood of the EM PCI-104 and remove both shelves.	-

Installing PCI-104 cards.

Step	Procedure	Diagram
1	Plug module into the slot and fix with four screws of spacing bolts.	
2	Optional: Insert additional cards. Secure the last card with four screws or spacing bolts.	-
3	Fix plug-in connectors to the prepared shelves.	-
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 elements Embedded Controller

Connection elements

The following connections are available on the Embedded Controller:



Designation	Description
X1 PN LAN P1	Two RJ45 PROFINET ports, 10/100 Mbps; 90° angle connector required; Auto-crossover supported
X1 PN LAN P2	
X2 PN (LAN)	One RJ45 Ethernet port, 10/100 Mbps; Interface for PG / 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
X60/X61 USB	2 USB 2.0 ports, 500 mA, for USB devices, e.g. keyboard, mouse or graphics adapter (USB to VGA converter).
DC 24 V	24 VDC power inlet (connector is included in the scope of delivery)

MAC addresses


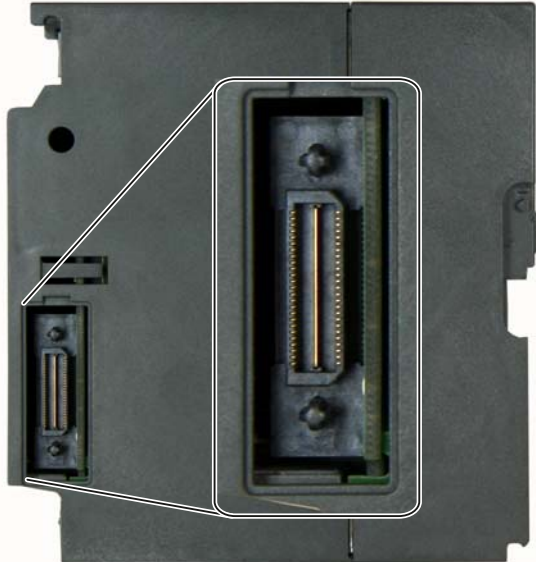
The first MAC address is assigned to interface X2 PN, the next MAC address to the PROFINET interface X1 PN.

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

Interfaces

The following interfaces are available on the Embedded Controller:

Designation	Description
Backplane bus	Connection for the backplane bus 
Extension bus	Connection for the expansion modules EM PCI-104 and EM PC 




See also

Configuration of the Ethernet interfaces (Page 71)

5.1.2 Connection elements EM PCI-104

Interfaces

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

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

5.1.3 Connection elements EM PC


Connection elements

The following connections are available on the EM PC:



Designation	Description
X1 P1 PN (LAN)	1 RJ45-Ethernet for 10/100/1000 Mbps Gigabit Ethernet connection for a high-performance data connection
X30	Serial RS 232 port for barcode reader or barcode scanner
X50 SD/MMC	Combination slot with ejector for SD or MMC as data memory, for example to exchange recipe and archive data.
X51 CF	Slot for Compact Flash card as data memory. Only use SIMATIC PC Compact Flash cards for industrial application (type I).
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.
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	Connection for the Embedded Controller or the expansion module EM-PCI-104 (bus connector) 

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. For further information, refer to the operating instructions *S7-300, CPU 31xC and CPU 31x: Installation*.

To be noted before you connect the device

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


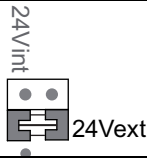

<p>⚠ WARNING</p> <p>The device should only be connected to a 24V DC power supply which satisfies the requirements of safe extra low voltage (SELV).</p> <p>When the device is operated on a wall, in an open rack or other similar locations, an NEC Class 2 current source is required for the compliance of 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.</p> <p>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.</p>
<p>NOTICE</p> <p>Permissible conductor cross-section for the 24 VDC connecting cable: 0.75 mm² to 2.5 mm².</p>

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.

NOTICE
Use the same power supply as for the Embedded Controller. This is necessary to ensure that the power supply for the Embedded Controller and the EM PCI-104 are switched on simultaneously.

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).	
Optional when using an expansion module EM PCI-104:		
3	On the board of the EM PCI-104, insert jumper on 24Vext .	
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 43)

5.3 Connecting PC I/O

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

NOTICE

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

Ethernet devices

Connect Ethernet devices (Thin Client, Ethernet switch, ...) to the X2 PN LAN interface using standard patch cables.

CAUTION

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

Regenerative feedback from USB devices

CAUTION

Damage to the Embedded Controller
--

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.

Hot-plug capable USB devices

Do not connect any hot-plug capable USB devices before you have closed all applications on the Embedded Controller.

CAUTION

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

Always ensure that PLC functionality is deactivated before you insert or remove hot-plug-capable USB devices.

USB devices which are not hot-plug capable

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

Safely removing USB devices

NOTICE
Driver crash
Always select the Windows function "Safely Remove Hardware" to deactivate or remove USB devices. Any other procedure could lead to driver crashes in Windows.

5.4 EC31-RTX / 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

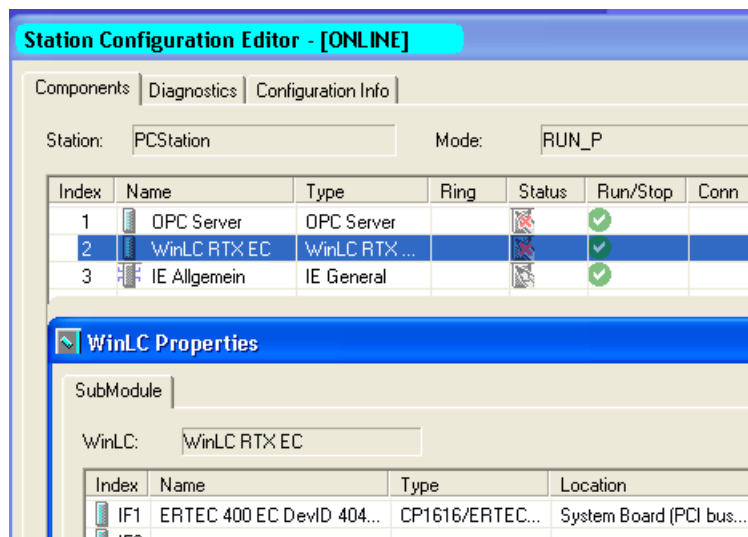
Configuring EC31-RTX / EC31-HMI/RTX

6.1 Preconfigured systems

Configuration for EC31-RTX in the Station Configuration Editor

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

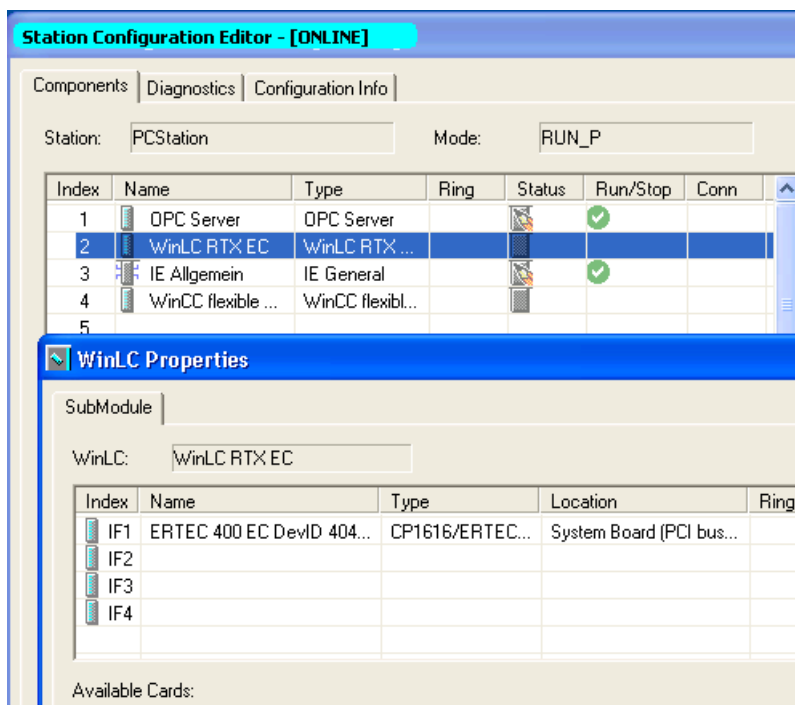
- "OPC server" in Index 1 of the PC station
- "WinLC RTX EC" (Windows Logic Controller of WinAC RTX 2008 SP1) in Index 2 of the PC station
- An integrated PROFINET interface ("ERTEC 400..."), configured as a submodule at slot IF1 of WinLC RTX (corresponds to X1 PN)
- An integrated Industrial Ethernet interface, configured as "IE General" at Index 3 of the PC station (corresponds to X2 PN)



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

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

- "OPC server" in Index 1 of the PC station
- "WinLC RTX EC" (Windows Logic Controller of WinAC RTX 2008 SP1) in Index 2 of the PC station
- An integrated PROFINET interface ("ERTEC 400..."), configured as a submodule at slot IF1 of WinLC RTX (corresponds to X1 PN)
- An integrated Industrial Ethernet interface, configured as "IE General" at Index 3 of the PC station (corresponds to X2 PN)
- WinCC flexible Runtime 2008 SP1 at Index 4 of the PC station

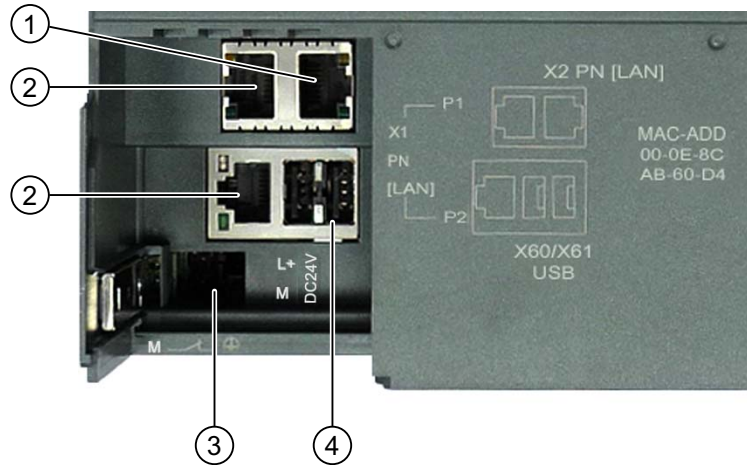


Optional expansions

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 EC31-RTX and EC31-HMI/RTX

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

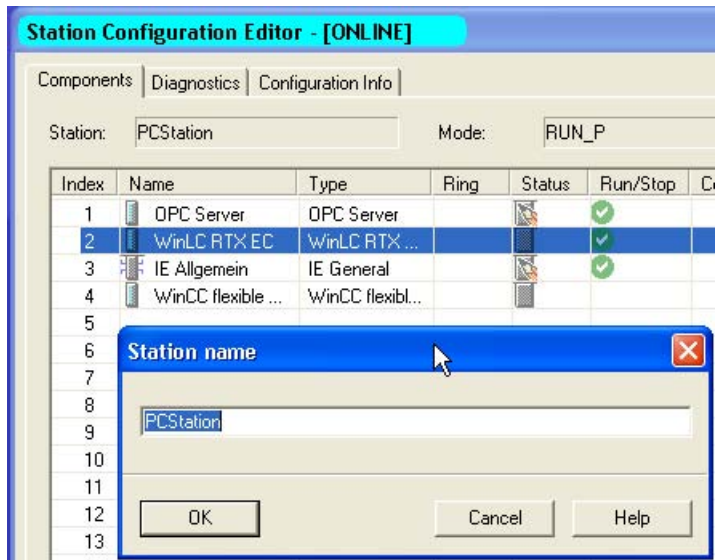


Number	Element	Preconfigured in the Station Configuration Editor
1	X2 PN (LAN) connection	IE General at Index 3 of the PC station
2	X1 PN (LAN) P1 X1 PN (LAN) P2	ERTEC 400 at slot IF1 as submodule of WinLC RTX The interface can be used after WinLC RTX has been started.
3	Power supply connection	-
4	USB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

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**
If you configure the Industrial Ethernet interface in the PC station, use the IP address and subnet mask configured in the Windows Control Panel in 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 a gateway, configure the corresponding values in the Windows network configuration and in STEP 7.

See also

Configuration of the Ethernet interfaces (Page 71)

6.2 Configuring and programming S7-mEC

6.2.1 Basic procedure

Configuring and programming the S7-mEC in STEP 7

Because EC31-RTX / 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 add the following options for the EC31-RTX / EC31-HMI/RTX 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 and EC31-HMI/RTX are preconfigured systems.

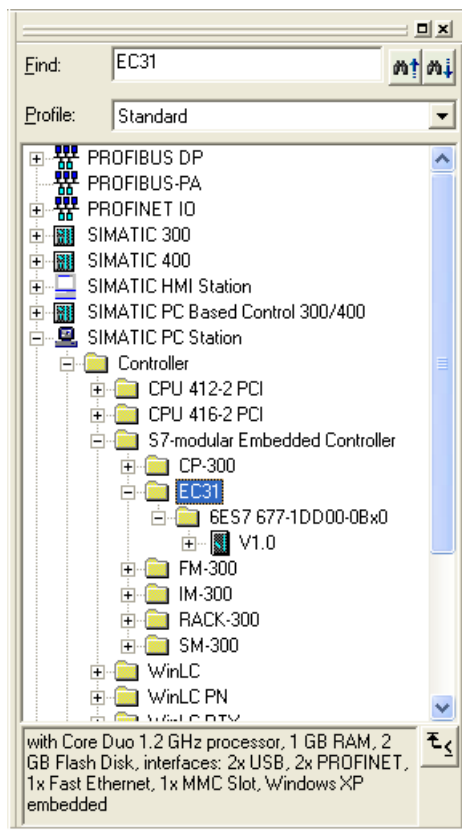
Requirements

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-HMI/RTX.

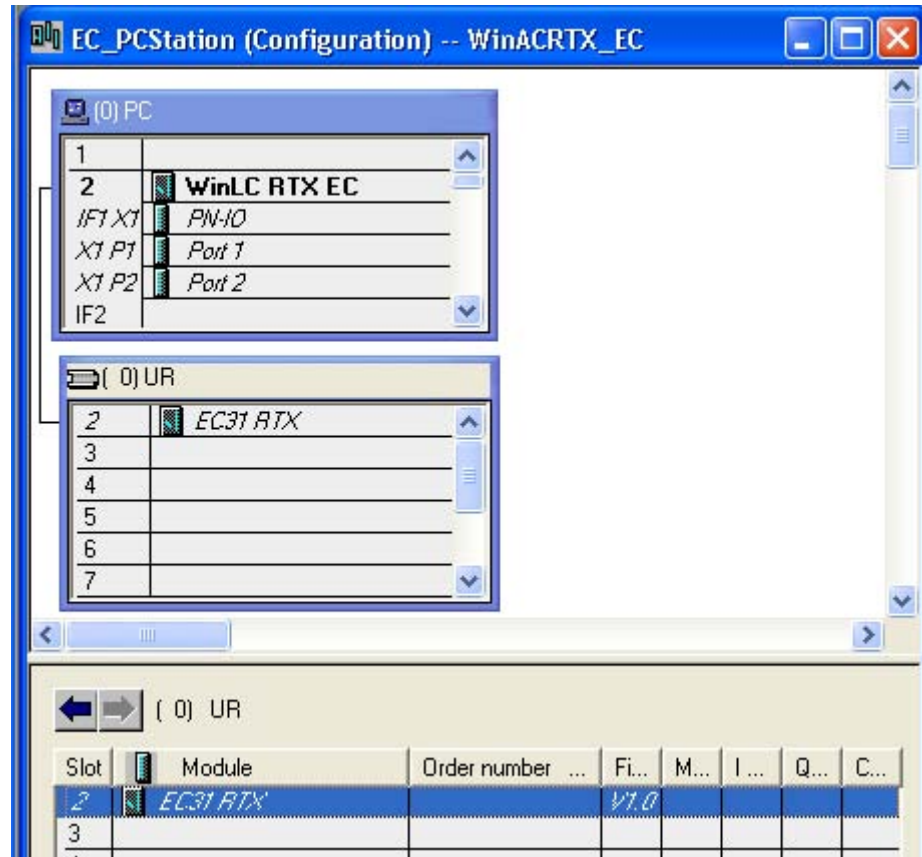
Configuring hardware

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:

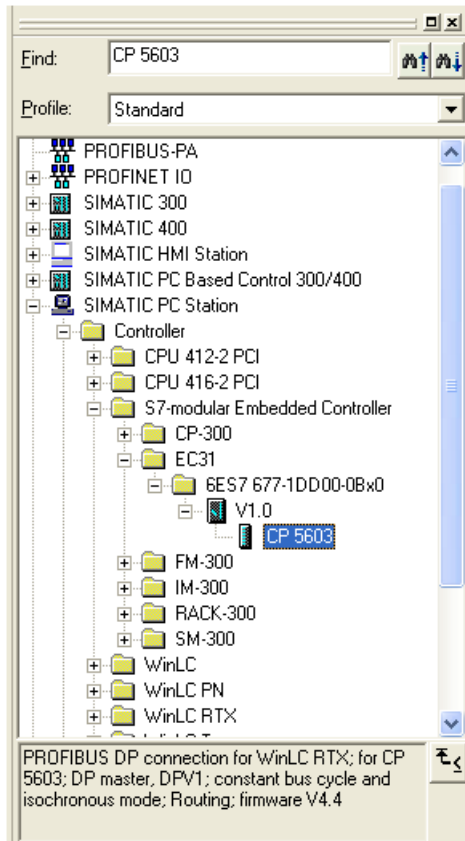
- The WinLC RTX EC module is displayed in the rack (0) PC of the PC station at slot 2.
- WinLC RTX EC is connected to the central rack of the EC31-RTX (0) UR .
- The configuration table displays the configuration of the selected rack.



WinLC RTX EC and EC31-RTX represent the same module and have identical object properties.

3. In the hardware catalog, select **SIMATIC PC Station > User Application > OPC Server >** and insert it at slot 1 of PC station (0) PC.
4. In the hardware catalog, select **SIMATIC PC Station > CP-Industrial Ethernet > IE General >** and insert it at slot 3 of PC station (0) PC.
5. 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.

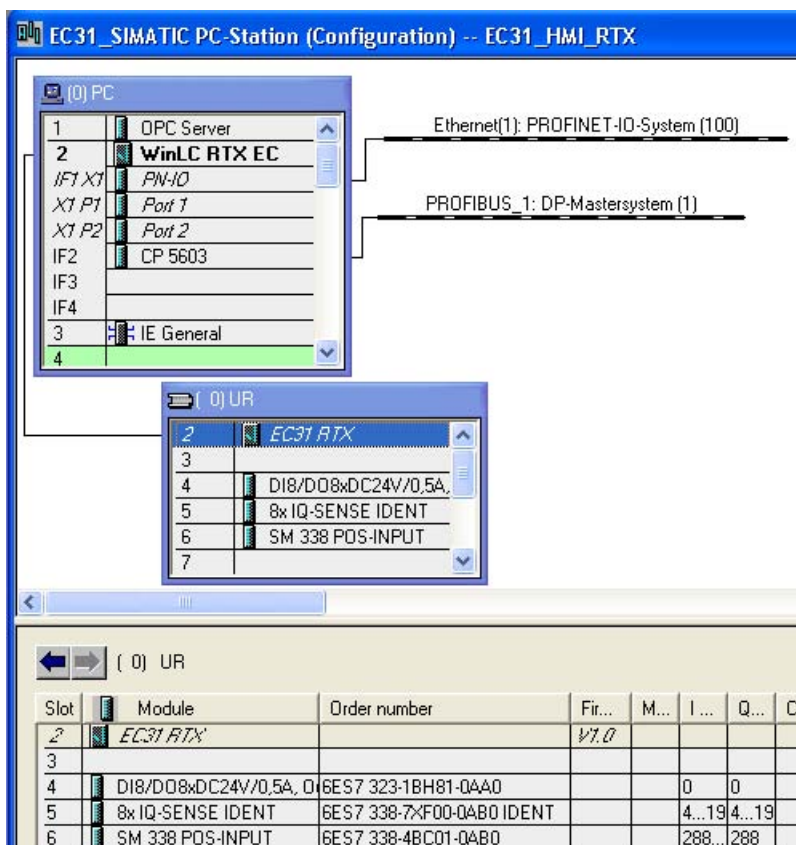
- 6. Optional: In the hardware catalog, select **SIMATIC PC Station > Controller > S7-modular Embedded Controller > EC31 ... CP 5603** and insert it at one of the free slots (IF2, IF3, or IF4) of PC station (0) PC.



7. 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.

8. 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**.

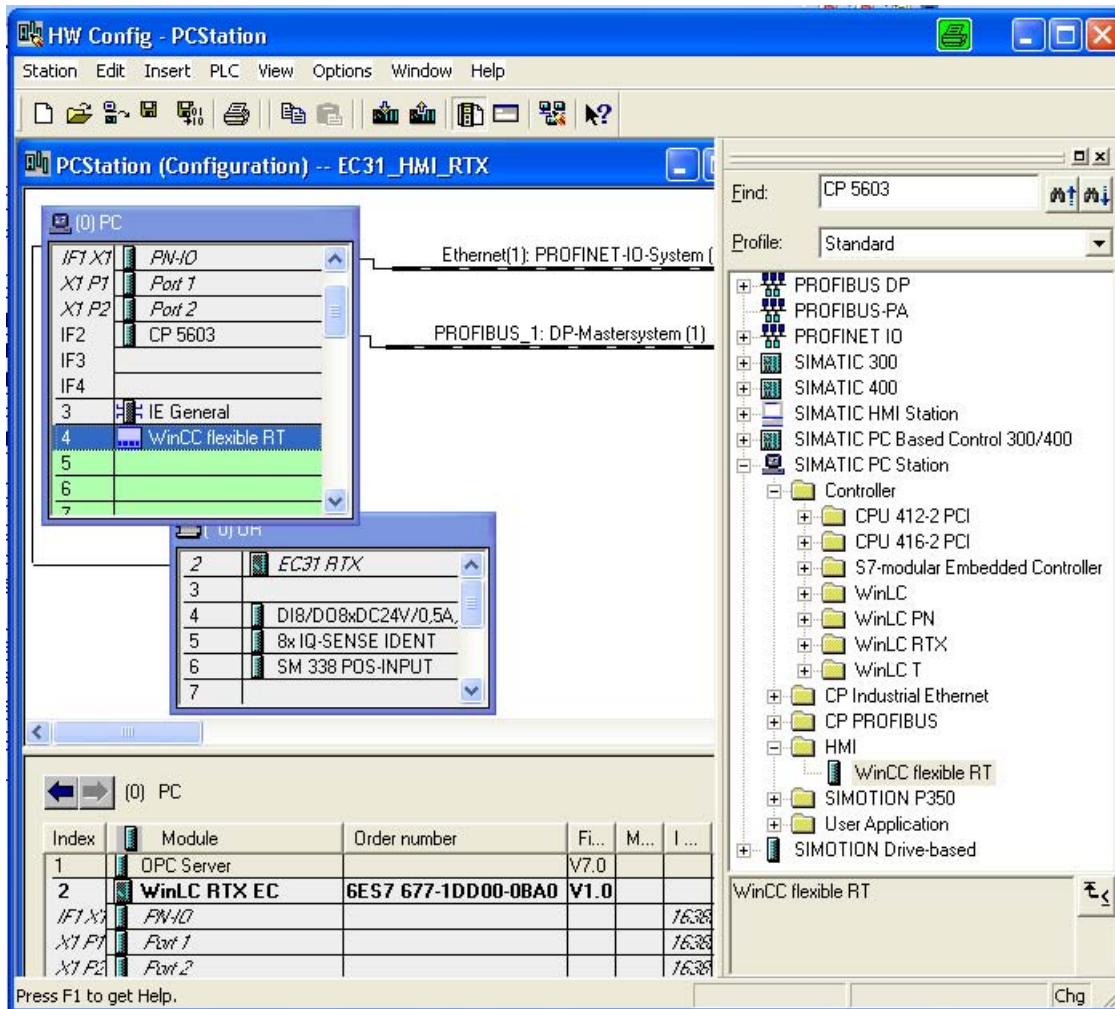


Note

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

9. For EC31-HMI/RTX:

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



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

6.2.3 Configuration of the Ethernet interfaces

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

EC31-RTX / EC31-HMI/RTX comes with two integrated Industrial Ethernet interfaces:

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

If S7-mEC contains an EM PC expansion module, IE_General can be assigned optionally to the Ethernet connection to EM PC.

Note

If you are accessing S7-mEC via Remote Desktop Protocol, you must ensure that S7-mEC is located in the same Ethernet subnet as the Engineering PC/programming device.

IP addresses

Ethernet interface	Configuration		Application
X1 PN LAN P1 / X1 PN LAN P2	IP address	Must be assigned.	<ul style="list-style-type: none"> • PROFINET IO with RT/IRT • PROFINET CBA • Support of PROFINET basic functions for commissioning and diagnostics
X2 PN LAN	IP address	Via DHCP, or default 192.168.2.1 / 255.255.255.0 Preconfigured at IE General in Index 3 of the PC station	<ul style="list-style-type: none"> • Support of PROFINET basic functions for commissioning and diagnostics • Standard Windows Ethernet communication

Configuring of the IP addresses

Note

The user interface of Windows XP Embedded is provided in English language.
The English language is always used for the Control Panel and all other dialog boxes.

Configure the Ethernet address for the X2 PN 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 are using a different IP address, subnet mask, or gateway for the Ethernet interface, you must configure this IP address and/or the other parameters for EC31-RTX / EC31-HMI/RTX and for the "IE General" properties using STEP 7.

Configure the IP address in STEP 7 as follows:

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

See also

Connection elements Embedded Controller (Page 51)

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-HMI/RTX.

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 2008.

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

You create the visualization project for EC31-HMI/RTX on the Engineering PC with WinCC flexible.

Requirements

- WinCC flexible 2008 SP1 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 context 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 75)

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
- Only the S7 program of WinLC RTX

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

Requirements

- The enhanced write filter (EWF) must be deactivated on the EC31-RTX if the entire PC station is to be downloaded. (refer to chapter "Managing the enhanced write filter" in the *WinAC RTX 2008* documentation).
- EC31-RTX is online to the PG/PC via Industrial Ethernet. The PG/PC interface must be set to TCP/IP.
- EC31-HMI/RTX only: The visualization project must have been 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. Start WinLC RTX EC on the EC31-RTX / EC31-HMI/RTX.
2. Deactivate the EWF on the EC31-RTX / EC31-HMI/RTX (if not yet deactivated).
3. Activate the PC station in the Station Configuration Editor ("Enable station" button).
4. Switch the EC31-RTX / 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
 - In the block editor **PLC > Download** to download the S7 -program of WinLC RTX.
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.

Completing the EC31-RTX / EC31-HMI/RTX for operation

Carry out the following steps:

- Set the enhanced write filter for drive C:\ to the "activated" state.

CAUTION
Enhanced Write Filter 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. For further information, refer to the "Managing the enhanced write filter" chapter in the WinAC RTX 2008 documentation. 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.

- 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.

Initial commissioning

7.1 Overview of initial commissioning

Options of initial commissioning

There are two methods for initial commissioning of the Embedded Controller:

- Local, with interconnected I/O devices (monitor, keyboard and mouse)
- Remote - using a PC / PG via *Remote Desktop Protocol*

CAUTION
Risk of damage!
If condensation has developed on the Embedded Controller, wait at least 12 hours before you start to commission it.

EC31: After initial commissioning

After the initial commissioning, you can load and start a user program created by the Software Development Kit (SDK).

EC31-RTX / EC31-HMI/RTX: After initial commissioning

After the initial commissioning, use the *Automation License Manager* (ALM) to install the license keys for WinAC RTX 2008, Softnet-S7 Lean Edition 2008 and WinCC flexible 2008 RT (EC31-HMI/RTX only) on the EC31-RTX / EC31-HMI/RTX. EC31-RTX / EC31-HMI/RTX is now ready for operation.

WinAC RTX 2008 is activated and the WinLC RTX panel can be opened by clicking the icon in the task bar.

See also

EC31-RTX / EC31-HMI/RTX: Installing License Keys (Page 85)

7.2 Initial commissioning - Local

Hardware requirements

The following devices are connected:

- 24 VDC power supply on the Embedded Controller
- Keyboard and mouse by means of the USB on the Embedded Controller.
- Monitor by means of the DVI-I on the EM PC expansion module

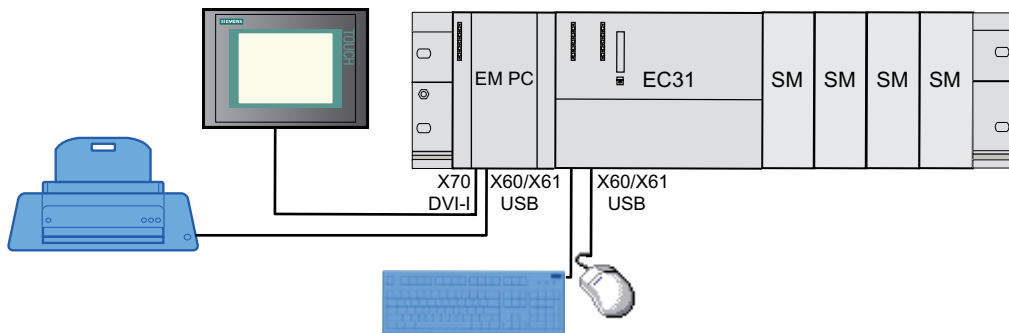


Figure 7-1 EC31 - Local access

Initial commissioning

The preinstalled Windows XP Embedded operating system is set up automatically on the Embedded Controller after **initial** power on. Proceed as follows:

1. Switch on power to the Embedded Controller.
Result: The Embedded Controller starts and LED display U4 flashes. The logon dialog opens.
2. Enter the user name "Administrator" and the password "admin".
Result: The Windows user interface opens. You can now configure Windows.

NOTICE

Installation procedure

The installation procedure during initial commissioning can take up to 15 minutes.

You must prevent any of the following actions in the course of installation (LED display U4 flashes):

- Switching off the device.
- Keyboard input
- Connecting additional USB devices

Restart after initial commissioning:

The Logon dialog of the Windows XP Embedded operating system opens approx. one minute after each subsequent restart. The default user name is "Administrator". The password is "admin".

Changing between local access and access over RDP

Note

If you have switched from access via *Remote Desktop Protocol* to local access via USB/VGA adapter, you might have to restart the EC.

7.3 Initial commissioning - Remote

Introduction

Interface X2 must be assigned an IP address for initial commissioning of the Embedded Controller via *Remote Desktop Protocol*. There are three corresponding options:

- IP address assignment via DHCP server (default)
- Using the default IP address 192.168.2.1 / 255.255.255.0
- IP address assignment via DCP (*Discovery and Basic Configuration Protocol*)

Requirements

- PC / PG or Thin Client (the term PC is used as synonym hereafter)
- Standard patch cable
- Prerequisite for IP address assignment via DCP is the installation of SIMATIC STEP 7 V5.4 SP4 or higher, or of the *Primary Setup Tool* V3.2 on the PC.

The *Primary Setup Tool* V3.2 is available for download from the Internet (<http://support.automation.siemens.com/WW/view/en/19440762>).

Preparing for initial commissioning

1. Connect the PC to the Embedded Controller by means of the X2 PN LAN interface.
2. Switch on the 24 V DC power supply of the Embedded Controller.

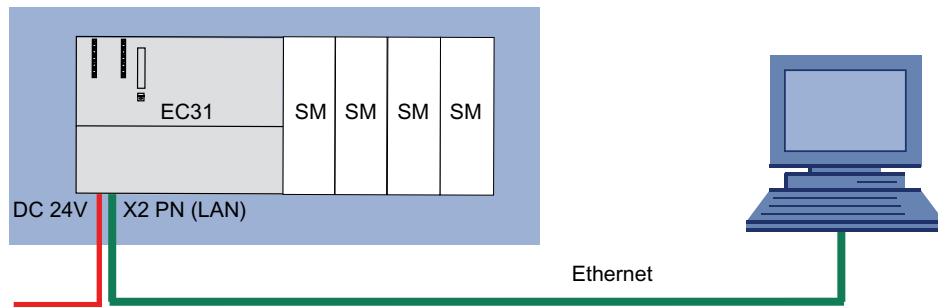


Figure 7-2 Connection for initial commissioning via remote PC

3. Switch on the power supply.

Result: The Embedded Controller starts and LED display U4 flashes.

IP address via DHCP server

The Dynamic Host Configuration Protocol (DHCP) is used to assign free IP addresses via DHCP server to new devices to be logged on to the LAN.

Default IP address

If a DHCP server is not available, you can set up a connection to the Embedded Controller using the default IP address 192.168.2.1 / 255.255.255.0. The Embedded Controller is available if LED display U4 flashes.

Select the following command to set up the connection to the Embedded Controller:

Start > Programs > Accessories > Communications > Remote Desktop Connection.

Initial commissioning via DCP

The preinstalled Windows XP Embedded operating system is set up automatically on the Embedded Controller after **initial** power on. 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 Login dialog of Windows XP Embedded opens.
2. Enter the user name "Administrator" and the password "admin".
Result: The Windows user interface opens. You can now configure Windows.

NOTICE
Do not switch off the Embedded Controller while the installation process is active.

Note

A system startup can take approx. 15 minutes during initial commissioning.

Restart after initial commissioning:

The Logon dialog of the Windows XP Embedded operating system opens approx. one minute after each subsequent restart. The default user name is "Administrator". The password is "admin".

See also

Disclaimer (Page 119)

7.4 Switching the Embedded Controller on and off

Requirements

Initial commissioning was successfully completed.

Switching on power to the Embedded Controller

Switch on the power supply of the Embedded Controller.
Result: Windows XP Embedded starts.

Setting up a Remote Desktop Connection

Select **Start > Programs > Accessories > Communication > Remote Desktop Connection**.

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

Switching off the Embedded Controller / closing Windows XP Embedded

Always use the **Start > Shutdown** command or the icon on your desktop to close Windows XP Embedded.

Note

If the Enhanced Write Filter is activated and no data is written to flash memory, the Embedded Controller can be switched off by disconnecting it from the power supply.

See also

Enhanced Write Filter (EWF) (Page 83)

7.5 Activating safety mechanisms

7.5.1 Safety mechanisms for data carriers

CAUTION
System which rely on flash media as data carrier require special protection due to the limited number of rewrite cycles. Any cyclic data transfers from a PLC lead to a significant reduction of the useful life of those memory media. Failure of the Embedded Controllers can be the consequence. Safety mechanisms such as write filters are a suitable means of prolonging the useful life of flash memory.

Write filters

There are 2 ways for setting write filters:

- By means of the EWFMGR.EXE program, as described in the following section.
- By means of *System Tool XPembedded*.
Call "Start > Programmes > SIMATIC > S7-mEC > EC31 > EWF-Tool".

Reference

For further information on the *System Tool XPembedded*, refer to the online help and the *SIMATIC Industrial PC System Tool XPembedded* on the supplied "Software and Documentation" DVD.

7.5.2 Enhanced Write Filter (EWF)

Purpose and function

The Enhanced Write Filter allows you to boot Windows XP Embedded from write-protected media (such as CD-ROM), to write protect specific partitions and adapt file system performance to suit user requirements.

NOTICE

Activating the EWF after data backup

The EWF is deactivated by default in Windows XP Embedded SP2 or higher. After having completed the setup of your operating system, generate a backup copy of your data and then activate the EWF.

Set EWF

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

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

NOTICE
Data loss
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 XP Embedded 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-HMI/RTX: Installing License Keys

Licensing the software

The product-specific license keys for WinAC RTX 2008, Softnet-S7 Lean Edition 2008 and WinCC flexible Runtime 2008 SP1 must be installed prior to commissioning using *Automation License Manager*. The License Keys are available on the USB stick included with your package.

The licenses can be installed either directly using the EC31-RTX / EC31-HMI/RTX, or via PG/PC.

Requirements

Initial commissioning was successfully completed; EC31-RTX / EC31-HMI/RTX is in operation.

Installing License Keys with local configuration

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

1. Select the **Start > SIMATIC > License Management > Automation License Manager** menu command.
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 PG/PC with STEP 7 and the EC31-RTX / EC31-HMI/RTX.

1. Connect the EC31-RTX / EC31-HMI/RTX with a PG/PC via the X2 IE LAN interface.
2. Select the **Edit > Connect computer** command and enter the IP address of EC31-RTX / EC31-HMI/RTX (default: 192.168.2.1).
3. Connect the USB stick to the programming device / PC.
4. Select the **Start > SIMATIC > License Management > Automation License Manager** menu command.
5. Drag-and-drop the License Keys from the USB stick to partition C: or D: EC31-RTX / EC31-HMI/RTX.

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, remove the license keys. Transfer the License Keys to a USB stick and reinstall them after you completed the Restore operation.

Operating EC31-RTX / EC31-HMI/RTX

8.1 Controller Panel WinLC RTX EC

Introduction to the controller panel

The controller panel WinLC RTX EC 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 startup monitoring are not displayed.



Figure 8-1 Controller Panel WinLC RTX EC

Opening the controller panel

The  icon is displayed in the Windows taskbar when 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 EC31-RTX (Page 19)

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 settings of the mode selector switch indicate the **selected** operating mode. The RUN and STOP LED displays indicate the **actual** operating state of EC31-RTX.

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 WinLC EC Controller Panel

The table below provides a description of the status displays of the Controller Panel.

Table 8- 1 Status displays of the Controller Panels

Display	Description
BF1	Bus error at interface X1 PN LAN P1 or X1 PN LAN P2
BF2	Reserved
U1/BF3	Reserved
U2/BF4	Reserved
SF	Group error
DC5V	5 V supply to the backplane bus (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.

8.3 RUN/STOP states

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-HMI/RTX: Permitted and forbidden functions in the RUN / STOP states

Operating state	Description
RUN	<p>Permitted functions:</p> <ul style="list-style-type: none"> • Download of a program to the controller • Download of selected blocks to the controller • Editing of program tags in STEP 7 and changes to the operating state of the controller • Memory reset by means of STEP 7 / mode selector switch (MRES) Start by setting the controller to STOP state. <p>Functions which are not allowed:</p> <ul style="list-style-type: none"> • Archiving and restoring of a STEP 7 user program
STOP	<p>Permitted functions:</p> <ul style="list-style-type: none"> • Download of a program or of selected blocks to the controller • Editing of program tags using STEP 7 • CPU memory reset using STEP 7 • Archiving and restoring of a STEP 7 user program

8.4 Memory reset using the mode selector switch

Memory reset for active WinAC

CAUTION
During memory reset all data (SDB, DB, OB, FB...) is deleted from the WinLC RTX EC. All configuration data of EC31-RTX / EC31-HMI/RTX is lost!

Using the mode selector switch to perform a memory reset on the EC31-RTX / EC31-HMI/RTX

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 / Restore - requirements and rules

EC-Backup_Restore Tool

The *EC-Backup_Restore Tool* is preinstalled on the Embedded Controller to support the following actions:

- Backup: Saving data
- Restore: Restoring data and the factory state

To start the *EC-Backup_Restore Tool*, go to the Windows Start bar and select **Start > SIMATIC > S7-mEC > EC31 > EC-Backup_Restore**. Follow the instructions in the software.

The *EC-Backup_Restore Tool* cancels the operation if the data carrier is corrupted.

The *EC-Backup_Restore Tool* is available in English language.

Requirements

- Restore DVD (included in scope of delivery)
- DVD-ROM drive
- Data carrier: USB stick or Multi Media Card with at least 4 GB.

Note

Backup / Restore is completed much quicker with a USB stick than with a multi media card.

Rules

Observe the following rules for Backup and Restore:

- Connect **only one** data carrier to the Embedded Controller.
- Do not use a USB hub.

NOTICE
Backup license keys
Before performing Backup and Restore, remove the license keys and use the <i>Automation License Manager</i> to reload these after a restart of the Embedded Controller.

Preparatory steps for Backup / Restore

1. Switch off the power supply of the Embedded Controller.
2. Detach all USB devices and make sure to remove any inserted MMCs from the Embedded Controller.
3. Connect the DVD-ROM drive to the Embedded Controller, not to the EM PC expansion module!
4. Place the Restore DVD into the drive.
5. Follow the steps described in the following sections.

Safely remove data carriers

 **CAUTION**

Use the Windows function "Safely remove hardware" only for USB devices!
Use the "Eject" shortcut menu to remove the following data carriers:

- Multi-Media Card
- SIMATIC Micro Memory Card
- SD cards and CF cards

See also

Display elements and interfaces of EC31-HMI/RTX (Page 25)

Display elements and interfaces of EC31-RTX (Page 19)

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.

To backup your data in Windows XP Embedded, generate an image of your installation using the preinstalled *EC-Backup_Restore Tool* and an USB stick. This method lets you quickly restore your original partitions C: and D:.

Note

Backing up data

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

NOTICE

Requirements and rules

Observe the described requirements and rules (Page 91) when you perform a backup /restore.

Backing up data with the *EC-Backup_Restore Tool* (Backup)

Step	Procedure	Result
1	Insert the USB stick directly into a USB port of the EC. Alternative: Insert the multi media card into the slot.	-
2	Start the <i>EC-Backup_Restore Tool</i> in the Windows Start bar by selecting Start > SIMATIC > S7-mEC > EC31 > EC-Backup_Restore .	A dialog box opens.
3	In the dialog window, select "Backup" and the type of data carrier to which the Embedded Controller data is to be backed up. Follow the instructions of the tool and select "Reboot" as final step.	The Embedded Controller is restarted. All LED displays are lit.
4	Press the MRES switch as soon as only the LED displays U1/BF3 and U2/BF4 are lit .	Backup is being initialized. U1/BF3 and U2/BF4 are no longer lit.
5	If the LED display U3 flashes , release the MRES switch.	Backup is being executed. U4 is lit. After the data backup has been completed the Embedded Controller switches itself off.
5	Switch the power supply on the Embedded Controller off and then on.	The Embedded Controller is restarted.

Further procedures

You can use the data carrier and the *EC-Backup_Restore Tool* to restore the data to the Embedded Controller.

Note

The LED displays U2/BF4, U3 and U4 start flashing if the backup has failed. Restart the operation.

Restoring data with the *EC-Backup_Restore Tool* (Restore)

Step	Procedure	Result
1	Insert the USB stick directly into a USB port of the EC. Alternative: Insert the multi media card into the slot.	-
2	Start the <i>EC-Backup_Restore Tool</i> in the Windows Start bar by selecting Start > SIMATIC > S7-mEC > EC31 > EC-Backup_Restore.	A dialog box opens.
3	In the dialog window, select "Restore" and the type of data carrier to which the Embedded Controller data is to be restored. Follow the instructions of the tool and select "Reboot" as final step.	The Embedded Controller is restarted. All LED displays are lit.
4	Press the MRES switch as soon as only the LED displays U1/BF3 and U2/BF4 are lit.	Restore is being initialized. U1/BF3 and U2/BF4 are no longer lit.
5	If the LED display U3 flashes , release the MRES switch.	Restore is being executed. U4 flashes. After the data restore has been completed the Embedded Controller switches itself off.
5	Switch the power supply on the Embedded Controller off and then on.	The Embedded Controller is restarted.

Result

The data of the Embedded Controllers have been restored.

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 of restoring the content of flash memory in the EC:

- Using the Restore DVD and USB DVD-ROM
- Using the Restore DVD, USB stick or multi media card with at least 4 GB

Compared to a USB stick, it takes longer to restore the system to factory settings from a Multi Media Card, depending on the card used.

CAUTION

Data loss

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 modified or added data, all programs and authorizations, as well as the partitions on flash memory will be lost!

You should generate a backup copy of your EC data after you parameterize the modules and when you make changes to the configuration.

NOTICE

Requirements and rules

Observe the described requirements and rules (Page 91) when you perform a backup /restore.

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

Step	Procedure	Result
1	Switch on the power supply of the Embedded Controller.	The Embedded Controller is restarted. All LED displays are lit.
2	Press the MRES switch as soon as only the LED displays U1/BF3 and U2/BF4 are lit.	Backup is being initialized. U1/BF3 and U2/BF4 are no longer lit.
3	If the LED display U3 flashes , release the MRES switch.	The data is now being restored. U4 flashes. After the data restore has been completed the Embedded Controller switches itself off.
4	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: Data backup with Restore DVD and USB-Stick / Multi Media Card

NOTICE
Data loss The special command (ufdprep.exe) must be executed to prepare the data carrier. This operation will delete all data from the data carrier. Therefore, you should generate a backup copy of all data on the carrier before you execute this command.

Preparing the USB stick / Multi Media Card

Step	Procedure
1	Switch on the power supply of the Embedded Controller.
2	Insert the USB stick directly into a USB port of the EC. Alternative: Insert the multi media card into the slot.
3	Type in the following command at the command prompt: <ul style="list-style-type: none">• For USB stick: <DVD-ROM drive letter>:\USB_Stick\Restore_Tools\ufdprep.exe <USB-Stick drive letter>: For MMC: <DVD-ROM drive letter>:\MMC\Restore_Tools\ufdprep.exe <Multi Media Card drive letter>:
4	Copy the following data of the Restore DVD to the root directory of the data carrier: <ul style="list-style-type: none">• For USB stick: The content of the USB_Stick folder and the entire Restore_Image folder with content• For MMC: The content of the MMC folder and the entire Restore_Image folder with content.
5	Remove the data carrier safely from the PC.

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

Step	Procedure	Result
1	Insert the USB stick directly into a USB port of the EC. Alternative: Insert the multi media card into the slot.	-
2	Switch on the power supply of the Embedded Controller.	The Embedded Controller is restarted. All LED displays are lit.
3	Press the MRES switch as soon as only the LED displays U1/BF3 and U2/BF4 are lit.	Restore is being initialized. The LED displays U1/BF3 and U2/BF4 are no longer lit.
4	If the LED display U3 flashes , release the MRES switch.	The data is now being restored. U4 flashes. After the data restore has been completed the Embedded Controller switches itself off.
5	Switch off the power supply of the Embedded Controller.	-

Further procedures

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

9.2 Windows XP Embedded

Features of Windows XP Embedded

The Windows XP Embedded SP2 Feature Pack 2007 is preinstalled with the typical features on EC31.

You can always install additional components. For latest information about the operating system, refer to www.windows.com.

9.3 Micro Memory Card

Properties

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

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

CAUTION
The S7-formatting will be overwritten
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!

9.4 Update software

You can find information on updating software on the Internet.

See also

Service and support (<http://www.siemens.com/automation/service&support>)

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 corresponding information provided in the equipment manual *S7-300 CPU 31xC and CPU 31x: Specifications*.

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.

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" (LowVoltage 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 is held on file 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)

Note

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

 II 3 G Ex nA II Parts 4 to 6

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).

Ship building certification (pending)

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

Product version	
Order no.:	6ES7677-1DD00-0BA0
• Hardware version	03
• Corresponding programming interface	Software Development Kit (SDK EC31)
Performance features	
Processor	Intel Core Duo 1.2 GHz
Main memory	1 GB RAM
Flash memory, integrated	2 GB
Operating system	Windows XP Embedded SP2 Feature Pack 2007
Memory for non-volatile data	256 KB
Power supply	
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
Supply voltages	
Power and voltage failure backup	5 ms
Reverse polarity protection	Yes; protection against destruction
Potentials	
Permitted potential difference (to the rail)	75 VDC, 60 VAC
Electrical isolation	
• Between Ethernet and electronic circuits	Yes
Isolation	
• Test voltage	500 VDC
• For Ethernet	1500 Vrms (IEEE802.3)
Power loss	typically 20 W; without backplane bus and USB supply
Module-specific data	
Data transmission rate	100 Mbps full duplex
Transmission mode	100BASE-TX
Autonegotiation	Yes
MAC addresses	4

Configuration	
Racks, max.	4
Modules per rack, max.	8
Monitoring Functions	
RUN/STOP switch	Yes; the switch can be programmed via SDK
LED display	Yes; the LED functions can be programmed via SDK
Transient voltage interruption	Up to 5 ms
EMC	
Limit class A, for use in industrial areas	Yes
Environmental requirements	
Operating temperature	
• Min.	0 °C
• Max.	50 °C
Storage/transport temperature	
• Min.	-40 °C
• Max.	70 °C
Degree of protection	
IP20	Yes
Standards, approvals, certificates	
CE label	Yes
cULus	Yes
FM approval	Yes
ATEX approval	Yes
Interfaces	
USB	2 x USB 2.0 high-speed / 500 mA
PROFINET	2 x 10/100 Mbps with RJ45
Ethernet (PROFINET basic services)	1 x 10/100 Mbps with RJ45
Dimensions and weight	
Width (mm)	160
Height (mm)	125
Depth (mm)	115
Weight (kg)	1.5

10.4 EC31-RTX

Technical data of EC31-RTX

Table 10- 3 Technical data of EC31-RTX

Product version	
Order no.:	6ES7677-1DD00-0BB0
• Hardware version	03
• Associated programming package	STEP 7 V5.4 SP4 with HSP 135
Performance features	
Processor	Intel Core Duo 1.2 GHz
Main memory	1 GB RAM
Flash memory, integrated	2 GB
Operating system	Windows XP Embedded SP2 Feature Pack 2007
Memory for program blocks	max. 4 MB
Memory for data blocks	max. 4 MB
Memory for non-volatile data	512 KB
NVRAM	512 KB
Power supply	
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
Supply voltages	
Power and voltage failure backup	5 ms
Reverse polarity protection	Yes; protection against destruction
Potentials	
Permitted potential difference (to the rail)	75 VDC, 60 VAC
Electrical isolation	
• Between Ethernet and electronic circuits	Yes
Isolation	
• Test voltage	500 VDC
• For Ethernet	1500 Vrms (IEEE802.3)
Power loss	typically 20 W; without backplane bus and USB supply

Module-specific data	
Data transmission rate	100 Mbps full duplex
Transmission mode	100BASE-TX
Autonegotiation	Yes
MAC addresses	4
Configuration	
Racks, max.	4
Modules per rack, max.	8
Monitoring Functions	
RUN/STOP switch	Yes
LED display	Yes
Transient voltage interruption	Up to 5 ms
EMC	
Limit class A, for use in industrial areas	Yes
Configuration software	
STEP 7	Yes; V5.4 SP4 with HW-Update/iMap V3.0 SP1
Installed software	
Controller	SIMATIC WinAC RTX 2008 SP1
Environmental requirements	
Operating temperature	
• Min.	0 °C
• Max.	50 °C
Storage/transport temperature	
• Min.	-40 °C
• Max.	70 °C
Degree of protection	
IP20	Yes
Standards, approvals, certificates	
CE label	Yes
cULus	Yes
FM approval	Yes
ATEX approval	Yes
Interfaces	
USB	2 x USB 2.0 high-speed / 500 mA
PROFINET	2 x 10/100 Mbps with RJ45
Ethernet (PROFINET basic services)	1 x 10/100 Mbps with RJ45
Dimensions and weight	
Width (mm)	160
Height (mm)	125
Depth (mm)	115
Weight (kg)	1.5

10.5 EC31-HMI/RTX

Technical data of EC31-HMI/RTX

Table 10- 4 Technical data of EC31-HMI/RTX

Product version	
Order numbers	
• EC31-HMI/RTX 128 PT	• 6ES7677-1DD00-0BF0
• EC31-HMI/RTX 512 PT	• 6ES7677-1DD00-0BG0
• EC31-HMI/RTX 2048 PT	• 6ES7677-1DD00-0BH0
• Hardware version	03
• Associated programming package	STEP 7 V5.4 SP4 with HSP 135
• HMI software	WinCC flexible RT 128 / 512 / 2048
Performance features	
Processor	Intel Core Duo 1.2 GHz
Main memory	1 GB RAM
Flash memory, integrated	2 GB
Operating system	Windows XP Embedded SP2 Feature Pack 2007
Memory for program blocks	Max. 4 MB
Memory for data blocks	Max. 4 MB
Memory for non-volatile data	512 KB
NVRAM	512 KB
Power supply	
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
Supply voltages	
Power and voltage failure backup	5 ms
Reverse polarity protection	Yes; protection against destruction
Potentials	
Permitted potential difference (to the rail)	75 VDC, 60 VAC
Electrical isolation	
• Between Ethernet and electronic circuits	Yes
Isolation	
• Test voltage	500 VDC
• For Ethernet	1500 Vrms. (IEEE802.3)
Power loss	typically 20 W; without backplane bus and USB supply

Module-specific data	
Data transmission rate	100 Mbps full duplex
Transmission mode	100BASE-TX
Autonegotiation	Yes
MAC addresses	4
Configuration	
Racks, max.	4
Modules per rack, max.	8
Monitoring Functions	
RUN/STOP switch	Yes
LED display	Yes
Transient voltage interruption	Up to 5 ms
EMC	
Limit class A, for use in industrial areas	Yes
Configuration software	
STEP 7	Yes; V5.4 SP4 with HW-Update/iMap V3.0 SP1
Installed software	
Controller	SIMATIC WinAC RTX 2008
Environmental requirements	
Operating temperature	
• Min.	0 °C
• Max.	50 °C
Storage/transport temperature	
• Min.	-40 °C
• Max.	70 °C
Degree of protection	
IP20	Yes
Standards, approvals, certificates	
CE label	Yes
cULus	Yes
FM approval	Yes
ATEX approval	Yes
Interfaces	
USB	2 x USB 2.0 high-speed / 500 mA
PROFINET	2 x 10/100 Mbps with RJ45
Ethernet (PROFINET basic services)	1 x 10/100 Mbps with RJ45
Dimensions and weight	
Width (mm)	160
Height (mm)	125
Depth (mm)	115
Weight (kg)	1.5

10.6 Expansion module EM PCI-104

Technical data EM PCI-104

Table 10- 5 Technical data EM PCI-104

Product version	
Order no.:	6ES7677-1DD40-1AA0
Hardware version	01
Power supply	
Rated value, 24 VDC	Yes, optional: External infeed
• Valid range, lower limit	20.4 V
• Valid range, upper limit	28.8 V
Voltages and currents	
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
Interfaces	
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
Configuration	
Modules per rack, max.	2
Diagnostics	
Diagnostic Functions	Yes; POWER LED; LED display on the card
EMC	
Limit class A, for use in industrial areas	Yes
Environmental requirements	
Operating temperature	
• Min.	0 °C
• Max.	50 °C
Storage/transport temperature	
• Min.	-40 °C
• Max.	70 °C
Degree of protection	
IP20	Yes
Standards, approvals, certificates	
CE label	Yes
CSA approval	Yes
cULus	Yes
FM approval	Yes
ATEX approval	Yes

10.7 Expansion module EM PC

Dimensions and weight	
Width (mm)	120; without bus connector extension bus
Height (mm)	125; without external voltage connecting terminal
Depth (mm)	115
Weight (kg)	0.5

10.7 Expansion module EM PC

Technical data of EM PC

Table 10- 6 Technical data of EM PC

Product version	
Order no.:	6ES7677-1DD50-2AA0
Hardware version	01
Potentials	
Power loss, typically	14 W from extension bus; incl. 2 x 0.5 A for USB = 5 W
Configuration	
Modules per rack, max.	1
Diagnostics	
Diagnostic Functions	Yes; ON LED, CARD LED for displaying accesses on SD/MMC, CF
EMC	
Limit class A, for use in industrial areas	Yes
Environmental requirements	
Operating temperature	
• Min.	0 °C
• Max.	50 °C
Storage/transport temperature	
• Min.	-40 °C
• Max.	70 °C
Degree of protection	
IP20	Yes
Standards, approvals, certificates	
CE label	Yes
CSA approval	Yes
cULus	Yes
FM approval	Yes
ATEX approval	Yes

Interfaces	
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
Dimensions and weight	
Width (mm)	80; without bus connector extension bus
Height (mm)	125
Depth (mm)	115
Weight (kg)	0.4

WinAC RTX 2008

The technical data of WinAC RTX 2008 is available on the Internet.

Technical data of WinAC RTX 2008

(<http://support.automation.siemens.com/WW/view/en/6ES7671-0RC06-0YA0>)

Appendix

A.1 Dimension drawings

A.1.1 EC31

Dimensional drawings EC31

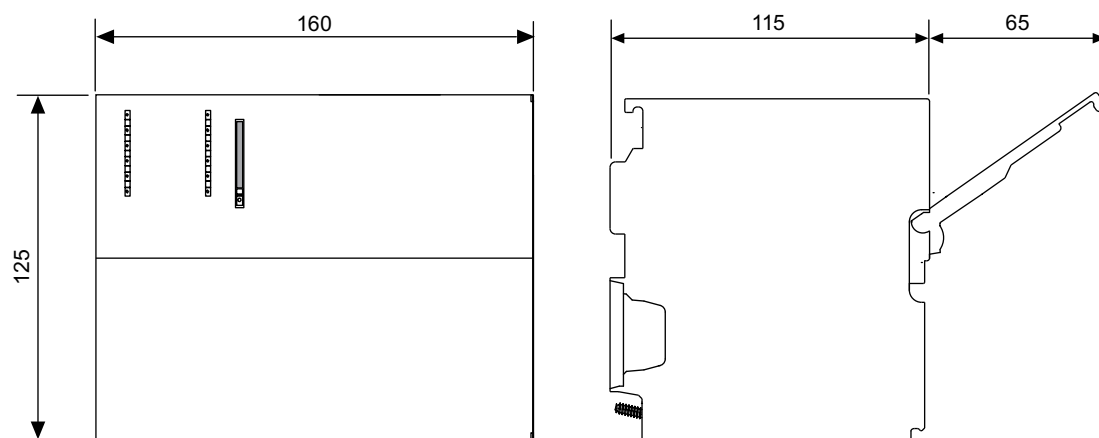


Figure A-1 Dimensional drawing EC31 (dimensions in mm)

A.1.2 EM PCI-104

Dimensional drawings of expansion module EM PCI-104

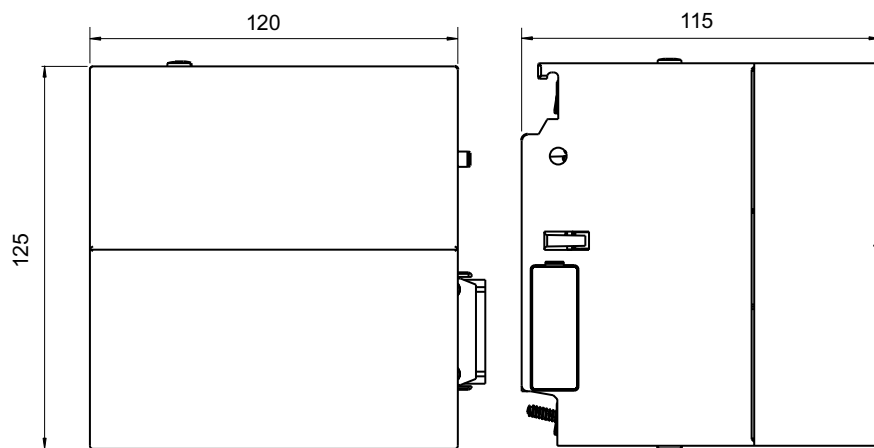


Figure A-2 Dimensional drawings EM PCI-104 interface module (dimensions in mm):

Dimensional drawings of shelves

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

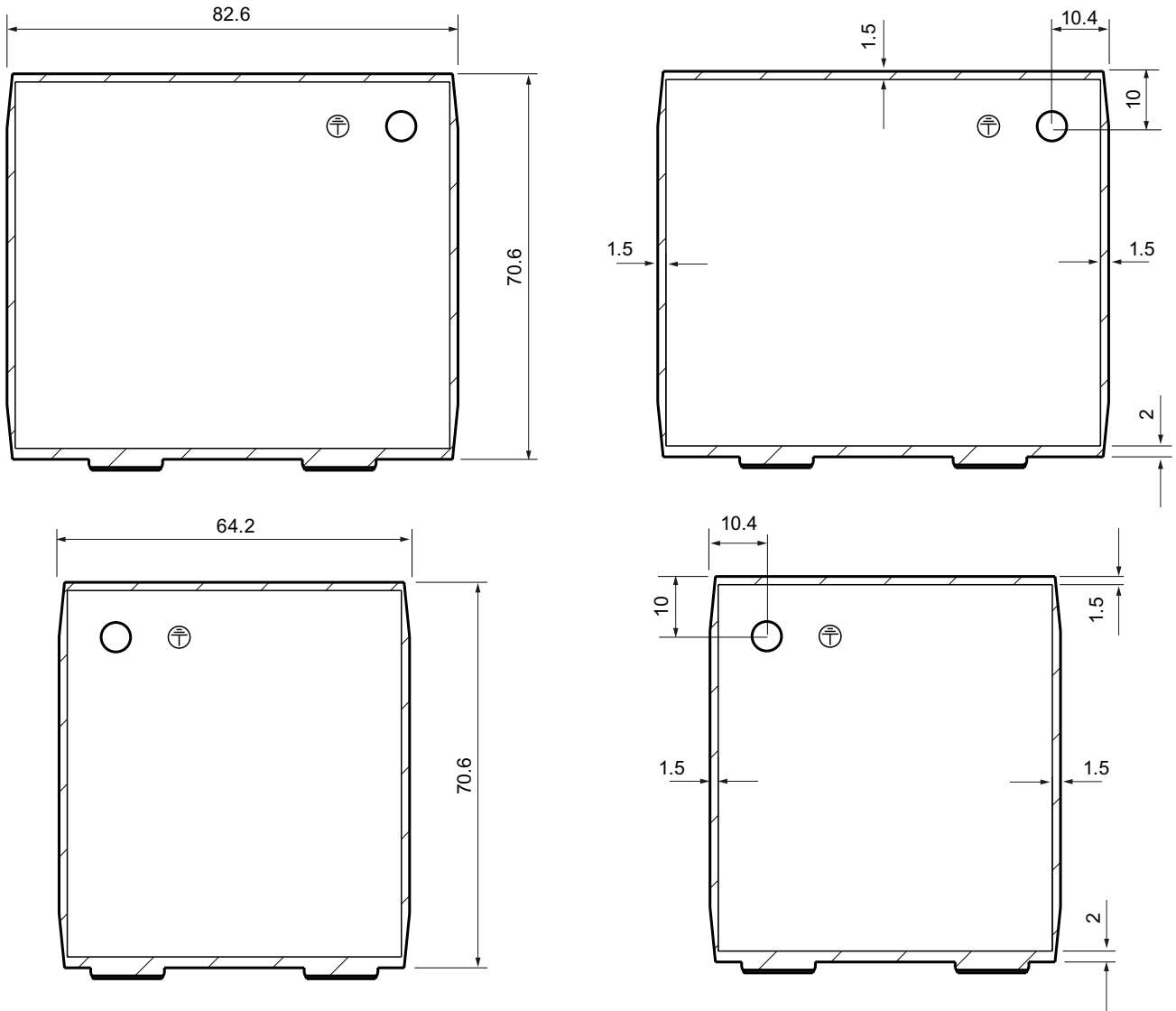


Figure A-3 Dimensional drawings of shelves (dimensions in mm)

See also

Preparing shelves (Page 45)

A.1.3 EM PC

Dimensional drawings of expansion module EM PC

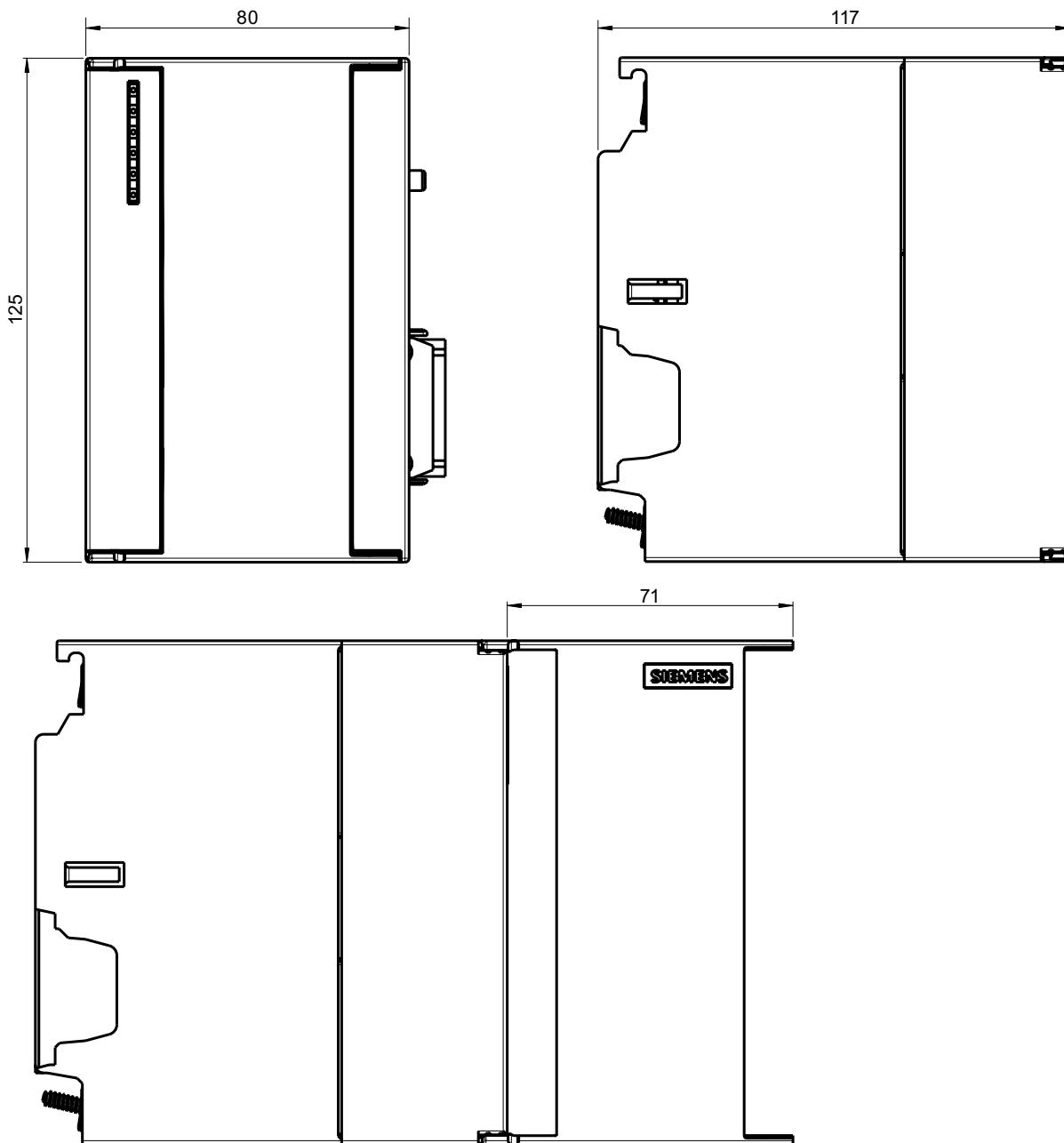


Figure A-4 Dimensional drawings EM PC (dimensions in mm)

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, 2 GB Flash memory, interfaces: 2 x USB, 2 x PROFINET, 1 x Fast Ethernet, 1 Slot MMC, with Windows XP Embedded SP2 FP 2007	6ES7677-1DD00-0BA0
EC31-RTX Embedded Controller with Intel Core Duo 1.2 GHz processor, 1 GB RAM, 2 GB Flash memory, interfaces: 2 x USB, 2 x PROFINET, 1 x Fast Ethernet, 1 Slot MMC, with Windows XP Embedded SP2 FP 2007, WinAC RTX 2008 SP1 and SIMATIC NET Softnet-S7 Lean Edition 2008	6ES7677-1DD00-0BB0
EC31-HMI/RTX Embedded Controller with Intel Core Duo 1.2 GHz processor, 1 GB RAM, 2 GB Flash memory, interfaces: 2 x USB, 2 x PROFINET, 1 x Fast Ethernet, 1 Slot MMC, with Windows XP Embedded SP2 FP 2007, WinAC RTX 2008 SP1 and SIMATIC NET Softnet-S7 Lean Edition 2008, WinCC flexible Runtime 2008 SP1	
• EC31-HMI/RTX 128 PT	6ES7677-1DD00-0BF0
• EC31-HMI/RTX 512 PT	6ES7677-1DD00-0BG0
• EC31-HMI/RTX 2048 PT	6ES7677-1DD00-0BH0
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	6GK1901-1BB20-2AA0
• 10 per pack, 1 pack	6GK1901-1BB20-2AB0
• 50 per pack, 1 pack	6GK1901-1BB20-2AE0
WinAC RTX 2008	6ES7671-0RC06-0YA0
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	6GK1560-3AE00
• CP 5603 communication processor	
• Installation kit CP 5603 for S7-mEC	
CP 5603 communication processor	6GK1560-3AA00
Installation kit CP 5603 for S7-mEC	6GK1560-3AA00-0AE0
• Panel for installation with slots for PROFIBUS DP plug-in connectors	

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

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

Table A- 3 Order numbers electronic modules

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 list of currently approved modules is available on the Service and Support pages on the Internet.

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-HMI/RTX.

A.3 Tips and Tricks

Software

Use only the software approved for Windows XP Embedded SP2 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 XP 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 you to insert the setup CD of Windows XP Embedded, 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.

See also

Initial commissioning - Remote (Page 79)

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	
CLK	Clock	PCI bus signal
CoA	Certificate of Authentication	Microsoft Windows Product Key
CoL	Certificate of License	License Key
DC	Direct Current	DC current
DCP	Discovery and Basic Configuration Protocol.	
DHCP	Dynamic Host Configuration Protocol	
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	
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.
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

List of abbreviations

B.1 Abbreviations

Abbreviation	Term	Meaning
HMI	Human Machine Interface	User interface
IEC	International Electrical Commission	
IF Slot	Interface Slot	
IM	Interface module	
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	
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	
PLC	Programmable Logic Controller (PLC)	
PG	Programming device	Compact programming device which meets the special requirements of industry. The PG is fully equipped for programming SIMATIC PLCs.
PS	Power supply	Power supply
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.
PST	Primary Setup Tool	Software for assigning IP addresses
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	
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
SD/MMC		SD cards and MMCs
SDK	Software Development Kit	
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

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